Holden Mine Site

Performance Standards Verification
2020 Annual Compliance Assessment Report



Prepared for
Rio Tinto AUM Company

Prepared by Floyd|Snider
with contributions from Confluence Environmental Company,
CDM Smith, and Pacific Groundwater Group

February 2021

Draft

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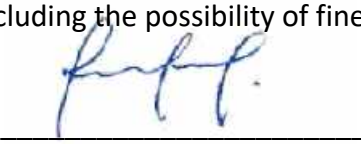
CDM Smith

FLOYD | SNIDER
strategy • science • engineering
Two Union Square • 601 Union Street • Suite 600
Seattle, Washington 98101 • tel: 206.292.2078

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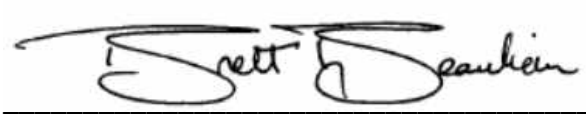


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Brett Beaulieu, LHG, Senior Hydrogeologist, Floyd|Snider Date

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List of Acronyms and Abbreviations

Acronym/ Abbreviation	Definition
ACAR	Annual Compliance Assessment Report
amsl	Above mean sea level
AOI	Area of Interest
ARAR	Applicable or relevant and appropriate requirement
ARI	Analytical Resources, Inc.
AVS	Acid Volatile Sulfide
bgs	Below ground surface
BMI	Benthic macroinvertebrate
COC	Contaminant of concern
CSL	Cleanup screening level
CSM	Conceptual site model
CUL	Cleanup level
DO	Dissolved oxygen
DOC	Dissolved organic carbon
DQO	Data quality objective
DSHH	Downslope of the Honeymoon Heights Waste Rock Piles
Ecology	Washington State Department of Ecology
EDD	Electronic data deliverable
GWCS	Groundwater collection system
Intalco	Intalco Aluminum Corporation
LDPE	Low-density polyethylene
MWTP	Mine Water Treatment Plant
µg/L	Micrograms per liter
µS/cm	Microsiemens per centimeter
mg	Milligrams

Acronym/ Abbreviation	Definition
mg/L	Milligrams per liter
mg/m^2	Milligrams per square meter
NRWQC	National Recommended Water Quality Criteria
NTU	Nephelometric turbidity units
ORP	Oxidation-reduction potential
POC	Point of compliance
PSVP	Performance Standards Verification Plan
PVC	Polyvinyl chloride
QAPP	Quality Assurance Project Plan
RAO	Remedial action objective
ROD	Record of Decision
SAP	Sampling and Analysis Plan
SCO	Sediment cleanup objective
SEF	Sediment Evaluation Framework
SEM	Simultaneously Extracted Metals
Site	Holden Mine Site
SMS	Sediment Management Standards
SOP	Standard Operating Procedure
SQV	Sediment Quality Value
TDS	Total dissolved solids
TOC	Total organic carbon
TSS	Total suspended solids
USEPA	U.S. Environmental Protection Agency
USFS	U.S. Department of Agriculture, Forest Service
VWP	Vibrating wire piezometer
WAC	Washington Administrative Code
WMA	Waste Management Area

1.0 Introduction

This Performance Standards Verification 2020 Annual Compliance Assessment Report (ACAR) presents and evaluates the results from the Performance Standards Verification Plan (PSVP) monitoring activities conducted in 2020 at the Holden Mine Site (Site) located in Chelan County, Washington (refer to Figure 1.1). The 2020 PSVP monitoring activities were conducted during three monitoring events (spring, summer, and fall). These 2020 monitoring activities were conducted in accordance with the approved project Quality Assurance Project Plan (QAPP; MWH 2013a), approved documents containing project standard operating procedures (SOPs) that comprise the Sampling and Analysis Plan (SAP; MWH 2010, 2013a, and 2013b), the approved Holden Mine 2020 PSVP Monitoring Activities Memorandum (Floyd|Snider 2020a), Holden Mine 2020 PSVP Monitoring Activities Addendum (Floyd|Snider 2020b), and the Site-Specific Health and Safety Plans (Floyd|Snider 2019a, Floyd|Snider 2020c). The work was completed in accordance with SAP and QAPP document requirements under the Unilateral Administrative Order for Remedial Design and Remedial Action and the attached Statement of Work (USFS 2012a) and as described in the March 2020 Draft Final PSVP (Floyd|Snider 2020d). The March 2020 Draft Final PSVP provides details regarding the 2020 PSVP sampling and analysis rationale.

Revisions to the PSVP continued during implementation of the 2020 PSVP monitoring activities in coordination with the U.S. Department of Agriculture, Forest Service (USFS), the U.S. Environmental Protection Agency (USEPA), and the Washington State Department of Ecology (Ecology), collectively referred to as the Agencies, in consultation with the Confederated Tribes and Bands of the Yakama Nation. Additional revised versions of the Draft Final PSVP were submitted to the Agencies for review in July 2020 and October 2020 to address additional written comments received from the Agencies. The Final PSVP was prepared and submitted to the Agencies in November 2020 and was approved by the Agencies on November 20, 2020 (Floyd|Snider 2020e).

PSVP monitoring was initiated in 2019 following the Agencies' determination that the Phase 1 Remedial Action was substantially complete as of December 31, 2018 (USFS 2018). The PSVP monitoring performed in 2020 represents the second year of data collection. The collection of data under the PSVP monitoring program in 2019 and 2020 will be part of the dataset, along with previously collected data used to evaluate longer term trends, that supports the three main PSVP objectives. These objectives include the following:

1. Assess the current site conditions and update the conceptual site model (CSM) following the implementation of the Phase 1 Remedial Action, which will establish the basis for final points of compliance (POCs).
2. Evaluate the Remedial Action's effectiveness at meeting the performance standards both in the short-term and long-term.
3. Assess the potential to modify or eliminate the Phase 2 Remedial Action as allowed by the Record of Decision (ROD; USFS 2012b).

The ROD contains an established timeline that a second and final phase of the Remedial Action (the Phase 2 Remedial Action) begin 5 years after completion of the Phase 1 Remedial Action (USFS 2012b). Based on this ROD timeline and the Phase 1 Remedial Action substantial completion date of December 31, 2018, an Agency determination around any proposed modifications to or the elimination of the Phase 2 Remedial Action by Intalco Aluminum Corporation (Intalco) would occur in 2022 (Year 4) and implementation of the Phase 2 Remedial Action would occur in 2024.

The results from the 2019 PSVP monitoring were presented and evaluated in the 2019 ACAR (Floyd|Snider 2020f). This 2020 ACAR presents a summary of the PSVP monitoring work performed and the data collected over the entire 2020 monitoring year, with consideration of 2019 and earlier results where appropriate, to help address the three main PSVP objectives. Evaluations of the data and a summary of the findings from these 2020 monitoring activities are also presented in this ACAR, along with proposed monitoring program or remedial action recommendations for the Agencies to consider based on these evaluations and findings.

1.1 ORGANIZATION OF THE REPORT

This ACAR is organized in a similar structure to the 2020 Final PSVP, as well as the 2019 ACAR, generally grouped according to the site media being evaluated, to provide a consistent presentation and placement of information between these documents and the previous ACAR submittal. The ACAR is organized into the following sections:

- Section 2.0—Surface Water and Aquatic Life
- Section 3.0—Sediment
- Section 4.0—Groundwater
- Section 5.0—Soil, Tailings, and Other Wastes
- Section 6.0—West Area Seeps
- Section 7.0—Conclusions
- Section 8.0—References

The introductions to Sections 2.0 through 6.0 list which site remedial action objective (RAO) from the ROD is being addressed in that section. Some of the site RAOs cover multiple site media; therefore, some of the RAOs are addressed in multiple sections of the ACAR. For Sections 2.0 through 6.0, each section also includes the following components: a summary of the 2020 monitoring conducted to address the specified media, including the methods and analyses used, the monitoring locations, and any deviations to the monitoring program; a summary of the 2020 monitoring results; an evaluation of the 2020 results relative to the applicable PSVP objectives, RAOs, and performance standards; and a summary of the 2020 monitoring conclusions and any proposed recommendations regarding changes to the future PSVP monitoring program or additional remedial modifications or actions for the Agencies to consider. Section 7.0 provides a general concluding summary of the comprehensive 2020 PSVP monitoring and its outcomes.

The monitoring activities and results from the spring 2020 PSVP monitoring event were previously submitted to the Agencies in the *Performance Standards Verification Spring 2020 Event Data Report* (hereafter referred to as the Spring 2020 Event Data Report; Floyd|Snider 2020g) in September 2020. This ACAR also summarizes the spring 2020 monitoring activities and results, in addition to the summer and fall 2020 monitoring activities results. However, the appendices included in the Spring 2020 Event Data Report are not replicated within this ACAR. Appendices provided in the Spring 2020 Event Data Report include field forms and photographs, laboratory reports, and a data validation report related to the spring 2020 monitoring event, as well as the Downslope of the Honeymoon Heights Waste Rock Piles Area Field pH Soil Survey Results Report. A cumulative electronic data deliverable (EDD) covering all numerical data collected at the Site through the spring 2020 monitoring event was also included as an appendix in the Spring 2020 Event Data Report.

Appendices provided in this ACAR include the following:

- Appendix A—Field sample collection forms from the summer and fall 2020 monitoring events
- Appendix B—Summer and fall 2020 laboratory reports
- Appendix C—EDD covering all numerical data collected at the Site during the spring, summer, and fall 2020 monitoring events
- Appendix D—Summer and fall 2020 data validation report
- Appendix E—Time-concentration plots for select surface water monitoring locations, groundwater monitoring wells, porewater monitoring locations, well points, and seeps
- Appendix F—Fall 2020 Biomonitoring Report, prepared by Confluence Environmental Company
- Appendix G—Summary of Ecology-collected periphyton metrics and chlorophyll data and concentrations of contaminants of concern (COCs) in periphyton tissue
- Appendix H—Select field photographs of sample collection and the installation of new measurement locations during the summer and fall 2020 monitoring events
- Appendix I—Sediment concentration charts
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- Appendix K—Aquifer Test Report, prepared by Pacific Groundwater Group
- Appendix L—Selected boring logs that are included in support of the identification of a low-permeability layer (low-K layer)
- Appendix M—Statistical analyses evaluating groundwater stability, comparisons to background, and compliance trends, prepared by Pacific Groundwater Group

2.0 Surface Water and Aquatic Life

RAO 1, as set forth in the ROD, is stated as, "Reduce concentrations of contaminants of concern to levels that are protective of aquatic life and comply with applicable or relevant and appropriate requirements (ARARs) in Railroad Creek and other surface waters." Surface water and aquatic life monitoring is performed at the Site under the PSVP to evaluate the effectiveness of the Phase 1 Remedial Action in addressing RAO 1. This section summarizes the data collection activities, results, and evaluation of the spring and fall 2020 surface water monitoring events and the fall 2020 biomonitoring (aquatic life) monitoring event conducted at the Site.

Section 2.1 provides an overview of the 2020 surface water sampling activities and results and summarizes an evaluation of the surface water data that compares surface water data to the site cleanup levels (CULs) over time. Section 2.2 provides an overview of the 2020 aquatic life monitoring performed and an evaluation of the results. The aquatic life monitoring included benthic macroinvertebrate (BMI) sampling and a fish population survey. Section 2.3 provides an overview of the periphyton data collected by Ecology to assess aquatic health in Railroad Creek in 2013, 2015, 2018, and 2019. Section 2.4 summarizes the conclusions from the 2020 surface water and aquatic life evaluations.

2.1 SURFACE WATER SAMPLING ACTIVITIES AND RESULTS

Surface water sampling was conducted at 13 surface water locations between June 5 and June 11, 2020, during the spring monitoring event, and at 16 locations between September 22 and September 27, 2020, during the fall monitoring event. Surface water sampling locations are shown on Figure 2.1. BMI and fish population monitoring were conducted at a subset of the surface water sampling locations, as described in Section 2.2. The 2020 surface water and aquatic life monitoring locations are generally consistent with the locations monitored during the baseline surface water monitoring conducted in 2010 and 2011 (MWH 2013b) as well as the surface water sample locations included in the Site-Wide Water Quality Monitoring During Remedial Action Plan (MWH 2013a).

Surface water samples were collected in the spring and fall from the following locations (listed upstream to downstream): RC-6, RC-1, RC-4, RC-16, RC-7, RC-24, RC-2 (SG-7), RC-13 (SG-8), SG-9, SG-10, SG-11, RC-5A, and SG-13. Additional surface water samples were collected in the fall from the following locations: SG-12R, RC-10 (SG-20), and RC-15E. The rationale for each of the surface water sample locations is summarized below. Additional information is provided in the Final PSVP (Floyd|Snider 2020e).

Samples were collected at locations RC-6 and RC-1 to evaluate surface water quality in Railroad Creek upstream of the Phase 1 Remedial Action. These locations are referred to as background locations. The sample locations downstream of the background locations are referred to as site sample locations. Samples were collected from site sample locations RC-4, RC-16, RC-7, RC-24, and RC-2 (SG-7) to evaluate surface water quality between the Lower West Area and downstream of Tailings Pile 3. RC-24 was a new sampling location for 2020 added between Tailings Piles 2 and 3 at

the request of the Agencies. Samples were collected from RC-13 (SG-8) and SG-9 to evaluate surface water quality downstream of the tailings piles. Samples were collected from SG-10, SG-11, and RC-5A to evaluate surface water quality downstream of the Mine Water Treatment Plant (MWTP) effluent discharge. Samples were collected from SG-12R and SG-13 to evaluate surface water quality downstream of the Tenmile Creek confluence. Samples were also collected from RC-10 (SG-20) and RC-15E to evaluate surface water quality downstream of the Site.

2.1.1 Surface Water Sampling Activities

Surface water samples were collected, handled, and submitted to Analytical Resources, Inc. (ARI) in Tukwila, Washington, for laboratory analysis of conventional parameters, metals, cations, major anions, total dissolved solids (TDS), and total suspended solids (TSS) in accordance with the procedures described in the existing SOPs (MWH 2010 and 2013a) and QAPP (MWH 2013a).

Prior to surface water sample collection, field water quality was measured at each location using a YSI multi-parameter water quality meter and a LaMotte 2020we turbidity meter. Field parameters included: pH, temperature, dissolved oxygen (DO), specific conductivity, turbidity, oxidation-reduction potential (ORP), and ferrous iron. Consistent with the Draft Final and Final PSVP, for locations where field turbidity approaches or exceeds 5 nephelometric turbidity units (NTU), a field-filtered sample would be collected through a 0.45-micron disposable filter and submitted for dissolved metals analysis in addition to a sample submitted for total metals and the additional planned analyses. Because turbidity was less than 5 NTU at all locations in both the spring and fall, no dissolved metals samples were collected. Surface water results for metals, conventional parameters, cations, and major anions are listed in Table 2.1.

During the spring 2020 and fall 2020 monitoring events, surface water samples were collected either via continuous flow sampling using a peristaltic pump or directly from Railroad Creek by dip sampling. For continuous-flow sampling, water samples were collected by pumping water to the creek bank through disposable polyethylene tubing. For dip sampling, the water quality meter was placed directly in the creek and unpreserved samples were collected upstream of the water quality meter using the laboratory-provided sample jar. For preserved samples, a laboratory-provided disposable container was used to collect the sample and the laboratory sample jar was filled from the sample collection container. Samples collected for dissolved organic carbon (DOC) analysis were field filtered using a peristaltic pump and disposable polyethylene tubing. Care was taken to not disturb the sediment while sampling via either method.

There were no modifications from the Draft Final and Final PSVP monitoring program (Floyd|Snider 2020d and 2020e).

Surface water sampling field forms from the fall 2020 monitoring event are included as Appendix A. Field forms for the spring 2020 monitoring event are provided in the Spring 2020 Event Data Report (Floyd|Snider 2020g).

2.1.2 Surface Water Results

Surface water analytical results, criteria, and field parameters from the spring and fall 2020 monitoring events are presented in Table 2.1. In Table 2.1, sample locations are listed from upstream to downstream. Analytical results for COCs from samples collected in the spring and fall are illustrated on Figures 2.2 and 2.3, respectively. For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown. Laboratory analytical reports for the fall 2020 surface water data are included as Appendix B, while the laboratory analytical reports for the spring 2020 surface water data are included in the Spring 2020 Event Data Report (Floyd|Snider 2020g). The spring and fall 2020 surface water data are presented electronically in an EDD included as Appendix C.

Consistent with the ROD and Draft Final PSVP, surface water results were compared to the surface water criteria from the ROD (USFS 2012b). Criteria for aluminum, cadmium, copper, iron, lead, and zinc for surface water are summarized in ROD Table 11 and are based on the chemical-specific ARARs and background concentrations for surface water in the ROD Table 3. As specified in the ROD Table 3, footnote 2, criteria for cadmium, copper, lead, and zinc require hardness correction specific to the sample data. In accordance with the ROD, cadmium, copper, lead, and zinc surface water criteria from the ROD were adjusted for hardness following the chemical-specific procedures outlined in the USEPA National Recommended Water Quality Criteria (NRWQC) or Washington Administrative Code (WAC) 173-201A. The hardness of the individual surface water sample was used in the adjustment. For the cadmium criterion, the ROD used the 2001 NRWQC formula for calculating the hardness-adjusted criterion for cadmium; however, the NRWQC formula for cadmium was updated in 2016 and is now being used to calculate the hardness-adjusted criterion for cadmium. The 2016 NRWQC-based cadmium criterion is used for comparison to the sample results in this ACAR; however, the 2001 NRWQC criterion from the ROD is also presented in the Table 2.1.

In spring 2020, copper concentrations at 6 of the 13 surface water sampling locations (RC-4, RC-24, RC-2(SG-7), RC-13(SG-8), SG-11, and RC-5A) slightly exceeded the surface water-based criteria. The maximum copper concentration of 3.63 micrograms per liter (µg/L) was measured in the sample collected from RC-13(SG-8). The hardness-adjusted surface water criterion for copper at this location was 1.99 µg/L, and the exceedance ratio was 1.8.

None of the other surface water COCs exceeded the surface water-based criteria in spring 2020. None of the fall 2020 surface water samples exceeded the criteria. All metals, except lead, were detected at all surface water locations during the spring and fall 2020 monitoring events. Lead was detected at 12 of 13 locations in spring 2020 and 13 of 16 locations in fall 2020.

All of the 2020 surface water results underwent compliance screening (USEPA Stage 2B) data validation in accordance with *National Functional Guidelines for Inorganic Superfund Methods Data Review* (USEPA 2017a), *National Functional Guidelines for Organic Superfund Data Review* (USEPA 2017b), and the QAPP, provided in Appendix A of the *Approved Site-Wide Water Quality Monitoring During Remedial Action Plan for Holden Mine* (MWH 2013a). Based on the data

quality review, data were determined to be of acceptable quality for use as reported by the laboratory unless specifically qualified in the Data Validation Report. Some laboratory qualifiers were updated to conform to the final qualifiers used for data table reporting and database management. Data validation for the fall 2020 data is described in more detail in the attached data validation report (Appendix D). The spring 2020 data validation report is included as Appendix A of the Spring 2020 Event Data Report (Floyd|Snider 2020g).

2.1.3 Surface Water Concentrations Over Time

Time-concentration plots showing surface water analytical results from the baseline water quality evaluation in 2010 (fall results only) and 2011 through 2020 are provided in Appendix E. Time-concentration plots were generated for each 2020 surface water location monitored and for each COC. These plots show total metals, surface water criteria from the ROD (USFS 2012b), and the timeframe of the Phase 1 Remedial Action, which took place from approximately 2014 through 2018. The surface water dataset presented in the time-concentration plots includes data that have been reported in this ACAR and in the following documents:

- Baseline Water Quality Conditions Report (MWH 2013b)
- 2015 Monitoring Report – Biological and Water Sampling Results (Stantec 2016a)
- 2016 Water Quality Monitoring Results (Stantec 2016b)
- 2017 Water Quality Monitoring Results Report (GHD 2018)
- 2018 Water Monitoring Report (Arcadis 2019)

In general, surface water COC concentrations have decreased over time. Consistent with this observation, copper concentrations at the locations with spring 2020 exceedances have also decreased substantially since the Phase 1 Remedial Action was implemented. Additionally, COC concentrations are generally observed to be greater in the spring than in the fall due to the influence of groundwater and surface water runoff. Exceedances of the surface water criteria from the ROD for surface water samples collected between 2010 (fall results only) and 2020 are summarized by COC and sample location in a Surface Water Sample Exceedance Summary table provided in Appendix E. There were no surface water exceedances in 2016, 2018, or 2019, or the fall of 2017 or 2020. In the spring of 2017 and 2020, copper concentrations slightly exceeded the surface water-based criteria at several locations.

Concentration plots presenting a comparison of current conditions to baseline conditions are also provided in Appendix E. These plots present the spring and fall data collected in 2011 and 2020 at each surface water sampling location. Concentrations of all the COCs decreased between 2011 and 2020 at the surface water sample locations, particularly along and downgradient of the Site, post Phase 1 implementation.

2.2 AQUATIC LIFE DATA COLLECTION AND EVALUATION SUMMARY

BMI and fish population monitoring were conducted from August 19 through August 29, 2020. Water levels were too deep to safely conduct BMI and fish sampling at RC-5A and RC-15; therefore, sampling was conducted at two alternate locations, SG-9 and SG-12R. Although it was unsafe to conduct sampling in the mainstem of Railroad Creek at location RC-15, BMI sampling was conducted in the RC-15 side channel. Therefore, BMI monitoring was conducted at eight 100-meter reaches, and fish population monitoring was conducted at seven 100-meter reaches. The aquatic life sampling locations are co-located with surface water sampling locations shown on Figure 2.1. Aquatic life sampling was conducted in accordance with the procedures described in the Draft Final and Final PSVP (Floyd|Snider 2020d and 2020e). These methods are based on protocols described by the Pacific Northwest Aquatic Monitoring Partnership in accordance with Ecology guidance (PNAMP 2007, Ecology 2010). The sampling methodology and results of aquatic life monitoring are summarized in the following sections and are described in the 2020 Biomonitoring Report (Appendix F).

2.2.1 Benthic Macroinvertebrate Monitoring Activities

BMI sampling was conducted at eight locations (RC-6, RC-1, RC-4, RC-2(SG-7), SG-9, SG-12R, RC-10(SG-20), and RC-15) in Railroad Creek between August 20 and August 28, 2020. Sampling at RC-15 was conducted in a side channel due to water depth and unsafe conditions within the main channel of Railroad Creek. Fifteen replicate samples were collected at discrete locations distributed across each 100-meter reach. Physical habitat and water quality metrics were also collected at each replicate station. Channel substrate within a 1-square-meter quadrat was agitated to a depth of 15 centimeters where possible, and any dislodged detritus was washed into a D-frame kick net (500-micron mesh) held just downstream. Large cobbles and boulders were scrubbed with a brush to dislodge clinging organisms. The sample in the net was then processed and transferred to a sample bottle with 95% ethanol.

Samples were labeled according to chain-of-custody guidelines, packaged, and sent to Aquatic Biology Associates in Corvallis, Oregon for taxonomic identification. Aquatic Biology Associates used the Pacific Northwest Aquatic Monitoring Partnership, Level 2 standard for taxonomic effort and nomenclature (Appendix F).

2.2.2 Benthic Macroinvertebrates Evaluation

The health of the BMI community was evaluated using 16 biological metrics grouped into the following categories: productivity, taxa richness, trophic/habit, composition, and tolerance. A statistical evaluation was conducted to evaluate differences in the metrics between the background locations (RC-6 and RC-1) and the site sample locations (RC-4, RC-2(SG-7), SG-9, SG-12R, RC-10(SG-20), and RC-15). Additionally, the results for each metric were evaluated over time using the data collected during monitoring conducted in 2010, 2011, 2015, 2016, 2018, and 2019. In general, most metrics indicate conditions have improved over time, with several metrics indicating considerable improvement compared to baseline conditions in 2010 and 2011. Most

site stations met background station target thresholds for richness metrics and did not significantly differ from background stations for the productivity, trophic/habit, composition, and tolerance metrics. Overall, the 2020 BMI metrics indicate increased macroinvertebrate community diversity at site stations relative to baseline conditions in 2010 and 2011 and reference station conditions. The results for each metric are described in Section 3.2 of the Biomonitoring Report (Appendix F).

2.2.3 Fish Population Monitoring Activities

Fish population monitoring was conducted over seven, 100-meter locations (RC-6, RC-1, RC-4, RC-2(SG-7), SG-9, SG-12R, and RC-10(SG-20)) between August 19 and August 29, 2020. The fish surveys were conducted at each location following the completion of BMI sampling. The fish surveys were conducted using a backpack electroshocker, with block nets installed at the upstream and downstream ends of each reach. Captured fish were placed in buckets and lightly anesthetized prior to measuring and weighing them. Each specimen was identified to species, when possible, and fork length and weight were recorded for each specimen (Appendix F).

2.2.4 Fish Population Evaluation

A total of 289 fish were collected from seven stations during the 2020 monitoring event. Approximately half (49%) of all collected fish were cutthroat trout (*Oncorhynchus clarkii*). Of the remaining fish collected, approximately half (25%) were cutthroat–rainbow trout hybrids, and approximately half (23%) were classified as young of the year, with no physical characteristics enabling visual identification to species. A total of eight rainbow trout (*O. mykiss*) were collected from four stations but were collected primarily from the farthest upstream station. Rainbow trout comprised 3% of the total number of fish observed during 2020 biomonitoring (Appendix F).

Estimated fish abundance at the background locations and RC-4 was less in 2020 compared to previous years; however, estimated abundance at site station SG-12R was one of the highest in the sampling record, and estimated abundance at RC-2 and RC-10 was similar to previous years, indicating that fish abundance naturally varies independent of potential mining-related effects. Estimated abundance was also high at SG-9 relative to the other locations. Temporal trends at SG-9 and SG-12R (which replaced RC-5A and RC-15, respectively) were not evaluated because there are no previous aquatic life data at those locations. Similarly, temporal trends were not discussed for RC-5A or RC-15 because these locations were not sampled in 2020.

Size distribution derived from fork length measurements was also considered during analysis. Fork length can be used as a general proxy for fish age. In general, a broad distribution of size classes ranging from young of the year to mature individuals was observed within and between sample stations, indicative of a healthy reproducing population.

The 2020 results demonstrate the dynamic nature of fish populations within mountain stream environments. Fish abundance is inherently variable and strongly influenced by environmental factors, including flow events, sediment delivery, and overwintering conditions. It is also

associated with habitat suitability, which varies between sampling locations and over time within a geomorphically active creek such as Railroad Creek. Fish distribution throughout a stream system also varies in response to short-term events, such as storms, and larger patterns of disturbance, such as the Wolverine Fire. These factors need to be considered when interpreting year-to-year changes in fish abundance within and between stations.

Results from the 2020 fish population monitoring are provided in further detail in Section 3.3 of the 2020 Biomonitoring Report (Appendix F).

2.3 PERIPHYTON SITE DATA SUMMARY

Periphyton is the biofilm that coats submerged surfaces in aquatic ecosystems. It is a complex mixture of living and dead algae, cyanobacteria, heterotrophic microbes, and detritus that contribute to the base of aquatic food webs. Although periphyton data collection activities are not part of the PSVP monitoring program, changes in periphyton community structure and chemical accumulation in tissue can provide useful and sensitive endpoints for water quality monitoring in streams. However, periphyton data are most effective when used with habitat and macroinvertebrate assessments (USEPA 1999) and should not be considered a substitute for BMI community assessment. BMI community condition is a more robust and stable basis for evaluation of benthic injury or recovery and is more directly tied to higher trophic levels (i.e., fish).

Periphyton taxonomy (cell counts by species), chlorophyll *a* biomass, and tissue data have been collected at the Site by Ecology to assess the health of aquatic life during four field events between 2013 and 2019. Ecology's project description, objectives, sampling methods, and the results of the 2013 periphyton data are described in the 2015 QAPP (Ecology 2015).

Periphyton data were collected by Ecology at six locations in Railroad Creek in 2013 and 2015, at eight locations in 2018, and at nine locations in 2019. The Ecology periphyton sampling locations are shown with the PSVP aquatic life sampling locations in Appendix G.1. These data, with the exception of the 2019 periphyton taxonomy data, are available in Ecology's Environmental Information Management (EIM) database. Additionally, the periphyton tissue data are described online on the Ecology website in the Railroad Creek Monitoring story map (Ecology 2019).

The following sections provide an updated evaluation of stream quality relative to the periphyton tissue data and chlorophyll *a* biomass data collected by Ecology through 2019, as an ancillary line of evidence to supplement the BMI community evaluation conducted under the PSVP monitoring program. An evaluation of the periphyton community data collected between 2013 and 2018 was presented in the 2019 ACAR (Floyd|Snider 2020f). No additional periphyton community data have been reported; therefore, a periphyton community data evaluation was not included in this ACAR. This supplementary information supports the objectives of the PSVP and ACAR to assess current site conditions and evaluate the effectiveness of the Phase 1 Remedial Action in addressing RAO 1.

2.3.1 Chlorophyll *a* Biomass

Chlorophyll *a* biomass was variable between locations and years with no clear differences among locations, except relatively high concentrations of biomass in 2015 at location RM 11.1, a background location near RC-6, and location RM 6.2, located approximately 3 miles downstream of the tailings piles near RC-10. In 2013, chlorophyll *a* biomass ranged from 0.40 to 3.2 milligrams per square meter (mg/m^2). In 2015, chlorophyll *a* biomass ranged from 1.5 to 6.7 mg/m^2. In 2018, chlorophyll *a* biomass ranged from 1.0 to 2.3 mg/m^2. And, in 2019 chlorophyll *a* biomass ranged from 0.55 to 1.9 mg/m^2. Chlorophyll *a* biomass concentrations are summarized in Appendix G.2.

2.3.2 Periphyton Tissue Evaluation

Charts showing periphyton tissue concentrations of site COCs from 2013 to 2019 are provided in Appendix G. Generally, concentrations of COCs in periphyton tissue were lowest in 2019 and have decreased every monitoring year for all COCs, except aluminum, which does not have a clear temporal or spatial trend. Concentrations of COCs in periphyton tissue are generally lower at the Ecology background locations (RM 11.1 and RM 10.8) than Ecology Site locations (RM 10.0 to RM 9.2); however, this trend is less evident in the 2019 data because tissue concentrations have decreased to concentrations close to background.

2.4 SURFACE WATER AND AQUATIC LIFE MONITORING CONCLUSIONS AND FUTURE MONITORING

The following are the main findings and recommendations based on the evaluation presented in this section. Refer to Section 7.1 for discussion of these findings with respect to RAO 1.

- In spring 2020, copper concentrations at six surface water sampling stations slightly exceeded the surface water-based criteria. The maximum copper concentration was measured at RC-13(SG-8), and the exceedance ratio was only 1.8. None of the other surface water COCs exceeded the surface water-based criteria in spring 2020.
- None of the fall 2020 surface water samples exceeded the criteria.
- Copper concentrations at the locations with spring 2020 exceedances have decreased substantially since the Phase 1 Remedial Action was implemented.
- A new surface water location (RC-24) that was requested by the Agencies in their May 21, 2020, PSVP comments was added to the program in spring 2020.
- Overall, the 2020 BMI metrics and fish population evaluation indicate that conditions in Railroad Creek have improved compared to baseline conditions in 2010 and 2011. The conclusions are summarized below:
    - The results of the evaluation of BMI data indicated that most site stations met reference station target thresholds for richness metrics and did not significantly differ from reference stations for the productivity, trophic/habit, composition, and tolerance metrics.

  - Estimated fish abundance at the background locations and RC-4 was less in 2020 compared to previous years; however, estimated abundance at site station SG-12R was one of the highest in the sampling record, and estimated abundance at RC-2 and RC-10 was similar to previous years and greater than baseline values. These results and the variability in estimated fish abundance observed at the reference stations over time, illustrates that abundance can vary temporally and spatially due to environmental conditions that are independent of the Phase 1 remedial actions, such as seasonal movements and normal changes to within-station habitat conditions.

- An evaluation of the periphyton data collected by Ecology was provided to supplement the aquatic life evaluation conducted under the PSVP monitoring program. The results of the evaluation are summarized below:
  - Chlorophyll *a* biomass was variable between locations and years with no clear differences between locations, except relatively high concentrations of biomass at RM 11.1 and RM 6.2 in 2015.
  - Generally, concentrations of COCs in periphyton tissue were lowest in 2019 and have decreased every monitoring year for all COCs, except aluminum, which does not have a clear temporal or spatial trend.
- There are no proposed changes to the 2021 PSVP surface water monitoring program.
- Based on the results of BMI and fish population monitoring over time, conditions in Railroad Creek have improved compared to baseline conditions in 2010 and 2011. Therefore, additional monitoring is proposed to be conducted every other year, with the next biomonitoring event to occur in the fall of 2022.

3.0 Sediment

RAO 2 is stated as, "Reduce exposure to contaminants of concern in sediment, (including the adverse effects of ferricrete on aquatic life in Railroad Creek) to protect aquatic life and comply with ARARs." Two types of sediment performance monitoring are described in the Final PSVP to assess compliance with RAO 2, and include: (1) assessing the presence of ferricrete in Railroad Creek through routine visual inspections; and (2) bioassay testing and chemical analyses on sediment samples collected from Railroad Creek and its delta in the Lucerne Bar area of Lake Chelan.

Section 3.1 provides an overview of sediment sampling locations in Railroad Creek and Lucerne Bar. Section 3.1.1 provides an overview of the 2020 sediment sampling activities. Section 3.1.2 summarizes an evaluation of sediment data that compares sediment data to the Sediment Management Standards (SMS) criteria for freshwater sediment, or the Sediment Quality Values (SQVs) proposed by the USFS in the Proposed Plan if an SMS criterion is not available (WAC 173-204-563 and USFS 2010)[1]. Section 3.1.3 provides an evaluation of the 2020 bioassay results that compares the bioassay results to SMS freshwater biological criteria for each biological test (WAC 173-204-563). Section 3.2 provides a summary of ferricrete removal activities performed in October 2020. Section 3.3 summarizes the conclusions from the 2020 sediment evaluations.

3.1 SEDIMENT SAMPLING ACTIVITIES AND RESULTS

Sediment sampling was conducted at six locations in Railroad Creek and two locations in Lucerne Bar between September 26 and September 29, 2020, during the fall monitoring event. Sediment sampling locations are shown on Figure 3.1. The locations in Railroad Creek are co-located with surface water and aquatic life monitoring locations.

Sediment samples were collected from the following locations in Railroad Creek (listed upstream to downstream): RC-6, RC-1, RC-4, RC-2(SG-7), RC-5A, and RC-10(SG-20). Sediment samples LB-1 and LB-2 were collected from the Lucerne Bar area at Lake Chelan, where Railroad Creek empties into the lake and forms a delta. Sample locations are shown on Figure 3.1. The rationale for each of the sediment sample locations is summarized below. Additional information is provided in the 2020 PSVP (Floyd|Snider 2020d and 2020e). Samples were collected at locations RC-6 and RC-1 to evaluate sediment quality in Railroad Creek upstream of the Phase 1 Remedial Action. These locations are referred to as background locations. The sample locations downstream of the background locations in Railroad Creek are referred to as site sample locations. Samples were collected from RC-4 and RC-2(SG-7) to evaluate sediment quality between the Lower West Area

[1] The sediment criteria proposed in the PSVP are consistent with the sediment criteria summarized in Table 11 of the USFS Proposed Plan, using updated screening level references (USFS 2010). The sediment criteria proposed in the USFS Proposed Plan were selected from the 2006 Northwest Regional Sediment Evaluation Framework (SEF) screening levels, which have been updated to be consistent with the SMS criteria (RSET 2018). Because SEF is intended to provide a framework for characterizing sediment to determine the suitability of dredged material for aquatic disposal, the reference for the sediment criteria has been updated to SMS (WAC 173-204-563) to better reflect the status of the Site.

and downstream of Tailings Pile 3. A sample was collected from RC-5A to evaluate sediment quality downstream of the MWTP effluent discharge, and a sample was collected from RC-10(SG-20) to evaluate sediment quality downstream from the Site. Samples collected from LB-1 and LB-2 in Lucerne Bar were collected to evaluate sediments from Railroad Creek that have deposited in Lake Chelan. These samples were collected in depositional areas within the Railroad Creek delta and are intended to represent conservative sampling locations for assessing potential depositions of sediment from Railroad Creek.

3.1.1 Sediment Sampling Activities

In accordance with the procedures described in the March 2020 Draft Final and Final PSVP (Floyd|Snider 2020d and 2020e), sediment samples were collected, handled, and submitted to ARI in Tukwila, Washington, for chemical analysis, and to Eurofins Test America, in Corvallis, Oregon, for bioassay testing. Sediment samples were analyzed for the metals COCs listed in the ROD (aluminum, beryllium, cadmium, chromium, copper, iron, silver, and zinc), total solids, total organic carbon (TOC), Acid Volatile Sulfide/Simultaneously Extracted Metals (AVS/SEM), and grain size. Bioassay testing included the following tests:

- *Chironomus tentans*[2], 10-day mortality, ASTM E1706-19 (2019)/USEPA Method 100.5 (USEPA 2000)
- *Hyalella azteca*, 28-day growth and mortality, USEPA Method 100.4 (USEPA 2000)

At each location, sediment samples were collected as composites of multiple grab samples taken from pockets of fines deposited among the gravel and cobble substrate of Railroad Creek. Grab samples were collected to a target depth of 30 centimeters, using a hand auger, drain spade or trowel. The number of grab samples, the composite sample depth, and sample description are summarized by location in Table 3.1. At many locations, cobbles and boulders were encountered and the full sample depth could not be collected.

At each location, the grab samples were composited and homogenized until the sediment was uniform in color and texture. The sample was stirred gently to minimize the introduction of air. Homogenized sediment for chemical analysis was placed into labeled, laboratory provided jars. Homogenized sediment for bioassay testing was placed in labeled, 1-gallon HDPE jars. Sample containers were stored in coolers containing ice until they were submitted under chain-of-custody to the appropriate laboratories.

Minor modifications from the 2020 PSVP monitoring program included the following: the use of a drain spade and hand auger in addition to the trowel and stainless-steel spoons, the use of plastic laboratory-provided sample jars for the bioassay sediment samples instead of glass jars or zippered plastic bags, and the collection of one equipment blank for the sediment program rather than daily collection of equipment blanks.

[2] The test species *Chironomus dilutes* and *Chironomus tentans* are synonymous.

Sediment sampling field forms from the fall 2020 monitoring event are included in Appendix A. Select photographs of sediment sampling activities are included in Appendix H.

3.1.2 Sediment Chemistry Results

Sediment analytical results from the fall 2020 monitoring event and SMS freshwater sediment criteria are presented in Table 3.2. Analytical results for COCs are illustrated by location on Figure 3.1 and by COC in Appendix I. For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown. Laboratory analytical reports are included as Appendix B and are presented electronically in an EDD included as Appendix C.

Sediment in Railroad Creek can be characterized as sandy gravel or gravely sand. The predominant size fractions for sand were very coarse and coarse. At the background locations (RC-1 and RC-6), sediment was composed of 43 to 56% gravel and 41 to 53% sand. Sediment collected from site locations RC-4 and RC-5A were predominantly gravel (65 to 79%), and site locations RC-2(SG-7) and RC-10(SG-20) were predominantly sand (55 to 80%). Sediment samples collected from Lucerne Bar (LB-1 and LB-2) were predominantly sand (83 to 91%). Fines were present in trace amounts at all locations except LB-1, where percent fines were 9%. Vegetative matter, such as twigs, roots, and leaves, was generally present in trace amounts. Grain size results are summarized in Table 3.2.

Consistent with the Draft Final and Final PSVP, sediment results were compared to the SMS criteria for freshwater sediment, or the SQVs proposed by USFS in the Proposed Plan if an SMS criterion was not available (WAC 173-204-563 and USFS 2010). None of the fall 2020 sediment samples exceeded the SMS criteria or SQVs. All metals, except silver, were detected at all sediment locations in fall 2020. Sediment COC concentrations in samples collected from Lucerne Bar were less than or similar to concentrations in samples from upstream site locations, indicating that COCs are not accumulating to levels of concern in sediments at the mouth of Railroad Creek. COC results for metals in sediment are summarized in Table 3.2.

AVS/SEM, which are indicators of metals bioavailability (primarily for anoxic sediments) were also analyzed. AVSs, which are sediment sulfides that are soluble in hydrochloric acid, can react with metals to make them unavailable to organisms. Metals known to bind to AVS are cadmium, copper, lead, nickel, silver, and zinc (lead and nickel are not sediment COCs and were not measured). The AVS/SEM model predicts that when the molar concentration of AVS is greater than the molar concentration of the sum of SEM (∑SEM), or when the ∑SEM/AVS ratio is less than 1, porewater concentrations should be low and no metals toxicity is expected (Berry et al. 1996).

The AVS and SEM results are summarized in Table 3.3. For this investigation, AVS was only detected at one location (LB-1) and therefore the ∑SEM/AVS ratio was only calculated for this location. The ∑SEM/AVS ratio calculated for LB-1 was 23, indicating that the SEM metals are likely bioavailable. Although the AVS/SEM model predicts that the metals are bioavailable in sediments at LB-1, the metals concentrations are much less than the sediment criteria.

3.1.3 Sediment Bioassay Results

The fall 2020 sediment bioassay results and the SMS freshwater biological criteria are presented in Table 3.4. Bioassay performance at each location is illustrated on Figure 3.2. Charts showing performance of each of the tests by replicate are included in Appendix J. The laboratory bioassay report for the fall 2020 data is included as Appendix B.

The 10-day Chironomid mortality test and the 28-day *Hyalella* growth and mortality test were conducted by Eurofins TestAmerica in Corvallis, Oregon, according to: *Methods for Measuring the Toxicity and Bioaccumulation of Sediment-associated Contaminants with Freshwater Invertebrates, Second Edition, EPA 600/R-99/064* (USEPA 2000). The tests were initiated on October 28 and October 30, 2020, respectively, and both tests met test acceptability requirements (USEPA 2000 and WAC 173-204-563) with the following exception: during the 10-day Chironomid mortality test, DO dropped to levels less than 2.5 milligrams per liter (mg/L) in a laboratory control replicate on days 8 and 9. The laboratory control test results were not impacted.

Out of the eight sample locations, two were background[3] sample locations (RC-6 and RC-1) that represent the effects of natural variability on the bioassay organisms, four locations were near the Site, and two locations were in Lucerne Bar. The bioassay tests also included a laboratory control sample. There were no modifications from the required or recommended procedures in the test methods.

Statistical analysis was performed by Eurofins TestAmerica according to USEPA guidance (USEPA 2000) using the Comprehensive Environmental Toxicity Information System (CETIS) software. Statistical tests were performed to evaluate distribution and variance, and to determine if there were significant differences between the site or Lucerne Bar sample results, and results from the background samples, RC-6 and RC-1, and the laboratory control sample. Test performance was evaluated using the SMS freshwater biological criteria (the sediment cleanup objective [SCO], cleanup screening level [CSL], and performance standards). As allowed under SMS (WAC 173-204-563), the site and Lucerne Bar bioassay results are proposed to be compared to the background sample results, rather than the laboratory control results, as the background samples are representative of natural conditions in Railroad Creek and the natural sediment matrix. Reference results were calculated as the average of the background sample results (i.e., the average of the results from RC-6 and RC-1). An exceedance of the SCO or CSL requires that the result be greater than the criteria, and that there be a statistically significant difference between the test result and background result at $p \leq 0.05$. A test result was considered statistically significant, if there was a statistically significant difference between the test result and both background samples (RC-6 or RC-1). Additionally, an exceedance of the SCO for any two bioassay test metrics equates to a CSL exceedance at the sample location.

[3] The term reference is used instead of background in WAC 173-204-563; these terms are synonymous for this Site.

Test metrics were calculated for comparison with the SMS freshwater biological criteria using Equations 1 and 2 below. As noted above, background results were calculated as the average of the background sample results.

Equation 1. $M_T - M_B$

Where:
T = Test
B = Background
M = Mortality

Equation 2. $(MIG_B - MIG_T) / MIG_B$

Where:
T = Test
B = Background
MIG = Mean individual growth at time final

The test endpoint reported for the 10-day Chironomid mortality test was survival, reported for comparison with the SMS freshwater biological criteria as percent mortality. Mortality metrics calculated using Equation 1 were compared to the SCO and CSL. None of the sample locations exceeded the *C. tentans* mortality SCO of greater than 20% or the CSL of greater than 30%.

The test endpoints reported for the 28-day Hyalella growth and mortality test were survival, reported as percent mortality, and growth, reported as mean dry weight per surviving organism. Survival and growth metrics were calculated using Equations 1 and 2 and compared to the SCO and CSL. The *H. azteca* mortality metric exceeded the SCO of greater than 10%, and the CSL of greater than 25%, at three sample locations (RC-4, LB-1, and LB-2). The results from RC-4, LB-1, and LB-2 were significantly different from the results from both background locations, and the results from RC-10(SG-20) were significantly different from RC-6, but not RC-1.

The *H. azteca* growth metric exceeded the SCO of 0.25 milligrams (mg) at three sample locations (RC-4, RC-10(SG-20), and LB-1), and the CSL of 0.40 mg at one sample location (RC-4). The results from RC-4, RC-10(SG-20), and LB-1 were significantly different from the results from both background locations, and the results from LB-2 were significantly different from RC-6 but not RC-1. Although test acceptability requirements were met, the background results from the 28-day *Hyalella* growth test did not meet the SMS performance standard for reference samples of ≥ 0.15 mg. Additionally, *H. azteca* growth at all the sample locations was significantly less than (α= 0.5) growth in the laboratory control. The poor performance of *H. azteca* in all of the test samples (site and background samples) compared to the laboratory control indicates that growth and potentially survival were influenced by natural variability.

General observations across the test endpoints are summarized below:

- None of the sample locations exceeded the *C. tentans* mortality SCO or CSL.

- Based on the *H. azteca* test metrics, sample locations RC-4, LB-1, and LB-2 exceeded the SMS biological CSL.
- *H. azteca* growth and survival performance was variable across the sample locations and no spatial trends were apparent based on a graphical analysis. For example, the *H. azteca* growth and survival metrics calculated for RC-4 exceeded the CSL; however *H. azteca* performed well at the two sample locations (RC-2(SG-7) and RC-5A) directly downstream of RC-4.
- The failure of the background samples to meet the 28-day *Hyalella* growth test SMS performance standard for background samples, and the statistically significant low *H. azteca* growth observed at all sample locations compared to the laboratory control, suggest that the exceedances of the SCO and CSL based on the *H. azteca* endpoints are likely related to the natural conditions in Railroad Creek and the natural sediment matrix, and are not by themselves indicative of the potential for COC concentrations in sediment to cause adverse effects to aquatic life.

3.2 FERRICRETE REMOVAL ACTIVITIES

Ferricrete monitoring surveys are performed along an approximately 2.3-mile stretch of Railroad Creek every 3 years to assess the presence of ferricrete in the creek in accordance with the Final PSVP. The stretch of the creek observed extends from the staff gauge location SG-12R, located downstream of the Railroad Creek's confluence with Tenmile Creek, to monitoring location RC-1, just upstream of the Lower West Area. The last ferricrete monitoring survey was performed during the fall 2019 monitoring event. The results from the fall 2019 monitoring survey are briefly described in this section, along with the related ferricrete removal activity that occurred in 2020 following that survey. Further details on the 2019 ferricrete monitoring survey are provided in the 2019 ACAR (Floyd|Snider 2020f).

During the 2019 ferricrete monitoring survey, small deposits of ferricrete were observed at two isolated locations on the south bank of Railroad Creek near the tailings piles. One occurrence was located adjacent to the Subsurface Barrier Wall along Tailings Pile 2 and approximately 100 feet upstream of surface water monitoring location RC-7 (monitoring point F19). The second location was approximately 200 feet upstream of the confluence with Copper Creek and adjacent to the Subsurface Barrier Wall along Tailings Pile 1 (monitoring point F30).

The limited amount of ferricrete observed at monitoring point F19, covering an approximately 2-foot by 2-foot area and approximately 1 to 3 inches thick, was easily broken up with a metal rod and left in place during the fall 2019 monitoring survey. However, the ferricrete observed near monitoring point F30, covering an approximately 2-foot by 9-foot area and less than 1 foot thick, was not broken up during the fall 2019 monitoring survey and remained in place following the survey. This ferricrete observed near monitoring point F30 was later broken up and left in place on October 3, 2020, in accordance with the revised draft Phase 1 Operations and Maintenance Plan (Phase 1 O&M Plan; Floyd|Snider 2020h).

3.3 SEDIMENT MONITORING CONCLUSIONS AND FUTURE MONITORING

The following are the main findings and recommendations based on the evaluation presented in this section. Refer to Section 7.1 for discussion of these findings with respect to RAO 1.

- Chemistry testing findings include:
  - None of the fall 2020 sediment samples exceeded the SMS chemical criteria or SQVs.
  - Sediment COC concentrations in samples collected from Lucerne Bar were less than or similar to concentrations in samples from upstream site locations, indicating that COCs are not accumulating to levels of concern in sediments at the mouth of Railroad Creek.
  - No additional sediment sampling for chemical analysis is proposed for the 2021 PSVP monitoring program.
- Bioassay testing findings include:
  - None of the sample locations exceeded the *C. tentans* mortality SCO or CSL.
  - Based on the *H. azteca* test metrics, sample locations RC-4, LB-1, and LB-2 exceeded the SMS biological CSL. However, the study results suggest that the poor performance observed at these locations was likely related to the natural conditions in Railroad Creek and the natural sediment matrix. Indications that poor performance was not related to COCs in sediment include:
    - The background results from the 28-day *Hyalella* growth test did not meet the SMS performance standard for background samples.
    - *H. azteca* growth measured at all test locations was significantly less than growth measured in the laboratory control.
    - *H. azteca* growth and survival performance was variable across the sample locations and no spatial trends were apparent based on a graphical analysis.
  - Based on the sediment chemistry and 10-day Chironomid mortality test results (no exceedances of the SMS criteria) and considering the impairment of *H. azteca* growth at all locations (including the background sample locations) compared to the laboratory control, the failure of the background samples to meet the 28-day *Hyalella* growth test SMS performance standard, and absence of a spatial trend, it is likely that exceedances of the SMS biological criteria for the 28-day *Hyalella* growth and survival test are related to the natural conditions in Railroad Creek and the natural sediment matrix rather than concentrations of COCs in sediment. In addition, the results of the BMI community evaluation indicate an improvement compared to the baseline conditions.
  - No additional bioassay testing is proposed for the 2021 PSVP monitoring program.

- Ferricrete removal activities and observations:
  - A small area of ferricrete observed during the 2019 ferricrete monitoring survey, located approximately 200 feet upstream of the confluence with Copper Creek and adjacent to the subsurface barrier wall along Tailings Pile 1 (monitoring point F30), was broken up on October 3, 2020. Both locations where ferricrete was observed during the 2019 ferricrete monitoring survey (near monitoring points F19 and F30) have now been broken up.
  - During the Fall 2019 ferricrete monitoring survey, ferricrete was not observed in the creek channel at the east end of Tailings Pile 3 and near seep SP-31 (monitoring point F13); however, the Agencies noted that they have observed ferricrete in the channel in this area of the creek during two past site visits. The 2019 ACAR recommended that a visit to this area with the Agencies during the 2020 monitoring activities to jointly evaluate the possible presence of ferricrete in this area. However, due to coronavirus travel restrictions in place, this recommended 2020 visit with the Agencies did not occur. It is recommended that a visit with the Agencies to observe this portion of the creek for the presence of ferricrete occur in 2021, if possible.
  - Another ferricrete monitoring survey will be completed over the entire ferricrete monitoring zone in 2022 in accordance with the Final PSVP. The 2022 ferricrete monitoring survey will revisit the same 2019 ferricrete monitoring points, paying particular attention to monitoring points F13, F19, and F30, to determine if ferricrete build up is occurring in these areas.

4.0 Groundwater

Data collection activities related to groundwater were performed to evaluate remedy performance relative to RAO 3 and portions of RAO 5, consistent with the data quality objectives (DQOs) described in the 2020 Final PSVP and subsequent requests by the Agencies. RAO 3 is stated as, "Prevent migration of contaminants of concern that exceed cleanup levels in groundwater (including the Main Portal discharge) from on-site waste management areas (WMAs), to protect aquatic life and comply with ARARs." The portions of RAO 5 that are addressed in the PSVP groundwater program are to "protect human health and comply with ARARs by…controlling exposure to contaminated groundwater, and by restoring groundwater beyond the WMAs to its beneficial use as a drinking water resource." The portion of RAO 5 related to reducing human exposures to COCs in soil and other media is addressed in Section 5.0.

These data are evaluated in the ACAR to address two of the three main PSVP objectives:

1. Assessing current site conditions and updating the CSM as a basis for determining final POCs.
2. Evaluating the effectiveness of the Phase 1 Remedial Action relative to performance standards.

The performance standards verification program for groundwater is intended to monitor the effectiveness of remedial actions that were implemented to reduce the migration of COCs and protect downgradient groundwater quality and Railroad Creek, and includes monitoring of groundwater from monitoring wells, well points, porewater, seeps along the barrier wall and tailings piles, and wetlands surface water. Performance monitoring of the West Area Seeps is addressed separately (refer to Section 6.0).

This section consists of three parts, followed by a summary of findings, divided as follows:

- In the first part (Sections 4.1, 4.2, and 4.3), 2020 data collection activities are described and the results are presented. Data collection activities in 2020 included modifications to the groundwater data collection network, the survey of hydrogeologic measurements, and water sampling from multiple location types.
- The second part (Section 4.4) includes a post-remedy CSM update and consideration of results related to specific CSM-related DQOs.
- The third part (Sections 4.5 and 4.6) consists of an evaluation of site data to address the remaining DQOs: groundwater stability, comparison to background, and remedy performance based on comparison to criteria and change over time.
- A summary of the main findings is presented in Section 4.7.

4.1 GROUNDWATER DATA COLLECTION NETWORK

The groundwater data collection network was updated and expanded in 2020 to address DQOs and the Agencies' requests. Changes included installation of additional well points, staff gauges, stilling wells, and pressure transducer or pressure transducer/specific conductivity data loggers. During the spring 2020 monitoring event, two additional well points, one stilling well (which includes a staff gauge, in accordance with the SOP), and one staff gauge were added to the monitoring network, and a total of nine pressure transducers and five transducer/conductivity meters were installed in select monitoring and stilling wells to collect continuous data. Six of the new pressure transducers (installed in TP1-8S, TP1-9S, TP2-12S, TP2-15, TP3-12S, and TP3-13) were installed for tailings pile geotechnical stability monitoring purposes outside of the PSVP monitoring program, and the data from these six pressure transducers are not included in this report. Details of the well point installation and deployment of the specific conductivity meters and pressure transducers are included in the Spring 2020 Event Data Report (Floyd|Snider 2020g). During the fall 2020 monitoring event, three stilling wells with pressure transducers and staff gauges, and one new staff gauge location were installed. Additionally, some of the existing staff gauges and porewater sampling locations were replaced or repaired during the fall 2020 event. Select photographs of new monitoring locations are included in Appendix H.

All new or repaired well points, stilling wells, and staff gauges were professionally surveyed to a vertical accuracy of ±0.01 feet above mean sea level (amsl) in the Holden Mine Vertical Datum (HMVD) and a horizontal accuracy of ±1 foot in the North American Datum of 1983 (NAD 83). The monitoring well and well point inventory (Table 4.1 and Figure 4.1) have been updated to reflect the 2020 survey results and changes to the monitoring network.

4.1.1 Staff Gauge, Stilling Well, and Transducer Installation

Figure 4.1 and Table 4.1 show water level monitoring locations added to the network in 2020. One new staff gauge, DS-16-SG, was installed during the fall 2020 monitoring event in Railroad Creek adjacent to the correspondingly named monitoring well, DS-16.

Three new stilling wells were also installed during the fall 2020 monitoring event: DS-15-STW, DS-18-STW, and SG-WL1STW. DS-15-STW and DS-18-STW were installed with staff gauges on the south side of Railroad Creek, adjacent to the correspondingly named monitoring well clusters, DS-15 and DS-18 on Tailings Pile 3. SG-WL1STW was installed on the existing SG-WL1 staff gauge located in the Wetlands East of Tailings Pile 3. All stilling wells were installed by driving steel fence posts into the creek bed or wetland until refusal, then securing 5-foot-long, 2-inch-diameter, schedule 80 polyvinyl chloride (PVC) pipes with U-bolts to the fence post. For stilling wells in Railroad Creek, the fence posts were additionally secured to nearby riprap or river rocks using a roto-hammer and concrete bolts. Holes were drilled through the PVC to allow creek water levels to equilibrate within the stilling well prior to deployment of new pressure transducers.

Each stilling well was instrumented with Solinst Levelogger Edge 3001 pressure transducers capable of measuring and logging water level changes to the nearest hundredth of a foot. To

prevent damage during freezing months, the stilling well transducers were winterized by placing the transducer in baggies of propylene glycol consistent with manufacturer guidance. Data loggers were programmed to record water levels every 20 minutes. Data are expected to be downloaded semiannually during the spring and fall monitoring events. However, the transducers have adequate memory to record continuously for 14 months. The transducer deployment summary is provided in Table 4.2. Details of the deployment of additional conductivity and pressure transducers in monitoring and stilling wells during the spring 2020 monitoring event are presented in the Spring 2020 Event Data Report (Floyd|Snider 2020g).

4.1.2 Well Point, Staff Gauge, and Porewater Repairs and Replacements

The well point at SG-16-WP was observed to be damaged from a fallen tree during the spring 2020 monitoring event. The well point was repaired during the fall 2020 monitoring event by replacing the bent stainless-steel casing. The broken well casing was removed from the ground by unscrewing the casing from the screen and reattaching a new casing without having to replace the well point screen.

Staff gauges SG-7, SG-8, SG-9, SG-14, SG-16, SG-17, and SG-18 were observed to be damaged or missing during the spring 2020 monitoring event. These staff gauges were all repaired or replaced during the fall 2020 monitoring event when creek levels were low enough to enter the creek safely. Staff gauges were installed by driving a steel fence post into the creek bed until refusal and attaching the staff gauges with U-bolts to the fence posts. Where possible, the fence posts were additionally secured to nearby riprap or river rocks using a roto-hammer and concrete bolts.

The porewater screens at station SG-17 were repaired during the fall 2020 event after high flow during the winter season eroded the creek bed and exposed the sampling screens. The existing porewater sampling screens were tested for damage and found to be in good condition, so the materials were reused to repair the sampling points. The 6-inch and 12-inch porewater samplers were re-installed by hand digging trenches to 6 and 12 inches below the streambed and laying the existing 3-foot lengths of ¾-inch-diameter, 0.01 slotted schedule 80 PVC pipes horizontally into the streambed with the top of PVC at the target depth of 6 or 12 inches. The 36-inch sampling point was re-installed by hand driving the existing ¾-inch-diameter, 6-inch-long stainless steel screen into the stream channel to 42 inches below the streambed. The low-density polyethylene (LDPE) sample tubing connected to each sampling point, run inside of 1-inch-diameter PVC braided vinyl hose, was re-laid in the trenches up to the stream bank on the north side of Railroad Creek to the existing surface completion protected by an irrigation utility box. The hosing was re-armored with lengths of heavy-duty angled steel prior to backfilling with river rock. The replaced porewater samplers were re-developed by purging with a peristaltic pump until purge water was clear of turbidity. Locations were not sampled for a minimum of 24 hours after installation to allow porewater composition to revert to ambient conditions.

4.2 HYDROGEOLOGIC MEASUREMENTS

Hydrogeologic measurements in 2020 included manual water level measurements at monitoring wells, well points, and staff gauges; vibrating wire piezometer (VWP) transducers located adjacent to the barrier wall; and pressure transducer measurements from selected monitoring wells where dataloggers were deployed during the 2019 and 2020 monitoring events. Table 4.3 presents the manual water level elevations and VWP head measurements (described below) for the June (spring) and September (fall) 2020 monitoring events. Monitoring wells are assigned to the Shallow, Intermediate, or Deep Zones based on relative well screen elevation. A comparison between staff gauge and adjacent well point measurements from 2020 is included as Table 4.4. Table 4.5 presents horizontal gradients of VWP data for cross-wall head differences. Tables 4.6 and 4.7 present vertical gradients calculated at monitoring well and VWP clusters, respectively. Figures 4.2 through 4.7 show maps of the potentiometric surfaces based on head elevations in the Shallow, Intermediate, and Deep Zones for the 2020 monitoring events. Figure 4.8 is a map of the 2020 vertical gradients as measured between the Shallow Zone monitoring well or VWP and the next shallowest well at the pair or cluster (Intermediate or Deep Zone). Additional vertical gradients are presented in Tables 4.5 and 4.6.

4.2.1 Manual Measurements

Manual water level measurements were collected over a period of a few hours to provide a snapshot of head measurements for use in assessment of groundwater flow, vertical gradients, and groundwater-surface water interactions during both the spring and fall 2020 monitoring events. The spring water level snapshot was conducted on June 5, 2020 (Floyd|Snider 2020g). The fall water level snapshot was conducted September 24, 2020, from monitoring wells, well points, and staff gauges, in accordance with the procedures described in the project SOPs (MWH 2013a). These water levels are summarized in Tables 4.3 and 4.4.

4.2.2 Vibrating Wire Piezometers

VWP measurements from 20 boring locations along the barrier wall (BW-VWP-60 through BW-VWP-79) are presented along with the 2020 water level data in Table 4.3. VWPs are shown on Figure 4.9, and select VWPs are shown on Figures 4.3 through 4.8. Plots of VWP head data for a 1-year period from October 2019 to October 2020 are shown on Figures 4.10 through 4.19 for each cross-barrier pair relative to ground surface, the groundwater collection system (GWCS) invert, and the approximate elevation of Railroad Creek. VWPs are installed at three to four depths in paired borings located at intervals on both sides of the barrier wall; however, VWP data are based on the elevation of the installed instrument and are not directly calibrated to water level elevation, so the head measurement accuracy relative to the vertical datum may be less than the 0.01-foot accuracy typical for manual water levels. VWP data were assigned to the Shallow, Intermediate, or Deep Zone based on relative VWP elevation and lithology; VWP data from glacial till were not used for mapping or gradients calculations. VWP head data are presented together with direct water level measurements to provide a more complete picture of hydrogeologic site conditions.

4.2.3 Pressure Transducers and Conductivity Loggers

Pressure transducer data were uploaded from 32 monitoring wells and 4 stilling wells that were instrumented during the 2019 and 2020 monitoring events and an accompanying barologger. Pressure transducer data were not uploaded from three stilling wells that were newly installed in fall of 2020 (DS-15-STW, DS-18-STW, and SG-WL1-STW). Conductivity data were also uploaded from five monitoring wells that are equipped with conductivity dataloggers. Refer to Figure 4.1 and Table 4.2 for the instrumented monitoring wells and stilling wells.

Transducer data from the spring to fall period were adjusted for barometric pressure and corrected for instrument drift by applying a linear interpolation between the starting and ending values. Hydrographs for paired or clustered monitoring well pairs, a grouping of Tailings Pile 2 and Tailings Pile 3 monitoring wells, and a grouping of stilling wells, are presented in Figures 4.20 through 4.30 with datalogger and manual water level measurements, and conductivity measurements where available.

4.2.4 Aquifer Testing

Aquifer testing was performed on 14 monitoring wells on the unwalled portion of Tailings Piles 2 and 3 during the spring 2020 monitoring event between June 12 and June 18, 2020. Aquifer testing was completed in accordance with the approved work plan memorandum (Floyd|Snider 2020i). The aquifer tests consisted of short-duration (61 to 150 minutes) constant-rate pumping tests followed by a recovery period. Drawdown and recovery data were imported into *Aqtesolv* and analyzed using Theis curve-matching techniques for an unconfined aquifer. The range of hydraulic conductivity values (0.17 to 220 feet per day) are consistent with previously measured values (Dames & Moore 1999, URS 2004, URS 2009, URS 2010, MWH 2014, MWH 2015). The results of this aquifer test will be compared with and used to further refine simulated hydraulic conductivity values in a groundwater numerical flow model that is being used to evaluate Phase 2 Remedial Action alternatives. Refer to the 2020 Aquifer Tests Report included in Appendix K for more details on field methodology and data analysis.

4.3 WATER SAMPLING ACTIVITIES

This section discusses water sampling activities that occurred during the 2020 spring, summer, and fall sampling events. COC results from these events are presented in Figures 4.31 through 4.38. Results are evaluated in Sections 4.4, 4.5, and 4.6. Sampling was conducted to address DQOs for remedy performance evaluation relative to RAO 3 and portions of RAO 5, as described in the 2020 Draft Final and Final PSVP. Sampling of groundwater from monitoring wells and well points, sampling of porewater, surveying and sampling of seeps, and sampling of wetlands surface water were conducted in accordance with the existing SOPs (MWH 2010 and 2013a) except where noted in the following sections. Water quality parameters, including pH, DO, turbidity, specific conductivity, ORP, temperature, and ferrous iron, were recorded during sampling. Samples were collected after field parameters stabilized during low-flow sampling. Groundwater, porewater, and surface water samples were collected and submitted to ARI for

laboratory analyses of conventional parameters including metals, major cations, alkalinity, DOC, TOC, TDS, TSS, hardness, and major anions. Seep samples were submitted for analysis of conventional parameters including metals, major cations, alkalinity, DOC, hardness, and major anions. For sampling locations where turbidity exceeded or approached 5 NTU, a field-filtered sample was collected and submitted for analysis of dissolved metals in addition to the unfiltered sample submitted for total metals analysis. Field forms for the summer and fall 2020 monitoring events are included in Appendix A. During the summer 2020 event, only wetlands surface water and seeps were sampled. The following subsections describe the water sampling activities and results from the summer and fall 2020 monitoring events. Refer to the Spring 2020 Event Data Report for details on water sampling activities conducted during the spring 2020 monitoring event (Floyd|Snider 2020g).

All of the 2020 groundwater, porewater, seep, and wetlands surface water analytical results underwent Compliance Screening (USEPA Stage 2B) data validation in accordance with *National Functional Guidelines for Inorganic Superfund Methods Data Review* (USEPA 2017a), *National Functional Guidelines for Organic Superfund Data Review* (USEPA 2017b), and the QAPP provided in Appendix A of the *Approved Site-Wide Water Quality Monitoring During Remedial Action Plan for Holden Mine* (MWH 2013a). Based on the data quality review, data are determined to be of acceptable quality for use as reported by the laboratory unless specifically qualified in the data validation report. Some laboratory qualifiers were updated for consistency with the final qualifiers used for data table reporting and database management. Data validation for the summer and fall 2020 data is described in more detail in the attached data validation report (Appendix D). The spring 2020 data validation report is included as Appendix A of the Spring 2020 Event Data Report (Floyd|Snider 2020g).

4.3.1 Monitoring Well Sampling

The monitoring wells sampled during the fall 2020 monitoring event are illustrated on Figure 4.33. Monitoring wells were sampled with either a peristaltic pump or a dedicated bladder pump, depending on the depth to water. Bladder pumps were installed in 2019 with the intake at the screen midpoint and with dedicated LDPE bonded tubing. All other monitoring wells were sampled with either new or dedicated polyethylene tubing.

A total of 43 monitoring wells were sampled during the fall 2020 monitoring event. Seven wells on the tailings piles (TP2-12S, TP2-14, TP2-16S, TP2-16D, TP2-17, TP3-12S, and TP3-14S) that were designated for sampling during the fall 2020 monitoring event were not sampled because they were dry or had too little water in the well casing to sample.

Monitoring well analytical results and field parameters from the spring and fall 2020 monitoring events are presented in Table 4.8. Analytical results for COCs are shown on Figures 4.31 (spring) and 4.33 (fall). Maps showing inferred and approximate extents of COC concentrations in groundwater greater than surface water cleanup criteria are presented in Figures 4.36 through 4.38.

4.3.2 Well Point Sampling

Eight well points (SG-7R-WP, SG-8-WP, SG-9-WP, SG-10-WP, SG-11-WP, SG-17-WP, SG-18-WP, and DS-14) were sampled during the fall 2020 monitoring event. The well points sampled are illustrated on Figures 4.31 (spring) and 4.33 (fall). Well points were sampled using a peristaltic pump and low-flow methods.

Well point analytical results and field parameters from the spring and fall 2020 monitoring events are presented in Table 4.9. Analytical results for COCs are shown on Figures 4.31 and 4.34 for spring and Figures 4.33 and 4.35 for fall.

4.3.3 Porewater Sampling

During the fall 2020 monitoring event, porewater samples were collected from locations adjacent to eight staff gauges (RC-6, SG-7, SG-8, SG-9, SG-10, SG-11, SG-17, and SG-18), each with multiple depth intervals at 6, 12, and 36 inches below the Railroad Creek streambed. The porewater locations sampled are presented on Figures 4.34 (spring) and 4.35 (fall). Porewater locations were sampled using a peristaltic pump and low-flow methods.

The porewater samplers at SG-17 were reinstalled during the fall 2020 monitoring event because of creek bed erosion, as discussed in Section 4.1.1. Sample volume was limited at the 36-inch porewater sampling depth at SG-17 because of low yield, so the sample collected from SG-17-WP-36 was submitted for a shorter analyte list consistent with the limited sample volume.

Porewater analytical results and field parameters from the spring and fall 2020 monitoring events are presented in Table 4.10. Analytical results for COCs are shown on Figures 4.34 (spring) and 4.35 (fall).

4.3.4 Seep Visual Survey and Sampling

The seep visual survey along the south side of Railroad Creek adjacent to the tailings piles was completed over 4 days between June 11 and 14, 2020, during the spring event, 3 days between July 20 and 22, 2020, during the summer event, and in 1 day on September 27, 2020, during the fall 2020 monitoring event. A separate portion of the seep survey, in the West Area Seeps, was also completed during the spring and summer 2020 monitoring events and is discussed separately in Section 6.0. The seep survey consisted of visual inspection of the south bank of Railroad Creek for seeps and flowing water above the active stream channel. Previously established seeps were inspected and sampled if present, and if new seeps were observed or suspected, they were given unique location identifiers and sampled using a peristaltic pump at the point of expression or most upgradient point of observation if the expression could not be traced. Field parameters, including ferrous iron, were recorded on field forms included as Appendix A. All seep locations were documented on a handheld GPS and are shown on Figures 4.31 (spring), 4.32 (summer), and 4.33 (fall). Select photographs from the seep survey are included in Appendix H. The field documents from the spring 2020 seep survey, including field forms and photographs, are provided in the Spring 2020 Event Data Report (Floyd|Snider 2020g).

All observed or suspected seeps along the tailings piles were present within the high-water channel banks near the active creek level, typically within areas of riprap. The flow rate of most seeps could not be measured accurately using standard methods, because these seeps were flowing over and/or around rock surfaces, so visual estimates were recorded on field forms.

Seep occurrence varied seasonally. No new seeps were identified in the summer 2020 monitoring event that were not previously observed during the 2019 or spring 2020 monitoring events, and four new seeps (SP-44, SP-45, SP-46, and SP-47) were identified during the fall 2020 monitoring event. All newly identified seeps were observed between the eastern edge of Tailings Pile 1 and Tailings Pile 3. Conversely, several seeps identified during the spring 2020 monitoring event (SP-33) or summer 2020 monitoring event (SP-32, SP-34,) were not observed subsequently; and some seeps observed in the fall 2020 monitoring event (SP-35 and SP-36) were not observed during previous 2020 monitoring events.

Seep analytical results and field parameters from the spring, summer, and fall 2020 monitoring events are presented in Table 4.11. Analytical results for COCs are shown on Figures 4.31 (spring), 4.32 (summer), and 4.33 (fall).

4.3.5 Wetlands Surface Water Sampling

Two surface water sampling locations were sampled in the wetlands area at the eastern edge of Tailings Pile 3 during all three field events in 2020. Wetlands surface water locations are shown on Figures 4.31 (spring), 4.32 (summer), and 4.33 (fall). Photographs of these wetlands surface water sample locations from summer and fall 2020 are included in Appendix H.

Analytical results and field parameters from the spring, summer, and fall 2020 monitoring events are presented in Table 4.12. Analytical results for COCs are shown on Figures 4.31 (spring), 4.32 (summer), and 4.33 (fall).

~~4.4~~ HYDROGEOLOGIC RESULTS AND CONCEPTUAL SITE MODEL EVALUATION

The following evaluation builds on the findings of the 2019 ACAR to address key CSM topics based on 2020 results. Specific CSM topics addressed include groundwater DQOs from the Final PSVP (refer to PSVP Section 4.3) and other significant findings. These topics include:

1. An overview of the extent of mine-influenced water based on 2020 results (Section 4.4.1).
2. A refinement of the Post-Phase 1 CSM based on the interpretation of a low-permeability layer beneath Tailings Pile 3 and areas to the east (Section 4.4.2).
3. Confirmation of continued trends in water levels and vertical hydraulic gradients within Tailings Piles 2 and 3 observed in 2019 results (DQO 1A; Section 4.4.3).
4. Further evaluation of groundwater-surface water interactions along Tailings Piles 2 and 3 and downstream to staff gauge SG-11 to assess gaining and losing conditions in

Railroad Creek as a basis for water quality compliance monitoring locations (DQO 1B; Section 4.4.4).

5. Evaluation of the source of COCs in wetlands surface water adjacent to Tailings Pile 3 in response to the 2019 and 2020 water data showing elevated COCs in this area (Section 4.4.5).
6. Evaluation of barrier wall hydraulic conditions as part of the review of overall Site hydrogeologic conditions (Section 4.4.6).

Additional details on the post-Phase 1 Remedial Action CSM, including an updated overview of site geology, hydrogeology, groundwater-surface water interactions, metals transport and attenuation, are provided in the 2019 ACAR. The CSM summary in the 2019 ACAR builds upon the detailed CSM developed following the 2008 field season (URS 2009) and subsequent data collection activities (URS 2010), baseline evaluation (MWH 2013b), and review of post-remedy data (Rio Tinto 2018 and 2019, Floyd|Snider 2020e).

4.4.1 Approximate Extent of Mine-Influenced Water

The approximate extents of mine-influenced water in the Shallow, Intermediate, and Deep Zones are shown on Figures 4.36, 4.37, and 4.38, respectively. The approximate extents of mine-influenced water shown are inferred based on exceedances of surface-water based criteria in groundwater, porewater, seeps, and wetlands surface water, using the greatest concentrations measured in 2020 spring and fall sampling for each location. This approach has been taken to illustrate approximate areas with mining-influenced water, even though surface water criteria are not expected to be the applicable ROD compliance criteria in all areas of the Site. The approximate extents shown are representational, because some areas are exaggerated to show overlapping extents. No impacts to Railroad Creek surface water should be inferred from the extents shown; locations with potential discharge of groundwater to surface water are discussed in the CSM evaluation. In addition and because groundwater is contained, the extent of mine-influenced water is not shown beneath the Lower West Area, Tailings Pile 1, and areas south of these locations and west of Copper Creek, or south of the barrier wall along Tailings Pile 2 where data are unavailable.

The extent maps reinforce and provide a visual illustration of the existing CSM. The area of greatest impact to Shallow Zone groundwater that is outside of the barrier wall and GWCS containment system is primarily limited to the footprint of Tailings Piles 2 and 3. To the east of this area, mine-influenced water generally moves downward into and remains within the Intermediate Zone as it migrates to the east. Farther downgradient, where the aquifer thins and Intermediate Zone groundwater flows upward, mine-influenced water is present in Shallow Zone groundwater, in the area where discharge to Railroad Creek is understood to occur, primarily between SG-9 and SG-10.

4.4.2 Low-Permeability Layer beneath Tailings Pile 3 and Areas to the East

This section describes the technical basis for the interpretation of a low-K layer below Tailings Pile 3 and areas to the east. This finding is a refinement of the post-Phase 1 CSM, which provides additional detail and explanation for observed conditions, including the depth of elevated COC concentrations in groundwater. The interpretation is based on two lines of evidence: head differences between deep and intermediate/shallow well completions, and lithologic observations from review of existing well logs. Well logs reviewed are included in Appendix L. The approximate depth, thickness, and extent of the low-K layer are shown in cross section on Figures 4.39 through 4.41. A summary of the two lines of evidence are provided below.

4.4.2.1 Head Differences

Table 4.13 summarizes average head differences between the shallowest and deepest screen depths for selected well clusters between DS-15 and DS-9 and a calculation of vertical gradients from the September 24, 2020, water level snapshot. Observations from boring logs are summarized in the table for context. The head differences are illustrated spatially in Figure 4.42, which shows the difference in head along a transect from well cluster DS-15 to well cluster DS-9 based on September 24, 2020, water levels. Key observations of the distribution of head differences include the following:

- Head differentials up to 15.47 feet were measured during the September 24, 2020, synoptic water level measurements that provide a single-day snapshot of water levels.
- The synoptic water level elevations are similar to average head differences observed for the full period or record at each well cluster. This similarity between the synoptic and long-term average differences suggests that the head differences are a consistent hydrogeologic feature.
- The greatest head differentials and corresponding downward vertical gradients between the Shallow/Intermediate and Deep Zones are measured at well clusters DS-18, DS-13, and NRC-3R, which is in the area where a low-K layer is interpreted to be present. This is illustrated in Figure 4.42. Well clusters upgradient of DS-18 are completed above the expected elevation of the low-K layer and show smaller vertical gradients.
- Well DS-12D is completed several feet above where the low-K layer is noted in the directly adjacent DS-13D well log and the water level elevations are more similar to those at DS-13I and DS-12I than at DS-13D.
- Head differences decrease downgradient toward the discharge area at Railroad Creek east of DS-9 (Figure 4.42).

The large differences in head measured in the Shallow/Intermediate Zone compared to the Deep Zone suggest the low-K layer extends from upgradient of DS-18 to the vicinity of DS-9. The large and consistent head differences between two screens at these monitoring locations strongly suggests that a lower hydraulic conductivity zone between them limits pressure equilibration

between the Shallow/Intermediate Zones and the Deep Zone. That is, without the impedance resulting from the occurrence of a low-K unit, relative hydraulic head differences in this area would be of similar magnitude to those seen elsewhere across the site (refer to Figure 4.42).

4.4.2.2 Geologic Observations

Geologic logs for wells in the area between DS-15 and DS-9 were reviewed for the presence of lithologies expected to have lower hydraulic conductivity above the deep well screen intervals (e.g., glacial deposits). Where observed, the logs were also reviewed for occurrence of similar lithologies throughout the vertical section at that location. General observations from this review are summarized below.

Lithologies consistent with the presence of a low-K layer were observed at or within a few feet of the logged contact between alluvial and underlying glacial units. Observations included occurrence of 1-foot-thick intervals of silt (DS-18) or dense silts with moderate to medium plasticity. Lithologies outside of this interval, unless specifically logged as glacial till (mostly at the bedrock contact) or overbank deposits (mostly in the vadose zone) were loose and had lower plasticity, if noted in the log. At DS-18 the log shows pH increasing from 5.0 to 7.6 across the 4 feet where the silt layers are observed. Lithologies consistent with the low-K layer are not described in boring logs DS-15, DS-16, and DS-17; however, these borings terminated above the expected elevation of the low-K layer.

The combined head and lithologic observations suggest the presence of a silty/clayey interval near the transition from glacial to overlying alluvial materials. The low-K layer or silty zone likely pinches out against the rising bedrock surface to the west. There are few borings to the east to constrain the extent, but the low-K layer appears to have less hydraulic influence at and east of DS-9. The presence of the low-K layer also provides a conceptual model to explain the lack of depressed pH and elevated COCs in the deeper well completions downgradient of Tailings Pile 3 despite the observed strong downward vertical gradient (i.e., this low-K layer impedes/prevents migration of mine-impacted water to depth).

4.4.2.3 Recommendations Based on Low-K Layer Finding

This refinement of the CSM provides additional detail and explanation for observed conditions and is in agreement with the previous understanding of groundwater flow and contaminant distribution. The low-K layer has been integrated into the updated numerical groundwater model that is being used to evaluate the Phase 2 Remedial Action required under the ROD, including potential alternatives to a fully-penetrating barrier wall and GWCS. Additional work may be undertaken to evaluate and design the Phase 2 Remedial Action, including potential investigation and confirmation of the low-K layer.

4.4.3 Tailings Piles Water Levels and Vertical Gradients

Water level and VWP results from 2020 monitoring confirm the 2019 findings concerning the changes in water levels in the tailings piles following the Phase 1 Remedial Action. Although

precipitation records (accessed at www.ncdc.noaa.gov) indicate that 2020 was a wetter year than 2019 at the Site, the water level data indicate a continuation of post-Phase 1 water levels in the contained portion of the tailings piles (Tailings Piles 1 and 2) that are generally similar to or increased from pre-Phase 1 levels, and confirm the continuation of the expected decrease in water levels and corresponding lessening of downward gradients at Tailings Pile 3 following the Phase 1 Remedial Action. Decreasing water levels and lessened vertical gradients within Tailings Pile 3 are expected to result in reductions in mass loading to underlying groundwater over time.

4.4.3.1 Tailings Pile Water Level Range Comparison

Water levels were generally higher in tailings piles monitoring wells in 2020 measurements (refer to Table 4.3) than in 2019 measurements when comparing events of the same season (refer to Table 4.3 in the 2019 ACAR for 2019 water levels; Floyd|Snider 2020f). Increases between 2019 and 2020 were generally greater between spring events than fall events, at locations in the interior of the tailings piles, and increases over this period were also greater in monitoring wells screened in the alluvium than in tailings. The seasonal rise and fall of water levels is consistent year to year, with some variation between measurements during spring and fall events due to the timing of measurement and the amount of snowmelt through the spring freshet. Monitoring well hydrographs showing data from June 2019 through October 2020 (Figures 4.20 through 4.29) illustrate variability between spring freshet conditions in both years. Figures 4.43 through 4.45 show changes in water levels over time in monitoring wells in each of the three tailings piles.

Even with a slight rise in water levels compared to 2019, the data show a general continuation of the water level and gradient conditions that have developed following the Phase 1 Remedial Action. 2020 water levels are within the ranges of water levels following the Phase 1 Remedial Action described in the 2019 ACAR (refer to Table 4.3) and Figures 4.43 through 4.45. 2020 water levels and VWP head measurements in Tailings Pile 1 range from 3,185 to 3,234 feet amsl, squarely within the range of post-Phase 1 Remedial Action water levels (refer to Figure 4.43). In Tailings Pile 2, 2020 water levels and head measurements range from 3,169 to 3,236 feet amsl[4], the high end of which exceeds the high end of the range from 2019 (3,231 feet amsl in TP2-14) by about 5 feet (refer to Figure 4.44).

Most significantly for the post-Phase 1 CSM, the 2020 water levels in Tailings Pile 3 interior monitoring wells range from 3,148 to 3,157 feet amsl, which is consistent with the range of 2019 water levels measured in Tailings Pile 3. Water levels along the perimeter of Tailings Pile 3 had water levels outside this range, including slightly higher water levels at DS-16S (3,159 feet amsl based on manual measurements), and lower water levels in the Deep Zone (as low as 3,132 feet amsl at DS-18D). Tailings Pile 3 water levels therefore continue to show declining water level elevation ranges since the Phase 1 Remedial Action and lower overall maximum water elevations. Assuming similar porosity post-construction, the lower water levels indicate a decrease in storage within Tailings Pile 3. This apparent decrease in water levels and storage is consistent with

[4] Water levels reported in 2019 and 2020 for TP2-16S reflect water in the well sump and are not consistent with the water table surface.

expected changes following diversion of surface water run-on to the tailings piles, covering and recontouring the tailings piles, and particularly diversion of surface water runoff and recharge from the South Tailings Pile 3 Borrow Area. The reduced water levels in Tailings Pile 3 are expected to gradually decrease leaching and COC mass loading downgradient of Tailings Pile 3 over time.

4.4.3.2 Tailings Pile Vertical Gradient Comparison

Vertical hydraulic gradients in the tailings piles are consistent between 2019 and 2020 and with previous results indicating predominantly downward vertical gradients. As with water levels, the seasonal variation in vertical gradients is also similar on a year-to-year basis. The continuity of the gradients between 2019 and 2020 suggest both years are representative of post-Phase 1 conditions. Localized areas of upward vertical gradients are present in areas of the tailings piles including between the Shallow and Intermediate Zones at the east end of Tailings Pile 3, discussed in Sections 4.4.3 and 4.4.4. Transient upward gradients were observed for periods in some locations, described below, as the alluvium underlying the tailings responded to hydraulic connection to upgradient areas.

Vertical gradients in Tailings Pile 1 during both spring and fall were generally unchanged in 2020 compared to 2019. As shown in Table 4.7 and Figures 4.8 and 4.14 through 4.17, the overall direction of vertical gradients at VWPs 68, 69, 70, 71, and 74 is downward and at a similar magnitude as in previous measurements. The hydrographs in Figure 4.15 indicate that the BW-VWP-71 vertical gradient is briefly upward in the spring of 2020. The fall 2020 direction of vertical gradients at BW-VWP-72 shown in Table 4.7 differs from fall of 2019, though the 2019 result appears to be an outlier out of the last five measurements shown in Table 4.7, and hydrographs in Figure 4.16 indicate that the pair (BW-VWP-72b and BW-VWP-72c) is essentially neutral in the fall. Vertical gradients remain consistently upward at BW-VWP-73, located on the Railroad Creek (south) side of the barrier wall, and BW-VWP-75, located on the Copper Creek (east) side of the wing wall.

Vertical gradients in Tailings Pile 2 are shown in Table 4.6 (monitoring wells), Table 4.7 (VWPs), and Figures 4.8, 4.18, and 4.19 and are generally consistent throughout 2019 and 2020. Vertical gradients in monitoring wells in the interior of Tailings Pile 2 at the TP2-13 and TP2-16 monitoring well clusters remain downward. The vertical gradient between the Shallow and Intermediate Zone at DS-15 was downward during all field monitoring events; however, hydrographs in Figure 4.22 from this location indicate a short period of upward gradient in the spring of 2020 (discussed further in Section 4.4.3.2). The direction of vertical gradients at BW-VWP-78 (Figure 4.19), located inside the barrier wall near its eastern terminus, remains downward throughout the year, and at a similar magnitude as 2019. The vertical gradient direction at BW-VWP-76 (inside the barrier wall) shown on Figure 4.18 and BW-VWP-79 (outside the barrier wall near its eastern terminus) shown on Figure 4.19 remain upward and at a similar magnitude as in previous measurements.

Tailings Pile 3 vertical gradients at monitoring well clusters remain generally consistent throughout 2019 and 2020 monitoring events. With few exceptions, vertical gradients are downward and at similar magnitudes during monitoring events throughout Tailings Pile 3 interior wells (TP3-12, TP3-14) and perimeter wells (DS-16, DS-17, DS-18, DS-12, and DS-13). The primary exceptions are the slight upward gradients that have consistently been measured between the Intermediate and Shallow Zones at DS-12 and DS-13, which is discussed further in the context of the Wetlands East of Tailings Pile 3 in Section 4.4.4. In addition, hydrograph data (Figure 4.22) indicate a brief period of upward gradient between DS-17S and DS-17I, which is discussed further in the context of groundwater-surface water interactions in Section 4.4.3.

4.4.3.3 Recommendations Based on Tailings Pile Water Levels and Vertical Gradients

The comparison of historical and recent water levels, and vertical gradient data collected following the Phase 1 Remedial Action, support the CSM understanding of reduced mass flux from Tailings Pile 3. The DQO 1A has been adequately addressed based on 2 years of post-Phase 1 data collection. It is recommended that the current program of manual and datalogger water-level measurements be continued as part of the PSVP program.

4.4.4 Groundwater-Surface Water Interaction along Tailings Piles 2 and 3 and Downstream to Staff Gauge SG-11

Groundwater-surface water interactions in the study area include reaches of Railroad Creek with both gaining conditions (groundwater discharges to surface water) or losing conditions (surface water infiltrates to groundwater). Groundwater-surface water interaction is an important element of the CSM and has been refined with additional data collected over the course of the project, most recently in the 2019 ACAR, based on historical data and data collected in 2018 and 2019 following the completion of the Phase 1 Remedial Action. Despite the addition of the Phase 1 barrier wall and GWCS north of Tailings Pile 1 and the western half of Tailings Pile 2, and rerouting of a section of Railroad Creek adjacent to Tailings Pile 3, the overall pattern of groundwater-surface water interaction between the alluvial aquifer and Railroad Creek remains effectively the same downgradient of the barrier wall, with some apparent variability. Findings presented in this section provide additional details to this understanding of groundwater-surface water interaction based on 2020 data.

The pre-Phase 1 Remedial Action CSM for groundwater-surface water interactions showed Railroad Creek to be a year-round losing stretch of creek along a portion of Tailings Pile 2 and along Tailings Pile 3 to approximately SG-8 and a year-round gaining stretch of creek from approximately SG-9 to SG-11. In the 2019 ACAR, this CSM was updated based on review of hydraulic head measurements from manual water level measurements and transducer dataloggers and corresponding vertical gradients, comparative head measurements between staff gauges and well points at pairs along Railroad Creek, and upwelling surveys from fall 2018 (Arcadis 2018) and spring 2019 (Floyd|Snider 2020f).

To further the understanding of current conditions following the completion of the Phase 1 Remedial Action, additional hydraulic head measurements from manual measurements in 2020 and transducer dataloggers through October 2020, vertical gradients, and comparative head measurements between staff gauges and well points at pairs along Railroad Creek were evaluated. Stilling well transducer data from locations instrumented in the fall of 2019 were used in the evaluation. In addition, measurements from specific conductivity dataloggers that were installed in select shallow monitoring wells in June 2020 were reviewed for additional indicators of groundwater-surface water interactions. Specific conductivity dataloggers were installed for this purpose based on an Agency request following discussion of the 2019 ACAR results.

4.4.4.1 Pre-Phase 1 Groundwater-Surface Water Interactions CSM

In the detailed Site CSM developed in 2009, prior to the implementation of the Phase 1 Remedial Action, gaining conditions were identified north of Tailings Pile 1 and northwest of Tailings Pile 2 to approximately the location of the eastern edge of the barrier wall. In this vicinity, the groundwater-surface water interactions transition to losing conditions along Tailings Pile 2 (URS 2009). The results of subsequent work showed that the losing conditions extended downstream to the area near staff gauge SG-8, and the area farther downstream near staff gauges SG-9 and SG-10 was found to be a year-round gaining stretch of Railroad Creek (URS 2010). Refer to Figure 4.1 for locations. The transition to a gaining reach in the vicinity of SG-9 and SG-10 was attributed to, and is likely related to, a decrease in alluvial aquifer transmissivity as the alluvial aquifer thins eastward and bedrock rises and is exposed at the ground surface. The alluvial aquifer thickness decreases from between 125 to 134 feet at wells NRC-3, DS-4, and NRC-6 to 98 feet at well DS-9D. Bedrock crops out along the south bank of Railroad Creek at location RC-5A (URS 2010) east of SG-11, which further supports the decreasing thickness of alluvium in this area. Refer to cross section A-A' in Figure 4.39.

Additional data collected and evaluated during the baseline water quality conditions report (MWH 2013b) confirmed these approximate gaining and losing stretches of Railroad Creek prior to the Phase 1 Remedial Action. The 2013 CSM was effectively approved by the Agencies and subsequently relied on for Phase 1 remedial design in that the location of the Phase 1 barrier wall is coincident with the end of the year-round gaining conditions along Railroad Creek. The CSM was based on lines of evidence from thermal profiling, vertical stratification in porewater quality, upward gradients indicated by staff gauge and head measurements at staff gauge/well point pairs, and the changing thickness of the aquifer (thickening eastward along Tailings Pile 2 and Tailings Pile 3 and then thinning between the eastern extent of Tailings Pile 3 and the SG-10 area).

4.4.4.2 Vertical Hydraulic Gradients Adjacent to Surface Water

Measurements of vertical gradient at or near the groundwater-surface water interface indicate if the nearby surface water is a gaining or losing reach, with gaining reaches indicated by an upward hydraulic gradient and losing reaches indicated by a downward hydraulic gradient. The relationship between Shallow Zone well screens, Shallow Zone water levels (i.e., well points), and Railroad Creek across a large portion of the Site are shown on cross section A-A' in Figure 4.39.

Table 4.6 summarizes vertical hydraulic gradients for paired monitoring wells in the site monitoring network. Table 4.7 summarizes vertical hydraulic gradients for VWP pairs between Railroad Creek and the Lower West Area, Tailings Pile 1, and the west side of Tailings Pile 2. Vertical gradients for manual water levels collected in spring and fall of 2020 are illustrated on Figure 4.8. Vertical gradients for monitoring wells equipped with transducers can be read from hydrographs on Figures 4.20 through 4.29, and vertical gradients for VWPs can be read from hydrographs on Figures 4.10 through 4.19. Locations of VWPs are shown on Figure 4.9.

Hydrographs from VWP locations outside/north of the barrier wall (i.e., Railroad Creek side) provide additional detail on changes to vertical gradients, and gaining and losing conditions, throughout the year beyond the spring and fall VWP measurements evaluated in the 2019 ACAR. Observations from review of these data from west to east, starting at the west end of the barrier wall, include the following:

- Vertical gradients observed outside/north of the barrier wall (i.e., Railroad Creek side) were consistently upward near the upgradient (west) edge of the barrier wall at BW-VWP-61. Downward gradients were observed between the two shallowest intervals (19 and 25 feet below ground surface [bgs]) in the fall at BW-VWP-61 (Figure 4.8), though VWP hydrographs (Figure 4.10) indicate these (shallowest) two intervals are essentially neutral relative to each other and that upward gradients are present year-round between the (deepest) 34.4-foot interval and both shallower intervals.
- Vertical gradients outside/north of the barrier wall along the Lower West Area and the western edge of Tailings Pile 1 (BW-VWP-65, BW-VWP-67, and BW-VWP-69) were downward throughout the period reviewed, similar to 2019 and consistent with losing conditions along this stretch of Railroad Creek. Slight upward gradients observed at BW-VWP-69 (Figures 4.8 and 4.14) between the two shallowest intervals (21 and 40 feet bgs) in the spring (2019 and 2020) are not representative of the gradients with deeper groundwater at this location, which are consistently downward relative to groundwater at 65 and 87 feet bgs.
- Vertical gradients outside/north of the barrier wall appear to transition in the vicinity of BW-VWP-71, in the middle of Tailings Pile 1, from the year-round losing conditions described above to seasonally gaining conditions in the spring. At this location, vertical gradients during the period reviewed shifted from downward to relatively neutral in February and then distinctly upward from April until June, when downward gradients resumed for the remainder of the summer and into the fall (refer to Figure 4.15).
- Vertical gradients outside/north of the barrier wall at the east end of Tailings Pile 1, near Copper Creek, and on the west side of Tailings Pile 2 (BW-VWP-73, BW-VWP-75, and BW-VWP-79) were upward throughout the year, consistent with gaining conditions along this stretch of Railroad Creek also observed in 2019 data. BW-VWP-77 is an exception to this pattern: slight upward gradients were observed for most of the year, from February to September, with slight downward gradients observed in the fall and early winter (Figure 4.18).

Hydrographs at well clusters DS-15 through DS-18, located along the south bank of Railroad Creek at the north side of Tailings Piles 2 and 3 and east of the barrier wall, provide a more detailed picture of vertical gradients between Shallow and Intermediate Zone groundwater than the spring and fall manual measurements but confirm the previous finding of a predominantly downward hydraulic gradient between the Shallow and Intermediate Zones. Newly available surface water stage data collected manually from staff gauges adjacent to DS-15S, DS-16S, and DS-18S in fall of 2020 provide an important indicator of groundwater-surface water interactions in fall conditions. Data from the period June 2019 through September 2020 are presented in Figures 4.20, 4.21, and 4.23. This confirms that Railroad Creek is predominantly losing water to groundwater along this reach, with the primary exception noted for DS-15 below:

- At the well cluster DS-15, upward vertical gradients were observed from March through approximately mid-June, when vertical gradients became essentially neutral until returning to downward in August. The September 2020 measurement at the new stilling well (DS-15-STW) installed adjacent to DS-15 indicates surface water to be approximately 1.1 feet lower in head than DS-15S at the time of the measurement, which indicates gaining conditions (refer to Figure 4.20). Because Railroad Creek surface water elevation varies by several feet in this vicinity throughout the year, as measured by STW-1, additional data immediately adjacent to DS-15 at DS-15-STW are needed to assess the consistency of gaining conditions.
- Relatively steep downward gradients (typically greater than 2 feet head difference) were observed throughout the period at the DS-16 well cluster. The September 2020 measurement at the new staff gauge (DS-16-SG) installed adjacent to DS-16 indicates surface water to be approximately 1 foot higher in head than DS-16S at the time of the measurement, which confirms losing conditions (refer to Figure 4.21).
- Downward gradients were observed at the DS-17 well cluster throughout the period, except for a brief timeframe where slightly upward, neutral, and slightly downward gradients are observed in May and June. The DS-17 cluster is located near a meander in Railroad Creek, and given the distance to surface water (approximately 200 feet) and small and variable head differences, these results do not suggest gaining conditions (refer to Figure 4.22).
- Relatively steep downward gradients (typically greater than 1 foot head difference) were observed throughout the period at the DS-18 well cluster. The September 2020 measurement at the new stilling well (DS-18-STW) installed adjacent to DS-18 indicates surface water to be approximately 1.2 feet higher in head than DS-18S at the time of the measurement, which confirms losing conditions (refer to Figure 4.23).

Hydrographs for well clusters DS-12 (Figure 4.25) and DS-13 (Figure 4.24), located at the east end of Tailings Pile 3, provide further confirmation of vertical gradient findings from 2019:

- Well cluster DS-12 had a consistently upward, slight (typically 0.01 feet per foot, about 0.1 foot head difference) gradient between the Intermediate and Shallow Zone throughout the period. The transducer installed at DS-12D in June of 2020 indicates

stronger downward gradients (0.02 to 0.0.8 feet per foot, up to approximately 2 feet of head difference) between the intermediate and deep zones, which is attributed to a low-permeability zone between these units (refer to Section 4.4.1).

- A similar pattern of slight upward gradients (0.007 to 0.02 feet per foot) were observed at well cluster DS-13 between Shallow and Intermediate Zones, although neutral and downward gradients were observed between approximately June to August 2020. Steep downward gradients (generally 0.25 to 0.33 feet per foot, with head differences of greater than 10 feet) were also observed between the Intermediate and Deep Zones, which is attributed to a low-permeability zone between these units (refer to Section 4.4.1).
- Shallow water level elevations in DS-12S and DS-13S (approximately 3,145 feet amsl in June 2020 and 3,144 feet amsl in September 2020) were greater than the surface water elevation measured in the wetland immediately east of Tailings Pile 3 at staff gauge SG-WL1 (approximately 3,143.5 feet amsl in June 2020 and 3,143.3 feet amsl in September 2020; refer to Table 4.3). These horizontal gradients between shallow groundwater and wetlands surface water, and the slight upward vertical gradients that include surface water head, suggest groundwater is upwelling locally and discharging to this wetland.
- The occurrence of a local upward gradient at the base of the steep Tailings Pile 3 slope would be generally consistent with local topography and does not necessarily suggest upwelling directly to Railroad Creek farther east. This potential local upwelling zone is bounded by bedrock to the south and by a losing reach of Railroad Creek to the north, as indicated by consistent downward vertical gradients at well clusters DS-18 and NRC-3R (Figure 4.8). Site features, such as seep collection boxes at the base of Tailings Pile 3, may interrupt shallow groundwater and have the potential to affect the vertical gradients in this area. Refer to Section 4.4.4 for further discussion of groundwater-surface water interactions at the Wetlands East of Tailings Pile 3.

Hydrographs for well clusters NRC-3R (Figure 4.26), DS-3/DS-4 (Figure 4.27), and DS-9 (Figure 4.28) located north of Railroad Creek and downgradient of Tailings Pile 3 confirm previous findings from 2019:

- Well cluster NRC-3R, located northeast of Tailings Pile 3 showed downward vertical gradients throughout the period, again consistent with a downward gradient and losing conditions in the adjacent reach of Railroad Creek. This well cluster is immediately across Railroad Creek from the Wetlands East of Tailings Pile 3. As was observed at the DS-12 and DS-13 clusters, downward gradients between both Shallow and Intermediate Zones and the Deep Zone were noticeably steeper here (0.12 to 0.29 feet per foot, with up to approximately 12 feet of head difference), which is attributed to a low-permeability zone discussed in Section 4.4.1.

- Consistently downward gradients were observed at well clusters DS-3 and DS-4. The monitoring well cluster DS-4 is closer to Railroad Creek and is likely more representative of groundwater-surface water interactions.
- Well cluster DS-9 shows downward gradients between the Shallow and Intermediate Zones, consistent with losing conditions in Railroad Creek, and upward gradients between the Deep and Intermediate Zones, consistent with upward groundwater flow due to the bedrock surface rising and the aquifer thinning to the east.

4.4.4.3 Specific Conductance in Shallow Groundwater

Specific conductance (specific conductivity normalized to 25 degrees Celsius) meters with dataloggers that record measurements at 20-minute intervals at five locations (DS-15S, DS-16S, DS-17S, DS-18S, and DS-13S; refer to Figures 4.20 through 4.24) provide another tool to support evaluation of groundwater-surface water interactions. Based on the CSM, tailings provide a source of ions and therefore elevated specific conductance to groundwater, and Railroad Creek surface water is low in specific conductance by comparison. Specific conductivity in interior tailings piles wells (refer to Table 4.8) ranged from approximately 107 to 2,392 microsiemens per centimeter (µS/cm) in 2020 monitoring, while Railroad Creek specific conductivity (refer to Table 2.1) ranged from approximately 16 to 68 µS/cm. Increasing specific conductance in a shallow groundwater monitoring well adjacent to Railroad Creek, therefore, would be expected to indicate either an increase in deeper groundwater upwelling to shallow groundwater or increasing horizontal groundwater flow from beneath the upgradient tailings piles relative to other sources. Decreasing specific conductance in a shallow monitoring well adjacent to Railroad Creek would be expected to indicate increasing surface water and/or precipitation recharging shallow groundwater relative to other sources.

Specific conductance measurements from the dataloggers are available beginning at approximately peak Railroad Creek flow conditions in June 2020. Based on the range and pattern of specific conductance, as explained below, the results generally fit into two groups:

- Results for DS-15S and DS-13S are consistent with neutral or gaining conditions (groundwater mixing with surface water in the hyporheic zone or as it discharges to surface water).
- Results for DS-16S, DS-17S, and DS-18S are consistent with losing conditions (surface water discharging to and mixing with groundwater in the hyporheic zone).

The overall range of specific conductance at DS-15S and DS-13S is more elevated than at DS-16S, DS-17S, and DS-18S, indicating a greater contribution from groundwater affected by seepage from tailings in DS-15S and DS-13S than the latter group of wells. Specific conductance at DS-15S ranged from approximately 700 to 1,400 µS/cm and at DS-13 ranged from approximately 250 µS/cm to 750 µS/cm. In contrast, the ranges for DS-16S, DS-17S, and DS-18S more closely match Railroad Creek, with a combined range between approximately 47 and 378 µS/cm, with values less than 100 µS/cm for most of the period monitored (refer to Figures 4.20 through 4.24).

The change in specific conductance during the period monitored follows two general patterns for the two groups of wells.

The specific conductance plots for DS-16S, DS-17S, and DS-18S show steeply decreasing specific conductance trends in the weeks immediately following the peak in high flow conditions in Railroad Creek and the groundwater system (approximately late June to mid-July), followed by a stabilization or slower rate of decline throughout the summer months. This is consistent with substantial recharge of surface water into groundwater (and subsequent increased mixing of surface water with underlying groundwater) during peak flow along the stretch of Railroad Creek from DS-16S to DS-18S, followed by baseline losing conditions. A longer span of data collection is expected to show specific conductance slowly increase in these wells as downward vertical gradients lessen in the spring.

At DS-15S and to a lesser extent at DS-13S, the decrease in specific conductance appears to be a transient response to the spring freshet diluting shallow groundwater. At DS-15S, this temporary drop of specific conductance in June and into July is followed by an increase in specific conductance back to the levels observed during peak flow conditions, indicating a baseline contribution from upgradient groundwater, which is reflected in groundwater quality (refer to Table 4.8). Neutral to downward vertical gradients are observed during this latter period of increasing specific conductivity, and this indicator of losing conditions suggests no discharge of groundwater to Railroad Creek is occurring during this period. Additional measurements of Railroad Creek stage, such as at the newly installed stilling well DS-15-STW, would provide greater certainty to this finding. At DS-13S, the decrease of specific conductance during the freshet is less substantial than at other locations monitored, which may be a function of its location further from Railroad Creek, and may reflect interception of shallow groundwater by the East Seeps Collection Structures. Specific conductance at DS-13S does not return to pre-freshet levels following the drop, but specific conductance during the period following peak flow remains closely tied to fluctuations in groundwater levels, suggesting a correlation with groundwater flux from higher specific conductance groundwater upgradient beneath Tailings Pile 3.

4.4.4.4 Staff Gauge/Well Point Pairs

A comparison of head measurements in well points and adjacent staff gauges from pairs along Railroad Creek downgradient of Tailings Pile 3 from June 5 and September 24, 2020, are shown on Table 4.4 and on the fall 2020 shallow potentiometric map (Figure 4.3). Because of the steep gradient of Railroad Creek, the results are sensitive to the relative placement of the staff gauge and the well points but provide an additional indication of gaining and losing conditions. Several monitoring locations that were damaged over the winter prevented measurements in the spring event. Spring measurements show relative water levels consistent with losing conditions at SG-14 and SG-15 pairs and gaining conditions at SG-10 and SG-11 pairs. Fall results are consistent with losing conditions between SG-14 and SG-17 pairs and with gaining conditions at the SG-10 pair. Fall results indicate very small head differences at the SG-18 and SG-11 pairs within the margin of measurement error, which are generally consistent with neutral conditions.

The observed head differences at well point and staff gauge pairs closest to Tailings Pile 3 were notably larger than farther downgradient, which is consistent with the CSM that the steepest downward vertical gradients are present in this area, where bedrock depths are greater, the aquifer thickens, and transmissivity increases compared to farther upgradient and downgradient. The head difference at staff gauge/well point pair SG-14 was 2.25 feet in the spring and 0.70 feet in the fall; the head difference at the SG-15 pair was 1.12 feet in the spring and 1.86 feet in the fall. Consistent with observations in 2019, water levels were higher in the SG-7R well point (north side of Railroad Creek) than in adjacent surface water, although gaining conditions in this location are not supported by other data including downward vertical gradients at nearby monitoring wells (NRC-3R), and may instead reflect the local shallow groundwater conditions influenced by the steep topography of the north bank.

Aside from the SG-7R measurements, these results are generally consistent with the current CSM and the CSM prior to the Phase 1 Remedial Action of gaining and losing stretches (summarized in the 2019 ACAR), except that they again show losing conditions extending past SG-9 to SG-17, a finding that is repeated from 2019. This indicates some variability in the exact boundary of the transition from losing to gaining conditions, which is thought to occur in the SG-9 area, but which appears to vary from upstream to SG-8 or downstream to SG-17 areas.

4.4.4.5 Recommendations Based on Groundwater-Surface Water Interaction Evaluation

The additional data collected following implementation of the Phase 1 Remedial Action, including transducer (including VWP) measurements along the entire length of the Lower West Area and tailings piles, specific conductance datalogger measurements along the entire unwalled portion of the tailings piles, and well point/staff gauge pairs along the reach of Railroad Creek downstream of the tailings piles, further confirms the previous CSM understanding of groundwater-surface water interactions and provides significantly more detail and confidence in the findings.

This program of manual and datalogger water-level measurements and specific conductance measurements should be continued as part of the PSVP program, and it is expected to provide additional insight based on targeted additional locations and longer spans of data for locations where data collection began in 2020. Stilling well transducer data from additional locations that were deployed in Railroad Creek immediately adjacent to the monitoring well clusters at DS-15 and DS-18, and in the Wetlands East of Tailings Pile 3 at SG-WL1-STW in September of 2020 will support a more definitive answer to whether groundwater discharges to surface water during periods of upward vertical gradients. Similarly, specific conductance data over the winter and spring months will support a greater understanding of groundwater flow, particularly in the DS-15S area.

4.4.5 Source of Elevated Contaminants of Concern to Wetlands East of Tailings Pile 3

In 2020, as in 2019, elevated COCs were measured in wetlands surface water locations east of Tailings Pile 3. Tailings present in the wetlands soil were identified as a potential source of the elevated COCs, which represent two areas of the wetlands (refer to Figures 4.31, 4.32, and 4.33):

- SW-TP3-East1 is located in the western area of the wetlands, which has undergone remediation and restoration and is located close to the DS-12 and DS-13 monitoring well clusters, the East Seeps Collection Structures and low permeability walls, and the perforated pipe discharging clean intercepted water from the South Tailings Pile 3 Borrow Area diversion channel (refer to cross sections B-B' in Figure 4.40 and C-C' in Figure 4.41).
- SW-TP3-East2 is located farther east and downstream from SW-TP3-East1 in the southeasterly-trending channel of the wetland, where water discharges to a culvert beneath the East Bypass Road. Tailings remain in shallow soil in this area, and iron precipitate is visible at the surface.

Samples collected from SW-TP3-East1 had slight exceedances of the criteria for copper during all three 2020 monitoring events, in addition to a slight exceedance of the criterion for iron in the summer 2020 monitoring event. The pH of the SW-TP3-East1 samples ranged from 6.5 to 6.9. At location SW-TP3-East2, aluminum, cadmium, copper, iron, and zinc exceeded surface water-based criteria from the ROD (adjusted for water hardness for cadmium, copper, lead, and zinc) in spring and summer 2020 monitoring events, and exceeded criteria for aluminum and iron in the fall 2020 monitoring event. The pH of the SW-TP3-East2 samples ranged from 4.7 to 5.6. Refer to Table 4.12 and Figures 4.31 (spring), 4.32 (summer), and 4.33 (fall), cross sections B-B' (Figure 4.40) and C-C' (Figure 4.41), and Section 4.6.3.4 for further discussion of these results.

To identify potential sources of elevated COCs detected at locations SW-TP3-East1 and SW-TP3-East2, hydraulic gradients and the remediation and restoration of the wetlands during the Phase 1 Remedial Action were evaluated in the 2019 ACAR (Floyd|Snider 2020f). The results suggested that a local source from tailings in shallow wetlands soil outside the remediated area may explain the elevated COC concentrations. Elevated metals concentrations and low pH were measured in the sample SW-TP3-East2 collected from the unremediated area, while the water quality of the wetlands surface water samples collected from the remediated area, from location SW-TP3-East1, have comparatively lower concentrations of COC metals, with only slight exceedances of copper and iron criteria, and pH in the general range of unimpacted water.

Oxidation and dissolution of pyrite in the tailings could potentially explain the observed elevated metals, lowered pH, and iron precipitate observed at the surface of the wetland near sample location SW-TP3-East2. A field inspection to investigate shallow soil in the vicinity of SW-TP3-East2 was planned to evaluate whether local soils were a source. Subsequent document review confirmed that an investigation of tailings in shallow soil had already been completed (MWH 2013c), which confirmed the presence of tailings material throughout the wetlands in the areas that had not been excavated, and no further soil investigation was conducted. A former

remedial project manager for the Site had determined that the tailings should be left in place to prevent damage to the wetlands (USFS 2015).

While the tailings constitute an apparent source, given the upward vertical gradients observed between the Intermediate and Shallow Zones of the aquifer at DS-12 and DS-13 (refer to Section 4.4.3.2), discharging groundwater from the Intermediate Zone is considered another potential contributing source. To evaluate the potential contribution from groundwater, gradients and geochemical indicators were further considered.

4.4.5.1 Gradients as Indicators of Groundwater Discharge to Wetlands East of Tailings Pile 3

As noted in Section 4.4.3.2, vertical gradients (Table 4.6) are slightly upward at the west edge of the Wetlands East of Tailings Pile 3 between the Intermediate and Shallow Zones, and horizontal gradients (Table 4.3) between the Shallow Zone and wetlands surface water are consistent with discharge to the wetlands. Hydrographs for well clusters DS-12 and DS-13 (Figures 4.25 and 4.24), located at the east end of Tailings Pile 3, further confirm vertical gradient findings from 2019. Slight upward vertical gradients are observed between the Intermediate and Shallow Zones in both DS-12 and DS-13 clusters, with more consistently upward and greater magnitude upward gradients farther south from Railroad Creek at DS-12. Shallow water level elevations in DS-12S and DS-13S were greater than the surface water elevation measured in the wetland immediately east of Tailings Pile 3 at SG-WL1 in both June and September 2020. The horizontal gradient between shallow groundwater and wetlands surface water, and the slight upward vertical gradients that extend to surface water, suggest groundwater upwelling locally and discharging to this wetland.

Additional monitoring locations added in 2020 allow for vertical gradient measurements in the two areas of the wetlands represented by the following samples (refer to Figure 4.1):

- The well point SG-WL1-WP and stilling well SG-WL1-STW are located in the western side of the wetland, near SW-TP3-East1.
- The well point SG-WL2-WP and stilling well SG-WL2-STW are located farther east, near SW-TP3-East2.

Water level measurements in June and September 2020 (Table 4.4, Figures 4.2 and 4.3) show slight upward gradients at the SG-WL1 pair, with a head difference of approximately 0.2 feet during both events. However, measurements at the SG-WL2 pair for both events do not show a very distinct or consistent head difference, which may indicate a neutral vertical gradient at this location. Surface water at SG-WL2 was measured to be 0.01 feet higher than groundwater at SG-WL2-WP in the spring, while surface water was measured to be 0.05 feet higher in the fall. These measurements are close to the margin of error for field measurement and should be further verified in subsequent events. The results also indicate an approximate 2.5-foot head drop over the 185 feet between the two pairs, an approximate slope of the wetlands surface water channel and horizontal groundwater gradient of 0.01 feet per foot.

Discharge of groundwater to the wetlands is consistent with local topography, consistent with groundwater discharge patterns prior to the Phase 1 Remedial Action, and may be influenced locally by induced gradients downstream of the East Seeps Collection Structures (shown in cross section C-C' in Figure 4.41). For reasons described in Section 4.4.3.2, it does not appear to suggest upwelling directly to Railroad Creek farther east.

These results provide additional support for the discharge of Shallow Zone and Intermediate Zone groundwater to the western portion of the wetlands. The western portion of the wetlands area is less affected than the eastern portion of the wetlands, where vertical gradients appear to be relatively neutral, suggesting that dilution may affect the surface water impacts observed in wetlands surface water, that steeper vertical gradients may be present than those measured at the SG-WL2 pair, and/or that oxidizing tailings in the eastern portion are a significant contributing source.

4.4.5.2 Geochemical Indicators of Groundwater Discharge to Wetlands

Impacted groundwater from upgradient sources discharging into the wetland was considered as a potential source based on geochemical indicators. The water quality of groundwater in 2019 and 2020 from groups of wells located in the general flow path from Tailings Pile 3 to the wetlands were compared to the wetlands water quality using box and whisker plots, which provide a convenient way to evaluate data visually. Wells used in the comparison include shallow groundwater in contact with tailings; Intermediate Zone groundwater beneath Tailings Pile 3; and groundwater from the toe of Tailings Pile 3, where shallow and intermediate groundwater appears to mix before discharging, based on upward vertical gradients.

The sources of data (2019 to 2020) used for each water type are summarized below:

- Tailings Pile 3 Shallow Zone groundwater (tailings seepage): TP3-12S, TP3-14S
- Tailings Pile 3 Intermediate Zone groundwater: TP3-12D, TP3-14D
- Tailings Pile 3 toe mixed groundwater: DS-12S, DS-12I, DS-13S, DS-13I
- Wetlands East of Tailings Pile 3 surface water: SW-TP3-East1, SW-TP3-East2

The results are presented in the box plots in Figures 4.46 through 4.49, which show the relative concentrations of aluminum, calcium, copper, iron, pH, sulfate, and zinc, as well as the mass ratio potassium/sodium of the previously mentioned water types. The ends of each box represent the 75^{th} and 25^{th} percentiles, while the whiskers represent the range of the values for each parameter. Based on these results, some observations can be made about the characteristics of the groups:

- **Tailings Pile 3 Shallow Zone groundwater (tailings seepage):** The shallow tailings wells are characterized by high iron and calcium concentrations, relatively high pH, a high potassium/sodium ratio, and relatively low concentrations of aluminum, copper, and zinc.

- **Tailings Pile 3 Intermediate Zone groundwater:** The Intermediate Zone groundwater is characterized by a relatively low potassium/sodium ratio, low iron and sulfate concentrations, and relatively high concentrations of aluminum, copper, and zinc, and low pH relative to the shallow groundwater.
- **Tailings Pile 3 toe mixed groundwater:** Groundwater in monitoring wells at the edge of the tailing piles' footprint appears to consist of a mixture of Shallow and Intermediate Zone groundwater. Figures 4.46 through 4.49 show that the boxes for the "Mixed" category is between the "Tailings" and "Intermediate" categories for each parameter.
- **Wetlands East of Tailings Pile 3 surface water:** The wetlands surface water typically has lower COC concentrations and higher pH than the mixing zone wells, which is consistent with dilution of wetlands surface water containing groundwater from the mixing zone with the surface water recharge from the South of Tailings Pile 3 Borrow Area.

These observed water quality differences between the Shallow and Intermediate Zones are generally consistent with those noted previously (URS 2009; URS 2010; MWH 2013). Monitoring well TP3-13, which is screened at a similar elevation to TP3-12S but was not used for the box plots because the data change dramatically between the spring and fall sampling events, appears to display characteristics of both groups, depending on the season. In the fall, the water quality for TP3-13 resembles tailings seepage (high iron and calcium and relatively low aluminum, copper, and zinc), but in the spring the water quality resembles Intermediate Zone groundwater (low sulfate).

Contribution to wetlands water quality by tailings within the wetlands sediment remains an inferred source and is not ruled out by the geochemical comparison. The water quality of wetlands surface water is also consistent with mixing of shallow groundwater affected by tailings seepage and Intermediate Zone groundwater, followed by dilution with surface water from the South Tailings Pile 3 Borrow Area diversion channel. The mixed profile of water in monitoring wells at the toe of Tailings Pile 3 is another indicator, along with upward vertical gradients, of the discharge of Intermediate Zone groundwater. Intermediate Zone groundwater is inferred to be a possible source of the concentrations of copper, zinc, and aluminum and the low sodium to potassium ratio within the wetland.

4.4.5.3 Recommendations Based on Evaluation of Metals Source to Wetlands

Tailings present in shallow wetlands soil were previously identified as a source of elevated COCs to wetlands surface water (Floyd|Snider 2020f). Available data reviewed to evaluate another potential contributing source suggest that impacted upgradient groundwater may also contribute to the elevated COC concentrations in the wetland surface water. Gradient information indicates groundwater discharge to the west portion of the wetland from the Shallow and Intermediate Zones, but provides no clear indication of discharge to the more impacted area of the wetlands farther east. A comparison of geochemical profiles indicates that

Shallow Zone groundwater affected by groundwater in contact with tailings and Intermediate Zone groundwater mix near the toe of Tailings Pile 3, where they discharge to the wetland. Surface water in this western area of the wetland is diluted by the South Tailings Pile 3 Borrow Area diverted surface water. Greater COC concentrations are observed farther east in the wetlands, where similar dilution would be expected but where tailings are present in shallow soil, suggesting the importance of tailings as a source.

It is recommended that the gradient findings be confirmed through further review of gradients using transducer measurements in the wetland stilling wells. These activities are currently planned as part of the spring and fall 2021 field event. In addition, it is recommended that the diverted surface water from the South Tailings Pile 3 Borrow Area be sampled once and analyzed for major cations and anions, COC metals, and pH to support a more complete understanding of the effect of this surface water on the wetlands surface water quality.

4.4.6 Barrier Wall Hydraulic Conditions

VWPs provide head measurements on both sides of the barrier wall at 500-foot intervals at multiple depths (refer to Figure 4.9). Monitoring of VWPs to assess barrier wall and groundwater collection and delivery system operations is included as an element of the Phase 1 O&M Plan (Floyd|Snider 2020h). In addition, VWP data are reported and evaluated as part of the ACAR to place barrier wall hydraulic conditions in the context of other site water level data. This evaluation is based on a review of cross-wall head differences and gradient directions for each VWP pair for the spring and fall events (Table 4.5) and for these pairs throughout the year based on hydrographs for the period between the fall 2019 field event and the fall 2020 field event (Figures 4.10 through 4.19).

Observed head differences across the barrier wall vary considerably by location and follow clear seasonal patterns. In general, based on the results described below, the combined barrier wall and GWCS is maintaining inward gradients along the Lower West Area, may not be effectively collecting groundwater from along Tailings Pile 1 to maintain inward gradients, and is maintaining inward gradients at the northwest corner of Tailings Pile 2 but not farther downstream closer to the eastern terminus of the barrier wall. Although inward gradients are not being maintained in all sections of the barrier wall and GWCS, this combined system works by both directly blocking flow and controlling gradients to minimize the potential for flow across the barrier wall. Based on the large head differences across the barrier indicating blockage of groundwater flow, and the substantial improvement in surface water quality and general surface water compliance with ROD criteria since the barrier wall was constructed, the barrier wall and GWCS system appear to be performing containment effectively.

Observations based on cross-barrier head differences, from the upgradient end of the barrier wall near BW-VWP-60/61, to the downgradient edge of the barrier wall near BW-VWP-78/79, are provided in this section by area. Head differences can be readily interpreted from the hydrographs by comparing the dashed lines (VWP inside barrier wall, even-numbered) to

the solid lines (VWP outside barrier wall, odd numbered) of the same color in Figures 4.10 through 4.19.

VWP observations from the Lower West Area include the following:

- **BW-VWP-60/61:** Inward gradients (lower head inside the barrier wall than outside) are observed throughout the year at the 19- and 24-foot depths, which are below Railroad Creek all year and below the GWCS invert in the summer and fall and slightly above it in the spring, based on available data. BW-VWP-60a, which is inside the barrier wall at a depth of 34.4 feet and placed in till, appears to be anomalous with much higher head than others at the pair and with head higher than the ground surface by up to approximately 15 feet. Because head measurements in shallower VWPs at the pair are in line with normal function of the GWCS and barrier wall, and do not suggest a groundwater flow path, head measurements at VWP-60a are consistent with effective containment. The relatively high head at BW-VWP-60a is likely due to being installed in the lower permeability till (e.g., similar to the inferred head differences due to glacial units along the east margin of Tailings Pile 3).
- **BW-VWP-62/63:** Inward gradients are observed throughout the year for all three depths. VWPs inside the barrier wall at shallow depths (16.5 and 26.5) are below the GWCS invert elevation, and mostly below the approximate elevation of Railroad Creek, except for short periods in winter and spring.
- **BW-VWP-64/65:** An inward gradient is observed in the shallowest VWP depth (17 feet) throughout the year. Head in the shallowest VWP inside the barrier (BW-VWP-64c) is generally below the approximate Railroad Creek elevation in the summer and fall, and stays close to the approximate Railroad Creek elevation throughout the winter and spring. Gradients for VWP pairs at greater depths (approximately 55 to 56 feet and 69 to 73 feet) are relatively neutral and below the head of the shallowest pair, Railroad Creek, and the GWCS invert.
- **BW-VWP-66/67:** An inward gradient is observed for all pairs throughout the year based on available data, except for a brief period in April and May in which heads inside the barrier exceed heads outside the barrier by approximately 1 to < 2 feet. During this period, heads approach and slightly exceed the approximate Railroad Creek elevation, though they remain well below the ground surface elevation and top of barrier wall. Heads for all three VWPs inside the barrier remain below the GWCS invert until the winter and remain above the GWCS invert until summer.

Mounding of excess water inside the barrier along Tailings Pile 1, including the barrier wing wall at its eastern edge, is being managed by pumping the water from Collection Sump 1 (refer to Figure 4.9) to the GWCS farther downgradient. Installation of a permanent connection between

Collection Sump 1 and the discharge line from the West Seeps Area is being planned. Observations from VWPs in this area include the following:

- **BW-VWP-68/69:** Heads for the two shallowest depths (21 feet and 40 feet) inside the barrier wall are considerably greater (approximately 7 to 9 feet) than corresponding heads outside the barrier wall. Heads at BW-VWP-68d and BW-VWP-68c remain well above the GWCS invert throughout the year, and are higher than the ground surface elevation for periods of the winter and spring. No surface expression of water is observed in this location, so these head measurements indicate a hydraulic head difference but not groundwater flow (likely due to differences in hydraulic conductivity between the VWP installation depths). Inward gradients are consistently maintained across the barrier in VWP pairs at the deeper intervals (65 feet and 85 to 87 feet).
- **BW-VWP-70/71:** Outward gradients (higher head inside the barrier wall) are observed throughout the year in all three pairs at this location. All VWPs, including the three VWPs inside the barrier wall, have heads greater than the GWCS invert throughout the year. Heads in all VWPs are generally close to the approximate elevation of Railroad Creek in the summer and fall months, but increasingly exceed this elevation in the winter and especially the spring. All heads remain below the elevation of the ground surface and top of barrier wall.
- **BW-VWP-72/73:** Outward gradients are observed throughout the year for all three pairs at this location, which is located in the vicinity of Collection Sump 1. VWP heads inside the barrier wall remain above the GWCS elevation and approximate Railroad Creek elevation throughout the year, and exceed the ground surface elevation during the spring. Heads in the two shallowest depth VWPs outside the barrier (18 feet and 35 feet) generally remain close to the approximate Railroad Creek elevation throughout the year.
- **BW-VWP-74/75:** Higher head is measured west of the barrier wing wall, on the Tailings Pile 1 side, than east of the barrier wing wall, on the Copper Creek side, throughout the year for all three pairs at this location. These VWPs are located in the vicinity of Collection Sump 1. No GWCS is present along the wing wall.

Observations from Tailings Pile 2, where the barrier wall terminates approximately 500 feet east of the BW-VWP-78/79 pair, include the following:

- **BW-VWP-76/77:** Inward gradients are consistently observed in the shallowest pair of VWPs (17 feet) at this location. The head measured at this shallow depth inside the barrier ranges from approximately the depth of the GWCS invert elevation in the fall to approximately 5 feet above the invert elevation during the winter and spring, before declining again in the summer. At slightly deeper VWPs (22 feet and 26 to 28 feet), inward gradients in the fall change to relatively neutral gradients in the winter, and slight outward gradients in the spring and summer. The maximum heads

for all VWPs, which occur in the spring, exceed the approximate elevation of Railroad Creek by less than 2 feet.

- **BW-VWP-78/79:** Outward gradients occur consistently throughout the year for all four VWP pairs. Heads for all VWPs exceed the GWCS invert elevation throughout the year, with the shallowest VWP (16 feet) about 5 feet above the GWCS in the fall, and up to 10 feet above the GWCS in the winter and spring. Heads for all VWPs inside the barrier are higher than the approximate elevation of Railroad Creek throughout the year, with the shallowest VWP (16 feet) about 2 feet above the approximate elevation of Railroad Creek in the fall, and up to roughly 7 feet above Railroad Creek in the winter and spring.

4.4.6.1 Recommendations Based on Barrier Wall Hydraulic Conditions

The barrier wall and GWCS were designed and constructed with the goal of maintaining inward gradients to provide for a robust system of containment by directly blocking flow and hydraulically controlling water levels to prevent steep horizontal gradients that create a potential for groundwater flow across the barrier wall or overtopping of the barrier wall. Cross-barrier head differences indicate that inward gradients are not uniformly being maintained; however, the data indicate that in combination, the barrier wall and GWCS are achieving containment. The occurrence of outward gradients in some areas may be a function of operational issues with sections of the GWCS and the ability of the system to collect and convey enough water or indicate hydraulic conductivity heterogeneities that result in differences in hydraulic head but little to no groundwater flow. Regardless of the variability of the hydraulic control portion of the system, the ability of the barrier wall to effectively block flow is demonstrated by the large differences in pressure measured on either side of the barrier wall.

Rio Tinto is taking steps to improve GWCS performance at Collection Sump 1 at the east end of Tailings Pile 1 that will be continued as part of operations and maintenance. Rio Tinto plans to conduct jetting to clear potential blockage and install a permanent connection between Collection Sump 1 and the discharge pipe conveying water from the West Seeps Area to the MWTP. This new connection is intended to maintain lower hydraulic head at and prevent excess accumulation of water in Collection Sump 1 and the Tailings Pile 1 GWCS by allowing for passive drainage. As part of this work, monitoring of the ground surface should be conducted for evidence of ponded groundwater in areas where VWPs indicate water levels are greater than the ground surface. In addition, it is recommended that ongoing monitoring and reporting be continued under the PSVP program.

4.5 WATER QUALITY STABILITY EVALUATION

This section addresses the DQO of indications of post-remedy groundwater stability based on changes in groundwater quality (DQO 2A) to address RAO 3 and portions of RAO 5. Attaining steady state conditions following remedial action is considered a necessary component for assessing remedial performance based on USEPA guidance (USEPA 2014 [OSWER 9283.1-44] and USEPA 2013 [OSWER 9355.0-129]).

Groundwater stabilization occurs in the time it takes for a groundwater plume to reach a steady state configuration if a contaminant source is wholly or partially removed (USGS 2003). Data are typically collected to evaluate whether the groundwater plume has reached a steady-state condition during an attainment monitoring phase that precedes compliance evaluation (USEPA 2014 [OSWER 9283.1-44] and USEPA 2013 [OSWER 9355.0-129]). Monitoring for water quality stability assures site conditions will be reflective of future conditions when comparing compliance monitoring data to CULs.

Statistical analysis of COC concentration data was performed for representative wells, well points, and porewater locations to evaluate whether groundwater concentrations have stabilized. The statistical evaluation is based on monitoring wells with available data selected to be representative of Tailings Pile 2 (TP2-12S, TP2-12D, TP2-13D, TP2-14, TP2-15, TP2-16S, TP2-16D, and TP2-17), Tailings Pile 3 (TP3-13, TP3-14S, TP3-14D, TP3-12S, and TP3-12D), the area adjacent to Tailings Pile 3 (DS-12S, DS-12I, DS-12D, DS-13S, DS-13I, DS-13D, NRC-3SR, NRC-3IR, and NRC-3DR), and the area downstream of Tailings Pile 3 (DS-3S, DS-3D, DS-4S, DS-4I, DS-4D, DS-4DD, DS-9S, DS-9I, DS-9D, SG-8-WP, SG-8-PW-6, SG-8-PW-12, SG-8-WP-36, SG-9-WP, SG-9-PW-6, SG-9-PW-12, SG-9-WP-36, SG-10-WP, SG-10-PW-6, SG-10-PW-12, SG-10-WP-36, SG-11-WP, SG-11-PW-6, SG-11-PW-12, and SG-11-WP-36). For a longer timeframe that allows for more detailed comparison between current conditions and those prior to the Phase 1 Remedial Action, selected wells that were installed as replacements (DS-12S, DS-12I, DS-12D, DS-13S, DS-13I, DS-13D, NRC-3SR, NRC-3IR, and NRC-3DR) for wells that were decommissioned for construction were grouped with predecessor wells from the same locations and with comparable well screen depths.

Data were assessed for stability in accordance with the USEPA guidance document “Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities” (USEPA 2009). Refer to the statistical evaluation memorandum included as Appendix M for more information. For the statistical analysis, the data were analyzed for treatment of non-detects, outlier removal, data distribution, seasonality, and trend analysis. The results of the analysis are summarized below:

- The large spring freshet has a significant impact on local hydrogeology, so water quality data were evaluated for potential seasonality between spring (May and June) and fall (September and October) datasets with three or more results per season using the Mann-Whitney test, the nonparametric equivalent of the t-test, to assess any significant differences. In approximately 10% of the tests, the null hypothesis was rejected at a 0.05 level of significance (p-level), suggesting a possible statistically significant seasonality in these locations. Of these tests, however, consistently greater metals concentrations in a given season were only observed at three locations: at SG-10-PW-6 and SG-10-PW-12, with greater concentrations occurring in fall events; and at NRC-3IR, with greater concentrations occurring in spring events. Except for these locations, spring and fall data were combined for trend analysis.
- The seasonality null hypothesis rejection rates evaluated at less stringent p values (0.1 and 0.2) were slightly greater (16% and 26%) but were also not indicative of widespread seasonality.

- The non-parametric Mann Kendall test for trend was used to evaluate concentration trends for the COCs, for well combinations for which there are eight or more analyses. Of 146 tests performed, none of the trends were statistically significant, suggesting that the concentrations were stable within the resolution of the datasets.
- Of the datasets that displayed seasonality, two trends were identified as statistically significant: total cadmium and copper show increasing trends at SG-10-PW-6 using fall data only.
- Based on the relative lack of significant trends and a review of the spatial variability of trends, no spatial pattern for stability was identified in the locations tested.
- While the absence of statistically significant trends in COC concentrations suggests relative stability in the site groundwater quality, it may indicate that changes affecting COC sources and associated groundwater concentrations following the Phase 1 Remedial Action are not yet able to be measured in groundwater samples at these locations.

Based on these findings, it is recommended that future statistical analyses for stability should include continued evaluation of seasonality as the dataset grows and its resolving power increases. The larger dataset available for the 2020 analysis was able to resolve seasonality at three locations that were not identified in the 2019 evaluation.

4.6 WATER QUALITY COMPLIANCE EVALUATION

Multiple DQOs, which are defined in the final PSVP (Floyd|Snider 2020e), are intended to support evaluation of compliance with site CULs (also referred to as criteria) and ARARs, in conjunction with the supporting hydrogeologic data and the stability of water quality data. The following DQOs are addressed in this section:

- The DQO for background water quality data (DQO 2B) is to assess whether concentrations of COCs measured in site groundwater, porewater, and wetlands surface water are significantly different than background concentrations, to understand site conditions that may influence compliance evaluation. Background values established in the ROD will not be altered without an Agency-approved change to the ROD.
- The DQO for water quality data at the edge of the Lower West Area and tailings piles (DQO 2C) is to evaluate whether the aquifer use could be maintained as drinking water outside of the Lower West Area and tailings piles, and therefore be compliant with drinking water-based standards including Maximum Contaminant Levels, at the edge of the Lower West Area and tailings piles.
- The DQO for water quality at the point of discharge to Railroad Creek surface water (DQO 2D) addresses both surface water and groundwater discharging to Railroad Creek. This DQO is intended to demonstrate that groundwater is protective of the environment by meeting surface water-based criteria at the POC, which is defined in

the ROD as "that portion of the hyporheic zone that supports aquatic life, including fish spawning and benthic macroinvertebrates." The objective of these data is to assess remedy effectiveness in:

- Preventing groundwater that discharges to the Railroad Creek biologically active hyporheic zone from discharging COCs at concentrations greater than surface water-based criteria.
- Preventing seeps and wetlands surface water adjacent to the barrier wall and along the unwalled portions of Tailings Piles 2 and 3, including the East Seeps Collection Structures, from discharging COCs at concentrations greater than surface water-based criteria to Railroad Creek or wetlands surface water.

4.6.1 Comparison to Background

Results from groundwater collected at downgradient monitoring wells and well points, porewater locations, and wetlands surface water locations identified in the PSVP were evaluated to determine whether COCs were statistically different than upgradient background concentrations. These "downgradient" locations (as distinguished from upgradient background locations) include all current monitoring locations that have the potential to be used to assess compliance. Background groundwater wells include: US-1S, US-1I, US-1D, HBKG-2, HV-3, and NRC-5. Background porewater locations include RC-6-PW-6, RC-6-PW-12, and RC-6-WP-36. The background wetlands surface water location is SW-US-1 (located in the wetlands north of RC-6).

Data were assessed for comparison to background in accordance with the USEPA guidance document "Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities" (USEPA 2009). Refer to the statistical evaluation memorandum included as Appendix M for more information. The data were analyzed for treatment of non-detects, outlier removal, upgradient data stationarity, data distribution, seasonality, and comparison to background. The results of the analysis are summarized below:

- As with the stability analysis, the Mann-Whitney test was used to evaluate spring versus fall datasets to evaluate whether they were significantly different. The null hypothesis that no difference exists in COC concentrations between seasons was applied with a 0.05 level of significance. Of 158 comparisons, there were 11 rejections of the null hypothesis. However, the season in which the concentration was greater was not consistent in these 11 cases, suggesting a lack of significant seasonality.
- Individual well/constituent combinations in the downgradient datasets were compared to background data populations from the background monitoring wells, porewater locations, and the wetlands surface water location. Data were divided into groundwater (monitoring well and well point), porewater, and wetlands surface water data for comparison to the corresponding background dataset to test the null hypotheses that the concentration of each COC at each well location is not significantly different than background. The null hypothesis that no difference exists between the upgradient and downgradient COC concentrations was tested at the

0.05 level of significance using Bonferroni-corrected p-values. Results include the following:

- For the groundwater dataset, the null hypothesis was rejected for 61 of the 210 comparisons performed (at 25 of 37 locations), indicating that downgradient concentrations are significantly different from background at a large percentage of the locations tested, depending on the COC. The COCs that differed statistically from background varied by location. Of the 24 locations, a difference with background was identified in the most locations for cadmium (23), followed by zinc (19), copper (12), aluminum (4), iron (2), and lead (1). Refer to Appendix M, Table 6 for results for individual wells.
- For the porewater dataset, the null hypothesis was rejected for 21 of the 88 comparisons performed (at 13 of 15 individual sample locations), indicating that downgradient porewater concentrations are significantly different from background at most locations tested, depending on the COC. Porewater sampling locations adjacent to SG-10 were found to be statistically different than background for the most COCs of any porewater location (for aluminum, cadmium, copper, and zinc). Copper was by far the most common COC to be statistically different than background. Refer to Appendix M, Table 7 for additional information.
- Wetlands surface water was also evaluated but had insufficient background data to perform statistical analysis. A review of wetlands surface water COC concentrations (refer to Table 4.12) suggests that wetlands surface water results are measurably different from background locations.

The finding of an overall statistical difference between background and downgradient locations is consistent with the expected results and CSM in that downgradient groundwater, porewater, and wetlands surface water include elevated COCs from mine-influenced water in certain locations.

4.6.2 Water Quality at the Edge of the Lower West Area and Tailings Piles

As described in the PSVP, results from the following monitoring wells were assessed relative to drinking water-based criteria from the ROD:

- **Wells located along the western edge of the Lower West Area and north of the barrier wall:** MW-1, MW-2, MW-3
- **Well clusters east of the barrier wall along Tailings Piles 2 and 3 and downstream:** DS-15, DS-16, DS-17, DS-18, DS-12, DS-13, NRC-3R, DS-3, DS-4, DS-9

For a more complete picture of water quality in this area, exceedances of drinking water criteria in monitoring wells located in the footprint of Tailings Piles 2 and 3 are also discussed.

Site criteria for aluminum, cadmium, copper, lead, and zinc for groundwater and surface water potentially used for drinking water are summarized in the ROD Table 11 based on the chemical-specific ARARs in the ROD Table 2 (USFS 2012b). Exceedances of these criteria are noted in Table 4.8 and on Figures 4.31 (spring) and 4.33 (fall). Exceedances shown on figures are based on comparison of total metals results with applicable criteria from the ROD, except for locations where turbidity was greater than 5 NTU. In these cases, dissolved results are compared to applicable criteria from the ROD. For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown on figures.

The following exceedances of drinking water-based criteria were identified during the 2020 monitoring events:

- **DS-17I:** Exceedance of the cadmium criterion of 5 µg/L in the spring 2020 monitoring event with a concentration of 9.70 µg/L. The concentration measured in the fall 2020 monitoring event was less than the criterion.
- **TP3-14D:** Exceedance of the cadmium criterion of 5 µg/L with a result of 7.69 µg/L in the fall 2020 monitoring event.
- **TP3-12D:** Exceedance of the cadmium criterion with a result of 5.49 µg/L in the fall 2020 monitoring event.
- **DS-12S:** Exceedance of the cadmium criterion in the spring and fall 2020 monitoring events with concentrations of 6.52 µg/L and 6.12 µg/L, respectively. DS-12I, which had an exceedance for cadmium in 2019 did not exceed the criteria for any COCs during the 2020 monitoring events.

The 2020 cadmium concentrations in spring and fall wetlands surface water samples collected immediately adjacent to the DS-12 cluster, at SW-TP3-East1, ranged between 0.0398 µg/L and 0.113 µg/L, which is one to two orders of magnitude less than the cadmium concentrations in DS-12S. The cadmium concentrations at a sample location farther east in the wetlands, SW-TP3-East2, ranged between 0.46 µg/L and 0.848 µg/L during 2020. These concentrations are consistent with the 2019 monitoring results. These wetlands surface water results are presented in Table 4.12 and also discussed in the following section relative to surface water-based criteria.

Aside from the low-level exceedances for cadmium within and immediately adjacent to Tailings Pile 3, all other downgradient groundwater monitoring locations (monitoring wells and well points) meet drinking water-based criteria for site COCs. Though not compared to drinking water criteria for compliance, all porewater samples meet drinking water-based criteria (listed in Table 4.8) except for one location, SG-10-WP-36, which exceeded drinking water-based cadmium criteria in spring and fall of 2019 and 2020.

4.6.3 Water Quality at the Point of Discharge to Surface Water

As described in the PSVP, results from the following locations were assessed relative to surface water-based criteria from Table 11 in the ROD (USFS 2012b). Cadmium results were compared

to NRWQC freshwater chronic criteria for protection of aquatic organisms, the ROD Table 3 ARAR that was updated by the USEPA in 2016 (USEPA 2016). Data from the following locations were assessed:

- **Groundwater discharging to Railroad Creek:** well points and porewater samples from SG-9, SG-10, SG-11, SG-17, SG-18; and well point DS-14
- **Surface water discharging to Railroad Creek:** Seeps sampled from the western edge of the barrier wall to the Wetlands East of Tailings Pile 3, and wetlands surface water locations SW-TP3-East1 and SW-TP3-East2

In addition to these locations, results for well points and porewater were compared to criteria for two locations (SG-7R and SG-8) that are generally understood to be within the losing stretch of Railroad Creek, but which may be close to the transition to the gaining stretch of the creek under some circumstances. Refer to Tables 4.9 (for well point data), 4.10 (for porewater data), 4.11 (for seep data), and 4.12 (for wetlands surface water data), and Figures 4.31 through 4.35, which show COC exceedances of surface water-based criteria in these samples. ROD surface water criteria are presented in Table 4.8 for a preliminary, conservative comparison to the results of monitoring wells screened in the Shallow Zone that are being evaluated with respect to the groundwater-surface water CSM.

4.6.3.1 Well Points

Well points are relatively shallow (typically 4 to 6 feet bgs, except DS-14, which is 10 feet bgs) monitoring wells with 6-inch-long well screens installed adjacent to or in close proximity to Railroad Creek. The results of well point monitoring from the area adjacent to Railroad Creek and downgradient of Tailings Pile 3 (between approximately SG-9 and SG-11) represent potential concentrations that may be discharging to the hyporheic zone beneath Railroad Creek, based on the CSM as updated with 2020 monitoring results.

Consistent with the ROD and PSVP, groundwater results from well point samples were compared to surface water criteria from the ROD. For the cadmium criterion, the ROD used the 2001 NRWQC formula for calculating the hardness-adjusted criterion for cadmium; however, the NRWQC formula for cadmium was updated in 2016 and is now being used to calculate the hardness-adjusted criterion for cadmium. The 2016 NRWQC-based cadmium criterion is used for comparison to the sample results in this ACAR; however, the 2001 NRWQC criterion from the ROD is also presented in the Table 4.9. Total metals results are used for comparison by default, with dissolved metals results used for samples with elevated turbidity. Criteria for aluminum, cadmium, copper, iron, lead, and zinc for surface water and groundwater discharging to surface water are summarized in the ROD Table 11 based on the chemical-specific ARARs and background concentrations for surface water in the ROD Table 3 (USFS 2012b). As specified in the ROD Table 3, footnote 2, criteria for cadmium, copper, lead, and zinc require hardness correction specific to the sample data. In accordance with the ROD, cadmium, copper, lead, and zinc surface water criteria from the ROD were adjusted for hardness following the chemical-specific procedures outlined in the USEPA NRWQC or WAC 173-201A. The hardness of the adjacent

porewater location at 12 inches below the streambed was used in the criteria adjustment. For well point locations with no adjacent porewater samples (i.e., DS-14), an average of the closest upstream and downstream 12-inch porewater samples was used. Exceedances of these hardness-adjusted criteria, and unadjusted criteria for aluminum and iron, are presented on Table 4.9 and Figures 4.31 and 4.34 (spring) and 4.33 and 4.35 (fall).

From upstream to downstream, the following exceedances of ROD surface water criteria, adjusted for hardness, where applicable, are indicated in the 2020 well point monitoring results:

- **SG-7R-WP:** Exceedance of aluminum criterion of 142 µg/L in the fall 2020 with a concentration of 533 µg/L.
- **SG-9-WP:** Exceedances of cadmium, copper, and zinc hardness-adjusted criteria in the spring 2020 monitoring event, and exceedances of cadmium and zinc criteria at similar concentrations in the fall 2020 monitoring event.
- **DS-14:** Exceedances of aluminum with a concentration of 199 µg/L, total and dissolved cadmium, and dissolved zinc criteria just above the hardness-adjusted criteria in the spring 2020 monitoring event.
- **SG-17-WP:** Exceedances of cadmium and zinc hardness-adjusted criteria in the spring 2020 monitoring event, and exceedances of aluminum at 160 µg/L, and cadmium and zinc at approximately double the spring concentrations were detected in the fall 2020 monitoring event.
- **SG-10-WP:** Exceedances of aluminum, cadmium, copper, and zinc criteria in the spring and fall 2020 monitoring events, with similar concentrations detected during both events.
- **SG-11-WP:** Exceedances of the iron criterion of 1,000 µg/L in the spring and fall 2020 monitoring events at 1,600 and 1,210 µg/L, respectively.

4.6.3.2 Porewater

Porewater samplers are sections of well screen installed at multiple depths (6, 12, and 36 inches) below the streambed of Railroad Creek to monitor water in the hyporheic zone. As described in Section 4.1.2, the three sample points at SG-17 were re-installed during the fall 2020 monitoring event after streambed scour exposed the screens in the creek. The results from porewater samplers from the area adjacent to Railroad Creek and downgradient of Tailings Pile 3, an area that was determined to be a gaining stretch based on the previous data and particularly 2019 and 2020 PSVP monitoring results, represent potential concentrations that may be discharging to the hyporheic zone beneath Railroad Creek.

Consistent with the ROD and 2020 PSVP, groundwater results from porewater samples were compared to surface water criteria from the ROD. For the cadmium criterion, the ROD used the 2001 NRWQC formula for calculating the hardness-adjusted criterion for cadmium; however, the NRWQC formula for cadmium was updated in 2016 and is now being used to calculate the

hardness-adjusted criterion for cadmium. The 2016 NRWQC-based cadmium criterion is used for comparison to the sample results in this ACAR; however, the 2001 NRWQC criterion from the ROD is also presented in Table 4.10. Total results are used for comparison by default, with dissolved results used for samples with elevated turbidity. Criteria for aluminum, cadmium, copper, iron, lead, and zinc for surface water and groundwater discharging to surface water are summarized in the ROD Table 11 based on the chemical-specific ARARs and background concentrations for surface water in the ROD Table 3. As specified in the ROD Table 3, footnote 2, criteria for cadmium, copper, lead, and zinc require hardness correction specific to the sample data. In accordance with the ROD, cadmium, copper, lead, and zinc surface water criteria from the ROD were adjusted for hardness following the chemical-specific procedures outlined in the USEPA NRWQC or WAC 173-201A. The hardness of the porewater sample at the location at 12 inches below streambed was used in the criteria adjustment. Exceedances of these hardness-adjusted criteria, and unadjusted criteria for aluminum and iron, are presented in Table 4.10 and Figures 4.34 (spring) and 4.35 (fall).

From upstream to downstream, the following exceedances of ROD surface water criteria, adjusted for hardness, where applicable, are indicated in the 2020 porewater monitoring results:

- **RC-6 (upgradient/background location):** Exceedance at all the three sampling depths of hardness-adjusted surface water criteria for zinc ranging from 32.4 to 45.2 µg/L in spring 2020 and 239 µg/L at the 6-inch depth in fall 2020.
- **SG-7R:** Exceedance at the 6-inch depth of hardness-adjusted criterion for copper in the spring 2020 event at 2.51 µg/L, an exceedance ratio of 1.7.
- **SG-8:** Exceedance at the 6-inch depth of hardness-adjusted criterion for copper in the spring 2020 event at 3.91 µg/L, an exceedance ratio of 2. Exceedances at the 36-inch depth of copper and zinc criteria in the spring 2020 event (exceedance ratios of 2.5 and 2.4, respectively) and exceedance of copper and lead criteria in the fall 2020 event (exceedance ratios of 4 and 3.5, respectively).
- **SG-17:** Exceedance at the 36-inch depth of hardness-adjusted criterion for copper in the spring 2020 event at 6.94 µg/L (exceedance ratio of 3.1); and exceedances of cadmium and copper in the fall 2020 event at 0.237 µg/L and 3.94 µg/L (exceedance ratio of 1.2 and 1.5), respectively.
- **SG-10:** Exceedances at the 6-inch depth of aluminum, cadmium, copper, and zinc criteria in the fall 2020 event; exceedances at the 12-inch depth of aluminum, cadmium, copper, and zinc criteria in the fall 2020 event; and exceedances at the 36-inch depth of aluminum, cadmium, copper, iron, and zinc criteria in the spring 2020 event, and of aluminum, cadmium, iron, and zinc criteria in the fall 2020 event, at similar concentrations as the spring event.
- **SG-18:** Exceedances at the 36-inch depth of aluminum 308 µg/L (exceedance ratio of 2.2) during the fall 2020 event.

- **SG-11:** Exceedance at the 12-inch depth of copper criterion at 3.15 µg/L (exceedance ratio of 1.1) and exceedance at the 36-inch depth of aluminum criterion at 338 µg/L, an exceedance ratio of 2.4) in the fall 2020 monitoring event.

4.6.3.3 Seeps Adjacent to Tailings Piles

Seeps identified and sampled from the western edge of the barrier wall to the Wetlands East of Tailings Pile 3 represent water that may discharge to Railroad Creek. These seeps vary in their occurrence by season.

Consistent with the ROD and PSVP, results from seep samples were compared to surface water criteria from the ROD. For the cadmium criterion, the ROD used the 2001 NRWQC formula for calculating the hardness-adjusted criterion for cadmium; however, the NRWQC formula for cadmium was updated in 2016 and is now being used to calculate the hardness-adjusted criterion for cadmium. The 2016 NRWQC-based cadmium criterion is used for comparison to the sample results in this ACAR; however, the 2001 NRWQC criterion from the ROD is also presented in Table 4.11 for comparison. Total results are used for comparison by default, with dissolved results used for samples with elevated turbidity. Criteria for aluminum, cadmium, copper, iron, lead, and zinc for surface water and groundwater discharging to surface water are summarized in the ROD Table 11 based on the chemical-specific ARARs and background concentrations for surface water in the ROD Table 3. As specified in the ROD Table 3, footnote 2, criteria for cadmium, copper, lead, and zinc require hardness correction specific to the sample data. In accordance with the ROD, cadmium, copper, lead, and zinc surface water criteria from the ROD were adjusted for hardness following the chemical-specific procedures outlined in the USEPA NRWQC or WAC 173-201A. The hardness of the seep sample was used in the adjustment. Exceedances of these hardness-adjusted criteria, and unadjusted criteria for aluminum and iron, are presented in Table 4.11 and on Figures 4.31 (spring), 4.32 (summer), and 4.33 (fall).

From upstream to downstream, and grouped by general area, the following exceedances of ROD surface water criteria, adjusted for hardness where applicable, are indicated in the 2020 seep monitoring results:

- Eastern end of Tailings Pile 1
    - **SP-44:** Slight exceedance of cadmium criterion in the fall 2020 event (exceedance ratio of 1.03). This seep was not observed during previous monitoring events.
    - **SP-40:** Exceedance of cadmium, copper, and zinc criteria in the spring 2020 event; exceedance of cadmium criterion in the summer 2020 event; and exceedances of cadmium and zinc in the fall 2020 event. All events had similar concentrations of COCs that exceeded criteria (refer to Table 4.11).
    - **SP-32:** Exceedance of cadmium criterion in the summer 2020 event (exceedance ratio of 1.7). This seep was not observed during other monitoring events.
- Eastern end of Tailings Pile 3

- **SP-31:** Exceedance of copper criterion in the fall 2020 event (exceedance ratio of 1.2).

Exceedances of criteria were primarily limited to cadmium and zinc along the walled portions of Tailings Piles 1 and 2, with only one slight exceedance of the copper criterion in one sample. Exceedances in seeps east of the barrier wall were notably limited. There were no exceedances at SP-34, at the most western point of the unwalled section of Tailings Pile 2, which was sampled during the summer 2020 event. There were no exceedances at SP-47, SP-36, SP-46, or SP-45, located along the eastern half of Tailings Pile 3, which were sampled in the fall 2020 event.

4.6.3.4 Wetlands Surface Water

Two wetlands surface water locations, shown on cross sections B-B' (Figure 4.40) and C-C' (Figure 4.41) were sampled during the three 2020 monitoring events. SW-TP3-East1 is located on the west side of the wetlands, in the area where tailings were removed and the wetland restored, adjacent to the East Seeps Collection Structures and exfiltration gallery for water diverted from the South Tailings Pile 3 Borrow Area. SW-TP3-East2 is located farther east, adjacent to the culvert that drains from the wetland to the east.

Consistent with the ROD and PSVP, results from wetlands surface water samples were compared to surface water criteria from the ROD. For the cadmium criterion, the ROD used the 2001 NRWQC formula for calculating the hardness-adjusted criterion for cadmium; however, the NRWQC formula for cadmium was updated in 2016 and is now being used to calculate the hardness-adjusted criterion for cadmium. The 2016 NRWQC-based cadmium criterion is used for comparison to the sample results in this ACAR; however, the 2001 NRWQC criterion from the ROD is also presented in Table 4.12. Criteria for aluminum, cadmium, copper, iron, lead, and zinc for surface water and groundwater discharging to surface water are summarized in the ROD Table 11 based on the chemical-specific ARARs and background concentrations for surface water in the ROD Table 3. As specified in the ROD Table 3, footnote 2, criteria for cadmium, copper, lead, and zinc require hardness correction specific to the sample data. In accordance with the ROD, cadmium, copper, lead, and zinc surface water criteria from the ROD were adjusted for hardness following the chemical-specific procedures outlined in the USEPA NRWQC or WAC 173 201A. The hardness of the wetlands surface water samples was used in the adjustment. Exceedances of these hardness-adjusted criteria, and unadjusted criteria for aluminum and iron, are presented on Figures 4.31 (spring), 4.32 (summer), and 4.33 (fall) and in Table 4.12.

The following exceedances of ROD surface water criteria, adjusted for hardness where applicable, are indicated in the 2020 wetlands surface water monitoring results:

- SW-TP3-East1 slightly exceeded the copper criterion in the spring, summer, and fall 2020 events (exceedance ratios of 1.6, 1.4, and 1.03, respectively), and the iron criterion in the fall 2020 event (exceedance ratio of 1.05).
- SW-TP3-East2 exceeded aluminum, cadmium, copper, iron, and zinc criteria in the spring and summer 2020 events with similar concentrations detected during both

events (exceedance ratios for aluminum: 10.5 during both events; cadmium: 1.4 and 1.2, respectively; copper: 1.7 and 1.5, respectively; iron: 2.9 and 3.8, respectively; and zinc: 1.5 and 1.7, respectively). SW-TP3-East2 also exceeded aluminum and iron criteria in the fall 2020 event (exceedance ratios of 3.8 and 6.5, respectively).

The potential sources of COC metals to wetlands surface water and recommendations are discussed further in Section 4.4.4.

4.6.4 Groundwater Concentrations over Time

COC concentrations over time were plotted for all the monitoring wells, well points, and porewater samples evaluated in this section, using data from the baseline water quality evaluation in 2010 and 2011, through 2020. These plots show metals results compared to surface water-based criteria (and drinking water-based criteria for monitoring wells) from the ROD (USFS 2012b), and the timeframe of the Phase 1 Remedial Action, which took place from approximately 2014 through 2018. Time-concentration plots were not prepared for seeps adjacent to the tailings piles, wetlands surface water locations, or other locations where 2 years or less of data were available. Time-concentration plots are included in Appendix E. In this section, changes in concentration over time are discussed for locations where exceedances were identified in the 2020 monitoring data. Statistical analysis of trends for water quality stability is discussed in Section 4.5 and Appendix M.

4.6.4.1 Monitoring Wells

The following observations about changes in COC concentrations over time in monitoring wells were made based on the time-concentration plots provided in Appendix E for locations where exceedances of drinking water-based criteria were identified in 2020 monitoring data (the plots show surface water-based criteria, for reference only):

- **DS-17I:** Concentrations of cadmium at DS-17I, which exceeded drinking water-based criteria in the spring of 2020 with a concentration of 9.7 µg/L, have increased slightly from the spring of 2019, when the cadmium concentration was measured at 6.97 µg/L.
- **TP3-14D:** Cadmium was the only COC to exceed drinking water-based criteria in this well in 2020; cadmium concentrations at TP3-14D are lower in 2020 than in 2019 and have been decreasing since 2018. Aluminum, copper, iron, and zinc concentrations detected in TP3-14D were lower in 2020 than in 2019, while lead was not detected in either year.
- **TP3-12D:** Cadmium was the only COC to exceed drinking water-based criteria in this well in 2020, consistent with the previous post-remediation data. Detected aluminum, cadmium, copper, iron, and zinc concentrations in TP3-12D were slightly lower in 2020 than in 2019, while lead has been consistently not detected at this location.

- **DS-12S:** Cadmium was the only COC to exceed drinking water-based criteria in this well in 2020. Cadmium concentrations at DS-12S, while exceeding drinking water-based criteria, represent a decrease relative to detected results from 2018 and 2019. The detected concentrations of aluminum, copper, iron, lead, and zinc were lower in 2020 than in 2019.

4.6.4.2 Well Points

The following observations about changes in COC concentrations over time in well points were made based on the time-concentration plots provided in Appendix E for locations where exceedances of criteria were identified in 2020 monitoring data:

- **SG-7R-WP:** Aluminum was the only COC to exceed surface water-based criteria at this well point. The fall 2020 aluminum result represents an increase from the fall 2019 result.
- **SG-9-WP:** Cadmium concentrations in the fall have decreased since 2019 but are greater than results from the baseline water quality evaluation in fall 2010 and 2011. Cadmium concentrations in the spring have, on average, decreased, since the 2010 to 2011 timeframe. Spring copper concentrations in 2019 and 2020 are lower than spring 2010 and 2011 results, while fall 2019 and 2020 copper concentrations remain, on average, similar to fall 2011 values. The spring 2020 zinc concentration was elevated relative to the 2019 result, but less than concentrations between 2010 and 2012. 2019 and 2020 fall zinc concentrations were elevated relative to fall 2010 and 2011 results.
- **SG-10-WP:** 2019 and 2020 aluminum concentrations were greater than most previous results between 2010 and 2015, and 2019 to 2020 cadmium, copper, and zinc results were greater than almost all previous results between 2010 and 2015.
- **SG-11-WP:** 2019 and 2020 iron concentrations are notably less than in 2010 to 2012 and remain slightly greater than the hardness-adjusted surface water criterion. Aluminum did not exceed in either 2020 event, suggesting that the aluminum exceedance observed during fall 2019 is an outlier. Copper, lead, and zinc at SG-11-WP results from 2019 and 2020 are, on average, similar to results from the 2010 to 2012 timeframe. Spring and fall 2020 cadmium concentrations were greater than all historical data but did not exceed the hardness-adjusted surface water criteria.

4.6.4.3 Porewater

The following observations about changes in COC concentrations over time in porewater were made based on the time-concentration plots provided in Appendix E for locations where exceedances of criteria were identified in 2020 monitoring data (and have more than 2 years of data to report):

- **SG-7-PW-6:** 2019 and 2020 copper concentrations were greater than criteria in spring, but did not exceed in fall. The copper concentrations are less than 2011, but similar to values reported in spring 2012.

- **SG-8-PW-6:** The copper concentration at SG-8-PW-6 for both spring and fall increased compared to 2019, but the copper concentrations have decreased compared to 2011. The copper and zinc concentrations have remained relatively unchanged at SG-8-WP-36 since 2019.
- **SG-10-PW-6:** Fall concentrations of aluminum, cadmium, copper, and zinc have consistently increased by four- to seven-fold since 2010. 2020 iron and lead concentrations fell within the range of historical results.
- **SG-10-PW-12:** Fall 2020 concentrations of aluminum, cadmium, and zinc increased approximately five-fold relative to 2010 results, while copper concentrations have increased approximately seven-fold since 2010. Spring concentrations of these COCs remain much less than fall results and are similar to pre-remediation concentrations (pre-2014).
- **SG-10-WP-36:** Concentrations of aluminum, cadmium, copper, and zinc are similar to 2019 concentrations and have increased since 2010. Measured iron concentrations represent two- to three-fold increases since 2019.
- **SG-11-PW-12:** 2020 copper concentrations represent an approximately 50 to 100% increase relative to measured concentrations since 2010. Copper exceeded the criteria in the spring 2020 event for the first time. Fall 2020 lead concentrations were also elevated by approximately three-fold relative to historical lead detections, but below criteria.
- **SG-11-WP-36:** The aluminum and iron concentrations decreased relative to the fall 2019 result but are still elevated relative to 2010.

4.7 GROUNDWATER CONCLUSIONS AND FUTURE MONITORING

The following are the main findings and recommendations based on the evaluation presented in this section. Refer to Section 7.3 for discussion of these findings with respect to RAOs 3 and 5:

- The groundwater data collection network was expanded and maintained in 2020 with addition and replacement of well points, staff gauges, stilling wells, specific conductance dataloggers, and pressure transducers to further support DQOs presented in the PSVP, in response to Agencies' requests, and to repair damage that occurred during the winter.
- Sampling of monitoring wells, well points, porewater, wetlands surface water, and surveying and sampling of seeps, and hydrogeologic measurements, were conducted in accordance with the existing SOPs (MWH 2010 and 2013a) to address DQOs for remedy performance evaluation relative to RAO 3 and portions of RAO 5, as described in the PSVP.
- Aquifer testing was performed at monitoring wells on the unwalled portion of Tailings Piles 2 and 3. The results indicate a range of hydraulic conductivity values (0.17 to 220 feet per day) consistent with previously measured values, which will be used to

further refine simulated hydraulic conductivity values in a groundwater numerical flow model that is being used to evaluate Phase 2 Remedial Action alternatives.

- A low-K layer has been identified below Tailings Pile 3 and areas to the east. This finding is a refinement of the post-Phase 1 CSM, which provides additional detail and explanation for observed conditions, including the depth of elevated COC concentrations in groundwater, and is in agreement with the previous understanding of groundwater flow and contaminant distribution. The interpretation is based on head differences between deep and intermediate/shallow well completions, and lithologic observations in well logs. The low-K layer has been integrated into the updated numerical groundwater model that is being used to evaluate the Phase 2 Remedial Action required under the ROD and potential alternative remedial actions. Future work that may be undertaken to evaluate and design the Phase 2 Remedial Action, including potential additional borings or other investigation that may be needed, should take into consideration the low-K layer.
- The comparison of historical and recent water levels and vertical gradient data collected in 2019 and 2020 following the Phase 1 Remedial Action confirm the 2019 findings concerning the general decrease in water levels in the tailings piles after the Phase 1 Remedial Action. This comparison provides further support for the CSM understanding that multiple controls on water entering Tailings Pile 3 have decreased water levels, lessened vertical gradients, and reduced leaching of COCs from Tailings Pile 3 and mass loading downgradient of Tailings Pile 3. DQO 1A has been adequately addressed based on 2 years of post-Phase 1 data collection.
- The CSM developed based on multiple lines of evidence in 2009 and further solidified in 2013 held that year-round losing conditions extend from midway along Tailings Pile 2 approximately to SG-8, and that year-round gaining conditions are present from SG-9 to SG-11. Additional data collected following implementation of the Phase 1 Remedial Action, including transducer measurements from monitoring wells and VWPs along the entire length of the Lower West Area and tailings piles, specific conductance datalogger measurements along the entire unwalled portion of the tailings piles, and well point/staff gauge pairs along the reach of Railroad Creek downstream of the tailings piles, further confirm the previous CSM understanding of groundwater-surface water interactions and provide significantly more detail and confidence in the findings:
    - Vertical gradients from VWPs demonstrate gaining conditions at the west end of the barrier wall, with losing conditions along Tailings Pile 1 that transition to gaining conditions along Tailings Pile 1 (BW-VWP-73), which extend eastward to the western edge of Tailings Pile 2.
    - Vertical gradients from transducer measurements in monitoring wells along Tailings Pile 2, Tailings Pile 3, and downgradient of Tailings Pile 3 to the DS-9 cluster demonstrate that Railroad Creek is losing surface water to groundwater

year-round, at all locations monitored except the DS-15 cluster at the edge of the barrier wall.

- Specific conductance datalogger results further support losing conditions between Railroad Creek and groundwater along Tailings Piles 2 and 3 at all locations except the DS-15 cluster.
- Well point/staff gauge pair head differences, which are sensitive to the relative placement of well points and staff gauges, further support the CSM, and indicate the boundary between losing conditions and gaining conditions downgradient of Tailings Pile 3 may vary between the SG-8 area and the SG-17 area.
- Vertical gradient and specific conductance suggest potential discharge of groundwater to the wetlands East of Tailings Pile 3 at DS-13 and DS-12.
- Stilling well transducer data from additional locations that were deployed in Railroad Creek immediately adjacent to the monitoring well clusters at DS-15 and DS-18, and in the wetlands at SG-WL1-STW in September of 2020, and specific conductance data over the winter and spring months will support a more definitive answer about whether groundwater discharges to surface water during periods of upward vertical gradients.

- In addition to leaching from tailings in shallow wetlands soils, further evaluation of the potential sources of COC metals and low pH to the surface water in the Wetlands East of Tailings Pile 3 based on hydraulic gradients and geochemistry indicate that impacted upgradient groundwater may also be a contributing source. Specific findings include the following:
  - Gradient information suggests discharge to the west portion of the wetland from the Shallow and Intermediate Zones and provides no clear indication of discharge to the more impacted area of the wetlands farther east. The horizontal gradient between shallow groundwater and wetlands surface water, and the slight upward vertical gradients between Intermediate and Shallow Zone groundwater that extend to surface water adjacent to the toe of Tailings Pile 3, suggest groundwater upwelling locally and discharging to this wetland adjacent to Tailings Pile 3. Neutral vertical gradients farther east in the wetlands, where surface water is more impacted than at the Tailings Pile 3 toe area, suggest that local tailings are an important source in this area.
  - A comparison of geochemical profiles indicates that Shallow Zone groundwater affected by groundwater in contact with tailings and Intermediate Zone groundwater mix near the toe of Tailings Pile 3, and may discharge to the wetland and are diluted by the South Tailings Pile 3 Borrow Area diverted surface water. Intermediate Zone groundwater is inferred to be a possible contributing source of the elevated concentrations of aluminum, copper, and zinc within the wetland, rather than solely the leaching from tailings in wetlands soils.
- Cross-barrier head differences and surface water quality improvements and general compliance with ROD criteria since the barrier wall was constructed, indicate that the

combined system of the barrier wall and GWCS is performing its containment function. This is demonstrated by the large differences in pressure measured on either side of the barrier, despite the fact that inward gradients are not uniformly being maintained. The barrier wall and GWCS were designed and constructed with the goal of maintaining inward gradients to provide for a robust system of containment by directly blocking flow and hydraulically controlling water levels to prevent steep horizontal gradients that create a potential for outward groundwater flow across the barrier wall. The occurrence of outward gradients in some areas may be a function of operational issues with sections of the GWCS and the ability of the system to collect and convey enough water or indicate hydraulic conductivity heterogeneities that result in differences in hydraulic head but little to no groundwater flow. Rio Tinto is taking steps to improve GWCS performance at Collection Sump 1 at the east end of Tailings Pile 1 that will be continued as part of operations and maintenance.

- The results of a stability evaluation based on statistical analysis of trends in a population of monitoring wells in and adjacent to Tailings Piles 2 and 3, and monitoring wells, well points, and porewater sampling locations downgradient of Tailings Pile 3, indicate a lack of significant trends over a period spanning the Phase 1 Remedial Action. Of 146 non-parametric Mann Kendall tests for trends in COC concentrations with no seasonality, none of the trends were statistically significant. Only two trends were identified as significant of the datasets that displayed seasonality. While these results suggest that the concentrations of COCs in mine-influenced water are relatively stable within the resolution of the datasets, it may indicate that changes affecting COC sources following the Phase 1 Remedial Action are not yet able to be measured in groundwater samples at these locations.
- Statistical evaluation of water quality data to assess potential seasonality between spring and fall using the Mann-Whitney test identified significant seasonality with consistent metals concentrations at only three locations, none of which were identified in the 2019 ACAR. The increase is attributed to the larger dataset used in the 2020 analysis. Despite the substantial impact on local hydrogeology of the spring freshet, the results indicate an overall lack of significant seasonality based on the current dataset, which may change as the dataset grows and its resolving power increases. For all locations except those with significant seasonality, spring and fall data were combined for trend analysis.
- Statistical comparison of upgradient background water quality with downgradient groundwater from monitoring wells and well points, porewater, and wetlands surface water indicates a statistically significant difference for groundwater and porewater and an observed difference for wetlands surface water. The finding of an overall statistical difference between background and downgradient locations is consistent with the expected results and CSM in that downgradient groundwater, porewater, and wetlands surface water include elevated COCs from mine-influenced water in certain and previously identified locations.

- The only COC that was detected at concentrations exceeding drinking water-based criteria during the 2020 sampling of monitoring wells was cadmium, with low-level exceedances within and immediately adjacent to Tailings Pile 3. All other downstream monitoring well and well point data met drinking water-based criteria for site COCs. All porewater samples met drinking water-based criteria except for one location, SG-10-WP-36, which exceeded drinking water-based criteria for cadmium in spring and fall of 2019 and 2020.
- One or more COCs that were detected at concentrations greater than the ROD surface water criteria for well points, adjusted for hardness where applicable, included aluminum, cadmium, copper, and zinc at SG-7R-WP (aluminum only), SG-9-WP, DS-14, SG-17-WP, SG-10-WP, and SG-11-WP (iron only). As in 2019, location SG-10-WP exhibited the most elevated COC concentrations and most criteria exceeded (aluminum, cadmium, copper, and zinc in both the spring and fall 2020 events).
- The porewater locations where one or more COCs were detected at concentrations exceeding ROD surface water criteria, adjusted for hardness where applicable, included aluminum, cadmium, copper, iron, lead, and zinc at SG-7R-PW-6 (copper only), SG-8-PW-6 (copper only), SG-8-WP-36, SG-17-WP-36, SG-10-PW-6, SG-10-PW-12, SG-10-WP-36, SG-18-WP-36, SG-11-PW-12 (copper only), and SG-11-WP-36 (aluminum only). The most elevated porewater concentrations of aluminum, cadmium, copper, iron, and zinc were in porewater from the SG-10 station. Porewater at upgradient background location RC-6 exceeded surface water criteria for zinc at multiple depths.
- The seep locations adjacent to the tailings piles where one or more COCs exceeded ROD surface water criteria were primarily limited to the walled portions of Tailings Piles 1 and 2, and primarily limited to exceedances of cadmium and zinc criteria. Exceedances in seeps east of the barrier wall end were notably limited. Water sampled as seeps in this area is inferred to be primarily hyporheic zone water. There was a low-level exceedance of surface water criteria for copper in a seep sample at the east edge of Tailings Pile 3, SP-31, in the fall event.
- The COCs that were measured in wetlands surface water at concentrations exceeding ROD surface water criteria, adjusted for hardness where applicable, include copper at SW-TP3-East1 and aluminum, cadmium, copper, iron, and zinc at SW-TP3-East2. Greater concentrations of COC metals were measured at the SW-TP3-East2 location.
- Time-concentration plots for monitoring wells, well points, and porewater locations with 2020 exceedances indicate few apparent patterns, and considerable variability by location and constituent, over the last 4 or more years of available data.

5.0 Soil, Tailings, and Other Wastes

The RAOs applicable to soil, tailings, and other wastes present at the Site include RAO 4 and a portion of RAO 5. RAO 4 is stated as, "Reduce exposure to contaminants of concern in soil (including tailings and other wastes) to protect terrestrial organisms and comply with ARARs. Prevent future releases of tailings and other wastes into surface water to protect aquatic receptors from contaminants of concern." The relevant portion of RAO 5 includes, "Protect human health and comply with ARARs by reducing human exposure to contaminants of concern in soil and other wastes." Section 5.1 provides an overview of the 2020 cap monitoring performed on Tailings Piles 1, 2, and 3, and the East and West Waste Rock Piles. Section 5.2 summarizes activities related to the five Areas of Interest (AOIs) identified for in situ soil remediation in the ROD.

5.1 CAP MONITORING

As part of the Phase 1 Remedial Action, Tailings Piles 1, 2, and 3 and the East and West Waste Rock Piles were regraded for slope stability and covered with soil caps to isolate the underlying tailings, waste rock, and/or contaminated soils from terrestrial and human receptors. These tailings and waste rock piles were also revegetated following placement of the soil caps. Cap monitoring is required for these vegetated soil caps to ensure that they remain protective and continue to isolate the underlying tailings, waste rock, and contaminated soils. The cap monitoring and maintenance program is included as a component of the Phase 1 O&M Plan. A revised Phase 1 O&M Plan was submitted to the Agencies in October 2020 (Floyd|Snider 2020h), and it contains an expanded suite of components under the cap monitoring and maintenance program that includes cap monitoring for erosion, slope failures, and human and other natural disturbances; cap thickness monitoring; and revegetation monitoring in these capped areas. The revised Phase 1 O&M Plan describes the methodology for monitoring, the assessment criteria, and the operations and maintenance requirements for maintaining the cap integrity, cap vegetation, and the effectiveness of these caps over time. Several elements of this cap monitoring program were performed in 2020, including the cap erosion and slope failure monitoring, as this was a component of the previous Phase 1 O&M Plan, and the revegetation monitoring. Cap thickness monitoring under the revised Phase 1 O&M Plan is anticipated to begin in 2021, pending input from the Agencies on this monitoring approach.

In June 2020, cap erosion and slope failure monitoring was conducted in accordance with the Phase 1 O&M Plan by the Stantec Phase 1 Engineer of Record. The 2020 monitoring inspection indicated that the soil cover was in good condition and that no significant erosion had occurred since the last monitoring inspections performed in 2017, 2018, and 2019. During the 2020 monitoring inspection, some minor rilling was observed on the soil cap on the top of Tailings Pile 2, but repairs were made in fall 2020 to address this issue by channeling the water in this area into a defined stormwater channel. During the 2019 and 2020 monitoring inspections, it was observed that a few shallow animal burrows were present within the large woody debris present on Tailings Pile 3; however, these burrows did not extend through the entire soil cover. These

observed animal burrows were filled in with rock and soil cover material and tamped down in summer 2020.

Revegetation monitoring was performed during the spring and fall 2020 monitoring events in accordance with revised Phase 1 O&M Plan. This monitoring indicated that the revegetation areas on the tailings piles and waste rock piles are progressing toward the area objectives of cover system stabilization, visual buffer, and extending the form and function of the adjacent forest ecosystem. While localized areas of higher mortality and occasional sun-stressed individuals were observed, substantial natural recruitment of healthy shrubs and trees Site-wide are expected to continue to fill in these areas. Currently the density (stems per acre) of shrubs and trees exceed the established target density. During the revegetation monitoring on the tailings piles and waste rock piles, there were no areas of compromised soil cover or exposed mine waste observed that would warrant repair. Some potential erosional areas were noted and a few shallow animal burrows were observed. These burrows did not extend through the entire soil cover. These potential erosional areas and burrow locations will continue to be monitored during the 2021 monitoring activities.

Further details regarding the 2020 cap erosion and slope failure monitoring and the revegetation monitoring in these capped areas will be provided in the 2020 Annual Phase 1 O&M Report, to be submitted to the Agencies in April 2021.

5.2 IN SITU SOIL REMEDIATION AREAS OF INTEREST

There are five site areas, referred to as AOIs, where in situ soil remediation work and assessment still need to be completed to fulfill the required Phase 1 Remedial Action work described in the ROD (USFS 2012b). These AOIs include the Honeymoon Heights Waste Rock Piles, the area downslope of the Honeymoon Heights Waste Rock Piles (DSHH), portions of the Lower West Area, Holden Village, and possibly portions of the Ballfield Area. No in situ treatment has been performed in these AOIs to date. While there have been no revisions to the ROD for the in situ soil treatment remedial requirements in these AOIs to date, in situ treatment was further evaluated in a 2017 *Feasibility Study of the Use of Agricultural Lime for the Remediation of Metals* (GHD 2017) conducted for the Site and in a 2020 *Reevaluation of the Applicability and Need for In Situ Treatment at Areas of Interest* memorandum (Floyd|Snider and CDM Smith 2020).

For the DSHH AOI, the first step in an evaluation of the suitability of this area for in situ treatment was conducted during the spring 2020 monitoring event. This work included conducting a pH soil survey in the DSHH AOI to better assess the soil conditions and provide information that may be applicable to in situ treatment in this area, in accordance with the ROD and an Agency request. This pH soil survey was completed in accordance with the approved *Downslope from the Honeymoon Heights Area Field pH Soil Survey Work Plan* (Floyd|Snider 2020j). Shallow soil samples were collected from a total of 42 locations downslope from the Honeymoon Heights Waste Rock Piles at the 300, 550, 800, and 1100 Level Portals. These samples were collected from between 0 and 6 inches bgs and were analyzed for pH to characterize the current pH conditions of shallow soil downslope of the waste rock piles following the 2015 Wolverine fire. The soil

samples were compared to background pH conditions in the Railroad Creek valley, including from 20 background locations that were collected from the hillside between the Honeymoon Heights Waste Rock Piles and the Copper Peak drainage. This area is understood to be unimpacted by mining operations; however, it is within the area impacted by the Wolverine fire. Additional details on the pH soil survey and results from the statistical evaluations performed on the soil pH data are provided in the DSHH Area Field pH Soil Survey Results Report included as Appendix F of the Spring 2020 Event Data Report (Floyd|Snider 2020g).

Intalco and the Agencies are currently evaluating the in situ soil treatment approaches in the five AOIs as a parallel evaluation process, one that is separate from the PSVP program at this time.

6.0 West Area Seeps

As part of the Phase 1 Remedial Action activities, a West Area Seeps Collection Trench was installed in the western portion of the Site downgradient of the Honeymoon Heights area to prevent contaminated seeps in this area from discharging into Railroad Creek. Performance monitoring of any remaining seeps in the west area is conducted under the PSVP program to evaluate the effectiveness of the Phase 1 Remedial Action in preventing contaminated West Area Seeps from discharging to Railroad Creek and in addressing RAO 1. RAO 1 is stated as, "Reduce concentrations of contaminants of concern to levels that are protective of aquatic life and comply with applicable, or relevant and appropriate requirements (ARARs) in Railroad Creek and other surface waters."

West Area Seeps performance monitoring was conducted in 2020 during the spring and summer monitoring events in accordance with the 2020 Draft Final PSVP (Floyd|Snider 2020d). This section presents a summary of the 2020 West Area Seeps performance monitoring, including a description of the monitoring and sampling performed (Section 6.1), the sampling results (Section 6.2), and an evaluation of the monitoring data (Section 6.3). Section 6.4 provides a summary of the 2020 West Area Seeps monitoring conclusions and recommendations for future evaluations and performance monitoring of the West Area Seeps.

6.1 VISUAL SURVEY AND SAMPLING ACTIVITIES

A West Area Seeps survey zone was identified in the 2020 Draft Final PSVP as the area to assess the presence of seeps, and collect samples where seeps were observed. The West Area Seeps survey zone is bounded in the east-west direction between the historical location of seep SP-23 and the upstream terminus of the Phase 1 barrier wall and in the north-south direction from the bank of Railroad Creek to the maximum elevation of the underground mine pool (approximately 3,550 feet amsl). The West Area Seeps survey zone is shown on Figure 4.31 (Sheet 1). The West Area Seeps survey zone evaluates both areas upgradient (upslope) and downgradient of the installed West Area Seeps Collection Trench. Additionally, a previous West Area Seeps location, seep SP-26, located upstream of seep SP-23 and outside of the West Area Seeps survey zone, is included as part of the West Area Seeps monitoring under the PSVP program.

During the spring and summer 2020 monitoring events, a visual survey of the West Area Seeps survey zone and of seep SP-26 was performed to determine the presence of any seeps in these areas. The spring survey was conducted on June 13 and 14, 2020, and the summer survey was conducted on July 22, 2020. Each visual survey was conducted by walking transects of the hillside to cover the entire West Area Seeps survey zone. Previously mapped seep locations downgradient of the West Area Seeps Collection Trench (including seeps SP-12 East, SP-12 West, and SP-23) and seep SP-26 were also inspected for the presence of seeps during these two visual surveys.

All seeps observed within the West Area Seeps survey zone or at seep SP-26 during the visual surveys had the seep location, estimated flow rate, spatial extent, and field parameters recorded

on a field form (included in Appendix A). Coordinates for seep locations were recorded using a handheld GPS. All observed seeps were sampled at the point where seep water expresses to the ground surface. All seeps were sampled using a peristaltic pump. Seep samples were submitted to ARI for the analysis of conventional parameters, total metals, cations, and major anions.

During the spring 2020 West Area Seeps survey, two seeps (SP-42 and SP-43) were observed upgradient (upslope) of the West Area Seeps Collection Trench, within or just upslope of the West Area Seeps survey zone. Four seeps (SP-23, SP-12 East, SP-12 West, and SP-41) were observed downgradient of the West Area Seeps Collection Trench within the West Area Seeps survey zone. Two of the downgradient seeps were present at the previously mapped locations for seeps SP-12 East and SP-23. SP-12 West was identified near Railroad Creek, just downslope from where this seep was previously mapped. The newly identified seep (SP-41) was observed approximately 50 feet downstream of SP-12 East. Samples were collected at all seep locations. A seep was also observed at the location of seep SP-26 and was sampled. Additional details on the spring 2020 West Seeps Area survey and sampling, including field forms, field photographs, laboratory reports, and data validation reports, are provided in the Spring 2020 Event Data Report (Floyd|Snider 2020g). The spring 2020 West Area Seeps sampling locations are shown on Figure 4.31 (Sheet 1).

During the summer 2020 West Area Seeps survey, no seeps were observed within the West Area Seeps survey zone. The locations of previously mapped seeps downgradient of the West Area Seeps Collection Trench (SP-12 West, SP-12 East, SP-23, and SP-41) and upgradient of the West Area Seeps Collection Trench (SP-42 and SP-43) were observed to be dry during the summer survey. Seep SP-26 was observed to be flowing and was sampled during the summer 2020 monitoring event. Seep locations for the summer 2020 monitoring event are shown on Figure 4.32 (Sheet 1).

West Area Seeps sampling forms from the summer 2020 monitoring event are included in Appendix A. Select photographs from the summer seep survey are included in Appendix H.

6.2 SEEP SAMPLING RESULTS

The analytical results and field parameters from the West Area Seeps from the spring and summer 2020 monitoring events are presented in Table 6.1. Analytical results for COCs (aluminum, cadmium, copper, iron, lead, and zinc) in the West Area Seeps are shown on Figure 4.31 (Sheet 1) for the spring 2020 monitoring event and Figure 4.32 (Sheet 1) for the summer 2020 monitoring event.

Consistent with the ROD and PSVP, seep sample results were compared to surface water criteria from the ROD (USFS 2012b). Criteria for aluminum, cadmium, copper, iron, lead, and zinc for surface water and groundwater discharging to surface water are summarized in the ROD Table 11 based on the chemical-specific ARARs and background concentrations for surface water in the ROD Table 3. As specified in the ROD Table 3, footnote 2, criteria for cadmium, copper, lead, and zinc require hardness correction specific to the sample data. In accordance with the ROD,

cadmium, copper, lead, and zinc surface water criteria from the ROD were adjusted for hardness following the chemical-specific procedures outlined in the USEPA NRWQC or WAC 173-201A. The hardness of the seep sample was used in the adjustment. For the cadmium criterion, the ROD used the 2001 NRWQC formula for calculating the hardness-adjusted criterion for cadmium; however, the NRWQC formula for cadmium was updated in 2016 and is now being used to calculate the hardness-adjusted criterion for cadmium. The 2016 NRWQC-based cadmium criterion is used for comparison to the sample results in this ACAR; however, the 2001 NRWQC criterion from the ROD is also presented in Table 6.1. Exceedances of these hardness-adjusted criteria for cadmium, copper, lead, and zinc and the ROD criteria for aluminum and iron in the West Area Seeps samples are indicated in red on Table 6.1 and on Figures 4.31 (Sheet 1) and 4.32 (Sheet 1).

Background seep samples (SP-US-1 and SP-US-2) used for comparison to the West Area Seeps results were collected during the spring and summer 2019 monitoring events and were not collected again during the spring and summer 2020 monitoring events. The analytical results and field parameters for these 2019 background seep samples are also included in Table 6.1 for reference. Refer to the 2019 ACAR for details on the collection of these background seep samples.

All of the 2020 West Area Seeps results underwent Compliance Screening (USEPA Stage 2B) data validation in accordance with *National Functional Guidelines for Inorganic Superfund Methods Data Review* (USEPA 2017a), *National Functional Guidelines for Organic Superfund Methods Data Review* (USEPA 2017b), and the QAPP provided in Appendix A of the *Approved Site-Wide Water Quality Monitoring During Remedial Action Plan for Holden Mine* (MWH 2013a). Based on the data quality review, data are determined to be of acceptable quality for use as reported by the laboratory unless specifically qualified in the data validation report. Some laboratory qualifiers were updated to conform to the final qualifiers used for data table reporting and database management. Data validation for the summer 2020 data is described in more detail in the attached data validation report (Appendix D). The spring 2020 data validation report is included as Appendix A of the Spring 2020 Event Data Report (Floyd|Snider 2020g).

6.3 WEST AREA SEEPS EVALUATION

6.3.1 Presence of Seeps

In accordance with the 2020 Draft Final PSVP, visual surveys of the West Area Seeps survey zone and seep SP-26 were performed during the spring and summer 2020 monitoring events to assess what seeps were present during these events.

As described in Section 6.1, during the spring 2020 survey there were two newly observed seeps (SP-42 and SP-43) within or just upslope of the portion of the West Area Seeps survey zone located upgradient of the West Area Seeps Collection Trench. Both seeps were identified on the east side of the West Area Seeps survey zone in a drainage that contains seasonal snow melt and runoff. There were no seeps observed within or just upslope of the portion of the West Area

Seeps survey zone located upgradient of the West Area Seeps Collection Trench during the summer 2020 West Area Seep visual survey.

Seeps SP-23, SP-12 East, SP-12 West, and SP-41, located downgradient of the West Area Seeps Collection Trench, were observed and sampled during the spring 2020 monitoring event. As described in Section 6.1, seep SP-41 was a newly identified seep, while the other three seeps (SP-12 East, SP-12 West, and SP-23) have been previously observed in this area. There were no seeps observed to be present downgradient of the West Area Seeps Collection Trench during the summer 2020 West Area Seep visual survey.

Seep SP-26 was present and sampled during both the spring and summer 2020 monitoring events. The flow rate at seep SP-26 decreased between the spring and summer monitoring events.

6.3.2 Comparison to Surface Water-Based Cleanup Levels and Background Seep Concentrations

The spring 2020 sample collected from seep SP-23, located downgradient of the West Area Seeps Collection Trench, had a copper concentration that exceeded the hardness-adjusted surface water-based criterion, as well as the 2019 background seep sample (SP-US-1 and SP-US-2) concentrations for copper (refer to Table 6.1). All other COCs detected in this sample were less than the surface water-based criteria. SP-23 was dry during the summer 2020 monitoring event.

The seep samples from SP-12 East, SP-12 West, SP-41, SP-42, and SP-43 collected during the spring 2020 monitoring event had surface water-based criteria exceedances for aluminum, cadmium, copper, and zinc. SP-42 and SP-43, located upgradient of the West Area Seeps Collection Trench, had aluminum concentrations an order of magnitude greater than SP-12 East, SP-12 West, and SP-41, which are located downgradient of the West Area Seeps Collection Trench and near Railroad Creek. SP-42 and SP-43 generally also had concentrations of cadmium, copper, and zinc 2 to 5 times greater than SP-12 East, SP-12 West, and SP-41. The aluminum, cadmium, copper, and zinc concentrations in these five seep samples also exceeded the 2019 background seep sample concentrations for these metals. Iron and lead detected in these seep samples were less than the surface water-based criteria. The concentrations of iron and lead in SP-12 East, SP-12 West, and SP-41 were generally comparable to the background seeps sample concentrations. SP-12 East, SP-12 West, SP-41, SP-42, and SP-43 were all dry during the summer 2020 monitoring event.

Samples collected from seep SP-26 during the spring and summer 2020 monitoring events had all COC results less than the surface water-based criteria. The COC concentrations in the 2019 background seep samples were generally comparable to the COC concentrations in the spring and summer 2020 seep SP-26 samples with the exceptions of aluminum and iron, which were slightly greater in the summer.

6.3.3 Seep Concentrations Over Time

Time-concentration plots showing seep analytical results from the baseline water quality evaluation in 2011 through 2020 are provided in Appendix E. Time-concentration plots were generated for each seep location that had COC concentrations that exceeded both surface water-based criteria and background seep concentrations in the 2020 monitoring events, as specified in the PSVP. These plots show total metals, surface water criteria from the ROD (USFS 2012b), and the timeframe of the West Area Seeps Collection Trench installation, which took place from approximately 2016 through 2017. Time-concentration plots for copper concentrations in seep SP-23 and aluminum, cadmium, copper, and zinc concentrations in seeps SP-12 East and SP-12 West from 2011 (baseline conditions) to 2020 are included in Appendix E. All available data from SP-23, SP-12 East, and SP-12 West data were collected during only the spring monitoring events because these seeps run dry during summer and fall.

At seep SP-23, copper concentrations in 2011 and 2014 spring samples exceeded 5,000 µg/L, whereas in the spring 2020 SP-23 sample, copper was detected at 20.1 µg/L. This 2020 copper concentration also shows a decrease from the 2019 copper concentration of 31.4 µg/L. This decrease in copper occurred following installation of the West Seeps Area Collection Trench, which indicates it is effectively capturing mine-influenced water to reduce flow into Railroad Creek.

The concentrations of aluminum, cadmium, copper, and zinc from the seep SP-12 East spring 2020 sample are all less than the 2011, 2012, and 2014 SP-12 East sample concentrations of these metals, but comparable to the SP-12 East spring 2019 sample concentrations. Of these metals, aluminum concentrations showed the largest decrease in concentrations since installation of the West Area Seeps Collection Trench, from 13,000 µg/L in 2011 to 411 µg/L in 2020. Copper and zinc also showed decreases in the SP-12 East since installation of the West Area Seeps Collection Trench; however, the spring 2020 copper concentration remains approximately 400 times greater than the hardness-adjusted surface water-based criteria and the spring 2020 zinc concentration remains approximately 40 times greater than the hardness-adjusted surface water-based criteria. The cadmium concentrations between the 2014 sample (the last sample collected at SP-12 East prior to the installation of the West Area Seeps Collection Trench) and the 2020 sample show only a slight decrease. The spring 2020 cadmium concentration from SP-12 East was detected at 10.1 µg/L, approximately 40 times greater than the hardness-adjusted surface water-based criteria.

The concentration of aluminum from the SP-12 West spring 2020 seep sample is less than the 2011 to 2014 sample concentrations, but still exceeds the surface water criteria of 142 µg/L by 1.5 times. Comparable to SP-12 East spring 2020 sample concentrations, the spring 2020 concentrations of cadmium, copper, and zinc at SP-12 West exceed the hardness-adjusted surface water criteria by nearly 40 times or more.

6.4 WEST AREA SEEPS MONITORING CONCLUSIONS AND FUTURE MONITORING

- Two newly identified seeps (SP-42 and SP-43) were observed upgradient of the West Area Seeps Collection Trench and four seeps (SP-23, SP-12 East, SP-12 West, and SP-41) were observed downgradient of the West Area Seeps Collection Trench during the spring 2020 monitoring. SP-26, a historical seep located to the west of the West Area Seeps Collection Trench, was also observed during the spring 2020 visual survey. Only SP-26 was observed to be present during the summer 2020 visual survey.
- Seep SP-26 samples had no surface water-based criteria exceedances during the 2019 or 2020 monitoring events. Additionally, SP-26 sample results from the spring and summer 2020 monitoring events were comparable to the background seep sample results collected during the 2019 events. It is recommended that monitoring of SP-26 be discontinued.
- Seeps SP-23, SP-12 East, SP-12 West, and SP-41 are located downgradient of the West Area Seeps Collection Trench, and the spring 2020 samples collected from all four seeps had copper concentrations that exceeded the applicable surface water-based criteria. The spring 2020 samples collected from SP-12 East, SP-12 West, and SP-41 also had surface water-based criteria exceedances for aluminum, cadmium, and zinc.
    - For SP-23, the 2020 copper concentration is similar to the 2019 copper concentration, which is over two orders of magnitude less than previous copper concentrations from SP-23 samples collected prior to installation of the West Area Seeps Collection Trench.
    - For SP-12 East, while concentrations of aluminum, cadmium, copper, and zinc have generally decreased over time, the concentrations of cadmium, copper, and zinc did not dramatically decrease between the 2014 sample (collected prior to installation of the West Area Seeps Collection Trench in 2016) and the spring 2020 sample. Concentrations of these metals in the 2019 and 2020 spring samples from SP-12 East were similar.
    - For SP-12 West, concentration of cadmium, copper, and zinc have not dramatically decreased between the 2014 sample (collected prior to installation of the West Area Seeps Collection Trench in 2016) and the spring 2020 sample.
- Seep visual surveys and sampling will continue in 2021 during the spring and summer monitoring events in accordance with the PSVP.

7.0 Conclusions

This section summarizes the major findings following the performance of the 2020 PSVP monitoring activities and the data evaluations conducted and presented in this ACAR. These findings focus on the evaluations conducted for two of the PSVP objectives, including assessing the current site conditions and updating the CSM (PSVP Objective 1) and evaluating the Remedial Action's effectiveness at meeting performance standards (PSVP Objective 2). Additionally, this section presents recommended modifications to the 2021 PSVP monitoring program based on the findings. These recommended modifications will require approval by the Agencies before they can be incorporated into the 2021 monitoring program.

7.1 SURFACE WATER AND AQUATIC LIFE (RAO 1)

7.1.1 Phase 1 Remedial Action Performance in 2020

Evaluated together, the surface water results, which have shown no exceedances since 2017, aside from the low-level exceedances of copper in spring 2020, and the 2020 PSVP biomonitoring program results, which show clear signs of improvement and were comparable with reference stations, demonstrate attainment of RAO 1 with respect to reducing concentrations of COCs to levels that are protective of aquatic life. In spring 2020, copper concentrations at six of the surface water sampling locations slightly exceeded the surface water-based criteria. The maximum copper concentration was measured at RC-13(SG-8), and the exceedance ratio was only 1.8. Copper concentrations at the locations with exceedances have decreased substantially since the Phase 1 Remedial Action was implemented. None of the fall 2020 surface water samples exceeded the criteria. Additionally, none of the surface water samples collected in 2016, the fall of 2017, 2018, or 2019 exceeded the surface water-based criteria.

Overall, the 2020 BMI metrics and fish population evaluation indicate that conditions in Railroad Creek have improved substantially compared to baseline conditions in 2010 and 2011. BMI metrics generally indicated a continuing trend of improvement over baseline conditions in 2020 and were comparable with reference stations. Most site stations met background location target thresholds for richness metrics and did not significantly differ from background locations for the productivity, trophic/habit, composition, and tolerance metrics. Breakdown of the trophic strategies and habits employed by individuals in the BMI community aligns with expectations based on the type of stream system. Temporal trends for metrics considered to be relatively more sensitive to metals pollution (total taxa, *Ephemeroptera*, *Plecoptera*, and *Trichoptera* richness, clinger richness, and percent *Ephemeroptera*) have shown significant improvement at the most impaired site stations (RC-2, RC-5A, and RC-10) compared to baseline conditions.

Estimated fish abundance at the background locations and RC-4 was less in 2020 compared to previous years; however, estimated abundance at site station SG-12R was one of the highest in the sampling record, and estimated abundance at RC-2 and RC-10 was similar to previous years and higher than baseline values. These results and the variability in estimated fish abundance observed at the reference stations over time, illustrates that abundance can vary temporally and

spatially due to environmental conditions that are independent of the Phase 1 remedial actions, such as seasonal movements and normal changes to within-station habitat conditions.

The distribution of fork lengths of collected fish was also considered during analysis. The fish species and size classifications identified in 2020 generally aligned with previous years of monitoring. In general, a broad distribution of individuals ranging from young of the year to mature individuals was observed at all locations, indicative of a healthy reproducing population.

An evaluation of the periphyton data collected by Ecology was provided to supplement the aquatic life evaluation conducted under the PSVP monitoring program. This supplementary information supports the objectives of the PSVP and this ACAR to assess current site conditions and evaluate the effectiveness of the Phase 1 Remedial Action in addressing RAO 1. Consistent with the 2020 biomonitoring results and the 2019 periphyton community results, the Ecology periphyton tissue and chlorophyll *a* results, available through 2019, demonstrated progress toward the attainment of RAO 1 with respect to reducing concentrations of COCs to levels that are protective of aquatic life.

Generally, concentrations of COCs in periphyton tissue were lowest in 2019 and have decreased every monitoring year for all COCs, except aluminum, which does not have a clear temporal or spatial trend. Chlorophyll *a* biomass was variable between sample locations and years with no clear differences among locations, except relatively high concentrations of biomass at RM 11.1 and RM 6.2 in 2015.

7.1.2 Recommendations for 2021 PSVP Monitoring Program Changes

There are currently no proposed changes to the PSVP surface water monitoring program. Based on the results of BMI and fish population monitoring over time, conditions in Railroad Creek have improved compared to baseline conditions in 2010 and 2011. Therefore, additional monitoring is proposed to be conducted every other year, with the next biomonitoring event to occur in the fall of 2022. Locations RC-5A and RC-15 will continue to be evaluated for safe conditions prior to sampling, and the alternate locations SG-9 and SG-12R will be used again if necessary.

7.2 SEDIMENT (RAO 2)

7.2.1 Phase 1 Remedial Action Performance in 2020

The 2020 PSVP monitoring program results demonstrate attainment of RAO 2 based on the results from sediment chemistry testing, bioassay testing, and the BMI community evaluation. The following are the main findings from these investigations, which support this conclusion:

- Chemistry Testing
    - None of the fall 2020 sediment samples exceeded the SMS chemical criteria or SQVs.
    - Sediment COC concentrations in samples collected from Lucerne Bar were less than or similar to concentrations in samples from upstream, indicating that COCs

are not accumulating to levels of concern in sediments at the mouth of Railroad Creek.

- Bioassay Testing
  - None of the sample locations exceeded the *C. tentans* mortality SCO or CSL.
  - Based on the results from the 28-day *Hyalella* growth and survival test, sample locations RC-4, LB-1, and LB-2 exceeded the SMS biological CSL. However, the study results suggest that the poor performance observed at these locations was likely related to the natural conditions in Railroad Creek and the natural sediment matrix. Indications that poor performance was not related to COCs in sediment include the following:
    - The background results from the 28-day *Hyalella* growth test did not meet the SMS performance standard for reference samples.
    - *H. azteca* growth measured at all test locations was significantly less than growth measured in the laboratory control.
    - *H. azteca* growth and survival performance were variable across the sample locations and no spatial trends were apparent based on a graphical analysis.
  - Based on the sediment chemistry and 10-day Chironomid mortality test results (no exceedances of the SMS criteria) and considering the impairment of *H. azteca* growth at all locations (including the background sample locations) compared to the laboratory control, the failure of the background samples to meet the 28-day *Hyalella* growth test SMS performance standard, and absence of a spatial trend, it is likely that exceedances of the SMS biological criteria for the 28-day *Hyalella* growth and survival test are related to the natural conditions in Railroad Creek and the natural sediment matrix rather than concentrations of COCs in sediment. In addition, the results of the BMI community evaluation indicate an improvement compared to the baseline conditions.

Based on the evaluation of these investigations, the low concentrations of COCs in sediment were determined to be protective of aquatic life and comply with ARARs.

RAO 2 includes reducing the adverse effects of ferricrete on aquatic life in Railroad Creek. Both locations where ferricrete was observed during the 2019 ferricrete monitoring survey (near monitoring points F19 and F30; refer to Figure 3.1 in the 2019 ACAR [Floyd|Snider 2020f]) have now been broken up. At this time, the ferricrete observed to be present in Railroad Creek appears to be limited to potentially one location within the creek or along the creek bank. Therefore, adverse effects on aquatic life due to the presence of ferricrete would be expected to be very limited.

Based on the Agencies' observations, ferricrete was indicated as present near the east end of Tailings Pile 3 (monitoring point F13). Because ferricrete was not observed at this location during the fall 2019 ferricrete monitoring survey, a joint site visit to this area with the Agencies was

recommended in the 2019 ACAR to confirm the location of the ferricrete. The joint site visit was not able to be completed due to coronavirus travel restrictions; therefore, it is recommended that this visit be conducted in 2021, if possible.

The next ferricrete monitoring survey is scheduled to be conducted in 2022, with particular attention given to the locations where ferricrete was observed during the 2019 survey. Where ferricrete is observed and remains intact in or adjacent to Railroad Creek, it will be broken up in 2021 in accordance with the revised Phase 1 O&M Plan to support RAO 2.

7.2.2 Recommendations for 2021 PSVP Monitoring Program Changes

No additional sediment sampling for chemical analysis or bioassay testing is proposed for the 2021 PSVP monitoring program. It is recommended that a site visit be conducted with the Agencies in 2021 to confirm the location of ferricrete in the creek channel near the east end of Tailings Pile 3 (monitoring point F13) where the Agencies previously noted observations of ferricrete.

7.3 GROUNDWATER (RAO 3 AND PORTION OF RAO 5)

7.3.1 Phase 1 Remedial Action Performance in 2020

The results for groundwater monitoring indicate the performance of the Phase 1 Remedial Action is making continued progress in attaining RAOs 3 and 5. Additional data points are needed to more accurately assess the effectiveness of the Phase 1 Remedial Action in attaining these RAOs.

7.3.1.1 RAO 5

The 2020 PSVP monitoring program results demonstrate continued progress toward the attainment of RAO 5, specifically in controlling exposure to contaminated groundwater by restoring groundwater beyond the Lower West Area/Tailings Pile 1 and tailings piles to drinking water-based criteria. The 2020 data, showing fewer locations with exceedances, reinforce a key RAO 5 finding from 2019: most groundwater meets drinking water-based standards outside of the Lower West Area/Tailings Pile 1, with only five locations currently exceeding criteria outside the Lower West Area/Tailings Pile 1. As two of these are located within Tailings Pile 3, only three locations exceed criteria outside the boundary of Tailings Pile 3. RAO 5 is effectively be attained everywhere in 2020 except for local cadmium exceedances at DS-12S, at DS-17I, and SG-10 porewater.

These results showing improved water quality in Tailings Pile 3 are consistent with the findings for DQO 1A, through which water level and VWP results from 2020 monitoring confirm the 2019 findings concerning the changes in water levels in the tailings piles following the Phase 1 Remedial Action. In particular, the water level data confirmed the continued decrease in water levels and downward gradients at Tailings Pile 3 following the Phase 1 Remedial Action, which are expected to result in reductions in mass loading from leaching through Tailings Pile 3 over time.

Progress toward attainment of RAO 5 is demonstrated based on the continued compliance with criteria at locations along the western edge of the Lower West Area and north of the barrier wall, fewer exceedances in wells east of the barrier wall along Tailings Piles 2 and 3, limited exceedances of drinking water criteria in monitoring wells located in the footprint of Tailings Piles 2 and 3, and continued compliance in all downstream locations except one porewater location:

- The number of locations with exceedances of drinking-water criteria in 2020 is down from six monitoring wells to four. Results from monitoring wells DS-16S and DS-12I, which both exceeded drinking water-based criteria for cadmium in 2019, were less than criteria for both spring and fall in 2020.
- The exceedances at the other four monitoring wells were again low-level exceedances of cadmium drinking water-based criteria (ranging from 5.49 to 9.70 µg/L compared to a criterion of 5 µg/L), within Tailings Pile 3 (TP3-12D and TP3-14D) and adjacent to Tailings Pile 3 (DS-12S and DS-17I).
- As in 2019, the 2020 results indicate that all monitoring wells, well points, and all porewater sampling locations downstream of the margin of Tailings Pile 3 except one (SG-10) meet drinking water-based criteria for site COCs. All porewater samples meet drinking water-based criteria except for one location, SG-10-WP-36, which exceeded drinking water-based cadmium criteria in spring and fall of 2019 and 2020.

In addition to the concentration decreases at DS-16S and DS-12I, changes in COC concentrations over time for these few remaining locations with drinking water-based exceedances also suggest continued progress, consistent with the CSM that leaching from Tailings Piles 2 and 3 is being reduced following the Phase 1 Remedial Action. Cadmium concentrations in three of the four monitoring wells (DS-12S, TP3-12D, and TP3-14D) have shown continued decreases over the 2019 to 2020 timeframe, and other COCs have also declined:

- At DS-12S, cadmium concentrations have decreased relative to results from 2018 and 2019, and concentrations of aluminum, copper, iron, lead, and zinc were also lower in 2020 than in 2019.
- At TP3-12D, the cadmium concentration decreased from an exceedance in 2019 to less than the criterion in the spring of 2020. Aluminum, copper, iron, and zinc concentrations in TP3-12D were also slightly lower in 2020 than in 2019.
- At TP3-14D, the concentration of cadmium has decreased steadily since 2018, and aluminum, copper, iron, and zinc concentrations detected in TP3-14D were lower in 2020 than in 2019.

COC concentration changes over time, which are expected to decrease with reduced loading because of reduced storage and flow through Tailings Piles 2 and 3, will continue to be evaluated as part of the PSVP monitoring program.

7.3.1.2 RAO 3

Assessing the performance of the Phase 1 Remedial Action in attaining RAO 3, which aims to prevent migration of COCs greater than CULs to protect aquatic life and comply with ARARs, is directly related to both assessing the current site conditions and updating the CSM (PSVP Objective 1) and evaluating the Remedial Action's effectiveness at meeting performance standards (PSVP Objective 2). In order to evaluate the effectiveness of the Phase 1 Remedial Action relative to performance standards, current site conditions and the CSM must be assessed, so that final POCs can be established.

Data collected in 2020 build on the findings of the 2019 ACAR and greatly solidify and provide further detail and confidence in a key element of the post-remedy CSM: that year-round losing conditions in Railroad Creek extend from a short distance downstream of the barrier wall on the eastern margin of Tailings Pile 2 between DS-15 and DS-16, along Tailings Pile 3, and downstream to approximately SG-8, and transition to gaining conditions for the stretch of Railroad Creek between approximately SG-9 and SG-11. The 2020 results establish several key refinements and updates to the CSM:

- The combined barrier wall and GWCS is effectively working to contain groundwater and protect Railroad Creek from COCs greater than aquatic life CULs. Containment is demonstrated by inward gradients along the Lower West Area and at the northwest corner of Tailings Pile 2, and outward gradients along Tailings Pile 1 and near the terminus of the barrier wall at Tailings Pile 2, which indicate blockage of groundwater flow based on the large head differences across the barrier. Work is being undertaken by Rio Tinto to mitigate potential operational issues along sections of the GWCS, particularly near Collection Sump 1 at the northeastern margin of Tailings Pile 1.
- Railroad Creek exhibits year-round losing conditions along the barrier wall adjacent to the Lower West Area and the western half of Tailings Pile 1, and year-round gaining conditions along the eastern half of Tailings Pile 1 and extending to the mid-point of Tailings Pile 2 (BW-VWP-79).
- Consistent gaining conditions transition to consistent losing conditions along Tailings Pile 2 between BW-VWP-79 and the DS-16 cluster, so that the transitional area spans the downstream terminus of the barrier wall and DS-15 cluster. Consistent losing conditions along the unwalled portion of Tailings Piles 2 and 3, in which Railroad Creek surface water discharges to groundwater and is therefore protected from mining-influenced groundwater, begin downstream of DS-15. Vertical gradients and specific conductance results in groundwater potentially indicate seasonally gaining conditions at the DS-15 cluster in the spring, subject to confirmation based on direct comparison to adjacent surface water elevations.
- Minor apparent variability in the boundary between losing and gaining conditions downgradient of Tailings Pile 3 was observed, with losing conditions extending at a minimum to SG-8 and as far downstream as SG-17. Consistent groundwater discharge to Railroad Creek occurs at SG-10 and SG-11.

- Groundwater, including mining-affected groundwater from beneath Tailings Pile 3, discharges to the Wetlands East of Tailings Pile 3 and appears to be a contributing source to the impacted wetlands surface water along with tailings in the shallow soil.
- A low-K layer is present below Tailings Pile 3 and areas to the east, which separates the Intermediate and Deep Zones in this area and explains observed conditions, including differences in groundwater chemistry and hydraulic head measured in these two zones, and the maximum depth of mining-impacted groundwater in the aquifer being limited to the Intermediate Zone.

The updated CSM is consistent with groundwater quality data that primarily show elevated COCs extending from Tailings Pile 3 in the Intermediate Zone of the alluvial aquifer beneath Railroad Creek until the aquifer thins and groundwater discharges to the hyporheic zone for a stretch of the creek. The general occurrence of mine-influenced water is illustrated by the approximated extents shown in Figures 4.36, 4.37, and 4.38. This element of the CSM is also consistent with the use of well points within this stretch, along with other areas where COCs may be discharging to Railroad Creek, as POCs for evaluating RAO 3.

Based on these CSM refinements, attainment of RAO 3 through protection of surface water from COCs at concentrations greater than surface water-based criteria is occurring throughout a large portion of the Site, but has not yet been attained in all areas. As described above in Section 7.1, direct measurements of surface water and aquatic life indicate the Phase 1 Remedial Action is protective of aquatic life in Railroad Creek (with the exception of slight exceedances of surface water criteria for copper in spring 2020). The Phase 1 Remedial Action is largely protective of surface water, with remaining locations of interest including the following:

- Railroad Creek is protected from exceedances by containment throughout the barrier wall and GWCS length, with localized exceedances as indicated by seep monitoring results.
- Railroad Creek is protected from exceedances throughout the unwalled portion of Tailings Pile 2 and Tailings Pile 3 by year-round losing conditions, except for potential indications of gaining conditions in the vicinity of the DS-15 cluster.
- Wetlands surface water in the Wetlands East of Tailings Pile 3 receives discharge of mine-influenced groundwater from the Intermediate and Shallow Zones.
- Railroad Creek receives discharge of mine-influenced groundwater in the year-round gaining stretch that extends from approximately SG-8 to SG-11.

Additional considerations for these locations of interest include:

- As in 2019, exceedances of surface water-based criteria in seeps adjacent to the tailings piles in 2020 were primarily limited to cadmium and zinc along the walled portions of Tailings Piles 1 and 2. These exceedances may be associated with residual iron hydroxide and other coatings on rock and soil surfaces from previous reaction with mine-influenced water outside the barrier wall.

- The only exceedance of surface water criteria in a seep along the unwalled portion of Tailings Pile 3 was a slight copper exceedance during the fall 2020 event, at a concentration similar to that measured in surface water, suggesting the result may be attributable to surface water or hyporheic zone water, rather than Tailings Pile 3. Additional refinement of the CSM in this area is needed before determining whether results from one or more Shallow Zone monitoring wells are relevant to RAO 3.
- Wetlands surface water east of Tailings Pile 3 was found to have exceedances of surface water criteria for aluminum, cadmium, copper, iron, and zinc in 2020 as in 2019. Available data suggest discharging groundwater may be a contributing source in addition to leaching from tailings in shallow wetlands soil.
- While direct measurements of surface water and aquatic life indicate the Phase 1 Remedial Action is protective of aquatic life in Railroad Creek, well points and porewater results from locations adjacent to Railroad Creek do not yet indicate compliance with criteria based on ARARs protective of Railroad Creek. Although compliance with surface water ARARs is being attained and biomonitoring results demonstrate substantial improvements compared to baseline conditions, exceedances of ROD criteria are being measured in well points and porewater.
- The occurrences of ROD surface water-based criteria exceedances for well points and porewater were relatively similar in 2020 as in 2019 and are consistent with the CSM of groundwater discharging to surface water in the downgradient reach between SG-8 and SG-11. In addition, there were porewater and well point exceedances at SG-7(R), which is located on the opposite bank as Tailings Pile 3, and which the data indicate is upgradient of the approximate edge of the gaining reach, though there is no exact boundary. There were again zinc exceedances in the upgradient, background porewater location at RC-6. This may indicate a local source from soil in the riverbank for both of these locations. For both well points and porewater datasets, the most elevated COC concentrations and the exceedances of the most COC criteria were again measured at the SG-10 location. In addition to the ROD criteria, the improvement in surface water quality and the recovery of BMIs and fish populations should be considered as important context for assessment of the effectiveness of the Phase 1 Remedial Action.

Although few statistically significant trends were identified (Section 4.5), time-concentration plots at locations of interest in the area of groundwater discharge to Railroad Creek, represented by well point SG-10-WP and porewater sampling locations at multiple depths at SG-10, appear to indicate an overall pattern of increasing concentrations of multiple COCs since baseline. However, given the distance from the tailings piles, it is likely too soon after the Phase 1 Remedial Action to interpret a response to the remedial action in this downgradient plume, and additional data will be needed to demonstrate plume stability before assessing compliance.

7.3.2 Recommendations for 2021 PSVP Monitoring Program Changes

The following are recommended for the 2021 PSVP monitoring program:

- The DQO 1A, the monitoring of hydrogeologic changes in tailings piles following regrading, cover, surface water diversion, and installation of the subsurface barrier wall and GWCS, has been adequately addressed based on 2 years of post-Phase 1 data collection. It is recommended that no further evaluation be conducted specifically for DQO 1A, but the current program of manual and datalogger water-level measurements will be continued as part of the PSVP program.
- Diverted surface water from the South Tailings Pile 3 Borrow Area diversion channel should be sampled in 2021 and analyzed for major cations and anions, COC metals, and pH to allow for a more complete understanding of the effect of this surface water on the wetlands surface water quality, including the dilution of wetlands surface water.

Other general recommendations include the following:

- Stilling well transducers adjacent to the DS-15 cluster should continue to be monitored for confirmation of potential gaining conditions identified in this area. These activities are currently planned as part of the spring and fall 2021 field event.
- Monitoring of specific conductance meters in groundwater should be continued over the winter and spring months for a fuller picture of year-round groundwater-surface water interactions at Railroad Creek and the Wetlands East of Tailings Pile 3. These activities are currently planned as part of the spring and fall 2021 field event.
- Wetlands stilling well transducer monitoring data should be used to confirm the findings of upward vertical gradients in the west side of the wetlands and neutral vertical gradients farther east in the wetlands. These activities are currently planned as part of the spring and fall 2021 field event.
- Future work to evaluate and design the Phase 2 Remedial Action, including potential additional borings or other investigations, should take into consideration the low-K layer.
- Current efforts to improve GWCS performance at Collection Sump 1 at the east end of Tailings Pile 1 will be continued as part of operations and maintenance. Monitoring of the ground surface, which has indicated ponding near Collection Sump 1 and BW-VWP-72, should continue to be conducted for evidence of ponded groundwater in this and other areas where VWPs indicate head measurements are greater than the ground surface. Near BW-VWP-68, head measurements above the ground surface do not result in ponding or reflect groundwater flow. In addition, it is recommended that ongoing monitoring of VWP data be continued under the Phase 1 O&M Plan and PSVP.

- Statistical analyses for stability should include continued evaluation of seasonality as the dataset grows and its resolving power increases. These activities are currently planned as part of the 2021 ACAR.

7.4 WEST AREA SEEPS (RAO 1)

7.4.1 Phase 1 Remedial Action Performance in 2020

Two newly identified seeps (SP-42 and SP-43) were identified upgradient of the West Area Seeps Collection Trench during the spring 2020 monitoring event and had one or more COCs exceed surface water-based criteria. Additionally, three historical seeps (SP-23, SP-12 East, and SP-12 West) and one newly identified seep (SP-41) were present downgradient of the West Area Seeps Collection Trench during the spring 2020 monitoring event and had one or more COCs exceed surface water-based criteria at similar concentrations as SP-42 and SP-43, upgradient of the West Area Seeps Collection Trench. Based on these surface water criteria exceedances, RAO 1 has not yet been achieved at these seeps. A decrease in COC concentrations following the installation of the West Area Seeps Collection Trench in 2016 was observed at SP-23; however, COC concentrations at SP-12 East and SP-12 West have remained similar with only small decreases since installation of the West Area Seeps Collection Trench. It is recommended that monitoring continue at seeps SP-23, SP-12 East, and SP-12 West during the 2021 spring and summer monitoring events to confirm the 2019 and 2020 monitoring results.

Historical seep SP-26 was also present during the spring and summer 2020 monitoring events. However, the samples collected from this seep during these events had no surface water-based criteria exceedances. This seep has COC concentrations that are protective of aquatic life and in compliance with ARARs.

7.4.2 Recommendations for 2021 PSVP Monitoring Program

Consistent with the monitoring schedule in the 2020 PSVP, annual West Area Seeps monitoring in 2021 will continue with two monitoring events, in spring and summer. Sampling of SP-26 is no longer needed based on 2019 and 2020 results less than criteria for COCs, and it is proposed to be discontinued for 2021 and future monitoring events.

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Holden Mine Site

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Tables

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Table 2.1
Surface Water Analytical Results

			Area	Background													Surface Water					
			Location [1]	RC-6						RC-1							RC-4					
			Sample Type	Field Sample			Field Sample			Field Sample			Field Sample				Field Sample			Field Sample		
			Sample Date	6/6/2020			9/27/2020			6/5/2020			9/26/2020				6/8/2020			9/26/2020		
Analytes	CAS No.	Units	Surface Water-Based Criteria [2]	Hardness-Adjusted Criteria ROD[3]	Hardness-Adjusted Criteria 2016[4]	Sample Result	Hardness-Adjusted Criteria ROD[3]	Hardness-Adjusted Criteria 2016[4]	Sample Result	Hardness-Adjusted Criteria ROD[3]	Hardness-Adjusted Criteria 2016[4]	Sample Result	Hardness-Adjusted Criteria ROD[3]	Hardness-Adjusted Criteria 2016[4]	Sample Result	Hardness-Adjusted Criteria ROD[3]	Hardness-Adjusted Criteria 2016[4]	Sample Result	Hardness-Adjusted Criteria ROD[3]	Hardness-Adjusted Criteria 2016[4]	Sample Result
Total Metals																						
Aluminum	7429-90-5	µg/L	**142**	--	--	88.4	--	--	90.2	--	--	80.5	--	--	82.4	--	--	72.4	--	--	86.7
Cadmium	7440-43-9	µg/L	0.05	0.0540	**0.139**	0.0212	0.0619	**0.161**	0.020 JQ	0.0550	**0.143**	0.020 JQ	0.0597	**0.155**	0.0172 JQ	0.0580	**0.152**	0.0386	0.0622	**0.162**	0.0254
Calcium	7440-70-2	µg/L	--	--	--	3,870	--	--	4780	--	--	4,000	--	--	4500	--	--	4,400	--	--	4780
Copper	7440-50-8	µg/L	1.45	**1.76**	--	1.11	**2.09**	--	0.868	**1.82**	--	0.981	**2.00**	--	0.849	**1.95**	--	**2.41**	**2.10**	--	1.04
Iron	7439-89-6	µg/L	**1000**	--	--	98.8	--	--	176	--	--	98.5	--	--	162	--	--	95.0	--	--	170
Lead	7439-92-1	µg/L	0.169	**0.220**	--	0.113	**0.276**	--	0.133	**0.229**	--	0.113	**0.260**	--	0.120	**0.251**	--	0.0920 JQ	**0.278**	--	0.120
Magnesium	7439-95-4	µg/L	--	--	--	409	--	--	465	--	--	404	--	--	454	--	--	424	--	--	482
Manganese	7439-96-5	µg/L	--	--	--	2.43	--	--	3.94	--	--	2.77	--	--	3.66	--	--	2.64	--	--	4.45
Potassium	9/7/7440	µg/L	--	--	--	370	--	--	484	--	--	372	--	--	480	--	--	381	--	--	500
Sodium	7440-23-5	µg/L	--	--	--	683	--	--	735	--	--	657	--	--	705	--	--	665	--	--	745
Zinc	7440-66-6	µg/L	13.6	**16.5**	--	2.23 JQ	**19.5**	--	2.62 JQ	**17.0**	--	2.25 JQ	**18.7**	--	2.88 JQ	**18.2**	--	4.08	**19.6**	--	2.88 JQ
Conventionals																						
Alkalinity, Total	--	mg-$CaCO_3$/L	--	--	--	9.24	--	--	9.78	--	--	9.65	--	--	9.69	--	--	10.8	--	--	9.48
Alkalinity, Bicarbonate	--	mg-$CaCO_3$/L	--	--	--	9.24	--	--	9.78	--	--	9.65	--	--	9.69	--	--	10.8	--	--	9.48
Alkalinity, Carbonate	--	mg-$CaCO_3$/L	--	--	--	1.00 U	--	--	1.00 U	--	--	1.00 U	--	--	1.00 U	--	--	1.00 U	--	--	1.00 U
Alkalinity, Hydroxide	--	mg-$CaCO_3$/L	--	--	--	1.00 U	--	--	1.00 U	--	--	1.00 U	--	--	1.00 U	--	--	1.00 U	--	--	1.00 U
Chloride	16887-00-6	mg/L	--	--	--	0.147	--	--	0.29	--	--	0.144	--	--	0.288	--	--	0.159	--	--	0.299
Dissolved Organic Carbon	--	mg/L	--	--	--	0.740	--	--	0.75	--	--	0.730	--	--	0.880	--	--	0.700	--	--	0.670
Nitrate (as Nitrogen)	14797-55-8	mg/L	--	--	--	0.100 UJ	--	--	0.100 U	--	--	0.100 UJ	--	--	0.100 UJ	--	--	0.100 UJ	--	--	0.100 UJ
Sulfate	14808-79-8	mg/L	--	--	--	2.12	--	--	3.58	--	--	2.25	--	--	3.61	--	--	2.62	--	--	3.89
Total Dissolved Solids	--	mg/L	--	--	--	26.0	--	--	16.0	--	--	23.0	--	--	21.0	--	--	15.0 J	--	--	9.00
Total Suspended Solids	--	mg/L	--	--	--	18.0	--	--	1.00	--	--	2.00	--	--	1.00 U	--	--	1.00 UJ	--	--	1.00
Total Organic Carbon	--	mg/L	--	--	--	0.720	--	--	0.700	--	--	0.740	--	--	0.740	--	--	0.760	--	--	0.690
Hardness, Total	--	mg-$CaCO_3$/L	--	--	--	11.3	--	--	13.8	--	--	11.7	--	--	13.1	--	--	12.7	--	--	13.9
Field Parameters [5]																						
Dissolved Oxygen (DO)	--	mg/L	--	--	--	11.54	--	--	11.12	--	--	11.24	--	--	10.41	--	--	11.32	--	--	11.04
Ferrous Iron	--	mg/L	--	--	--	0.5 U	--	--	0.5 U	--	--	0.5 U	--	--	0.5 U	--	--	0.5 U	--	--	0.5 U
Oxidation-Reduction Potential (ORP)	--	mV	--	--	--	143.4	--	--	105.7	--	--	126.9	--	--	184.7	--	--	132.1	--	--	168.4
pH	--	pH	--	--	--	6.51	--	--	7.15	--	--	6.53	--	--	6.67	--	--	6.80	--	--	8.14
Specific Conductivity	--	µS/cm	--	--	--	27.4	--	--	30.8	--	--	28.4	--	--	32.1	--	--	22.7	--	--	32.3
Turbidity	--	NTU	--	--	--	1.48	--	--	1.76	--	--	1.25	--	--	1.21	--	--	1.10	--	--	1.44

Notes:

Results for total metals and conventionals are presented to three significant figures. Results for field parameters are presented to the significant figures indicated by the field meter.

-- Not applicable/available or not analyzed.

RED/BOLD Detected exceedance of applicable criteria (applicable criteria presented in **bold**).

1 Locations are listed from upstream (west) to downstream (east).

2 Surface water criteria given in Tables 3 and 11 of the ROD are presented for reference only. Reference criteria from the ROD for cadmium, copper, lead, and zinc are adjusted based on a hardness of 9 mg/L.

3 For cadmium, copper, lead, and zinc, criteria are presented that are adjusted for hardness for each sample, in accordance with Table 3 of the ROD. The cadmium criteria, adjusted in accordance with the U.S. Environmental Protection Agency National Recommended Water Quality Criteria (NRWQC) last updated in 2001, is presented for reference only. Cadmium results are compared to 2016 hardness adjusted criteria. Copper, lead, and zinc were adjusted based on WAC Chapter 173-201A (accessed at https://apps.leg.wa.gov/WAC/default.aspx?cite=173-201A-240). The hardness of the individual surface water sample was used in the adjustment.

4 Cadmium criteria adjusted for hardness using the current (updated 2016) NRWQC hardness correction formula (accessed at https://www.epa.gov/wqc/national-recommended-water-quality-criteria-aquatic-life-criteria-table#b).

5 Field measurements were collected with YSI ProDSS water quality instrument and LaMotte 2020we turbidity meter during surface water sampling. Ferrous iron measured with a Hach Iron test kit, Model IR-18, 0–10 mg/L.

Abbreviations:

CAS Chemical Abstracts Service
µg/L Micrograms per liter
µS/cm Microsiemens per centimeter
mg-$CaCO_3$/L Milligrams calcium carbonate per liter
mg/L Milligrams per liter
mV Millivolts
NTU Nephelometric turbidity units
ROD Record of Decision

Qualifiers:

JQ Analyte was detected between the method detection limit and reporting limit, concentration is considered to be an estimate.
U Analyte was not detected at the given reporting limit.
UJ Analyte was not detected at the given reporting limit, which is considered to be an estimate.

Table 2.1
Surface Water Analytical Results

Area	Surface Water (cont.)																	
Location [1]	RC-16								RC-7									
Sample Type	Field Sample			Field Sample			Field Sample			Field Sample			Field Duplicate					
Sample Date	6/8/2020			9/26/2020			6/11/2020			9/26/2020			9/26/2020					
Analytes	CAS No.	Units	Surface Water-Based Criteria [2]	Hardness-Adjusted Criteria ROD [3]	Hardness-Adjusted Criteria 2016 [4]	Sample Result	Hardness-Adjusted Criteria ROD [3]	Hardness-Adjusted Criteria 2016 [4]	Sample Result	Hardness-Adjusted Criteria ROD [3]	Hardness-Adjusted Criteria 2016 [4]	Sample Result	Hardness-Adjusted Criteria ROD [3]	Hardness-Adjusted Criteria 2016 [4]	Sample Result	Hardness-Adjusted Criteria ROD [3]	Hardness-Adjusted Criteria 2016 [4]	Sample Result
Total Metals																		
Aluminum	7429-90-5	µg/L	**142**	--	--	39.5	--	--	58.8	--	--	59.6	--	--	79.8	--	--	84.3
Cadmium	7440-43-9	µg/L	0.05	0.0570	**0.147**	0.0102 JQ	0.059	**0.153**	0.0156 JQ	0.0560	**0.146**	0.0328	0.0616	**0.161**	0.0278	0.0622	**0.162**	0.0288
Calcium	7440-70-2	µg/L	--	--	--	4,100	--	--	4310	--	--	4,160	--	--	4680	--	--	4730
Copper	7440-50-8	µg/L	1.45	**1.88**	--	0.714	**1.97**	--	0.649	**1.87**	--	1.80	**2.08**	--	0.998	**2.10**	--	1.02
Iron	7439-89-6	µg/L	**1000**	--	--	58.5	--	--	98.2	--	--	82.4	--	--	158	--	--	162
Lead	7439-92-1	µg/L	0.169	**0.240**	--	0.100 U	**0.256**	--	0.100 U	**0.238**	--	0.0790 JQ	**0.274**	--	0.114	**0.278**	--	0.108
Magnesium	7439-95-4	µg/L	--	--	--	482	--	--	518	--	--	417	--	--	492	--	--	500
Manganese	7439-96-5	µg/L	--	--	--	1.55	--	--	2.38	--	--	3.09	--	--	4.21	--	--	4.27
Potassium	9/7/7440	µg/L	--	--	--	582	--	--	606	--	--	405	--	--	509	--	--	507
Sodium	7440-23-5	µg/L	--	--	--	605	--	--	689	--	--	649	--	--	719	--	--	751
Zinc	7440-66-6	µg/L	13.6	**17.6**	--	1.59 JQ	**18.4**	--	2.35 JQ	**17.5**	--	4.76	**19.4**	--	5.10	**19.6**	--	5.02
Conventionals																		
Alkalinity, Total	--	mg-$CaCO_3$/L	--	--	--	9.29	--	--	9.44	--	--	9.57	--	--	9.88	--	--	10.3
Alkalinity, Bicarbonate	--	mg-$CaCO_3$/L	--	--	--	9.29	--	--	9.44	--	--	9.57	--	--	9.88	--	--	10.3
Alkalinity, Carbonate	--	mg-$CaCO_3$/L	--	--	--	1.00 U	--	--	1.00 U	--	--	1.00 U	--	--	1.00 U	--	--	1.00 U
Alkalinity, Hydroxide	--	mg-$CaCO_3$/L	--	--	--	1.00 U	--	--	1.00 U	--	--	1.00 U	--	--	1.00 U	--	--	1.00 U
Chloride	16887-00-6	mg/L	--	--	--	0.100 U	--	--	0.156	--	--	0.144	--	--	0.287	--	--	0.277
Dissolved Organic Carbon	--	mg/L	--	--	--	0.500 U	--	--	0.650	--	--	0.710	--	--	0.700	--	--	0.670
Nitrate (as Nitrogen)	14797-55-8	mg/L	--	--	--	0.199 J	--	--	0.100 UJ	--	--	0.100 UJ	--	--	0.100 UJ	--	--	0.100 UJ
Sulfate	14808-79-8	mg/L	--	--	--	2.85	--	--	3.60	--	--	2.61	--	--	4.10	--	--	4.09
Total Dissolved Solids	--	mg/L	--	--	--	14.0 J	--	--	20.0	--	--	5.00 UJ	--	--	21.0	--	--	20.0
Total Suspended Solids	--	mg/L	--	--	--	3.00 J	--	--	2.00	--	--	1.00 U	--	--	1.00	--	--	1.00
Total Organic Carbon	--	mg/L	--	--	--	0.500 U	--	--	0.580	--	--	0.720	--	--	0.710	--	--	0.690
Hardness, Total	--	mg-$CaCO_3$/L	--	--	--	12.2	--	--	12.9	--	--	12.1	--	--	13.7	--	--	13.9
Field Parameters [5]																		
Dissolved Oxygen (DO)	--	mg/L	--	--	--	11.32	--	--	11.08	--	--	11.21	--	--	10.83	--	--	--
Ferrous Iron	--	mg/L	--	--	--	--	--	--	0.5 U	--	--	0.5 U	--	--	0.5 U	--	--	--
Oxidation-Reduction Potential (ORP)	--	mV	--	--	--	139.3	--	--	164.7	--	--	114.5	--	--	159.5	--	--	--
pH	--	pH	--	--	--	6.84	--	--	8.22	--	--	6.77	--	--	8.2	--	--	--
Specific Conductivity	--	µS/cm	--	--	--	21.9	--	--	30.5	--	--	28.5	--	--	32.8	--	--	--
Turbidity	--	NTU	--	--	--	0.70	--	--	1.2	--	--	0.60	--	--	1.75	--	--	--

Notes:

Results for total metals and conventionals are presented to three significant figures. Results for field parameters are presented to the significant figures indicated by the field meter.

-- Not applicable/available or not analyzed.

RED/BOLD Detected exceedance of applicable criteria (applicable criteria presented in **bold**).

1 Locations are listed from upstream (west) to downstream (east).

2 Surface water criteria given in Tables 3 and 11 of the ROD are presented for reference only. Reference criteria from the ROD for cadmium, copper, lead, and zinc are adjusted based on a hardness of 9 mg/L.

3 For cadmium, copper, lead, and zinc, criteria are presented that are adjusted for hardness for each sample, in accordance with Table 3 of the ROD. The cadmium criteria, adjusted in accordance with the U.S. Environmental Protection Agency National Recommended Water Quality Criteria (NRWQC) last updated in 2001, is presented for reference only. Cadmium results are compared to 2016 hardness adjusted criteria. Copper, lead, and zinc were adjusted based on WAC Chapter 173-201A (accessed at https://apps.leg.wa.gov/WAC/default.aspx?cite=173-201A-240). The hardness of the individual surface water sample was used in the adjustment.

4 Cadmium criteria adjusted for hardness using the current (updated 2016) NRWQC hardness correction formula (accessed at https://www.epa.gov/wqc/national-recommended-water-quality-criteria-aquatic-life-criteria-table#b).

5 Field measurements were collected with YSI ProDSS water quality instrument and LaMotte 2020we turbidity meter during surface water sampling. Ferrous iron measured with a Hach Iron test kit, Model IR-18, 0–10 mg/L.

Abbreviations:

CAS Chemical Abstracts Service
µg/L Micrograms per liter
µS/cm Microsiemens per centimeter
mg-$CaCO_3$/L Milligrams calcium carbonate per liter
mg/L Milligrams per liter
mV Millivolts
NTU Nephelometric turbidity units
ROD Record of Decision

Qualifiers:

JQ Analyte was detected between the method detection limit and reporting limit, concentration is considered to be an estimate.
U Analyte was not detected at the given reporting limit.
UJ Analyte was not detected at the given reporting limit, which is considered to be an estimate.

Table 2.1
Surface Water Analytical Results

			Area	Surface Water (cont.)														
			Location [1]	RC-24									RC-2 (SG-7)					
			Sample Type	Field Sample			Field Duplicate			Field Sample			Field Sample			Field Sample		
			Sample Date	6/7/2020			6/7/2020			9/27/2720			6/7/2020			9/22/2020		
Analytes	CAS No.	Units	Surface Water-Based Criteria [2]	Hardness-Adjusted Criteria ROD [3]	Hardness-Adjusted Criteria 2016 [4]	Sample Result	Hardness-Adjusted Criteria ROD [3]	Hardness-Adjusted Criteria 2016 [4]	Sample Result	Hardness-Adjusted Criteria ROD [3]	Hardness-Adjusted Criteria 2016 [4]	Sample Result	Hardness-Adjusted Criteria ROD [3]	Hardness-Adjusted Criteria 2016 [4]	Sample Result	Hardness-Adjusted Criteria ROD [3]	Hardness-Adjusted Criteria 2016 [4]	Sample Result
Total Metals																		
Aluminum	7429-90-5	µg/L	**142**	--	--	64.9	--	--	56.2	--	--	93.1	--	--	79.2	--	--	21.1
Cadmium	7440-43-9	µg/L	0.05	0.0570	**0.148**	0.0386	0.0560	**0.146**	0.0400	0.0616	**0.161**	0.0316	0.0600	**0.157**	0.0390	0.0695	**0.183**	0.0390
Calcium	7440-70-2	µg/L	--	--	--	4,200	--	--	4,130	--	--	4730	--	--	4,550	--	--	5590
Copper	7440-50-8	µg/L	1.45	**1.89**	--	**2.12**	**1.87**	--	**2.02**	**2.08**	--	1.16	**2.03**	--	**2.11**	**2.41**	--	0.614
Iron	7439-89-6	µg/L	**1000**	--	--	113	--	--	115	--	--	196	--	--	105	--	--	68.8
Lead	7439-92-1	µg/L	0.169	**0.242**	--	0.0920 JQ	**0.238**	--	0.0890 JQ	**0.274**	--	0.115	**0.265**	--	0.114	**0.334**	--	0.100 U
Magnesium	7439-95-4	µg/L	--	--	--	431	--	--	426	--	--	451	--	--	466	--	--	565
Manganese	7439-96-5	µg/L	--	--	--	4.06	--	--	4.06	--	--	5.77	--	--	3.73	--	--	3.34
Potassium	9/7/7440	µg/L	--	--	--	382	--	--	382	--	--	480	--	--	400	--	--	494
Sodium	7440-23-5	µg/L	--	--	--	645	--	--	642	--	--	607	--	--	690	--	--	729
Zinc	7440-66-6	µg/L	13.6	**17.7**	--	4.86	**17.5**	--	4.56	**19.4**	--	5.84	**18.9**	--	4.51	**22.5**	--	5.63
Conventionals																		
Alkalinity, Total	--	mg-$CaCO_3$/L	--	--	--	10.3	--	--	9.81	--	--	10.6	--	--	10.0	--	--	12.7
Alkalinity, Bicarbonate	--	mg-$CaCO_3$/L	--	--	--	10.3	--	--	9.81	--	--	10.6	--	--	10.0	--	--	12.7
Alkalinity, Carbonate	--	mg-$CaCO_3$/L	--	--	--	1.00 U	--	--	1.00 U	--	--	1.00 U	--	--	1.00 U	--	--	1.00 U
Alkalinity, Hydroxide	--	mg-$CaCO_3$/L	--	--	--	1.00 U	--	--	1.00 U	--	--	1.00 U	--	--	1.00 U	--	--	1.00 U
Chloride	16887-00-6	mg/L	--	--	--	0.144	--	--	0.139	--	--	0.278	--	--	0.141	--	--	0.335
Dissolved Organic Carbon	--	mg/L	--	--	--	0.700	--	--	0.640	--	--	0.840	--	--	0.630	--	--	0.500 U
Nitrate (as Nitrogen)	14797-55-8	mg/L	--	--	--	0.100 UJ	--	--	0.100 UJ	--	--	0.100 U	--	--	0.100 UJ	--	--	0.100 UJ
Sulfate	14808-79-8	mg/L	--	--	--	2.90	--	--	2.86	--	--	4.47	--	--	2.67	--	--	5.47
Total Dissolved Solids	--	mg/L	--	--	--	27.0 J	--	--	17.0	--	--	22.0	--	--	21.0	--	--	31.0
Total Suspended Solids	--	mg/L	--	--	--	2.00	--	--	2.00	--	--	1.00	--	--	22.0	--	--	1.00 U
Total Organic Carbon	--	mg/L	--	--	--	0.620	--	--	0.650	--	--	0.790	--	--	0.680	--	--	0.500 U
Hardness, Total	--	mg-$CaCO_3$/L	--	--	--	12.3	--	--	12.1	--	--	13.7	--	--	13.3	--	--	16.3
Field Parameters [5]																		
Dissolved Oxygen (DO)	--	mg/L	--	--	--	9.20	--	--	--	--	--	11	--	--	11.38	--	--	10.17
Ferrous Iron	--	mg/L	--	--	--	0.5 U	--	--	--	--	--	0.5 U	--	--	0.5 U	--	--	0.5 U
Oxidation-Reduction Potential (ORP)	--	mV	--	--	--	152.1	--	--	--	--	--	77	--	--	193.4	--	--	138.2
pH	--	pH	--	--	--	6.90	--	--	--	--	--	7.12	--	--	6.84	--	--	6.78
Specific Conductivity	--	µS/cm	--	--	--	16.5	--	--	--	--	--	33.1	--	--	29.7	--	--	40.2
Turbidity	--	NTU	--	--	--	1.17	--	--	--	--	--	1.64	--	--	4.70	--	--	3.9

Notes:

Results for total metals and conventionals are presented to three significant figures. Results for field parameters are presented to the significant figures indicated by the field meter.

-- Not applicable/available or not analyzed.

RED/BOLD Detected exceedance of applicable criteria (applicable criteria presented in **bold**).

1 Locations are listed from upstream (west) to downstream (east).

2 Surface water criteria given in Tables 3 and 11 of the ROD are presented for reference only. Reference criteria from the ROD for cadmium, copper, lead, and zinc are adjusted based on a hardness of 9 mg/L.

3 For cadmium, copper, lead, and zinc, criteria are presented that are adjusted for hardness for each sample, in accordance with Table 3 of the ROD. The cadmium criteria, adjusted in accordance with the U.S. Environmental Protection Agency National Recommended Water Quality Criteria (NRWQC) last updated in 2001, is presented for reference only. Cadmium results are compared to 2016 hardness adjusted criteria. Copper, lead, and zinc were adjusted based on WAC Chapter 173-201A (accessed at https://apps.leg.wa.gov/WAC/default.aspx?cite=173-201A-240). The hardness of the individual surface water sample was used in the adjustment.

4 Cadmium criteria adjusted for hardness using the current (updated 2016) NRWQC hardness correction formula (accessed at https://www.epa.gov/wqc/national-recommended-water-quality-criteria-aquatic-life-criteria-table#b).

5 Field measurements were collected with YSI ProDSS water quality instrument and LaMotte 2020we turbidity meter during surface water sampling. Ferrous iron measured with a Hach Iron test kit, Model IR-18, 0–10 mg/L.

Abbreviations:

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mg/L Milligrams per liter
mV Millivolts
NTU Nephelometric turbidity units
ROD Record of Decision

Qualifiers:

JQ Analyte was detected between the method detection limit and reporting limit, concentration is considered to be an estimate.
U Analyte was not detected at the given reporting limit.
UJ Analyte was not detected at the given reporting limit, which is considered to be an estimate.

Table 2.1
Surface Water Analytical Results

Area	Surface Water (cont.)																				
Location [1]	RC-13 (SG-8)								SG-9						SG-10					
Sample Type	Field Sample			Field Sample			Field Sample			Field Sample			Field Sample			Field Sample				
Sample Date	6/6/2020			9/26/2020			6/7/2020			9/27/2020			6/7/2020			9/27/2020				
Analytes	CAS No.	Units	Surface Water-Based Criteria [2]	Hardness-Adjusted Criteria ROD[3]	Hardness-Adjusted Criteria 2016[4]	Sample Result	Hardness-Adjusted Criteria ROD[3]	Hardness-Adjusted Criteria 2016[4]	Sample Result	Hardness-Adjusted Criteria ROD[3]	Hardness-Adjusted Criteria 2016[4]	Sample Result	Hardness-Adjusted Criteria ROD[3]	Hardness-Adjusted Criteria 2016[4]	Sample Result	Hardness-Adjusted Criteria ROD[3]	Hardness-Adjusted Criteria 2016[4]	Sample Result	Hardness-Adjusted Criteria ROD[3]	Hardness-Adjusted Criteria 2016[4]	Sample Result
Total Metals																					
Aluminum	7429-90-5	µg/L	**142**	--	--	92.7	--	--	90.4	--	--	62.1	--	--	72.8	--	--	84.0	--	--	82.8
Cadmium	7440-43-9	µg/L	0.05	0.0590	**0.154**	0.0434	0.0628	**0.164**	0.034	0.0700	**0.183**	0.0400	0.1	**0.272**	0.0398	0.0670	**0.175**	0.0628	0.0841	**0.225**	0.0488
Calcium	7440-70-2	µg/L	--	--	--	4,450	--	--	4810	--	--	5,590	--	--	9620	--	--	5,220	--	--	7440
Copper	7440-50-8	µg/L	1.45	**1.99**	--	**3.63**	**2.13**	--	1.12	**2.41**	--	1.95	**3.78**	--	1.03	**2.28**	--	2.27	**3.04**	--	1.05
Iron	7439-89-6	µg/L	**1000**	--	--	121	--	--	178	--	--	98.7	--	--	161	--	--	112	--	--	159
Lead	7439-92-1	µg/L	0.169	**0.258**	--	0.117	**0.283**	--	0.117	**0.334**	--	0.0840 JQ	**0.605**	--	0.101	**0.310**	--	0.0860 JQ	**0.454**	--	0.096 JQ
Magnesium	7439-95-4	µg/L	--	--	--	459	--	--	507	--	--	559	--	--	859	--	--	561	--	--	695
Manganese	7439-96-5	µg/L	--	--	--	3.88	--	--	4.85	--	--	10.8	--	--	19.8	--	--	23.1	--	--	19.1
Potassium	9/7/7440	µg/L	--	--	--	417	--	--	523	--	--	444	--	--	670	--	--	466	--	--	606
Sodium	7440-23-5	µg/L	--	--	--	708	--	--	719	--	--	760	--	--	945	--	--	775	--	--	828
Zinc	7440-66-6	µg/L	13.6	**18.6**	--	5.75	**19.9**	--	5.34	**22.5**	--	5.18	**35.1**	--	6.98	**21.3**	--	7.82	**28.3**	--	6.99
Conventionals																					
Alkalinity, Total	--	mg-$CaCO_3$/L	--	--	--	9.34	--	--	9.78	--	--	10.3	--	--	11.2	--	--	9.65	--	--	10.5
Alkalinity, Bicarbonate	--	mg-$CaCO_3$/L	--	--	--	9.34	--	--	9.78	--	--	10.3	--	--	11.2	--	--	9.65	--	--	10.5
Alkalinity, Carbonate	--	mg-$CaCO_3$/L	--	--	--	1.00 U	--	--	1.00 U	--	--	1.00 U	--	--	1.00 U	--	--	1.00 U	--	--	1.00 U
Alkalinity, Hydroxide	--	mg-$CaCO_3$/L	--	--	--	1.00 U	--	--	1.00 U	--	--	1.00 U	--	--	1.00 U	--	--	1.00 U	--	--	1.00 U
Chloride	16887-00-6	mg/L	--	--	--	0.141	--	--	0.273	--	--	0.150	--	--	0.295	--	--	0.149	--	--	0.283
Dissolved Organic Carbon	--	mg/L	--	--	--	0.650	--	--	0.740	--	--	0.640	--	--	0.690	--	--	0.780	--	--	0.650
Nitrate (as Nitrogen)	14797-55-8	mg/L	--	--	--	0.100 UJ	--	--	0.100 UJ	--	--	0.100 UJ	--	--	0.100 U	--	--	0.100 UJ	--	--	0.100 U
Sulfate	14808-79-8	mg/L	--	--	--	2.59	--	--	4.04	--	--	6.30	--	--	18.0	--	--	5.48	--	--	10.7
Total Dissolved Solids	--	mg/L	--	--	--	29.0	--	--	21.0	--	--	34.0	--	--	45.0	--	--	31.0	--	--	31.0
Total Suspended Solids	--	mg/L	--	--	--	7.00	--	--	2.00	--	--	2.00	--	--	1.00	--	--	2.00	--	--	1.00
Total Organic Carbon	--	mg/L	--	--	--	0.710	--	--	0.740	--	--	0.700	--	--	0.650	--	--	0.650	--	--	0.650
Hardness, Total	--	mg-$CaCO_3$/L	--	--	--	13.0	--	--	14.1	--	--	16.3	--	--	27.6	--	--	15.3	--	--	21.4
Field Parameters [5]																					
Dissolved Oxygen (DO)	--	mg/L	--	--	--	11.15	--	--	10.56	--	--	10.95	--	--	11.16	--	--	11.22	--	--	11.27
Ferrous Iron	--	mg/L	--	--	--	0.5 U	--	--	0.5 U	--	--	--	--	--	0.5	--	--	0.5 U	--	--	0.5 U
Oxidation-Reduction Potential (ORP)	--	mV	--	--	--	167.9	--	--	70.8	--	--	149.6	--	--	116.8	--	--	203.4	--	--	189.6
pH	--	pH	--	--	--	6.26	--	--	6.24	--	--	6.20	--	--	6.82	--	--	6.41	--	--	5.95
Specific Conductivity	--	µS/cm	--	--	--	24.3	--	--	32.5	--	--	22.0	--	--	68	--	--	20.6	--	--	47.4
Turbidity	--	NTU	--	--	--	2.80	--	--	1.7	--	--	0.60	--	--	1.4	--	--	1.42	--	--	1.01

Notes:

Results for total metals and conventionals are presented to three significant figures. Results for field parameters are presented to the significant figures indicated by the field meter.

-- Not applicable/available or not analyzed.

RED/BOLD Detected exceedance of applicable criteria (applicable criteria presented in **bold**).

1 Locations are listed from upstream (west) to downstream (east).

2 Surface water criteria given in Tables 3 and 11 of the ROD are presented for reference only. Reference criteria from the ROD for cadmium, copper, lead, and zinc are adjusted based on a hardness of 9 mg/L.

3 For cadmium, copper, lead, and zinc, criteria are presented that are adjusted for hardness for each sample, in accordance with Table 3 of the ROD. The cadmium criteria, adjusted in accordance with the U.S. Environmental Protection Agency National Recommended Water Quality Criteria (NRWQC) last updated in 2001, is presented for reference only. Cadmium results are compared to 2016 hardness adjusted criteria. Copper, lead, and zinc were adjusted based on WAC Chapter 173-201A (accessed at https://apps.leg.wa.gov/WAC/default.aspx?cite=173-201A-240). The hardness of the individual surface water sample was used in the adjustment.

4 Cadmium criteria adjusted for hardness using the current (updated 2016) NRWQC hardness correction formula (accessed at https://www.epa.gov/wqc/national-recommended-water-quality-criteria-aquatic-life-criteria-table#b).

5 Field measurements were collected with YSI ProDSS water quality instrument and LaMotte 2020we turbidity meter during surface water sampling. Ferrous iron measured with a Hach Iron test kit, Model IR-18, 0–10 mg/L.

Abbreviations:

CAS Chemical Abstracts Service
µg/L Micrograms per liter
µS/cm Microsiemens per centimeter
mg-$CaCO_3$/L Milligrams calcium carbonate per liter
mg/L Milligrams per liter
mV Millivolts
NTU Nephelometric turbidity units
ROD Record of Decision

Qualifiers:

JQ Analyte was detected between the method detection limit and reporting limit, concentration is considered to be an estimate.
U Analyte was not detected at the given reporting limit.
UJ Analyte was not detected at the given reporting limit, which is considered to be an estimate.

Table 2.1
Surface Water Analytical Results

Area	Surface Water (cont.)																	
Location [1]	SG-11						RC-5A						SG-12R		
Sample Type	Field Sample			Field Sample			Field Sample			Field Sample			Field Sample		
Sample Date	6/6/2020			9/27/2020			6/6/2020			9/23/2020			9/26/2020		
Analytes	CAS No.	Units	Surface Water-Based Criteria [2]	Hardness-Adjusted Criteria ROD[3]	Hardness-Adjusted Criteria 2016[4]	Sample Result	Hardness-Adjusted Criteria ROD[3]	Hardness-Adjusted Criteria 2016[4]	Sample Result	Hardness-Adjusted Criteria ROD[3]	Hardness-Adjusted Criteria 2016[4]	Sample Result	Hardness-Adjusted Criteria ROD[3]	Hardness-Adjusted Criteria 2016[4]	Sample Result	Hardness-Adjusted Criteria ROD[3]	Hardness-Adjusted Criteria 2016[4]	Sample Result
Total Metals																		
Aluminum	7429-90-5	µg/L	**142**	--	--	72.5	--	--	81.3	--	--	79.6	--	--	48.9	--	--	78.1
Cadmium	7440-43-9	µg/L	0.05	0.0670	**0.175**	0.0480	0.0854	**0.229**	0.0472	0.0670	**0.176**	0.0458	0.0968	**0.262**	0.0602	0.0802	**0.214**	0.0378
Calcium	7440-70-2	µg/L	--	--	--	5,300	--	--	7590	--	--	5,310	--	--	9110	--	--	6860
Copper	7440-50-8	µg/L	1.45	**2.30**	--	**2.69**	**3.10**	--	1.10	**2.31**	--	**2.32**	**3.61**	--	0.933	**2.87**	--	1.06
Iron	7439-89-6	µg/L	**1000**	--	--	93.6	--	--	160	--	--	101	--	--	104	--	--	164
Lead	7439-92-1	µg/L	0.169	**0.313**	--	0.151	**0.466**	--	0.094 JQ	**0.315**	--	0.255	**0.57**	--	0.100 U	**0.421**	--	0.100
Magnesium	7439-95-4	µg/L	--	--	--	528	--	--	726	--	--	539	--	--	827	--	--	708
Manganese	7439-96-5	µg/L	--	--	--	8.91	--	--	16.5	--	--	8.95	--	--	27.6	--	--	13.7
Potassium	9/7/7440	µg/L	--	--	--	428	--	--	607	--	--	441	--	--	678	--	--	606
Sodium	7440-23-5	µg/L	--	--	--	751	--	--	839	--	--	731	--	--	926	--	--	862
Zinc	7440-66-6	µg/L	13.6	**21.4**	--	7.05	**28.9**	--	6.74	**21.5**	--	7.04	**33.6**	--	9.65	**26.7**	--	7.10
Conventionals																		
Alkalinity, Total	--	mg-$CaCO_3$/L	--	--	--	9.95	--	--	10.5	--	--	10.3	--	--	12.9	--	--	11.5
Alkalinity, Bicarbonate	--	mg-$CaCO_3$/L	--	--	--	9.95	--	--	10.5	--	--	10.3	--	--	12.9	--	--	11.5
Alkalinity, Carbonate	--	mg-$CaCO_3$/L	--	--	--	1.00 U	--	--	1.00 U	--	--	1.00 U	--	--	1.00 U	--	--	1.00 U
Alkalinity, Hydroxide	--	mg-$CaCO_3$/L	--	--	--	1.00 U	--	--	1.00 U	--	--	1.00 U	--	--	1.00 U	--	--	1.00 U
Chloride	16887-00-6	mg/L	--	--	--	0.150	--	--	0.284	--	--	0.143	--	--	0.312	--	--	0.276
Dissolved Organic Carbon	--	mg/L	--	--	--	0.900	--	--	0.640	--	--	0.980	--	--	0.810	--	--	0.720
Nitrate (as Nitrogen)	14797-55-8	mg/L	--	--	--	0.100 UJ	--	--	0.100 U	--	--	0.100 UJ	--	--	0.100 UJ	--	--	0.100 UJ
Sulfate	14808-79-8	mg/L	--	--	--	4.62	--	--	10.3	--	--	4.77	--	--	14.0	--	--	9.30
Total Dissolved Solids	--	mg/L	--	--	--	37.0	--	--	11.0	--	--	31.0	--	--	58.0	--	--	13.0
Total Suspended Solids	--	mg/L	--	--	--	1.00 U	--	--	1.00 U	--	--	2.00	--	--	1.00 U	--	--	1.00
Total Organic Carbon	--	mg/L	--	--	--	0.680	--	--	0.660	--	--	0.680	--	--	0.600	--	--	0.760
Hardness, Total	--	mg-$CaCO_3$/L	--	--	--	15.4	--	--	21.9	--	--	15.5	--	--	26.2	--	--	20.0
Field Parameters [5]																		
Dissolved Oxygen (DO)	--	mg/L	--	--	--	10.26	--	--	11.11	--	--	11.39	--	--	10.09	--	--	--
Ferrous Iron	--	mg/L	--	--	--	0.5 U	--	--	0.5 U	--	--	0.5 U	--	--	0.5 U	--	--	--
Oxidation-Reduction Potential (ORP)	--	mV	--	--	--	99.1	--	--	148	--	--	80.0	--	--	84.4	--	--	--
pH	--	pH	--	--	--	6.91	--	--	6.61	--	--	8.12	--	--	6.91	--	--	--
Specific Conductivity	--	µS/cm	--	--	--	35.2	--	--	49.4	--	--	37.3	--	--	64.6	--	--	--
Turbidity	--	NTU	--	--	--	0.58	--	--	2.15	--	--	1.08	--	--	1.19	--	--	--

Notes:

Results for total metals and conventionals are presented to three significant figures. Results for field parameters are presented to the significant figures indicated by the field meter.

-- Not applicable/available or not analyzed.

RED/BOLD Detected exceedance of applicable criteria (applicable criteria presented in **bold**).

1 Locations are listed from upstream (west) to downstream (east).

2 Surface water criteria given in Tables 3 and 11 of the ROD are presented for reference only. Reference criteria from the ROD for cadmium, copper, lead, and zinc are adjusted based on a hardness of 9 mg/L.

3 For cadmium, copper, lead, and zinc, criteria are presented that are adjusted for hardness for each sample, in accordance with Table 3 of the ROD. The cadmium criteria, adjusted in accordance with the U.S. Environmental Protection Agency National Recommended Water Quality Criteria (NRWQC) last updated in 2001, is presented for reference only. Cadmium results are compared to 2016 hardness adjusted criteria. Copper, lead, and zinc were adjusted based on WAC Chapter 173-201A (accessed at https://apps.leg.wa.gov/WAC/default.aspx?cite=173-201A-240). The hardness of the individual surface water sample was used in the adjustment.

4 Cadmium criteria adjusted for hardness using the current (updated 2016) NRWQC hardness correction formula (accessed at https://www.epa.gov/wqc/national-recommended-water-quality-criteria-aquatic-life-criteria-table#b).

5 Field measurements were collected with YSI ProDSS water quality instrument and LaMotte 2020we turbidity meter during surface water sampling. Ferrous iron measured with a Hach Iron test kit, Model IR-18, 0–10 mg/L.

Abbreviations:

CAS Chemical Abstracts Service
µg/L Micrograms per liter
µS/cm Microsiemens per centimeter
mg-$CaCO_3$/L Milligrams calcium carbonate per liter
mg/L Milligrams per liter
mV Millivolts
NTU Nephelometric turbidity units
ROD Record of Decision

Qualifiers:

JQ Analyte was detected between the method detection limit and reporting limit, concentration is considered to be an estimate.
U Analyte was not detected at the given reporting limit.
UJ Analyte was not detected at the given reporting limit, which is considered to be an estimate.

Table 2.1
Surface Water Analytical Results

			Area	Surface Water (cont.)												
			Location [1]	SG-13						RC-10 (SG-20)			RC-15E		
			Sample Type	Field Sample			Field Sample			Field Sample			Field Sample		
			Sample Date	6/8/2020			9/26/2020			9/26/2020			9/26/2020		
Analytes	CAS No.	Units	Surface Water-Based Criteria [2]	Hardness-Adjusted Criteria ROD[3]	Hardness-Adjusted Criteria 2016[4]	Sample Result	Hardness-Adjusted Criteria ROD[3]	Hardness-Adjusted Criteria 2016[4]	Sample Result	Hardness-Adjusted Criteria ROD[3]	Hardness-Adjusted Criteria 2016[4]	Sample Result	Hardness-Adjusted Criteria ROD[3]	Hardness-Adjusted Criteria 2016[4]	Sample Result
Total Metals															
Aluminum	7429-90-5	µg/L	**142**	--	--	60.6	--	--	81.4	--	--	64.3	--	--	61.5
Cadmium	7440-43-9	µg/L	0.05	0.0810	**0.217**	0.0396	0.0796	**0.212**	0.0432	0.0805	**0.214**	0.0372	0.0807	**0.215**	0.0368
Calcium	7440-70-2	µg/L	--	--	--	7,000	--	--	6820	--	--	6890	--	--	6920
Copper	7440-50-8	µg/L	1.45	**2.92**	--	1.77	**2.84**	--	1.18	**2.88**	--	1.02	**2.89**	--	1.04
Iron	7439-89-6	µg/L	**1000**	--	--	109	--	--	159	--	--	136	--	--	123
Lead	7439-92-1	µg/L	0.169	**0.430**	--	0.0710 JQ	**0.416**	--	0.106	**0.423**	--	0.091 JQ	**0.425**	--	0.0830 JQ
Magnesium	7439-95-4	µg/L	--	--	--	713	--	--	667	--	--	695	--	--	704
Manganese	7439-96-5	µg/L	--	--	--	12.7	--	--	13.9	--	--	10.3	--	--	9.01
Potassium	9/7/7440	µg/L	--	--	--	496	--	--	601	--	--	604	--	--	595
Sodium	7440-23-5	µg/L	--	--	--	856	--	--	823	--	--	853	--	--	860
Zinc	7440-66-6	µg/L	13.6	**27.2**	--	5.64	**26.5**	--	7.02	**26.8**	--	5.41	**27.0**	--	5.25
Conventionals															
Alkalinity, Total	--	mg-$CaCO_3$/L	--	--	--	14.0	--	--	11.9	--	--	12.2	--	--	12.2
Alkalinity, Bicarbonate	--	mg-$CaCO_3$/L	--	--	--	14.0	--	--	11.9	--	--	12.2	--	--	12.2
Alkalinity, Carbonate	--	mg-$CaCO_3$/L	--	--	--	1.00 U	--	--	1.00 U	--	--	1.00 U	--	--	1.00 U
Alkalinity, Hydroxide	--	mg-$CaCO_3$/L	--	--	--	1.00 U	--	--	1.00 U	--	--	1.00 U	--	--	1.00 U
Chloride	16887-00-6	mg/L	--	--	--	0.150	--	--	0.274	--	--	0.276	--	--	0.276
Dissolved Organic Carbon	--	mg/L	--	--	--	0.840	--	--	0.750	--	--	0.830	--	--	0.900
Nitrate (as Nitrogen)	14797-55-8	mg/L	--	--	--	0.101 J	--	--	0.100 UJ	--	--	0.100 UJ	--	--	0.100 UJ
Sulfate	14808-79-8	mg/L	--	--	--	5.37	--	--	9.84	--	--	8.65	--	--	8.48
Total Dissolved Solids	--	mg/L	--	--	--	26.0 J	--	--	26.0	--	--	21.0	--	--	25.0
Total Suspended Solids	--	mg/L	--	--	--	2.00 J	--	--	2.00	--	--	1.00	--	--	1.00 U
Total Organic Carbon	--	mg/L	--	--	--	0.710	--	--	0.730	--	--	0.690	--	--	0.720
Hardness, Total	--	mg-$CaCO_3$/L	--	--	--	20.4	--	--	19.8	--	--	20.1	--	--	20.2
Field Parameters [5]															
Dissolved Oxygen (DO)	--	mg/L	--	--	--	11.26	--	--	10.54	--	--	10.54	--	--	10.5
Ferrous Iron	--	mg/L	--	--	--	0.5 U	--	--	0.5 U	--	--	0.5 U	--	--	0.5 U
Oxidation-Reduction Potential (ORP)	--	mV	--	--	--	141.3	--	--	82.8	--	--	98.1	--	--	97.3
pH	--	pH	--	--	--	6.67	--	--	6.52	--	--	6.64	--	--	6.47
Specific Conductivity	--	µS/cm	--	--	--	33.7	--	--	50.6	--	--	50	--	--	49.9
Turbidity	--	NTU	--	--	--	1.00	--	--	1.03	--	--	0.89	--	--	1.83

Notes:

Results for total metals and conventionals are presented to three significant figures. Results for field parameters are presented to the significant figures indicated by the field meter.

-- Not applicable/available or not analyzed.

RED/BOLD Detected exceedance of applicable criteria (applicable criteria presented in **bold**).

1 Locations are listed from upstream (west) to downstream (east).

2 Surface water criteria given in Tables 3 and 11 of the ROD are presented for reference only. Reference criteria from the ROD for cadmium, copper, lead, and zinc are adjusted based on a hardness of 9 mg/L.

3 For cadmium, copper, lead, and zinc, criteria are presented that are adjusted for hardness for each sample, in accordance with Table 3 of the ROD. The cadmium criteria, adjusted in accordance with the U.S. Environmental Protection Agency National Recommended Water Quality Criteria (NRWQC) last updated in 2001, is presented for reference only. Cadmium results are compared to 2016 hardness adjusted criteria. Copper, lead, and zinc were adjusted based on WAC Chapter 173-201A (accessed at https://apps.leg.wa.gov/WAC/default.aspx?cite=173-201A-240). The hardness of the individual surface water sample was used in the adjustment.

4 Cadmium criteria adjusted for hardness using the current (updated 2016) NRWQC hardness correction formula (accessed at https://www.epa.gov/wqc/national-recommended-water-quality-criteria-aquatic-life-criteria-table#b).

5 Field measurements were collected with YSI ProDSS water quality instrument and LaMotte 2020we turbidity meter during surface water sampling. Ferrous iron measured with a Hach Iron test kit, Model IR-18, 0–10 mg/L.

Abbreviations:

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µg/L Micrograms per liter
µS/cm Microsiemens per centimeter
mg-$CaCO_3$/L Milligrams calcium carbonate per liter
mg/L Milligrams per liter
mV Millivolts
NTU Nephelometric turbidity units
ROD Record of Decision

Qualifiers:

JQ Analyte was detected between the method detection limit and reporting limit, concentration is considered to be an estimate.
U Analyte was not detected at the given reporting limit.
UJ Analyte was not detected at the given reporting limit, which is considered to be an estimate.

Table 3.1
Sediment Sample Summary

Area	Sample Locations	Sample ID	Collection Date	Northing [1]	Easting [1]	Number of Grab Samples per Composite	Composite Sample Recovery Depth (cm) [2]	Sample Analyses
Background	RC-6	RC-6-SS-092920	9/29/20	437695.45	1650460.10	6	0 to 12	Metals (aluminum, beryllium cadmium, chromium, copper, iron, silver, zinc), TS, TOC, AVS/SEM, grain size, bioassay tests
	RC-1	RC-1-SS-092620	9/26/20	437574.76	1651085.10	6	0 to 20	
Site	RC-4	RC-4-SS-092620	9/26/20	437419.00	1653804.67	7	0 to 25	
	RC-2(SG-7) [3]	RC-2(SG-7)-SS-092920	9/29/20	436808.92	1658181.47	9	0 to 15	
	RC-5A	RC-5A-SS-092620	9/26/20	436259.43	1660850.24	7	0 to 23	
	RC-10(SG-20)	RC-10-SS-092720	9/27/20	434402.04	1672049.93	7	0 to 30	
Lucerne Bar	LB-1	LB-1-SS-092720	9/27/20	438513.20	1698167.34	6	0 to 30	
	LB-2	LB-2-SS-092720	9/27/20	438451.53	1698103.36	6	0 to 20	

Notes:

1 Coordinates are in WA State Plane N NAD 83-ft and represent the midpoint of the individual grab sample locations.

2 The target sample depth of 30-cm was not met at six of the eight sample locations due to the presence of cobbles.

3 The field duplicate was collected at this location.

Abbreviations:

AVS/SEM Acid volatile sulfide/simultaneously extracted metals

TOC Total organic carbon

TS Total solids

Table 3.2
Sediment Analytical Results

				Location	RC-6	RC-1	RC-4	RC-2(SG-7)		RC-5A	RC-10(SG-20)	LB-1	LB-2
				Sample ID	RC-6-SS-092920	RC-1-SS-092620	RC-4-SS-092620	RC-2(SG-7)-SS-092920	RC-102(SG-107)-SS-092920	RC-5A-SS-092620	RC-10-SS-092720	LB-1-SS-092720	LB-2-SS-092720
				Sample Type	Field Sample	Field Sample	Field Sample	Field Sample	Field Duplicate	Field Sample	Field Sample	Field Sample	Field Sample
				Sample Date	9/29/2020	9/26/2020	9/26/2020	9/29/2020	9/29/2020	9/26/2020	9/27/2020	9/27/2020	9/27/2020
				Depth	0–12 cm	0-20 cm	0-25 cm	0-15 cm	0-15 cm	0-23 cm	0-30 cm	0-30 cm	0-20 cm
Analytes	Units	SMS SCO [1]	SMS CSL [1]	Literature SQVs [2]									
Conventionals													
Total Organic Carbon	%	--	--	--	0.52	0.24	0.07	0.3	0.3	0.11	0.18	0.96	0.07
Total Solids	%	--	--	--	72.3	71.9	83.4	75.2	70.9	87.8	74.4	67.5	73.5
Metals													
Aluminum	mg/kg	--	--	58,000	10,400	10,600	9,290	11,400	9,700	5,870	10,400	7,010	6,340
Beryllium	mg/kg	--	--	--	0.08 JQ	0.07 JQ	0.06 JQ	0.11 JQ	0.08 JQ	0.08 JQ	0.09 JQ	0.09 JQ	0.07 JQ
Cadmium	mg/kg	2.1	5.4	--	0.17	0.12 JQ	0.38	0.4 JQ	0.24	0.25	0.45	0.27	0.23
Chromium	mg/kg	72	88	--	15.8	14.8	17.1	17.6	15.4	10.3	8.73	9.63	7.54
Copper	mg/kg	400	1,200	--	23.5	26.8	73.7	49.4	36.6	37.6	31.5	21.4	13.8
Iron	mg/kg	--	--	40,000	15,800	16,100	14,800	16,100	13,600	11,200	19,200	12,100	11,300
Silver	mg/kg	0.57	1.7	--	0.03 JQ	0.03 JQ	0.04 JQ	0.07 JQ	0.04 JQ	0.23 U	0.24 U	0.03 JQ	0.25 U
Zinc	mg/kg	3,200	4,200	--	54.9	49.3	79	90.9 JQ	73.4	45.7	86	71.7	58.8
Grain Size													
Gravel (<-1 Phi)	%	--	--	--	56.2	43.4	79.1	23.1	15.8	64.6	43.7	0	16.5
Sand (very coarse, -1 to 0 Phi)	%	--	--	--	7.5	14.5	11.1	7.1	6.7	16.7	23.1	1.8	22.7
Sand (coarse, 0 to 1 Phi)	%	--	--	--	11.2	18.5	4.7	22.6	26.6	9.1	16.6	9.3	32
Sand (medium, 1 to 2 Phi)	%	--	--	--	11.4	14.5	3.5	27.6	29.7	6	11.6	30.7	22.3
Sand (fine, 2 to 3 Phi)	%	--	--	--	7.9	4.3	1.3	11.5	12.4	1.2	3.2	31.4	5
Sand (very fine, 3 to 4 Phi)	%	--	--	--	2.9	1.1	0.4	4.4	5	0.3	0.5	18.2	0.6
Sand (total)	%	--	--	--	40.9	52.9	21.0	73.2	80.4	33.3	55.0	91.4	82.6
Silt (coarse, 4 to 5 Phi)	%	--	--	--	0	0	0	0	0	0	0	0	0
Silt (medium, 5 to 6 Phi)	%	--	--	--	0	0	0	0	0	0	0	0	0
Silt (fine, 6 to 7 Phi)	%	--	--	--	0	0	0	0	0	0	0	0	0
Silt (very fine, 7 to 8 Phi)	%	--	--	--	0	0	0	0	0	0	0	0	0
Clay (8 to 9 Phi)	%	--	--	--	0	0	0	0	0	0	0	0	0
Clay (9 to 10 Phi)	%	--	--	--	0	0	0	0	0	0	0	0	0
Clay (>10 Phi)	%	--	--	--	0	0	0	0	0	0	0	0	0
Total Fines	%	--	--	--	3.0	3.7	0	3.6	3.7	2.2	1.4	8.6	0.9

Notes:
1 Freshwater SCOs and CSLs Chemical Criteria (WAC 173-204-563).
2 SQVs proposed by USFS in the Proposed Plan (USFS 2010).

Abbreviations:
CSL Cleanup Screening Level
mg/kg Milligram per kilogram
SCO Sediment Cleanup Objective
SMS Sediment Management Standards
SQV Sediment Quality Value
USFS U.S. Department of Agriculture, Forest Service

Qualifiers:
JQ Analyte was detected between the method detection limit and reporting limit and is considered to be an estimate.
U Analyte was not detected at the given reporting limit.

Table 3.3
Sediment AVS and SEM Results

	Location	RC-6	RC-1	RC-4	RC-2(SG-7)		RC-5A	RC-10	LB-1	LB-2
	Sample ID	RC-6-SS-092920	RC-1-SS-092620	RC-4-SS-092620	RC-2(SG-7)-SS-092920	RC-102(SG-107)-SS-092920	RC-5A-SS-092620	RC-10-SS-092720	LB-1-SS-092720	LB-2-SS-092720
	Sample Type	Field Sample	Field Sample	Field Sample	Field Sample	Field Duplicate	Field Sample	Field Sample	Field Sample	Field Sample
	Sample Date	9/29/2020	9/26/2020	9/26/2020	9/29/2020	9/29/2020	9/26/2020	9/27/2020	9/27/2020	9/27/2020
	Depth	0–12 cm	0–20 cm	0–25 cm	0–15 cm	0–15 cm	0–23 cm	0–30 cm	0–30 cm	0–20 cm
Analytes	**Units**									
Conventionals										
Acid-volatile sulfide	umol/g	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U	0.03 U	0.04 U	0.06	0.04 U
SEM										
Cadmium	umol/g	0.0020	0.0012	0.0028	0.0026	0.0027	0.0022	0.0030	0.0028	0.0019
Copper	umol/g	0.18 JB	0.16 JB	0.83 JB	0.38 JB	0.43 JB	0.28 JB	0.29 JB	0.28 JB	0.13 JB
Silver	umol/g	0.00028 JQ	0.00019 JQ	0.00028 JQ	0.00028 JQ	0.00037 JQ	0.00019 JQ	0.00037 JQ	0.00019 JQ	9.3E-05 JQ
Zinc	umol/g	0.37 JB	0.23 JB	0.63 JB	0.70 JB	0.73 JB	0.46 JB	0.69 JB	1.0 JB	0.65 JB
∑SEM	umol/g	0.55	0.40	1.5	1.1	1.2	0.74	0.98	1.3	0.78
∑SEM/AVS										
∑SEM/AVS	umol/g	--	--	--	--	--	--	--	23	--

Notes:

-- Not applicable. ∑SEM/AVS was not calculated where AVS was non-detect.

Abbreviations:

AVS Acid volatile sulfide
g gram
SEM Simultaneously extracted metals
umol micromol

Qualifiers:

JB Analyte was detected and is considered to be estimated due to potential blank contamination.
JQ Analyte was detected between the method detection limit and reporting limit and is considered to be an estimate.
U Analyte was not detected at the given reporting limit.

Table 3.4
Summary of Bioassay Results

Location						RC-6	RC-1	RC-4	RC-2(SG-7)	RC-5A	RC-10(SG-20)	LB-1	LB-2
Sample ID					Lab Control	RC-6-SS-092920	RC-1-SS-092620	RC-4-SS-092620	RC-2(SG-7)-SS-092920	RC-5A-SS-092620	RC-10-SS-092720	LB-1-SS-092720	LB-2-SS-092720
Sample Date						9/29/2020	9/26/2020	9/26/2020	9/29/2020	9/26/2020	9/27/2020	9/27/2020	9/27/2020
Depth						0–12 cm	0–20 cm	0–25 cm	0–15 cm	0–23 cm	0–30 cm	0–30 cm	0–20 cm
Bioassay Tests and Metrics [1]	Units	Performance Standard [2] (Control and Background)	SMS Biological SCO [2,3]	SMS Biological CSL [2,3]									
10-day Chironomid Mortality Test													
Percent Mortality	%	≤30 and ≤30	--	--	5.0	13.7	17.5 a	15.0 a	5.0	31.2 a, c	18.7 a	8.7	15.0 a
M_T - M_B	%	--	> 20	> 30	--	--	--	-0.6	-10.6	15.6	3.1	-6.9	-0.6
28-day Hyalella Mortality Test													
Percent Mortality	%	≤20 and ≤30	--	--	8.7	10.0	25.0 a, c	70.0 a, b, c	16.2	22.5 a, c	31.2 a, c	48.7 a, b, c	48.7 a, b, c
M_T - M_B	%	--	> 10	> 25	--	--	--	**52.5**	-1.3	5.0	13.7 [4]	**31.2**	**31.2**
28-day Hyalella Growth Test													
Mean Dry Weight Per Surviving Organism	mg	≥0.15 and ≥0.15	--	--	0.696	**0.128** a	**0.103** a, c	0.037 a, b, c	0.125 a	0.096 a, c	0.076 a, b, c	0.070 a, b, c	0.084 a, c
(MIG_B - MIG_T)/MIG_B	mg	--	> 0.25	> 0.40	--	--	--	**0.680**	-0.0823	0.169	**0.342**	**0.394**	0.273 [4]

Notes:

-- Not applicable.

BOLD Result exceeds the performance standard for control or reference samples.

BOLD Result exceeds the SCO. An exceedance of the SCO for any two bioassay test metrics equated to a CSL exceedance at the sample location.

BOLD Result exceeds the SCO and CSL. An exceedance of the SCO for any two bioassay test metrics equated to a CSL exceedance at the sample location.

1 As allowed under SMS (WAC 173-204-563), the Site and Lucerne Bar bioassay results are proposed to be compared to the background sample results, rather than the laboratory control results, as the background samples are representative of natural sediment conditions and the natural sediment matrix. Background results were calculated as the average of the results from RC-6 and RC-1.

2 Freshwater SCOs and CSLs Biological Criteria (WAC 173-204-563).

3 An exceedance of the SCO or CSL requires that the result is greater than the criteria, and that there is a statistically significant difference between the test result and reference result at $p \leq 0.05$. A test result was considered statistically significant, if there was a statistically significant difference between the test result and both background samples (RC-6 and RC-1).

4 The result is greater than the SCO, but there is not a statistically significant difference between the result and both background samples results.

a Indicates a statistically significant difference from the laboratory control at alpha = 0.05.

b Indicates a statistically significant difference from RC-1 background site at alpha = 0.05.

c Indicates a statistically significant difference from RC-6 background site at alpha = 0.05.

Abbreviations:

B Background
CSL Cleanup Screening Level
M Mortality
mg milligrams
MIG Mean individual growth at time final
SCO Sediment Cleanup Objective
SMS Sediment Management Standards
T Test

Table 4.1
Monitoring Well, Well Point, Staff Gauge, and Stilling Well Inventory

Location ID	Ecology Tag	Location Type	Transducer Serial Number (last 4 or 5 digits)	Installation Date (completion)	Screened Lithologic Unit [1]	Screen Potentiometric Zone [2]	Total Well Depth at Time of Drilling (feet bgs)	Total Depth (measured from TOC)	Top of Screen Interval (feet bgs)	Bottom of Screen Interval (feet bgs)	Top of Screen Interval (feet amsl)	Bottom of Screen Interval (feet amsl)	TOC Elevation (feet amsl)	SG Measurement Adjustment (feet)	Ground Surface Elevation (feet amsl)	Well Diameter (inches)	Easting (feet NAD 83) [3]	Northing (feet NAD 83) [3]
DS-10D	BBB115	Monitoring well	--	6/12/09	Not used	Deep	unknown	60.89	47.9	57.9	2,814.69	2,804.69	2,865.58	--	NM	2.0	1672048.72	434449.89
DS-10I	BBB114	Monitoring well	--	6/13/09	Not used	Intermediate	unknown	37.97	25.0	35.0	2,837.98	2,827.98	2,865.95	--	NM	2.0	1672043.90	434460.40
DS-10S	BBB113	Monitoring well	--	6/14/09	Not used	Shallow	unknown	18.90	5.9	15.9	2,857.63	2,847.63	2,866.53	--	NM	2.0	1672038.95	434472.36
DS-11D	BBJ266	Monitoring well	--	10/12/10	Not used	Deep	unknown	52.69	39.7	49.7	2,989.78	2,979.78	3,032.47	--	NM	2.0	1665065.30	435845.11
DS-11I	BBJ267	Monitoring well	--	10/13/10	Not used	Intermediate	unknown	38.36	25.4	35.4	3,004.06	2,994.06	3,032.42	--	NM	2.0	1665068.70	435852.66
DS-11S	BBJ268	Monitoring well	--	10/14/10	Not used	Shallow	unknown	19.02	6.0	16.0	3,023.83	3,013.83	3,032.85	--	NM	2.0	1665059.85	435852.56
DS-12D	BIO849	Monitoring well	0360	10/16/16	Alluvium	Intermediate	65	66.3	54.6	64.6	3,094.25	3,084.25	3,150.55	--	3,148.85	2.0	1658160.68	436541.44
DS-12I	BIO847	Monitoring well	07073	10/17/16	Alluvium	Shallow	35.3	36.8	24.9	34.9	3,123.95	3,113.95	3,150.75	--	3,148.85	2.0	1658163.33	436544.82
DS-12S	BIO848	Monitoring well	07044	10/17/16	Alluvium	Shallow	25.3	27.55	15.18	25.18	3,133.89	3,123.89	3,151.44	--	3,149.07	2.0	1658166.84	436550.04
DS-13D	BIO850	Monitoring well	07057	10/11/16	Alluvium	Deep	95.8	98.75	86.11	96.11	3,064.33	3,054.33	3,152.77	--	3,150.13	2.0	1658213.73	436598.47
DS-13I	BIO851	Monitoring well	07038	10/18/16	Alluvium	Intermediate	60	62.45	50.24	60.24	3,100.19	3,090.19	3,152.41	--	3,150.19	2.0	1658216.76	436602.75
DS-13S	BIO854	Monitoring well	1017	10/19/16	Alluvium	Shallow	30.7	33.4	21.5	31.5	3,129.61	3,119.51	3,152.21	--	3,150.31	2.0	1658220.21	436607.17
DS-14	--	Well point	--	6/13/19	Alluvium	Shallow	10.0	12.65	9.5	10.0	3,112.12	3,111.62	3,123.77	--	3,121.11	0.8	1659688.66	436272.04
DS-15I	BLW-311	Monitoring well	07034	6/15/19	Alluvium	Intermediate	50	53.65	40	50	3,139.44	3,129.44	3,182.13	--	3,179.44	2.0	1656537.34	437211.08
DS-15S	BLW310	Monitoring well	79599	6/15/19	Alluvium	Shallow	23	26.7	8.0	23.0	3,171.53	3,156.53	3,182.32	--	3,179.53	2.0	1656532.12	437211.86
DS-15-SG	--	Staff gauge	--	9/22/2020	--	Shallow	--	--	--	--	--	--	3,167.00	4.00	NM	--	1656524.90	437251.31
DS-15-STW	--	Stilling well	24502	9/22/2020	--	Shallow	--	--	--	--	--	--	3,167.40		NM	2.0	1656525.05	437251.82
DS-16D	BLW314	Monitoring well	--	6/12/19	Alluvium	Deep	74	78.41	65.42	75.42	3,108.86	3,098.86	3,177.27	--	3,174.28	2.0	1657042.01	437183.38
DS-16I	BLW313	Monitoring well	07040	6/10/19	Alluvium	Intermediate	51	54.05	41	51	3,133.24	3,123.24	3,177.29	--	3,174.23	2.0	1657037.01	437184.11
DS-16S	BLW312	Monitoring well	79607	6/10/19	Alluvium	Shallow	28	24.0	13	28	3,161.27	3,146.27	3,177.32	--	3,174.27	2.0	1657031.47	437184.54
DG-16-SG	--	Staff gauge	--	9/22/20	--	Shallow	--	--	--	--	--	--	3,162.47	4.00	NM	--	1657041.78	437222.91
DS-17I	BLW316	Monitoring well	07072	6/17/19	Alluvium	Intermediate	60	29.6	50	60	3,115.21	3,105.21	3,168.22	--	3,165.21	2.0	1657552.59	437073.28
DS-17S	BLW315	Monitoring well	79608	6/17/19	Alluvium	Shallow	24	27.5	9.5	24.5	3,155.82	3,140.82	3,168.32	--	3,165.30	2.0	1657545.93	437074.62
DS-18D	BLW319	Monitoring well	--	6/19/19	Glacial Outwash	Deep	120	122.9	110.5	120.5	3,050.79	3,040.79	3,163.69	--	3,161.24	2.0	1657906.28	436924.96
DS-18I	BLW318	Monitoring well	07037	6/20/19	Alluvium	Intermediate	55	58.7	45.8	55.8	3,115.24	3,105.24	3,163.94	--	3,161.06	2.0	1657901.35	436927.24
DS-18S	BLW317	Monitoring well	79595	6/20/19	Alluvium	Shallow	22	25.0	7.0	22.0	3,154.17	3,139.17	3,164.11	--	3,161.17	2.0	1657897.01	436929.73
DS-18-SG	--	Staff gauge	--	9/23/20	--	Shallow	--	--	--	--	--	--	3,153.38	4.00	NM	--	1657899.01	436965.87
DS-18-STW	--	Stilling well	25201	9/22/20	--	Shallow	--	--	--	--	--	--	3,154.65	--	NM	2.0	1657899.35	436966.01
DS-3D	AFS844	Monitoring well	--	11/16/01	Alluvium	Intermediate	49.6	51.7	39.7	49.7	3,108.37	3,098.13	3,149.83	--	3,147.86	2.0	1658892.44	436532.22
DS-3S	AFS845	Monitoring well	07028	11/16/01	Alluvium	Shallow	27	28.9	16.8	26.8	3,130.85	3,120.93	3,149.83	--	3,147.77	2.0	1658888.45	436530.16
DS-4D	AFS842	Monitoring well	--	11/15/01	Alluvium	Intermediate	49.8	51.9	39.9	49.9	3,104.65	3,094.34	3,146.24	--	3,144.22	2.0	1658892.68	436423.19
DS-4DD	BBB111	Monitoring well	--	5/30/09	Glacial Outwash	Deep	129	131.2	119.1	129.1	3,025.16	3,015.16	3,146.36	--	3,144.25	2.0	1658882.36	436437.69
DS-4I	BLN929	Monitoring well	07031 + baro	10/11/18	Glacial Moraine	Intermediate	68	68.3	55.2	65.2	3,088.61	3,078.61	3,146.91	--	3,143.83	2.0	1658883.03	436428.87
DS-4S	AFS843	Monitoring well	07035	11/15/01	Alluvium	Shallow	25.2	26.9	14.2	24.2	3,129.13	3,119.46	3,146.36	--	3,143.66	2.0	1658892.82	436429.47
DS-5	unknown	Monitoring well	--	11/14/01	Alluvium	Shallow	22.6	NM	12.1	22.1	3,128.75	3,118.75	3,141.35	--	3,139.30	2.0	1658855.85	436106.46
DS-9D	BBB118	Monitoring well	--	5/27/09	Glacial Outwash	Deep	99	99.89	87.56	97.56	3,046.62	3,036.62	3,136.51	--	3,134.19	2.0	1659357.82	436363.58
DS-9I	BBB116	Monitoring well	07039	5/27/09	Alluvium	Intermediate	52.5	54.9	42.4	52.4	3,092.16	3,082.16	3,137.06	--	3,134.55	2.0	1659351.09	436383.98
DS-9S	BBB117	Monitoring well	07071	5/27/09	Alluvium	Shallow	25	27.86	15.56	25.56	3,118.85	3,108.85	3,136.71	--	3,134.41	2.0	1659351.65	436373.05
HBKG-2	no tag	Monitoring well	--	8/15/95	Alluvium	Shallow	20	23.1	10.2	20.2	3,257.84	3,247.84	3,270.94	--	3,268.00	2.0	1651091.78	437608.67
HV-1	no tag	Monitoring well	--	8/22/95	Alluvium	Shallow	15.6	14.82	2.94	12.94	3,205.02	3,195.02	3,209.84	--	3,207.96	2.0	1654402.38	437400.11
HV-2D	no tag	Monitoring well	--	8/23/95	Alluvium	Shallow	24	23.93	14.39	24.39	3,189.86	3,179.86	3,203.40	--	3,203.86	2.0	1654905.44	437375.86
HV-2S	no tag	Monitoring well	--	8/23/95	Alluvium	Shallow	14	14.05	4.36	14.36	3,199.86	3,189.86	3,203.55	--	3,203.86	2.0	1654905.44	437375.86
HV-3	no tag	Monitoring well	--	8/23/95	Debris Flow	Shallow	75	77.07	61.57	74.57	3,207.86	3,194.86	3,272.36	--	3,269.86	2.0	1654451.17	437829.56
MW-1	AHR109	Monitoring well	--	10/4/03	Alluvium	Shallow	22.5	25.29	12.46	22.46	3,219.63	3,204.63	3,229.92	--	3,227.09	2.0	1652834.60	437595.42
MW-2	AHR110	Monitoring well	--	10/3/03	Alluvium	Shallow	30.5	32.64	20.13	30.13	3,220.17	3,205.17	3,237.81	--	3,235.29	2.0	1652674.99	437435.81
MW-3	AHR111	Monitoring well	--	10/2/03	Alluvium	Shallow	21.5	23.43	10.90	20.90	3,231.98	3,216.98	3,240.41	--	3,237.88	2.0	1652525.97	437325.02
MW-4D	AHR112	Monitoring well	--	10/1/03	Alluvium	Intermediate	27.5	29.34	21.86	26.86	3,210.29	3,205.29	3,234.77	--	3,232.29	2.0	1652820.72	437375.16
MW-4S	AHR113	Monitoring well	--	10/1/03	Alluvium	Shallow	18.5	20.41	8.40	18.40	3,224.38	3,214.38	3,234.40	--	3,232.38	2.0	1652824.93	437380.09
NRC-1D	BAN472	Monitoring well	--	7/16/08	Alluvium	Shallow	unknown	16.98	3.99	13.99	3,205.50	3,195.50	3,212.48	--	3,209.50	2.0	1654462.56	437403.92
NRC-3DR	BLN930	Monitoring well	07065	10/13/18	Alluvium	Deep	116	119.22	106.13	116.13	3,052.77	3,042.77	3,161.99	--	3,158.89	2.0	1658352.49	436754.77
NRC-3IR	BLN931	Monitoring well	07041	10/13/18	Alluvium	Intermediate	70	73.29	60.00	70.00	3,098.75	3,088.75	3,162.04	--	3,158.75	2.0	1658364.15	436757.00
NRC-3SR	BLN932	Monitoring well	07026	10/14/18	Alluvium	Shallow	23.5	27.05	13.75	23.75	3,145.22	3,135.22	3,162.27	--	3,158.97	2.0	1658355.00	436764.76
NRC-4D	BAN474	Monitoring well	--	7/2/08	Alluvium	Intermediate	68.6	71.1	58.5	68.5	3,113.95	3,103.95	3,175.05	--	3,172.43	2.0	1657978.57	437362.37
NRC-5D	BAN471	Monitoring well	--	5/24/08	Colluvium/Glacial	Deep	130.3	NM	119	129	3,150.74	3,140.74	3,271.70	--	3,269.74	2.0	1654461.37	437834.67
NRC-6D	BAN478	Monitoring well	--	8/1/08	Alluvium	Deep	unknown	135.98	123.12	133.12	3,046.91	3,036.91	3,172.89	--	3,170.03	2.0	1658903.84	436884.16
NRC-6I	BAN479	Monitoring well	--	8/8/08	Alluvium	Intermediate	unknown	88.44	76.07	86.07	3,094.91	3,084.91	3,173.35	--	3,170.98	2.0	1658905.07	436893.99
NRC-6S	BAN480	Monitoring well	--	8/9/08	Alluvium	Shallow	unknown	50.42	37.74	47.74	3,134.04	3,124.04	3,174.46	--	3,171.79	2.0	1658906.32	436903.39
RC-4 BANK	--	Staff gauge	--	--	--	Shallow	--	--	--	--	--	--	3,209.05	3.33	3,209.05	--	1653804.67	437419.00
RC-4 RIVER	--	Staff gauge	--	--	--	Shallow	--	--	--	--	--	--	3,205.98	6.66	3,205.98	--	1653800.95	437429.46
RC-6	--	Staff gauge	--	--	--	Shallow	--	--	--	--	--	--	3,278.76	3.33	NM	--	1650460.10	437695.45
RC-PZ-2	BHK035	Piezometer	--	11/6/2011	Alluvium	Shallow	unknown	19.29	6.78	16.78	3,186.02	3,176.02	3,195.31	--	3,192.81	2.0	1655027.93	437206.12
RC-PZ-4	BHK037	Piezometer	--	11/8/2011	Alluvium	Shallow	unknown	32.26	19.50	29.50	3,164.57	3,154.57	3,186.83	--	3,184.07	2.0	1655988.08	437347.26

Table 4.1
Monitoring Well, Well Point, Staff Gauge, and Stilling Well Inventory

Location ID	Ecology Tag	Location Type	Transducer Serial Number (last 4 or 5 digits)	Installation Date (completion)	Screened Lithologic Unit [1]	Screen Potentiometric Zone [2]	Total Well Depth at Time of Drilling (feet bgs)	Total Depth (measured from TOC)	Top of Screen Interval (feet bgs)	Bottom of Screen Interval (feet bgs)	Top of Screen Interval (feet amsl)	Bottom of Screen Interval (feet amsl)	TOC Elevation (feet amsl)	SG Measurement Adjustment (feet)	Ground Surface Elevation (feet amsl)	Well Diameter (inches)	Easting (feet NAD 83) [3]	Northing (feet NAD 83) [3]
SG-10	--	Staff gauge	--	10/2/19	--	Shallow	--	--	--	--	--	--	3,113.38	3.30	3,110.08	--	1659936.00	436290.00
SG-10-STW	--	Stilling well	0996	10/2/19	--	Shallow	--	--	--	--	--		3,114.63	--	3,110.24	2.0	1659936.00	436290.00
SG-10-WP	--	Well point	--	6/1/09	Alluvium	Shallow	--	7.11	2.8	3.3	3,118.93	3,108.93	3,116.04	--	3,112.20	0.8	1659917.64	436267.93
SG-11	--	Staff gauge	--	6/1/09	--	Shallow	--	--	--	--	--	--	3,103.21	4.00	3,098.98	--	1660676.00	436233.00
SG-11-WP	--	Well point	--	6/27/09	Alluvium	Shallow	--	NM	5.6	6.1	NM	NM	3,104.72	--	3,102.52	0.8	1660682.00	436238.00
SG-12R	--	Staff gauge	--	10/1/18	--	Shallow	--	--	--	--	--	--	3,090.58	3.33	NM	--	1662051.36	436546.22
SG-12R-WP	--	Well point	--	10/1/18	Alluvium	Shallow	--	NM	NM	NM	NM	NM	3,094.61	--	NM	0.8	1662001.72	436534.05
SG-13	--	Staff gauge	--	6/27/09	--	Shallow	--	--	--	--	--	--	3,072.98	--	NM	--	1663058.14	436475.04
SG-13-WP	--	Well point	--	6/2009	Alluvium	Shallow	--	9.22	4.41	5.41			3,082.29	--	NM	0.8	1663055.00	436488.00
SG-14 [4]	--	Staff gauge	--	10/3/19	--	Shallow	--	--	--	--	--	--	3,147.12	4.00	3,143.02	--	1658431.09	436570.75
SG-14-WP	--	Well point	--	6/11/19	Alluvium	Shallow	--	9.44	5.5	6.0	3,149.29	3,139.29	3,148.89	--	3,144.65	0.8	1658435.86	436594.45
SG-15	--	Staff gauge	--	10/3/19	--	Shallow	--	--	--	--	--	--	3,144.12	4.00	3,140.26	--	1658620.73	436405.95
SG-15-WP	--	Well point	--	6/13/19	Alluvium	Shallow	--	9.47	5.5	6.0	3,147.15	3,137.15	3,146.62	--	3,143.22	0.8	1658613.26	436391.14
SG-16 [4]	--	Staff gauge	--	10/2/19	--	Shallow	--	--	--	--	--	--	3,132.02	4.00	3,128.11	--	1659069.99	435993.90
SG-16-WP [5]	--	Well point	--	6/13/19	Alluvium	Shallow	--	9.61	5.5	6.0	3,134.29	3,124.29	3,133.90	--	3,133.90	0.8	1659073.49	436004.31
SG-17	--	Staff gauge	--	9/22/20	--	Shallow	--	--	--	--	--	--	3,116.48	4.00	3,112.88	--	1659863.31	436140.29
SG-17-WP	--	Well point	--	9/22/20	Alluvium	Shallow	--	9.08	5.5	6.0	3,119.50	3,109.50	3,118.56	--	3,114.81	0.8	1659857.71	436155.16
SG-18 [4]	--	Staff gauge	--	9/23/20	--	Shallow	--	--	--	--	--	--	3,108.26	4.00	3,104.63	--	1660276.00	436326.43
SG-18-WP	--	Well point	--	6/12/19	Alluvium	Shallow	--	NM	5.4	5.9	NM	NM	3,111.23	--	3,107.58	0.8	1660280.77	436343.61
SG-7 [4]	--	Staff gauge	--	10/1/18	--	Shallow	--	--	--	--	--	--	3,148.81	3.33	3,145.15	--	1658157.69	436880.74
SG-7R-WP	--	Well point	--	6/11/19	Alluvium	Shallow	--	6.31	3.5	4.0	3,156.58	3,146.58	3,152.89	--	3,149.66	0.8	1658195.30	436888.36
SG-7STW	--	Stilling well	0993	10/2/19	--	Shallow	--	NM	--	--	--	--	3,150.71	--	3,145.71	2.0	1658215.04	436829.96
SG-7STW-SG	--	Staff gauge	--	10/2/19	--	Shallow	--	--	--	--	--	--	3,150.22	4.00	3,145.71	--	1658214.80	436829.62
SG-8 [4]	--	Staff gauge	--	10/1/18	--	Shallow	--	--	--	--	--	--	3,136.31	4.00	3,132.47	--	1658853.17	436192.44
SG-8-WP	--	Well point	--	5/1/09	Alluvium	Shallow	--	6.85	3.8	4.3	3,139.79	3,129.79	3,136.64	--	3,134.06	0.8	1658612.93	436390.20
SG-9 [4]	--	Staff gauge	--	9/23/20	--	Shallow	--	--	--	--	--	--	3,124.97	4.00	3,119.93	--	1659397.94	436189.48
SG-9-WP	--	Well point	--	5/1/09	Alluvium	Shallow	--	NM	NM	NM	NM	NM	3,126.42	--	3,122.95	0.8	1659415.59	436262.27
STW-1	--	Stilling well	1008	10/3/19	--	Shallow	--	NM	--	--	--	--	3,163.85	--	3,160.05	2.0	1656972.91	437268.56
STW-1-SG	--	Staff gauge	--	10/3/19	--	Shallow	--	--	--	--	--	--	3,162.75	4.00	3,158.75	--	1656972.78	437268.59
SG-WL1	--	Staff gauge	--	6/4/20	--	Shallow	--	--	--	--	--	--	3146.282877	--	NM	--	1658193.50	436470.60
SG-WL1-WP	--	Well point	--	6/4/20	Alluvium	Shallow	8.3	9.09	7.70	8.3	--	--	3,145.51	--	NM	0.80	1658174.41	436502.24
SG-WL1-STW	--	Stilling well	23924	9/23/20	--	Shallow	--	--	--	--	--	--	3,148.08	--	NM	2.0	1658193.40	436470.54
SG-WL2	--	Staff gauge	--	6/4/20	--	Shallow	--	--	--	--	--	--	3143.249906	4.00	NM	--	1658279.37	436349.83
SG-WL2-WP	--	Well point	--	6/4/20	Alluvium	Shallow	5.5	6.44	5.00	5.5	--	--	3142.427221	--	NM	0.80	1658280.22	436356.56
SG-WL2-STW	--	Stilling well	0354	6/4/20	--	Shallow	--	--	--	--	--	--	3,144.23	--	NM	2.0	1658279.25	436349.85
TP1-10D	BIO864	Monitoring well	--	11/1/16	Tailings	Tailings Pile	46.2	47.7	36.0	46.1	3,235.29	3,225.29	3,273.04	--	3,271.47	2.5	1654617.62	436534.92
TP1-10S	BIO865	Monitoring well	--	11/2/2016	Tailings	Tailings Pile	40	40.65	28.9	38.9	3,242.82	3,232.82	3,272.95	--	3,271.18	2.5	1654613.49	436536.41
TP1-8D	BIO873	Monitoring well	--	9/12/16	Alluvium	Shallow	65.5	67.3	54.8	64.8	3,197.82	3,187.82	3,255.10	--	3,252.62	2.0	1654046.06	437042.98
TP1-8S	BIO871	Monitoring well	0351	9/13/16	Tailings	Tailings Pile	46	48.5	35.5	46.0	3,198.96	3,188.96	3,255.08	--	3,252.59	2.0	1654050.76	437040.73
TP1-9D	BIO872	Monitoring well	--	9/16/16	Alluvium	Shallow	65	66.1	53.7	63.7	3,192.05	3,182.05	3,248.17	--	3,245.80	2.5	1654904.00	436716.54
TP1-9S	BIO852	Monitoring well	0341	10/18/16	Tailings	Tailings Pile	37	37	25	35	3,221.06	3,211.06	3,247.99	--	3,245.90	2.5	1654920.24	436722.25
TP2-12D	BIO855	Monitoring well	07134	10/23/16	Alluvium	Shallow	120	123.78	112.02	122.0	3,178.38	3,168.38	3,292.16	--	3,290.40	2.5	1655603.44	436586.35
TP2-12S	BIO856	Monitoring well	--	10/23/16	Tailings	Tailings Pile	100	101.5	89.2	99.2	3,201.17	3,191.17	3,292.67	--	3,290.38	2.5	1655611.34	436591.88
TP2-13D	BIO863	Monitoring well	07140	11/6/16	Alluvium	Shallow	133	141.2	129.9	139.9	3,158.45	3,148.45	3,290.30	--	3,289.00	2.5	1656486.19	436804.84
TP2-13S	BIO862	Monitoring well	--	11/8/16	Alluvium & Tailings	Tailings Pile	115.5	117.4	105.8	115.8	3,182.59	3,172.59	3,290.59	--	3,288.95	2.5	1656476.37	436803.45
TP2-14	BIO866	Monitoring well	--	10/29/16	Tailings	Tailings Pile	80	80.4	68.4	78.4	3,221.22	3,211.22	3,291.63	--	3,289.64	2.5	1655961.90	436246.19
TP2-15	BIO868	Monitoring well	07030	10/28/16	Alluvium	Shallow	135	137.15	125.35	135.4	3,163.83	3,153.83	3,290.87	--	3,289.08	2.5	1656046.17	436813.74
TP2-16D	BIO858	Monitoring well	--	11/13/16	Tailings	Tailings Pile	68	64.8	52.5	62.5	3,229.05	3,219.05	3,283.79	--	3,281.47	2.5	1656361.34	436345.18
TP2-16S	no tag	Monitoring well	--	11/13/16	Tailings	Tailings Pile	40.3	42.25	29.92	39.9	3,251.70	3,241.70	3,283.92	--	3,281.59	2.5	1656357.37	436348.95
TP2-17	BIO857	Monitoring well	--	10/26/16	Tailings	Tailings Pile	110	110.8	98.5	108.5	3,183.88	3,173.88	3,284.71	--	3,282.40	2.5	1656832.68	436348.36
TP3-12D	BIO869	Monitoring well	07137	9/6/16	Alluvium	Intermediate	110	109.8	98.2	108.2	3,129.69	3,119.69	3,230.39	--	3,228.77	2.0	1657807.00	436651.62
TP3-12S	BIO870	Monitoring well	07027	9/6/16	Alluvium & Tailings	Shallow	85	85.4	75.0	85.0	3,154.29	3,144.29	3,230.62	--	3,229.29	2.0	1657803.62	436655.23
TP3-13	BIO861	Monitoring well	7064	9/11/16	Alluvium	Shallow	130	130.2	117.8	127.8	3,143.17	3,133.17	3,263.06	--	3,260.65	2.0	1657241.99	436770.66
TP3-14D	BIO853	Monitoring well	07135	11/10/16	Alluvium	Shallow	110.5	112.1	100.4	110.4	3,138.77	3,128.77	3,241.88	--	3,240.15	2.5	1657458.03	436577.46
TP3-14S	BIO860	Monitoring well	--	11/10/16	Tailings	Tailings Pile	90.5	92.05	80.46	90.46	3,158.88	3,148.88	3,241.32	--	3,239.73	2.5	1657459.76	436572.07
US-1D	BBJ263	Monitoring well	--	10/9/10	Alluvium	Deep	80	38.98	26.66	36.66	3,225.94	3,215.94	3,279.30	--	3,276.98	2.0	1650634.74	437816.69
US-1I	BBJ264	Monitoring well	--	10/10/10	Alluvium	Intermediate	50	62.77	55.38	60.38	3,245.25	3,240.25	3,279.17	--	3,276.77	2.0	1650633.11	437824.60
US-1S	BBJ265	Monitoring well	--	10/11/10	Alluvium	Shallow	27	28.16	15.56	25.56	3,261.07	3,251.07	3,279.29	--	3,276.69	2.0	1650645.60	437821.78

Notes:

-- Information not applicable or not available.

1 General lithologic unit in which the well screen is placed.

2 Unit assigned for potentiometric mapping based on well screen elevation, representing the Shallow, Intermediate, and Deep Zones of the alluvial aquifer and the tailings piles.

3 Washington State Plane North NAD 83.

4 This location was replaced in September 2020.

5 This location was repaired in September 2020

Abbreviations:

amsl Above mean sea level

bgs Below ground surface

NAD 83 North American Datum of 1983

NM Not measured

SG Staff gauge

TOC Top of casing

Table 4.2

Pressure Transducer and Specific Conductance Datalogger Deployment Summary [1]

Well ID	Instrument Set Depth (feet bTOC)	Depth to Water (feet bTOC)	TOC elevation (feel amsl)	Water Level Elevation (feet amsl)	Serial No. (last 4 or 5)	Measurement Date & Time	Unit Range [2]
DS-3S	25	18.97	3,149.83	3,130.86	7028	9/22/2020 14:04	5 m
DS-4I	25	18.17	3,146.91	3,128.74	7031	9/22/2020 13:57	5 m
DS-4S	20	15.01	3,146.36	3,131.35	7035	9/22/2020 13:51	5 m
DS-9I	20	14.49	3,137.06	3,122.57	7039	9/22/2020 13:39	5 m
DS-9S	20	13.57	3,136.71	3,123.14	7071	9/22/2020 13:44	5 m
DS-12D	13	9.21	3,150.55	3,141.34	0360	9/22/2020 11:41	5 m
DS-12I	15	7.14	3,150.75	3,143.61	7073	9/22/2020 11:38	5 m
DS-12S	15	7.89	3,151.44	3,143.55	7044	9/22/2020 11:36	5 m
DS-13D	15	20.75	3,152.77	3,132.02	7057	9/22/2020 12:01	5 m
DS-13I	15	8.60	3,152.41	3,143.81	7038	9/22/2020 11:52	5 m
DS-13S	15	8.62	3,152.21	3,143.59	1017 [3]	9/22/2020 11:55	5 m
DS-15I	30	17.04	3,182.13	3,165.09	7034	9/22/2020 10:21	5 m
DS-15S	22	17.01	3,182.32	3,165.31	9594 [3]	9/22/2020 10:18	5 m
DS-15-STW [4]	4	3.60	3,167.40	3,163.80	24502	9/22/2020 9:13	5 m
DS-16I	35	22.93	3,177.29	3,154.36	7040	9/22/2020 10:44	5 m
DS-16S	25	19.80	3,177.32	3,157.52	9607 [3]	9/22/2020 10:41	5 m
DS-17I	30	18.66	3,168.22	3,149.56	7072	9/22/2020 10:54	5 m
DS-17S	20	17.38	3,168.32	3,150.94	9608 [3]	9/22/2020 10:56	5 m
DS-18I	30	16.28	3,163.94	3,147.66	7037	9/22/2020 11:15	5 m
DS-18S	20	15.17	3,164.11	3,148.94	9595 [3]	9/22/2020 10:54	5 m
DS-18-STW [4]	4.75	4.54	3,154.65	3,150.11	25201	9/22/2020 10:45	5 m
NRC-3DR	37	36.16	3,161.99	3,125.83	7065	9/22/2020 14:56	5 m
NRC-3IR	25	18.84	3,162.04	3,143.20	7041	9/22/2020 14:51	5 m
NRC-3SR	25	18.01	3,162.27	3,144.26	7026	9/22/2020 14:49	5 m
SG-10STW	4.70	3.90	3,114.63	3,110.73	0996	9/22/2020 13:26	5 m
SG-7STW	4.58	4.38	3,150.71	3,146.33	0993	9/22/2020 15:07	5 m
SG-WL1-STW [4]	5.25	5.02	3,148.08	3,143.06	23924	9/23/2020 11:20	5 m
SG-WL2STW	4.30	3.02	3,144.23	3,141.21	0354	9/22/2020 12:18	5 m
STW-1	4.93	4.50	3,163.85	3,159.35	1008	9/22/2020 14:26	5 m
TP1-8S	48.3	48.22	3,255.08	3,206.86	0351	9/22/2020 8:15	5 m
TP1-9S	36.6	36.88	3,247.99	3,211.11	0341	9/22/2020 8:32	5 m
TP2-12D	115	105.04	3,292.16	3,187.12	7134	9/22/2020 8:51	10 m
TP2-12S	101.2	DRY	3,292.67	NA	7056	9/22/2020 8:45	5 m
TP2-13D	130	120.84	3,290.30	3,169.46	7140	9/22/2020 9:13	10 m
TP2-15	116	112.80	3,290.87	3,178.07	7030	9/22/2020 9:03	5 m
TP3-12D	90	82.08	3,230.39	3,148.31	7137	9/22/2020 10:00	10 m
TP3-12S	84.5	79.70	3,230.62	3,150.92	7027	9/22/2020 9:51	5 m
TP3-13	115	112.07	3,263.06	3,150.99	7064	9/22/2020 9:25	5 m
TP3-14D	98	91.96	3,241.88	3,149.92	7135	9/22/2020 9:40	10 m
BAROLOGGER [5]	NA	NA	NA	NA	6911	NA	NA

Notes:

1 Solinst Levelogger Edge 3001 pressure transducers or LTC Levelogger Edge 3001 pressure/conductivity loggers were deployed in accordance with SOPs for transducer installation in the Draft Final PSVP (Floyd|Snider 2020d), at depths based on the unit range and water level measurements. Conductivity loggers were calibrated in accordance with manufacturer recommendations. Several pressure transducers were reprogrammed and transferred from their 2019 locations where they were replaced with pressure/conductivity loggers. The transducers were deployed with a recording interval of 20 minutes and a capacity of 40,000 measurements.

2 5-m or 15-foot pressure range is designed for 15-foot submergence. 10-m or 30-foot pressure range is designed for 30-foot submergence.

3 Instrument is a pressure transducer/conductivity logger.

4 Transducer installed at this location in September 2020.

5 A Solinst Barologger is deployed in the DS-4I well monument with the same measurement frequency as the pressure transducers. The barologger collects barometric data for compensation of the potentiometric data collected from monitoring wells.

Abbreviations:

amsl Above mean sea level
bTOC Below top of casing
m Meters
NA Not applicable
NM Not measured
PSVP Performance Standards Verification Plan
SOP Standard operating procedure

Table 4.3
Water Level Elevations (Spring and Fall 2020)

Location ID	Measuring Point Elevation (TOC or Top of SG; ft amsl)	Location Type	Hydrostratigraphic Unit of Screened Interval or VWP [1]	Potentiometric Map Interval [2]	Date of Measurement (Spring 2020 Synoptic Measurements)	Time of Measurement (Spring 2020 Synoptic Measurements)	Depth to Water or Height of Water Spring 2020 Synoptic Measurements (feet)	Water Level Elevation Spring 2020 Synoptic Measurements (feet amsl) [3] [4]	Date of Measurement (Spring 2020 Sampling Measurements)	Time of Measurement (Spring 2020 Sampling Measurements)	Depth to Water or Height of Water Spring 2020 Sampling Measurement (feet)	Water Level Elevation Spring 2020 Sampling Measurement (feet amsl) [3]
BW-VWP-60a	--	VWP	Glacial Till	Not Used	6/5/20	--	--	3,256.41	--	--	--	--
BW-VWP-60b	--	VWP	Glacial Moraine	Not Used	6/5/20	--	--	3,228.41	--	--	--	--
BW-VWP-60c	--	VWP	Alluvium	Shallow	6/5/20	--	--	3,228.33	--	--	--	--
BW-VWP-61a	--	VWP	Glacial Till	Not Used	6/5/20	--	--	3,233.49	--	--	--	--
BW-VWP-61b	--	VWP	Glacial Moraine	Not Used	6/5/20	--	--	3,230.82	--	--	--	--
BW-VWP-61c	--	VWP	Alluvium	Shallow	6/5/20	--	--	3,230.58	--	--	--	--
BW-VWP-62a	--	VWP	Glacial Till	Not Used	6/5/20	--	--	3,224.64	--	--	--	--
BW-VWP-62b	--	VWP	Glacial Till	Not Used	6/5/20	--	--	3,218.26	--	--	--	--
BW-VWP-62c	--	VWP	Alluvium	Shallow	6/5/20	--	--	3,217.55	--	--	--	--
BW-VWP-63a	--	VWP	Glacial Till	Not Used	6/5/20	--	--	3,225.66	--	--	--	--
BW-VWP-63b	--	VWP	Glacial Till	Not Used	6/5/20	--	--	3,225.91	--	--	--	--
BW-VWP-63c	--	VWP	Alluvium	Shallow	6/5/20	--	--	3,225.69	--	--	--	--
BW-VWP-64a	--	VWP	Glacial Till	Not Used	6/5/20	--	--	3,211.04	--	--	--	--
BW-VWP-64b	--	VWP	Glacial Moraine	Deep	6/5/20	--	--	3,210.85	--	--	--	--
BW-VWP-64c	--	VWP	Alluvium	Shallow	6/5/20	--	--	3,213.10	--	--	--	--
BW-VWP-65a	--	VWP	Glacial Till	Not Used	6/5/20	--	--	3,210.70	--	--	--	--
BW-VWP-65b	--	VWP	Glacial Moraine	Deep	6/5/20	--	--	3,210.74	--	--	--	--
BW-VWP-65c	--	VWP	Alluvium	Shallow	6/5/20	--	--	3,215.21	--	--	--	--
BW-VWP-66a	--	VWP	Glacial Till	Not Used	6/5/20	--	--	3,206.52	--	--	--	--
BW-VWP-66b	--	VWP	Glacial Moraine	Intermediate	6/5/20	--	--	3,206.43	--	--	--	--
BW-VWP-66c	--	VWP	Alluvium	Shallow	6/5/20	--	--	3,207.91	--	--	--	--
BW-VWP-67a	--	VWP	Glacial Till	Not Used	6/5/20	--	--	3,207.14	--	--	--	--
BW-VWP-67b	--	VWP	Glacial Moraine	Intermediate	6/5/20	--	--	3,207.66	--	--	--	--
BW-VWP-67c	--	VWP	Alluvium	Shallow	6/5/20	--	--	3,209.17	--	--	--	--
BW-VWP-68a	--	VWP	Glacial Till	Not Used	6/5/20	--	--	3,200.06	--	--	--	--
BW-VWP-68b	--	VWP	Glacial Outwash	Deep	6/5/20	--	--	3,200.39	--	--	--	--
BW-VWP-68c	--	VWP	Glacial Moraine	Intermediate	6/5/20	--	--	3,210.47	--	--	--	--
BW-VWP-68d	--	VWP	Alluvium	Shallow	6/5/20	--	--	3,212.44	--	--	--	--
BW-VWP-69a	--	VWP	Glacial Till	Not Used	6/5/20	--	--	3,201.10	--	--	--	--
BW-VWP-69b	--	VWP	Glacial Outwash	Deep	6/5/20	--	--	3,201.07	--	--	--	--
BW-VWP-69c	--	VWP	Glacial Moraine	Intermediate	6/5/20	--	--	3,201.84	--	--	--	--
BW-VWP-69d	--	VWP	Alluvium	Shallow	6/5/20	--	--	3,201.68	--	--	--	--
BW-VWP-70a	--	VWP	Glacial Till	Not Used	6/5/20	--	--	3,196.35	--	--	--	--
BW-VWP-70b	--	VWP	Glacial Moraine	Deep	6/5/20	--	--	3,197.20	--	--	--	--
BW-VWP-70c	--	VWP	Alluvium	Shallow	6/5/20	--	--	3,197.76	--	--	--	--
BW-VWP-71a	--	VWP	Glacial Till	Not Used	6/5/20	--	--	3,195.54	--	--	--	--
BW-VWP-71b	--	VWP	Glacial Moraine	Deep	6/5/20	--	--	3,195.32	--	--	--	--
BW-VWP-71c	--	VWP	Alluvium	Shallow	6/5/20	--	--	3,195.35	--	--	--	--
BW-VWP-72a	--	VWP	Glacial Till	Not Used	6/5/20	--	--	3,196.73	--	--	--	--
BW-VWP-72b	--	VWP	Glacial Moraine	Intermediate	6/5/20	--	--	3,194.56	--	--	--	--
BW-VWP-72c	--	VWP	Alluvium	Shallow	6/5/20	--	--	3,195.44	--	--	--	--
BW-VWP-73a	--	VWP	Glacial Till	Not Used	6/5/20	--	--	3,189.64	--	--	--	--
BW-VWP-73b	--	VWP	Glacial Moraine	Intermediate	6/5/20	--	--	3,187.00	--	--	--	--
BW-VWP-73c	--	VWP	Alluvium	Shallow	6/5/20	--	--	3,186.02	--	--	--	--
BW-VWP-74a	--	VWP	Glacial Till	Not Used	6/5/20	--	--	3,192.15	--	--	--	--
BW-VWP-74b	--	VWP	Glacial Outwash	Deep	6/5/20	--	--	3,193.49	--	--	--	--
BW-VWP-74c	--	VWP	Alluvium	Shallow	6/5/20	--	--	3,197.09	--	--	--	--
BW-VWP-75a	--	VWP	Glacial Till	Not Used	6/5/20	--	--	3,190.98	--	--	--	--
BW-VWP-75b	--	VWP	Glacial Outwash	Deep	6/5/20	--	--	3,190.21	--	--	--	--
BW-VWP-75c	--	VWP	Alluvium	Shallow	6/5/20	--	--	3,175.56	--	--	--	--
BW-VWP-76a	--	VWP	Glacial Till	Not Used	6/5/20	--	--	3,181.12	--	--	--	--
BW-VWP-76b	--	VWP	Glacial Outwash	Not Used	6/5/20	--	--	3,180.97	--	--	--	--
BW-VWP-76c	--	VWP	Glacial Moraine	Shallow	6/5/20	--	--	3,180.21	--	--	--	--

Table 4.3
Water Level Elevations (Spring and Fall 2020)

Location ID	Measuring Point Elevation (TOC or Top of SG; ft amsl)	Location Type	Hydrostratigraphic Unit of Screened Interval or VWP [1]	Potentiometric Map Interval [2]	Date of Measurement (Fall 2020 Synoptic Measurements)	Time of Measurement (Fall 2020 Synoptic Measurements)	Depth to Water Fall 2020 Synoptic Measurement (feet)	Water Level Elevation Fall 2020 Synoptic Measurement (feet amsl) [3] [4]	Date of Measurement (Fall 2020 Sampling Measurements)	Time of Measurement (Fall 2020 Sampling Measurements)	Depth to Water Fall 2020 Sampling Measurement (feet)	Water Level Elevation Fall 2020 sampling Measurement (feet amsl) [3]
BW-VWP-60a	--	VWP	Glacial Till	Not Used	9/24/20	--	--	3250.29	--	--	--	--
BW-VWP-60b	--	VWP	Glacial Moraine	Not Used	9/24/20	--	--	3225.46	--	--	--	--
BW-VWP-60c	--	VWP	Alluvium	Shallow	9/24/20	--	--	3224.78	--	--	--	--
BW-VWP-61a	--	VWP	Glacial Till	Not Used	9/24/20	--	--	3231.62	--	--	--	--
BW-VWP-61b	--	VWP	Glacial Moraine	Not Used	9/24/20	--	--	3229.16	--	--	--	--
BW-VWP-61c	--	VWP	Alluvium	Shallow	9/24/20	--	--	3229.42	--	--	--	--
BW-VWP-62a	--	VWP	Glacial Till	Not Used	9/24/20	--	--	3222.59	--	--	--	--
BW-VWP-62b	--	VWP	Glacial Till	Not Used	9/24/20	--	--	3213.52	--	--	--	--
BW-VWP-62c	--	VWP	Alluvium	Shallow	9/24/20	--	--	3216.10	--	--	--	--
BW-VWP-63a	--	VWP	Glacial Till	Not Used	9/24/20	--	--	3224.28	--	--	--	--
BW-VWP-63b	--	VWP	Glacial Till	Not Used	9/24/20	--	--	3224.51	--	--	--	--
BW-VWP-63c	--	VWP	Alluvium	Shallow	9/24/20	--	--	3224.25	--	--	--	--
BW-VWP-64a	--	VWP	Glacial Till	Not Used	9/24/20	--	--	3208.48	--	--	--	--
BW-VWP-64b	--	VWP	Glacial Moraine	Deep	9/24/20	--	--	3208.33	--	--	--	--
BW-VWP-64c	--	VWP	Alluvium	Shallow	9/24/20	--	--	3210.57	--	--	--	--
BW-VWP-65a	--	VWP	Glacial Till	Not Used	9/24/20	--	--	3208.11	--	--	--	--
BW-VWP-65b	--	VWP	Glacial Moraine	Deep	9/24/20	--	--	3208.28	--	--	--	--
BW-VWP-65c	--	VWP	Alluvium	Shallow	9/24/20	--	--	3213.72	--	--	--	--
BW-VWP-66a	--	VWP	Glacial Till	Not Used	--	--	--	--	--	--	--	--
BW-VWP-66b	--	VWP	Glacial Moraine	Intermediate	--	--	--	--	--	--	--	--
BW-VWP-66c	--	VWP	Alluvium	Shallow	--	--	--	--	--	--	--	--
BW-VWP-67a	--	VWP	Glacial Till	Not Used	9/24/20	--	--	3204.82	--	--	--	--
BW-VWP-67b	--	VWP	Glacial Moraine	Intermediate	9/24/20	--	--	3205.52	--	--	--	--
BW-VWP-67c	--	VWP	Alluvium	Shallow	9/24/20	--	--	3207.77	--	--	--	--
BW-VWP-68a	--	VWP	Glacial Till	Not Used	9/24/20	--	--	3197.14	--	--	--	--
BW-VWP-68b	--	VWP	Glacial Outwash	Deep	9/24/20	--	--	3197.66	--	--	--	--
BW-VWP-68c	--	VWP	Glacial Moraine	Intermediate	9/24/20	--	--	3207.52	--	--	--	--
BW-VWP-68d	--	VWP	Alluvium	Shallow	9/24/20	--	--	3209.09	--	--	--	--
BW-VWP-69a	--	VWP	Glacial Till	Not Used	9/24/20	--	--	3198.35	--	--	--	--
BW-VWP-69b	--	VWP	Glacial Outwash	Deep	9/24/20	--	--	3198.37	--	--	--	--
BW-VWP-69c	--	VWP	Glacial Moraine	Intermediate	9/24/20	--	--	3200.15	--	--	--	--
BW-VWP-69d	--	VWP	Alluvium	Shallow	9/24/20	--	--	3200.42	--	--	--	--
BW-VWP-70a	--	VWP	Glacial Till	Not Used	9/24/20	--	--	3193.70	--	--	--	--
BW-VWP-70b	--	VWP	Glacial Moraine	Deep	9/24/20	--	--	3194.08	--	--	--	--
BW-VWP-70c	--	VWP	Alluvium	Shallow	9/24/20	--	--	3194.24	--	--	--	--
BW-VWP-71a	--	VWP	Glacial Till	Not Used	9/24/20	--	--	3193.31	--	--	--	--
BW-VWP-71b	--	VWP	Glacial Moraine	Deep	9/24/20	--	--	3193.45	--	--	--	--
BW-VWP-71c	--	VWP	Alluvium	Shallow	9/24/20	--	--	3194.35	--	--	--	--
BW-VWP-72a	--	VWP	Glacial Till	Not Used	9/24/20	--	--	3193.56	--	--	--	--
BW-VWP-72b	--	VWP	Glacial Moraine	Intermediate	9/24/20	--	--	3189.34	--	--	--	--
BW-VWP-72c	--	VWP	Alluvium	Shallow	9/24/20	--	--	3189.39	--	--	--	--
BW-VWP-73a	--	VWP	Glacial Till	Not Used	9/24/20	--	--	3186.29	--	--	--	--
BW-VWP-73b	--	VWP	Glacial Moraine	Intermediate	9/24/20	--	--	3185.52	--	--	--	--
BW-VWP-73c	--	VWP	Alluvium	Shallow	9/24/20	--	--	3185.31	--	--	--	--
BW-VWP-74a	--	VWP	Glacial Till	Not Used	9/24/20	--	--	3188.09	--	--	--	--
BW-VWP-74b	--	VWP	Glacial Outwash	Deep	9/24/20	--	--	3189.38	--	--	--	--
BW-VWP-74c	--	VWP	Alluvium	Shallow	9/24/20	--	--	3191.77	--	--	--	--
BW-VWP-75a	--	VWP	Glacial Till	Not Used	9/24/20	--	--	3187.04	--	--	--	--
BW-VWP-75b	--	VWP	Glacial Outwash	Deep	9/24/20	--	--	3186.58	--	--	--	--
BW-VWP-75c	--	VWP	Alluvium	Shallow	9/24/20	--	--	3183.43	--	--	--	--
BW-VWP-76a	--	VWP	Glacial Till	Not Used	9/24/20	--	--	3178.28	--	--	--	--
BW-VWP-76b	--	VWP	Glacial Outwash	Not Used	9/24/20	--	--	3178.11	--	--	--	--
BW-VWP-76c	--	VWP	Glacial Moraine	Shallow	9/24/20	--	--	3177.00	--	--	--	--

Table 4.3
Water Level Elevations (Spring and Fall 2020)

Location ID	Measuring Point Elevation (TOC or Top of SG; ft amsl)	Location Type	Hydrostratigraphic Unit of Screened Interval or VWP [1]	Potentiometric Map Interval [2]	Date of Measurement (Spring 2020 Synoptic Measurements)	Time of Measurement (Spring 2020 Synoptic Measurements)	Depth to Water or Height of Water Spring 2020 Synoptic Measurements (feet)	Water Level Elevation Spring 2020 Synoptic Measurements (feet amsl) [3] [4]	Date of Measurement (Spring 2020 Sampling Measurements)	Time of Measurement (Spring 2020 Sampling Measurements)	Depth to Water or Height of Water Spring 2020 Sampling Measurement (feet)	Water Level Elevation Spring 2020 Sampling Measurement (feet amsl) [3]
BW-VWP-77a	--	VWP	Glacial Till	Not Used	6/5/20	--	--	3,180.93	--	--	--	--
BW-VWP-77b	--	VWP	Glacial Outwash	Not Used	6/5/20	--	--	3,180.62	--	--	--	--
BW-VWP-77c	--	VWP	Glacial Moraine	Shallow	6/5/20	--	--	3,180.51	--	--	--	--
BW-VWP-78a	--	VWP	Glacial Till	Not Used	6/5/20	--	--	3,175.03	--	--	--	--
BW-VWP-78b	--	VWP	Glacial Moraine	Deep	6/5/20	--	--	3,174.85	--	--	--	--
BW-VWP-78c	--	VWP	Glacial Moraine	Intermediate (not used)	6/5/20	--	--	3,175.45	--	--	--	--
BW-VWP-78d	--	VWP	Alluvium	Shallow	6/5/20	--	--	3,176.34	--	--	--	--
BW-VWP-79a	--	VWP	Glacial Till	Not Used	6/5/20	--	--	3,174.12	--	--	--	--
BW-VWP-79b	--	VWP	Glacial Moraine	Deep	6/5/20	--	--	3,173.27	--	--	--	--
BW-VWP-79c	--	VWP	Glacial Moraine	Intermediate (not used)	6/5/20	--	--	3,170.24	--	--	--	--
BW-VWP-79d	--	VWP	Alluvium	Shallow	6/5/20	--	--	3,169.63	--	--	--	--
DS-3S	3149.83	Monitoring Well	Alluvium	Shallow	6/5/20	15:45	14.32	3,135.51	6/6/20	15:47	15.18	3134.65
DS-3D	3149.83	Monitoring Well	Alluvium	Intermediate	6/5/20	11:11	15.30	3,134.53	6/6/20	15:54	15.50	3134.33
DS-4S	3146.36	Monitoring Well	Alluvium	Shallow	6/5/20	15:53	10.57	3,135.79	6/6/20	14:34	10.68	3135.68
DS-4I	3146.91	Monitoring Well	Glacial Moraine	Intermediate	6/5/20	15:59	14.05	3,132.86	6/6/20	13:11	14.16	3132.75
DS-4D	3146.24	Monitoring Well	Alluvium	Intermediate (not used)	6/5/20	11:16	12.48	3,133.76	6/6/20	13:00	12.64	3133.60
DS-4DD	3146.36	Monitoring Well	Glacial Outwash	Deep	6/5/20	17:20	16.14	3,130.22	6/6/20	13:00	16.31	3130.05
DS-5	3141.35	Monitoring Well	Alluvium	Shallow	--	--	Not measured	--	6/18/20	6:45	8.02	3130.05
DS-9S	3136.71	Monitoring Well	Alluvium	Shallow	6/5/20	13:34	10.90	3,125.81	6/7/20	15:33	11.04	3125.67
DS-9I	3137.06	Monitoring Well	Alluvium	Intermediate	6/5/20	13:32	11.42	3,125.64	6/7/20	15:45	11.57	3125.49
DS-9D	3136.51	Monitoring Well	Glacial Outwash	Deep	6/5/20	13:34	9.02	3,127.49	6/7/20	14:11	9.23	3127.28
DS-10S	2866.53	Monitoring Well	Not Used	Shallow (not used)	--	--	Not measured	--	--	--	Not measured	--
DS-10I	2865.95	Monitoring Well	Not Used	Intermediate (not used)	--	--	Not measured	--	--	--	Not measured	--
DS-10D	2865.58	Monitoring Well	Not Used	Deep (not used)	--	--	Not measured	--	--	--	Not measured	--
DS-11S	3032.85	Monitoring Well	Not Used	Shallow (not used)	--	--	Not measured	--	--	--	Not measured	--
DS-11I	3032.42	Monitoring Well	Not Used	Intermediate (not used)	--	--	Not measured	--	--	--	Not measured	--
DS-11D	3032.47	Monitoring Well	Not Used	Deep (not used)	--	--	Not measured	--	--	--	Not measured	--
DS-12S	3151.44	Monitoring Well	Alluvium	Shallow	6/5/20	11:42	6.50	3,144.94	6/10/20	12:09	6.69	3144.75
DS-12I	3150.75	Monitoring Well	Alluvium	Shallow (not used)	6/5/20	11:40	5.62	3,145.13	6/10/20	14:18	5.85	3144.90
DS-12D	3150.55	Monitoring Well	Alluvium	Intermediate	6/5/20	11:37	6.15	3,144.40	6/10/20	13:57	6.59	3143.96
DS-13S	3152.21	Monitoring Well	Alluvium	Shallow	6/5/20	11:50	7.14	3,145.07	6/10/20	9:20	7.30	3144.91
DS-13I	3152.41	Monitoring Well	Alluvium	Intermediate	6/5/20	11:48	6.70	3,145.71	6/10/20	9:14	6.99	3145.42
DS-13D	3152.77	Monitoring Well	Alluvium	Deep	6/5/20	11:45	16.18	3,136.59	6/10/20	12:30	16.89	3135.88
DS-14	3123.77	Well Point	Alluvium	Shallow	6/5/20	16:42	5.10	3,118.67	6/7/20	14:48	5.01	3118.76
DS-15S	3182.32	Monitoring Well	Alluvium	Shallow	6/5/20	11:03	14.54	3,167.78	6/8/20	8:41	14.82	3167.50
DS-15I	3182.13	Monitoring Well	Alluvium	Intermediate	6/5/20	11:10	14.47	3,167.66	6/8/10	8:39	14.71	3167.42
DS-15-STW	3167.40	Stilling Well	--	Shallow	--	--	--	--	--	--	--	--
DS-15-SG	3167.00	Staff Gauge	--	Shallow	--	--	--	--	--	--	--	--
DS-16S	3177.32	Monitoring Well	Alluvium	Shallow	6/5/20	10:25	17.74	3,159.58	6/8/20	10:15	17.97	3159.35
DS-16I	3177.29	Monitoring Well	Alluvium	Intermediate	6/5/20	10:51	20.13	3,157.16	6/8/20	10:12	20.43	3156.86
DS-16D	3177.27	Monitoring Well	Alluvium	Deep	6/5/20	10:38	19.51	3,157.76	6/8/20	11:11	19.81	3157.46
DS-16-SG	3162.47	Staff Gauge	--	Shallow	--	--	--	--	--	--	--	--
DS-17S	3168.32	Monitoring Well	Alluvium	Shallow	6/5/20	10:04	15.25	3,153.07	6/8/20	11:50	14.85	3153.47
DS-17I	3168.22	Monitoring Well	Alluvium	Intermediate	6/5/20	9:57	15.45	3,152.77	6/8/20	13:24	15.82	3152.40
DS-18S	3164.11	Monitoring Well	Alluvium	Shallow	6/5/20	9:46	13.00	3,151.11	6/8/20	12:59	13.27	3150.84
DS-18I	3163.94	Monitoring Well	Alluvium	Intermediate	6/5/20	9:30	13.62	3,150.32	6/8/20	13:47	14.00	3149.94
DS-18D	3163.69	Monitoring Well	Glacial Outwash	Deep	6/5/20	10:30	25.50	3,138.19	6/12/20	8:42	26.05	3137.64
DS-18-STW	3154.65	Stilling Well	--	Shallow	--	--	--	--	--	--	--	--
DS-18-SG	3153.38	Staff Gauge	--	Shallow	--	--	--	--	--	--	--	--
HBKG-2	3270.94	Monitoring Well	Alluvium	Shallow	6/5/20	10:44	7.43	3,263.51	6/13/20	14:24	8.44	3262.50
HV-1	3209.84	Monitoring Well	Alluvium	Shallow	6/5/20	9:10	6.69	3,203.15	--	--	Not measured	--
HV-2S	3203.55	Monitoring Well	Alluvium	Shallow	6/5/20	9:27	5.82	3,197.73	--	--	Not measured	--
HV-2D	3203.40	Monitoring Well	Alluvium	Shallow (not used)	6/5/20	9:28	6.49	3,196.91	--	--	Not measured	--
HV-3	3272.36	Monitoring Well	Debris Flow	Shallow	6/5/20	8:53	52.87	3,219.49	6/7/20	9:00	53.68	3218.68

Table 4.3
Water Level Elevations (Spring and Fall 2020)

Location ID	Measuring Point Elevation (TOC or Top of SG; ft amsl)	Location Type	Hydrostratigraphic Unit of Screened Interval or VWP [1]	Potentiometric Map Interval [2]	Date of Measurement (Fall 2020 Synoptic Measurements)	Time of Measurement (Fall 2020 Synoptic Measurements)	Depth to Water Fall 2020 Synoptic Measurement (feet)	Water Level Elevation Fall 2020 Synoptic Measurement (feet amsl) [3] [4]	Date of Measurement (Fall 2020 Sampling Measurements)	Time of Measurement (Fall 2020 Sampling Measurements)	Depth to Water Fall 2020 Sampling Measurement (feet)	Water Level Elevation Fall 2020 sampling Measurement (feet amsl) [3]
BW-VWP-77a	--	VWP	Glacial Till	Not Used	9/24/20	--	--	3178.18	--	--	--	--
BW-VWP-77b	--	VWP	Glacial Outwash	Not Used	9/24/20	--	--	3178.64	--	--	--	--
BW-VWP-77c	--	VWP	Glacial Moraine	Shallow	9/24/20	--	--	3178.69	--	--	--	--
BW-VWP-78a	--	VWP	Glacial Till	Not Used	9/24/20	--	--	3171.53	--	--	--	--
BW-VWP-78b	--	VWP	Glacial Moraine	Deep	9/24/20	--	--	3171.19	--	--	--	--
BW-VWP-78c	--	VWP	Glacial Moraine	Intermediate (not used)	9/24/20	--	--	3171.56	--	--	--	--
BW-VWP-78d	--	VWP	Alluvium	Shallow	9/24/20	--	--	3172.63	--	--	--	--
BW-VWP-79a	--	VWP	Glacial Till	Not Used	9/24/20	--	--	3170.94	--	--	--	--
BW-VWP-79b	--	VWP	Glacial Moraine	Deep	9/24/20	--	--	3170.39	--	--	--	--
BW-VWP-79c	--	VWP	Glacial Moraine	Intermediate (not used)	9/24/20	--	--	3169.17	--	--	--	--
BW-VWP-79d	--	VWP	Alluvium	Shallow	9/24/20	--	--	3168.93	--	--	--	--
DS-3S	3149.83	Monitoring Well	Alluvium	Shallow	9/24/20	9:50	18.36	3,131.47	9/23/20	13:55	19.01	3,130.82
DS-3D	3149.83	Monitoring Well	Alluvium	Intermediate	9/24/20	9:52	19.11	3,130.72	9/23/20	13:30	19.67	3,130.16
DS-4S	3146.36	Monitoring Well	Alluvium	Shallow	9/24/20	10:05	14.35	3,132.01	9/23/20	16:27	15.06	3,131.30
DS-4I	3146.91	Monitoring Well	Glacial Moraine	Intermediate	9/24/20	10:00	17.62	3,129.29	9/23/20	15:00	18.21	3,128.70
DS-4D	3146.24	Monitoring Well	Alluvium	Intermediate (not used)	9/24/20	10:03	16.13	3,130.11	9/23/20	15:20	16.73	3,129.51
DS-4DD	3146.36	Monitoring Well	Glacial Outwash	Deep	9/24/20	9:57	20.56	3,125.80	9/26/20	10:00	20.07	3,126.29
DS-5	3141.35	Monitoring Well	Alluvium	Shallow	--	--	NM	NM	9/22/20	11:25	9.33	3132.02
DS-9S	3136.71	Monitoring Well	Alluvium	Shallow	9/24/20	11:33	13.09	3,123.62	9/23/20	9:25	13.59	3,123.12
DS-9I	3137.06	Monitoring Well	Alluvium	Intermediate	9/24/20	11:31	13.95	3,123.11	9/23/20	9:50	14.45	3,122.61
DS-9D	3136.51	Monitoring Well	Glacial Outwash	Deep	9/24/20	11:35	12.78	3,123.73	9/23/20	10:35	13.23	3,123.28
DS-10S	2866.53	Monitoring Well	Not Used	Shallow (not used)	9/24/20	12:24	12.77	2853.76	--	--	NM	NM
DS-10I	2865.95	Monitoring Well	Not Used	Intermediate (not used)	9/24/20	12:20	12.43	2853.52	--	--	NM	NM
DS-10D	2865.58	Monitoring Well	Not Used	Deep (not used)	9/24/20	12:22	15.13	2850.45	--	--	NM	NM
DS-11S	3032.85	Monitoring Well	Not Used	Shallow (not used)	--	--	NM	NM	--	--	NM	NM
DS-11I	3032.42	Monitoring Well	Not Used	Intermediate (not used)	--	--	NM	NM	--	--	NM	NM
DS-11D	3032.47	Monitoring Well	Not Used	Deep (not used)	--	--	NM	NM	--	--	NM	NM
DS-12S	3151.44	Monitoring Well	Alluvium	Shallow	9/24/20	9:01	7.37	3,144.07	9/25/20	12:45	7.43	3,144.01
DS-12I	3150.75	Monitoring Well	Alluvium	Shallow (not used)	9/24/20	8:59	6.63	3,144.12	9/25/20	13:50	6.70	3,144.05
DS-12D	3150.55	Monitoring Well	Alluvium	Intermediate	9/24/20	8:58	8.79	3,141.76	9/25/20	13:55	8.73	3,141.82
DS-13S	3152.21	Monitoring Well	Alluvium	Shallow	9/24/20	9:06	8.09	3,144.12	9/25/20	10:35	8.21	3,144.00
DS-13I	3152.41	Monitoring Well	Alluvium	Intermediate	9/24/20	9:05	8.09	3,144.32	9/25/20	12:25	8.16	3,144.25
DS-13D	3152.77	Monitoring Well	Alluvium	Deep	9/24/20	9:03	20.39	3,132.38	9/25/20	10:25	20.25	3,132.52
DS-14	3123.77	Well Point	Alluvium	Shallow	9/24/20	10:41	5.25	3,118.52	9/25/20	14:00	5.51	3,118.26
DS-15S	3182.32	Monitoring Well	Alluvium	Shallow	9/24/20	8:20	16.73	3,165.59	9/23/20	8:40	17.01	3,165.31
DS-15I	3182.13	Monitoring Well	Alluvium	Intermediate	9/24/20	8:22	16.65	3,165.48	9/23/20	8:30	17.05	3,165.08
DS-15-STW	3167.40	Stilling Well	--	Shallow	9/24/20	8:16	2.95	3,164.45	--	--	NM	NM
DS-15-SG	3167.00	Staff Gauge	--	Shallow	9/24/20	8:16	1.48	3,164.48	--	--	NM	NM
DS-16S	3177.32	Monitoring Well	Alluvium	Shallow	9/24/20	8:27	19.38	3,157.94	9/23/20	11:00	19.82	3,157.50
DS-16I	3177.29	Monitoring Well	Alluvium	Intermediate	9/24/20	8:29	22.47	3,154.82	9/23/20	10:50	22.96	3,154.33
DS-16D	3177.27	Monitoring Well	Alluvium	Deep	9/24/20	8:31	22.01	3,155.26	9/23/20	12:15	22.51	3,154.76
DS-16-SG	3162.47	Staff Gauge	--	Shallow	9/24/20	8:26	0.45	3,158.92	--	--	NM	NM
DS-17S	3168.32	Monitoring Well	Alluvium	Shallow	9/24/20	8:35	16.58	3,151.74	9/23/20	12:30	17.42	3,150.90
DS-17I	3168.22	Monitoring Well	Alluvium	Intermediate	9/24/20	8:37	18.12	3,150.10	9/23/20	14:00	18.68	3,149.54
DS-18S	3164.11	Monitoring Well	Alluvium	Shallow	9/24/20	8:43	14.57	3,149.54	9/23/20	15:15	15.18	3,148.93
DS-18I	3163.94	Monitoring Well	Alluvium	Intermediate	9/24/20	8:44	15.78	3,148.16	9/23/20	13:30	16.26	3,147.68
DS-18D	3163.69	Monitoring Well	Glacial Outwash	Deep	9/24/20	8:46	29.62	3,134.07	9/23/20	16:00	29.99	3,133.70
DS-18-STW	3154.65	Stilling Well	--	Shallow	9/24/20	8:41	3.94	3,150.71	--	--	NM	NM
DS-18-SG	3153.38	Staff Gauge	--	Shallow	9/24/20	8:41	1.32	3,150.70	--	--	NM	NM
HBKG-2	3270.94	Monitoring Well	Alluvium	Shallow	9/24/20	11:37	10.82	3,260.12	9/26/20	11:55	10.95	3,259.99
HV-1	3209.84	Monitoring Well	Alluvium	Shallow	9/24/20	10:00	9.97	3,199.87	--	--	NM	NM
HV-2S	3203.55	Monitoring Well	Alluvium	Shallow	9/24/20	9:24	10.10	3,193.45	--	--	NM	NM
HV-2D	3203.40	Monitoring Well	Alluvium	Shallow (not used)	9/24/20	9:28	10.04	3,193.36	--	--	NM	NM
HV-3	3272.36	Monitoring Well	Debris Flow	Shallow	9/24/20	10:10	68.47	3,203.89	9/24/20	16:30	68.57	3,203.79

Table 4.3
Water Level Elevations (Spring and Fall 2020)

Location ID	Measuring Point Elevation (TOC or Top of SG; ft amsl)	Location Type	Hydrostratigraphic Unit of Screened Interval or VWP [1]	Potentiometric Map Interval [2]	Date of Measurement (Spring 2020 Synoptic Measurements)	Time of Measurement (Spring 2020 Synoptic Measurements)	Depth to Water or Height of Water Spring 2020 Synoptic Measurements (feet)	Water Level Elevation Spring 2020 Synoptic Measurements (feet amsl) [3] [4]	Date of Measurement (Spring 2020 Sampling Measurements)	Time of Measurement (Spring 2020 Sampling Measurements)	Depth to Water or Height of Water Spring 2020 Sampling Measurement (feet)	Water Level Elevation Spring 2020 Sampling Measurement (feet amsl) [3]
MW-1	3229.92	Monitoring Well	Alluvium	Shallow	6/5/20	11:25	6.82	3,223.10	6/7/20	11:10	7.58	3222.34
MW-2	3237.81	Monitoring Well	Alluvium	Shallow	6/5/20	11:20	8.86	3,228.95	6/7/20	10:45	8.93	3228.88
MW-3	3240.41	Monitoring Well	Alluvium	Shallow	6/5/20	11:40	9.30	3,231.11	6/7/20	10:38	9.37	3231.04
MW-4S	3234.40	Monitoring Well	Alluvium	Shallow	6/5/20	11:33	15.02	3,219.38	--	--	Not measured	--
MW-4D	3234.77	Monitoring Well	Alluvium	Intermediate (not used)	6/5/20	11:33	15.39	3,219.38	--	--	Not measured	--
NRC-1D	3212.48	Monitoring Well	Alluvium	Shallow	6/5/20	9:11	7.26	3,205.22	--	--	Not measured	--
NRC-3SR	3162.27	Monitoring Well	Alluvium	Shallow	6/5/20	15:27	16.52	3,145.75	6/8/20	15:05	16.70	3145.57
NRC-3IR	3162.04	Monitoring Well	Alluvium	Intermediate	6/5/20	15:14	16.58	3,145.46	6/8/20	15:24	16.83	3145.21
NRC-3DR	3161.99	Monitoring Well	Alluvium	Deep	6/5/20	15:20	27.27	3,134.72	6/7/20	15:35	27.58	3134.41
NRC-4D	3175.05	Monitoring Well	Alluvium	Intermediate	6/5/20	15:29	24.87	3,150.18	--	--	Not measured	--
NRC-5D	3271.70	Monitoring Well	Colluvium/Glacial Till	Deep	6/5/20	8:52	53.32	3,218.38	--	--	Not measured	--
NRC-6S	3174.46	Monitoring Well	Alluvium	Shallow	6/5/20	13:18	40.04	3,134.42	--	--	Not measured	--
NRC-6I	3173.35	Monitoring Well	Alluvium	Intermediate	6/5/20	13:25	41.57	3,131.78	--	--	Not measured	--
NRC-6D	3172.887	Monitoring Well	Alluvium	Deep	6/5/20	13:20	41.35	3,131.54	--	--	Not measured	--
RC-4 RIVER	3205.98	Staff Gauge	--	Shallow (not used)	6/5/20	11:01	1.60	3,204.25	--	--	Not measured	--
RC-6	3278.76	Staff Gauge	--	Shallow (not used)	6/5/20	10:27	1.60	--	6/6/20	9:30	1.65	--
RC-PZ-2	3195.31	Piezometer	Alluvium	Shallow	6/5/20	9:35	2.99	3,192.32	--	--	Not measured	--
RC-PZ-4	3186.83	Piezometer	Alluvium	Shallow	6/5/20	15:38	13.94	3,172.89	--	--	Not measured	--
STW-1	3163.85	Stilling Well	--	Shallow (not used)	6/10/20	8:39	3.43	3,160.42	--	--	Not measured	--
STW-1-SG	3162.751	Staff Gauge	--	Shallow (not used)	6/10/20	8:39	1.58	3,160.33	--	--	Not measured	--
SG-7R-WP	3152.89	Well Point	Alluvium	Shallow	6/5/20	15:51	2.68	3,150.21	--	--	Not measured	--
SG-7	3148.81	Staff Gauge	--	Shallow	6/5/20	15:51	2.50	3,147.98	--	--	Not measured	--
SG-7STW	3150.71	Stilling Well	--	Shallow (not used)	6/5/20	11:15	2.75	3,147.96	--	--	Not measured	--
SG-7STW-SG	3150.22	Staff Gauge	--	Shallow (not used)	6/5/20	15:39	2.65	3,147.57	--	--	Not measured	--
SG-8-WP	3136.639	Well Point	Alluvium	Shallow	6/5/20	11:21	4.23	3,132.41	--	--	Not measured	--
SG-8	3136.31	Staff Gauge	--	Shallow	--	--	damaged	--	--	--	damaged	--
SG-9-WP	3126.42	Well Point	Alluvium	Shallow	6/5/20	13:19	3.60	3,122.97	6/7/20	10:18	3.55	3123.02
SG-9	3124.97	Staff Gauge	--	Shallow	--	--	damaged	--	--	--	damaged	--
SG-10-WP	3116.04	Well Point	Alluvium	Shallow	6/5/20	13:05	4.25	3,111.79	6/7/20	8:57	4.25	3111.79
SG-10	3113.38	Staff Gauge	--	Shallow	6/5/20	16:44	1.55	3,111.63	--	--	Not measured	--
SG-10STW	3114.63	Stilling Well	--	Shallow (not used)	6/5/20	16:45	3.05	3,111.58	--	--	Not measured	--
SG-11-WP	3104.72	Well Point	Alluvium	Shallow	6/5/20	12:49	3.85	3,100.87	6/6/20	12:33	3.81	3100.91
SG-11	3103.21	Staff Gauge	--	Shallow	6/5/20	12:49	1.50	3,100.71	--	--	Not measured	--
SG-12R-WP	3094.61	Well Point	Alluvium	Shallow	--	--	Not measured	--	--	--	Not measured	--
SG-12R	3090.58	Staff Gauge	--	Shallow	--	--	Not measured	--	--	--	Not measured	--
SG-13	3072.98	Staff Gauge	--	Shallow	--	--	Not measured	--	--	--	Not measured	--
SG-13-WP	3082.29	Well Point	Alluvium	Shallow	--	--	Not measured	--	6/8/20	9:26	7.60	3074.69
SG-14-WP	3148.89	Well Point	Alluvium	Shallow	6/5/20	10:59	5.68	3,143.05	--	--	Not measured	--
SG-14	3148.89	Staff Gauge	--	Shallow	6/5/20	11:01	2.25	3,145.30	--	--	Not measured	--
SG-15-WP	3146.62	Well Point	Alluvium	Shallow	6/5/20	16:02	5.62	3,141.00	--	--	Not measured	--
SG-15	3144.12	Staff Gauge	--	Shallow	6/5/20	16:03	2.00	3,142.12	--	--	Not measured	--
SG-16-WP	3133.90	Well Point	Alluvium	Shallow	--	--	damaged	--	--	--	damaged	--
SG-16	3132.02	Staff Gauge	--	Shallow	--	--	damaged	--	--	--	damaged	--
SG-17-WP	3118.56	Well Point	Alluvium	Shallow	6/5/20	13:11	4.54	3,114.04	6/7/20	12:46	4.65	3113.93
SG-17	3116.48	Staff Gauge	--	Shallow	--	--	damaged	--	--	--	damaged	--
SG-18-WP	3111.23	Well Point	Alluvium	Shallow	6/5/20	12:58	5.16	3,107.40	6/6/20	14:55	5.15	3106.10
SG-18	3108.26	Staff Gauge	--	Shallow	--	--	damaged	--	--	--	damaged	--
SG-WL2	3143.25	Staff Gauge	--	Shallow	6/5/20	16:13	1.69	3,140.94	--	--	--	--
SG-WL2-STW	3144.23	Stilling Well	--	Shallow	--	--	--	NM	--	--	Not measured	--
SG-WL2-WP	3142.43	Well Point	Alluvium	Shallow	6/5/20	16:15	1.50	3,140.93	--	--	Not measured	--
SG-WL1	3146.28	Staff Gauge	--	Shallow	6/5/20	11:54	1.25	3,143.53	--	--	Not measured	--
SG-WL1-WP	3145.51	Well Point	Alluvium	Shallow	6/5/20	11:55	1.77	3,143.74	--	--	Not measured	--
SG-WL1-STW	3148.08	Stilling Well	--	Shallow	--	--	--	--	--	--	--	--

Table 4.3
Water Level Elevations (Spring and Fall 2020)

Location ID	Measuring Point Elevation (TOC or Top of SG; ft amsl)	Location Type	Hydrostratigraphic Unit of Screened Interval or VWP [1]	Potentiometric Map Interval [2]	Date of Measurement (Fall 2020 Synoptic Measurements)	Time of Measurement (Fall 2020 Synoptic Measurements)	Depth to Water Fall 2020 Synoptic Measurement (feet)	Water Level Elevation Fall 2020 Synoptic Measurement (feet amsl) [3] [4]	Date of Measurement (Fall 2020 Sampling Measurements)	Time of Measurement (Fall 2020 Sampling Measurements)	Depth to Water Fall 2020 Sampling Measurement (feet)	Water Level Elevation Fall 2020 sampling Measurement (feet amsl) [3]
MW-1	3229.92	Monitoring Well	Alluvium	Shallow	9/24/20	11:07	8.07	3,221.85	9/24/20	16:10	7.96	3,221.96
MW-2	3237.81	Monitoring Well	Alluvium	Shallow	9/24/20	11:26	9.76	3,228.05	9/24/20	15:00	9.70	3,228.11
MW-3	3240.41	Monitoring Well	Alluvium	Shallow	9/24/20	11:31	10.05	3,230.36	9/24/20	14:40	10.03	3,230.38
MW-4S	3234.40	Monitoring Well	Alluvium	Shallow	--	--	NM	NM	--	--	NM	NM
MW-4D	3234.77	Monitoring Well	Alluvium	Intermediate (not used)	9/24/20	11:14	20.27	3,214.50	--	--	NM	NM
NRC-1D	3212.48	Monitoring Well	Alluvium	Shallow	9/24/20	9:54	10.72	3,201.76	--	--	NM	NM
NRC-3SR	3162.27	Monitoring Well	Alluvium	Shallow	9/24/20	9:05	17.43	3,144.84	9/22/20	15:05	18.01	3,144.26
NRC-3IR	3162.04	Monitoring Well	Alluvium	Intermediate	9/24/20	9:06	18.35	3,143.69	9/22/20	14:00	18.82	3,143.22
NRC-3DR	3161.99	Monitoring Well	Alluvium	Deep	9/24/20	9:08	31.68	3,130.31	9/22/20	14:00	32.16	3,129.83
NRC-4D	3175.05	Monitoring Well	Alluvium	Intermediate	9/24/20	8:47	27.04	3,148.01	--	--	NM	NM
NRC-5D	3271.70	Monitoring Well	Colluvium/Glacial Till	Deep	9/24/20	10:06	68.04	3,203.66	--	--	NM	NM
NRC-6S	3174.46	Monitoring Well	Alluvium	Shallow	9/24/20	11:43	43.79	3,130.67	--	--	NM	NM
NRC-6I	3173.35	Monitoring Well	Alluvium	Intermediate	9/24/20	11:44	46.49	3,126.86	--	--	NM	NM
NRC-6D	3172.887	Monitoring Well	Alluvium	Deep	9/24/20	11:46	46.30	3,126.59	--	--	NM	NM
RC-4 RIVER	3205.98	Staff Gauge	--	Shallow (not used)	9/24/20	13:37	1.15	3,203.80	9/26/20	13:45	0.85	3,203.50
RC-6	3278.76	Staff Gauge	--	Shallow (not used)	9/24/20	13:45	1.10	3,276.53	9/27/20	10:10	0.75	3,276.18
RC-PZ-2	3195.31	Piezometer	Alluvium	Shallow	9/24/20	9:18	4.20	3,191.11	--	--	NM	NM
RC-PZ-4	3186.83	Piezometer	Alluvium	Shallow	9/24/20	9:07	15.59	3,171.24	--	--	NM	NM
STW-1	3163.85	Stilling Well	--	Shallow (not used)	9/24/20	12:02	3.83	3,160.02	--	--	NM	NM
STW-1-SG	3162.751	Staff Gauge	--	Shallow (not used)	9/24/20	12:03	1.27	3,160.02	--	--	NM	NM
SG-7R-WP	3152.89	Well Point	Alluvium	Shallow	9/24/20	9:13	3.75	3,149.14	9/22/20	16:05	4.28	3,148.61
SG-7	3148.81	Staff Gauge	--	Shallow	9/24/20	9:12	1.85	3,147.33	9/22/20	16:12	1.00	3,146.48
SG-7STW	3150.71	Stilling Well	--	Shallow (not used)	9/24/20	9:16	3.54	3,147.17	--	--	NM	NM
SG-7STW-SG	3150.22	Staff Gauge	--	Shallow (not used)	9/24/20	9:15	1.00	3,147.22	9/22/20	16:12	0.12	3,146.34
SG-8-WP	3136.639	Well Point	Alluvium	Shallow	9/24/20	10:08	4.59	3,132.05	9/26/20	9:30	4.43	3,132.21
SG-8	3136.31	Staff Gauge	--	Shallow	9/24/20	10:09	0.90	3,133.21	9/26/20	7:45	0.80	3,133.11
SG-9-WP	3126.42	Well Point	Alluvium	Shallow	9/24/20	11:19	4.15	3,122.27	9/26/20	8:32	4.26	3,122.16
SG-9	3124.97	Staff Gauge	--	Shallow	9/24/20	11:20	1.82	3,122.79	9/27/20	9:23	1.40	3,122.37
SG-10-WP	3116.04	Well Point	Alluvium	Shallow	9/24/20	11:08	4.54	3,111.50	9/25/20	9:30	4.65	3,111.39
SG-10	3113.38	Staff Gauge	--	Shallow	9/24/20	11:09	1.05	3,111.13	9/27/20	8:47	0.70	3,110.78
SG-10STW	3114.63	Stilling Well	--	Shallow (not used)	--	--	NM	NM	--	--	NM	NM
SG-11-WP	3104.72	Well Point	Alluvium	Shallow	9/24/20	10:52	4.62	3,100.10	9/23/20	14:30	5.19	3,099.53
SG-11	3103.21	Staff Gauge	--	Shallow	9/24/20	10:51	0.91	3,100.12	--	--	NM	NM
SG-12R-WP	3094.61	Well Point	Alluvium	Shallow	9/24/20	12:01	5.60	3,089.01	--	--	NM	NM
SG-12R	3090.58	Staff Gauge	--	Shallow	9/24/20	12:01	3.00	3,090.25	--	--	NM	NM
SG-13	3072.98	Staff Gauge	--	Shallow	--	--	NM	NM	--	--	NM	NM
SG-13-WP	3082.29	Well Point	Alluvium	Shallow	--	--	NM	NM	9/26/20	16:00	8.83	3,073.46
SG-14-WP	3148.89	Well Point	Alluvium	Shallow	9/24/20	9:28	5.52	3,143.21	--	--	NM	NM
SG-14	3148.89	Staff Gauge	--	Shallow	9/24/20	9:27	0.80	3,143.92	--	--	NM	NM
SG-15-WP	3146.62	Well Point	Alluvium	Shallow	9/24/20	9:40	7.05	3,139.57	--	--	NM	NM
SG-15	3144.12	Staff Gauge	--	Shallow	9/24/20	9:39	1.31	3,141.43	--	--	NM	NM
SG-16-WP	3133.90	Well Point	Alluvium	Shallow	9/24/20	10:22	5.40	3,128.50	--	--	NM	NM
SG-16	3132.02	Staff Gauge	--	Shallow	9/24/20	10:21	0.75	3,128.77	--	--	NM	NM
SG-17-WP	3118.56	Well Point	Alluvium	Shallow	9/24/20	11:12	4.98	3,113.58	9/25/20	12:00	5.15	3,113.41
SG-17	3116.48	Staff Gauge	--	Shallow	9/24/20	11:11	1.35	3,113.83	--	--	NM	NM
SG-18-WP	3111.23	Well Point	Alluvium	Shallow	9/24/20	10:58	5.65	3,105.58	--	--	NM	NM
SG-18	3108.26	Staff Gauge	--	Shallow	9/24/20	10:57	1.25	3,105.51	--	--	NM	NM
SG-WL2	3143.25	Staff Gauge	--	Shallow	9/24/20	12:26	1.67	3,140.92	--	--	NM	NM
SG-WL2-STW	3144.23	Stilling Well	--	Shallow	9/24/20	12:26	3.33	3,140.90	--	--	NM	NM
SG-WL2-WP	3142.43	Well Point	Alluvium	Shallow	9/24/20	12:25	1.56	3,140.87	--	--	NM	NM
SG-WL1	3146.28	Staff Gauge	--	Shallow	9/24/20	12:18	1.03	3,143.31	--	--	NM	NM
SG-WL1-WP	3145.51	Well Point	Alluvium	Shallow	9/24/20	12:16	1.98	3,143.53	--	--	NM	NM
SG-WL1-STW	3148.08	Stilling Well	--	Shallow	9/24/20	12:17	4.80	3,143.28	--	--	NM	NM

Table 4.3
Water Level Elevations (Spring and Fall 2020)

Location ID	Measuring Point Elevation (TOC or Top of SG; ft amsl)	Location Type	Hydrostratigraphic Unit of Screened Interval or VWP [1]	Potentiometric Map Interval [2]	Date of Measurement (Spring 2020 Synoptic Measurements)	Time of Measurement (Spring 2020 Synoptic Measurements)	Depth to Water or Height of Water Spring 2020 Synoptic Measurements (feet)	Water Level Elevation Spring 2020 Synoptic Measurements (feet amsl) [3] [4]	Date of Measurement (Spring 2020 Sampling Measurements)	Time of Measurement (Spring 2020 Sampling Measurements)	Depth to Water or Height of Water Spring 2020 Sampling Measurement (feet)	Water Level Elevation Spring 2020 Sampling Measurement (feet amsl) [3]
TP1-10S	3272.95	Monitoring Well	Tailings	Tailings Pile (not used)	6/5/20	9:13	38.90	3,234.05	--	--	Not measured	--
TP1-10D	3273.04	Monitoring Well	Tailings	Tailings Pile (not used)	6/5/20	9:16	45.97	3,227.07	--	--	Not measured	--
TP1-8S	3255.08	Monitoring Well	Tailings	Tailings Pile (not used)	6/5/20	9:24	48.09	3,206.99	--	--	Not measured	--
TP1-8D	3255.10	Monitoring Well	Alluvium	Shallow	6/5/20	9:22	49.38	3,205.72	--	--	Not measured	--
TP1-9S	3247.99	Monitoring Well	Tailings	Tailings Pile (not used)	6/5/20	9:36	36.87	3,211.12	--	--	Not measured	--
TP1-9D	3248.17	Monitoring Well	Alluvium	Shallow	6/5/20	9:34	50.46	3,197.71	--	--	Not measured	--
TP2-12S	3292.67	Monitoring Well	Tailings	Tailings Pile (not used)	6/5/20	12:49	92.20	3,200.47	6/8/20	9:12	94.21	3198.46
TP2-12D	3292.16	Monitoring Well	Alluvium	Shallow	6/5/20	12:42	91.37	3,200.79	6/8/20	8:58	92.15	3200.01
TP2-13S	3290.59	Monitoring Well	Alluvium & Tailings	Tailings Pile (not used)	6/5/20	9:52	114.17	3,176.42	--	--	Not measured	--
TP2-13D	3290.30	Monitoring Well	Alluvium	Shallow	6/5/20	13:35	115.50	3,174.80	6/11/20	15:00	116.14	3174.16
TP2-14	3291.63	Monitoring Well	Tailings	Tailings Pile (not used)	6/5/20	10:09	55.49	3,236.14	6/8/20	11:30	58.21	3233.42
TP2-15	3290.87	Monitoring Well	Alluvium	Shallow	6/5/20	13:09	106.09	3,184.78	6/8/20	11:55	106.52	3184.35
TP2-16S	3283.92	Monitoring Well	Tailings	Tailings Pile (not used)	6/5/20	10:17	41.99	3,241.93	6/11/20	--	Dry	--
TP2-16D	3283.79	Monitoring Well	Tailings	Tailings Pile (not used)	6/5/20	10:15	48.72	3,235.07	6/11/20	10:51	53.50	3230.29
TP2-17	3284.71	Monitoring Well	Tailings	Tailings Pile (not used)	6/5/20	10:02	84.21	3,200.50	6/15/20	15:25	90.68	3194.03
TP3-12S	3230.62	Monitoring Well	Alluvium & Tailings	Shallow	6/5/20	14:30	77.78	3,152.84	6/10/20	11:33	78.10	3152.52
TP3-12D	3230.39	Monitoring Well	Alluvium	Intermediate	6/5/20	14:38	78.30	3,152.09	6/10/20	11:32	79.06	3151.33
TP3-13	3263.06	Monitoring Well	Alluvium	Shallow	6/5/20	14:00	105.56	3,157.50	6/10/20	14:19	106.55	3156.51
TP3-14S	3241.32	Monitoring Well	Tailings	Tailings Pile (not used)	--	--	Not measured	--	6/15/20	14:27	83.44	3157.88
TP3-14D	3241.88	Monitoring Well	Alluvium	Shallow	6/5/20	14:14	84.48	3,157.40	6/10/20	14:16	85.70	3156.18
US-1S	3279.29	Monitoring Well	Alluvium	Shallow	6/5/20	10:08	6.64	3,272.65	6/6/20	14:10	6.82	3272.47
US-1I	3279.17	Monitoring Well	Alluvium	Intermediate	6/5/20	10:15	7.26	3,271.91	6/6/20	15:19	7.41	3271.76
US-1D	3279.30	Monitoring Well	Alluvium	Deep	6/5/20	10:08	7.55	3,271.75	6/6/20	11:00	7.64	3271.66

Notes:

-- Not applicable or not measured.

1 General lithologic unit in which the well screen is placed.

2 Unit assigned for potentiometric mapping based on well screen elevation, representing the Shallow, Intermediate, and Deep Zones of the alluvial aquifer and the tailings piles, unless noted as "not used."

3 Holden Mine Vertical Datum.

4 VWP data are based on the elevation of the installed instrument, and are not directly calibrated to water level elevation. Elevations may not be accurate to 0.01 feet.

Abbreviations:

amsl Above mean sea level

NM Not measured

VWP Vibrating wire piezometer

Table 4.3
Water Level Elevations (Spring and Fall 2020)

Location ID	Measuring Point Elevation (TOC or Top of SG; ft amsl)	Location Type	Hydrostratigraphic Unit of Screened Interval or VWP [1]	Potentiometric Map Interval [2]	Date of Measurement (Fall 2020 Synoptic Measurements)	Time of Measurement (Fall 2020 Synoptic Measurements)	Depth to Water Fall 2020 Synoptic Measurement (feet)	Water Level Elevation Fall 2020 Synoptic Measurement (feet amsl) [3] [4]	Date of Measurement (Fall 2020 Sampling Measurements)	Time of Measurement (Fall 2020 Sampling Measurements)	Depth to Water Fall 2020 Sampling Measurement (feet)	Water Level Elevation Fall 2020 sampling Measurement (feet amsl) [3]
TP1-10S	3272.95	Monitoring Well	Tailings	Tailings Pile (not used)	9/24/20	10:44	DRY	DRY	--	--	NM	NM
TP1-10D	3273.04	Monitoring Well	Tailings	Tailings Pile (not used)	9/24/20	10:38	47.55	3,225.49	--	--	NM	NM
TP1-8S	3255.08	Monitoring Well	Tailings	Tailings Pile (not used)	9/24/20	10:54	48.31	3,206.77	--	--	NM	NM
TP1-8D	3255.10	Monitoring Well	Alluvium	Shallow	9/24/20	10:48	54.12	3,200.98	--	--	NM	NM
TP1-9S	3247.99	Monitoring Well	Tailings	Tailings Pile (not used)	9/24/20	10:30	36.89	3,211.10	--	--	NM	NM
TP1-9D	3248.17	Monitoring Well	Alluvium	Shallow	9/24/20	10:25	55.47	3,192.70	--	--	NM	NM
TP2-12S	3292.67	Monitoring Well	Tailings	Tailings Pile (not used)	9/24/20	11:12	DRY	DRY	--	--	NM	NM
TP2-12D	3292.16	Monitoring Well	Alluvium	Shallow	9/24/20	11:18	105.19	3,186.97	9/25/20	12:30	105.20	3,186.96
TP2-13S	3290.59	Monitoring Well	Alluvium & Tailings	Tailings Pile (not used)	9/24/20	11:00	117.23	3,173.36	--	--	NM	NM
TP2-13D	3290.30	Monitoring Well	Alluvium	Shallow	9/24/20	11:03	120.77	3,169.53	9/25/20	9:00	120.60	3,169.70
TP2-14	3291.63	Monitoring Well	Tailings	Tailings Pile (not used)	9/24/20	11:43	80.29	3,211.34	--	--	NM	NM
TP2-15	3290.87	Monitoring Well	Alluvium	Shallow	9/24/20	11:08	112.75	3,178.12	9/25/20	12:30	112.66	3,178.21
TP2-16S	3283.92	Monitoring Well	Tailings	Tailings Pile (not used)	9/24/20	11:27	42.00	3,241.92	--	--	NM	NM
TP2-16D	3283.79	Monitoring Well	Tailings	Tailings Pile (not used)	9/24/20	11:29	64.59	3,219.20	--	--	NM	NM
TP2-17	3284.71	Monitoring Well	Tailings	Tailings Pile (not used)	9/24/20	11:36	110.70	3,174.01	--	--	NM	NM
TP3-12S	3230.62	Monitoring Well	Alluvium & Tailings	Shallow	9/24/20	9:24	79.55	3,151.07	9/24/20	15:09	79.75	3,150.87
TP3-12D	3230.39	Monitoring Well	Alluvium	Intermediate	9/24/20	9:22	81.64	3,148.75	9/24/20	14:50	81.60	3,148.79
TP3-13	3263.06	Monitoring Well	Alluvium	Shallow	9/24/20	9:38	111.76	3,151.30	9/25/20	9:15	111.67	3,151.39
TP3-14S	3241.32	Monitoring Well	Tailings	Tailings Pile (not used)	9/24/20	9:29	88.81	3,152.51	--	--	NM	NM
TP3-14D	3241.88	Monitoring Well	Alluvium	Shallow	9/24/20	9:32	91.65	3,150.23	9/25/20	14:45	91.56	3,150.32
US-1S	3279.29	Monitoring Well	Alluvium	Shallow	9/24/20	11:48	10.49	3,268.80	9/26/20	9:20	10.24	3,269.05
US-1I	3279.17	Monitoring Well	Alluvium	Intermediate	9/24/20	11:51	10.42	3,268.75	9/26/20	10:40	10.34	3,268.83
US-1D	3279.30	Monitoring Well	Alluvium	Deep	9/24/20	11:53	10.67	3,268.63	9/26/20	9:22	10.60	3,268.70

Notes:

-- Not applicable or not measured.

1 General lithologic unit in which the well screen is placed.

2 Unit assigned for potentiometric mapping based on well screen elevation, representing the Shallow, Intermediate, and Deep Zones of the alluvial aquifer and the tailings piles, unless noted as "not used."

3 Holden Mine Vertical Datum.

4 VWP data are based on the elevation of the installed instrument, and are not directly calibrated to water level elevation. Elevations may not be accurate to 0.01 feet.

Abbreviations:

amsl Above mean sea level

NM Not measured

VWP Vibrating wire piezometer

Table 4.4
Comparison of Water Level Elevations at Well Points and Staff Gauges (Spring and Fall 2020)

Location ID [1]	Location Type	Total Depth (feet measured from TOC) [2]	Spring 2020 Measurements					Fall 2020 Measurements				
			Date of Measurement	Time of Measurement	Water Level Elevation (feet amsl)	Head Difference, Groundwater Minus Surface Water (feet) [3]	Apparent Groundwater–Surface Water Interaction	Date of Measurement	Time of Measurement	Water Level Elevation (feet amsl)	Head Difference, Groundwater Minus Surface Water (feet) [3]	Apparent Groundwater–Surface Water Interaction
Railroad Creek Pairs												
SG-7R-WP	Well Point	6.31	6/5/20	15:51	3,150.21	2.23	Gaining	9/24/20	9:13	3,149.14	1.81	Gaining
SG-7	Staff Gauge	--	6/5/20	15:51	3,147.98			9/24/20	9:12	3,147.33		
SG-14-WP	Well Point	9.44	6/5/20	10:59	3,143.05	-2.25	Losing	9/24/20	9:28	3,143.21	-0.70	Losing
SG-14	Staff Gauge	--	6/5/20	11:01	3,145.30			9/24/20	9:27	3,143.92		
SG-15-WP	Well Point	9.47	6/5/20	16:02	3,141.00	-1.12	Losing	9/24/20	9:40	3,139.57	-1.86	Losing
SG-15	Staff Gauge	--	6/5/20	16:03	3,142.12			9/24/20	9:39	3,141.43		
SG-8-WP	Well Point	6.85	6/5/20	11:21	3,132.41	NM	NM	9/24/20	10:08	3,132.05	-1.16	Losing
SG-8	Staff Gauge	--	--	damaged	--			9/24/20	10:09	3,133.21		
SG-16-WP	Well Point	9.61	--	damaged	--	NM	NM	9/24/20	10:22	3,128.50	-0.27	Losing
SG-16	Staff Gauge	--	--	damaged	--			9/24/20	10:21	3,128.77		
SG-9-WP	well point	6.93	6/5/20	13:19	3,122.97	NM	NM	9/24/20	11:19	3,122.27	-0.52	Losing
SG-9	Staff gauge	--	--	damaged	--			9/24/20	11:20	3,122.79		
SG-17-WP	Well Point	9.08	6/5/20	13:11	3,118.58	NM	NM	9/24/20	11:12	3,113.58	-0.24	Losing
SG-17	Staff Gauge	--	--	damaged	--			9/24/20	11:11	3,113.83		
SG-10-WP	Well Point	7.11	6/5/20	13:05	3,111.79	0.16	Gaining	9/24/20	11:08	3,111.50	0.37	Gaining
SG-10	Staff Gauge	--	6/5/20	16:44	3,111.63			9/24/20	11:09	3,111.13		
SG-18-WP	Well Point	9.56	6/5/20	12:58	3,105.32	NM	NM	9/24/20	10:58	3,105.58	0.06	Neutral
SG-18	Staff Gauge	--	--	damaged	--			9/24/20	10:57	3,105.51		
SG-11-WP	Well Point	6.13	6/5/20	12:49	3,099.93	0.29	Gaining	9/24/20	10:52	3,100.10	-0.02	Neutral
SG-11	Staff Gauge	--	6/5/20	12:49	3,099.64			9/24/20	10:51	3,100.12		
Wetlands East of Tailings Pile 3 Pairs												
SG-WL1-WP	Well Point	7.70	6/5/20	11:55	3,143.74	0.21	Upwelling	9/24/20	12:16	3,143.53	0.22	Upwelling
SG-WL1	Staff Gauge	--	6/5/20	11:54	3,143.53			9/24/20	12:18	3,143.31		
SG-WL2-WP	Well Point	5.00	6/5/20	16:15	3,140.93	-0.01	Neutral	9/24/20	12:25	3,140.87	-0.05	Neutral
SG-WL2	Staff Gauge	--	6/5/20	16:13	3,140.94			9/24/20	12:26	3,140.92		

Notes:

-- Not applicable or not measured.

1 Location groups listed in order from west to east (upstream to downstream).

2 Total measured depth does not include 6"screen interval below well point casing.

3 Positive value indicates head was higher in groundwater than surface water at the time of measurement, consistent with groundwater discharging to surface water. Negative value indicates head was higher in surface water than in groundwater at the time of measurement, consistent with surface water discharging to groundwater. Differences of less than 0.1 feet are considered neutral based on measurement accuracy.

Abbreviations:

amsl Above mean sea level

NM Not measured

TOC Top of casing

Table 4.5
Head Differences across Barrier Wall (Spring and Fall 2020)

Mountain Side				Railroad Creek Side							
Location ID	VWP Installation Depth (feet bgs)	Water Level Elevation, 6/5/2020 (feet amsl) [1]	Water Level Elevation, 9/24/2020 (feet amsl) [1]	Location ID	VWP Installation Depth (feet bgs)	Water Level Elevation, June 5, 2020 (feet amsl) [1]	Water Level Elevation, September 24, 2020 (feet amsl) [1]	Subsurface Lithology	Head Difference, Mountain Side Minus Railroad Creek Side 6/5/2020 (feet) [2]	Head Difference, Mountain Side Minus Railroad Creek Side, 9/24/2020 (feet) [2]	Apparent Gradient Direction Relative to Barrier Wall (June 2020 / September 2020)
Lower West Area											
BW-VWP-60c	19	3,228.33	3224.78	BW-VWP-61c	19	3,230.58	3229.42	Alluvium	-2.25	-4.64	Inward/Inward
BW-VWP-60b	25	3,228.41	3225.46	BW-VWP-61b	24	3,230.82	3229.16	Glacial Moraine	-2.40	-3.70	Inward/Inward
BW-VWP-60a	34.4	3,256.41	3250.29	BW-VWP-61a	34.4	3,233.49	3231.62	Glacial Till	22.92	18.67	Outward/Outward
BW-VWP-62c	16.5	3,217.55	3216.10	BW-VWP-63c	16.5	3,225.69	3224.25	Alluvium	-8.14	-8.15	Inward/Inward
BW-VWP-62b	26.5	3,218.26	3213.52	BW-VWP-63b	28	3,225.91	3224.51	Glacial Till	-7.65	-10.98	Inward/Inward
BW-VWP-62a	36.5	3,224.64	3222.59	BW-VWP-63a	36	3,225.66	3224.28	Glacial Till	-1.02	-1.69	Inward/Inward
BW-VWP-64c	17	3,213.10	3210.57	BW-VWP-65c	18	3,215.21	3213.72	Alluvium	-2.11	-3.15	Inward/Inward
BW-VWP-64b	55	3,210.85	3208.33	BW-VWP-65b	56	3,210.74	3208.28	Glacial Moraine	0.11	0.05	Outward/Outward
BW-VWP-64a	73	3,211.04	3208.48	BW-VWP-65a	69	3,210.70	3208.11	Glacial Till	0.34	0.37	Outward/Outward
BW-VWP-66c	15	3,207.91	NA	BW-VWP-67c	15	3,209.17	3207.77	Alluvium	-1.26	NA	Inward/NA
BW-VWP-66b	42	3,206.43	NA	BW-VWP-67b	42	3,207.66	3205.52	Glacial Moraine	-1.22	NA	Inward/NA
BW-VWP-66a	50	3,206.52	NA	BW-VWP-67a	53	3,207.14	3204.82	Glacial Till	-0.63	NA	Inward/NA
Tailings Pile 1											
BW-VWP-68d	21	3,212.44	3209.09	BW-VWP-69d	21	3,201.68	3200.42	Alluvium	10.76	8.67	Outward/Outward
BW-VWP-68c	40	3,210.47	3207.52	BW-VWP-69c	40	3,201.84	3200.15	Glacial Moraine	8.63	7.37	Outward/Outward
BW-VWP-68b	65	3,200.39	3197.66	BW-VWP-69b	65	3,201.07	3198.37	Glacial Outwash	-0.68	-0.71	Inward/Inward
BW-VWP-68a	85	3,200.06	3197.14	BW-VWP-69a	87	3,201.10	3198.35	Glacial Till	-1.04	-1.21	Inward/Inward
BW-VWP-70c	18	3,197.76	3194.24	BW-VWP-71c	18	3,195.35	3194.35	Alluvium	2.42	-0.11	Outward/Inward
BW-VWP-70b	65	3,197.20	3194.08	BW-VWP-71b	65	3,195.32	3193.45	Glacial Moraine	1.88	0.63	Outward/Outward
BW-VWP-70a	75	3,196.35	3193.70	BW-VWP-71a	75	3,195.54	3193.31	Glacial Till	0.81	0.39	Outward/Outward
BW-VWP-72c	18	3,195.44	3189.39	BW-VWP-73c	18	3,186.02	3185.31	Alluvium	9.42	4.08	Outward/Outward
BW-VWP-72b	35	3,194.56	3189.34	BW-VWP-73b	35	3,187.00	3185.52	Glacial Moraine	7.56	3.82	Outward/Outward
BW-VWP-72a	79	3,196.73	3193.56	BW-VWP-73a	79	3,189.64	3186.29	Glacial Till	7.09	7.26	Outward/Outward
Wing Wall											
BW-VWP-74c	28	3,197.09	3191.77	BW-VWP-75c	28	3,187.99	3183.43	Alluvium	9.10	8.34	NA [3]
BW-VWP-74b	51	3,193.49	3189.38	BW-VWP-75b	51	3,190.21	3186.58	Glacial Outwash	3.28	2.80	NA [3]
BW-VWP-74a	78	3,192.15	3188.09	BW-VWP-75a	76	3,190.98	3187.04	Glacial Till	1.17	1.05	NA [3]
Tailings Pile 2											
BW-VWP-76c	17	3,180.21	3177.00	BW-VWP-77c	17	3,180.51	3178.69	Glacial Moraine	-0.30	-1.68	Inward/Inward
BW-VWP-76b	22	3,180.97	3178.11	BW-VWP-77b	22	3,180.62	3178.64	Glacial Outwash	0.35	-0.54	Outward/Inward
BW-VWP-76a	28	3,181.12	3178.28	BW-VWP-77a	26	3,180.93	3178.18	Glacial Till	0.19	0.10	Outward/Outward
BW-VWP-78d	16	3,176.34	3172.63	BW-VWP-79d	16	3,169.63	3168.93	Alluvium	6.72	3.70	Outward/Outward
BW-VWP-78c	33	3,175.45	3171.56	BW-VWP-79c	33	3,170.24	3169.17	Glacial Moraine	5.21	2.39	Outward/Outward
BW-VWP-78b	43.5	3,174.85	3171.19	BW-VWP-79b	43.5	3,173.27	3170.39	Glacial Moraine	1.58	0.80	Outward/Outward
BW-VWP-78a	47	3,175.03	3171.53	BW-VWP-79a	47	3,174.12	3170.94	Glacial Till	0.91	0.59	Outward/Outward

Notes:

1 Holden Mine Vertical Datum.

2 Positive value indicates head was higher on the mountain side than on the Railroad Creek side at the time of measurement. Negative value indicates head was higher on the Railroad Creek side than on the mountain side.

3 Head difference is measured across the wing wall section of the barrier wall, which is upgradient of the Tailings Pile 2 barrier wall and groundwater collection system.

Abbreviations:

bgs Below ground surface

VWP Vibrating wire piezometer

NA Not applicable or measurement not available

Table 4.6
Vertical Gradients Based on Monitoring Wells

Monitoring Well Cluster [1]	Date	Season	Monitoring Well Data									Vertical Gradients [2]					
			Deep Well			Intermediate Well			Shallow Well								
			Water Level Elevation (feet amsl)	Well Screen Top Elevation[3] (feet amsl)	Well Screen Bottom Elevation[3] (feet amsl)	Water Level Elevation (feet amsl)	Well Screen Top Elevation[3] (feet amsl)	Well Screen Bottom Elevation[3] (feet amsl)	Water Level Elevation (feet amsl)	Well Screen Top Elevation[3] (feet amsl)	Well Screen Bottom Elevation[3] (feet amsl)	Shallow Well to Intermediate Well Gradient (ft/ft)	Gradient Direction	Shallow Well to Deep Well Gradient (ft/ft)	Gradient Direction	Intermediate Well to Deep Well Gradient (ft/ft)	Gradient Direction
			Well ID			Well ID			Well ID								
			US-1D			US-1I			US-1S								
US-1	9/24/20	Fall	3,268.63	3,225.94	3,215.94	3,268.75	3,245.25	3,240.25	3,268.80	3261.07	3,251.07	0.004	downward	0.005	downward	0.005	downward
	6/5/20	Spring	3,271.75	3,225.94	3,215.94	3271.91	3,245.25	3,240.25	3272.65	3261.07	3,251.07	0.056	downward	0.026	downward	0.007	downward
	10/6/19	Fall	3,267.96	3,225.94	3,215.94	3,268.07	3,245.25	3,240.25	3,268.26	3261.07	3,251.07	0.015	downward	0.009	downward	0.005	downward
	6/6/19	Spring	3,270.30	3,225.94	3,215.94	3,270.44	3,245.25	3,240.25	3,270.97	3261.07	3,251.07	0.040	downward	0.019	downward	0.006	downward
			MW-4D			None			MW-4S								
MW-4	9/24/20	Fall	3,214.50	3,210.29	3,205.29	--	--	--	--	--	--	--	--	--	--	--	--
	6/5/20	Spring	3,219.38	3,210.29	3,205.29	--	--	--	3219.38	3,224.38	3,214.38	--	--	-0.001	upward	--	--
	10/6/19	Fall	3,214.33	3,210.29	3,205.29	--	--	--	3,214.20	3,224.38	3,214.38	--	--	-0.012	upward	--	--
	6/6/19	Spring	3,219.19	3,210.29	3,205.29	--	--	--	3,219.14	3,224.38	3,214.38	--	--	-0.005	upward	--	--
			NRC-5D			None			HV-3								
HV-3 & NRC-5D	9/24/20	Fall	3,203.66	3,150.74	3,140.74	--	--	--	3,203.89	3,207.86	3,194.86	--	--	0.004	downward	--	--
	6/5/20	Spring	3218.38	3,150.74	3,140.74	--	--	--	3219.49	3,207.86	3,194.86	--	--	0.020	downward	--	--
	10/6/19	Fall	3,203.02	3,150.74	3,140.74	--	--	--	3,203.24	3,207.86	3,194.86	--	--	0.004	downward	--	--
	6/6/19	Spring	3,207.70	3,150.74	3,140.74	--	--	--	3,211.95	3,207.86	3,194.86	--	--	0.076	downward	--	--
			HV-2D			None			HV-2S								
HV-2	9/24/20	Fall	3,193.36	3,189.86	3,179.86	--	--	--	3,193.45	3,199.86	3,189.86	--	--	0.009	downward	--	--
	6/5/20	Spring	3196.91	3,189.86	3,179.86	--	--	--	3197.73	3,199.86	3,189.86	--	--	0.082	downward	--	--
	10/6/19	Fall	3,192.91	3,189.86	3,179.86	--	--	--	3,193.01	3,199.86	3,189.86	--	--	0.010	downward	--	--
	7/16/19	Summer	3,193.96	3,189.86	3,179.86	--	--	--	3,194.17	3,199.86	3,189.86	--	--	0.021	downward	--	--
			TP2-12D			None			TP2-12S								
TP2-12	9/24/20	Fall	3,186.97	3,178.38	3,168.38	--	--	--	DRY	3,201.17	3,191.17	--	--	--	--	--	--
	6/5/20	Spring	3200.79	3,178.38	3,168.38	--	--	--	3200.47	3,201.17	3,191.17	--	--	-0.014	upward	--	--
	10/7/19	Fall	3,185.04	3,178.38	3,168.38	--	--	--	DRY	3,201.17	3,191.17	--	--	--	--	--	--
	6/6/19	Spring	3,198.62	3,178.38	3,168.38	--	--	--	3,198.46	3,201.17	3,191.17	--	--	-0.007	upward	--	--
			TP2-13D			None			TP2-13S								
TP2-13	9/24/20	Fall	3,169.53	3,158.45	3,148.45	--	--	--	3,173.36	3,182.59	3,172.59	--	--	0.159	downward		
	6/5/20	Spring	3174.80	3,158.45	3,148.45	--	--	--	3176.42	3,182.59	3,172.59	--	--	0.067	downward	--	--
	10/6/19	Fall	3,168.67	3,158.45	3,148.45	--	--	--	DRY	3,182.59	3,172.59	--	--	--	--	--	--
	6/6/19	Spring	3,174.69	3,158.45	3,148.45	--	--	--	3,176.58	3,182.59	3,172.59	--	--	0.078	downward	--	--
			TP2-16D			None			TP2-16S								
TP2-16	9/24/20	Fall	3,219.20	3,229.05	3,219.05	--	--	--	3,241.92	3,251.70	3,241.70	--	--	1.003	downward		
	6/5/20	Spring	3235.07	3,229.05	3,219.05	--	--	--	3241.93	3,251.70	3,241.70	--	--	0.303	downward	--	--
	10/6/19	Fall	DRY	3,229.05	3,219.05	--	--	--	DRY	3,251.70	3,241.70	--	--	--	--	--	--
	6/8/19	Spring	3,230.62	3,229.05	3,219.05	--	--	--	DRY	3,251.70	3,241.70	--	--	--	--	--	--
			None			DS-15I			DS-15S								
DS-15	9/24/20	Fall	--	--	--	3165.484	3,139.44	3,129.44	3,165.59	3,171.53	3,156.53	0.003	downward	--	--	--	--
	6/5/20	Spring	--	--	--	3167.66	3,139.44	3,129.44	3167.78	3,171.53	3,156.53	0.004	downward	--	--	--	--
	10/6/19	Fall	--	--	--	3,164.81	3,139.44	3,129.44	3,165.07	3,171.53	3,156.53	0.01	downward	--	--	--	--
	6/21/19	Spring	--	--	--	3,167.00	3,139.44	3,129.44	3,167.35	3,171.53	3,156.53	0.01	downward	--	--	--	--
			DS-16D			DS-16I			DS-16S								
DS-16	9/24/20	Fall	3,155.26	3,108.86	3,098.86	3154.815	3,133.24	3,123.24	3,157.94	3,161.27	3,146.27	0.12	downward	0.054	downward	-0.02	upward
	6/5/20	Spring	3157.76	3,108.86	3,098.86	3157.16	3,133.24	3,123.24	3159.58	3,161.27	3,146.27	0.10	downward	0.037	downward	-0.02	upward
	10/6/19	Fall	3,154.59	3,108.86	3,098.86	3,153.91	3,133.24	3,123.24	3,157.17	3,161.27	3,146.27	0.13	downward	0.052	downward	-0.03	upward
	6/20/19	Spring	3,157.86	3,108.86	3,098.86	3,156.13	3,133.24	3,123.24	3,158.97	3,161.27	3,146.27	0.11	downward	0.022	downward	-0.07	upward
			TP3-14D			None			TP3-14S								
TP3-14	9/24/20	Fall	3,150.23	3,138.77	3,128.77	--	--	--	3,152.51	3,158.88	3,148.88	--	--	0.11	downward	--	--
	06/5/2020 and 06/10/2020	Spring	3157.40	3,138.77	3,128.77	--	--	--	3157.88	3,158.88	3,148.88	--	--	0.02	downward	--	--
	10/6/19	Fall	3,149.36	3,138.77	3,128.77	--	--	--	3,151.92	3,158.88	3,148.88	--	--	0.13	downward	--	--
	6/6/19	Spring	3,156.19	3,138.77	3,128.77	--	--	--	3,158.89	3,158.88	3,148.88	--	--	0.13	downward	--	--

Table 4.6
Vertical Gradients Based on Monitoring Wells

Monitoring Well Cluster [1]	Date	Season	Monitoring Well Data									Vertical Gradients [2]					
			Deep Well			Intermediate Well			Shallow Well								
			Water Level Elevation (feet amsl)	Well Screen Top Elevation[3] (feet amsl)	Well Screen Bottom Elevation[3] (feet amsl)	Water Level Elevation (feet amsl)	Well Screen Top Elevation[3] (feet amsl)	Well Screen Bottom Elevation[3] (feet amsl)	Water Level Elevation (feet amsl)	Well Screen Top Elevation[3] (feet amsl)	Well Screen Bottom Elevation[3] (feet amsl)	Shallow Well to Intermediate Well Gradient (ft/ft)	Gradient Direction	Shallow Well to Deep Well Gradient (ft/ft)	Gradient Direction	Intermediate Well to Deep Well Gradient (ft/ft)	Gradient Direction
			Well ID			Well ID			Well ID								
DS-17			None			DS-17I			DS-17S								
	9/24/20	Fall	--	--	--	3,150.10	3,115.21	3,105.21	3,151.74	3,155.82	3,140.82	0.04	downward	--	--	--	--
	6/5/20	Spring	--	--	--	3152.77	3,115.21	3,105.21	3153.07	3,155.82	3,140.82	0.01	downward	--	--	--	--
	10/6/19	Fall	--	--	--	3,149.01	3,115.21	3,105.21	3,150.28	3,155.82	3,140.82	0.03	downward	--	--	--	--
	6/22/19	Spring	--	--	--	3,151.28	3,115.21	3,105.21	3,152.61	3,155.82	3,140.82	0.03	downward	--	--	--	--
TP3-12			TP3-12D			None			TP3-12S								
	9/24/20	Fall	3,148.75	3,129.69	3,119.69	--	--	--	3,151.07	3,154.29	3,144.29	--	--	0.09	downward	--	--
	6/5/20	Spring	3152.09	3,129.69	3,119.69	--	--	--	3152.84	3,154.29	3,144.29	--	--	0.03	downward	--	--
	10/6/19	Fall	3,147.80	3,129.69	3,119.69	--	--	--	3,150.51	3,154.29	3,144.29	--	--	0.11	downward	--	--
	6/6/19	Spring	3,151.67	3,129.69	3,119.69	--	--	--	3,153.22	3,154.29	3,144.29	--	--	0.06	downward	--	--
DS-18			DS-18D			DS-18I			DS-18S								
	9/24/20	Fall	3,134.07	3,050.79	3,040.79	3148.157	3,115.24	3,105.24	3,149.54	3,154.17	3,139.17	0.038	downward	0.15	downward	0.22	downward
	6/5/20	Spring	3138.19	3,050.79	3,040.79	3150.32	3,115.24	3,105.24	3151.11	3,154.17	3,139.17	0.022	downward	0.13	downward	0.19	downward
	10/6/19	Fall	3,132.95	3,050.79	3,040.79	3,147.17	3,115.24	3,105.24	3,148.42	3,154.17	3,139.17	0.034	downward	0.15	downward	0.22	downward
	6/22/19	Spring	3,136.27	3,050.79	3,040.79	3,149.10	3,115.24	3,105.24	3,150.28	3,154.17	3,139.17	0.032	downward	0.14	downward	0.20	downward
DS-12			DS-12D			DS-12I			DS-12S								
	9/24/20	Fall	3,141.76	3,094.25	3,084.25	3,144.12	3,123.95	3,113.95	3,144.07	3,133.89	3,123.89	-0.004	upward	0.058	downward	0.08	downward
	6/5/20	Spring	3144.40	3,094.25	3,084.25	3145.13	3,123.95	3,113.95	3144.94	3,133.89	3,123.89	-0.018	upward	0.014	downward	0.02	downward
	10/6/19	Fall	3,140.98	3,094.25	3,084.25	3,143.22	3,123.95	3,113.95	3,143.16	3,133.89	3,123.89	-0.005	upward	0.055	downward	0.08	downward
	6/6/19	Spring	3,144.34	3,094.25	3,084.25	3,145.03	3,123.95	3,113.95	3,144.90	3,133.89	3,123.89	-0.012	upward	0.014	downward	0.02	downward
DS-13			DS-13D			DS-13I			DS-13S								
	9/24/20	Fall	3,132.38	3,064.33	3,054.33	3144.316	3,100.19	3,090.19	3,144.12	3,129.61	3,119.51	-0.007	upward	0.18	downward	0.33	downward
	6/5/20	Spring	3136.59	3,064.33	3,054.33	3145.71	3,100.19	3,090.19	3145.07	3,129.61	3,119.51	-0.022	upward	0.13	downward	0.25	downward
	10/6/19	Fall	3,131.19	3,064.33	3,054.33	3,143.39	3,100.19	3,090.19	3,143.19	3,129.61	3,119.51	-0.007	upward	0.18	downward	0.34	downward
	6/6/19	Spring	3,136.55	3,064.33	3,054.33	3,145.62	3,100.19	3,090.19	3,144.99	3,129.61	3,119.51	-0.021	upward	0.13	downward	0.25	downward
NRC-3R			NRC-3DR			NRC-3IR			NRC-3SR								
	9/24/20	Fall	3,130.31	3,052.77	3,042.77	3143.689	3,098.75	3,088.75	3,144.84	3,145.22	3,135.22	0.02	downward	0.16	downward	0.29	downward
	6/5/20	Spring	3134.72	3,052.77	3,042.77	3145.46	3,098.75	3,088.75	3145.75	3,145.22	3,135.22	0.01	downward	0.12	downward	0.23	downward
	10/6/19	Fall	3,129.11	3,052.77	3,042.77	3,142.77	3,098.75	3,088.75	3,143.82	3,145.22	3,135.22	0.02	downward	0.16	downward	0.30	downward
	6/6/19	Spring	3,134.75	3,052.77	3,042.77	3,145.37	3,098.75	3,088.75	3,145.68	3,145.22	3,135.22	0.01	downward	0.12	downward	0.23	downward
NRC-6			NRC-6D			NRC-6I			NRC-6S								
	9/24/20	Fall	3,126.59	3,046.91	3,036.91	3126.86	3,094.91	3,084.91	3,130.67	3,134.04	3,124.04	0.10	downward	0.05	downward	0.006	downward
	6/5/20	Spring	3131.54	3,046.91	3,036.91	3131.78	3,094.91	3,084.91	3134.42	3,134.04	3,124.04	0.07	downward	0.03	downward	0.005	downward
	10/6/19	Fall	3,125.21	3,046.91	3,036.91	3,125.46	3,094.91	3,084.91	3,129.32	3,134.04	3,124.04	0.10	downward	0.05	downward	0.005	downward
	NM	Spring	--	--	--	--			--	--	--	--	--	--	--	--	--
DS-3			DS-3D			None			DS-3S								
	9/24/20	Fall	3,130.72	3,108.37	3,098.13	--	--	--	3,131.47	3,130.85	3,120.93	--	--	0.033	downward	--	--
	6/5/20	Spring	3134.53	3,108.37	3,098.13	--	--	--	3135.51	3,130.85	3,120.93	--	--	0.043	downward	--	--
	10/6/19	Fall	3,129.37	3,108.37	3,098.13	--	--	--	3,129.95	3,130.85	3,120.93	--	--	0.026	downward	--	--
	6/6/19	Spring	3,135.50	3,108.37	3,098.13	--	--	--	3,134.49	3,130.85	3,120.93	--	--	-0.044	upward	--	--
DS-4			DS-4DD			DS-4I			DS-4S								
	9/24/20	Fall	3,125.80	3,025.16	3,015.16	3129.294	3,088.61	3,078.61	3,132.01	3,129.13	3,119.46	0.07	downward	0.06	downward	0.06	downward
	6/5/20	Spring	3130.22	3,025.16	3,015.16	3132.86	3,088.61	3,078.61	3135.79	3,129.13	3,119.46	0.07	downward	0.05	downward	0.04	downward
	10/6/19	Fall	3,124.66	3,025.16	3,015.16	3,127.93	3,088.61	3,078.61	3,130.50	3,129.13	3,119.46	0.06	downward	0.06	downward	0.05	downward
	6/6/19	Spring	3,130.26	3,025.16	3,015.16	3,132.85	3,088.61	3,078.61	3,135.72	3,129.13	3,119.46	0.07	downward	0.05	downward	0.04	downward
DS-9			DS-9D			DS-9I			DS-9S								
	9/24/20	Fall	3,123.73	3,046.62	3,036.62	3,123.11	3,092.16	3,082.16	3,123.62	3,118.85	3,108.85	0.02	downward	-0.002	upward	-0.01	upward
	6/5/20	Spring	3127.49	3,046.62	3,036.62	3125.64	3,092.16	3,082.16	3125.81	3,118.85	3,108.85	0.01	downward	-0.023	upward	-0.04	upward
	10/6/19	Fall	3,122.40	3,046.62	3,036.62	3,121.85	3,092.16	3,082.16	3,122.56	3,118.85	3,108.85	0.03	downward	0.002	downward	-0.01	upward
	6/6/19	Spring	3,127.48	3,046.62	3,036.62	3,125.49	3,092.16	3,082.16	3,125.75	3,118.85	3,108.85	0.01	downward	-0.024	upward	-0.04	upward

Notes:

-- Data are not available or gradient information is not able to be calculated with available data.

1 Locations are listed from upstream (west) to downstream (east).

2 Vertical gradients are calculated using the difference in head between two wells (Shallow minus Intermediate, Shallow minus Deep, Intermediate minus Deep) divided by the distance between screen mid-points. A positive value indicates greater head in the shallower unit of the pair, so that positive values indicate downward gradient directions. A negative value indicates greater head in the deeper unit of the pair, so that negative values indicate upward gradient directions.

3 Well screens were assumed to be 10 feet long if well logs were not available.

Abbreviations:

amsl Above mean sea level

ft/ft Feet per foot

NM Not measured

Table 4.7
Vertical Gradients Based on Vibrating Wire Piezometers

VWP Cluster [1]	Date	Season	Vibrating Wire Piezometer Data [2]						Vertical Gradients [3]					
			Deep VWP		Intermediate VWP		Shallow VWP							
			VWP Water Elevation (feet amsl)	VWP Elevation (feet amsl)	VWP Water Elevation (feet amsl)	VWP Elevation (feet amsl)	VWP Water Elevation (feet amsl)	VWP Elevation (feet amsl)	Shallow VWP to Intermediate VWP Gradient (ft/ft)	Gradient Direction	Shallow VWP to Deep VWP Gradient (ft/ft)	Gradient Direction	Intermediate VWP to Deep VWP Gradient (ft/ft)	Gradient Direction
			VWP ID		VWP ID		VWP ID							
BW-VWP-60			None		BW-VWP-60b		BW-VWP-60c							
	9/24/20	Fall	--	--	3225.46	3,216	3224.78	3,222	-0.11	upward	--	--	--	--
	6/5/20	Spring	--	--	3,228.41	3,216	3,228.33	3,222	-0.01	upward	--	--	--	--
	11/9/19	Fall	--	--	3225.55	3,216	3224.99	3,222	-0.09	upward	--	--	--	--
	NM	Summer	--	--	--	--	--	--	--	--	--	--	--	--
	NM	Spring	--	--	--	--	--	--	--	--	--	--	--	--
BW-VWP-61			None		BW-VWP-61b		BW-VWP-61c							
	9/24/20	Fall	--	--	3229.16	3,217	3229.42	3,222	0.05	downward	--	--	--	--
	6/5/20	Spring	--	--	3,230.82	3,217	3,230.58	3,222	-0.05	upward	--	--	--	--
	10/6/19	Fall	--	--	3,229.22	3,217	3,229.43	3,222	0.04	downward	--	--	--	--
	7/16/19	Summer	--	--	3,229.63	3,217	3,229.80	3,222	0.03	downward	--	--	--	--
	6/6/19	Spring	--	--	3,230.40	3,217	3,230.31	3,222	-0.02	upward	--	--	--	--
BW-VWP-64			BW-VWP-64b		None		BW-VWP-64c							
	9/24/20	Fall	3,208.33	3,171	--	--	3,210.57	3,209	--	--	0.06	downward	--	--
	6/5/20	Spring	3,210.85	3,171	--	--	3,213.10	3,209	--	--	0.06	downward	--	--
	10/6/19	Fall	3,208.70	3,171	--	--	3,210.97	3,209	--	--	0.06	downward	--	--
	7/16/19	Summer	3,209.30	3,171	--	--	3,211.56	3,209	--	--	0.06	downward	--	--
	6/6/19	Spring	3,210.58	3,171	--	--	3,213.15	3,209	--	--	0.07	downward	--	--
BW-VWP-65			BW-VWP-65b		None		BW-VWP-65c							
	9/24/20	Fall	3,208.28	3,170	--	--	3,213.72	3,208	--	--	0.1	downward	--	--
	6/5/20	Spring	3,210.74	3,170	--	--	3,215.21	3,208	--	--	0.1	downward	--	--
	10/6/19	Fall	3,208.57	3,170	--	--	3,213.64	3,208	--	--	0.1	downward	--	--
	7/16/19	Summer	3,209.18	3,170	--	--	3,214.19	3,208	--	--	0.1	downward	--	--
	6/6/19	Spring	3,210.34	3,170	--	--	3,214.87	3,208	--	--	0.1	downward	--	--
BW-VWP-66			None		BW-VWP-66b		BW-VWP-66c							
	9/24/20	Fall	--	--	--	--	--	--	--	--	--	--	--	--
	6/5/20	Spring	--	--	3,206.43	3,174	3,207.91	3,201	0.05	downward	--	--	--	--
	10/6/19	Fall	--	--	3,202.65	3,174	3,203.83	3,201	0.04	downward	--	--	--	--
	7/16/19	Summer	--	--	3,203.90	3,174	3,205.37	3,201	0.05	downward	--	--	--	--
	6/6/19	Spring	--	--	3,205.58	3,174	3,207.46	3,201	0.07	downward	--	--	--	--
BW-VWP-67			None		BW-VWP-67b		BW-VWP-67c							
	9/24/20	Fall	--	--	3,205.52	3,174	3,207.77	3,201	0.08	downward	--	--	--	--
	6/5/20	Spring	--	--	3,207.66	3,174	3,209.17	3,201	0.06	downward	--	--	--	--
	10/6/19	Fall	--	--	3,205.87	3,174	3,207.75	3,201	0.07	downward	--	--	--	--
	7/16/19	Summer	--	--	3,206.30	3,174	3,208.07	3,201	0.07	downward	--	--	--	--
	6/6/19	Spring	--	--	3,207.09	3,174	3,208.66	3,201	0.06	downward	--	--	--	--
BW-VWP-68			BW-VWP-68b		BW-VWP-68c		BW-VWP-68d							
	9/24/20	Fall	3,197.66	3,146	3,207.52	3,171	3,209.09	3,190	0.08	downward	0.3	downward	0.4	downward
	6/5/20	Spring	3,200.39	3,146	3,210.47	3,171	3,212.44	3,190	0.10	downward	0.3	downward	0.4	downward
	10/6/19	Fall	3,197.82	3,146	3,207.64	3,171	3,209.31	3,190	0.09	downward	0.3	downward	0.4	downward
	7/16/19	Summer	3,198.58	3,146	3,208.34	3,171	3,210.07	3,190	0.09	downward	0.3	downward	0.4	downward
	6/6/19	Spring	3,199.74	3,146	3,209.56	3,171	3,211.47	3,190	0.10	downward	0.3	downward	0.4	downward
BW-VWP-69			BW-VWP-69b		BW-VWP-69c		BW-VWP-69d							
	9/24/20	Fall	3,198.37	3,146	3,200.15	3,171	3,200.42	3,190	0.01	downward	0.05	downward	0.07	downward
	6/5/20	Spring	3,201.07	3,146	3,201.84	3,171	3,201.68	3,190	-0.009	upward	0.01	downward	0.03	downward
	10/6/19	Fall	3,198.53	3,146	3,200.18	3,171	3,200.50	3,190	0.02	downward	0.04	downward	0.1	downward
	7/16/19	Summer	3,199.20	3,146	3,200.57	3,171	3,200.80	3,190	0.01	downward	0.04	downward	0.1	downward
	6/6/19	Spring	3,200.25	3,146	3,201.24	3,171	3,201.29	3,190	0.003	downward	0.02	downward	0.04	downward

Table 4.7
Vertical Gradients Based on Vibrating Wire Piezometers

VWP Cluster [1]	Date	Season	Vibrating Wire Piezometer Data [2]						Vertical Gradients [3]					
			Deep VWP		Intermediate VWP		Shallow VWP							
			VWP Water Elevation (feet amsl)	VWP Elevation (feet amsl)	VWP Water Elevation (feet amsl)	VWP Elevation (feet amsl)	VWP Water Elevation (feet amsl)	VWP Elevation (feet amsl)	Shallow VWP to Intermediate VWP Gradient (ft/ft)	Gradient Direction	Shallow VWP to Deep VWP Gradient (ft/ft)	Gradient Direction	Intermediate VWP to Deep VWP Gradient (ft/ft)	Gradient Direction
			VWP ID		VWP ID		VWP ID							
BW-VWP-70			BW-VWP-70b		None		BW-VWP-70c							
	9/24/20	Fall	3,194.08	3,137	--	--	3,194.24	3,184	--	--	0.003	downward	--	--
	6/5/20	Spring	3,197.20	3,137	--	--	3,197.76	3,184	--	--	0.01	downward	--	--
	10/6/19	Fall	3,194.17	3,137	--	--	3,194.38	3,184	--	--	0.004	downward	--	--
	7/16/19	Summer	3,195.17	3,137	--	--	3,195.97	3,184	--	--	0.02	downward	--	--
	6/6/19	Spring	3,196.71	3,137	--	--	3,197.14	3,184	--	--	0.01	downward	--	--
BW-VWP-71			BW-VWP-71b		None		BW-VWP-71c							
	9/24/20	Fall	3,193.45	3,138	--	--	3,194.35	3,185	--	--	0.02	downward	--	--
	6/5/20	Spring	3,195.32	3,138	--	--	3,195.35	3,185	--	--	0.000	downward	--	--
	10/6/19	Fall	3,193.48	3,138	--	--	3,194.45	3,185	--	--	0.02	downward	--	--
	7/16/19	Summer	3,194.06	3,138	--	--	3,194.67	3,185	--	--	0.01	downward	--	--
	6/6/19	Spring	3,194.96	3,138	--	--	3,195.19	3,185	--	--	0.005	downward	--	--
BW-VWP-72			None		BW-VWP-72b		BW-VWP-72c							
	9/24/20	Fall	--	--	3,189.34	3,163	3,189.39	3,180	0.003	downward	--	--	--	--
	6/5/20	Spring	--	--	3,194.56	3,163	3,195.44	3,180	0.05	downward	--	--	--	--
	10/6/19	Fall	--	--	3,189.12	3,163	3,189.08	3,180	-0.002	upward	--	--	--	--
	7/16/19	Summer	--	--	3,190.83	3,163	3,191.02	3,180	0.01	downward	--	--	--	--
	6/6/19	Spring	--	--	3,194.48	3,163	3,195.41	3,180	0.05	downward	--	--	--	--
BW-VWP-73			None		BW-VWP-73b		BW-VWP-73c							
	9/24/20	Fall	--	--	3,185.52	3,163	3,185.31	3,180	-0.01	upward	--	--	--	--
	6/5/20	Spring	--	--	3,187.00	3,163	3,186.02	3,180	-0.06	upward	--	--	--	--
	10/6/19	Fall	--	--	3,185.32	3,163	3,185.12	3,180	-0.01	upward	--	--	--	--
	7/16/19	Summer	--	--	3,185.93	3,163	3,185.50	3,180	-0.03	upward	--	--	--	--
	6/6/19	Spring	--	--	3,186.89	3,163	3,185.93	3,180	-0.06	upward	--	--	--	--
BW-VWP-74			BW-VWP-74b		None		BW-VWP-74c							
	9/24/20	Fall	3,189.38	3,153	--	--	3,191.77	3,176	--	--	0.1	downward	--	--
	6/5/20	Spring	3,193.49	3,153	--	--	3,197.09	3,176	--	--	0.2	downward	--	--
	10/6/19	Fall	3,189.27	3,153	--	--	3,191.66	3,176	--	--	0.1	downward	--	--
	7/16/19	Summer	3,190.60	3,153	--	--	3,193.17	3,176	--	--	0.1	downward	--	--
	6/6/19	Spring	3,193.23	3,153	--	--	3,196.66	3,176	--	--	0.1	downward	--	--
BW-VWP-75			BW-VWP-75b		None		BW-VWP-75c							
	9/24/20	Fall	3,186.58	3,153	--	--	3,183.43	3,176	--	--	-0.1	upward	--	--
	6/5/20	Spring	3,190.21	3,153	--	--	3,175.56	3,176	--	--	-0.6	upward	--	--
	10/6/19	Fall	3,186.44	3,153	--	--	3,183.31	3,176	--	--	-0.1	upward	--	--
	7/16/19	Summer	3,187.90	3,153	--	--	3,185.24	3,176	--	--	-0.1	upward	--	--
	6/6/19	Spring	3,189.88	3,153	--	--	3,187.43	3,176	--	--	-0.1	upward	--	--
BW-VWP-76			None		BW-VWP-76b		BW-VWP-76c							
	9/24/20	Fall	--	--	3,178.11	3,165	3,177.00	3,170	-0.2	upward	--	--	--	--
	6/5/20	Spring	--	--	3,180.97	3,165	3,180.21	3,170	-0.2	upward	--	--	--	--
	10/6/19	Fall	--	--	3,177.43	3,165	3,176.43	3,170	-0.2	upward	--	--	--	--
	7/16/19	Summer	--	--	3,179.85	3,165	3,179.26	3,170	-0.1	upward	--	--	--	--
	6/6/19	Spring	--	--	3,180.41	3,165	3,179.96	3,170	-0.1	upward	--	--	--	--
BW-VWP-77			None		BW-VWP-77b		BW-VWP-77c							
	9/24/20	Fall	--	--	3,178.64	3,165	3,178.69	3,170	0.01	downward	--	--	--	--
	6/5/20	Spring	--	--	3,180.62	3,165	3,180.51	3,170	-0.02	upward	--	--	--	--
	10/6/19	Fall	--	--	3,178.46	3,165	3,178.56	3,170	0.02	downward	--	--	--	--
	7/16/19	Summer	--	--	3,179.59	3,165	3,179.38	3,170	-0.04	upward	--	--	--	--
	6/6/19	Spring	--	--	3,180.30	3,165	3,180.12	3,170	-0.04	upward	--	--	--	--

Table 4.7
Vertical Gradients Based on Vibrating Wire Piezometers

VWP Cluster [1]	Date	Season	Vibrating Wire Piezometer Data [2]						Vertical Gradients [3]					
			Deep VWP		Intermediate VWP		Shallow VWP							
			VWP Water Elevation (feet amsl)	VWP Elevation (feet amsl)	VWP Water Elevation (feet amsl)	VWP Elevation (feet amsl)	VWP Water Elevation (feet amsl)	VWP Elevation (feet amsl)	Shallow VWP to Intermediate VWP Gradient (ft/ft)	Gradient Direction	Shallow VWP to Deep VWP Gradient (ft/ft)	Gradient Direction	Intermediate VWP to Deep VWP Gradient (ft/ft)	Gradient Direction
			VWP ID		VWP ID		VWP ID							
BW-VWP-78			None		BW-VWP-78b		BW-VWP-78d							
	9/24/20	Fall	--	--	3,171.19	3,136	3,172.63	3,164	0.05	downward	--	--	--	--
	6/5/20	Spring	--	--	3,174.85	3,136	3,176.34	3,164	0.05	downward	--	--	--	--
	10/6/19	Fall	--	--	3,171.01	3,136	3,172.33	3,164	0.05	downward	--	--	--	--
	7/16/19	Summer	--	--	3,173.11	3,136	3,174.87	3,164	0.06	downward	--	--	--	--
	6/6/19	Spring	--	--	3,174.85	3,136	3,176.27	3,164	0.05	downward	--	--	--	--
BW-VWP-79			None		BW-VWP-79b		BW-VWP-79d							
	9/24/20	Fall	--	--	3,170.39	3,136	3,168.93	3,164	-0.1	upward	--	--	--	--
	6/5/20	Spring	--	--	3,173.27	3,136	3,169.63	3,164	-0.1	upward	--	--	--	--
	10/6/19	Fall	--	--	3,170.19	3,136	3,168.75	3,164	-0.1	upward	--	--	--	--
	7/16/19	Summer	--	--	3,171.73	3,136	3,169.05	3,164	-0.1	upward	--	--	--	--
	6/6/19	Spring	--	--	3,173.20	3,136	3,169.54	3,164	-0.1	upward	--	--	--	--

Notes:

-- Data are not available or gradient information is not able to be calculated with available data.

1 Locations are listed from upstream (west) to downstream (east).

2 VWP are designated as Shallow, Intermediate, or Deep based on lithology and relative elevation. VWP data from glacial till are not used.

3 Vertical gradients are calculated using the difference in head between two VWPs (Shallow minus Intermediate, Shallow minus Deep, Intermediate minus Deep) divided by the distance between VWP elevations. A positive value indicates greater head in the shallower unit of the pair, so that positive values indicate downward gradient directions. A negative value indicates greater head in the deeper unit of the pair, so that negative values indicate upward gradient directions.

Abbreviations:

amsl Above mean sea level

ft/ft Feet per foot

NM Not measured

VWP Vibrating wire piezometer

Table 4.8
Analytical Results from Groundwater Monitoring Wells

					Area	Background										
					Location [1]	US-1S		US-1I		US-1D		HBKG-2			HV-3	
					Sample Type	Field Sample	Field Sample	Field Sample	Field Sample	Field Sample	Field Sample	Field Sample	Field Sample	Field Sample	Field Sample	Field Sample
					Sample Date	6/6/2020	9/26/2020	6/6/2020	9/26/2020	6/6/2020	9/26/2020	6/5/2020	6/13/2020	9/26/2020	6/7/2020	9/24/2020
Analytes	CAS No.	Units	Drinking Water-Based Criteria [2]	Surface Water-Based Criteria [3]												
Total Metals																
Aluminum	7429-90-5	µg/L	**16,000**	142	3.23 JQ	5.52 JQ	20.0 U	2.85 JQ	20.0 U	2.47 JQ	--	20.0 U	20.0 U	20.0 U	4.42 JQ
Cadmium	7440-43-9	µg/L	**5**	0.05	0.0216	0.0290	0.0360	0.0236	0.0342	0.0330	--	0.0150 JQ	0.0124 JQ	0.0124 JQ	0.00800 JQ
Calcium	7440-70-2	µg/L	--	--	18,400	13,800	18,900	14,300	32,100	28,600	--	19,900	11,400	11,500	12,900
Copper	7440-50-8	µg/L	**592**	1.45	0.386 JQ	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	--	0.500 U	0.500 U	0.500 U	0.500 U
Iron	7439-89-6	µg/L	--	1,000	20.0 U	20.0 U	20.0 U	20.0 U	20.0 U	6.33 JQ	--	20.0 U	6.92 JQ	20.0 U	10.8 JQ
Lead	7439-92-1	µg/L	**15**	0.169	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	--	0.100 U	0.100 U	0.100 U	0.100 U
Magnesium	7439-95-4	µg/L	--	--	1,710	1,290	1,780	1,400	2,680	2,500	--	2,020	1,060	1,740	1,640
Manganese	7439-96-5	µg/L	--	--	0.500 U	0.500 U	0.114 JQ	0.500 U	0.500 U	0.500 U	--	2.01	0.394 JQ	0.0910 JQ	0.190 JQ
Potassium	7440-09-7	µg/L	--	--	679	690	703	728	1,330	1,350	--	695	634	806	837
Sodium	7440-23-5	µg/L	--	--	1,500	1,390	1,580	1,510	4,460	4,320	--	1,930	1,240	1,380	1,330
Zinc	7440-66-6	µg/L	**4,800**	13.6	0.878 JQ	1.07 JQ	0.911 JQ	1.28 JQ	0.953 JQ	1.33 JQ	--	1.73 JQ	1.11 JQ	2.05 JQ	1.06 JQ
Dissolved Metals [4]																
Aluminum	7429-90-5	µg/L	**16,000**	142	--	--	--	--	--	--	--	--	--	--	--
Cadmium	7440-43-9	µg/L	**5**	0.05	--	--	--	--	--	--	--	--	--	--	--
Calcium	7440-70-2	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--
Copper	7440-50-8	µg/L	**592**	1.45	--	--	--	--	--	--	--	--	--	--	--
Iron	7439-89-6	µg/L	--	1,000	--	--	--	--	--	--	--	--	--	--	--
Lead	7439-92-1	µg/L	**15**	0.169	--	--	--	--	--	--	--	--	--	--	--
Magnesium	7439-95-4	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--
Manganese	7439-96-5	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--
Potassium	7440-09-7	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--
Sodium	7440-23-5	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--
Zinc	7440-66-6	µg/L	**4,800**	13.6	--	--	--	--	--	--	--	--	--	--	--
Conventionals																
Alkalinity, Total	--	mg-$CaCO_3$/L	--	--	43.3	35.1	43.6	35.9	49.3	48.7	48.2	--	29.7	36.6	39.3
Alkalinity, Bicarbonate	--	mg-$CaCO_3$/L	--	--	43.3	35.1	43.6	35.9	49.3	48.7	48.2	--	29.7	36.6	39.3
Alkalinity, Carbonate	--	mg-$CaCO_3$/L	--	--	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	--	1.00 U	1.00 U	1.00 U
Alkalinity, Hydroxide	--	mg-$CaCO_3$/L	--	--	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	--	1.00 U	1.00 U	1.00 U
Chloride	16887-00-6	mg/L	--	--	0.252	0.308	0.342	0.455	4.05	3.82	0.605	--	0.317	0.116	0.121
Dissolved Organic Carbon	--	mg/L	--	--	0.510	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.520	--	0.500 U	0.500 U	0.500 U
Nitrate (as Nitrogen)	14797-55-8	mg/L	--	--	0.146 J	0.100 UJ	0.222 J	0.143 J	0.382 J	0.310 J	0.347 J	--	0.100 UJ	0.244 J	0.167 J
Sulfate	14808-79-8	mg/L	--	--	9.31	7.70	9.91	9.35	31.4	34.6	11.6	--	5.94	3.28	4.85
Total Dissolved Solids	--	mg/L	--	--	79.0	49.0	80.0	50.0	136	112	85.0	--	41.0	41.0	47.0
Total Suspended Solids	--	mg/L	--	--	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	--	1.00 U	1.00 U	1.00 U
Total Organic Carbon	--	mg/L	--	--	0.540	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	--	0.500 U	0.500 U	0.500 U
Hardness, Total	--	mg-$CaCO_3$/L	--	--	53.0	39.7	54.5	41.4	91.3	81.7	--	57.9	32.7	35.8	39.1

Table 4.8
Analytical Results from Groundwater Monitoring Wells

					Area	Background										
					Location [1]	US-1S		US-1I		US-1D		HBKG-2			HV-3	
					Sample Type	Field Sample	Field Sample	Field Sample	Field Sample	Field Sample	Field Sample	Field Sample	Field Sample	Field Sample	Field Sample	Field Sample
					Sample Date	6/6/2020	9/26/2020	6/6/2020	9/26/2020	6/6/2020	9/26/2020	6/5/2020	6/13/2020	9/26/2020	6/7/2020	9/24/2020
Analytes	CAS No.	Units	Drinking Water-Based Criteria [2]	Surface Water-Based Criteria [3]												
Field Parameters [5]																
Dissolved Oxygen (DO)	--	mg/L	--	--	3.69	1.89	4.29	4.19	5.45	5.94	3.66	--	1.11	10.11	9.82
Ferrous Iron	--	mg/L	--	--	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	--	0.5 U	0.5 U	0.5 U
Oxidation-Reduction Potential (ORP)	--	mV	--	--	171.9	180.1	200.9	211.6	181.2	203.5	159.3	--	185.2	216.7	149.3
pH	--	pH	--	--	6.42	7.54	6.43	6.67	6.55	6.85	6.20	--	7.42	6.33	6.61
Specific Conductivity	--	µS/cm	--	--	90.7	86.7	92.3	92.1	165.2	187.9	127.2	--	72.6	78.8	87
Turbidity	--	NTU	--	--	0.34	0.31	0.20	0.14	0.10	0.1	0.82	--	0.05	1.30	0.07

Notes:

Results for total and dissolved metals and conventionals are presented to three significant figures. Results for field parameters are presented to the significant figures indicated by the field meter.

-- Not applicable/available or not analyzed.

RED/BOLD Detected exceedance of drinking water-based criteria.

1 Locations are listed from upstream (west) to downstream (east).

2 Drinking water criteria given in Tables 2 and 11 of the ROD.

3 Surface water criteria given in Tables 3 and 11 of the ROD are presented for reference only. Reference criteria from the ROD for cadmium, copper, lead, and zinc are adjusted based on a hardness of 9 mg/L.

4 Field-filtered samples were submitted for dissolved metals analysis for locations where turbidity exceeded or approached 5 NTU.

5 Field measurements were collected with YSI ProDSS water quality instrument and LaMotte 2020we turbidity meter during sampling. Ferrous iron measured with a Hach Iron test kit, Model IR-18, 0–10 mg/L.

Abbreviations:

CAS Chemical Abstracts Service
µg/L Micrograms per liter
µS/cm Microsiemens per centimeter
mg-$CaCO_3$/L Milligrams calcium carbonate per liter
mg/L Milligrams per liter
mV Millivolts
NTU Nephelometric turbidity units
ROD Record of Decision

Qualifiers:

J Analyte was detected, concentration is considered to be an estimate.
JQ Analyte was detected between the method detection limit and reporting limit, concentration is considered to be an estimate.
U Analyte was not detected at the given reporting limit.
UJ Analyte was not detected at the given reporting limit, which is considered to be an estimate.

Table 4.8
Analytical Results from Groundwater Monitoring Wells

					Area	Monitoring Wells								
					Location [1]	MW-3			MW-2					
					Sample Type	Field Sample		Field Sample	Field Sample	Field Duplicate	Field Sample	Field Duplicate	Field Sample	Field Duplicate
					Sample Date	6/5/2020	6/7/2020	9/24/2020	6/5/2020	6/5/2020	6/7/2020	6/7/2020	9/24/2020	9/24/2020
Analytes	CAS No.	Units	Drinking Water-Based Criteria [2]	Surface Water-Based Criteria [3]										
Total Metals														
Aluminum	7429-90-5	µg/L	**16,000**	142	--	26.3	13.0 JQ	--	--	4.50 JQ	5.67 JQ	4.81 JQ	18.8 JQ
Cadmium	7440-43-9	µg/L	**5**	0.05	--	2.30	0.956	--	--	0.491	0.546	0.560	0.549
Calcium	7440-70-2	µg/L	--	--	--	14,000	6,090	--	--	5,170	4,990	5,940	6,110
Copper	7440-50-8	µg/L	**592**	1.45	--	41.2	14.5	--	--	9.05	9.40	7.65	7.87
Iron	7439-89-6	µg/L	--	1,000	--	20.0 U	8.62 JQ	--	--	20.0 U	20.0 U	6.42 JQ	32.2
Lead	7439-92-1	µg/L	**15**	0.169	--	0.100 U	0.100 U	--	--	0.100 U	0.100 U	0.100 U	0.100 U
Magnesium	7439-95-4	µg/L	--	--	--	1,730	640	--	--	527	503	544	565
Manganese	7439-96-5	µg/L	--	--	--	3.14	0.810	--	--	0.872 J	0.165 JQ	0.135 JQ	0.565
Potassium	7440-09-7	µg/L	--	--	--	1,470	748	--	--	480	456	542	554
Sodium	7440-23-5	µg/L	--	--	--	2,260	1,010	--	--	883	933	831	903
Zinc	7440-66-6	µg/L	**4,800**	13.6	--	438	136	--	--	68.8	69.3	70.0	74.7
Dissolved Metals [4]														
Aluminum	7429-90-5	µg/L	**16,000**	142	24.1	--	--	3.62 JQ	--	--	--	--	--
Cadmium	7440-43-9	µg/L	**5**	0.05	2.30	--	--	0.535	--	--	--	--	--
Calcium	7440-70-2	µg/L	--	--	12,900	--	--	5,300	--	--	--	--	--
Copper	7440-50-8	µg/L	**592**	1.45	40.6	--	--	9.29	--	--	--	--	--
Iron	7439-89-6	µg/L	--	1,000	20.0 U	--	--	20.0 U	--	--	--	--	--
Lead	7439-92-1	µg/L	**15**	0.169	0.100 U	--	--	0.100 U	--	--	--	--	--
Magnesium	7439-95-4	µg/L	--	--	1,510	--	--	482	--	--	--	--	--
Manganese	7439-96-5	µg/L	--	--	2.78	--	--	0.115 JQ	--	--	--	--	--
Potassium	7440-09-7	µg/L	--	--	1,280	--	--	477	--	--	--	--	--
Sodium	7440-23-5	µg/L	--	--	1,950	--	--	783	--	--	--	--	--
Zinc	7440-66-6	µg/L	**4,800**	13.6	441	--	--	77.2	--	--	--	--	--
Conventionals														
Alkalinity, Total	--	mg-$CaCO_3$/L	--	--	7.08	--	7.15	9.13	9.65	--	--	12.3	13.1
Alkalinity, Bicarbonate	--	mg-$CaCO_3$/L	--	--	7.08	--	7.15	9.13	9.65	--	--	12.3	13.1
Alkalinity, Carbonate	--	mg-$CaCO_3$/L	--	--	1.00 U	--	1.00 U	1.00 U	1.00 U	--	--	1.00 U	1.00 U
Alkalinity, Hydroxide	--	mg-$CaCO_3$/L	--	--	1.00 U	--	1.00 U	1.00 U	1.00 U	--	--	1.00 U	1.00 U
Chloride	16887-00-6	mg/L	--	--	0.302	--	0.408	0.195	0.196	--	--	0.330	0.330
Dissolved Organic Carbon	--	mg/L	--	--	0.680	--	0.500 U	0.510	0.500	--	--	0.500 U	0.500 U
Nitrate (as Nitrogen)	14797-55-8	mg/L	--	--	0.293 J	--	0.100 UJ	0.104 J	0.105 J	--	--	0.104 J	0.105 J
Sulfate	14808-79-8	mg/L	--	--	29.2	--	12.9	6.14	6.16	--	--	6.19	6.18
Total Dissolved Solids	--	mg/L	--	--	80.0	--	56.0	34.0	30.0	--	--	34.0	31.0
Total Suspended Solids	--	mg/L	--	--	1.00 U	--	1.00 U	1.00 U	1.00 U	--	--	1.00 U	1.00 U
Total Organic Carbon	--	mg/L	--	--	0.710	--	0.500 U	0.530	0.500 U	--	--	0.500 U	0.500 U
Hardness, Total	--	mg-$CaCO_3$/L	--	--	--	42.1	17.9	--		15.1	14.5	17.1	17.6

Table 4.8
Analytical Results from Groundwater Monitoring Wells

Area					Monitoring Wells								
Location [1]					MW-3			MW-2					
Sample Type					Field Sample		Field Sample	Field Sample	Field Duplicate	Field Sample	Field Duplicate	Field Sample	Field Duplicate
Sample Date					6/5/2020	6/7/2020	9/24/2020	6/5/2020	6/5/2020	6/7/2020	6/7/2020	9/24/2020	9/24/2020
Analytes	CAS No.	Units	Drinking Water-Based Criteria [2]	Surface Water-Based Criteria [3]									
Field Parameters [5]													
Dissolved Oxygen (DO)	--	mg/L	--	--	8.16	10.29	9.16	10.20	--	10.18	--	8.62	--
Ferrous Iron	--	mg/L	--	--	0.5 U	--	0.5 U	0.5 U	--	--	--	0.5 U	--
Oxidation-Reduction Potential (ORP)	--	mV	--	--	231.0	222.8	257.1	89.3	--	192.8	--	181.3	--
pH	--	pH	--	--	5.80	5.51	5.72	6.40	--	6.18	--	6.11	--
Specific Conductivity	--	µS/cm	--	--	114.1	--	50.3	40.3	--	--	--	45.4	--
Turbidity	--	NTU	--	--	0.27	2.60	0.6	0.90	--	1.50	--	0.07	--

Notes:

Results for total and dissolved metals and conventionals are presented to three significant figures. Results for field parameters are presented to the significant figures indicated by the field meter.

-- Not applicable/available or not analyzed.

RED/BOLD Detected exceedance of drinking water-based criteria.

1 Locations are listed from upstream (west) to downstream (east).

2 Drinking water criteria given in Tables 2 and 11 of the ROD.

3 Surface water criteria given in Tables 3 and 11 of the ROD are presented for reference only. Reference criteria from the ROD for cadmium, copper, lead, and zinc are adjusted based on a hardness of 9 mg/L.

4 Field-filtered samples were submitted for dissolved metals analysis for locations where turbidity exceeded or approached 5 NTU.

5 Field measurements were collected with YSI ProDSS water quality instrument and LaMotte 2020we turbidity meter during sampling. Ferrous iron measured with a Hach Iron test kit, Model IR-18, 0–10 mg/L.

Abbreviations:

CAS Chemical Abstracts Service
µg/L Micrograms per liter
µS/cm Microsiemens per centimeter
mg-$CaCO_3$/L Milligrams calcium carbonate per liter
mg/L Milligrams per liter
mV Millivolts
NTU Nephelometric turbidity units
ROD Record of Decision

Qualifiers:

J Analyte was detected, concentration is considered to be an estimate.
JQ Analyte was detected between the method detection limit and reporting limit, concentration is considered to be an estimate.
U Analyte was not detected at the given reporting limit.
UJ Analyte was not detected at the given reporting limit, which is considered to be an estimate.

Table 4.8
Analytical Results from Groundwater Monitoring Wells

					Area	Monitoring Wells (cont.)										
					Location [1]	MW-1			TP2-12D			TP2-12S	TP2-14	TP2-15		TP2-16D
					Sample Type	Field Sample		Field Sample	Field Sample	Field Duplicate	Field Sample	Field Sample	Field Sample	Field Sample	Field Sample	Field Sample
					Sample Date	6/5/2020	6/7/2020	9/24/2020	6/8/2020	6/8/2020	9/25/2020	6/8/2020	6/8/2020	6/8/2020	9/25/2020	6/11/2020
Analytes	CAS No.	Units	Drinking Water-Based Criteria [2]	Surface Water-Based Criteria [3]												
Total Metals																
Aluminum	7429-90-5	µg/L	**16,000**	142	--	17.5 JQ	8.76 JQ	1,100	1,050	895	9.25 JQ	571	5.84 JQ	200 U	389	
Cadmium	7440-43-9	µg/L	**5**	0.05	--	0.366	0.446	0.845	0.934	1.91	0.130	1.19	0.183	0.0400 U	1.08	
Calcium	7440-70-2	µg/L	--	--	--	6,690	7,150	21,600	20,600	102,000	130,000	12,100	19,200	115,000	22,500	
Copper	7440-50-8	µg/L	**592**	1.45	--	1.77	0.968	56.8	19.3	15.4	0.994	19.3	1.67	0.500 U	9.04	
Iron	7439-89-6	µg/L	--	1,000	--	20.0 U	20.0 U	48.4	35.5	6,690	19,500	14.3 JQ	36.4	1,280	39.6	
Lead	7439-92-1	µg/L	**15**	0.169	--	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	
Magnesium	7439-95-4	µg/L	--	--	--	714	626	1,740	1,670	6,240	7,340	1,500	1,790	8,930	2,710	
Manganese	7439-96-5	µg/L	--	--	--	0.204 JQ	0.274 JQ	73.0	71.1	419	489	33.1	0.527	143	37.4	
Potassium	7440-09-7	µg/L	--	--	--	479	549	3,840	3,630	8,660	15,900	1,790	3,720	14,200	4,120	
Sodium	7440-23-5	µg/L	--	--	--	1,080	913	1,610	1,480	3,290	3,610	1,970	1,780	3,340	2,370	
Zinc	7440-66-6	µg/L	**4,800**	13.6	--	73.2	74.0	95.7	94.2	137	363	138	13.8	2.47 JQ	105	
Dissolved Metals [4]																
Aluminum	7429-90-5	µg/L	**16,000**	142	--	--	--	--	--	--	--	--	--	--	--	
Cadmium	7440-43-9	µg/L	**5**	0.05	--	--	--	--	--	--	--	--	--	--	--	
Calcium	7440-70-2	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	
Copper	7440-50-8	µg/L	**592**	1.45	--	--	--	--	--	--	--	--	--	--	--	
Iron	7439-89-6	µg/L	--	1,000	--	--	--	--	--	--	--	--	--	--	--	
Lead	7439-92-1	µg/L	**15**	0.169	--	--	--	--	--	--	--	--	--	--	--	
Magnesium	7439-95-4	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	
Manganese	7439-96-5	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	
Potassium	7440-09-7	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	
Sodium	7440-23-5	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--	
Zinc	7440-66-6	µg/L	**4,800**	13.6	--	--	--	--	--	--	--	--	--	--	--	
Conventionals																
Alkalinity, Total	--	mg-$CaCO_3$/L	--	--	9.85	--	13.3	1.00 U	1.00 U	1.33	14.0	1.00 U	30.1	78.5	9.39	
Alkalinity, Bicarbonate	--	mg-$CaCO_3$/L	--	--	9.85	--	13.3	1.00 U	1.00 U	1.33	14.0	1.00 U	30.1	78.5	9.39	
Alkalinity, Carbonate	--	mg-$CaCO_3$/L	--	--	1.00 U	--	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	
Alkalinity, Hydroxide	--	mg-$CaCO_3$/L	--	--	1.00 U	--	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	
Chloride	16887-00-6	mg/L	--	--	0.195	--	0.368	0.183	0.183	0.281	0.264	0.164	0.182	0.202	0.188	
Dissolved Organic Carbon	--	mg/L	--	--	0.910	--	0.500 U	0.500 U	0.500 U	0.550	0.760	0.500 U	0.500 U	0.840	0.500 U	
Nitrate (as Nitrogen)	14797-55-8	mg/L	--	--	0.100 UJ	--	0.100 UJ	0.100 UJ	0.100 UJ	0.100 UJ	0.100 UJ	0.100 UJ	0.100 UJ	0.100 UJ	0.139 J	
Sulfate	14808-79-8	mg/L	--	--	7.53	--	8.47	62.4	62.4	281	340	35.0	28.3	258	55.4	
Total Dissolved Solids	--	mg/L	--	--	37.0	--	36.0	107 J	104 J	484	629 J	75.0 J	84.0 J	486	139 J	
Total Suspended Solids	--	mg/L	--	--	1.00 U	--	1.00 U	1.00 UJ	1.00 UJ	1.00 U	17.0 J	1.00 UJ	1.00 UJ	2.00	1.00 U	
Total Organic Carbon	--	mg/L	--	--	0.860	--	0.500 U	0.500 U	0.500 U	0.500	0.910	0.500 U	0.500 U	0.740	0.500 U	
Hardness, Total	--	mg-$CaCO_3$/L	--	--		19.6	20.4	61.2	58.3	281	355	36.4	55.3	325	67.3	

Table 4.8
Analytical Results from Groundwater Monitoring Wells

					Area	Monitoring Wells (cont.)										
					Location [1]	MW-1			TP2-12D			TP2-12S	TP2-14	TP2-15		TP2-16D
					Sample Type	Field Sample		Field Sample	Field Sample	Field Duplicate	Field Sample	Field Sample	Field Sample	Field Sample	Field Sample	Field Sample
					Sample Date	6/5/2020	6/7/2020	9/24/2020	6/8/2020	6/8/2020	9/25/2020	6/8/2020	6/8/2020	6/8/2020	9/25/2020	6/11/2020
Analytes	CAS No.	Units	Drinking Water-Based Criteria [2]	Surface Water-Based Criteria [3]												
Field Parameters [5]																
Dissolved Oxygen (DO)	--	mg/L	--	--	6.83	8.38	6.99	6.68	6.68	0.48	1.68	5.28	9.09	0.52	5.62
Ferrous Iron	--	mg/L	--	--	0.5 U	--	0.5 U	0.5 U	0.5 U	3	2.0	0.5 U	0.5 U	2.5	0.5 U
Oxidation-Reduction Potential (ORP)	--	mV	--	--	174.8	236.6	251	260.3	260.3	184.6	25.3	256.3	229.4	18.2	256.2
pH	--	pH	--	--	5.93	5.82	5.84	4.41	4.41	4.94	5.82	4.72	6.05	6.47	5.22
Specific Conductivity	--	µS/cm	--	--	47.1		48.1	162.2	162.2	617	872.0	106.9	122.7	682	137.8
Turbidity	--	NTU	--	--	0.38	1.80	0.3	3.29	3.29	0.56	3.60	1.69	1.34	0.13	2.80

Notes:

Results for total and dissolved metals and conventionals are presented to three significant figures. Results for field parameters are presented to the significant figures indicated by the field meter.

-- Not applicable/available or not analyzed.

RED/BOLD Detected exceedance of drinking water-based criteria.

1 Locations are listed from upstream (west) to downstream (east).

2 Drinking water criteria given in Tables 2 and 11 of the ROD.

3 Surface water criteria given in Tables 3 and 11 of the ROD are presented for reference only. Reference criteria from the ROD for cadmium, copper, lead, and zinc are adjusted based on a hardness of 9 mg/L.

4 Field-filtered samples were submitted for dissolved metals analysis for locations where turbidity exceeded or approached 5 NTU.

5 Field measurements were collected with YSI ProDSS water quality instrument and LaMotte 2020we turbidity meter during sampling. Ferrous iron measured with a Hach Iron test kit, Model IR-18, 0–10 mg/L.

Abbreviations:

CAS Chemical Abstracts Service
µg/L Micrograms per liter
µS/cm Microsiemens per centimeter
mg-$CaCO_3$/L Milligrams calcium carbonate per liter
mg/L Milligrams per liter
mV Millivolts
NTU Nephelometric turbidity units
ROD Record of Decision

Qualifiers:

J Analyte was detected, concentration is considered to be an estimate.
JQ Analyte was detected between the method detection limit and reporting limit, concentration is considered to be an estimate.
U Analyte was not detected at the given reporting limit.
UJ Analyte was not detected at the given reporting limit, which is considered to be an estimate.

Table 4.8
Analytical Results from Groundwater Monitoring Wells

					Area	Monitoring Wells (cont.)								
					Location [1]	TP2-13D		DS-15S		DS-15I		TP2-17	DS-16S	
					Sample Type	Field Sample	Field Sample	Field Sample	Field Sample	Field Sample	Field Sample	Field Sample	Field Sample	Field Sample
					Sample Date	6/11/2020	9/25/2020	6/8/2020	9/23/2020	6/8/2020	9/23/2020	6/15/2020	6/8/2020	9/23/2020
Analytes	CAS No.	Units	Drinking Water-Based Criteria [2]	Surface Water-Based Criteria [3]										
Total Metals														
Aluminum	7429-90-5	µg/L	**16,000**	142		6.51 JQ	200 U	21.6	30.5 JQ	9.40 JQ	3.42 JQ	2,920	69.2	15.9 JQ
Cadmium	7440-43-9	µg/L	**5**	0.05		0.0200 U	0.0400 U	0.124	0.154	0.0312	0.169	0.681	3.47	0.312
Calcium	7440-70-2	µg/L	--	--		127,000	157,000	116,000	121,000	43,300	51,800	13,500	43,000	5,570
Copper	7440-50-8	µg/L	**592**	1.45		0.500 U	0.500 U	0.747	0.603	0.500 U	0.500 U	17.4	5.98	0.771
Iron	7439-89-6	µg/L	--	1,000		2,990	2,810	38,500	39,500	22.6	20.0 U	84.1	76.6	205
Lead	7439-92-1	µg/L	**15**	0.169		0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U
Magnesium	7439-95-4	µg/L	--	--		13,800	14,600	14,600	14,800	4,760	5,240	1,980	7,160	686
Manganese	7439-96-5	µg/L	--	--		216	232	712	552	6.15	25.5	128	246	24.3
Potassium	7440-09-7	µg/L	--	--		17,100	18,400	16,200	15,500	2,850	3,930	1,610	1,410	732
Sodium	7440-23-5	µg/L	--	--		4,290	4,390	5,400	5,000	3,640	3,940	1,700	3,430	920
Zinc	7440-66-6	µg/L	**4,800**	13.6		1.45 JQ	1.61 JQ	48.9	43.3	0.842 JQ	2.39 JQ	80.0	232	20.3
Dissolved Metals [4]														
Aluminum	7429-90-5	µg/L	**16,000**	142		--	--	--	--	--	--	--	--	--
Cadmium	7440-43-9	µg/L	**5**	0.05		--	--	--	--	--	--	--	--	--
Calcium	7440-70-2	µg/L	--	--		--	--	--	--	--	--	--	--	--
Copper	7440-50-8	µg/L	**592**	1.45		--	--	--	--	--	--	--	--	--
Iron	7439-89-6	µg/L	--	1,000		--	--	--	--	--	--	--	--	--
Lead	7439-92-1	µg/L	**15**	0.169		--	--	--	--	--	--	--	--	--
Magnesium	7439-95-4	µg/L	--	--		--	--	--	--	--	--	--	--	--
Manganese	7439-96-5	µg/L	--	--		--	--	--	--	--	--	--	--	--
Potassium	7440-09-7	µg/L	--	--		--	--	--	--	--	--	--	--	--
Sodium	7440-23-5	µg/L	--	--		--	--	--	--	--	--	--	--	--
Zinc	7440-66-6	µg/L	**4,800**	13.6		--	--	--	--	--	--	--	--	--
Conventionals														
Alkalinity, Total	--	mg-$CaCO_3$/L	--	--		78.5	78.6	30.0	32.7	115	74.8	1.00 U	12.6	9.07
Alkalinity, Bicarbonate	--	mg-$CaCO_3$/L	--	--		78.5	78.6	30.0	32.7	115	74.8	1.00 U	12.6	9.07
Alkalinity, Carbonate	--	mg-$CaCO_3$/L	--	--		1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Alkalinity, Hydroxide	--	mg-$CaCO_3$/L	--	--		1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Chloride	16887-00-6	mg/L	--	--		0.208	0.198	0.394	0.334	0.645	0.841	0.177	0.373	0.317
Dissolved Organic Carbon	--	mg/L	--	--		0.820	0.670	0.940	0.880	0.610	0.500 U	0.500	0.500 U	0.500 U
Nitrate (as Nitrogen)	14797-55-8	mg/L	--	--		0.100 UJ	0.100 UJ	0.100 UJ	0.100 UJ	0.873 J	0.428 J	0.100 UJ	0.128 J	0.100 UJ
Sulfate	14808-79-8	mg/L	--	--		295	378	303	366	24.6	81.3	57.8	105	10.2
Total Dissolved Solids	--	mg/L	--	--		563 J	683	573 J	662	163 J	247	125	204 J	73.0
Total Suspended Solids	--	mg/L	--	--		5.00	4.00	18.0 J	17.0	1.00 UJ	1.00 U	1.00 U	1.00 UJ	1.00 U
Total Organic Carbon	--	mg/L	--	--		0.750	0.650	0.910	0.840	0.500 U	0.500 U	0.580	0.500 U	0.500 U
Hardness, Total	--	mg-$CaCO_3$/L	--	--		374	453	350	363	128	151	42.0	137	16.7

Table 4.8
Analytical Results from Groundwater Monitoring Wells

					Area	Monitoring Wells (cont.)								
					Location [1]	TP2-13D		DS-15S		DS-15I		TP2-17	DS-16S	
					Sample Type	Field Sample	Field Sample	Field Sample	Field Sample	Field Sample	Field Sample	Field Sample	Field Sample	Field Sample
					Sample Date	6/11/2020	9/25/2020	6/8/2020	9/23/2020	6/8/2020	9/23/2020	6/15/2020	6/8/2020	9/23/2020
Analytes	CAS No.	Units	Drinking Water-Based Criteria [2]	Surface Water-Based Criteria [3]										
Field Parameters [5]														
Dissolved Oxygen (DO)	--	mg/L	--	--		0.79	1.6	1.20	0.36	3.01	1.31	4.34	2.96	6.68
Ferrous Iron	--	mg/L	--	--		--	3	1.5	4	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Oxidation-Reduction Potential (ORP)	--	mV	--	--		-29.3	-51.6	-15.5	-56.1	117.1	177.8	251.8	167.5	157.8
pH	--	pH	--	--		6.62	6.48	6.14	6.37	6.85	6.35	4.28	5.44	6.06
Specific Conductivity	--	µS/cm	--	--		563.0	875	835.0	851	258.2	323.1	141.0	322.4	48.2
Turbidity	--	NTU	--	--		0.73	0.29	3.90	0.44	0.15	0.55	1.80	0.41	1.33

Notes:

Results for total and dissolved metals and conventionals are presented to three significant figures. Results for field parameters are presented to the significant figures indicated by the field meter.

-- Not applicable/available or not analyzed.

RED/BOLD Detected exceedance of drinking water-based criteria.

1 Locations are listed from upstream (west) to downstream (east).

2 Drinking water criteria given in Tables 2 and 11 of the ROD.

3 Surface water criteria given in Tables 3 and 11 of the ROD are presented for reference only. Reference criteria from the ROD for cadmium, copper, lead, and zinc are adjusted based on a hardness of 9 mg/L.

4 Field-filtered samples were submitted for dissolved metals analysis for locations where turbidity exceeded or approached 5 NTU.

5 Field measurements were collected with YSI ProDSS water quality instrument and LaMotte 2020we turbidity meter during sampling. Ferrous iron measured with a Hach Iron test kit, Model IR-18, 0–10 mg/L.

Abbreviations:

CAS Chemical Abstracts Service
µg/L Micrograms per liter
µS/cm Microsiemens per centimeter
mg-$CaCO_3$/L Milligrams calcium carbonate per liter
mg/L Milligrams per liter
mV Millivolts
NTU Nephelometric turbidity units
ROD Record of Decision

Qualifiers:

J Analyte was detected, concentration is considered to be an estimate.
JQ Analyte was detected between the method detection limit and reporting limit, concentration is considered to be an estimate.
U Analyte was not detected at the given reporting limit.
UJ Analyte was not detected at the given reporting limit, which is considered to be an estimate.

Table 4.8
Analytical Results from Groundwater Monitoring Wells

					Area	Monitoring Wells (cont.)									
					Location [1]	DS-16I			DS-16D		TP3-13		TP3-14S	TP3-14D	
					Sample Type	Field Sample	Field Sample	Field Duplicate	Field Sample	Field Sample	Field Sample	Field Sample	Field Sample	Field Sample	Field Sample
					Sample Date	6/8/2020	9/23/2020	9/23/2020	6/8/2020	9/23/2020	6/10/2020	9/25/2020	6/15/2020	6/10/2020	9/25/2020
Analytes	CAS No.	Units	Drinking Water-Based Criteria [2]	Surface Water-Based Criteria [3]										
Total Metals															
Aluminum	7429-90-5	µg/L	**16,000**	142	5.08 JQ	13.1 JQ	11.3 JQ	48.2	11.0 JQ	4,720	7,500	92.0 JQ	3,540	3,430
Cadmium	7440-43-9	µg/L	**5**	0.05	0.334	0.358	0.444	0.00820 JQ	0.0200 U	3.22	3.12	0.561	3.33	**7.69**
Calcium	7440-70-2	µg/L	--	--	8,310	7,530	7,840	48,300	49,000	40,600	230,000	381,000	15,600	70,600
Copper	7440-50-8	µg/L	**592**	1.45	1.01	1.17	1.25	0.500 U	0.500 U	16.0	38.6	6.90	95.7	132
Iron	7439-89-6	µg/L	--	1,000	20.0 U	18.2 JQ	12.6 JQ	42.0	37.1	370	239,000	116,000	15.1 JQ	209
Lead	7439-92-1	µg/L	**15**	0.169	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.121	0.195	0.420	0.200 U	0.100 U
Magnesium	7439-95-4	µg/L	--	--	1,400	1,290	1,270	6,920	6,140	7,490	39,200	22,000	2,640	13,400
Manganese	7439-96-5	µg/L	--	--	7.31	8.27	8.95	40.2	65.5	1,720	3,060	2,180	400	1,740
Potassium	7440-09-7	µg/L	--	--	706	826	811	1,980	1,990	4,610	18,900	38,300	1,700	3,270
Sodium	7440-23-5	µg/L	--	--	1,160	1,370	1,280	5,780	5,510	3,340	9,120	8,340	2,240	5,660
Zinc	7440-66-6	µg/L	**4,800**	13.6	44.9	53.0	55.1	0.857 JQ	1.64 JQ	560	562	174	355	778
Dissolved Metals [4]															
Aluminum	7429-90-5	µg/L	**16,000**	142	--	--	--	--	--	--	--	14.1 JQ	--	--
Cadmium	7440-43-9	µg/L	**5**	0.05	--	--	--	--	--	--	--	0.526	--	--
Calcium	7440-70-2	µg/L	--	--	--	--	--	--	--	--	--	382,000	--	--
Copper	7440-50-8	µg/L	**592**	1.45	--	--	--	--	--	--	--	0.513	--	--
Iron	7439-89-6	µg/L	--	1,000	--	--	--	--	--	--	--	118,000	--	--
Lead	7439-92-1	µg/L	**15**	0.169	--	--	--	--	--	--	--	0.100 U	--	--
Magnesium	7439-95-4	µg/L	--	--	--	--	--	--	--	--	--	21,900	--	--
Manganese	7439-96-5	µg/L	--	--	--	--	--	--	--	--	--	2,280	--	--
Potassium	7440-09-7	µg/L	--	--	--	--	--	--	--	--	--	38,700	--	--
Sodium	7440-23-5	µg/L	--	--	--	--	--	--	--	--	--	8,430	--	--
Zinc	7440-66-6	µg/L	**4,800**	13.6	--	--	--	--	--	--	--	189	--	--
Conventionals															
Alkalinity, Total	--	mg-$CaCO_3$/L	--	--	8.67	9.47	10.7	153	149	1.00 U	1.00 U	87.7	1.00 U	1.00 U
Alkalinity, Bicarbonate	--	mg-$CaCO_3$/L	--	--	8.67	9.47	10.7	153	149	1.00 U	1.00 U	87.7	1.00 U	1.00 U
Alkalinity, Carbonate	--	mg-$CaCO_3$/L	--	--	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Alkalinity, Hydroxide	--	mg-$CaCO_3$/L	--	--	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Chloride	16887-00-6	mg/L	--	--	0.518	0.257	0.257	0.581	0.645	0.228	0.383	0.622	0.137	0.367
Dissolved Organic Carbon	--	mg/L	--	--	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.520	0.830	1.42	0.540	0.940
Nitrate (as Nitrogen)	14797-55-8	mg/L	--	--	0.223 J	0.115 J	0.115 J	0.309 J	0.234 J	0.100 UJ	0.100 UJ	0.100 UJ	0.100 UJ	0.100 UJ
Sulfate	14808-79-8	mg/L	--	--	14.6	18.0	17.8	13.0	13.1	141	1,260	1,010	63.5	220
Total Dissolved Solids	--	mg/L	--	--	27.0 J	64.0	61.0	161 J	195	270 J	1,980	1,720	114 J	393
Total Suspended Solids	--	mg/L	--	--	1.00 UJ	1.00 U	1.00 U	1.00 UJ	1.00 U	1.00 U	1.00 U	164	1.00 U	1.00 U
Total Organic Carbon	--	mg/L	--	--	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.800	1.75	0.500 U	0.840
Hardness, Total	--	mg-$CaCO_3$/L	--	--	26.5	24.1	24.8	149	148	132	737	1,040	49.9	231

Table 4.8
Analytical Results from Groundwater Monitoring Wells

					Area	Monitoring Wells (cont.)									
					Location [1]	DS-16I			DS-16D		TP3-13		TP3-14S	TP3-14D	
					Sample Type	Field Sample	Field Sample	Field Duplicate	Field Sample	Field Sample	Field Sample	Field Sample	Field Sample	Field Sample	Field Sample
					Sample Date	6/8/2020	9/23/2020	9/23/2020	6/8/2020	9/23/2020	6/10/2020	9/25/2020	6/15/2020	6/10/2020	9/25/2020
Analytes	CAS No.	Units	Drinking Water-Based Criteria [2]	Surface Water-Based Criteria [3]											
Field Parameters [5]															
Dissolved Oxygen (DO)	--	mg/L	--	--	6.74	6.15	--	1.40	0.49	1.34	0.48	4.77	4.28	0.43
Ferrous Iron	--	mg/L	--	--	--	0.5 U	--	0.5 U	0.5 U	0.5 U	5	1.5	0.5 U	0.5 U
Oxidation-Reduction Potential (ORP)	--	mV	--	--	151.5	200.1	--	69.7	-85.3	338.5	177.2	-5.4	314.2	208.2
pH	--	pH	--	--	5.88	5.86	--	7.39	7.41	3.94	4.12	6.30	4.47	4.47
Specific Conductivity	--	µS/cm	--	--	60.5	66.2	--	310.8	287.9	375.8	1,950	159.8	171.4	486.4
Turbidity	--	NTU	--	--	0.55	0.12	--	1.47	0.2	2.20	0.26	12.2	0.49	1

Notes:

Results for total and dissolved metals and conventionals are presented to three significant figures. Results for field parameters are presented to the significant figures indicated by the field meter.

-- Not applicable/available or not analyzed.

RED/BOLD Detected exceedance of drinking water-based criteria.

1 Locations are listed from upstream (west) to downstream (east).

2 Drinking water criteria given in Tables 2 and 11 of the ROD.

3 Surface water criteria given in Tables 3 and 11 of the ROD are presented for reference only. Reference criteria from the ROD for cadmium, copper, lead, and zinc are adjusted based on a hardness of 9 mg/L.

4 Field-filtered samples were submitted for dissolved metals analysis for locations where turbidity exceeded or approached 5 NTU.

5 Field measurements were collected with YSI ProDSS water quality instrument and LaMotte 2020we turbidity meter during sampling. Ferrous iron measured with a Hach Iron test kit, Model IR-18, 0–10 mg/L.

Abbreviations:

CAS Chemical Abstracts Service
µg/L Micrograms per liter
µS/cm Microsiemens per centimeter
mg-$CaCO_3$/L Milligrams calcium carbonate per liter
mg/L Milligrams per liter
mV Millivolts
NTU Nephelometric turbidity units
ROD Record of Decision

Qualifiers:

J Analyte was detected, concentration is considered to be an estimate.
JQ Analyte was detected between the method detection limit and reporting limit, concentration is considered to be an estimate.
U Analyte was not detected at the given reporting limit.
UJ Analyte was not detected at the given reporting limit, which is considered to be an estimate.

Table 4.8
Analytical Results from Groundwater Monitoring Wells

					Area	Monitoring Wells (cont.)										
					Location [1]	DS-17S		DS-17I		TP3-12S	TP3-12D		DS-18S		DS-18I	
					Sample Type	Field Sample	Field Sample	Field Sample	Field Sample	Field Sample	Field Sample	Field Sample	Field Sample	Field Sample	Field Sample	Field Sample
					Sample Date	6/8/2020	9/23/2020	6/8/2020	9/23/2020	6/10/2020	6/10/2020	9/24/2020	6/8/2020	9/23/2020	6/8/2020	9/23/2020
Analytes	CAS No.	Units	Drinking Water-Based Criteria [2]	Surface Water-Based Criteria [3]												
Total Metals																
Aluminum	7429-90-5	µg/L	**16,000**	142	10,500	388	7,200	1,300	3.76 JQ	651	873	65.5	47.9	7,970	1,920
Cadmium	7440-43-9	µg/L	**5**	0.05	4.63	0.457	**9.70**	1.82	0.143	2.71	**5.49**	0.110	0.0306	3.10	0.632
Calcium	7440-70-2	µg/L	--	--	41,800	4,560	94,500	9,780	538,000	25,300	74,500	17,000	4,070	69,100	8,770
Copper	7440-50-8	µg/L	**592**	1.45	63.2	9.13	101	21.6	0.379 JQ	73.6	70.9	1.45	0.471 JQ	69.7	23.3
Iron	7439-89-6	µg/L	--	1,000	591	12.0 JQ	68,500	12.9 JQ	22,800	40.0 U	12.3 JQ	63.2	45.9	22,900	21.5
Lead	7439-92-1	µg/L	**15**	0.169	0.100 U	0.100 U	0.274	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.109	0.100 U
Magnesium	7439-95-4	µg/L	--	--	7,730	555	16,300	1,530	27,000	2,970	8,580	3,700	512	12,900	1,150
Manganese	7439-96-5	µg/L	--	--	577	24.4	1,030	49.8	1,770	214	816	47.6	3.64	985	55.2
Potassium	7440-09-7	µg/L	--	--	2,900	673	8,270	1,220	38,800	2,980	5,250	762	643	3,820	1,100
Sodium	7440-23-5	µg/L	--	--	3,380	793	5,490	1,350	10,700	2,080	3,430	2,550	761	4,510	1,390
Zinc	7440-66-6	µg/L	**4,800**	13.6	667	55.4	1,200	197	32.3	394	761	6.21	2.14 JQ	393	84.2
Dissolved Metals [4]															
Aluminum	7429-90-5	µg/L	**16,000**	142	--	--	--	--	20.0 U	--	--	--	--	--	--
Cadmium	7440-43-9	µg/L	**5**	0.05	--	--	--	--	0.0600 JQ	--	--	--	--	--	--
Calcium	7440-70-2	µg/L	--	--	--	--	--	--	545,000	--	--	--	--	--	--
Copper	7440-50-8	µg/L	**592**	1.45	--	--	--	--	0.500 U	--	--	--	--	--	--
Iron	7439-89-6	µg/L	--	1,000	--	--	--	--	22,800	--	--	--	--	--	--
Lead	7439-92-1	µg/L	**15**	0.169	--	--	--	--	0.100 U	--	--	--	--	--	--
Magnesium	7439-95-4	µg/L	--	--	--	--	--	--	27,700	--	--	--	--	--	--
Manganese	7439-96-5	µg/L	--	--	--	--	--	--	1,820	--	--	--	--	--	--
Potassium	7440-09-7	µg/L	--	--	--	--	--	--	38,000	--	--	--	--	--	--
Sodium	7440-23-5	µg/L	--	--	--	--	--	--	11,100	--	--	--	--	--	--
Zinc	7440-66-6	µg/L	**4,800**	13.6	--	--	--	--	32.7	--	--	--	--	--	--
Conventionals															
Alkalinity, Total	--	mg-$CaCO_3$/L	--	--	1.00 U	1.00 U	1.00 U	1.00 U	81.6	1.65	5.04	8.05	5.04	1.00 U	1.00 UJ
Alkalinity, Bicarbonate	--	mg-$CaCO_3$/L	--	--	1.00 U	1.00 U	1.00 U	1.00 U	81.6	1.65	5.04	8.05	5.04	1.00 U	1.00 UJ
Alkalinity, Carbonate	--	mg-$CaCO_3$/L	--	--	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 UJ
Alkalinity, Hydroxide	--	mg-$CaCO_3$/L	--	--	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 UJ
Chloride	16887-00-6	mg/L	--	--	0.276	0.309	0.726	0.277	0.100 U	0.126	0.227	0.382	0.307	0.502	0.241
Dissolved Organic Carbon	--	mg/L	--	--	0.500 U	0.500 U	0.500 U	0.500 U	0.510	0.520	0.700	0.500 U	0.500 U	0.500 U	0.500 UJ
Nitrate (as Nitrogen)	14797-55-8	mg/L	--	--	0.100 UJ	0.100 UJ	0.100 UJ	0.110 J	0.100 UJ	0.127 J	0.100 UJ	0.100 UJ	0.100 UJ	0.100 UJ	0.100 UJ
Sulfate	14808-79-8	mg/L	--	--	160	18.5	377	40.6	1,490	68.7	213	44.0	9.12	254	41.2 J
Total Dissolved Solids	--	mg/L	--	--	281 J	46.0	680 J	89.0	2,340 J	140 J	382	70.0 J	33.0	18.0 J	102 J
Total Suspended Solids	--	mg/L	--	--	1.00 UJ	1.00 U	1.00 UJ	1.00 U	27.0	1.00 U	1.00 U	1.00 UJ	3.00	1.00 UJ	1.00 UJ
Total Organic Carbon	--	mg/L	--	--	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.620	0.500 U	0.500 U	0.500 U	0.500 UJ
Hardness, Total	--	mg-$CaCO_3$/L	--	--	136	13.7	303	30.7	1,450	75.5	221	57.6	12.3	226	26.6

Table 4.8
Analytical Results from Groundwater Monitoring Wells

					Area	Monitoring Wells (cont.)										
					Location [1]	DS-17S		DS-17I		TP3-12S	TP3-12D		DS-18S		DS-18I	
					Sample Type	Field Sample	Field Sample	Field Sample	Field Sample	Field Sample	Field Sample	Field Sample	Field Sample	Field Sample	Field Sample	Field Sample
					Sample Date	6/8/2020	9/23/2020	6/8/2020	9/23/2020	6/10/2020	6/10/2020	9/24/2020	6/8/2020	9/23/2020	6/8/2020	9/23/2020
Analytes	CAS No.	Units	Drinking Water-Based Criteria [2]	Surface Water-Based Criteria [3]												
Field Parameters [5]																
Dissolved Oxygen (DO)	--	mg/L	--	--		0.56	5.96	0.71	6	1.58	3.55	1.62	3.68	7.14	1.18	6.9
Ferrous Iron	--	mg/L	--	--		0.5	0.5 U	4.5	0.5 U	1.5	0.5 U	0.5 U	0.5 U	0.5 U	2.0	0.5 U
Oxidation-Reduction Potential (ORP)	--	mV	--	--		444.3	366.6	256.7	421.1	6.5	238.2	297.5	202.6	265.1	255.1	227.4
pH	--	pH	--	--		3.85	4.48	4.03	4.47	6.53	4.88	5.07	5.36	5.5	4.06	4.16
Specific Conductivity	--	µS/cm	--	--		378.9	60.4	776.0	119	239.2	183.3	518	148.8	35.8	614	116.9
Turbidity	--	NTU	--	--		0.66	0.11	0.44	0.43	3.06	1.40	0.94	0.43	0.06	0.90	0.02

Notes:

Results for total and dissolved metals and conventionals are presented to three significant figures. Results for field parameters are presented to the significant figures indicated by the field meter.

-- Not applicable/available or not analyzed.

RED/BOLD Detected exceedance of drinking water-based criteria.

1 Locations are listed from upstream (west) to downstream (east).

2 Drinking water criteria given in Tables 2 and 11 of the ROD.

3 Surface water criteria given in Tables 3 and 11 of the ROD are presented for reference only. Reference criteria from the ROD for cadmium, copper, lead, and zinc are adjusted based on a hardness of 9 mg/L.

4 Field-filtered samples were submitted for dissolved metals analysis for locations where turbidity exceeded or approached 5 NTU.

5 Field measurements were collected with YSI ProDSS water quality instrument and LaMotte 2020we turbidity meter during sampling. Ferrous iron measured with a Hach Iron test kit, Model IR-18, 0–10 mg/L.

Abbreviations:

CAS Chemical Abstracts Service
µg/L Micrograms per liter
µS/cm Microsiemens per centimeter
mg-$CaCO_3$/L Milligrams calcium carbonate per liter
mg/L Milligrams per liter
mV Millivolts
NTU Nephelometric turbidity units
ROD Record of Decision

Qualifiers:

J Analyte was detected, concentration is considered to be an estimate.
JQ Analyte was detected between the method detection limit and reporting limit, concentration is considered to be an estimate.
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Table 4.8
Analytical Results from Groundwater Monitoring Wells

					Area	Monitoring Wells (cont.)									
					Location [1]	DS-18D		DS-13S		DS-13I				DS-13D	
					Sample Type	Field Sample	Field Sample	Field Sample	Field Sample	Field Sample	Field Duplicate	Field Sample	Field Duplicate	Field Sample	Field Sample
					Sample Date	6/12/2020	9/23/2020	6/10/2020	9/25/2020	6/10/2020	6/10/2020	9/25/2020	9/25/2020	6/10/2020	9/25/2020
Analytes	CAS No.	Units	Drinking Water-Based Criteria [2]	Surface Water-Based Criteria [3]											
Total Metals															
Aluminum	7429-90-5	µg/L	**16,000**	142	10.5 JQ	5.71 JQ	3,770	6,080	2,050	2,090	3,710	3,620	3.28 JQ	4.88 JQ
Cadmium	7440-43-9	µg/L	**5**	0.05	0.0396	0.0252	2.40	1.82	2.82	2.69	3.56	3.53	0.248	0.206
Calcium	7440-70-2	µg/L	--	--	59,400	50,100	52,100	24,500	40,100	40,400	59,600	58,800	49,700	53,900
Copper	7440-50-8	µg/L	**592**	1.45	0.500 U	0.500 U	32.7	44.8	26.7	26.4	40.2	40.3	0.500 U	0.500 U
Iron	7439-89-6	µg/L	--	1,000	75.9	70.1	11,600	3,330	12.2 JQ	11.8 JQ	9,290	8,940	20.0 U	10.2 JQ
Lead	7439-92-1	µg/L	**15**	0.169	0.100 U	0.100 U	0.130	0.119	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U
Magnesium	7439-95-4	µg/L	--	--	8,680	7,340	6,470	2,850	5,200	5,370	9,500	9,400	7,540	7,950
Manganese	7439-96-5	µg/L	--	--	1,060	870	1,460	290	957	945	1,620	1,600	0.303 JQ	0.315 JQ
Potassium	7440-09-7	µg/L	--	--	4,810	4,310	7,980	3,510	4,100	4,210	5,280	5,060	2,310	2,310
Sodium	7440-23-5	µg/L	--	--	5,120	4,760	3,340	1,960	2,950	2,900	3,860	3,800	2,820	2,960
Zinc	7440-66-6	µg/L	**4,800**	13.6	1.39 JQ	1.11 JQ	293	351	281	270	455	450	2.20 JQ	2.26 JQ
Dissolved Metals [4]															
Aluminum	7429-90-5	µg/L	**16,000**	142	--	--	--	--	--	--	--	--	--	--
Cadmium	7440-43-9	µg/L	**5**	0.05	--	--	--	--	--	--	--	--	--	--
Calcium	7440-70-2	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
Copper	7440-50-8	µg/L	**592**	1.45	--	--	--	--	--	--	--	--	--	--
Iron	7439-89-6	µg/L	--	1,000	--	--	--	--	--	--	--	--	--	--
Lead	7439-92-1	µg/L	**15**	0.169	--	--	--	--	--	--	--	--	--	--
Magnesium	7439-95-4	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
Manganese	7439-96-5	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
Potassium	7440-09-7	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
Sodium	7440-23-5	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
Zinc	7440-66-6	µg/L	**4,800**	13.6	--	--	--	--	--	--	--	--	--	--
Conventionals															
Alkalinity, Total	--	mg-$CaCO_3$/L	--	--	34.1	30.1	1.00 U	1.00 UJ	1.00 U	1.00 U	1.00 U	1.00 U	32.2	32.5
Alkalinity, Bicarbonate	--	mg-$CaCO_3$/L	--	--	34.1	30.1	1.00 U	1.00 UJ	1.00 U	1.00 U	1.00 U	1.00 U	32.2	32.5
Alkalinity, Carbonate	--	mg-$CaCO_3$/L	--	--	1.00 U	1.00 U	1.00 U	1.00 UJ	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Alkalinity, Hydroxide	--	mg-$CaCO_3$/L	--	--	1.00 U	1.00 U	1.00 U	1.00 UJ	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	
Chloride	16887-00-6	mg/L	--	--	0.931	0.948	0.188	0.259	0.187	0.185	0.278	0.278	0.221	0.246
Dissolved Organic Carbon	--	mg/L	--	--	0.500 U	0.500 U	0.500 U	0.500 UJ	0.500 U	0.500 U	0.560	0.550	0.500 U	0.500 U
Nitrate (as Nitrogen)	14797-55-8	mg/L	--	--	0.100 UJ	0.100 UJ	0.100 UJ	0.100 UJ	0.118 J	0.119 J	0.100 UJ	0.100 UJ	0.328 J	0.343 J
Sulfate	14808-79-8	mg/L	--	--	135	130	169	121 J	115	102	215	216	106	126
Total Dissolved Solids	--	mg/L	--	--	282 J	271	343 J	202 J	231 J	229 J	391	378	237 J	250
Total Suspended Solids	--	mg/L	--	--	1.00 U	1.00 U	1.00 U	1.00 UJ	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Total Organic Carbon	--	mg/L	--	--	0.500 U	0.500 U	0.500 U	0.500 UJ	0.500 U	0.500 U	0.530	0.520	0.500 U	0.500 U
Hardness, Total	--	mg-$CaCO_3$/L	--	--	184	155	157	72.9	122	123	188	186	155	167

Table 4.8
Analytical Results from Groundwater Monitoring Wells

				Area	Monitoring Wells (cont.)										
				Location [1]	DS-18D		DS-13S		DS-13I				DS-13D		
				Sample Type	Field Sample	Field Sample	Field Sample	Field Sample	Field Sample	Field Duplicate	Field Sample	Field Duplicate	Field Sample	Field Sample	
				Sample Date	6/12/2020	9/23/2020	6/10/2020	9/25/2020	6/10/2020	6/10/2020	9/25/2020	9/25/2020	6/10/2020	9/25/2020	
Analytes	CAS No.	Units	Drinking Water-Based Criteria [2]	Surface Water-Based Criteria [3]											
Field Parameters [5]															
Dissolved Oxygen (DO)	--	mg/L	--	--	2.41	0.3	3.16	0.49	1.22	--	0.41	--	5.90	5.12	
Ferrous Iron	--	mg/L	--	--	0.5 U	0.5 U	3.5	1.5	0.5 U	--	1.5 U	--	0.5 U	0.5 U	
Oxidation-Reduction Potential (ORP)	--	mV	--	--	98.2	149.3	208.2	350.3	178.7	--	234.5	--	157.7	189.5	
pH	--	pH	--	--	5.89	5.94	3.96	3.73	4.58	--	4.39	--	6.29	6.19	
Specific Conductivity	--	µS/cm	--	--	310.6	342.8	328.5	299.7	314.1	--	460.6	--	326.1	333.7	
Turbidity	--	NTU	--	--	0.85	0.06	1.18	0.39	1.90	--	0.4	--	2.10	0.29	

Notes:

Results for total and dissolved metals and conventionals are presented to three significant figures. Results for field parameters are presented to the significant figures indicated by the field meter.

-- Not applicable/available or not analyzed.

RED/BOLD Detected exceedance of drinking water-based criteria.

1 Locations are listed from upstream (west) to downstream (east).

2 Drinking water criteria given in Tables 2 and 11 of the ROD.

3 Surface water criteria given in Tables 3 and 11 of the ROD are presented for reference only. Reference criteria from the ROD for cadmium, copper, lead, and zinc are adjusted based on a hardness of 9 mg/L.

4 Field-filtered samples were submitted for dissolved metals analysis for locations where turbidity exceeded or approached 5 NTU.

5 Field measurements were collected with YSI ProDSS water quality instrument and LaMotte 2020we turbidity meter during sampling. Ferrous iron measured with a Hach Iron test kit, Model IR-18, 0–10 mg/L.

Abbreviations:

CAS Chemical Abstracts Service
µg/L Micrograms per liter
µS/cm Microsiemens per centimeter
mg-$CaCO_3$/L Milligrams calcium carbonate per liter
mg/L Milligrams per liter
mV Millivolts
NTU Nephelometric turbidity units
ROD Record of Decision

Qualifiers:

J Analyte was detected, concentration is considered to be an estimate.
JQ Analyte was detected between the method detection limit and reporting limit, concentration is considered to be an estimate.
U Analyte was not detected at the given reporting limit.
UJ Analyte was not detected at the given reporting limit, which is considered to be an estimate.

Table 4.8
Analytical Results from Groundwater Monitoring Wells

					Area	Monitoring Wells (cont.)									
					Location [1]	DS-12S		DS-12I		DS-12D		NRC-3SR		NRC-3IR	
					Sample Type	Field Sample	Field Sample	Field Sample	Field Sample	Field Sample	Field Sample	Field Sample	Field Sample	Field Sample	Field Sample
					Sample Date	6/10/2020	9/25/2020	6/10/2020	9/25/2020	6/10/2020	9/25/2020	6/8/2020	9/22/2020	6/8/2020	9/22/2020
Analytes	CAS No.	Units	Drinking Water-Based Criteria [2]	Surface Water-Based Criteria [3]											
Total Metals															
Aluminum	7429-90-5	µg/L	**16,000**	142	1,550	2,050	120	246	3.42 JQ	100 U	9.83 JQ	622	6,170	2,930
Cadmium	7440-43-9	µg/L	**5**	0.05	**6.52**	**6.12**	4.37	3.75	1.14	1.46	0.0722	0.118	3.24	2.14
Calcium	7440-70-2	µg/L	--	--	74,000	87,800	81,500	62,800	46,300	52,100	7,160	5,040	63,800	46,100
Copper	7440-50-8	µg/L	**592**	1.45	30.5	45.0	0.841	1.38	0.500 U	0.500 U	0.426 JQ	1.70	28.2	18.8
Iron	7439-89-6	µg/L	--	1,000	13.3 JQ	16,900	20.0 U	148	6.67 JQ	54.7	8.97 JQ	366	20,900	13,100
Lead	7439-92-1	µg/L	**15**	0.169	0.100 U	0.0760 JQ	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.135	0.100 U
Magnesium	7439-95-4	µg/L	--	--	8,710	11,800	10,600	8,200	6,380	6,210	848	659	9,810	6,550
Manganese	7439-96-5	µg/L	--	--	3,600	3,080	1,760	1,510	105	214	1.71	109	736	471
Potassium	7440-09-7	µg/L	--	--	6,370	7,870	5,160	4,730	3,210	3,360	594	563	8,120	6,780
Sodium	7440-23-5	µg/L	--	--	3,920	4,840	3,960	3,530	2,850	2,700	1,090	778	4,470	3,130
Zinc	7440-66-6	µg/L	**4,800**	13.6	422	648	25.8	44.7	2.50 JQ	3.79 JQ	56.2	23.3	450	307
Dissolved Metals [4]															
Aluminum	7429-90-5	µg/L	**16,000**	142	--	--	--	--	--	--	--	--	--	--
Cadmium	7440-43-9	µg/L	**5**	0.05	--	--	--	--	--	--	--	--	--	--
Calcium	7440-70-2	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
Copper	7440-50-8	µg/L	**592**	1.45	--	--	--	--	--	--	--	--	--	--
Iron	7439-89-6	µg/L	--	1,000	--	--	--	--	--	--	--	--	--	--
Lead	7439-92-1	µg/L	**15**	0.169	--	--	--	--	--	--	--	--	--	--
Magnesium	7439-95-4	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
Manganese	7439-96-5	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
Potassium	7440-09-7	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
Sodium	7440-23-5	µg/L	--	--	--	--	--	--	--	--	--	--	--	--
Zinc	7440-66-6	µg/L	**4,800**	13.6	--	--	--	--	--	--	--	--	--	--
Conventionals															
Alkalinity, Total	--	mg-$CaCO_3$/L	--	--	1.00 U	1.00 U	5.78	3.88	13.0	12.8	12.7	10.1	1.00 U	1.00 U
Alkalinity, Bicarbonate	--	mg-$CaCO_3$/L	--	--	1.00 U	1.00 U	5.78	3.88	13.0	12.8	12.7	10.1	1.00 U	1.00 U
Alkalinity, Carbonate	--	mg-$CaCO_3$/L	--	--	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Alkalinity, Hydroxide	--	mg-$CaCO_3$/L	--	--	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Chloride	16887-00-6	mg/L	--	--	0.203	0.246	0.225	0.226	0.197	0.211	0.249	0.309	0.492	0.448
Dissolved Organic Carbon	--	mg/L	--	--	0.530	0.640	0.500 U	0.500 U	0.500 U	0.520	0.500 U	0.500 U	0.500 U	0.500 U
Nitrate (as Nitrogen)	14797-55-8	mg/L	--	--	0.100 UJ	0.100 UJ	0.116 J	0.100 UJ	0.245 J	0.100 UJ	0.126 J	0.100 UJ	0.100 UJ	0.100 UJ
Sulfate	14808-79-8	mg/L	--	--	193	276	189	182	112	152	9.70	6.74	229	189
Total Dissolved Solids	--	mg/L	--	--	382 J	487	385 J	318	235 J	284	441 J	25.0	412 J	334
Total Suspended Solids	--	mg/L	--	--	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 UJ	17.0	1.00 UJ	1.00 U
Total Organic Carbon	--	mg/L	--	--	0.510	0.540	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U
Hardness, Total	--	mg-$CaCO_3$/L	--	--	221	268	247	191	142	156	21.4	15.3	200	142

Table 4.8
Analytical Results from Groundwater Monitoring Wells

					Area	Monitoring Wells (cont.)									
					Location [1]	DS-12S		DS-12I		DS-12D		NRC-3SR		NRC-3IR	
					Sample Type	Field Sample	Field Sample	Field Sample	Field Sample	Field Sample	Field Sample	Field Sample	Field Sample	Field Sample	Field Sample
					Sample Date	6/10/2020	9/25/2020	6/10/2020	9/25/2020	6/10/2020	9/25/2020	6/8/2020	9/22/2020	6/8/2020	9/22/2020
Analytes	CAS No.	Units	Drinking Water-Based Criteria [2]	Surface Water-Based Criteria [3]											
Field Parameters [5]															
Dissolved Oxygen (DO)	--	mg/L	--	--		1.77	0.41	4.10	0.31	6.10	0.93	7.73	9.02	0.59	0.27
Ferrous Iron	--	mg/L	--	--		0.5 U	3 U	0.5 U	0.05 U	0.5 U	0.5 U	0.5 U	0.5 U	4.0	3
Oxidation-Reduction Potential (ORP)	--	mV	--	--		213.6	236.2	200.8	245.4	206.3	201.1	212.2	159.1	278.4	187.6
pH	--	pH	--	--		4.37	4.35	5.16	5.02	5.63	5.61	6.17	6.3	3.95	4.26
Specific Conductivity	--	µS/cm	--	--		374.4	601	379.5	420.1	245.3	350.1	55.8	37.1	517.0	415.2
Turbidity	--	NTU	--	--		1.06	0.19	0.80	1.31	0.96	0.21	0.10	0.03	0.57	0.43

Notes:

Results for total and dissolved metals and conventionals are presented to three significant figures. Results for field parameters are presented to the significant figures indicated by the field meter.

-- Not applicable/available or not analyzed.

RED/BOLD Detected exceedance of drinking water-based criteria.

1 Locations are listed from upstream (west) to downstream (east).

2 Drinking water criteria given in Tables 2 and 11 of the ROD.

3 Surface water criteria given in Tables 3 and 11 of the ROD are presented for reference only. Reference criteria from the ROD for cadmium, copper, lead, and zinc are adjusted based on a hardness of 9 mg/L.

4 Field-filtered samples were submitted for dissolved metals analysis for locations where turbidity exceeded or approached 5 NTU.

5 Field measurements were collected with YSI ProDSS water quality instrument and LaMotte 2020we turbidity meter during sampling. Ferrous iron measured with a Hach Iron test kit, Model IR-18, 0–10 mg/L.

Abbreviations:

CAS Chemical Abstracts Service
µg/L Micrograms per liter
µS/cm Microsiemens per centimeter
mg-$CaCO_3$/L Milligrams calcium carbonate per liter
mg/L Milligrams per liter
mV Millivolts
NTU Nephelometric turbidity units
ROD Record of Decision

Qualifiers:

J Analyte was detected, concentration is considered to be an estimate.
JQ Analyte was detected between the method detection limit and reporting limit, concentration is considered to be an estimate.
U Analyte was not detected at the given reporting limit.
UJ Analyte was not detected at the given reporting limit, which is considered to be an estimate.

Table 4.8
Analytical Results from Groundwater Monitoring Wells

					Area	Monitoring Wells (cont.)									
					Location [1]	NRC-3DR		DS-3S		DS-3D		DS-4S		DS-4D	
					Sample Type	Field Sample	Field Sample	Field Sample	Field Sample	Field Sample	Field Sample	Field Sample	Field Sample	Field Sample	Field Sample
					Sample Date	6/7/2020	9/22/2020	6/6/2020	9/23/2020	6/6/2020	9/23/2020	6/6/2020	9/23/2020	6/6/2020	9/23/2020
Analytes	CAS No.	Units	Drinking Water-Based Criteria [2]	Surface Water-Based Criteria [3]											
Total Metals															
Aluminum	7429-90-5	µg/L	**16,000**	142	5.93 JQ	51.4	3.50 JQ	5.16 JQ	8.45 JQ	21.9	4.46 JQ	4.19 JQ	26.1	66.8
Cadmium	7440-43-9	µg/L	**5**	0.05	0.0470	0.0324	0.0592	0.0934	0.0574	0.160	0.0724	0.115	0.186	0.249
Calcium	7440-70-2	µg/L	--	--	72,500	70,800	3,400	4,990	3,950	5,690	3,500	5,170	5,040	8,610
Copper	7440-50-8	µg/L	**592**	1.45	0.500 U	0.429 JQ	0.500 U	0.500 U	0.941	0.500 U	0.357 JQ	0.500 U	0.500 U	0.500 U
Iron	7439-89-6	µg/L	--	1,000	16.9 JQ	55.0	20.0 U	20.0 U	20.0 U	7.62 JQ	20.0 U	6.72 JQ	20.0 U	8.06 JQ
Lead	7439-92-1	µg/L	**15**	0.169	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U
Magnesium	7439-95-4	µg/L	--	--	10,700	10,100	381	533	448	733	373	563	612	1,230
Manganese	7439-96-5	µg/L	--	--	16.1	3.76	0.252 JQ	0.350 JQ	0.451 JQ	16.3	0.318 JQ	0.132 JQ	5.46	68.5
Potassium	7440-09-7	µg/L	--	--	4,270	4,250	368	591	445	745	392	550	760	1,050
Sodium	7440-23-5	µg/L	--	--	5,270	4,900	663	835	769	983	652	764	815	1,160
Zinc	7440-66-6	µg/L	**4,800**	13.6	1.07 JQ	2.52 JQ	4.57	10.3	5.26	13.5	9.21	11.2	19.0	24.5
Dissolved Metals [4]															
Aluminum	7429-90-5	µg/L	**16,000**	142	151	--	--	--	--	--	--	--	--	--
Cadmium	7440-43-9	µg/L	**5**	0.05	0.0540	--	--	--	--	--	--	--	--	--
Calcium	7440-70-2	µg/L	--	--	65,400	--	--	--	--	--	--	--	--	--
Copper	7440-50-8	µg/L	**592**	1.45	2.12	--	--	--	--	--	--	--	--	--
Iron	7439-89-6	µg/L	--	1,000	158	--	--	--	--	--	--	--	--	--
Lead	7439-92-1	µg/L	**15**	0.169	0.111	--	--	--	--	--	--	--	--	--
Magnesium	7439-95-4	µg/L	--	--	9,980	--	--	--	--	--	--	--	--	--
Manganese	7439-96-5	µg/L	--	--	14.8	--	--	--	--	--	--	--	--	--
Potassium	7440-09-7	µg/L	--	--	3,950	--	--	--	--	--	--	--	--	--
Sodium	7440-23-5	µg/L	--	--	4,690	--	--	--	--	--	--	--	--	--
Zinc	7440-66-6	µg/L	**4,800**	13.6	2.27 JQ	--	--	--	--	--	--	--	--	--
Conventionals															
Alkalinity, Total	--	mg-$CaCO_3$/L	--	--	33.2	33.5	8.31	10.7	8.31	7.96	8.31	12.1	4.72	6.15
Alkalinity, Bicarbonate	--	mg-$CaCO_3$/L	--	--	33.2	33.5	8.31	10.7	8.31	7.96	8.31	12.1	4.72	6.15
Alkalinity, Carbonate	--	mg-$CaCO_3$/L	--	--	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Alkalinity, Hydroxide	--	mg-$CaCO_3$/L	--	--	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Chloride	16887-00-6	mg/L	--	--	0.637	0.725	0.137	0.302	0.148	0.295	0.134	0.305	0.141	0.280
Dissolved Organic Carbon	--	mg/L	--	--	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U
Nitrate (as Nitrogen)	14797-55-8	mg/L	--	--	0.100 UJ	0.100 UJ	0.100 UJ	0.100 UJ	0.100 UJ	0.100 UJ	0.100 UJ	0.100 UJ	0.100 UJ	0.100 UJ
Sulfate	14808-79-8	mg/L	--	--	149	181	2.77	5.49	3.87	12.2	2.74	5.46	8.01	22.6
Total Dissolved Solids	--	mg/L	--	--	332	359	22.0	28.0	7.00	43.0	16.0	34.0	36.0	59.0
Total Suspended Solids	--	mg/L	--	--	10.0	2.00	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Total Organic Carbon	--	mg/L	--	--	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U	0.500 U
Hardness, Total	--	mg-$CaCO_3$/L	--	--	225	218	10.1	14.7	11.7	17.2	10.3	15.2	15.1	26.6

Table 4.8
Analytical Results from Groundwater Monitoring Wells

					Area	Monitoring Wells (cont.)									
					Location [1]	NRC-3DR		DS-3S		DS-3D		DS-4S		DS-4D	
					Sample Type	Field Sample	Field Sample	Field Sample	Field Sample	Field Sample	Field Sample	Field Sample	Field Sample	Field Sample	Field Sample
					Sample Date	6/7/2020	9/22/2020	6/6/2020	9/23/2020	6/6/2020	9/23/2020	6/6/2020	9/23/2020	6/6/2020	9/23/2020
Analytes	CAS No.	Units	Drinking Water-Based Criteria [2]	Surface Water-Based Criteria [3]											
Field Parameters [5]															
Dissolved Oxygen (DO)	--	mg/L	--	--		1.74	0.98	9.57	7.23	8.74	6.67	9.36	6.52	9.39	6.2
Ferrous Iron	--	mg/L	--	--		--	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	--	0.5 U	0.5 U	0.5 U
Oxidation-Reduction Potential (ORP)	--	mV	--	--		185.5	134.4	172.7	166	190.0	182.7	188.9	181.2	210.4	202.5
pH	--	pH	--	--		6.05	6.11	6.39	6.07	6.25	5.98	6.41	6.21	5.95	5.79
Specific Conductivity	--	µS/cm	--	--		448.2	458.6	21.5	38.1	25.4	49.5	22.6	39.9	35.7	74
Turbidity	--	NTU	--	--		14.80	4.75	0.90	0.79	0.37	0.4	1.90	0.09	1.90	0.5

Notes:

Results for total and dissolved metals and conventionals are presented to three significant figures. Results for field parameters are presented to the significant figures indicated by the field meter.

-- Not applicable/available or not analyzed.

RED/BOLD Detected exceedance of drinking water-based criteria.

1 Locations are listed from upstream (west) to downstream (east).

2 Drinking water criteria given in Tables 2 and 11 of the ROD.

3 Surface water criteria given in Tables 3 and 11 of the ROD are presented for reference only. Reference criteria from the ROD for cadmium, copper, lead, and zinc are adjusted based on a hardness of 9 mg/L.

4 Field-filtered samples were submitted for dissolved metals analysis for locations where turbidity exceeded or approached 5 NTU.

5 Field measurements were collected with YSI ProDSS water quality instrument and LaMotte 2020we turbidity meter during sampling. Ferrous iron measured with a Hach Iron test kit, Model IR-18, 0–10 mg/L.

Abbreviations:

CAS Chemical Abstracts Service
µg/L Micrograms per liter
µS/cm Microsiemens per centimeter
mg-$CaCO_3$/L Milligrams calcium carbonate per liter
mg/L Milligrams per liter
mV Millivolts
NTU Nephelometric turbidity units
ROD Record of Decision

Qualifiers:

J Analyte was detected, concentration is considered to be an estimate.
JQ Analyte was detected between the method detection limit and reporting limit, concentration is considered to be an estimate.
U Analyte was not detected at the given reporting limit.
UJ Analyte was not detected at the given reporting limit, which is considered to be an estimate.

Table 4.8
Analytical Results from Groundwater Monitoring Wells

					Area	Monitoring Wells (cont.)										
					Location [1]	DS-4I		DS-4DD		DS-5	DS-9S		DS-9I		DS-9D	
					Sample Type	Field Sample	Field Sample	Field Sample	Field Sample	Field Sample	Field Sample	Field Sample	Field Sample	Field Sample	Field Sample	Field Sample
					Sample Date	6/6/2020	9/23/2020	6/6/2020	9/26/2020	9/22/2020	6/7/2020	9/23/2020	6/7/2020	9/23/2020	6/7/2020	9/23/2020
Analytes	CAS No.	Units	Drinking Water-Based Criteria [2]	Surface Water-Based Criteria [3]												
Total Metals																
Aluminum	7429-90-5	µg/L	**16,000**	142	7,340	6,100	31.2	16.3 JQ	227 J	10.8 JQ	11.3 JQ	4,420	6,020	20.0 U	3.06 JQ
Cadmium	7440-43-9	µg/L	**5**	0.05	2.90	2.50	0.173	0.164	0.0304	0.107	0.133	2.25	2.77	0.133	0.0678
Calcium	7440-70-2	µg/L	--	--	67,600	64,700	56,000	55,400	6,140	7,150	6,320	67,200	70,300	52,100	50,600
Copper	7440-50-8	µg/L	**592**	1.45	43.6	35.0	0.500 U	0.369 JQ	0.703	0.500 U	0.500 U	14.7	25.9	0.500 U	0.500 U
Iron	7439-89-6	µg/L	--	1,000	11,000	23,200	24.6	14.5 JQ	194 J	20.0 U	20.0 U	11,400	20,400	17.4 JQ	15.3 JQ
Lead	7439-92-1	µg/L	**15**	0.169	0.0930 JQ	0.0990 JQ	0.100 U	0.100 U	0.165	0.100 U	0.100 U	0.102	0.117	0.100 U	0.100 U
Magnesium	7439-95-4	µg/L	--	--	10,700	10,200	8,230	8,060	701	831	818	10,100	11,000	8,800	7,400
Manganese	7439-96-5	µg/L	--	--	1,400	1,030	1.04	0.346 JQ	6.21	0.800	1.03	1,330	1,540	2.39	6.12
Potassium	7440-09-7	µg/L	--	--	7,980	8,450	2,160	2,260	589	838	856	8,060	8,330	2,270	2,030
Sodium	7440-23-5	µg/L	--	--	4,560	4,130	3,440	3,500	775	1,200	975	4,550	4,400	3,680	3,180
Zinc	7440-66-6	µg/L	**4,800**	13.6	422	422	1.91 JQ	1.82 JQ	4.61	10.7	10.2	293	433	3.05 JQ	6.02
Dissolved Metals [4]																
Aluminum	7429-90-5	µg/L	**16,000**	142	--	--	--	--	4.54 JQ	--	--	--	--	--	--
Cadmium	7440-43-9	µg/L	**5**	0.05	--	--	--	--	0.0226	--	--	--	--	--	--
Calcium	7440-70-2	µg/L	--	--	--	--	--	--	5,950	--	--	--	--	--	--
Copper	7440-50-8	µg/L	**592**	1.45	--	--	--	--	0.500 U	--	--	--	--	--	--
Iron	7439-89-6	µg/L	--	1,000	--	--	--	--	8.99 JQ	--	--	--	--	--	--
Lead	7439-92-1	µg/L	**15**	0.169	--	--	--	--	0.100 U	--	--	--	--	--	--
Magnesium	7439-95-4	µg/L	--	--	--	--	--	--	632	--	--	--	--	--	--
Manganese	7439-96-5	µg/L	--	--	--	--	--	--	0.186 JQ	--	--	--	--	--	--
Potassium	7440-09-7	µg/L	--	--	--	--	--	--	540	--	--	--	--	--	--
Sodium	7440-23-5	µg/L	--	--	--	--	--	--	771	--	--	--	--	--	--
Zinc	7440-66-6	µg/L	**4,800**	13.6	--	--	--	--	3.78 JQ	--	--	--	--	--	--
Conventionals																
Alkalinity, Total	--	mg-$CaCO_3$/L	--	--	1.00 U	1.00 UJ	35.0	36.2	11.4	1.00 U	6.95 J	1.00 U	1.00 U	33.1	33.8
Alkalinity, Bicarbonate	--	mg-$CaCO_3$/L	--	--	1.00 U	1.00 UJ	35.0	36.2	11.4	1.00 U	6.95 J	1.00 U	1.00 U	33.1	33.8
Alkalinity, Carbonate	--	mg-$CaCO_3$/L	--	--	1.00 U	1.00 UJ	1.00 U	1.00 U	1.00 U	1.00 U	1.00 UJ	1.00 U	1.00 U	1.00 U	1.00 U
Alkalinity, Hydroxide	--	mg-$CaCO_3$/L	--	--	1.00 U	1.00 UJ	1.00 U	1.00 U	1.00 U	1.00 U	1.00 UJ	1.00 U	1.00 U	1.00 U	1.00 U
Chloride	16887-00-6	mg/L	--	--	0.379	0.410	0.355	0.376	0.317	0.393	0.276	0.434	0.411	0.377	0.429
Dissolved Organic Carbon	--	mg/L	--	--	0.500 U	0.500 UJ	0.500 U	0.500 U	0.500 U	0.500 U	0.500 UJ	0.500 U	0.500 U	0.500 U	0.500 U
Nitrate (as Nitrogen)	14797-55-8	mg/L	--	--	0.100 UJ	0.100 UJ	0.245 J	0.232 J	0.100 UJ	0.100 UJ	0.100 UJ	0.100 UJ	0.100 UJ	0.276 J	0.116 J
Sulfate	14808-79-8	mg/L	--	--	230	280 J	106	129	7.26	13.1	14.8 J	210	290	102	122
Total Dissolved Solids	--	mg/L	--	--	432	507 J	249	262	45.0	41.0	40.0 J	442	559	259	269
Total Suspended Solids	--	mg/L	--	--	2.00	3.00 J	1.00	1.00 U	31.0	1.00 U	1.00 UJ	1.00 U	1.00 U	1.00 U	1.00 U
Total Organic Carbon	--	mg/L	--	--	0.500 U	0.500 UJ	0.500 U	0.500 U	0.550	0.500 U	0.500 UJ	0.500 U	0.500 U	0.500 U	0.500 U
Hardness, Total	--	mg-$CaCO_3$/L	--	--	213	203	174	171	18.2	21.3	19.1	209	221	166	157

Table 4.8
Analytical Results from Groundwater Monitoring Wells

					Area	Monitoring Wells (cont.)										
					Location [1]	DS-4I		DS-4DD		DS-5	DS-9S		DS-9I		DS-9D	
					Sample Type	Field Sample	Field Sample	Field Sample	Field Sample	Field Sample	Field Sample	Field Sample	Field Sample	Field Sample	Field Sample	Field Sample
					Sample Date	6/6/2020	9/23/2020	6/6/2020	9/26/2020	9/22/2020	6/7/2020	9/23/2020	6/7/2020	9/23/2020	6/7/2020	9/23/2020
Analytes	CAS No.	Units	Drinking Water-Based Criteria [2]	Surface Water-Based Criteria [3]												
Field Parameters [5]																
Dissolved Oxygen (DO)	--	mg/L	--	--		1.12	0.22	3.98	3.08	8.01	8.62	5.86	2.61	0.43	2.88	1.08
Ferrous Iron	--	mg/L	--	--		1.5	2	--	0.5 U	0.5 U	0.5 U	0.5 U	3.0	4	0.5 U	0.5 U
Oxidation-Reduction Potential (ORP)	--	mV	--	--		249.2	221.7	173.6	115.2	150.8	205.3	190.9	170.9	184.2	171.4	155.4
pH	--	pH	--	--		4.09	4.33	6.48	6.02	6.36	5.74	5.62	4.36	4.28	6.35	6.35
Specific Conductivity	--	µS/cm	--	--		469.8	561	294.6	380.5	44.8	28.7	55.3	276.1	583	171.4	339.4
Turbidity	--	NTU	--	--		3.20	4.34	1.20	0.6	8.3	0.63	0.01	0.90	0.35	0.00	0.1

Notes:

Results for total and dissolved metals and conventionals are presented to three significant figures. Results for field parameters are presented to the significant figures indicated by the field meter.

-- Not applicable/available or not analyzed.

RED/BOLD Detected exceedance of drinking water-based criteria.

1 Locations are listed from upstream (west) to downstream (east).

2 Drinking water criteria given in Tables 2 and 11 of the ROD.

3 Surface water criteria given in Tables 3 and 11 of the ROD are presented for reference only. Reference criteria from the ROD for cadmium, copper, lead, and zinc are adjusted based on a hardness of 9 mg/L.

4 Field-filtered samples were submitted for dissolved metals analysis for locations where turbidity exceeded or approached 5 NTU.

5 Field measurements were collected with YSI ProDSS water quality instrument and LaMotte 2020we turbidity meter during sampling. Ferrous iron measured with a Hach Iron test kit, Model IR-18, 0–10 mg/L.

Abbreviations:

CAS Chemical Abstracts Service
µg/L Micrograms per liter
µS/cm Microsiemens per centimeter
mg-$CaCO_3$/L Milligrams calcium carbonate per liter
mg/L Milligrams per liter
mV Millivolts
NTU Nephelometric turbidity units
ROD Record of Decision

Qualifiers:

J Analyte was detected, concentration is considered to be an estimate.
JQ Analyte was detected between the method detection limit and reporting limit, concentration is considered to be an estimate.
U Analyte was not detected at the given reporting limit.
UJ Analyte was not detected at the given reporting limit, which is considered to be an estimate.

Table 4.9
Analytical Results from Well Points

Area				Well Points											
Location [1]				SG-7R-WP						SG-8-WP					
Sample Type				Field Sample			Field Sample			Field Sample			Field Sample		
Sample Date				6/7/2020			9/22/2020			6/6/2020			9/26/2020		
Screen Interval (feet bgs)				3.5–4.0			3.5-4.0			5.0–5.5			5.0-5.5		
Analytes	CAS No.	Units	Surface Water-Based Criteria [2]	Hardness-Adjusted Criteria ROD [3]	Hardness-Adjusted Criteria 2016 [4]	Sample Result	Hardness-Adjusted Criteria ROD [3]	Hardness-Adjusted Criteria 2016 [4]	Sample Result	Hardness-Adjusted Criteria ROD [3]	Hardness-Adjusted Criteria 2016 [4]	Sample Result	Hardness-Adjusted Criteria ROD [3]	Hardness-Adjusted Criteria 2016 [4]	Sample Result
Total Metals															
Aluminum	7429-90-5	µg/L	**142**	--	--	75.3	--	--	**533**	--	--	17.7 JQ	--	--	34.6
Cadmium	7440-43-9	µg/L	0.05	0.0580	**0.150**	0.0228	0.0613	**0.160**	0.0246	0.058	**0.15**	0.00680 JQ	0.0606	**0.158**	0.0200 U
Calcium	7440-70-2	µg/L	--	--	--	6,470	--	--	5,130	--	--	5,480	--	--	4,880
Copper	7440-50-8	µg/L	1.45	**1.92**	--	0.449 JQ	**2.06**	--	1.37	**1.92**	--	0.367 JQ	**2.04**	--	0.351 JQ
Iron	7439-89-6	µg/L	**1,000**		--	19.4 JQ	--	--	147	--	--	362	--	--	358
Lead	7439-92-1	µg/L	0.169	**0.247**	--	0.100 U	**0.271**	--	0.100 U	**0.247**	--	0.100 U	**0.267**	--	0.0760 JQ
Magnesium	7439-95-4	µg/L	--	--	--	714	--	--	557	--	--	733	--	--	571
Manganese	7439-96-5	µg/L	--	--	--	0.920	--	--	6.96	--	--	9.18	--	--	7.64
Potassium	7440-09-7	µg/L	--	--	--	558	--	--	525	--	--	556	--	--	582
Sodium	7440-23-5	µg/L	--	--	--	1,040	--	--	695	--	--	1,200	--	--	981
Zinc	7440-66-6	µg/L	13.6	**17.9**	--	1.30 JQ	**19.3**	--	3.36 JQ	**17.9**	--	2.32 JQ	**19**	--	2.40 JQ
Dissolved Metals [5]															
Aluminum	7429-90-5	µg/L	**142**	--	--	54.9	--	--	**196**	--	--	--	--	--	--
Cadmium	7440-43-9	µg/L	0.05	0.0580	**0.150**	0.0230	0.0613	**0.16**	0.0184 JQ	--	**--**	--	--	**--**	--
Calcium	7440-70-2	µg/L	--	--	--	6,250	--	--	5,020	--	--	--	--	--	--
Copper	7440-50-8	µg/L	1.45	**1.92**	--	0.484 JQ	**2.06**	--	0.749	**--**	--	--	**--**	--	--
Iron	7439-89-6	µg/L	**1,000**	--	--	23.4	--	--	60.7	--	--	--	--	--	--
Lead	7439-92-1	µg/L	0.169	**0.247**	--	0.100 U	**0.271**	--	0.100 U	**--**	--	--	**--**	--	--
Magnesium	7439-95-4	µg/L	--	--	--	670	--	--	534	--	--	--	--	--	--
Manganese	7439-96-5	µg/L	--	--	--	0.692	--	--	2.38	--	--	--	--	--	--
Potassium	7440-09-7	µg/L	--	--	--	501	--	--	514	--	--	--	--	--	--
Sodium	7440-23-5	µg/L	--	--	--	979	--	--	709	--	--	--	--	--	--
Zinc	7440-66-6	µg/L	13.6	**17.9**	--	2.04 JQ	**19.3**	--	2.42 JQ	**--**	--	--	**--**	--	--
Conventionals															
Alkalinity, Total	--	mg-$CaCO_3$/L	--	--	--	15.4	--	--	10.5	--	--	14.2	--	--	12.5
Alkalinity, Bicarbonate	--	mg-$CaCO_3$/L	--	--	--	15.4	--	--	10.5	--	--	14.2	--	--	12.5
Alkalinity, Carbonate	--	mg-$CaCO_3$/L	--	--	--	1.00 U	--	--	1.00 U	--	--	1.00 U	--	--	1.00 U
Alkalinity, Hydroxide	--	mg-$CaCO_3$/L	--	--	--	1.00 U	--	--	1.00 U	--	--	1.00 U	--	--	1.00 U
Chloride	16887-00-6	mg/L	--	--	--	0.186	--	--	0.325	--	--	0.265	--	--	0.294
Dissolved Organic Carbon	--	mg/L	--	--	--	0.500 U	--	--	0.500 U	--	--	0.770	--	--	0.710
Nitrate (as Nitrogen)	14797-55-8	mg/L	--	--	--	0.100 J	--	--	0.100 UJ	--	--	0.100 UJ	--	--	0.100 UJ
Sulfate	14808-79-8	mg/L	--	--	--	5.27	--	--	5.16	--	--	3.88	--	--	3.18
Total Dissolved Solids	--	mg/L	--	--	--	35.0	--	--	36.0	--	--	23.0	--	--	27.0
Total Suspended Solids	--	mg/L	--	--	--	6.00	--	--	45.0	--	--	1.00 U	--	--	1.00 U
Total Organic Carbon	--	mg/L	--	--	--	0.500 U	--	--	0.500 U	--	--	0.700	--	--	0.660
Hardness, Total	--	mg-$CaCO_3$/L	--	--	--	19.1	--	--	15.1	--	--	16.7	--	--	14.5

Table 4.9
Analytical Results from Well Points

Area				Well Points											
Location [1]				SG-7R-WP						SG-8-WP					
Sample Type				Field Sample			Field Sample			Field Sample			Field Sample		
Sample Date				6/7/2020			9/22/2020			6/6/2020			9/26/2020		
Screen Interval (feet bgs)				3.5–4.0			3.5-4.0			5.0–5.5			5.0-5.5		
Analytes	CAS No.	Units	Surface Water-Based Criteria [2]	Hardness-Adjusted Criteria ROD[3]	Hardness-Adjusted Criteria 2016[4]	Sample Result	Hardness-Adjusted Criteria ROD[3]	Hardness-Adjusted Criteria 2016[4]	Sample Result	Hardness-Adjusted Criteria ROD[3]	Hardness-Adjusted Criteria 2016[4]	Sample Result	Hardness-Adjusted Criteria ROD[3]	Hardness-Adjusted Criteria 2016[4]	Sample Result
Field Parameters [6]															
Dissolved Oxygen (DO)	--	mg/L	--	--	--	10.31	--	--	9.17	--	--	7.35	--	--	9.55
Ferrous Iron	--	mg/L	--	--	--	0.5 U	--	--	0.5 U	--	--	0.5 U	--	--	0.5 U
Oxidation-Reduction Potential (ORP)	--	mV	--	--	--	206.2	--	--	117.6	--	--	101.6	--	--	16.6
pH	--	pH	--	--	--	6.66	--	--	6.72	--	--	6.21	--	--	5.88
Specific Conductivity	--	µS/cm	--	--	--	45.9	--	--	37.3	--	--	35.6	--	--	36.9
Turbidity	--	ntu	--	--	--	14.40	--	--	29.1	--	--	1.70	--	--	1.96

Notes:

Results for total and dissolved metals and conventionals are presented to three significant figures. Results for field parameters are presented to the significant figures indicated by the field meter.

-- Not applicable/available or not analyzed.

RED/BOLD Detected exceedance of applicable criteria (applicable criteria presented in **bold**).

1 Locations are listed from upstream (west) to downstream (east).

2 Surface water criteria given in Tables 3 and 11 of the ROD are presented for reference only. Reference criteria from the ROD for cadmium, copper, lead, and zinc are adjusted based on a hardness of 9 mg/L.

3 For cadmium, copper, lead, and zinc, criteria are presented that are adjusted for hardness for each sample, in accordance with Table 3 of the ROD. The cadmium criteria, adjusted in accordance with the U.S. Environmental Protection Agency National Recommended Water Quality Criteria (NRWQC) last updated in 2001, is presented for reference only. Cadmium results are compared to 2016 hardness adjusted criteria. Copper, lead, and zinc were adjusted based on WAC Chapter 173-201A (accessed at https://apps.leg.wa.gov/WAC/default.aspx?cite=173-201A-240). The hardness of the hyporheic zone, the 12-inch porewater hardness at the adjacent porewater sampling cluster, was used for the adjustment. For locations with no adjacent porewater samplers (DS-14), the average of the two closest locations was used.

4 Cadmium criteria adjusted for hardness using the current (updated 2016) NRWQC hardness correction formula (accessed at https://www.epa.gov/wqc/national-recommended-water-quality-criteria-aquatic-life-criteria-table#b).

5 Field-filtered samples were submitted for dissolved metals analysis for locations where turbidity exceeded or approached 5 NTU.

6 Field measurements were collected with YSI ProDSS water quality instrument and LaMotte 2020we turbidity meter during sampling. Ferrous iron measured with a Hach Iron test kit, Model IR-18, 0–10 mg/L.

Abbreviations:

bgs	Below ground surface	mg/L	Milligrams per liter
CAS	Chemical Abstracts Service	mV	Millivolts
µg/L	Micrograms per liter	NTU	Nephelometric turbidity units
µS/cm	Microsiemens per centimeter	ROD	Record of Decision
mg-$CaCO_3$/L	Milligrams calcium carbonate per liter		

Qualifiers:

J	Analyte was detected, concentration is considered to be an estimate.
JQ	Analyte was detected between the method detection limit and reporting limit, concentration is considered to be an estimate.
U	Analyte was not detected at the given reporting limit.
UJ	Analyte was not detected at the given reporting limit, which is considered to be an estimate.

Table 4.9
Analytical Results from Well Points

Area				Well Points (cont.)											
Location [1]				SG-9-WP						DS-14					
Sample Type				Field Sample			Field Sample			Field Sample			Field Sample		
Sample Date				6/7/2020			9/26/2020			6/7/2020			9/25/2020		
Screen Interval (feet bgs)				5.0–5.5			5.0-5.5			9.5–10			9.5-10		
Analytes	CAS No.	Units	Surface Water-Based Criteria [2]	Hardness-Adjusted Criteria ROD [3]	Hardness-Adjusted Criteria 2016 [4]	Sample Result	Hardness-Adjusted Criteria ROD [3]	Hardness-Adjusted Criteria 2016 [4]	Sample Result	Hardness-Adjusted Criteria ROD [3]	Hardness-Adjusted Criteria 2016 [4]	Sample Result	Hardness-Adjusted Criteria ROD [3]	Hardness-Adjusted Criteria 2016 [4]	Sample Result
Total Metals															
Aluminum	7429-90-5	µg/L	**142**	--	--	16.3 JQ	--	--	27.7	--	--	**199**	--	--	50.5
Cadmium	7440-43-9	µg/L	0.05	0.07	**0.186**	**0.328**	0.0873	**0.234**	**0.325**	0.068	**0.178**	**0.190**	0.0807	**0.215**	0.166
Calcium	7440-70-2	µg/L	--	--	--	7,720	--	--	12,100	--	--	9,420	--	--	8,650
Copper	7440-50-8	µg/L	1.45	**2.45**	--	**2.52**	**3.19**	--	2.84	**2.34**	--	1.18	**2.89**	--	0.520
Iron	7439-89-6	µg/L	**1,000**	--	--	20.0 U	--	--	91.7	--	--	688	--	--	132
Lead	7439-92-1	µg/L	0.169	**0.341**	--	0.100 U	**0.483**	--	0.100 U	**0.321**	--	0.162	**0.425**	--	0.100 U
Magnesium	7439-95-4	µg/L	--	--	--	1,060	--	--	1,580	--	--	1,580	--	--	1,190
Manganese	7439-96-5	µg/L	--	--	--	10.2	--	--	2.62	--	--	24.4	--	--	8.86
Potassium	7440-09-7	µg/L	--	--	--	1,020	--	--	1,270	--	--	1,230	--	--	1,320
Sodium	7440-23-5	µg/L	--	--	--	1,030	--	--	1,280	--	--	1,480	--	--	1,550
Zinc	7440-66-6	µg/L	13.6	**22.8**	--	**33.5**	**29.6**	--	**31.2**	**21.8**	--	21.8	**27**	--	20.5
Dissolved Metals [5]															
Aluminum	7429-90-5	µg/L	**142**	--	--	--	--	--	--	--	--	**356**	--	--	--
Cadmium	7440-43-9	µg/L	0.05	--	**--**	--	--	**--**	--	0.068	**0.178**	**0.236**	--	**--**	--
Calcium	7440-70-2	µg/L	--	--	--	--	--	--	--	--	--	9,040	--	--	--
Copper	7440-50-8	µg/L	1.45	**--**	--	--	**--**	--	--	**2.34**	--	1.88	**--**	--	--
Iron	7439-89-6	µg/L	**1,000**	--	--	--	--	--	--	--	--	**1,200**	--	--	--
Lead	7439-92-1	µg/L	0.169	**--**	--	--	**--**	--	--	**0.321**	--	0.250	**--**	--	--
Magnesium	7439-95-4	µg/L	--	--	--	--	--	--	--	--	--	1,460	--	--	--
Manganese	7439-96-5	µg/L	--	--	--	--	--	--	--	--	--	29.6	--	--	--
Potassium	7440-09-7	µg/L	--	--	--	--	--	--	--	--	--	1,070	--	--	--
Sodium	7440-23-5	µg/L	--	--	--	--	--	--	--	--	--	1,330	--	--	--
Zinc	7440-66-6	µg/L	13.6	**--**	--	--	**--**	--	--	**21.8**	--	**24.6**	**--**	--	--
Conventionals															
Alkalinity, Total	--	mg-$CaCO_3$/L	--	--	--	4.62	--	--	6.33	--	--	4.52	--	--	4.28
Alkalinity, Bicarbonate	--	mg-$CaCO_3$/L	--	--	--	4.62	--	--	6.33	--	--	4.52	--	--	4.28
Alkalinity, Carbonate	--	mg-$CaCO_3$/L	--	--	--	1.00 U	--	--	1.00 U	--	--	1.00 U	--	--	1.00 U
Alkalinity, Hydroxide	--	mg-$CaCO_3$/L	--	--	--	1.00 U	--	--	1.00 U	--	--	1.00 U	--	--	1.00 U
Chloride	16887-00-6	mg/L	--	--	--	0.153	--	--	0.287	--	--	0.665	--	--	0.300
Dissolved Organic Carbon	--	mg/L	--	--	--	0.500 U	--	--	0.500 U	--	--	--	--	--	0.500 U
Nitrate (as Nitrogen)	14797-55-8	mg/L	--	--	--	0.100 UJ	--	--	0.100 UJ	--	--	0.100 UJ	--	--	0.100 UJ
Sulfate	14808-79-8	mg/L	--	--	--	16.4	--	--	30.0	--	--	21.9	--	--	22.1
Total Dissolved Solids	--	mg/L	--	--	--	42.0	--	--	59.0	--	--	--	--	--	57.0
Total Suspended Solids	--	mg/L	--	--	--	1.00 U	--	--	1.00	--	--	--	--	--	14.0
Total Organic Carbon	--	mg/L	--	--	--	0.500 U	--	--	0.500 U	--	--	--	--	--	0.500 U
Hardness, Total	--	mg-$CaCO_3$/L	--	--	--	23.7	--	--	36.7	--	--	30.0	--	--	26.5

Table 4.9
Analytical Results from Well Points

Area				Well Points (cont.)											
Location [1]				SG-9-WP						DS-14					
Sample Type				Field Sample			Field Sample			Field Sample			Field Sample		
Sample Date				6/7/2020			9/26/2020			6/7/2020			9/25/2020		
Screen Interval (feet bgs)				5.0–5.5			5.0-5.5			9.5–10			9.5-10		
Analytes	CAS No.	Units	Surface Water-Based Criteria [2]	Hardness-Adjusted Criteria ROD[3]	Hardness-Adjusted Criteria 2016[4]	Sample Result	Hardness-Adjusted Criteria ROD[3]	Hardness-Adjusted Criteria 2016[4]	Sample Result	Hardness-Adjusted Criteria ROD[3]	Hardness-Adjusted Criteria 2016[4]	Sample Result	Hardness-Adjusted Criteria ROD[3]	Hardness-Adjusted Criteria 2016[4]	Sample Result
Field Parameters [6]															
Dissolved Oxygen (DO)	--	mg/L	--	--	--	7.04	--	--	4.12	--	--	6.50	--	--	3.89
Ferrous Iron	--	mg/L	--	--	--	0.5 U	--	--	0.5 U	--	--	0.5 U	--	--	0.5 U
Oxidation-Reduction Potential (ORP)	--	mV	--	--	--	220.5	--	--	217.3	--	--	201.0	--	--	217.7
pH	--	pH	--	--	--	5.47	--	--	5.45	--	--	5.57	--	--	5.48
Specific Conductivity	--	µS/cm	--	--	--	33.6	--	--	98.4	--	--	46.5	--	--	69.3
Turbidity	--	ntu	--	--	--	0.86	--	--	0.53	--	--	34.80	--	--	0.81

Notes:

Results for total and dissolved metals and conventionals are presented to three significant figures. Results for field parameters are presented to the significant figures indicated by the field meter.

-- Not applicable/available or not analyzed.

RED/BOLD Detected exceedance of applicable criteria (applicable criteria presented in **bold**).

1 Locations are listed from upstream (west) to downstream (east).

2 Surface water criteria given in Tables 3 and 11 of the ROD are presented for reference only. Reference criteria from the ROD for cadmium, copper, lead, and zinc are adjusted based on a hardness of 9 mg/L.

3 For cadmium, copper, lead, and zinc, criteria are presented that are adjusted for hardness for each sample, in accordance with Table 3 of the ROD. The cadmium criteria, adjusted in accordance with the U.S. Environmental Protection Agency National Recommended Water Quality Criteria (NRWQC) last updated in 2001, is presented for reference only. Cadmium results are compared to 2016 hardness adjusted criteria. Copper, lead, and zinc were adjusted based on WAC Chapter 173-201A (accessed at https://apps.leg.wa.gov/WAC/default.aspx?cite=173-201A-240). The hardness of the hyporheic zone, the 12-inch porewater hardness at the adjacent porewater sampling cluster, was used for the adjustment. For locations with no adjacent porewater samplers (DS-14), the average of the two closest locations was used.

4 Cadmium criteria adjusted for hardness using the current (updated 2016) NRWQC hardness correction formula (accessed at https://www.epa.gov/wqc/national-recommended-water-quality-criteria-aquatic-life-criteria-table#b).

5 Field-filtered samples were submitted for dissolved metals analysis for locations where turbidity exceeded or approached 5 NTU.

6 Field measurements were collected with YSI ProDSS water quality instrument and LaMotte 2020we turbidity meter during sampling. Ferrous iron measured with a Hach Iron test kit, Model IR-18, 0–10 mg/L.

Abbreviations:

bgs Below ground surface
CAS Chemical Abstracts Service
µg/L Micrograms per liter
µS/cm Microsiemens per centimeter
mg-$CaCO_3$/L Milligrams calcium carbonate per liter
mg/L Milligrams per liter
mV Millivolts
NTU Nephelometric turbidity units
ROD Record of Decision

Qualifiers:

J Analyte was detected, concentration is considered to be an estimate.
JQ Analyte was detected between the method detection limit and reporting limit, concentration is considered to be an estimate.
U Analyte was not detected at the given reporting limit.
UJ Analyte was not detected at the given reporting limit, which is considered to be an estimate.

Table 4.9
Analytical Results from Well Points

Area				Well Points (cont.)											
Location [1]				SG-17-WP						SG-10-WP					
Sample Type				Field Sample			Field Sample			Field Sample			Field Sample		
Sample Date				6/7/2020			9/25/2020			6/7/2020			9/25/2020		
Screen Interval (feet bgs)				5.5–6.0			5.5-6.0			5.0–5.5			5.5-5.5		
Analytes	CAS No.	Units	Surface Water-Based Criteria [2]	Hardness-Adjusted Criteria ROD [3]	Hardness-Adjusted Criteria 2016 [4]	Sample Result	Hardness-Adjusted Criteria ROD [3]	Hardness-Adjusted Criteria 2016 [4]	Sample Result	Hardness-Adjusted Criteria ROD [3]	Hardness-Adjusted Criteria 2016 [4]	Sample Result	Hardness-Adjusted Criteria ROD [3]	Hardness-Adjusted Criteria 2016 [4]	Sample Result
Total Metals															
Aluminum	7429-90-5	µg/L	**142**	--	--	96.6	--	--	**160**	--	--	**4,130**	--	--	**3,420**
Cadmium	7440-43-9	µg/L	0.05	0.065	**0.171**	**0.627**	0.0739	**0.196**	**1.08**	0.066	**0.172**	**4.37**	0.367	**1.11**	**4.08**
Calcium	7440-70-2	µg/L	--	--	--	37,900	--	--	36,500	--	--	52,500	--	--	44,500
Copper	7440-50-8	µg/L	1.45	**2.23**	--	0.971	**2.6**	--	1.26	**2.24**	--	**34.8**	**18.6**	--	**25.0**
Iron	7439-89-6	µg/L	**1,000**	--	--	14.1 JQ	--	--	40.0 U	--	--	20.2	--	--	40.0 U
Lead	7439-92-1	µg/L	0.169	**0.301**	--	0.100 U	**0.369**	--	0.100 U	**0.303**	--	0.153	**4.69**	--	0.121
Magnesium	7439-95-4	µg/L	--	--	--	5,970	--	--	5,320	--	--	7,520	--	--	6,550
Manganese	7439-96-5	µg/L	--	--	--	274	--	--	288	--	--	3,490	--	--	2,370
Potassium	7440-09-7	µg/L	--	--	--	2,950	--	--	3,150	--	--	4,670	--	--	5,000
Sodium	7440-23-5	µg/L	--	--	--	3,210	--	--	2,740	--	--	3,320	--	--	3,190
Zinc	7440-66-6	µg/L	13.6	**20.8**	--	**49.4**	**24.2**	--	**82.7**	**20.9**	--	**317**	**170**	--	**332**
Dissolved Metals [5]															
Aluminum	7429-90-5	µg/L	**142**	--	--	--	--	--	--	--	--	--	--	--	--
Cadmium	7440-43-9	µg/L	0.05	--	--	--	--	--	--	--	--	--	--	--	--
Calcium	7440-70-2	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--
Copper	7440-50-8	µg/L	1.45	--	--	--	--	--	--	--	--	--	--	--	--
Iron	7439-89-6	µg/L	**1,000**	--	--	--	--	--	--	--	--	--	--	--	--
Lead	7439-92-1	µg/L	0.169	--	--	--	--	--	--	--	--	--	--	--	--
Magnesium	7439-95-4	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--
Manganese	7439-96-5	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--
Potassium	7440-09-7	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--
Sodium	7440-23-5	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--
Zinc	7440-66-6	µg/L	13.6	--	--	--	--	--	--	--	--	--	--	--	--
Conventionals															
Alkalinity, Total	--	mg-$CaCO_3$/L	--	--	--	8.52	--	--	5.82	--	--	1.00 U	--	--	1.00 U
Alkalinity, Bicarbonate	--	mg-$CaCO_3$/L	--	--	--	8.52	--	--	5.82	--	--	1.00 U	--	--	1.00 U
Alkalinity, Carbonate	--	mg-$CaCO_3$/L	--	--	--	1.00 U	--	--	1.00 U	--	--	1.00 U	--	--	1.00 U
Alkalinity, Hydroxide	--	mg-$CaCO_3$/L	--	--	--	1.00 U	--	--	1.00 U	--	--	1.00 U	--	--	1.00 U
Chloride	16887-00-6	mg/L	--	--	--	0.397	--	--	0.402	--	--	0.382	--	--	0.350
Dissolved Organic Carbon	--	mg/L	--	--	--	0.610	--	--	0.500 U	--	--	0.700	--	--	0.520
Nitrate (as Nitrogen)	14797-55-8	mg/L	--	--	--	0.112 J	--	--	0.100 UJ	--	--	0.100 UJ	--	--	0.100 UJ
Sulfate	14808-79-8	mg/L	--	--	--	86.9	--	--	113	--	--	154	--	--	160
Total Dissolved Solids	--	mg/L	--	--	--	185	--	--	196	--	--	309	--	--	275
Total Suspended Solids	--	mg/L	--	--	--	2.00	--	--	1.00 U	--	--	1.00 U	--	--	1.00 U
Total Organic Carbon	--	mg/L	--	--	--	0.500 U	--	--	0.500 U	--	--	0.630	--	--	0.500 U
Hardness, Total	--	mg-$CaCO_3$/L	--	--	--	119	--	--	113	--	--	162	--	--	138

Table 4.9
Analytical Results from Well Points

Area	Well Points (cont.)														
Location [1]	SG-17-WP								SG-10-WP						
Sample Type	Field Sample			Field Sample			Field Sample			Field Sample					
Sample Date	6/7/2020			9/25/2020			6/7/2020			9/25/2020					
Screen Interval (feet bgs)	5.5–6.0			5.5-6.0			5.0–5.5			5.5-5.5					
Analytes	CAS No.	Units	Surface Water-Based Criteria [2]	Hardness-Adjusted Criteria ROD [3]	Hardness-Adjusted Criteria 2016 [4]	Sample Result	Hardness-Adjusted Criteria ROD [3]	Hardness-Adjusted Criteria 2016 [4]	Sample Result	Hardness-Adjusted Criteria ROD [3]	Hardness-Adjusted Criteria 2016 [4]	Sample Result	Hardness-Adjusted Criteria ROD [3]	Hardness-Adjusted Criteria 2016 [4]	Sample Result
Field Parameters [6]															
Dissolved Oxygen (DO)	--	mg/L	--	--	--	4.68	--	--	2.91	--	--	1.79	--	--	1.12
Ferrous Iron	--	mg/L	--	--	--	0.5 U	--	--	0.5 U	--	--	0.5 U	--	--	0.5 U
Oxidation-Reduction Potential (ORP)	--	mV	--	--	--	282.4	--	--	201.6	--	--	350.6	--	--	294.5
pH	--	pH	--	--	--	5.59	--	--	5.55	--	--	4.17	--	--	4.44
Specific Conductivity	--	µS/cm	--	--	--	145.4	--	--	271.7	--	--	217.3	--	--	353
Turbidity	--	ntu	--	--	--	0.31	--	--	0.2	--	--	0.44	--	--	0.3

Notes:

Results for total and dissolved metals and conventionals are presented to three significant figures. Results for field parameters are presented to the significant figures indicated by the field meter.

-- Not applicable/available or not analyzed.

RED/BOLD Detected exceedance of applicable criteria (applicable criteria presented in **bold**).

1 Locations are listed from upstream (west) to downstream (east).

2 Surface water criteria given in Tables 3 and 11 of the ROD are presented for reference only. Reference criteria from the ROD for cadmium, copper, lead, and zinc are adjusted based on a hardness of 9 mg/L.

3 For cadmium, copper, lead, and zinc, criteria are presented that are adjusted for hardness for each sample, in accordance with Table 3 of the ROD. The cadmium criteria, adjusted in accordance with the U.S. Environmental Protection Agency National Recommended Water Quality Criteria (NRWQC) last updated in 2001, is presented for reference only. Cadmium results are compared to 2016 hardness adjusted criteria. Copper, lead, and zinc were adjusted based on WAC Chapter 173-201A (accessed at https://apps.leg.wa.gov/WAC/default.aspx?cite=173-201A-240). The hardness of the hyporheic zone, the 12-inch porewater hardness at the adjacent porewater sampling cluster, was used for the adjustment. For locations with no adjacent porewater samplers (DS-14), the average of the two closest locations was used.

4 Cadmium criteria adjusted for hardness using the current (updated 2016) NRWQC hardness correction formula (accessed at https://www.epa.gov/wqc/national-recommended-water-quality-criteria-aquatic-life-criteria-table#b).

5 Field-filtered samples were submitted for dissolved metals analysis for locations where turbidity exceeded or approached 5 NTU.

6 Field measurements were collected with YSI ProDSS water quality instrument and LaMotte 2020we turbidity meter during sampling. Ferrous iron measured with a Hach Iron test kit, Model IR-18, 0–10 mg/L.

Abbreviations:

bgs Below ground surface
CAS Chemical Abstracts Service
µg/L Micrograms per liter
µS/cm Microsiemens per centimeter
mg-$CaCO_3$/L Milligrams calcium carbonate per liter
mg/L Milligrams per liter
mV Millivolts
NTU Nephelometric turbidity units
ROD Record of Decision

Qualifiers:

J Analyte was detected, concentration is considered to be an estimate.
JQ Analyte was detected between the method detection limit and reporting limit, concentration is considered to be an estimate.
U Analyte was not detected at the given reporting limit.
UJ Analyte was not detected at the given reporting limit, which is considered to be an estimate.

Table 4.9
Analytical Results from Well Points

Area				Well Points (cont.)											
Location [1]				SG-18-WP						SG-11-WP					
Sample Type				Field Sample			Field Sample			Field Sample			Field Sample		
Sample Date				6/6/2020			9/24/2020			6/6/2020			9/23/2020		
Screen Interval (feet bgs)				5.4–5.9			5.4-5.9			5.6–6.1			5.6-6.1		
Analytes	CAS No.	Units	Surface Water-Based Criteria [2]	Hardness-Adjusted Criteria ROD [3]	Hardness-Adjusted Criteria 2016 [4]	Sample Result	Hardness-Adjusted Criteria ROD [3]	Hardness-Adjusted Criteria 2016 [4]	Sample Result	Hardness-Adjusted Criteria ROD [3]	Hardness-Adjusted Criteria 2016 [4]	Sample Result	Hardness-Adjusted Criteria ROD [3]	Hardness-Adjusted Criteria 2016 [4]	Sample Result
Total Metals															
Aluminum	7429-90-5	µg/L	**142**	--	--	19.7 JQ	--	--	23.2	--	--	27.0	--	--	49.3
Cadmium	7440-43-9	µg/L	0.05	0.179	**0.509**	0.0694	0.149	**0.417**	0.0516	0.078	**0.206**	0.204	0.172	**0.487**	0.281
Calcium	7440-70-2	µg/L	--	--	--	11,000	--	--	9,580	--	--	35,700	--	--	35,100
Copper	7440-50-8	µg/L	1.45	**7.68**	--	0.861	**6.13**	--	0.823	**2.76**	--	0.447 JQ	**7.29**	--	0.670
Iron	7439-89-6	µg/L	**1,000**	--	--	17.6 JQ	--	--	28.5	--	--	**1,600**	--	--	**1,210**
Lead	7439-92-1	µg/L	0.169	**1.53**	--	0.100 U	**1.14**	--	0.100 U	**0.399**	--	0.100 U	**1.43**	--	0.100 U
Magnesium	7439-95-4	µg/L	--	--	--	1,440	--	--	1,030	--	--	6,000	--	--	5,280
Manganese	7439-96-5	µg/L	--	--	--	5.93	--	--	6.07	--	--	12.3	--	--	14.1
Potassium	7440-09-7	µg/L	--	--	--	881	--	--	735	--	--	2,390	--	--	2,460
Sodium	7440-23-5	µg/L	--	--	--	1,230	--	--	982	--	--	3,490	--	--	3,430
Zinc	7440-66-6	µg/L	13.6	**70.9**	--	6.21	**56.7**	--	5.37	**25.7**	--	17.7	**67.4**	--	17.3
Dissolved Metals [5]															
Aluminum	7429-90-5	µg/L	**142**	--	--	--	--	--	--	--	--	--	--	--	--
Cadmium	7440-43-9	µg/L	0.05	--	--	--	--	--	--	--	--	--	--	--	--
Calcium	7440-70-2	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--
Copper	7440-50-8	µg/L	1.45	--	--	--	--	--	--	--	--	--	--	--	--
Iron	7439-89-6	µg/L	**1,000**	--	--	--	--	--	--	--	--	--	--	--	--
Lead	7439-92-1	µg/L	0.169	--	--	--	--	--	--	--	--	--	--	--	--
Magnesium	7439-95-4	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--
Manganese	7439-96-5	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--
Potassium	7440-09-7	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--
Sodium	7440-23-5	µg/L	--	--	--	--	--	--	--	--	--	--	--	--	--
Zinc	7440-66-6	µg/L	13.6	--	--	--	--	--	--	--	--	--	--	--	--
Conventionals															
Alkalinity, Total	--	mg-$CaCO_3$/L	--	--	--	14.8	--	--	21.1	--	--	25.0	--	--	20.7
Alkalinity, Bicarbonate	--	mg-$CaCO_3$/L	--	--	--	14.8	--	--	21.1	--	--	25.0	--	--	20.7
Alkalinity, Carbonate	--	mg-$CaCO_3$/L	--	--	--	1.00 U	--	--	1.00 U	--	--	1.00 U	--	--	1.00 U
Alkalinity, Hydroxide	--	mg-$CaCO_3$/L	--	--	--	1.00 U	--	--	1.00 U	--	--	1.00 U	--	--	1.00 U
Chloride	16887-00-6	mg/L	--	--	--	0.183	--	--	0.112	--	--	0.280	--	--	0.607
Dissolved Organic Carbon	--	mg/L	--	--	--	0.770	--	--	0.660	--	--	1.49	--	--	1.42
Nitrate (as Nitrogen)	14797-55-8	mg/L	--	--	--	0.269 J	--	--	0.100 UJ	--	--	0.100 UJ	--	--	0.196 J
Sulfate	14808-79-8	mg/L	--	--	--	17.1	--	--	11.8	--	--	70.8	--	--	88.2
Total Dissolved Solids	--	mg/L	--	--	--	56.0	--	--	50.0	--	--	188	--	--	185
Total Suspended Solids	--	mg/L	--	--	--	1.00	--	--	11.0	--	--	60.0	--	--	3.00
Total Organic Carbon	--	mg/L	--	--	--	0.590	--	--	0.500 U	--	--	1.39	--	--	0.990
Hardness, Total	--	mg-$CaCO_3$/L	--	--	--	33.3	--	--	28.2	--	--	114	--	--	109

Table 4.9
Analytical Results from Well Points

Area				Well Points (cont.)											
Location [1]				SG-18-WP						SG-11-WP					
Sample Type				Field Sample			Field Sample			Field Sample			Field Sample		
Sample Date				6/6/2020			9/24/2020			6/6/2020			9/23/2020		
Screen Interval (feet bgs)				5.4–5.9			5.4-5.9			5.6–6.1			5.6-6.1		
Analytes	CAS No.	Units	Surface Water-Based Criteria [2]	Hardness-Adjusted Criteria ROD [3]	Hardness-Adjusted Criteria 2016 [4]	Sample Result	Hardness-Adjusted Criteria ROD [3]	Hardness-Adjusted Criteria 2016 [4]	Sample Result	Hardness-Adjusted Criteria ROD [3]	Hardness-Adjusted Criteria 2016 [4]	Sample Result	Hardness-Adjusted Criteria ROD [3]	Hardness-Adjusted Criteria 2016 [4]	Sample Result
Field Parameters [6]															
Dissolved Oxygen (DO)	--	mg/L	--	--	--	7.94	--	--	4.94	--	--	7.45	--	--	9.93
Ferrous Iron	--	mg/L	--	--	--	0.5 U	--	--	0.5 U	--	--	2.0	--	--	2
Oxidation-Reduction Potential (ORP)	--	mV	--	--	--	108.6	--	--	199.9	--	--	64.2	--	--	66
pH	--	pH	--	--	--	6.29	--	--	6.04	--	--	6.42	--	--	6.68
Specific Conductivity	--	µS/cm	--	--	--	87.2	--	--	75.9	--	--	264.4	--	--	253
Turbidity	--	ntu	--	--	--	0.45	--	--	1.24	--	--	0.66	--	--	0.4

Notes:

Results for total and dissolved metals and conventionals are presented to three significant figures. Results for field parameters are presented to the significant figures indicated by the field meter.

-- Not applicable/available or not analyzed.

RED/BOLD Detected exceedance of applicable criteria (applicable criteria presented in **bold**).

1 Locations are listed from upstream (west) to downstream (east).

2 Surface water criteria given in Tables 3 and 11 of the ROD are presented for reference only. Reference criteria from the ROD for cadmium, copper, lead, and zinc are adjusted based on a hardness of 9 mg/L.

3 For cadmium, copper, lead, and zinc, criteria are presented that are adjusted for hardness for each sample, in accordance with Table 3 of the ROD. The cadmium criteria, adjusted in accordance with the U.S. Environmental Protection Agency National Recommended Water Quality Criteria (NRWQC) last updated in 2001, is presented for reference only. Cadmium results are compared to 2016 hardness adjusted criteria. Copper, lead, and zinc were adjusted based on WAC Chapter 173-201A (accessed at https://apps.leg.wa.gov/WAC/default.aspx?cite=173-201A-240). The hardness of the hyporheic zone, the 12-inch porewater hardness at the adjacent porewater sampling cluster, was used for the adjustment. For locations with no adjacent porewater samplers (DS-14), the average of the two closest locations was used.

4 Cadmium criteria adjusted for hardness using the current (updated 2016) NRWQC hardness correction formula (accessed at https://www.epa.gov/wqc/national-recommended-water-quality-criteria-aquatic-life-criteria-table#b).

5 Field-filtered samples were submitted for dissolved metals analysis for locations where turbidity exceeded or approached 5 NTU.

6 Field measurements were collected with YSI ProDSS water quality instrument and LaMotte 2020we turbidity meter during sampling. Ferrous iron measured with a Hach Iron test kit, Model IR-18, 0–10 mg/L.

Abbreviations:

bgs Below ground surface
CAS Chemical Abstracts Service
µg/L Micrograms per liter
µS/cm Microsiemens per centimeter
mg-$CaCO_3$/L Milligrams calcium carbonate per liter
mg/L Milligrams per liter
mV Millivolts
NTU Nephelometric turbidity units
ROD Record of Decision

Qualifiers:

J Analyte was detected, concentration is considered to be an estimate.
JQ Analyte was detected between the method detection limit and reporting limit, concentration is considered to be an estimate.
U Analyte was not detected at the given reporting limit.
UJ Analyte was not detected at the given reporting limit, which is considered to be an estimate.

Table 4.10
Analytical Results from Porewater Sample Locations

				Area	Background																	
				Location [1]	RC-6-PW-6						RC-6-PW-12						RC-6-WP-36					
				Sample Type	Field Sample			Field Sample			Field Sample			Field Sample			Field Sample			Field Sample		
				Sample Date	6/6/2020			9/26/2020			6/6/2020			9/26/2020			6/6/2020			9/26/2020		
				Porewater Sampler Depth (feet bgs)	0.5			0.5			1			1			3			3		
Analytes	CAS No.	Units	Water-Based Criteria [2]		Hardness-Adjusted		Sample Result	Hardness-Adjusted		Sample Result	Hardness-Adjusted		Sample Result	Hardness-Adjusted		Sample Result	Hardness-Adjusted		Sample Result	Hardness-Adjusted		Sample Result
					ROD [3]	2016 [4]		ROD [3]	2016 [4]		ROD [3]	2016 [4]		ROD [3]	2016 [4]		ROD [3]	2016 [4]		ROD [3]	2016 [4]	
Total Metals [5]																						
Aluminum	7429-90-5	µg/L	**142**		--	--	14.8 JQ	--	--	8.72 JQ	--	--	26.4	--	--	8.30 JQ	--	--	78.8	--	--	7.56 JQ
Cadmium	7440-43-9	µg/L	0.05		0.054	**0.140**	0.013 JQ	0.0597	**0.155**	0.0186 JQ	0.054	**0.140**	0.015 JQ	0.0597	**0.155**	0.0114 JQ	0.054	**0.140**	0.016 JQ	0.0597	**0.155**	0.00940 JQ
Calcium	7440-70-2	µg/L	--		--	--	3,820	--	--	4,510	--	--	3,960	--	--	4,580	--	--	3,830	--	--	4,710
Copper	7440-50-8	µg/L	1.45		**1.78**	--	0.541	**2.00**	--	0.502	**1.78**	--	0.669	**2.00**	--	0.550	**1.78**	--	0.872	**2.00**	--	0.363 JQ
Iron	7439-89-6	µg/L	**1,000**		--	--	15.2 JQ	--	--	6.95 JQ	--	--	32.5	--	--	20.8	--	--	64.4	--	--	10.8 JQ
Lead	7439-92-1	µg/L	0.169		**0.222**	--	0.100 U	**0.260**	--	0.100 U	**0.222**	--	0.100 U	**0.260**	--	0.100 U	**0.222**	--	0.0870 JQ	**0.3**	--	0.100 U
Magnesium	7439-95-4	µg/L	--		--	--	371	--	--	398	--	--	375	--	--	412	--	--	387	--	--	428
Manganese	7439-96-5	µg/L	--		--	--	0.139 JQ	--	--	0.140 JQ	--	--	0.788	--	--	0.178 JQ	--	--	2.11	--	--	0.202 JQ
Potassium	7440-09-7	µg/L	--		--	--	379	--	--	363	--	--	370	--	--	398	--	--	369	--	--	393
Sodium	7440-23-5	µg/L	--		--	--	635	--	--	649	--	--	638	--	--	700	--	--	639	--	--	715
Zinc	7440-66-6	µg/L	13.6		**16.6**	--	**45.2**	**18.7**	--	**239**	**16.6**	--	**32.4**	**18.7**	--	9.75	**16.6**	--	**36.5**	**18.7**	--	4.82
Conventionals																						
Alkalinity, Total	--	mg-$CaCO_3$/L	--		--	--	9.54	--	--	10.1	--	--	9.54	--	--	10.1	--	--	9.34	--	--	9.90
Alkalinity, Bicarbonate	--	mg-$CaCO_3$/L	--		--	--	9.54	--	--	10.1	--	--	9.54	--	--	10.1	--	--	9.34	--	--	9.90
Alkalinity, Carbonate	--	mg-$CaCO_3$/L	--		--	--	1.00 U	--	--	1.00 U	--	--	1.00 U	--	--	1.00 U	--	--	1.00 U	--	--	1.00 U
Alkalinity, Hydroxide	--	mg-$CaCO_3$/L	--		--	--	1.00 U	--	--	1.00 U	--	--	1.00 U	--	--	1.00 U	--	--	1.00 U	--	--	1.00 U
Chloride	16887-00-6	mg/L	--		--	--	0.145	--	--	0.288	--	--	0.147	--	--	0.289	--	--	0.147	--	--	0.296
Dissolved Organic Carbon	--	mg/L	--		--	--	0.700	--	--	0.760	--	--	0.790	--	--	0.590	--	--	0.780	--	--	0.700
Nitrate (as Nitrogen)	14797-55-8	mg/L	--		--	--	0.100 UJ	--	--	0.100 UJ	--	--	0.100 UJ	--	--	0.100 UJ	--	--	0.100 UJ	--	--	0.100 UJ
Sulfate	14808-79-8	mg/L	--		--	--	2.11	--	--	3.49	--	--	2.12	--	--	3.52	--	--	2.13	--	--	3.46
Total Dissolved Solids	--	mg/L	--		--	--	23.0	--	--	16.0	--	--	29.0	--	--	15.0	--	--	22.0	--	--	19.0
Total Suspended Solids	--	mg/L	--		--	--	1.00 U	--	--	1.00 U	--	--	8.00	--	--	1.00 U	--	--	4.00	--	--	1.00 U
Total Organic Carbon	--	mg/L	--		--	--	0.620	--	--	0.510	--	--	0.640	--	--	0.720	--	--	0.680	--	--	0.510
Hardness, Total	--	mg-$CaCO_3$/L	--		--	--	11.1	--	--	12.9	--	--	11.4	--	--	13.1	--	--	11.2	--	--	13.5
Field Parameters [6]																						
Dissolved Oxygen (DO)	--	mg/L	--		--	--	10.70	--	--	8.98	--	--	10.83	--	--	9.91	--	--	10.49	--	--	8.52
Ferrous Iron	--	mg/L	--		--	--	0.5 U	--	--	0.5 U	--	--	0.5 U	--	--	0.5 U	--	--	0.5 U	--	--	0.5 U
Oxidation-Reduction Potential (ORP)	--	mV	--		--	--	139.7	--	--	138.4	--	--	141.5	--	--	150.4	--	--	153.3	--	--	190.5
pH	--	pH	--		--	--	6.50	--	--	6.57	--	--	6.82	--	--	6.71	--	--	6.76	--	--	6.52
Specific Conductivity	--	µS/cm	--		--	--	27.7	--	--	32	--	--	27.4	--	--	31.2	--	--	27.5	--	--	32.9
Turbidity	--	ntu	--		--	--	0.70	--	--	0.25	--	--	0.90	--	--	0.1	--	--	0.90	--	--	0.15

Notes:

Results for total metals and conventionals are presented to three significant figures. Results for field parameters are presented to the significant figures indicated by the field meter.

-- Not applicable/available or not analyzed.

RED/BOLD Detected exceedance of applicable criteria (applicable criteria presented in **bold**).

1 Locations are listed from upstream (west) to downstream (east).

2 Surface water criteria given in Tables 3 and 11 of the ROD are presented for reference only. Reference criteria from the ROD for cadmium, copper, lead, and zinc are adjusted based on a hardness of 9 mg/L.

3 For cadmium, copper, lead, and zinc, criteria are presented that are adjusted for hardness for each sample, in accordance with Table 3 of the ROD. The cadmium criteria, adjusted in accordance with the U.S. Environmental Protection Agency National Recommended Water Quality Criteria (NRWQC) last updated in 2001, is presented for reference only. Cadmium results are compared to 2016 hardness adjusted criteria. Copper, lead, and zinc were adjusted based on WAC Chapter 173-201A (accessed at https://apps.leg.wa.gov/WAC/default.aspx?cite=173-201A-240). The hardness of the hyporheic zone, the 12-inch porewater hardness for each porewater sampling location cluster, was used for the adjustment.

4 Cadmium criteria adjusted for hardness using the current (updated 2016) NRWQC hardness correction formula (accessed at https://www.epa.gov/wqc/national-recommended-water-quality-criteria-aquatic-life-criteria-table#b).

5 Field-filtered samples were submitted for dissolved metals analysis for locations where turbidity exceeded or approached 5 NTU. Dissolved results presented in parentheses.

6 Field measurements were collected with YSI ProDSS water quality instrument and LaMotte 2020we turbidity meter during sampling. Ferrous iron measured with a Hach Iron test kit, Model IR-18, 0–10 mg/L.

Abbreviations:

bgs Below ground surface
CAS Chemical Abstracts Service
µg/L Micrograms per liter
µS/cm Microsiemens per centimeter
mg-$CaCO_3$/L Milligrams calcium carbonate per liter
mg/L Milligrams per liter
mV Millivolts
NTU Nephelometric turbidity units
ROD Record of Decision

Qualifiers:

J Analyte was detected, concentration is considered to be an estimate.
JQ Analyte was detected between the method detection limit and reporting limit, concentration is considered to be an estimate.
U Analyte was not detected at the given reporting limit.
UJ Analyte was not detected at the given reporting limit, which is considered to be an estimate.

Table 4.10
Analytical Results from Porewater Sample Locations

			Area	Porewater														
			Location [1]	SG-7-PW-6						SG-7-PW-12								
			Sample Type	Field Sample			Field Sample			Field Sample			Field Sample			Field Duplicate		
			Sample Date	6/7/2020			9/26/2020			6/7/2020			9/26/2020			9/26/2020		
			Porewater Sampler Depth (feet bgs)	0.5			0.5			1			1			1		
Analytes	CAS No.	Units	Water-Based Criteria [2]	Hardness-Adjusted ROD [3]	Hardness-Adjusted 2016 [4]	Sample Result	Hardness-Adjusted ROD [3]	Hardness-Adjusted 2016 [4]	Sample Result	Hardness-Adjusted ROD [3]	Hardness-Adjusted 2016 [4]	Sample Result	Hardness-Adjusted ROD [3]	Hardness-Adjusted 2016 [4]	Sample Result	Hardness-Adjusted ROD [3]	Hardness-Adjusted 2016 [4]	Sample Result
Total Metals [5]																		
Aluminum	7429-90-5	µg/L	**142**	--	--	8.18 JQ	--	--	55.8	--	--	7.64 JQ	--	--	6.13 JQ			6.30 JQ
Cadmium	7440-43-9	µg/L	0.05	0.058	**0.15**	0.0300	0.0613	**0.16**	0.0288	0.058	**0.15**	0.0330	0.0613	**0.16**	0.0404	0.0613	**0.16**	0.0372
Calcium	7440-70-2	µg/L	--	--	--	4,090	--	--	4,310	--	--	4,280	--	--	4,700	--	--	4,520
Copper	7440-50-8	µg/L	1.45	**1.92**	--	**2.51**	**2.06**	--	1.09 J	**1.92**	--	1.06	**2.06**	--	1.04	**2.06**	--	1.03
Iron	7439-89-6	µg/L	**1,000**	--	--	10.2 JQ	--	--	112	--	--	7.98 JQ	--	--	10.1 JQ	--	--	11.0 JQ
Lead	7439-92-1	µg/L	0.169	**0.247**	--	0.100 U	**0.271**	--	0.0930 JQ	**0.247**	--	0.100 U	**0.271**	--	0.100 U	**0.271**	--	0.100 U
Magnesium	7439-95-4	µg/L	--	--	--	432	--	--	441	--	--	440	--	--	451	--	--	445
Manganese	7439-96-5	µg/L	--	--	--	0.127 JQ	--	--	2.92	--	--	0.0990 JQ	--	--	0.0890 JQ	--	--	0.125 JQ
Potassium	7440-09-7	µg/L	--	--	--	425	--	--	460	--	--	428	--	--	422	--	--	417
Sodium	7440-23-5	µg/L	--	--	--	687	--	--	591	--	--	673	--	--	730	--	--	736
Zinc	7440-66-6	µg/L	13.6	**17.9**	--	3.65 JQ	**19.3**	--	4.38	**17.9**	--	3.50 JQ	**19.3**	--	7.34	**19.3**	--	6.50
Conventionals																		
Alkalinity, Total	--	mg-$CaCO_3$/L	--	--	--	9.81	--	--	10.0	--	--	9.91	--	--	9.39	--	--	9.18
Alkalinity, Bicarbonate	--	mg-$CaCO_3$/L	--	--	--	9.81	--	--	10.0	--	--	9.91	--	--	9.39	--	--	9.18
Alkalinity, Carbonate	--	mg-$CaCO_3$/L	--	--	--	1.00 U	--	--	1.00 U	--	--	1.00 U	--	--	1.00 U	--	--	1.00 U
Alkalinity, Hydroxide	--	mg-$CaCO_3$/L	--	--	--	1.00 U	--	--	1.00 U	--	--	1.00 U	--	--	1.00 U	--	--	1.00 U
Chloride	16887-00-6	mg/L	--	--	--	0.146	--	--	0.277	--	--	0.143	--	--	0.278	--	--	0.276
Dissolved Organic Carbon	--	mg/L	--	--	--	1.74	--	--	0.700	--	--	0.810	--	--	0.710	--	--	0.580
Nitrate (as Nitrogen)	14797-55-8	mg/L	--	--	--	0.100 UJ	--	--	0.100 UJ	--	--	0.106 J	--	--	0.100 UJ	--	--	0.100 UJ
Sulfate	14808-79-8	mg/L	--	--	--	2.62	--	--	4.10	--	--	2.54	--	--	4.02	--	--	4.02
Total Dissolved Solids	--	mg/L	--	--	--	24.0	--	--	24.0	--	--	25.0	--	--	12.0	--	--	14.0
Total Suspended Solids	--	mg/L	--	--	--	1.00 U	--	--	2.00	--	--	1.00 U	--	--	1.00 U	--	--	1.00 U
Total Organic Carbon	--	mg/L	--	--	--	0.550	--	--	0.660	--	--	0.540	--	--	0.550	--	--	0.550
Hardness, Total	--	mg-$CaCO_3$/L	--	--	--	12.0	--	--	12.6	--	--	12.5	--	--	13.6	--	--	13.1
Field Parameters [6]																		
Dissolved Oxygen (DO)	--	mg/L	--	--	--	9.30	--	--	10.38	--	--	9.17	--	--	8.61	--	--	--
Ferrous Iron	--	mg/L	--	--	--	0.5 U	--	--	0.5 U	--	--	0.5 U	--	--	0.5 U	--	--	--
Oxidation-Reduction Potential (ORP)	--	mV	--	--	--	109.2	--	--	131.5	--	--	108.6	--	--	172.5	--	--	--
pH	--	pH	--	--	--	6.72	--	--	6.64	--	--	6.73	--	--	6.49	--	--	--
Specific Conductivity	--	µS/cm	--	--	--	17.8	--	--	32.8	--	--	18.2	--	--	33	--	--	--
Turbidity	--	ntu	--	--	--	1.50	--	--	0.41	--	--	1.70	--	--	0.1	--	--	--

Notes:

Results for total metals and conventionals are presented to three significant figures. Results for field parameters are presented to the significant figures indicated by the field meter.

-- Not applicable/available or not analyzed.

RED/BOLD Detected exceedance of applicable criteria (applicable criteria presented in **bold**).

1 Locations are listed from upstream (west) to downstream (east).

2 Surface water criteria given in Tables 3 and 11 of the ROD are presented for reference only. Reference criteria from the ROD for cadmium, copper, lead, and zinc are adjusted based on a hardness of 9 mg/L.

3 For cadmium, copper, lead, and zinc, criteria are presented that are adjusted for hardness for each sample, in accordance with Table 3 of the ROD. The cadmium criteria, adjusted in accordance with the U.S. Environmental Protection Agency National Recommended Water Quality Criteria (NRWQC) last updated in 2001, is presented for reference only. Cadmium results are compared to 2016 hardness adjusted criteria. Copper, lead, and zinc were adjusted based on WAC Chapter 173-201A (accessed at https://apps.leg.wa.gov/WAC/default.aspx?cite=173-201A-240). The hardness of the hyporheic zone, the 12-inch porewater hardness for each porewater sampling location cluster, was used for the adjustment.

4 Cadmium criteria adjusted for hardness using the current (updated 2016) NRWQC hardness correction formula (accessed at https://www.epa.gov/wqc/national-recommended-water-quality-criteria-aquatic-life-criteria-table#b).

5 Field-filtered samples were submitted for dissolved metals analysis for locations where turbidity exceeded or approached 5 NTU. Dissolved results presented in parentheses.

6 Field measurements were collected with YSI ProDSS water quality instrument and LaMotte 2020we turbidity meter during sampling. Ferrous iron measured with a Hach Iron test kit, Model IR-18, 0–10 mg/L.

Abbreviations:

bgs Below ground surface
CAS Chemical Abstracts Service
µg/L Micrograms per liter
µS/cm Microsiemens per centimeter
mg-$CaCO_3$/L Milligrams calcium carbonate per liter
mg/L Milligrams per liter
mV Millivolts
NTU Nephelometric turbidity units
ROD Record of Decision

Qualifiers:

J Analyte was detected, concentration is considered to be an estimate.
JQ Analyte was detected between the method detection limit and reporting limit, concentration is considered to be an estimate.
U Analyte was not detected at the given reporting limit.
UJ Analyte was not detected at the given reporting limit, which is considered to be an estimate.

Table 4.10
Analytical Results from Porewater Sample Locations

			Area	Porewater (cont.)														
			Location [1]	SG-7-WP-36									SG-8-PW-6					
			Sample Type	Field Sample			Field Duplicate			Field Sample			Field Sample			Field Sample		
			Sample Date	6/7/2020			6/7/2020			9/26/2020			6/6/2020			9/26/2020		
			Porewater Sampler Depth (feet bgs)	3			3			3			0.5			0.5		
Analytes	CAS No.	Units	Water-Based Criteria [2]	Hardness-Adjusted ROD [3]	Hardness-Adjusted 2016 [4]	Sample Result	Hardness-Adjusted ROD [3]	Hardness-Adjusted 2016 [4]	Sample Result	Hardness-Adjusted ROD [3]	Hardness-Adjusted 2016 [4]	Sample Result	Hardness-Adjusted ROD [3]	Hardness-Adjusted 2016 [4]	Sample Result	Hardness-Adjusted ROD [3]	Hardness-Adjusted 2016 [4]	Sample Result
Total Metals [5]																		
Aluminum	7429-90-5	µg/L	**142**	--	--	23.7	--	--	27.1	--	--	17.7 JQ	--	--	14.4 JQ	--	--	12.5 JQ
Cadmium	7440-43-9	µg/L	0.05	0.058	**0.15**	0.026	0.058	**0.15**	0.0230	0.0613	**0.16**	0.0138 JQ	0.058	**0.15**	0.043	0.0606	**0.158**	0.0278
Calcium	7440-70-2	µg/L	--	--	--	4,300	--	--	4,040	--	--	4,640	--	--	4,430	--	--	4,880
Copper	7440-50-8	µg/L	1.45	**1.92**	--	1.34	**1.92**	--	1.54	**2.06**	--	1.53	**1.92**	--	**3.91**	**2.04**	--	1.33
Iron	7439-89-6	µg/L	**1,000**	--	--	22.9	--	--	22.7	--	--	16.7 JQ	--	--	18.3 JQ	--	--	24.9
Lead	7439-92-1	µg/L	0.169	**0.247**	--	0.0690 JQ	**0.247**	--	0.100 U	**0.271**	--	0.150	**0.247**	--	0.100 U	**0.267**	--	0.100 U
Magnesium	7439-95-4	µg/L	--	--	--	437	--	--	435	--	--	454	--	--	424	--	--	468
Manganese	7439-96-5	µg/L	--	--	--	0.543	--	--	0.566	--	--	0.292 JQ	--	--	0.292 JQ	--	--	0.230 JQ
Potassium	7440-09-7	µg/L	--	--	--	417	--	--	400	--	--	429	--	--	418	--	--	473
Sodium	7440-23-5	µg/L	--	--	--	704	--	--	714	--	--	691	--	--	685	--	--	719
Zinc	7440-66-6	µg/L	13.6	**17.9**	--	3.82 JQ	**17.9**	--	4.23	**19.3**	--	9.74	**17.9**	--	10.0	**19**	--	4.66
Conventionals																		
Alkalinity, Total	--	mg-$CaCO_3$/L	--	--	--	9.39	--	--	9.08	--	--	6.02	--	--	9.85	--	--	9.68
Alkalinity, Bicarbonate	--	mg-$CaCO_3$/L	--	--	--	9.39	--	--	9.08	--	--	6.02	--	--	9.85	--	--	9.68
Alkalinity, Carbonate	--	mg-$CaCO_3$/L	--	--	--	1.00 U	--	--	1.00 U	--	--	1.00 U	--	--	1.00 U	--	--	1.00 U
Alkalinity, Hydroxide	--	mg-$CaCO_3$/L	--	--	--	1.00 U	--	--	1.00 U	--	--	1.00 U	--	--	1.00 U	--	--	1.00 U
Chloride	16887-00-6	mg/L	--	--	--	0.145	--	--	0.142	--	--	0.275	--	--	0.140	--	--	0.274
Dissolved Organic Carbon	--	mg/L	--	--	--	0.550	--	--	0.540	--	--	0.750	--	--	0.880	--	--	0.670
Nitrate (as Nitrogen)	14797-55-8	mg/L	--	--	--	0.100 UJ	--	--	0.100 UJ	--	--	0.100 UJ	--	--	0.100 UJ	--	--	0.100 UJ
Sulfate	14808-79-8	mg/L	--	--	--	2.65	--	--	2.67	--	--	4.00	--	--	2.65	--	--	4.03
Total Dissolved Solids	--	mg/L	--	--	--	25.0	--	--	30.0	--	--	24.0	--	--	13.0	--	--	23.0
Total Suspended Solids	--	mg/L	--	--	--	9.00 J	--	--	1.00 U	--	--	1.00 U	--	--	1.00 U	--	--	1.00 U
Total Organic Carbon	--	mg/L	--	--	--	0.560	--	--	0.570	--	--	0.500	--	--	0.630	--	--	0.610
Hardness, Total	--	mg-$CaCO_3$/L	--	--	--	12.5	--	--	11.9	--	--	13.5	--	--	12.8	--	--	14.1
Field Parameters [6]																		
Dissolved Oxygen (DO)	--	mg/L	--	--	--	10.77	--	--	--	--	--	10.17	--	--	10.43	--	--	9.89
Ferrous Iron	--	mg/L	--	--	--	0.5 U	--	--	--	--	--	0.5 U	--	--	0.5 U	--	--	0.5 U
Oxidation-Reduction Potential (ORP)	--	mV	--	--	--	105.0	--	--	--	--	--	130.5	--	--	151.3	--	--	99.7
pH	--	pH	--	--	--	6.81	--	--	--	--	--	6.76	--	--	6.76	--	--	6.13
Specific Conductivity	--	µS/cm	--	--	--	17.3	--	--	--	--	--	32.9	--	--	25.5	--	--	33.4
Turbidity	--	ntu	--	--	--	2.00	--	--	--	--	--	0.07	--	--	2.00	--	--	0.12

Notes:

Results for total metals and conventionals are presented to three significant figures. Results for field parameters are presented to the significant figures indicated by the field meter.

-- Not applicable/available or not analyzed.

RED/BOLD Detected exceedance of applicable criteria (applicable criteria presented in **bold**).

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2 Surface water criteria given in Tables 3 and 11 of the ROD are presented for reference only. Reference criteria from the ROD for cadmium, copper, lead, and zinc are adjusted based on a hardness of 9 mg/L.

3 For cadmium, copper, lead, and zinc, criteria are presented that are adjusted for hardness for each sample, in accordance with Table 3 of the ROD. The cadmium criteria, adjusted in accordance with the U.S. Environmental Protection Agency National Recommended Water Quality Criteria (NRWQC) last updated in 2001, is presented for reference only. Cadmium results are compared to 2016 hardness adjusted criteria. Copper, lead, and zinc were adjusted based on WAC Chapter 173-201A (accessed at https://apps.leg.wa.gov/WAC/default.aspx?cite=173-201A-240). The hardness of the hyporheic zone, the 12-inch porewater hardness for each porewater sampling location cluster, was used for the adjustment.

4 Cadmium criteria adjusted for hardness using the current (updated 2016) NRWQC hardness correction formula (accessed at https://www.epa.gov/wqc/national-recommended-water-quality-criteria-aquatic-life-criteria-table#b).

5 Field-filtered samples were submitted for dissolved metals analysis for locations where turbidity exceeded or approached 5 NTU. Dissolved results presented in parentheses.

6 Field measurements were collected with YSI ProDSS water quality instrument and LaMotte 2020we turbidity meter during sampling. Ferrous iron measured with a Hach Iron test kit, Model IR-18, 0–10 mg/L.

Abbreviations:

bgs Below ground surface
CAS Chemical Abstracts Service
µg/L Micrograms per liter
µS/cm Microsiemens per centimeter
mg-$CaCO_3$/L Milligrams calcium carbonate per liter
mg/L Milligrams per liter
mV Millivolts
NTU Nephelometric turbidity units
ROD Record of Decision

Qualifiers:

J Analyte was detected, concentration is considered to be an estimate.
JQ Analyte was detected between the method detection limit and reporting limit, concentration is considered to be an estimate.
U Analyte was not detected at the given reporting limit.
UJ Analyte was not detected at the given reporting limit, which is considered to be an estimate.

Table 4.10
Analytical Results from Porewater Sample Locations

				Area	Porewater (cont.)														
				Location [1]	SG-8-PW-12						SG-8-WP-36								
				Sample Type	Field Sample			Field Sample			Field Sample			Field Duplicate			Field Sample		
				Sample Date	6/6/2020			9/26/2020			6/6/2020			6/6/2020			9/26/2020		
				Porewater Sampler Depth (feet bgs)	1			1			3			3			3		
Analytes	CAS No.	Units	Water-Based Criteria [2]	Hardness-Adjusted ROD [3]	Hardness-Adjusted 2016 [4]	Sample Result	Hardness-Adjusted ROD [3]	Hardness-Adjusted 2016 [4]	Sample Result	Hardness-Adjusted ROD [3]	Hardness-Adjusted 2016 [4]	Sample Result	Hardness-Adjusted ROD [3]	Hardness-Adjusted 2016 [4]	Sample Result	Hardness-Adjusted ROD [3]	Hardness-Adjusted 2016 [4]	Sample Result
Total Metals [5]																		
Aluminum	7429-90-5	µg/L	**142**	--	--	38.9	--	--	22.5	--	--	5.49 JQ	--	--	5.43 JQ	--	--	41.0
Cadmium	7440-43-9	µg/L	0.05	0.058	**0.15**	0.028	0.0606	**0.158**	0.0302	0.058	**0.15**	0.149	0.058	**0.15**	0.102	0.0606	**0.158**	0.0558
Calcium	7440-70-2	µg/L	--	--	--	4,290	--	--	4,630	--	--	4,810	--	--	4,750	--	--	5,040
Copper	7440-50-8	µg/L	1.45	**1.92**	--	1.70	**2.04**	--	1.42	**1.92**	--	**3.57**	**1.92**	--	**3.46**	**2.04**	--	**8.00**
Iron	7439-89-6	µg/L	**1,000**	--	--	47.8	--	--	43.3	--	--	20.0 U	--	--	6.94 JQ	--	--	93.3
Lead	7439-92-1	µg/L	0.169	**0.247**	--	0.100 U	**0.267**	--	0.100 U	**0.247**	--	0.100 U	**0.247**	--	0.100 U	**0.267**	--	**0.935**
Magnesium	7439-95-4	µg/L	--	--	--	431	--	--	457	--	--	512	--	--	494	--	--	503
Manganese	7439-96-5	µg/L	--	--	--	0.898	--	--	0.434 JQ	--	--	0.126 JQ	--	--	0.139 JQ	--	--	1.91
Potassium	7440-09-7	µg/L	--	--	--	411	--	--	482	--	--	562	--	--	550	--	--	474
Sodium	7440-23-5	µg/L	--	--	--	667	--	--	699	--	--	758	--	--	750	--	--	720
Zinc	7440-66-6	µg/L	13.6	**17.9**	--	4.93	**19**	--	4.57	**17.9**	--	**39.5**	**17.9**	--	**42.9**	**19**	--	16.0
Conventionals																		
Alkalinity, Total	--	mg-$CaCO_3$/L	--	--	--	9.85	--	--	9.58	--	--	10.5	--	--	10.2	--	--	10.2
Alkalinity, Bicarbonate	--	mg-$CaCO_3$/L	--	--	--	9.85	--	--	9.58	--	--	10.5	--	--	10.2	--	--	10.2
Alkalinity, Carbonate	--	mg-$CaCO_3$/L	--	--	--	1.00 U	--	--	1.00 U	--	--	1.00 U	--	--	1.00 U	--	--	1.00 U
Alkalinity, Hydroxide	--	mg-$CaCO_3$/L	--	--	--	1.00 U	--	--	1.00 U	--	--	1.00 U	--	--	1.00 U	--	--	1.00 U
Chloride	16887-00-6	mg/L	--	--	--	0.143	--	--	0.274	--	--	0.142	--	--	0.143	--	--	0.282
Dissolved Organic Carbon	--	mg/L	--	--	--	0.750	--	--	0.690	--	--	0.880	--	--	0.640	--	--	0.520
Nitrate (as Nitrogen)	14797-55-8	mg/L	--	--	--	0.100 UJ	--	--	0.100 UJ	--	--	0.100 UJ	--	--	0.100 UJ	--	--	0.100 UJ
Sulfate	14808-79-8	mg/L	--	--	--	2.60	--	--	4.04	--	--	3.63	--	--	3.63	--	--	4.15
Total Dissolved Solids	--	mg/L	--	--	--	25.0	--	--	21.0	--	--	32.0	--	--	23.0	--	--	20.0
Total Suspended Solids	--	mg/L	--	--	--	1.00 U	--	--	1.00 U	--	--	1.00 U	--	--	1.00 U	--	--	1.00
Total Organic Carbon	--	mg/L	--	--	--	0.620	--	--	0.640	--	--	0.500 U	--	--	0.500 U	--	--	0.530
Hardness, Total	--	mg-$CaCO_3$/L	--	--	--	12.5	--	--	13.4	--	--	14.1	--	--	13.9	--	--	14.7
Field Parameters [6]																		
Dissolved Oxygen (DO)	--	mg/L	--	--	--	11.22	--	--	10.24	--	--	9.30	--	--	--	--	--	9.1
Ferrous Iron	--	mg/L	--	--	--	0.5 U	--	--	0.5 U	--	--	0.5 U	--	--	--	--	--	0.5 U
Oxidation-Reduction Potential (ORP)	--	mV	--	--	--	140.3	--	--	95.2	--	--	159.3	--	--	--	--	--	112.6
pH	--	pH	--	--	--	6.98	--	--	6.29	--	--	6.71	--	--	--	--	--	6.15
Specific Conductivity	--	µS/cm	--	--	--	25.3	--	--	32.9	--	--	29.2	--	--	--	--	--	34.5
Turbidity	--	ntu	--	--	--	2.60	--	--	0.74	--	--	1.80	--	--	--	--	--	1.08

Notes:

Results for total metals and conventionals are presented to three significant figures. Results for field parameters are presented to the significant figures indicated by the field meter.

-- Not applicable/available or not analyzed.

RED/BOLD Detected exceedance of applicable criteria (applicable criteria presented in **bold**).

1 Locations are listed from upstream (west) to downstream (east).

2 Surface water criteria given in Tables 3 and 11 of the ROD are presented for reference only. Reference criteria from the ROD for cadmium, copper, lead, and zinc are adjusted based on a hardness of 9 mg/L.

3 For cadmium, copper, lead, and zinc, criteria are presented that are adjusted for hardness for each sample, in accordance with Table 3 of the ROD. The cadmium criteria, adjusted in accordance with the U.S. Environmental Protection Agency National Recommended Water Quality Criteria (NRWQC) last updated in 2001, is presented for reference only. Cadmium results are compared to 2016 hardness adjusted criteria. Copper, lead, and zinc were adjusted based on WAC Chapter 173-201A (accessed at https://apps.leg.wa.gov/WAC/default.aspx?cite=173-201A-240). The hardness of the hyporheic zone, the 12-inch porewater hardness for each porewater sampling location cluster, was used for the adjustment.

4 Cadmium criteria adjusted for hardness using the current (updated 2016) NRWQC hardness correction formula (accessed at https://www.epa.gov/wqc/national-recommended-water-quality-criteria-aquatic-life-criteria-table#b).

5 Field-filtered samples were submitted for dissolved metals analysis for locations where turbidity exceeded or approached 5 NTU. Dissolved results presented in parentheses.

6 Field measurements were collected with YSI ProDSS water quality instrument and LaMotte 2020we turbidity meter during sampling. Ferrous iron measured with a Hach Iron test kit, Model IR-18, 0–10 mg/L.

Abbreviations:

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mV Millivolts
NTU Nephelometric turbidity units
ROD Record of Decision

Qualifiers:

J Analyte was detected, concentration is considered to be an estimate.
JQ Analyte was detected between the method detection limit and reporting limit, concentration is considered to be an estimate.
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UJ Analyte was not detected at the given reporting limit, which is considered to be an estimate.

Table 4.10
Analytical Results from Porewater Sample Locations

			Area	Porewater (cont.)											
			Location [1]	SG-9-PW-6						SG-9-PW-12					
			Sample Type	Field Sample			Field Sample			Field Sample			Field Sample		
			Sample Date	6/7/2020			9/26/2020			6/7/2020			9/26/2020		
			Porewater Sampler Depth (feet bgs)	0.5			0.5			1			1		
				Hardness-Adjusted			Hardness-Adjusted			Hardness-Adjusted			Hardness-Adjusted		
Analytes	CAS No.	Units	Water-Based Criteria [2]	ROD [3]	2016 [4]	Sample Result	ROD [3]	2016 [4]	Sample Result	ROD [3]	2016 [4]	Sample Result	ROD [3]	2016 [4]	Sample Result
Total Metals [5]															
Aluminum	7429-90-5	µg/L	**142**	--	--	24.0	--	--	19.0 JQ	--	--	20.8	--	--	25.7
Cadmium	7440-43-9	µg/L	0.05	0.07	**0.186**	0.03	0.0873	**0.234**	0.0874	0.07	**0.186**	0.03	0.0873	**0.234**	0.0406
Calcium	7440-70-2	µg/L	--	--	--	5,490	--	--	7,790	--	--	5,700	--	--	7,850
Copper	7440-50-8	µg/L	1.45	**2.45**	--	2.09	**3.19**	--	1.51	**2.45**	--	1.49	**3.19**	--	1.53
Iron	7439-89-6	µg/L	**1,000**	--	--	34.6	--	--	35.1	--	--	32.4	--	--	53.7
Lead	7439-92-1	µg/L	0.169	**0.341**	--	0.100 U	**0.483**	--	0.100 U	**0.341**	--	0.100 U	**0.483**	--	0.100 U
Magnesium	7439-95-4	µg/L	--	--	--	573	--	--	854	--	--	584	--	--	737
Manganese	7439-96-5	µg/L	--	--	--	3.12	--	--	2.51	--	--	0.940	--	--	6.24
Potassium	7440-09-7	µg/L	--	--	--	486	--	--	757	--	--	492	--	--	653
Sodium	7440-23-5	µg/L	--	--	--	762	--	--	957	--	--	750	--	--	876
Zinc	7440-66-6	µg/L	13.6	**22.8**	--	4.37	**29.6**	--	15.6	**22.8**	--	4.92	**29.6**	--	7.04
Conventionals															
Alkalinity, Total	--	mg-$CaCO_3$/L	--	--	--	9.54	--	--	7.35	--	--	8.93	--	--	8.67
Alkalinity, Bicarbonate	--	mg-$CaCO_3$/L	--	--	--	9.54	--	--	7.35	--	--	8.93	--	--	8.67
Alkalinity, Carbonate	--	mg-$CaCO_3$/L	--	--	--	1.00 U	--	--	1.00 U	--	--	1.00 U	--	--	1.00 U
Alkalinity, Hydroxide	--	mg-$CaCO_3$/L	--	--	--	1.00 U	--	--	1.00 U	--	--	1.00 U	--	--	1.00 U
Chloride	16887-00-6	mg/L	--	--	--	0.148	--	--	0.287	--	--	0.169	--	--	0.285
Dissolved Organic Carbon	--	mg/L	--	--	--	0.650	--	--	0.780	--	--	0.620	--	--	0.800
Nitrate (as Nitrogen)	14797-55-8	mg/L	--	--	--	0.100 UJ	--	--	0.100 UJ	--	--	0.100 UJ	--	--	0.100 UJ
Sulfate	14808-79-8	mg/L	--	--	--	6.64	--	--	14.8	--	--	6.59	--	--	12.5
Total Dissolved Solids	--	mg/L	--	--	--	33.0	--	--	33.0	--	--	31.0	--	--	36.0
Total Suspended Solids	--	mg/L	--	--	--	1.00 U	--	--	1.00 U	--	--	1.00 U	--	--	1.00 U
Total Organic Carbon	--	mg/L	--	--	--	0.610	--	--	0.600	--	--	0.570	--	--	0.650
Hardness, Total	--	mg-$CaCO_3$/L	--	--	--	16.1	--	--	23.0	--	--	16.6	--	--	22.6
Field Parameters [6]															
Dissolved Oxygen (DO)	--	mg/L	--	--	--	10.82	--	--	8.56	--	--	9.97	--	--	10.08
Ferrous Iron	--	mg/L	--	--	--	0.5 U	--	--	0.5 U	--	--	0.5 U	--	--	0.5 U
Oxidation-Reduction Potential (ORP)	--	mV	--	--	--	149.8	--	--	186.9	--	--	130.9	--	--	164.6
pH	--	pH	--	--	--	6.55	--	--	5.85	--	--	6.65	--	--	6.26
Specific Conductivity	--	µS/cm	--	--	--	22.5	--	--	57.3	--	--	23.4	--	--	53.2
Turbidity	--	ntu	--	--	--	1.55	--	--	0.17	--	--	0.80	--	--	0.01

Notes:

Results for total metals and conventionals are presented to three significant figures. Results for field parameters are presented to the significant figures indicated by the field meter.

-- Not applicable/available or not analyzed.

RED/BOLD Detected exceedance of applicable criteria (applicable criteria presented in **bold**).

1 Locations are listed from upstream (west) to downstream (east).

2 Surface water criteria given in Tables 3 and 11 of the ROD are presented for reference only. Reference criteria from the ROD for cadmium, copper, lead, and zinc are adjusted based on a hardness of 9 mg/L.

3 For cadmium, copper, lead, and zinc, criteria are presented that are adjusted for hardness for each sample, in accordance with Table 3 of the ROD. The cadmium criteria, adjusted in accordance with the U.S. Environmental Protection Agency National Recommended Water Quality Criteria (NRWQC) last updated in 2001, is presented for reference only. Cadmium results are compared to 2016 hardness adjusted criteria. Copper, lead, and zinc were adjusted based on WAC Chapter 173-201A (accessed at https://apps.leg.wa.gov/WAC/default.aspx?cite=173-201A-240). The hardness of the hyporheic zone, the 12-inch porewater hardness for each porewater sampling location cluster, was used for the adjustment.

4 Cadmium criteria adjusted for hardness using the current (updated 2016) NRWQC hardness correction formula (accessed at https://www.epa.gov/wqc/national-recommended-water-quality-criteria-aquatic-life-criteria-table#b).

5 Field-filtered samples were submitted for dissolved metals analysis for locations where turbidity exceeded or approached 5 NTU. Dissolved results presented in parentheses.

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Abbreviations:

bgs Below ground surface
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ROD Record of Decision

Qualifiers:

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UJ Analyte was not detected at the given reporting limit, which is considered to be an estimate.

Table 4.10
Analytical Results from Porewater Sample Locations

			Area	Porewater (cont.)														
			Location [1]	SG-9-WP-36									SG-17-PW-6					
			Sample Type	Field Sample			Field Sample			Field Sample			Field Sample			Field Sample		
			Sample Date	6/7/2020			6/12/2020			9/26/2020			6/7/2020			9/25/2020		
			Porewater Sampler Depth (feet bgs)	3			3			3			0.5			0.5		
Analytes	CAS No.	Units	Water-Based Criteria [2]	Hardness-Adjusted ROD [3]	Hardness-Adjusted 2016 [4]	Sample Result	Hardness-Adjusted ROD [3]	Hardness-Adjusted 2016 [4]	Sample Result	Hardness-Adjusted ROD [3]	Hardness-Adjusted 2016 [4]	Sample Result	Hardness-Adjusted ROD [3]	Hardness-Adjusted 2016 [4]	Sample Result	Hardness-Adjusted ROD [3]	Hardness-Adjusted 2016 [4]	Sample Result
Total Metals [5]																		
Aluminum	7429-90-5	µg/L	**142**	--	--	--	--	--	17.7 JQ	--	--	13.7 JQ	--	--	75.3	--	--	53.4
Cadmium	7440-43-9	µg/L	0.05	--	--	--	0.07	**0.186**	0.041	0.0873	**0.234**	0.110	0.965	**0.171**	0.04	0.0739	**0.196**	0.0658
Calcium	7440-70-2	µg/L	--	--	--	--	--	--	5,650	--	--	9,400	--	--	5,210	--	--	5,380
Copper	7440-50-8	µg/L	1.45	--	--	--	**2.45**	--	1.16	**3.19**	--	1.36	**2.23**	--	2.22	**2.6**	--	2.46
Iron	7439-89-6	µg/L	**1,000**	--	--	--	--	--	24.5	--	--	19.8 JQ	--	--	107	--	--	84.7
Lead	7439-92-1	µg/L	0.169	--	--	--	**0.341**	--	0.100 U	**0.483**	--	0.100 U	**0.301**	--	0.100	**0.369**	--	0.100 U
Magnesium	7439-95-4	µg/L	--	--	--	--	--	--	563	--	--	1,040	--	--	540	--	--	515
Manganese	7439-96-5	µg/L	--	--	--	--	--	--	1.68	--	--	0.961	--	--	11.2	--	--	3.79
Potassium	7440-09-7	µg/L	--	--	--	--	--	--	505	--	--	844	--	--	449	--	--	700
Sodium	7440-23-5	µg/L	--	--	--	--	--	--	663	--	--	975	--	--	728	--	--	694
Zinc	7440-66-6	µg/L	13.6	--	--	--	**22.8**	--	4.34	**29.6**	--	12.4	**20.8**	--	6.17	**24.2**	--	10.8
Conventionals																		
Alkalinity, Total	--	mg-$CaCO_3$/L	--	--	--	7.70	--	--	--	--	--	8.26	--	--	10.2	--	--	9.08
Alkalinity, Bicarbonate	--	mg-$CaCO_3$/L	--	--	--	7.70	--	--	--	--	--	8.26	--	--	10.2	--	--	9.08
Alkalinity, Carbonate	--	mg-$CaCO_3$/L	--	--	--	1.00 U	--	--	--	--	--	1.00 U	--	--	1.00 U	--	--	1.00 U
Alkalinity, Hydroxide	--	mg-$CaCO_3$/L	--	--	--	1.00 U	--	--	--	--	--	1.00 U	--	--	1.00 U	--	--	1.00 U
Chloride	16887-00-6	mg/L	--	--	--	0.149	--	--	--	--	--	0.287	--	--	0.144	--	--	0.298
Dissolved Organic Carbon	--	mg/L	--	--	--	0.550	--	--	--	--	--	0.680	--	--	0.780	--	--	0.880
Nitrate (as Nitrogen)	14797-55-8	mg/L	--	--	--	0.100 UJ	--	--	--	--	--	0.100 UJ	--	--	0.100 UJ	--	--	0.100 UJ
Sulfate	14808-79-8	mg/L	--	--	--	7.71	--	--	--	--	--	17.8	--	--	4.86	--	--	8.55
Total Dissolved Solids	--	mg/L	--	--	--	30.0	--	--	--	--	--	43.0	--	--	30.0	--	--	22.0
Total Suspended Solids	--	mg/L	--	--	--	1.00 U	--	--	--	--	--	1.00 U	--	--	16.0	--	--	2.00
Total Organic Carbon	--	mg/L	--	--	--	0.500 U	--	--	--	--	--	0.500 U	--	--	0.680	--	--	0.880
Hardness, Total	--	mg-$CaCO_3$/L	--	--	--	--	--	--	16.4	--	--	27.8	--	--	15.2	--	--	15.5
Field Parameters [6]																		
Dissolved Oxygen (DO)	--	mg/L	--	--	--	10.50	--	--	--	--	--	7.31	--	--	11.30	--	--	7.83
Ferrous Iron	--	mg/L	--	--	--	0.5 U	--	--	--	--	--	0.5 U	--	--	0.5 U	--	--	0.5 U
Oxidation-Reduction Potential (ORP)	--	mV	--	--	--	159.6	--	--	--	--	--	148.5	--	--	118.6	--	--	213.6
pH	--	pH	--	--	--	6.47	--	--	--	--	--	5.89	--	--	6.82	--	--	6.36
Specific Conductivity	--	µS/cm	--	--	--	23.3	--	--	--	--	--	68.5	--	--	20.2	--	--	40
Turbidity	--	ntu	--	--	--	1.22	--	--	--	--	--	0.3	--	--	0.40	--	--	0.47

Notes:

Results for total metals and conventionals are presented to three significant figures. Results for field parameters are presented to the significant figures indicated by the field meter.

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RED/BOLD Detected exceedance of applicable criteria (applicable criteria presented in **bold**).

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bgs Below ground surface
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µg/L Micrograms per liter
µS/cm Microsiemens per centimeter
mg-$CaCO_3$/L Milligrams calcium carbonate per liter
mg/L Milligrams per liter
mV Millivolts
NTU Nephelometric turbidity units
ROD Record of Decision

Qualifiers:

J Analyte was detected, concentration is considered to be an estimate.
JQ Analyte was detected between the method detection limit and reporting limit, concentration is considered to be an estimate.
U Analyte was not detected at the given reporting limit.
UJ Analyte was not detected at the given reporting limit, which is considered to be an estimate.

Table 4.10
Analytical Results from Porewater Sample Locations

			Area	Porewater (cont.)																	
			Location [1]	SG-17-PW-12						SG-17-WP-36						SG-10-PW-6					
			Sample Type	Field Sample			Field Sample			Field Sample			Field Sample			Field Sample			Field Sample		
			Sample Date	6/7/2020			9/25/2020			6/7/2020			9/25/2020			6/7/2020			9/25/2020		
			Porewater Sampler Depth (feet bgs)	1			1			3			3			0.5			0.5		
Analytes	CAS No.	Units	Water-Based Criteria [2]	Hardness-Adjusted ROD[3]	Hardness-Adjusted 2016[4]	Sample Result	Hardness-Adjusted ROD[3]	Hardness-Adjusted 2016[4]	Sample Result	Hardness-Adjusted ROD[3]	Hardness-Adjusted 2016[4]	Sample Result	Hardness-Adjusted ROD[3]	Hardness-Adjusted 2016[4]	Sample Result	Hardness-Adjusted ROD[3]	Hardness-Adjusted 2016[4]	Sample Result	Hardness-Adjusted ROD[3]	Hardness-Adjusted 2016[4]	Sample Result
Total Metals[5]																					
Aluminum	7429-90-5	µg/L	**142**	--	--	65.6	--	--	31.9	--	--	110	--	--	70.1	--	--	67.7	--	--	**5,370**
Cadmium	7440-43-9	µg/L	0.05	0.965	**0.171**	0.043	0.0739	**0.196**	0.0320	0.965	**0.171**	0.0600	0.0739	**0.196**	**0.237**	0.066	**0.172**	0.048	0.367	**1.11**	**4.27**
Calcium	7440-70-2	µg/L	--	--	--	5,120	--	--	6,280	--	--	5,080	--	--	7,540	--	--	4,930	--	--	54,200
Copper	7440-50-8	µg/L	1.45	**2.23**	--	2.20	**2.6**	--	1.30	**2.23**	--	**6.94**	**2.6**	--	**3.94**	**2.24**	--	2.08	**18.6**	--	**36.5**
Iron	7439-89-6	µg/L	**1,000**	--	--	97.0	--	--	54.8	--	--	227	--	--	171	--	--	82.2	--	--	28.6 JQ
Lead	7439-92-1	µg/L	0.169	**0.301**	--	0.0900 JQ	**0.369**	--	0.100 U	**0.301**	--	0.128	**0.369**	--	0.122	**0.303**	--	0.0790 JQ	**4.69**	--	0.148
Magnesium	7439-95-4	µg/L	--	--	--	516	--	--	526	--	--	536	--	--	630	--	--	533	--	--	8,060
Manganese	7439-96-5	µg/L	--	--	--	10.5	--	--	1.24	--	--	4.09	--	--	137	--	--	11.6	--	--	2,690
Potassium	7440-09-7	µg/L	--	--	--	442	--	--	550	--	--	495	--	--	647	--	--	465	--	--	6,230
Sodium	7440-23-5	µg/L	--	--	--	750	--	--	669	--	--	755	--	--	761	--	--	745	--	--	3,710
Zinc	7440-66-6	µg/L	13.6	**20.8**	--	6.29	**24.2**	--	5.27	**20.8**	--	10.9	**24.2**	--	16.3	**20.9**	--	6.90	**170**	--	**414**
Conventionals																					
Alkalinity, Total	--	mg-$CaCO_3$/L	--	--	--	10.1	--	--	10.7	--	--	9.75	--	--		--	--	9.75	--	--	1.00 U
Alkalinity, Bicarbonate	--	mg-$CaCO_3$/L	--	--	--	10.1	--	--	10.7	--	--	9.75	--	--		--	--	9.75	--	--	1.00 U
Alkalinity, Carbonate	--	mg-$CaCO_3$/L	--	--	--	1.00 U	--	--	1.00 U	--	--	1.00 U	--	--		--	--	1.00 U	--	--	1.00 U
Alkalinity, Hydroxide	--	mg-$CaCO_3$/L	--	--	--	1.00 U	--	--	1.00 U	--	--	1.00 U	--	--		--	--	1.00 U	--	--	1.00 U
Chloride	16887-00-6	mg/L	--	--	--	0.149	--	--	0.299	--	--	0.149	--	--		--	--	0.147	--	--	0.375
Dissolved Organic Carbon	--	mg/L	--	--	--	0.720	--	--	0.730	--	--	1.12	--	--		--	--	0.660	--	--	0.550
Nitrate (as Nitrogen)	14797-55-8	mg/L	--	--	--	0.100 UJ	--	--	0.100 UJ	--	--	0.100 UJ	--	--		--	--	0.100 UJ	--	--	0.100 UJ
Sulfate	14808-79-8	mg/L	--	--	--	4.84	--	--	8.48	--	--	4.47	--	--		--	--	4.62	--	--	206
Total Dissolved Solids	--	mg/L	--	--	--	30.0	--	--	23.0	--	--	19.0	--	--		--	--	18.0	--	--	354
Total Suspended Solids	--	mg/L	--	--	--	2.00	--	--	2.00	--	--	2.00	--	--		--	--	2.00	--	--	1.00 U
Total Organic Carbon	--	mg/L	--	--	--	0.670	--	--	0.660	--	--	3.39	--	--		--	--	0.710	--	--	0.500 U
Hardness, Total	--	mg-$CaCO_3$/L	--	--	--	14.9	--	--	17.8	--	--	14.9	--	--	21.4	--	--	14.5	--	--	168
Field Parameters [6]																					
Dissolved Oxygen (DO)	--	mg/L	--	--	--	11.33	--	--	9.99	--	--	8.58	--	--	89.7	--	--	11.56	--	--	0.7
Ferrous Iron	--	mg/L	--	--	--	0.5 U	--	--	0.5 U	--	--	0.5 U	--	--	0.5 U	--	--	0.5 U	--	--	0.5 U
Oxidation-Reduction Potential (ORP)	--	mV	--	--	--	101.8	--	--	181.6	--	--	250.9	--	--	173.8	--	--	128.3	--	--	393.7
pH	--	pH	--	--	--	6.95	--	--	6.78	--	--	6.64	--	--	7.06	--	--	6.59	--	--	4.28
Specific Conductivity	--	µS/cm	--	--	--	20.4	--	--	42	--	--	19.1	--	--	52	--	--	20.0	--	--	435
Turbidity	--	ntu	--	--	--	0.36	--	--	0.17	--	--	0.25	--	--	2.61	--	--	2.56	--	--	0.2

Notes:

Results for total metals and conventionals are presented to three significant figures. Results for field parameters are presented to the significant figures indicated by the field meter.

-- Not applicable/available or not analyzed.

RED/BOLD Detected exceedance of applicable criteria (applicable criteria presented in **bold**).

1 Locations are listed from upstream (west) to downstream (east).

2 Surface water criteria given in Tables 3 and 11 of the ROD are presented for reference only. Reference criteria from the ROD for cadmium, copper, lead, and zinc are adjusted based on a hardness of 9 mg/L.

3 For cadmium, copper, lead, and zinc, criteria are presented that are adjusted for hardness for each sample, in accordance with Table 3 of the ROD. The cadmium criteria, adjusted in accordance with the U.S. Environmental Protection Agency National Recommended Water Quality Criteria (NRWQC) last updated in 2001, is presented for reference only. Cadmium results are compared to 2016 hardness adjusted criteria. Copper, lead, and zinc were adjusted based on WAC Chapter 173-201A (accessed at https://apps.leg.wa.gov/WAC/default.aspx?cite=173-201A-240). The hardness of the hyporheic zone, the 12-inch porewater hardness for each porewater sampling location cluster, was used for the adjustment.

4 Cadmium criteria adjusted for hardness using the current (updated 2016) NRWQC hardness correction formula (accessed at https://www.epa.gov/wqc/national-recommended-water-quality-criteria-aquatic-life-criteria-table#b).

5 Field-filtered samples were submitted for dissolved metals analysis for locations where turbidity exceeded or approached 5 NTU. Dissolved results presented in parentheses.

6 Field measurements were collected with YSI ProDSS water quality instrument and LaMotte 2020we turbidity meter during sampling. Ferrous iron measured with a Hach Iron test kit, Model IR-18, 0–10 mg/L.

Abbreviations:

bgs Below ground surface
CAS Chemical Abstracts Service
µg/L Micrograms per liter
µS/cm Microsiemens per centimeter
mg-$CaCO_3$/L Milligrams calcium carbonate per liter
mg/L Milligrams per liter
mV Millivolts
NTU Nephelometric turbidity units
ROD Record of Decision

Qualifiers:

J Analyte was detected, concentration is considered to be an estimate.
JQ Analyte was detected between the method detection limit and reporting limit, concentration is considered to be an estimate.
U Analyte was not detected at the given reporting limit.
UJ Analyte was not detected at the given reporting limit, which is considered to be an estimate.

Table 4.10
Analytical Results from Porewater Sample Locations

				Area	Porewater (cont.)																	
				Location [1]	SG-10-PW-12						SG-10-WP-36						SG-18-PW-6					
				Sample Type	Field Sample			Field Sample			Field Sample			Field Sample			Field Sample			Field Sample		
				Sample Date	6/7/2020			9/25/2020			6/7/2020			9/25/2020			6/6/2020			9/24/2020		
				Porewater Sampler Depth (feet bgs)	1			1			3			3			0.5			0.5		
Analytes	CAS No.	Units	Water-Based Criteria [2]		Hardness-Adjusted		Sample Result	Hardness-Adjusted		Sample Result	Hardness-Adjusted		Sample Result	Hardness-Adjusted		Sample Result	Hardness-Adjusted		Sample Result	Hardness-Adjusted		Sample Result
					ROD [3]	2016 [4]		ROD [3]	2016 [4]		ROD [3]	2016 [4]		ROD [3]	2016 [4]		ROD [3]	2016 [4]		ROD [3]	2016 [4]	
Total Metals [5]																						
Aluminum	7429-90-5	µg/L	**142**		--	--	43.0	--	--	**5,400**	--	--	**5,540**	--	--	**6,390**	--	--	19.5 JQ	--	--	8.21 JQ
Cadmium	7440-43-9	µg/L	0.05		0.066	**0.172**	0.0440	0.367	**1.11**	**4.86**	0.066	**0.172**	**5.36**	0.367	**1.11**	**5.17**	0.179	**0.509**	0.144	0.149	**0.417**	0.0630
Calcium	7440-70-2	µg/L	--		--	--	5,140	--	--	57,600	--	--	68,300	--	--	67,400	--	--	20,500	--	--	14,400
Copper	7440-50-8	µg/L	1.45		**2.24**	--	1.32	**18.6**	--	**30.1**	**2.24**	--	**19.4**	**18.6**	--	15.5	**7.68**	--	0.511	**6.13**	--	0.361 JQ
Iron	7439-89-6	µg/L	**1,000**		--	--	60.6	--	--	40.0 U	--	--	**3,670**	--	--	**5,410**	--	--	8.31 JQ	--	--	20.0 U
Lead	7439-92-1	µg/L	0.169		**0.303**	--	0.100 U	**4.69**	--	0.100	**0.303**	--	0.100	**4.69**	--	0.0760 JQ	**1.53**	--	0.100 U	**1.14**	--	0.100 U
Magnesium	7439-95-4	µg/L	--		--	--	515	--	--	8,440	--	--	9,750	--	--	10,300	--	--	2,890	--	--	1,800
Manganese	7439-96-5	µg/L	--		--	--	10.1	--	--	3,660	--	--	4,870	--	--	3,870	--	--	2.43	--	--	0.717
Potassium	7440-09-7	µg/L	--		--	--	444	--	--	6,210	--	--	6,760	--	--	7,970	--	--	1,590	--	--	1,060
Sodium	7440-23-5	µg/L	--		--	--	726	--	--	3,830	--	--	4,250	--	--	4,480	--	--	1,800	--	--	1,350
Zinc	7440-66-6	µg/L	13.6		**20.9**	--	4.69	**170**	--	**437**	**20.9**	--	**444**	**170**	--	**457**	**70.9**	--	15.0	**56.7**	--	6.29
Conventionals																						
Alkalinity, Total	--	mg-$CaCO_3$/L	--		--	--	8.62	--	--	1.00 U	--	--	1.00 U	--	--	1.00 U	--	--	10.7	--	--	17.3
Alkalinity, Bicarbonate	--	mg-$CaCO_3$/L	--		--	--	8.62	--	--	1.00 U	--	--	1.00 U	--	--	1.00 U	--	--	10.7	--	--	17.3
Alkalinity, Carbonate	--	mg-$CaCO_3$/L	--		--	--	1.00 U	--	--	1.00 U	--	--	1.00 U	--	--	1.00 U	--	--	1.00 U	--	--	1.00 U
Alkalinity, Hydroxide	--	mg-$CaCO_3$/L	--		--	--	1.00 U	--	--	1.00 U	--	--	1.00 U	--	--	1.00 U	--	--	1.00 U	--	--	1.00 U
Chloride	16887-00-6	mg/L	--		--	--	0.146	--	--	0.379	--	--	0.444	--	--	0.405	--	--	0.281	--	--	0.201
Dissolved Organic Carbon	--	mg/L	--		--	--	0.570	--	--	0.620	--	--	0.820	--	--	0.690	--	--	0.500 U	--	--	0.580
Nitrate (as Nitrogen)	14797-55-8	mg/L	--		--	--	0.100 UJ	--	--	0.100 UJ	--	--	0.100 UJ	--	--	0.100 UJ	--	--	0.272 J	--	--	0.126 J
Sulfate	14808-79-8	mg/L	--		--	--	5.05	--	--	204	--	--	206	--	--	262	--	--	42.6	--	--	27.8
Total Dissolved Solids	--	mg/L	--		--	--	27.0	--	--	357	--	--	422	--	--	451	--	--	89.0	--	--	81.0
Total Suspended Solids	--	mg/L	--		--	--	1.00 U	--	--	1.00 U	--	--	4.00	--	--	2.00	--	--	1.00 U	--	--	2.00
Total Organic Carbon	--	mg/L	--		--	--	0.620	--	--	0.540	--	--	0.710	--	--	0.500 U	--	--	0.550	--	--	0.500 U
Hardness, Total	--	mg-$CaCO_3$/L	--		--	--	15.0	--	--	178	--	--	211	--	--	211	--	--	63.2	--	--	43.4
Field Parameters [6]																						
Dissolved Oxygen (DO)	--	mg/L	--		--	--	11.39	--	--	0.7	--	--	0.26	--	--	0.38	--	--	8.22	--	--	5.58
Ferrous Iron	--	mg/L	--		--	--	0.5 U	--	--	0.5 U	--	--	2.0	--	--	4	--	--	0.5 U	--	--	0.5 U
Oxidation-Reduction Potential (ORP)	--	mV	--		--	--	145.3	--	--	339.1	--	--	278.9	--	--	198.6	--	--	143.3	--	--	165.2
pH	--	pH	--		--	--	6.71	--	--	4.44	--	--	4.53	--	--	4.45	--	--	5.90	--	--	6
Specific Conductivity	--	µS/cm	--		--	--	20.1	--	--	441	--	--	278.8	--	--	540	--	--	145.0	--	--	110
Turbidity	--	ntu	--		--	--	0.35	--	--	0.13	--	--	0.21	--	--	0.2	--	--	0.30	--	--	0.04

Notes:

Results for total metals and conventionals are presented to three significant figures. Results for field parameters are presented to the significant figures indicated by the field meter.

-- Not applicable/available or not analyzed.

RED/BOLD Detected exceedance of applicable criteria (applicable criteria presented in **bold**).

1 Locations are listed from upstream (west) to downstream (east).

2 Surface water criteria given in Tables 3 and 11 of the ROD are presented for reference only. Reference criteria from the ROD for cadmium, copper, lead, and zinc are adjusted based on a hardness of 9 mg/L.

3 For cadmium, copper, lead, and zinc, criteria are presented that are adjusted for hardness for each sample, in accordance with Table 3 of the ROD. The cadmium criteria, adjusted in accordance with the U.S. Environmental Protection Agency National Recommended Water Quality Criteria (NRWQC) last updated in 2001, is presented for reference only. Cadmium results are compared to 2016 hardness adjusted criteria. Copper, lead, and zinc were adjusted based on WAC Chapter 173-201A (accessed at https://apps.leg.wa.gov/WAC/default.aspx?cite=173-201A-240). The hardness of the hyporheic zone, the 12-inch porewater hardness for each porewater sampling location cluster, was used for the adjustment.

4 Cadmium criteria adjusted for hardness using the current (updated 2016) NRWQC hardness correction formula (accessed at https://www.epa.gov/wqc/national-recommended-water-quality-criteria-aquatic-life-criteria-table#b).

5 Field-filtered samples were submitted for dissolved metals analysis for locations where turbidity exceeded or approached 5 NTU. Dissolved results presented in parentheses.

6 Field measurements were collected with YSI ProDSS water quality instrument and LaMotte 2020we turbidity meter during sampling. Ferrous iron measured with a Hach Iron test kit, Model IR-18, 0–10 mg/L.

Abbreviations:

bgs Below ground surface
CAS Chemical Abstracts Service
µg/L Micrograms per liter
µS/cm Microsiemens per centimeter
mg-$CaCO_3$/L Milligrams calcium carbonate per liter
mg/L Milligrams per liter
mV Millivolts
NTU Nephelometric turbidity units
ROD Record of Decision

Qualifiers:

J Analyte was detected, concentration is considered to be an estimate.
JQ Analyte was detected between the method detection limit and reporting limit, concentration is considered to be an estimate.
U Analyte was not detected at the given reporting limit.
UJ Analyte was not detected at the given reporting limit, which is considered to be an estimate.

Table 4.10
Analytical Results from Porewater Sample Locations

				Area	Porewater (cont.)															
				Location [1]	SG-18-PW-12									SG-18-WP-36						
				Sample Type	Field Sample			Field Duplicate			Field Sample			Field Sample			Field Sample			
				Sample Date	6/6/2020			6/6/2020			9/24/2020			6/6/2020			9/24/2020			
				Porewater Sampler Depth (feet bgs)	1			1			1			3			3			
Analytes	CAS No.	Units	Water-Based Criteria [2]	Hardness-Adjusted ROD [3]	Hardness-Adjusted 2016 [4]	Sample Result	Hardness-Adjusted ROD [3]	Hardness-Adjusted 2016 [4]	Sample Result	Hardness-Adjusted ROD [3]	Hardness-Adjusted 2016 [4]	Sample Result	Hardness-Adjusted ROD [3]	Hardness-Adjusted 2016 [4]	Sample Result	Hardness-Adjusted ROD [3]	Hardness-Adjusted 2016 [4]	Sample Result Total	Sample Result Dissolved
Total Metals [5]																			
Aluminum	7429-90-5	µg/L	**142**	--	--	17.4 JQ	--	--	16.1 JQ	--	--	19.5 JQ	--	--	10.3 JQ	--	--	**308**	**(275)**
Cadmium	7440-43-9	µg/L	0.05	0.179	**0.509**	0.162	0.175	**0.498**	0.163	0.149	**0.417**	0.0886	0.179	**0.509**	0.072	0.149	**0.417**	**0.480**	(0.374)
Calcium	7440-70-2	µg/L	--	--	--	20,300	--	--	19,600	--	--	15,900	--	--	12,700	--	--	10,700	(11,100)
Copper	7440-50-8	µg/L	1.45	**7.68**	--	0.535	**7.49**	--	0.411 JQ	**6.13**	--	0.461 JQ	**7.68**	--	0.455 JQ	**6.13**	--	2.68	(2.62)
Iron	7439-89-6	µg/L	**1,000**	--	--	20.0 U	--	--	20.0 U	--	--	40.7	--	--	20.0 U	--	--	258	(237)
Lead	7439-92-1	µg/L	0.169	**1.53**	--	0.100 U	**1.48**	--	0.100 U	**1.14**	--	0.100 U	**1.53**	--	0.100 U	**1.14**	--	0.100	(0.092 JQ)
Magnesium	7439-95-4	µg/L	--	--	--	3,090	--	--	3,020	--	--	2,130	--	--	1,670	--	--	1,220	(1,250)
Manganese	7439-96-5	µg/L	--	--	--	2.78	--	--	2.68	--	--	1.92	--	--	2.83	--	--	149	(133)
Potassium	7440-09-7	µg/L	--	--	--	1,670	--	--	1,620	--	--	1,300	--	--	971	--	--	808	(818)
Sodium	7440-23-5	µg/L	--	--	--	1,840	--	--	1,820	--	--	1,500	--	--	1,320	--	--	1,040	(1,040)
Zinc	7440-66-6	µg/L	13.6	**70.9**	--	15.9	**69.2**	--	15.4	**56.7**	--	9.02	**70.9**	--	6.20	**56.7**	--	13.9	(12.3)
Conventionals																			
Alkalinity, Total	--	mg-$CaCO_3$/L	--	--	--	9.85	--	--	--	--	--	14.6	--	--	14.4	--	--	20.5	
Alkalinity, Bicarbonate	--	mg-$CaCO_3$/L	--	--	--	9.85	--	--	--	--	--	14.6	--	--	14.4	--	--	20.5	
Alkalinity, Carbonate	--	mg-$CaCO_3$/L	--	--	--	1.00 U	--	--	--	--	--	1.00 U	--	--	1.00 U	--	--	1.00 U	
Alkalinity, Hydroxide	--	mg-$CaCO_3$/L	--	--	--	1.00 U	--	--	--	--	--	1.00 U	--	--	1.00 U	--	--	1.00 U	
Chloride	16887-00-6	mg/L	--	--	--	0.306	--	--	--	--	--	0.254	--	--	0.199	--	--	0.128	
Dissolved Organic Carbon	--	mg/L	--	--	--	0.500 U	--	--	--	--	--	0.530	--	--	0.600	--	--	0.750	
Nitrate (as Nitrogen)	14797-55-8	mg/L	--	--	--	0.304 J	--	--	--	--	--	0.122 J	--	--	0.279 J	--	--	0.116 J	
Sulfate	14808-79-8	mg/L	--	--	--	47.8	--	--	--	--	--	35.6	--	--	20.1	--	--	15.1	
Total Dissolved Solids	--	mg/L	--	--	--	125	--	--	--	--	--	92.0	--	--	70.0	--	--	58.0	
Total Suspended Solids	--	mg/L	--	--	--	1.00 U	--	--	--	--	--	1.00 U	--	--	2.00	--	--	12.0	
Total Organic Carbon	--	mg/L	--	--	--	0.500 U	--	--	--	--	--	0.500 U	--	--	0.540	--	--	0.550	
Hardness, Total	--	mg-$CaCO_3$/L	--	--	--	63.3	--	--	61.5	--	--	48.6	--	--	38.7	--	--	31.8	
Field Parameters [6]																			
Dissolved Oxygen (DO)	--	mg/L	--	--	--	7.86	--	--	--	--	--	6.13	--	--	7.60	--	--	5.01	
Ferrous Iron	--	mg/L	--	--	--	0.5 U	--	--	--	--	--	0.5 U	--	--	0.5 U	--	--	0.5 U	
Oxidation-Reduction Potential (ORP)	--	mV	--	--	--	154.8	--	--	--	--	--	188.6	--	--	134.3	--	--	195.9	
pH	--	pH	--	--	--	5.77	--	--	--	--	--	5.93	--	--	6.20	--	--	6.05	
Specific Conductivity	--	µS/cm	--	--	--	154.7	--	--	--	--	--	122	--	--	97.2	--	--	82.7	
Turbidity	--	ntu	--	--	--	0.030	--	--	--	--	--	0.15	--	--	0.42	--	--	3.23	

Notes:

Results for total metals and conventionals are presented to three significant figures. Results for field parameters are presented to the significant figures indicated by the field meter.

-- Not applicable/available or not analyzed.

RED/BOLD Detected exceedance of applicable criteria (applicable criteria presented in **bold**).

1 Locations are listed from upstream (west) to downstream (east).

2 Surface water criteria given in Tables 3 and 11 of the ROD are presented for reference only. Reference criteria from the ROD for cadmium, copper, lead, and zinc are adjusted based on a hardness of 9 mg/L.

3 For cadmium, copper, lead, and zinc, criteria are presented that are adjusted for hardness for each sample, in accordance with Table 3 of the ROD. The cadmium criteria, adjusted in accordance with the U.S. Environmental Protection Agency National Recommended Water Quality Criteria (NRWQC) last updated in 2001, is presented for reference only. Cadmium results are compared to 2016 hardness adjusted criteria. Copper, lead, and zinc were adjusted based on WAC Chapter 173-201A (accessed at https://apps.leg.wa.gov/WAC/default.aspx?cite=173-201A-240). The hardness of the hyporheic zone, the 12-inch porewater hardness for each porewater sampling location cluster, was used for the adjustment.

4 Cadmium criteria adjusted for hardness using the current (updated 2016) NRWQC hardness correction formula (accessed at https://www.epa.gov/wqc/national-recommended-water-quality-criteria-aquatic-life-criteria-table#b).

5 Field-filtered samples were submitted for dissolved metals analysis for locations where turbidity exceeded or approached 5 NTU. Dissolved results presented in parentheses.

6 Field measurements were collected with YSI ProDSS water quality instrument and LaMotte 2020we turbidity meter during sampling. Ferrous iron measured with a Hach Iron test kit, Model IR-18, 0–10 mg/L.

Abbreviations:

bgs Below ground surface
CAS Chemical Abstracts Service
µg/L Micrograms per liter
µS/cm Microsiemens per centimeter
mg-$CaCO_3$/L Milligrams calcium carbonate per liter
mg/L Milligrams per liter
mV Millivolts
NTU Nephelometric turbidity units
ROD Record of Decision

Qualifiers:

J Analyte was detected, concentration is considered to be an estimate.
JQ Analyte was detected between the method detection limit and reporting limit, concentration is considered to be an estimate.
U Analyte was not detected at the given reporting limit.
UJ Analyte was not detected at the given reporting limit, which is considered to be an estimate.

Table 4.10
Analytical Results from Porewater Sample Locations

				Area	Porewater (cont.)																	
				Location [1]	SG-11-PW-6						SG-11-PW-12						SG-11-WP-36					
				Sample Type	Field Sample			Field Sample			Field Sample			Field Sample			Field Sample			Field Sample		
				Sample Date	6/6/2020			9/23/2020			6/6/2020			9/23/2020			6/6/2020			9/23/2020		
				Porewater Sampler Depth (feet bgs)	0.5			0.5			1			1			3			3		
Analytes	CAS No.	Units	Water-Based Criteria [2]	Hardness-Adjusted ROD [3]	Hardness-Adjusted 2016 [4]	Sample Result	Hardness-Adjusted ROD [3]	Hardness-Adjusted 2016 [4]	Sample Result	Hardness-Adjusted ROD [3]	Hardness-Adjusted 2016 [4]	Sample Result	Hardness-Adjusted ROD [3]	Hardness-Adjusted 2016 [4]	Sample Result	Hardness-Adjusted ROD [3]	Hardness-Adjusted 2016 [4]	Sample Result	Hardness-Adjusted ROD [3]	Hardness-Adjusted 2016 [4]	Sample Result
Total Metals [5]																					
Aluminum	7429-90-5	µg/L	**142**	--	--	63.0	--	--	19.8 JQ	--	--	38.6	--	--	12.4 JQ	--	--	46.5	--	--	**338**
Cadmium	7440-43-9	µg/L	0.05	0.078	**0.206**	0.04	0.172	**0.487**	0.0448	0.078	**0.206**	0.0300	0.172	**0.487**	0.0434	0.078	**0.206**	0.032	0.172	**0.487**	0.0502
Calcium	7440-70-2	µg/L	--	--	--	5,240	--	--	12,900	--	--	6,330	--	--	19,600	--	--	18,300	--	--	32,000
Copper	7440-50-8	µg/L	1.45	**2.76**	--	2.58	**7.29**	--	3.74	**2.76**	--	**3.15**	**7.29**	--	1.41	**2.76**	--	0.804	**7.29**	--	1.21
Iron	7439-89-6	µg/L	**1,000**	--	--	80.8	--	--	49.4	--	--	49.8	--	--	87.4	--	--	56.5	--	--	484
Lead	7439-92-1	µg/L	0.169	**0.399**	--	0.122	**1.43**	--	0.150	**0.399**	--	0.111	**1.43**	--	0.990	**0.399**	--	0.100 U	**1.43**	--	0.225
Magnesium	7439-95-4	µg/L	--	--	--	521	--	--	1,470	--	--	800	--	--	2,610	--	--	2,540	--	--	4,870
Manganese	7439-96-5	µg/L	--	--	--	6.99	--	--	10.9	--	--	2.95	--	--	8.19	--	--	5.50	--	--	20.2
Potassium	7440-09-7	µg/L	--	--	--	442	--	--	925	--	--	566	--	--	1,270	--	--	1,300	--	--	2,090
Sodium	7440-23-5	µg/L	--	--	--	747	--	--	1,410	--	--	888	--	--	1,960	--	--	1,950	--	--	3,410
Zinc	7440-66-6	µg/L	13.6	**25.7**	--	6.25	**67.4**	--	12.2	**25.7**	--	8.20	**67.4**	--	7.58	**25.7**	--	4.86	**67.4**	--	8.10
Conventionals																					
Alkalinity, Total	--	mg-$CaCO_3$/L	--	--	--	10.3	--	--	15.3	--	--	10.9	--	--	17.3	--	--	16.4	--	--	24.2 J
Alkalinity, Bicarbonate	--	mg-$CaCO_3$/L	--	--	--	10.3	--	--	15.3	--	--	10.9	--	--	17.3	--	--	16.4	--	--	24.2 J
Alkalinity, Carbonate	--	mg-$CaCO_3$/L	--	--	--	1.00 U	--	--	1.00 U	--	--	1.00 U	--	--	1.00 U	--	--	1.00 U	--	--	1.00 UJ
Alkalinity, Hydroxide	--	mg-$CaCO_3$/L	--	--	--	1.00 U	--	--	1.00 U	--	--	1.00 U	--	--	1.00 U	--	--	1.00 U	--	--	1.00 UJ
Chloride	16887-00-6	mg/L	--	--	--	0.142	--	--	0.404	--	--	0.157	--	--	0.593	--	--	0.252	--	--	0.634
Dissolved Organic Carbon	--	mg/L	--	--	--	0.740	--	--	0.530	--	--	0.660	--	--	0.640	--	--	0.690	--	--	2.13 J
Nitrate (as Nitrogen)	14797-55-8	mg/L	--	--	--	0.100 UJ	--	--	0.100 UJ	--	--	0.100 UJ	--	--	0.116 J	--	--	0.100 UJ	--	--	0.182 J
Sulfate	14808-79-8	mg/L	--	--	--	4.65	--	--	24.3	--	--	9.06	--	--	44.2	--	--	31.3	--	--	76.4 J
Total Dissolved Solids	--	mg/L	--	--	--	34.0	--	--	68.0	--	--	43.0	--	--	106	--	--	90.0	--	--	172 J
Total Suspended Solids	--	mg/L	--	--	--	1.00	--	--	2.00	--	--	1.00 U	--	--	1.00 U	--	--	3.00	--	--	21.0 J
Total Organic Carbon	--	mg/L	--	--	--	0.670	--	--	0.700	--	--	0.610	--	--	0.800	--	--	0.720	--	--	2.34 J
Hardness, Total	--	mg-$CaCO_3$/L	--	--	--	15.2	--	--	38.2	--	--	19.1	--	--	59.6	--	--	56.1	--	--	100
Field Parameters [6]																					
Dissolved Oxygen (DO)	--	mg/L	--	--	--	10.61	--	--	8.67	--	--	10.15	--	--	7.28	--	--	7.77	--	--	4.32
Ferrous Iron	--	mg/L	--	--	--	0.5 U	--	--	0.5 U	--	--	0.5 U	--	--	0.5 U	--	--	0.5 U	--	--	0.5 U
Oxidation-Reduction Potential (ORP)	--	mV	--	--	--	103.9	--	--	171.5	--	--	116.8	--	--	123.3	--	--	131.8	--	--	123.6
pH	--	pH	--	--	--	6.64	--	--	6.99	--	--	6.59	--	--	6.32	--	--	6.22	--	--	6.13
Specific Conductivity	--	µS/cm	--	--	--	34.0	--	--	100	--	--	48.6	--	--	150	--	--	118.1	--	--	236
Turbidity	--	ntu	--	--	--	0.38	--	--	0.2	--	--	0.20	--	--	1.81	--	--	0.26	--	--	1.41

Notes:

Results for total metals and conventionals are presented to three significant figures. Results for field parameters are presented to the significant figures indicated by the field meter.

-- Not applicable/available or not analyzed.

RED/BOLD Detected exceedance of applicable criteria (applicable criteria presented in **bold**).

1 Locations are listed from upstream (west) to downstream (east).

2 Surface water criteria given in Tables 3 and 11 of the ROD are presented for reference only. Reference criteria from the ROD for cadmium, copper, lead, and zinc are adjusted based on a hardness of 9 mg/L.

3 For cadmium, copper, lead, and zinc, criteria are presented that are adjusted for hardness for each sample, in accordance with Table 3 of the ROD. The cadmium criteria, adjusted in accordance with the U.S. Environmental Protection Agency National Recommended Water Quality Criteria (NRWQC) last updated in 2001, is presented for reference only. Cadmium results are compared to 2016 hardness adjusted criteria. Copper, lead, and zinc were adjusted based on WAC Chapter 173-201A (accessed at https://apps.leg.wa.gov/WAC/default.aspx?cite=173-201A-240). The hardness of the hyporheic zone, the 12-inch porewater hardness for each porewater sampling location cluster, was used for the adjustment.

4 Cadmium criteria adjusted for hardness using the current (updated 2016) NRWQC hardness correction formula (accessed at https://www.epa.gov/wqc/national-recommended-water-quality-criteria-aquatic-life-criteria-table#b).

5 Field-filtered samples were submitted for dissolved metals analysis for locations where turbidity exceeded or approached 5 NTU. Dissolved results presented in parentheses.

6 Field measurements were collected with YSI ProDSS water quality instrument and LaMotte 2020we turbidity meter during sampling. Ferrous iron measured with a Hach Iron test kit, Model IR-18, 0–10 mg/L.

Abbreviations:

bgs Below ground surface
CAS Chemical Abstracts Service
µg/L Micrograms per liter
µS/cm Microsiemens per centimeter
mg-$CaCO_3$/L Milligrams calcium carbonate per liter
mg/L Milligrams per liter
mV Millivolts
NTU Nephelometric turbidity units
ROD Record of Decision

Qualifiers:

J Analyte was detected, concentration is considered to be an estimate.
JQ Analyte was detected between the method detection limit and reporting limit, concentration is considered to be an estimate.
U Analyte was not detected at the given reporting limit.
UJ Analyte was not detected at the given reporting limit, which is considered to be an estimate.

Table 4.11
Analytical Results from Seeps Adjacent to Lower West Area and Tailings Piles

Area				Seeps																	
Location [1]				SP-44			SP-33						SP-40								
Sample Type				Field Sample			Field Sample			Field Duplicate			Field Sample			Field Sample			Field Sample		
Sample Date				9/27/2020			6/12/2020			6/12/2020			6/14/2020			7/21/2020			9/27/2020		
Analytes	CAS No.	Units	Surface Water-Based Criteria [2]	Hardness-Adjusted Criteria ROD[3]	Hardness-Adjusted Criteria 2016[4]	Sample Result	Hardness-Adjusted Criteria ROD[3]	Hardness-Adjusted Criteria 2016[4]	Sample Result	Hardness-Adjusted Criteria ROD[3]	Hardness-Adjusted Criteria 2016[4]	Sample Result	Hardness-Adjusted Criteria ROD[3]	Hardness-Adjusted Criteria 2016[4]	Sample Result	Hardness-Adjusted Criteria ROD[3]	Hardness-Adjusted Criteria 2016[4]	Sample Result	Hardness-Adjusted Criteria ROD[3]	Hardness-Adjusted Criteria 2016[4]	Sample Result
Total Metals																					
Aluminum	7429-90-5	µg/L	**142**	--	--	49.6	--	--	35.1	--	--	37.6	--	--	71.3	--	--	28.9	--	--	77.4
Cadmium	7440-43-9	µg/L	0.05	0.0796	**0.212**	**0.219**	0.083	**0.222**	0.218	0.082	**0.219**	0.206	0.074	**0.195**	**0.425**	0.0686	**0.181**	**0.301**	0.0889	**0.239**	**0.434**
Calcium	7440-70-2	µg/L	--	--	--	6,690	--	--	6,950	--	--	6,870	--	--	5,910	--	--	5,310	--	--	7,750
Copper	7440-50-8	µg/L	1.45	**2.84**	--	1.59	**2.99**	--	1.70	**2.96**	--	1.70	**2.59**	--	**2.85**	**2.37**	--	1.21	**3.26**	--	2.48
Iron	7439-89-6	µg/L	**1,000**	--	--	82.4	--	--	42.7	--	--	47.5	--	--	361	--	--	58	--	--	453
Lead	7439-92-1	µg/L	0.169	**0.416**	--	0.100 U	**0.444**	--	0.100 U	**0.437**	--	0.100 U	**0.366**	--	0.0770 JQ	**0.327**	--	0.1 U	**0.497**	--	0.0980 JQ
Magnesium	7439-95-4	µg/L	--	--	--	740	--	--	881	--	--	855	--	--	719	--	--	624	--	--	929
Manganese	7439-96-5	µg/L	--	--	--	2.98	--	--	2.59	--	--	2.71	--	--	4.27	--	--	1.95	--	--	5.58
Potassium	7440-09-7	µg/L	--	--	--	631	--	--	491	--	--	492	--	--	437	--	--	415	--	--	647
Sodium	7440-23-5	µg/L	--	--	--	1,090	--	--	1,270	--	--	1,220	--	--	981	--	--	815	--	--	1,380
Zinc	7440-66-6	µg/L	13.6	**26.5**	--	12.8	**27.9**	--	23.0	**27.5**	--	23.3	**24.1**	--	**26.4**	**22.1**	--	19.2	**30.3**	--	**33.3**
Conventionals																					
Alkalinity, Total	--	mg-$CaCO_3$/L	--	--	--	11.5	--	--	10.5	--	--	10.6	--	--	11.7	--	--	9.77	--	--	13.0
Alkalinity, Bicarbonate	--	mg-$CaCO_3$/L	--	--	--	11.5	--	--	10.5	--	--	10.6	--	--	11.7	--	--	9.77	--	--	13.0
Alkalinity, Carbonate	--	mg-$CaCO_3$/L	--	--	--	1.00 U	--	--	1.00 U	--	--	1.00 U	--	--	1.00 U	--	--	1 U	--	--	1.00 U
Alkalinity, Hydroxide	--	mg-$CaCO_3$/L	--	--	--	1.00 U	--	--	1.00 U	--	--	1.00 U	--	--	1.00 U	--	--	1 U	--	--	1.00 U
Chloride	16887-00-6	mg/L	--	--	--	0.352	--	--	0.351	--	--	0.349	--	--	0.284	--	--	0.235	--	--	0.445
Dissolved Organic Carbon	--	mg/L	--	--	--	0.580	--	--	0.660	--	--	0.670	--	--	0.690	--	--	0.5 U	--	--	0.500 U
Nitrate (as Nitrogen)	14797-55-8	mg/L	--	--	--	0.106	--	--	0.100 UJ	--	--	0.100 UJ	--	--	0.100 UJ	--	--	0.1 UJ	--	--	0.108
Sulfate	14808-79-8	mg/L	--	--	--	10.1	--	--	10.9	--	--	10.7	--	--	7.47	--	--	7.27	--	--	13.0
Hardness, Total	--	mg-$CaCO_3$/L	--	--	--	19.8	--	--	21.0	--	--	20.7	--	--	17.7	--	--	15.8	--	--	23.2
Field Parameters [5]																					
Dissolved Oxygen (DO)	--	mg/L	--	--	--	9.98	--	--	8.23	--	--	8.23	--	--	11.06	--	--	8.94	--	--	9.42
Ferrous Iron	--	mg/L	--	--	--	0.5 U	--	--	0.5 U	--	--	--	--	--	0.5 U	--	--	0.5 U	--	--	0.5 U
Oxidation-Reduction Potential (ORP	--	mV	--	--	--	137.7	--	--	175.8	--	--	175.8	--	--	172.9	--	--	163.7	--	--	115.8
pH	--	pH	--	--	--	6.65	--	--	6.03	--	--	6.03	--	--	6.03	--	--	6.84	--	--	6.56
Specific Conductivity	--	µS/cm	--	--	--	48.2	--	--	38.1	--	--	38.1	--	--	40.2	--	--	25.8	--	--	60.9
Turbidity	--	ntu	--	--	--	1.5	--	--	1.13	--	--	1.13	--	--	1.27	--	--	0.04	--	--	1.7

Notes:

Results for total metals and conventionals are presented to three significant figures. Results for field parameters are presented to the significant figures indicated by the field meter.

-- Not applicable/available or not analyzed.

RED/BOLD Detected exceedance of applicable criteria (applicable criteria presented in **bold**).

1 Locations are listed from upstream (west) to downstream (east).

2 Surface water criteria given in Tables 3 and 11 of the ROD are presented for reference only. Reference criteria from the ROD for cadmium, copper, lead, and zinc are adjusted based on a hardness of 9 mg/L.

3 For cadmium, copper, lead, and zinc, criteria are presented that are adjusted for hardness for each sample, in accordance with Table 3 of the ROD. The cadmium criteria, adjusted in accordance with the U.S. Environmental Protection Agency National Recommended Water Quality Criteria (NRWQC) last updated in 2001, is presented for reference only. Cadmium results are compared to 2016 hardness adjusted criteria. Copper, lead, and zinc were adjusted based on WAC Chapter 173-201A (accessed at https://apps.leg.wa.gov/WAC/default.aspx?cite=173-201A-240). The hardness of the individual sample was used for the adjustment.

4 Cadmium criteria adjusted for hardness using the current (updated 2016) NRWQC hardness correction formula (accessed at https://www.epa.gov/wqc/national-recommended-water-quality-criteria-aquatic-life-criteria-table#b).

5 Field measurements were collected with YSI ProDSS water quality instrument and LaMotte 2020we turbidity meter during sampling. Ferrous iron measured with a Hach Iron test kit, Model IR-18, 0–10 mg/l

Abbreviations:

CAS Chemical Abstracts Service
µg/L Micrograms per liter
µS/cm Microsiemens per centimeter
mg-$CaCO_3$/L Milligrams calcium carbonate per liter
mg/L Milligrams per liter
mV Millivolts
NTU Nephelometric turbidity units
ROD Record of Decision

Qualifiers:

JQ Analyte was detected between the method detection limit and reporting limit, concentration is considered to be an estimate.
U Analyte was not detected at the given reporting limit.
UJ Analyte was not detected at the given reporting limit, which is considered to be an estimate.

Table 4.11
Analytical Results from Seeps Adjacent to Lower West Area and Tailings Piles

Area				Seeps (cont.)																	
Location [1]				SP-32			SP-34			SP-47			SP-36			SP-46			SP-45		
Sample Type				Field Sample			Field Sample			Field Sample			Field Sample			Field Sample			Field Sample		
Sample Date				7/21/2020			7/21/2020			9/27/2020			9/27/2020			9/27/2020			9/27/2020		
Analytes	CAS No.	Units	Surface Water-Based Criteria [2]	Hardness-Adjusted Criteria ROD [3]	Hardness-Adjusted Criteria 2016 [4]	Sample Result	Hardness-Adjusted Criteria ROD [3]	Hardness-Adjusted Criteria 2016 [4]	Sample Result	Hardness-Adjusted Criteria ROD [3]	Hardness-Adjusted Criteria 2016 [4]	Sample Result	Hardness-Adjusted Criteria ROD [3]	Hardness-Adjusted Criteria 2016 [4]	Sample Result	Hardness-Adjusted Criteria ROD [3]	Hardness-Adjusted Criteria 2016 [4]	Sample Result	Hardness-Adjusted Criteria ROD [3]	Hardness-Adjusted Criteria 2016 [4]	Sample Result
Total Metals																					
Aluminum	7429-90-5	µg/L	**142**	--	--	24.8	--	--	46.5	--	--	61.2	--	--	71.9	--	--	52.5	--	--	51.5
Cadmium	7440-43-9	µg/L	0.05	0.0686	**0.181**	**0.308**	0.0528	**0.136**	0.0296	0.0625	**0.163**	0.0324	0.0625	**0.163**	0.0346	0.0622	**0.162**	0.0248	0.0609	**0.159**	0.0282
Calcium	7440-70-2	µg/L	--	--	--	5,380			3,870	--	--	4,840	--	--	4,830	--	--	4,810	--	--	4,650
Copper	7440-50-8	µg/L	1.45	**2.37**	--	1.41	**1.72**	--	1.1	**2.12**	--	1.09	**2.12**	--	1.24	**2.10**	--	1.05	**2.05**	--	0.969
Iron	7439-89-6	µg/L	**1,000**	--	--	43.9	--	--	96.2	--	--	124	--	--	149	--	--	111	--	--	94.7
Lead	7439-92-1	µg/L	0.169	**0.327**	--	0.1 U	**0.213**	--	0.1 U	**0.281**	--	0.0770 JQ	**0.281**	--	0.0870 JQ	**0.278**	--	0.100 U	**0.269**	--	0.100 U
Magnesium	7439-95-4	µg/L	--	--	--	621	--	--	392	--	--	471	--	--	465	--	--	471	--	--	457
Manganese	7439-96-5	µg/L	--	--	--	1.83	--	--	3.71	--	--	2.69	--	--	3.58	--	--	2.77	--	--	2.13
Potassium	7440-09-7	µg/L	--	--	--	427	--	--	360	--	--	481	--	--	468	--	--	472	--	--	452
Sodium	7440-23-5	µg/L	--	--	--	818	--	--	574	--	--	717	--	--	688	--	--	677	--	--	638
Zinc	7440-66-6	µg/L	13.6	**22.1**	--	19.1	**16.1**	--	4.36	**19.8**	--	7.86	**19.8**	--	6.25	**19.6**	--	5.15	**19.2**	--	5.89
Conventionals																					
Alkalinity, Total	--	mg-$CaCO_3$/L	--	--	--	9.56	--	--	9.25	--	--	10.4	--	--	10.5	--	--	10.1	--	--	10.4
Alkalinity, Bicarbonate	--	mg-$CaCO_3$/L	--	--	--	9.56	--	--	9.25	--	--	10.4	--	--	10.5	--	--	10.1	--	--	10.4
Alkalinity, Carbonate	--	mg-$CaCO_3$/L	--	--	--	1 U	--	--	1 U	--	--	1.00 U	--	--	1.00 U	--	--	1.00 U	--	--	1.00 U
Alkalinity, Hydroxide	--	mg-$CaCO_3$/L	--	--	--	1 U	--	--	1 U	--	--	1.00 U	--	--	1.00 U	--	--	1.00 U	--	--	1.00 U
Chloride	16887-00-6	mg/L	--	--	--	0.237	--	--	0.137	--	--	0.275	--	--	0.279	--	--	0.275	--	--	0.274
Dissolved Organic Carbon	--	mg/L	--	--	--	0.5 U	--	--	0.5 U	--	--	0.620	--	--	0.640	--	--	0.630	--	--	0.610
Nitrate (as Nitrogen)	14797-55-8	mg/L	--	--	--	0.1 UJ	--	--	0.1 UJ	--	--	0.100 U	--	--	0.100 U	--	--	0.100 U	--	--	0.100 U
Sulfate	14808-79-8	mg/L	--	--	--	7.29	--	--	3.42	--	--	4.35	--	--	4.33	--	--	4.30	--	--	4.28
Hardness, Total	--	mg-$CaCO_3$/L	--	--	--	16	--	--	11.3	--	--	14.0	--	--	14.0	--	--	13.9	--	--	13.5
Field Parameters [5]																					
Dissolved Oxygen (DO)	--	mg/L	--	--	--	8.57	--	--	9.53	--	--	11.23	--	--	11.55	--	--	11.31	--	--	11.17
Ferrous Iron	--	mg/L	--	--	--	0.5 U	--	--	0.5 U	--	--	0.5 U	--	--	0.5 U	--	--	0.5 U	--	--	0.5 U
Oxidation-Reduction Potential (ORP	--	mV	--	--	--	136.2	--	--	101.8	--	--	129.5	--	--	114.9	--	--	126.9	--	--	120.8
pH	--	pH	--	--	--	6.69	--	--	7.1	--	--	7.07	--	--	7.08	--	--	7.09	--	--	6.93
Specific Conductivity	--	µS/cm	--	--	--	29.7	--	--	20.9	--	--	33	--	--	33	--	--	32.8	--	--	32.9
Turbidity	--	ntu	--	--	--	1.63	--	--	0.38	--	--	0.43	--	--	--	--	--	0.69	--	--	0.31

Notes:

Results for total metals and conventionals are presented to three significant figures. Results for field parameters are presented to the significant figures indicated by the field meter.

-- Not applicable/available or not analyzed.

RED/BOLD Detected exceedance of applicable criteria (applicable criteria presented in **bold**).

1 Locations are listed from upstream (west) to downstream (east).

2 Surface water criteria given in Tables 3 and 11 of the ROD are presented for reference only. Reference criteria from the ROD for cadmium, copper, lead, and zinc are adjusted based on a hardness of 9 mg/L.

3 For cadmium, copper, lead, and zinc, criteria are presented that are adjusted for hardness for each sample, in accordance with Table 3 of the ROD. The cadmium criteria, adjusted in accordance with the U.S. Environmental Protection Agency National Recommended Water Quality Criteria (NRWQC) last updated in 2001, is presented for reference only. Cadmium results are compared to 2016 hardness adjusted criteria. Copper, lead, and zinc were adjusted based on WAC Chapter 173-201A (accessed at https://apps.leg.wa.gov/WAC/default.aspx?cite=173-201A-240). The hardness of the individual sample was used for the adjustment.

4 Cadmium criteria adjusted for hardness using the current (updated 2016) NRWQC hardness correction formula (accessed at https://www.epa.gov/wqc/national-recommended-water-quality-criteria-aquatic-life-criteria-table#b).

5 Field measurements were collected with YSI ProDSS water quality instrument and LaMotte 2020we turbidity meter during sampling. Ferrous iron measured with a Hach Iron test kit, Model IR-18, 0–10 mg/l

Abbreviations:

CAS Chemical Abstracts Service
µg/L Micrograms per liter
µS/cm Microsiemens per centimeter
mg-$CaCO_3$/L Milligrams calcium carbonate per liter
mg/L Milligrams per liter
mV Millivolts
NTU Nephelometric turbidity units
ROD Record of Decision

Qualifiers:

JQ Analyte was detected between the method detection limit and reporting limit, concentration is considered to be an estimate.
U Analyte was not detected at the given reporting limit.
UJ Analyte was not detected at the given reporting limit, which is considered to be an estimate.

Table 4.11
Analytical Results from Seeps Adjacent to Lower West Area and Tailings Piles

Area				Seeps (cont.)														
Location [1]				SP-30						SP-31								
Sample Type				Field Sample			Field Sample			Field Sample			Field Sample			Field Duplicate		
Sample Date				6/11/2020			7/20/2020			6/11/2020			9/27/2020			9/27/2020		
Analytes	CAS No.	Units	Surface Water-Based Criteria [2]	Hardness-Adjusted Criteria ROD [3]	Hardness-Adjusted Criteria 2016 [4]	Sample Result	Hardness-Adjusted Criteria ROD [3]	Hardness-Adjusted Criteria 2016 [4]	Sample Result	Hardness-Adjusted Criteria ROD [3]	Hardness-Adjusted Criteria 2016 [4]	Sample Result	Hardness-Adjusted Criteria ROD [3]	Hardness-Adjusted Criteria 2016 [4]	Sample Result	Hardness-Adjusted Criteria ROD [3]	Hardness-Adjusted Criteria 2016 [4]	Sample Result
Total Metals																		
Aluminum	7429-90-5	µg/L	**142**	--	--	81.7	--	--	60.8	--	--	76.9	--	--	114	--	--	121
Cadmium	7440-43-9	µg/L	0.05	0.072	**0.191**	0.083	0.0494	**0.127**	0.0366	0.073	**0.193**	0.108	0.059	**0.153**	0.0270	0.0613	**0.160**	0.0348
Calcium	7440-70-2	µg/L	--	--	--	5,830	--	--	3,530	--	--	5,860	--	--	4,430	--	--	4,690
Copper	7440-50-8	µg/L	1.45	**2.52**	--	2.17	**1.59**	--	1.46	**2.56**	--	2.02	**1.97**	--	**2.21**	**2.06**	--	**2.37**
Iron	7439-89-6	µg/L	**1,000**	--	--	111	--	--	103	--	--	98.9	--	--	336	--	--	403
Lead	7439-92-1	µg/L	0.169	**0.355**	--	0.100 U	**0.191**	--	0.1 U	**0.362**	--	0.100 U	**0.256**	--	0.130	**0.271**	--	0.174
Magnesium	7439-95-4	µg/L	--	--	--	641	--	--	362	--	--	688	--	--	451	--	--	473
Manganese	7439-96-5	µg/L	--	--	--	20.1	--	--	3.92	--	--	22.3	--	--	6.25	--	--	6.06
Potassium	7440-09-7	µg/L	--	--	--	474	--	--	364	--	--	465	--	--	457	--	--	480
Sodium	7440-23-5	µg/L	--	--	--	712	--	--	514	--	--	713	--	--	612	--	--	648
Zinc	7440-66-6	µg/L	13.6	**23.5**	--	14.8	**14.9**	--	5.32	**23.9**	--	14.6	**18.4**	--	6.09	**19.3**	--	8.15
Conventionals																		
Alkalinity, Total	--	mg-$CaCO_3$/L	--	--	--	9.70	--	--	8.33	--	--	8.88	--	--	10.5	--	--	9.58
Alkalinity, Bicarbonate	--	mg-$CaCO_3$/L	--	--	--	9.70	--	--	8.33	--	--	8.88	--	--	10.5	--	--	9.58
Alkalinity, Carbonate	--	mg-$CaCO_3$/L	--	--	--	1.00 U	--	--	1 U	--	--	1.00 U	--	--	1.00 U	--	--	1.00 U
Alkalinity, Hydroxide	--	mg-$CaCO_3$/L	--	--	--	1.00 U	--	--	1 U	--	--	1.00 U	--	--	1.00 U	--	--	1.00 U
Chloride	16887-00-6	mg/L	--	--	--	0.159	--	--	0.128	--	--	0.160	--	--	0.280	--	--	0.281
Dissolved Organic Carbon	--	mg/L	--	--	--	0.640	--	--	0.5	--	--	0.670	--	--	0.650	--	--	0.620
Nitrate (as Nitrogen)	14797-55-8	mg/L	--	--	--	0.100 UJ	--	--	0.1 UJ	--	--	0.100 UJ	--	--	0.100 U	--	--	0.100 U
Sulfate	14808-79-8	mg/L	--	--	--	7.89	--	--	3.28	--	--	8.43	--	--	4.32	--	--	4.34
Hardness, Total	--	mg-$CaCO_3$/L	--	--	--	17.2	--	--	10.3	--	--	17.5	--	--	12.9	--	--	13.6
Field Parameters [5]																		
Dissolved Oxygen (DO)	--	mg/L	--	--	--	10.32	--	--	8.64	--	--	10.59	--	--	11.14	--	--	--
Ferrous Iron	--	mg/L	--	--	--	0.5 U	--	--	0.5 U	--	--	0.5 U	--	--	0.5 U	--	--	--
Oxidation-Reduction Potential (ORP	--	mV	--	--	--	148.0	--	--	125.1	--	--	102.9	--	--	181.9	--	--	--
pH	--	pH	--	--	--	6.39	--	--	6.84	--	--	6.57	--	--	6.66	--	--	--
Specific Conductivity	--	µS/cm	--	--	--	38.7	--	--	17.3	--	--	43.5	--	--	32.4	--	--	--
Turbidity	--	ntu	--	--	--	1.14	--	--	1.54	--	--	0.73	--	--	0.01	--	--	--

Notes:

Results for total metals and conventionals are presented to three significant figures. Results for field parameters are presented to the significant figures indicated by the field meter.

-- Not applicable/available or not analyzed.

RED/BOLD Detected exceedance of applicable criteria (applicable criteria presented in **bold**).

1 Locations are listed from upstream (west) to downstream (east).

2 Surface water criteria given in Tables 3 and 11 of the ROD are presented for reference only. Reference criteria from the ROD for cadmium, copper, lead, and zinc are adjusted based on a hardness of 9 mg/L.

3 For cadmium, copper, lead, and zinc, criteria are presented that are adjusted for hardness for each sample, in accordance with Table 3 of the ROD. The cadmium criteria, adjusted in accordance with the U.S. Environmental Protection Agency National Recommended Water Quality Criteria (NRWQC) last updated in 2001, is presented for reference only. Cadmium results are compared to 2016 hardness adjusted criteria. Copper, lead, and zinc were adjusted based on WAC Chapter 173-201A (accessed at https://apps.leg.wa.gov/WAC/default.aspx?cite=173-201A-240). The hardness of the individual sample was used for the adjustment.

4 Cadmium criteria adjusted for hardness using the current (updated 2016) NRWQC hardness correction formula (accessed at https://www.epa.gov/wqc/national-recommended-water-quality-criteria-aquatic-life-criteria-table#b).

5 Field measurements were collected with YSI ProDSS water quality instrument and LaMotte 2020we turbidity meter during sampling. Ferrous iron measured with a Hach Iron test kit, Model IR-18, 0–10 mg/l

Abbreviations:

CAS Chemical Abstracts Service
µg/L Micrograms per liter
µS/cm Microsiemens per centimeter
mg-$CaCO_3$/L Milligrams calcium carbonate per liter
mg/L Milligrams per liter
mV Millivolts
NTU Nephelometric turbidity units
ROD Record of Decision

Qualifiers:

JQ Analyte was detected between the method detection limit and reporting limit, concentration is considered to be an estimate.
U Analyte was not detected at the given reporting limit.
UJ Analyte was not detected at the given reporting limit, which is considered to be an estimate.

Table 4.12
Analytical Results from Wetlands Surface Water

			Area	Background			Wetlands Surface Water								
			Location [1]	SW-US-1			SW-TP3-East1								
			Sample Type	Field Sample			Field Sample			Field Sample			Field Sample		
			Sample Date	6/13/19			6/10/2020			7/22/2020			9/26/2020		
Analytes	CAS No.	Units	Surface Water-Based Criteria [2]	Hardness-Adjusted Criteria ROD[3]	Hardness-Adjusted Criteria 2016[4]	Sample Result	Hardness-Adjusted Criteria ROD[3]	Hardness-Adjusted Criteria 2016[4]	Sample Result	Hardness-Adjusted Criteria ROD[3]	Hardness-Adjusted Criteria 2016[4]	Sample Result	Hardness-Adjusted Criteria ROD[3]	Hardness-Adjusted Criteria 2016[4]	Sample Result
Total Metals															
Aluminum	7429-90-5	µg/L	**142**	--	--	8.68 JQ	--	--	21.0	--	--	37.2	--	--	35.5
Cadmium	7440-43-9	µg/L	0.05	0.0857	**0.230**	0.0120 JQ	0.105	**0.287**	0.113	0.0989	**0.268**	0.0782	0.113	**0.308**	0.0398
Calcium	7440-70-2	µg/L	--	--	--	7,660	--	--	9,560	--	--	8,850	--	--	10,500
Copper	7440-50-8	µg/L	1.45	**3.11**	--	0.528	**4.00**	--	**6.34**	**3.71**	--	**5.25**	**4.34**	--	**4.47**
Iron	7439-89-6	µg/L	**1,000**	--	--	11.3 JQ	--	--	227	--	--	**1,050**	--	--	73.5
Lead	7439-92-1	µg/L	0.169	**0.468**	--	0.100 U	**0.652**	--	0.120	**0.590**	--	0.322	**0.726**	--	0.0780 JQ
Magnesium	7439-95-4	µg/L	--	--	--	652	--	--	1,370	--	--	1,300	--	--	1,510
Manganese	7439-96-5	µg/L	--	--	--	1.87	--	--	20.0	--	--	87.3 JB	--	--	12.7
Potassium	7440-09-7	µg/L	--	--	--	432	--	--	1,860	--	--	1,300	--	--	2,530
Sodium	7440-23-5	µg/L	--	--	--	753	--	--	1,210	--	--	1,220	--	--	1,360
Zinc	7440-66-6	µg/L	13.6	**29.0**	--	1.85 JQ	**37.1**	--	13.8	**34.5**	--	6.44	**40.3**	--	7.43
Conventionals															
Alkalinity, Total	--	mg-$CaCO_3$/L	--	--		18.0	--	--	17.6	--	--	25.1	--	--	20.5
Alkalinity, Bicarbonate	--	mg-$CaCO_3$/L	--	--		18.0	--	--	17.6	--	--	25.1	--	--	20.5
Alkalinity, Carbonate	--	mg-$CaCO_3$/L	--	--		1.00 U	--	--	1.00 U	--	--	1.00 U	--	--	1.00 U
Alkalinity, Hydroxide	--	mg-$CaCO_3$/L	--	--		1.00 U	--	--	1.00 U	--	--	1.00 U	--	--	1.00 U
Chloride	16887-00-6	mg/L	--	--		0.220	--	--	0.152	--	--	0.100	--	--	0.670
Dissolved Organic Carbon	--	mg/L	--	--		1.40	--	--	3.91	--	--	3.32	--	--	3.22
Nitrate (as Nitrogen)	14797-55-8	mg/L	--	--		0.100 UJ	--	--	0.100 UJ	--	--	0.100 UJ	--	--	0.100 UJ
Sulfate	14808-79-8	mg/L	--	--		4.10	--	--	13.8	--	--	9.93	--	--	18.1
Total Dissolved Solids	--	mg/L	--	--		27.0	--	--	45.0 J	--	--	49.0	--	--	59.0
Total Suspended Solids	--	mg/L	--	--		1.00 U	--	--	1.00 U	--	--	4.00	--	--	1.00 U
Total Organic Carbon	--	mg/L	--	--		0.860	--	--	3.88	--	--	3.25	--	--	3.24
Hardness, Total	--	mg-$CaCO_3$/L	--	--		22.0	--	--	29.5	--	--	27.4	--	--	32.5
Field Parameters [5]															
Dissolved Oxygen (DO)	--	mg/L	--	--		6.65	--	--	9.05	--	--	8.72	--	--	10.6
Ferrous Iron	--	mg/L	--	--		0.5 U	--	--	0.5 U	--	--	0.5 U	--	--	0.5 U
Oxidation-Reduction Potential (ORP)	--	mV	--	--		146.8	--	--	158.6	--	--	102.8	--	--	168.2
pH	--	pH	--	--		6.46	--	--	6.53	--	--	6.68	--	--	6.94
Specific Conductivity	--	µS/cm	--	--		51.1	--	--	74.7	--	--	66.4	--	--	98.3
Turbidity	--	ntu	--	--		0.13	--	--	0.00	--	--	1.55	--	--	0.23

Notes:

Results for total metals and conventionals are presented to three significant figures. Results for field parameters are presented to the significant figures indicated by the field meter.

-- Not applicable/available or not analyzed.

RED/BOLD Detected exceedance of applicable criteria (applicable criteria presented in **bold**).

1 Locations are listed from upstream (west) to downstream (east).

2 Surface water criteria given in Tables 3 and 11 of the ROD are presented for reference only. Reference criteria from the ROD for cadmium, copper, lead, and zinc are adjusted based on a hardness of 9 mg/L.

3 For cadmium, copper, lead, and zinc, criteria are presented that are adjusted for hardness for each sample, in accordance with Table 3 of the ROD. Cadmium was adjusted in accordance with the U.S. Environmental Protection Agency National Recommended Water Quality Criteria (NRWQC) last updated in 2001. Copper, lead, and zinc were adjusted based on Washington Administrative Code Chapter 173-201A (accessed at https://apps.leg.wa.gov/WAC/default.aspx?cite=173-201A-240). The hardness of the individual sample was used for the adjustment.

4 Cadmium criteria adjusted for hardness using the current (updated 2016) NRWQC hardness correction formula (accessed at https://www.epa.gov/wqc/national-recommended-water-quality-criteria-aquatic-life-criteria-table#b) are presented for comparison pending Agency approval of the updated criteria.

5 Field measurements were collected with YSI ProDSS water quality instrument and LaMotte 2020we turbidity meter during sampling. Ferrous iron measured with a Hach Iron test kit, Model IR-18, 0–10 mg/L.

Abbreviations:

CAS Chemical Abstracts Service
µg/L Micrograms per liter
µS/cm Microsiemens per centimeter
mg-$CaCO_3$/L Milligrams calcium carbonate per liter
mg/L Milligrams per liter
mV Millivolts
NTU Nephelometric turbidity units
ROD Record of Decision

Qualifiers:

JB Analyte was detected, concentration is considered to be an estimate due to potential blank contamination.
JQ Analyte was detected between the method detection limit and reporting limit, concentration is considered to be an estimate.
U Analyte was not detected at the given reporting limit.
UJ Analyte was not detected at the given reporting limit, which is considered to be an estimate.

Table 4.12
Analytical Results from Wetlands Surface Water

				Area	Wetlands Surface Water (cont.)								
				Location [1]	SW-TP3-East2								
				Sample Type	Field Sample			Field Sample			Field Sample		
				Sample Date	6/11/2020			7/22/2020			9/26/2020		
Analytes	CAS No.	Units	Surface Water-Based Criteria [2]	Hardness-Adjusted Criteria ROD [3]	Hardness-Adjusted Criteria 2016 [4]	Sample Result	Hardness-Adjusted Criteria ROD [3]	Hardness-Adjusted Criteria 2016 [4]	Sample Result	Hardness-Adjusted Criteria ROD [3]	Hardness-Adjusted Criteria 2016 [4]	Sample Result
Total Metals												
Aluminum	7429-90-5	µg/L	**142**	--	--	**1,460**	--	--	**1,490**	--	--	**537**
Cadmium	7440-43-9	µg/L	0.05	0.213	**0.614**	**0.848**	0.218	**0.630**	**0.738**	0.271	**0.798**	0.460
Calcium	7440-70-2	µg/L	--	--	--	26,500	--	--	27,000	--	--	38,200
Copper	7440-50-8	µg/L	1.45	**9.50**	--	**16.1**	**9.78**	--	**15.1**	**12.8**	--	5.23
Iron	7439-89-6	µg/L	**1,000**	--	--	**2,850**	--	--	**3,830**	--	--	**6,460**
Lead	7439-92-1	µg/L	0.169	**2.01**	--	0.119	**2.08**	--	0.160	**2.93**	--	0.199
Magnesium	7439-95-4	µg/L	--	--	--	3,640	--	--	3,920	--	--	4,710
Manganese	7439-96-5	µg/L	--	--	--	641	--	--	700	--	--	789
Potassium	7440-09-7	µg/L	--	--	--	2,360	--	--	2,640	--	--	3,110
Sodium	7440-23-5	µg/L	--	--	--	2,010	--	--	2,230	--	--	2,470
Zinc	7440-66-6	µg/L	13.6	**87.6**	--	**135**	**90.2**	--	**149**	**118**	--	88.8
Conventionals												
Alkalinity, Total	--	mg-$CaCO_3$/L	--	--	--	1.00 U	--	--	1.00 U	--	--	7.04
Alkalinity, Bicarbonate	--	mg-$CaCO_3$/L	--	--	--	1.00 U	--	--	1.00 U	--	--	7.04
Alkalinity, Carbonate	--	mg-$CaCO_3$/L	--	--	--	1.00 U	--	--	1.00 U	--	--	1.00 U
Alkalinity, Hydroxide	--	mg-$CaCO_3$/L	--	--	--	1.00 U	--	--	1.00 U	--	--	1.00 U
Chloride	16887-00-6	mg/L	--	--	--	0.126	--	--	0.191	--	--	0.253
Dissolved Organic Carbon	--	mg/L	--	--	--	0.660	--	--	0.700	--	--	1.07
Nitrate (as Nitrogen)	14797-55-8	mg/L	--	--	--	0.100 UJ	--	--	0.100 UJ	--	--	0.100 UJ
Sulfate	14808-79-8	mg/L	--	--	--	47.7	--	--	93.9	--	--	110
Total Dissolved Solids	--	mg/L	--	--	--	90.0 J	--	--	186	--	--	210
Total Suspended Solids	--	mg/L	--	--	--	4.00	--	--	3.00	--	--	6.00
Total Organic Carbon	--	mg/L	--	--	--	0.770	--	--	0.790	--	--	1.17
Hardness, Total	--	mg-$CaCO_3$/L	--	--	--	81.2	--	--	83.5	--	--	115
Field Parameters [5]												
Dissolved Oxygen (DO)	--	mg/L	--	--	--	7.63	--	--	5.67	--	--	5.8
Ferrous Iron	--	mg/L	--	--	--	1.5	--	--	3	--	--	0.5
Oxidation-Reduction Potential (ORP)	--	mV	--	--	--	155.8	--	--	279.8	--	--	57
pH	--	pH	--	--	--	4.93	--	--	4.74	--	--	5.6
Specific Conductivity	--	µS/cm	--	--	--	233.1	--	--	227.3	--	--	289.8
Turbidity	--	ntu	--	--	--	0.10	--	--	0.32	--	--	1.15

Notes:

Results for total metals and conventionals are presented to three significant figures. Results for field parameters are presented to the significant figures indicated by the field meter.

-- Not applicable/available or not analyzed.

RED/BOLD Detected exceedance of applicable criteria (applicable criteria presented in **bold**).

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Abbreviations:

CAS Chemical Abstracts Service
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mg-$CaCO_3$/L Milligrams calcium carbonate per liter
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NTU Nephelometric turbidity units
ROD Record of Decision

Qualifiers:

JB Analyte was detected, concentration is considered to be an estimate due to potential blank contamination.
JQ Analyte was detected between the method detection limit and reporting limit, concentration is considered to be an estimate.
U Analyte was not detected at the given reporting limit.
UJ Analyte was not detected at the given reporting limit, which is considered to be an estimate.

Table 4.13
Summary of Low-K Layer Observations

Well Cluster	Shallowest Screen Depth	Deepest Screen Depth	Average Head Difference	9/24/2020 Head Difference	Vertical Gradient (ft/ft)	Distance East of DS-15	Shallow Interval WLE (ft)	Intermediate Interval WLE (ft)	Deep Interval WLE (ft)	Low K Layer Observations
DS-15 Cluster *	18	45	0.21	0.11	0.004	0	3,165.59	3,165.48	--	Not observed in log (BOH 3,122 ft amsl).
DS-16 Cluster	23	69	2.14	2.68	0.058	510	3,157.94	3,154.82	3,155.26	Not observed in log (Bedrock at 3,099 ft amsl).
DS-17 Cluster *	19	55	1.21	1.64	0.046	1020	3,151.74	3,150.10	--	Not observed in log (BOH 3,088 ft amsl).
DS-18 Cluster	17	115	14.63	15.47	0.158	1374	3,149.54	3,148.16	3,134.07	1-foot-thick silt layers with change in pH at 77 to 81 ft bgs (~3,084 ft amsl).
DS-13 Cluster	25	90	10.63	11.74	0.181	1681	3,144.12	3,144.32	3,132.38	Interval of densely packed silty material with low plasticity noted in log at 63 to 64 ft bgs (~3,083 ft amsl). Gravel with some clay noted at 50 to 51 ft bgs.
DS-12 Cluster	20	60	1.63	2.31	0.058	1628	3,144.07	3,144.12	3,141.76	Dense silty gravel observed in DS-6DR, predecessor to DS-12 cluster, from 40 to 50 feet bgs (3,097 to 3,107 amsl; BOH 3,029 amsl). No recovery from this interval in DS-12D (BOH 3,084 ft amsl).
NRC-3 Cluster	18	111	13.12	14.53	0.156	1820	3,144.84	3,143.69	3,130.31	Dense silty sand 62 to 69 ft bgs (3,096 to 3,089 ft amsl) consistent with density observations at DS-13, but does not mention high silt content. Lithologic log inconclusive.
DS-4 Cluster	19	124	5.81	6.21	0.059	2350	3,132.01	3,129.29	3,125.80	Silty gravel with medium plasticity, glacial origin, dense to medium dense, 52 to 70 ft bgs (3,095 to 3,077 ft amsl). At contact between what is logged as alluvium and glacial.
DS-9 Cluster	20	92	-0.50	-0.11	-0.002	2705	3,123.62	3,123.11	3,123.73	Interval of silty gravel with medium plasticity at base of alluvium, but lacks combination of density and higher fines content observed elsewhere. Interval at 55 to 69 ft bgs (3,081 to 3,065 ft amsl).

Notes:

All units in ft, bgs or asl, for elevations.
Water levels from September 24, 2020.
Head difference calculated as the shallow water level minus the water level in the deepest screen interval.
Average head difference calculated from all dates in database where water levels are available from all screen intervals at a well cluster.
Deepest screen depth shown as 5 feet above the bottom of the screen interval, which is typically the middle of the saturated interval.
* No deep interval, comparison to intermediate interval.
-- Not available or applicable.

Abbreviations:

amsl Above mean sea level
bgs Below ground surface
ft Feet
BOH Bottom of hole/boring
WLE Water Level Elevation

Table 6.1
Analytical Results from West Area Seeps

			Area	Background						West Area Seeps								
			Location [1]	SP-US-1			SP-US-2			SP-26								
			Sample Type	Field Sample			Field Sample			Field Sample			Field Sample			Field Duplicate		
			Sample Date	06/17/2019			07/18/2019			6/13/2020			7/22/2020			7/22/2020		
Analytes	CAS No.	Units	Surface Water-Based Criteria [2]	Hardness-Adjusted Criteria ROD [3]	Hardness-Adjusted Criteria 2016 [4]	Sample Result	Hardness-Adjusted Criteria ROD [3]	Hardness-Adjusted Criteria 2016 [4]	Sample Result	Hardness-Adjusted Criteria ROD [3]	Hardness-Adjusted Criteria 2016 [4]	Sample Result	Hardness-Adjusted Criteria ROD [3]	Hardness-Adjusted Criteria 2016 [4]	Sample Result	Hardness-Adjusted Criteria ROD [3]	Hardness-Adjusted Criteria 2016 [4]	Sample Result
Total Metals																		
Aluminum	7429-90-5	µg/L	**142**	--	--	8.86 JQ	--	--	8.04 JQ	--	--	10.7 JQ	--	--	77.3	--	--	54.5
Cadmium	7440-43-9	µg/L	0.05	0.043	**0.123**	0.0200 U	0.048	**0.123**	0.0200 U	0.0760	**0.202**	0.0200 U	0.1060	**0.290**	0.0162 JQ	0.1060	**0.290**	0.0198 JQ
Calcium	7440-70-2	µg/L	--	--	--	2,840	--	--	3,350	--	--	6,110	--	--	9,720	--	--	9,910
Copper	7440-50-8	µg/L	1.45	**1.53**	--	0.500 U	**1.53**	--	0.500 U	**2.70**	--	0.353 JQ	**4.06**	--	0.387 JQ	**4.06**	--	0.346 JQ
Iron	7439-89-6	µg/L	**1,000**	--	--	18.9 JQ	--	--	10.7 JQ	--	--	20.0 U	--	--	48.8 J	--	--	27.7
Lead	7439-92-1	µg/L	0.169	**0.182**	--	0.100 U	**0.182**	--	0.100 U	**0.387**	--	0.100 U	**0.664**	--	0.100 U	**0.664**	--	0.0740 JQ
Magnesium	7439-95-4	µg/L	--	--	--	268	--	--	300	--	--	799	--	--	1,290	--	--	1,290
Manganese	7439-96-5	µg/L	--	--	--	0.543	--	--	0.907	--	--	0.500 U	--	--	1.61	--	--	1.83
Potassium	7440-09-7	µg/L	--	--	--	208	--	--	92.4	--	--	488	--	--	659	--	--	656
Sodium	7440-23-5	µg/L	--	--	--	503	--	--	561	--	--	1,000	--	--	1,470	--	--	1,470
Zinc	7440-66-6	µg/L	13.6	**14.3**	--	1.51 JQ	**14.3**	--	1.58 JQ	**25.1**	--	1.11 JQ	**37.7**	--	1.77 JQ	**37.7**	--	2.70 JQ
Conventionals																		
Alkalinity, Total	--	mg-$CaCO_3$/L	--		--	7.90	--		8.80	--	--	12.6	--	--	11.7	--	--	13.8
Alkalinity, Bicarbonate	--	mg-$CaCO_3$/L	--		--	7.90	--		8.80	--	--	12.6	--	--	11.7	--	--	13.8
Alkalinity, Carbonate	--	mg-$CaCO_3$/L	--		--	1.00 U	--		1.00 U	--	--	1.00 U	--	--	1.00 U	--	--	1.00 U
Alkalinity, Hydroxide	--	mg-$CaCO_3$/L	--		--	1.00 U	--		1.00 U	--	--	1.00 U	--	--	1.00 U	--	--	1.00 U
Chloride	16887-00-6	mg/L	--		--	0.120	--		0.100 U	--	--	0.157	--	--	0.275	--	--	0.276
Dissolved Organic Carbon	--	mg/L	--		--	0.550	--		0.500 U	--	--	0.500 U	--	--	0.500 U	--	--	0.500 U
Nitrate (as Nitrogen)	14797-55-8	mg/L	--		--	0.100 UJ	--		0.100 UJ	--	--	0.100 UJ	--	--	0.100 UJ	--	--	0.100 UJ
Sulfate	14808-79-8	mg/L	--		--	1.70	--		1.90	--	--	8.89	--	--	18.0	--	--	18.1
Hardness, Total	--	mg-$CaCO_3$/L	--		--	8.20	--		9.60	--	--	18.6	--	--	29.6	--	--	30.1
Field Parameters [5]																		
Dissolved Oxygen (DO)	--	mg/L	--		--	10.77	--		9.04	--	--	11.85	--	--	11.32	--	--	--
Ferrous Iron		mg/L				0.5 U			0.5 U	--	--	0.5 U			0.5 U			
Oxidation-Reduction Potential (ORP)	--	mV	--		--	173	--		121	--	--	216.2	--	--	168.9	--	--	--
pH	--	pH	--		--	5.99	--		5.57	--	--	6.12	--	--	6.18	--	--	--
Specific conductivity	--	µS/cm	--		--	21.2	--		33.3	--	--	51.8	--	--	71.7	--	--	--
Turbidity	--	ntu	--		--	0.67	--		4.70	--	--	0.12	--	--	2.88	--	--	--

Notes:

Results for total metals and conventionals are presented to three significant figures. Results for field parameters are presented to the significant figures indicated by the field meter.

-- Not applicable/available or not analyzed.

RED/BOLD Detected exceedance of applicable criteria (applicable criteria presented in **bold**).

1 Locations are listed from upstream (west) to downstream (east).

2 Surface water criteria given in Tables 3 and 11 of the ROD are presented for reference only. Reference criteria from the ROD for cadmium, copper, lead, and zinc are adjusted based on a hardness of 9 mg/L.

3 For cadmium, copper, lead, and zinc, criteria are presented that are adjusted for hardness for each sample, in accordance with Table 3 of the ROD. Cadmium was adjusted in accordance with the U.S. Environmental Protection Agency National Recommended Water Quality Criteria (NRWQC) last updated in 2001. Copper, lead, and zinc were adjusted based on Washington Administrative Code Chapter 173-201A (accessed at https://apps.leg.wa.gov/WAC/default.aspx?cite=173-201A-240). The hardness of the individual sample was used for the adjustment.

4 Cadmium criteria adjusted for hardness using the current (updated 2016) NRWQC hardness correction formula (accessed at https://www.epa.gov/wqc/national-recommended-water-quality-criteria-aquatic-life-criteria-table#b) are presented for comparison pending Agency approval of the updated criteria.

5 Field measurements were collected with YSI ProDSS water quality instrument and LaMotte 2020we turbidity meter during sampling. Ferrous iron measured with a Hach Iron test kit, Model IR-18, 0–10 mg/L.

Abbreviations:

CAS Chemical Abstracts Service
µg/L Micrograms per liter
µS/cm Microsiemens per centimeter
mg-$CaCO_3$/L Milligrams calcium carbonate per liter
mg/L Milligrams per liter
mV Millivolts
NTU Nephelometric turbidity units
ROD Record of Decision

Qualifiers:

J Analyte was detected, concentration is considered to be an estimate.
JQ Analyte was detected between the method detection limit and reporting limit, concentration is considered to be an estimate.
U Analyte was not detected at the given reporting limit.
UJ Analyte was not detected at the given reporting limit, which is considered to be an estimate.

Table 6.1
Analytical Results from West Area Seeps

			Area	West Area Seeps Downgradient of Collection System												
			Location [1]	SP-23			SP-12 West			SP-12 East			SP-41		
			Sample Type	Field Sample			Field Sample			Field Sample			Field Sample		
			Sample Date	6/13/2020			6/14/2020			6/14/2020			6/14/2020		
Analytes	CAS No.	Units	Surface Water-Based Criteria [2]	Hardness-Adjusted Criteria ROD [3]	Hardness-Adjusted Criteria 2016 [4]	Sample Result	Hardness-Adjusted Criteria ROD [3]	Hardness-Adjusted Criteria 2016 [4]	Sample Result	Hardness-Adjusted Criteria ROD [3]	Hardness-Adjusted Criteria 2016 [4]	Sample Result	Hardness-Adjusted Criteria ROD [3]	Hardness-Adjusted Criteria 2016 [4]	Sample Result
Total Metals															
Aluminum	7429-90-5	µg/L	**142**	--	--	4.16 JQ	--	--	**222**	--	--	**411**	--	--	**356**
Cadmium	7440-43-9	µg/L	0.05	0.1450	**0.405**	0.333	0.0780	**0.208**	**7.91**	0.0910	**0.244**	**10.1**	0.1200	**0.330**	**13.4**
Calcium	7440-70-2	µg/L	--	--	--	15,000	--	--	6,200	--	--	7,610	--	--	11,100
Copper	7440-50-8	µg/L	1.45	**5.92**	--	**20.1**	**2.78**	--	**934**	**3.34**	--	**1,330**	**4.70**	--	**1,960**
Iron	7439-89-6	µg/L	**1,000**	--	--	20.0 U	--	--	6.86 JQ	--	--	17.5 JQ	--	--	6.44 JQ
Lead	7439-92-1	µg/L	0.169	**1.09**	--	0.100 U	**0.404**	--	0.100 U	**0.514**	--	0.100 U	**0.804**	--	0.100 U
Magnesium	7439-95-4	µg/L	--	--	--	2,230	--	--	919	--	--	1,180	--	--	1,930
Manganese	7439-96-5	µg/L	--	--	--	0.178 JQ	--	--	23.3	--	--	31.9	--	--	47.7
Potassium	7440-09-7	µg/L	--	--	--	1,170	--	--	862	--	--	1,060	--	--	1,330
Sodium	7440-23-5	µg/L	--	--	--	2,660	--	--	1,150	--	--	1,360	--	--	1,780
Zinc	7440-66-6	µg/L	13.6	**54.8**	--	38.8	**25.9**	--	**1,020**	**31.1**	--	**1,260**	**43.6**	--	**1,610**
Conventionals															
Alkalinity, Total	--	mg-$CaCO_3$/L	--	--	--	21.9	--	--	1.00 U	--	--	1.00 U	--	--	1.00 U
Alkalinity, Bicarbonate	--	mg-$CaCO_3$/L	--	--	--	21.9	--	--	1.00 U	--	--	1.00 U	--	--	1.00 U
Alkalinity, Carbonate	--	mg-$CaCO_3$/L	--	--	--	1.00 U	--	--	1.00 U	--	--	1.00 U	--	--	1.00 U
Alkalinity, Hydroxide	--	mg-$CaCO_3$/L	--	--	--	1.00 U	--	--	1.00 U	--	--	1.00 U	--	--	1.00 U
Chloride	16887-00-6	mg/L	--	--	--	0.313	--	--	0.139	--	--	0.180	--	--	0.280
Dissolved Organic Carbon	--	mg/L	--	--	--	0.640	--	--	0.500	--	--	0.540	--	--	0.550
Nitrate (as Nitrogen)	14797-55-8	mg/L	--	--	--	0.100 UJ	--	--	0.380 J	--	--	0.405 J	--	--	0.483 J
Sulfate	14808-79-8	mg/L	--	--	--	31.8	--	--	23.4	--	--	29.3	--	--	41.1
Hardness, Total	--	mg-$CaCO_3$/L	--	--	--	46.7	--	--	19.3	--	--	23.9	--	--	35.6
Field Parameters [5]															
Dissolved Oxygen (DO)	--	mg/L	--	--	--	9.92	--	--	11.52	--	--	11.22	--	--	10.96
Ferrous Iron		mg/L		--	--	0.5 U	--	--	0.5 U	--	--	0.5 U	--	--	0.5 U
Oxidation-Reduction Potential (ORP)	--	mV	--	--	--	246.9	--	--	203.2	--	--	211.0	--	--	191.8
pH	--	pH	--	--	--	5.98	--	--	5.00	--	--	4.98	--	--	5.05
Specific conductivity	--	µS/cm	--	--	--	129.8	--	--	35.3	--	--	43.5	--	--	58.6
Turbidity	--	ntu	--	--	--	0.13	--	--	0.84	--	--	0.76	--	--	0.75

Notes:

Results for total metals and conventionals are presented to three significant figures. Results for field parameters are presented to the significant figures indicated by the field meter.

-- Not applicable/available or not analyzed.

RED/BOLD Detected exceedance of applicable criteria (applicable criteria presented in **bold**).

1 Locations are listed from upstream (west) to downstream (east).

2 Surface water criteria given in Tables 3 and 11 of the ROD are presented for reference only. Reference criteria from the ROD for cadmium, copper, lead, and zinc are adjusted based on a hardness of 9 mg/L.

3 For cadmium, copper, lead, and zinc, criteria are presented that are adjusted for hardness for each sample, in accordance with Table 3 of the ROD. Cadmium was adjusted in accordance with the U.S. Environmental Protection Agency National Recommended Water Quality Criteria (NRWQC) last updated in 2001. Copper, lead, and zinc were adjusted based on Washington Administrative Code Chapter 173-201A (accessed at https://apps.leg.wa.gov/WAC/default.aspx?cite=173-201A-240). The hardness of the individual sample was used for the adjustment.

4 Cadmium criteria adjusted for hardness using the current (updated 2016) NRWQC hardness correction formula (accessed at https://www.epa.gov/wqc/national-recommended-water-quality-criteria-aquatic-life-criteria-table#b) are presented for comparison pending Agency approval of the updated criteria.

5 Field measurements were collected with YSI ProDSS water quality instrument and LaMotte 2020we turbidity meter during sampling. Ferrous iron measured with a Hach Iron test kit, Model IR-18, 0–10 mg/L.

Abbreviations:

CAS Chemical Abstracts Service
µg/L Micrograms per liter
µS/cm Microsiemens per centimeter
mg-$CaCO_3$/L Milligrams calcium carbonate per liter
mg/L Milligrams per liter
mV Millivolts
NTU Nephelometric turbidity units
ROD Record of Decision

Qualifiers:

J Analyte was detected, concentration is considered to be an estimate.
JQ Analyte was detected between the method detection limit and reporting limit, concentration is considered to be an estimate.
U Analyte was not detected at the given reporting limit.
UJ Analyte was not detected at the given reporting limit, which is considered to be an estimate.

Table 6.1
Analytical Results from West Area Seeps

			Area	West Area Seeps Upgradient of Collection System					
			Location [1]	SP-42			SP-43		
			Sample Type	Field Sample			Field Sample		
			Sample Date	6/14/2020			6/14/2020		
Analytes	CAS No.	Units	Surface Water-Based Criteria [2]	Hardness-Adjusted Criteria ROD[3]	Hardness-Adjusted Criteria 2016[4]	Sample Result	Hardness-Adjusted Criteria ROD[3]	Hardness-Adjusted Criteria 2016[4]	Sample Result
Total Metals									
Aluminum	7429-90-5	µg/L	**142**	--	--	**1,540**	--	--	**2,850**
Cadmium	7440-43-9	µg/L	0.05	0.1050	**0.287**	**23.6**	0.1250	**0.347**	**33.8**
Calcium	7440-70-2	µg/L	--	--	--	8,030	--	--	10,000
Copper	7440-50-8	µg/L	1.45	**4.01**	--	**3,510**	**4.97**	--	**5,050**
Iron	7439-89-6	µg/L	**1,000**	--	--	23.4	--	--	90.7
Lead	7439-92-1	µg/L	0.169	**0.654**	--	0.114	**0.865**	--	0.858
Magnesium	7439-95-4	µg/L	--	--	--	2,330	--	--	3,170
Manganese	7439-96-5	µg/L	--	--	--	150	--	--	222
Potassium	7440-09-7	µg/L	--	--	--	1,360	--	--	1,550
Sodium	7440-23-5	µg/L	--	--	--	1,810	--	--	2,010
Zinc	7440-66-6	µg/L	13.6	**37.3**	--	**3,060**	**46.0**	--	**4,580**
Conventionals									
Alkalinity, Total	--	mg-$CaCO_3$/L	--	--	--	1.00 U	--	--	1.00 U
Alkalinity, Bicarbonate	--	mg-$CaCO_3$/L	--	--	--	1.00 U	--	--	1.00 U
Alkalinity, Carbonate	--	mg-$CaCO_3$/L	--	--	--	1.00 U	--	--	1.00 U
Alkalinity, Hydroxide	--	mg-$CaCO_3$/L	--	--	--	1.00 U	--	--	1.00 U
Chloride	16887-00-6	mg/L	--	--	--	0.240	--	--	0.250
Dissolved Organic Carbon	--	mg/L	--	--	--	0.990	--	--	0.790
Nitrate (as Nitrogen)	14797-55-8	mg/L	--	--	--	0.694 J	--	--	0.684 J
Sulfate	14808-79-8	mg/L	--	--	--	48.1	--	--	65.9
Hardness, Total	--	mg-$CaCO_3$/L	--	--	--	29.6	--	--	38.0
Field Parameters [5]									
Dissolved Oxygen (DO)	--	mg/L	--	--	--	11.11	--	--	11.44
Ferrous Iron		mg/L		--	--	0.5 U	--	--	0.5 U
Oxidation-Reduction Potential (ORP)	--	mV	--	--	--	250.3	--	--	237.4
pH	--	pH	--	--	--	4.51	--	--	4.43
Specific conductivity	--	µS/cm	--	--	--	68.0	--	--	158.9
Turbidity	--	ntu	--	--	--	0.77	--	--	0.50

Notes:

Results for total metals and conventionals are presented to three significant figures. Results for field parameters are presented to the significant figures indicated by the field meter.

-- Not applicable/available or not analyzed.

RED/BOLD Detected exceedance of applicable criteria (applicable criteria presented in **bold**).

1 Locations are listed from upstream (west) to downstream (east).

2 Surface water criteria given in Tables 3 and 11 of the ROD are presented for reference only. Reference criteria from the ROD for cadmium, copper, lead, and zinc are adjusted based on a hardness of 9 mg/L.

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4 Cadmium criteria adjusted for hardness using the current (updated 2016) NRWQC hardness correction formula (accessed at https://www.epa.gov/wqc/national-recommended-water-quality-criteria-aquatic-life-criteria-table#b) are presented for comparison pending Agency approval of the updated criteria.

5 Field measurements were collected with YSI ProDSS water quality instrument and LaMotte 2020we turbidity meter during sampling. Ferrous iron measured with a Hach Iron test kit, Model IR-18, 0–10 mg/L.

Abbreviations:

CAS Chemical Abstracts Service
µg/L Micrograms per liter
µS/cm Microsiemens per centimeter
mg-$CaCO_3$/L Milligrams calcium carbonate per liter
mg/L Milligrams per liter
mV Millivolts
NTU Nephelometric turbidity units
ROD Record of Decision

Qualifiers:

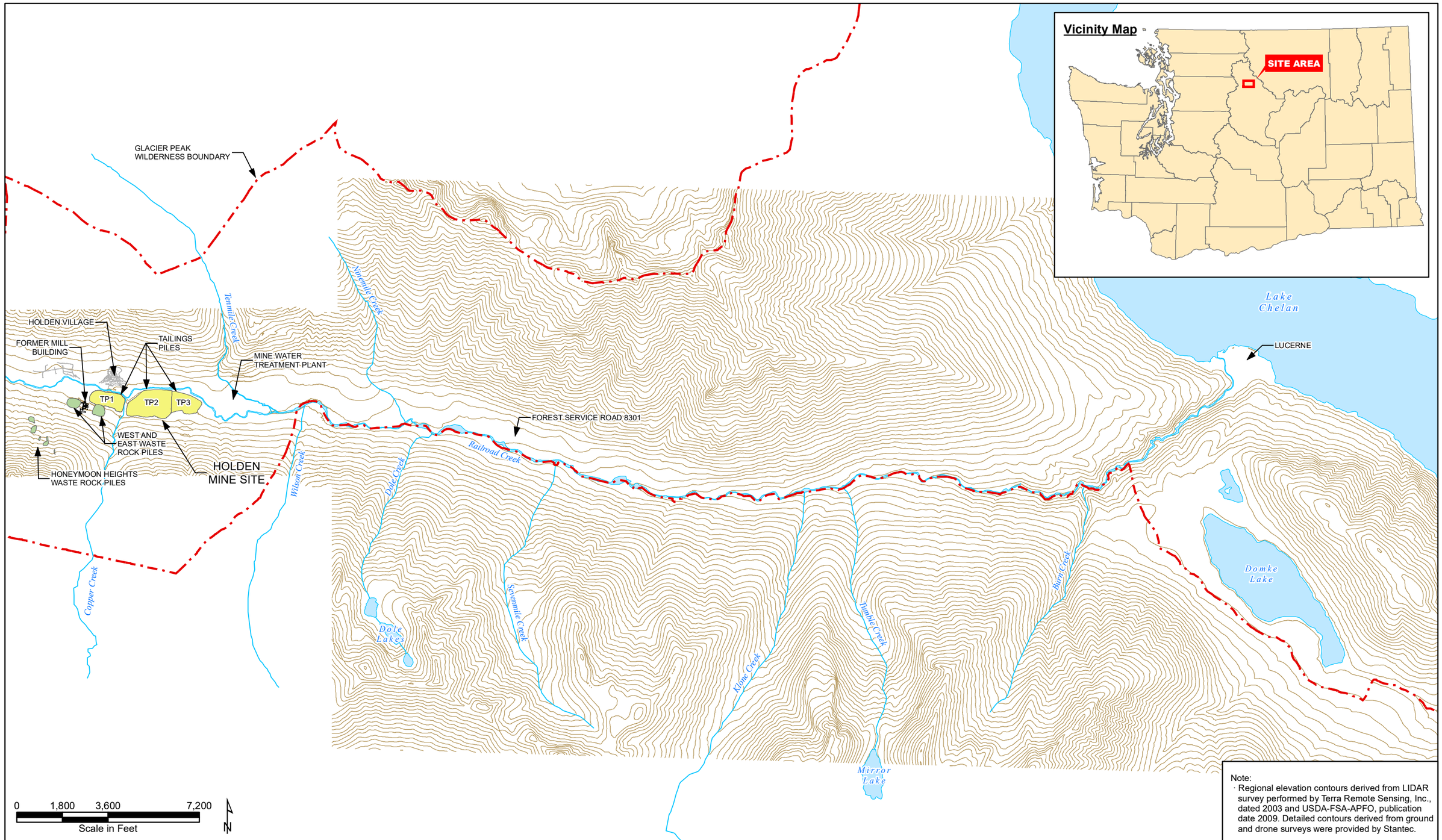
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JQ Analyte was detected between the method detection limit and reporting limit, concentration is considered to be an estimate.
U Analyte was not detected at the given reporting limit.
UJ Analyte was not detected at the given reporting limit, which is considered to be an estimate.

Holden Mine Site

Performance Standards Verification
2020 Annual Compliance Assessment Report

Figures

DRAFT



Note:
· Regional elevation contours derived from LIDAR survey performed by Terra Remote Sensing, Inc., dated 2003 and USDA-FSA-APFO, publication date 2009. Detailed contours derived from ground and drone surveys were provided by Stantec.

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Performance Standards Verification
2020 Annual Compliance Assessment Report
Holden Mine Site
Chelan County, Washington

Figure 1.1
Site Location Map

I:\GIS\Projects\RT-Holden\MXD\ACAR\2020\Figure 1.1 Site Location Map.mxd
1/25/2021

Legend

- Staff Gauge Location
- Surface Water Sample Location
- Aquatic Life Survey Location
- Aquatic Life Survey Location, 2020 Alternate
- Aquatic Life Survey Location, Not Sampled in 2020
- Approximate Location of Subsurface Barrier Wall
- Surface Water Flow Direction
- 100-foot Elevation Index Contour

Notes:

- Where surface water samples and staff gauges are collocated, "SG" is included in the location ID and only the surface water sample location is shown.
- Benthic macroinvertebrate surveys and fish population surveys were conducted over a 100-meter reach at each location.
- Regional elevation contours derived from LIDAR survey performed by Terra Remote Sensing, Inc., dated 2003 and USDA-FSA-APFO, publication date 2009. Detailed contours derived from ground and drone surveys were provided by Stantec. Contours are shown in feet above mean sea level.

0 450 900 1,800
Scale in Feet

N

FORMER WINSTON HOME SITES
BALLFIELD AREA
RC-6
RC-1
FORMER SURFACE WATER RETENTION AREA
1500 Level Ventilator Portal Access Road
WEST BYPASS ROAD BRIDGE
LOWER WEST AREA
RC-4
HOLDEN VILLAGE
RailroadCreek
RC-7
Forest Service Road 8301
RC-24
TENMILE QUARRY
Tenmile Creek
EAST BYPASS ROAD BRIDGE
WEST WASTE ROCK PILE
MAINTENANCE BUILDING
EAST WASTE ROCK PILE
TAILINGS PILE 1
RC-16
TAILINGS PILE 2
TAILINGS PILE 3
RC-2 (SG-7)
SG-14
SG-15
MINE WATER TREATMENT PLANT
SG-12R
SG-18
SG-10
SG-9
RC-5A
SG-11
SG-17
RC-13 (SG-8)
SG-16
Honeymoon Heights Abandoned Road/Trail
Holden Village Bypass Road
SOUTH TAILINGS PILE 3 BORROW AREA
Copper Creek
Wilson Creek

SG-12R
SG-13
Ninemile Creek
Wilson Creek
Forest Service Road 8301
Railroad Creek
Dole Creek
RC-10 (SG-20)
Sevenmile Creek
RC-15E

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Chelan County, Washington

Figure 2.1
Surface Water Sampling and Aquatic Life Survey Locations

I:\GIS\Projects\RT-Holden\MXD\ACAR\2020\Figure 2.1 Surface Water Sampling and Aquatic Life Survey Locations .mxd
1/25/2021

Legend

- Surface Water Sampling Location
- West Area Seeps Collection Trench
- Approximate Location of Subsurface Barrier Wall
- Seep Survey Zone
- West Area Seeps Survey Zone
- Waste Management Area
- Portal
- Surface Water Flow Direction
- 100-foot Elevation Index Contour

Sample Key

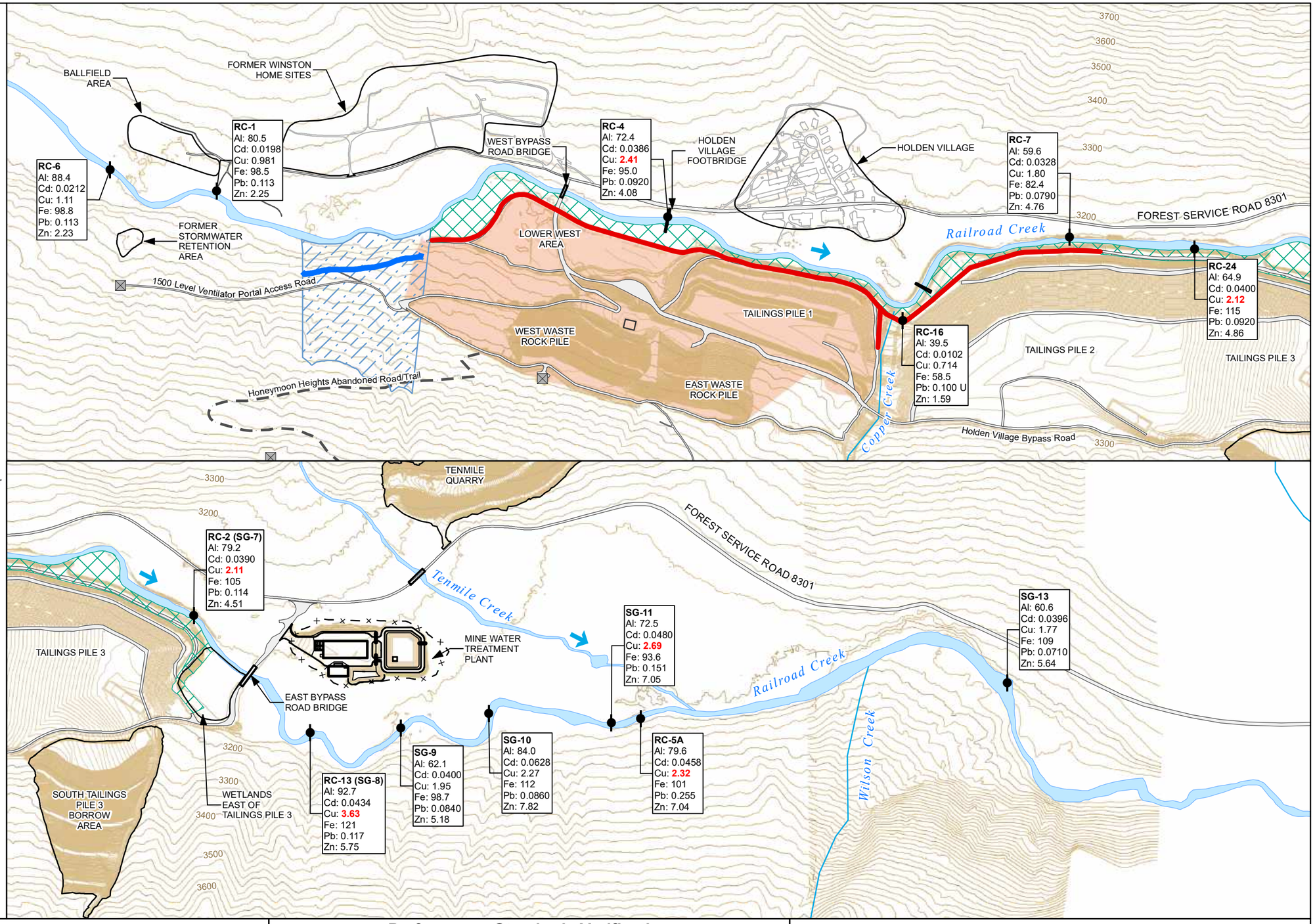
Location ID → **RC-1**
Analyte → Al: 80.5 ← Result and Qualifier

Notes:
· All results presented in µg/L.
· Total metals results are presented.
· Results presented in **RED** indicate an exceedance of applicable criteria. Surface water results are compared to criteria for surface water and groundwater discharging to surface water, which are hardness-adjusted for copper, lead, and zinc, based on ARARs in ROD Table 3. Cadmium results are compared to the National Recommended Water Quality Criteria (NRWQC) hardness-adjusted freshwater chronic criteria for protection of aquatic organisms, the ROD Table 3 ARAR that was updated by USEPA in 2016.
· For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
· Regional elevation contours derived from LIDAR survey performed by Terra Remote Sensing, Inc., dated 2003 and USDA-FSA-APFO, publication date 2009. Detailed contours derived from ground and drone surveys were provided by Stantec. Contours are shown in feet above mean sea level.

Abbreviations:
Al = Aluminum
ARAR = Applicable or Relevant and Appropriate Requirement
Cd = Cadmium
COC = Contaminant of concern
Cu = Copper
Fe = Iron
µg/L = Micrograms per liter
Pb = Lead
ROD = Record of Decision
USEPA = U.S. Environmental Protection Agency
Zn = Zinc

Qualifier:
U Analyte was not detected at the given reporting limit.

0 300 600 1,200
Scale in Feet
N



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Figure 2.2
COC Results from Railroad Creek Surface Water Locations (Spring 2020)

I:\GIS\Projects\RT-Holden\MXD\ACAR\2020\Figure 2.2 COC Results from Surface Water Locations (Spring 2020).mxd
1/25/2021

Legend

- Surface Water Sampling Location
- West Area Seeps Collection Trench
- Approximate Location of Subsurface Barrier Wall
- Seep Survey Zone
- West Area Seeps Survey Zone
- Waste Management Area
- Portal
- Surface Water Flow Direction
- 3400 100-foot Elevation Index Contour

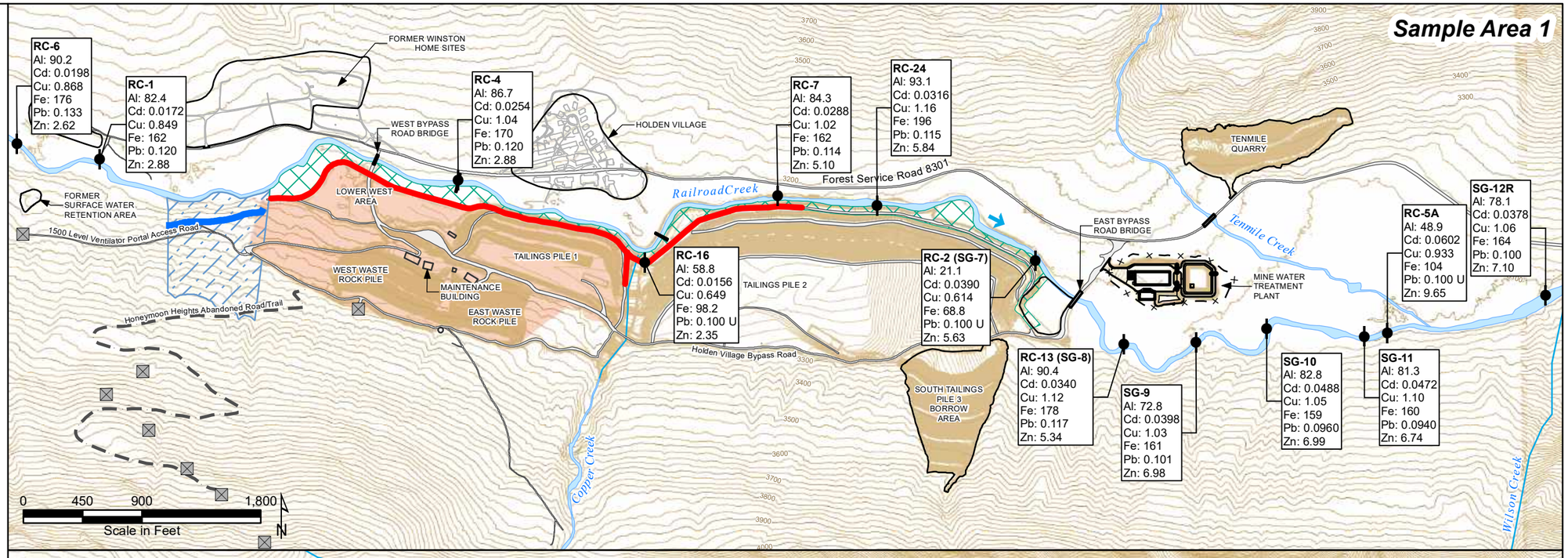
Sample Key

Location ID → **RC-1**
Analyte → Al: 82.4 ← Result and Qualifier

Notes:
- All results presented in µg/L.
- Total metals results are presented.
- Results presented in **RED** indicate an exceedance of applicable criteria. Surface water results are compared to criteria for surface water and groundwater discharging to surface water, which are hardness-adjusted for copper, lead, and zinc, based on ARARs in ROD Table 3. Cadmium results are compared to the National Recommended Water Quality Criteria (NRWQC) hardness-adjusted freshwater chronic criteria for protection of aquatic organisms, the ROD Table 3 ARAR that was updated by USEPA in 2016.
- For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
- Regional elevation contours derived from LIDAR survey performed by Terra Remote Sensing, Inc., dated 2003 and USDA-FSA-APFO, publication date 2009. Detailed contours derived from ground and drone surveys were provided by Stantec. Contours are shown in feet above mean sea level.

Abbreviations:
Al = Aluminum
ARAR = Applicable or Relevant and Appropriate Requirement
Cd = Cadmium
COC = Contaminant of concern
Cu = Copper
Fe = Iron
µg/L = Micrograms per liter
Pb = Lead
ROD = Record of Decision
USEPA = U.S. Environmental Protection Agency
Zn = Zinc

Qualifier:
U Analyte was not detected at the given reporting limit.



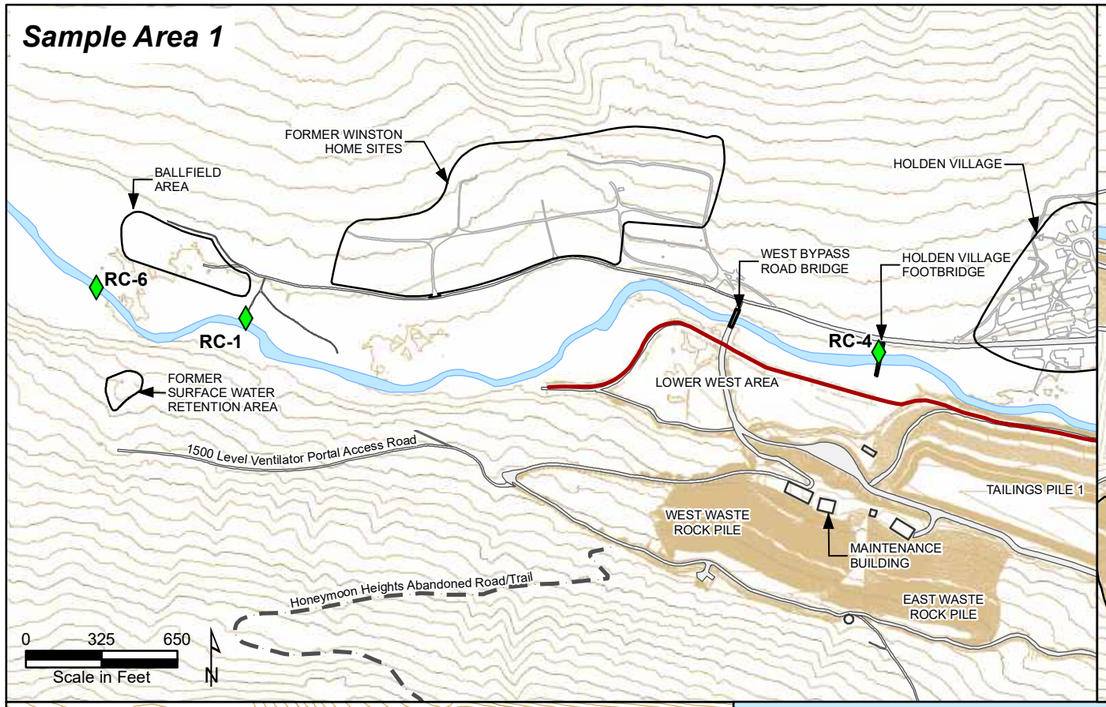
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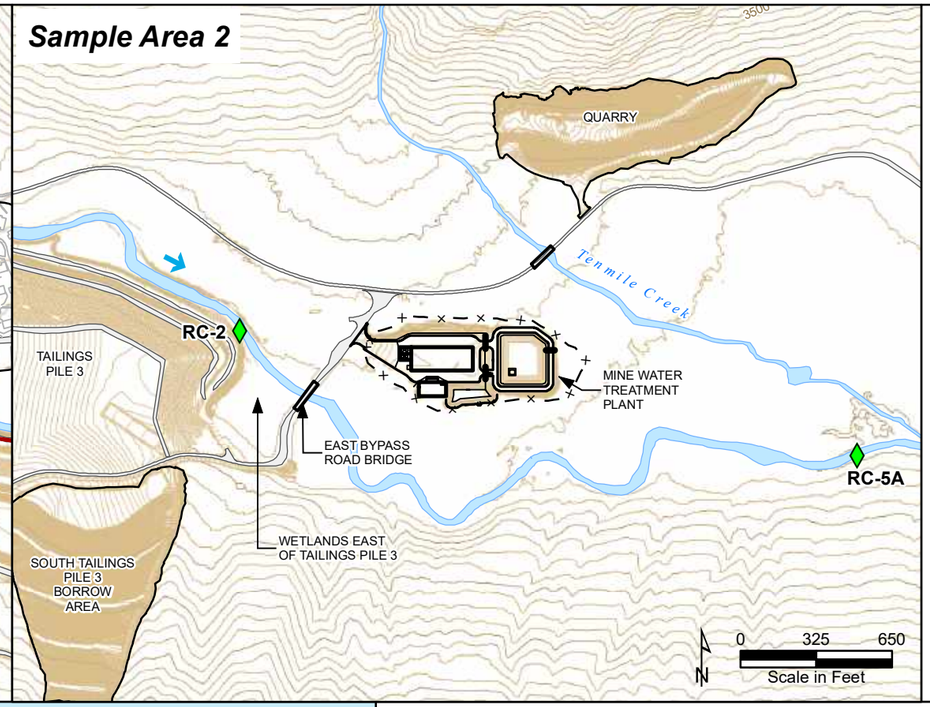
Figure 2.3
COC Results from Railroad Creek Surface Water Locations (Fall 2020)

I:\GIS\Projects\RT-Holden\MXD\ACAR\2020\Figure 2.3 COC Results from Surface Water Locations (Fall 2020).mxd
1/25/2021

Sample Area 1



Sample Area 2



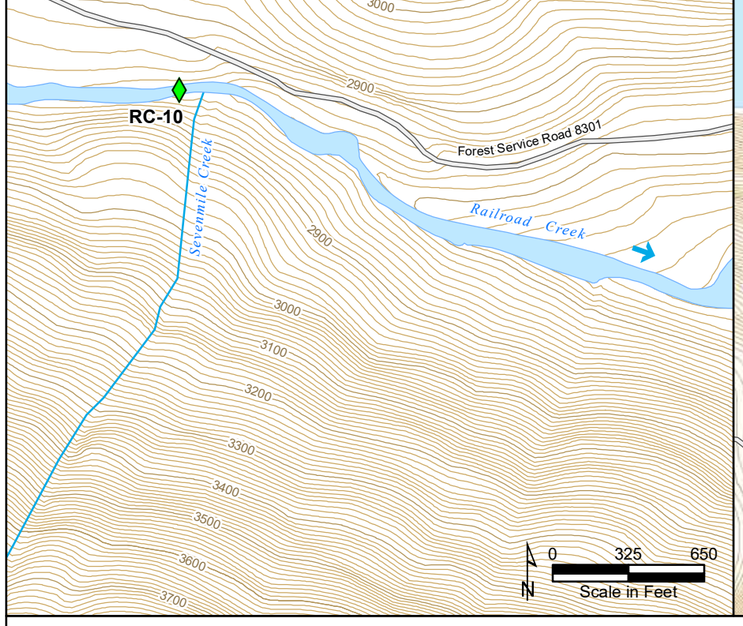
Legend

- Sediment Sample Location
- Approximate Location of Subsurface Barrier Wall
- Surface Water Flow Direction
- 3400 100-foot Elevation Index Contour

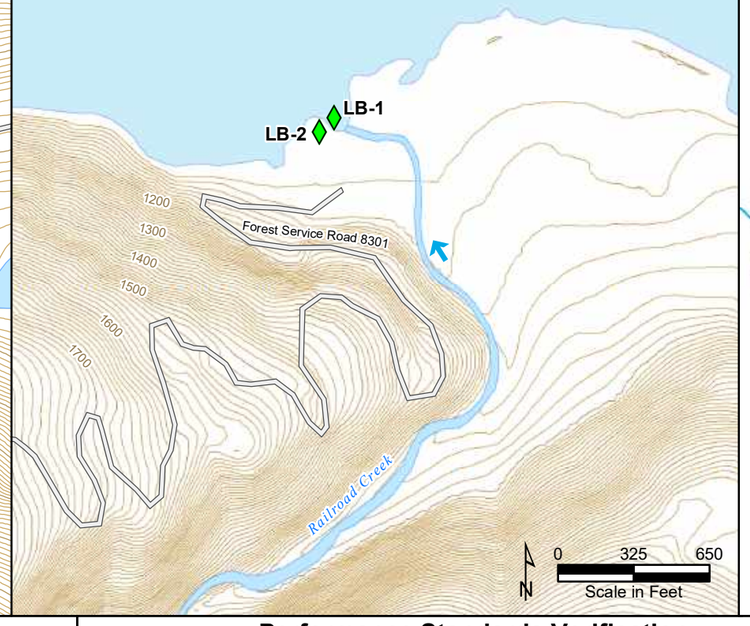
Notes:

- At each location, sediment was collected from the biologically active zone from 0- to 30-centimeters or until refusal.
- Sediment sample locations in Railroad Creek are co-located with surface water and aquatic life sample locations.
- Elevation contours provided by Stantec. Contours are shown in feet above mean sea level.

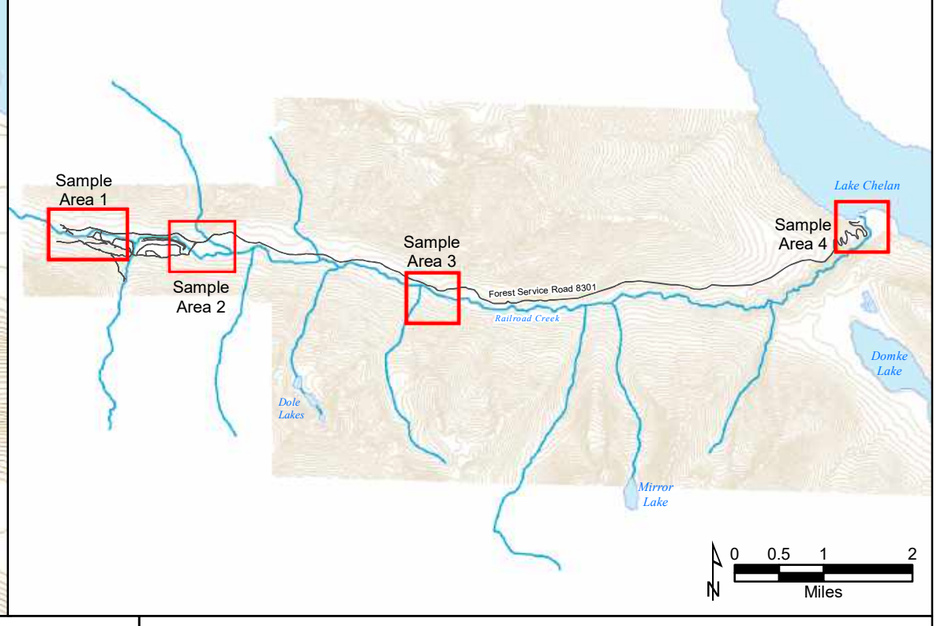
Sample Area 3



Sample Area 4



INDEX MAP



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Figure 3.1
Sediment Sample Locations

I:\GIS\Projects\RT-Holden\MXD\ACAR\2020\Figure 3.1 Sediment Sample Locations.mxd
1/25/2021

Legend

- Sediment Sample Location
- Approximate Location of Subsurface Barrier Wall
- Surface Water Flow Direction
- 100-foot Elevation Index Contour

Sample Key

Location ID → **RC-1**
Analyte → Ag: 0.0300 ← Result and Qualifier

Bioassay Results

Chironomid Mortality
Hyalella Mortality
Hyalella Growth

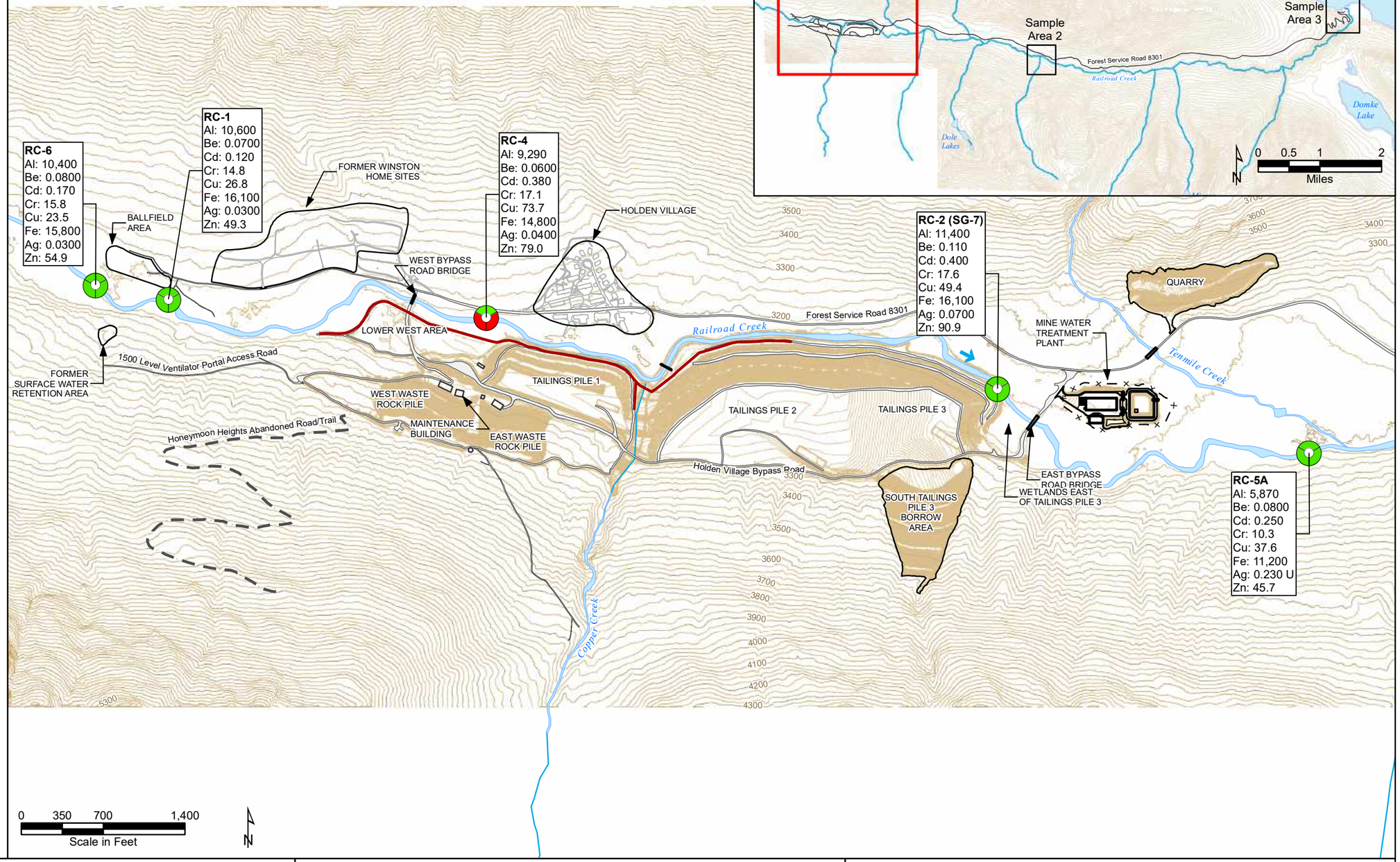
- Fail CSL
- Fail SCO
- Pass

Notes:
· All results presented in mg/kg dry weight.
· All sediment chemistry results are less than the SMS and SQV criteria for freshwater sediment (WAC 173-204-563 and USFS 2010).
· Elevation contours provided by Stantec. Contours are shown in feet above mean sea level.

Abbreviations:
Ag = Silver
Al = Aluminum
Be = Beryllium
Cd = Cadmium
COC = Contaminant of concern
Cr = Chromium
CSL = Cleanup Screening Level
Cu = Copper
Fe = Iron
mg/kg = Milligrams per kilogram
SCO = Sediment Cleanup Objective
SMS = Sediment Management Standard
SQV = Sediment Quality Values
USFS = United States Forest Service
WAC = Washington Administrative Code
Zn = Zinc

Qualifier:
U Analyte was not detected at the given reporting limit.

Sample Area 1



INDEX MAP

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Figure 3.2
COC and Bioassay Results from Sediment Sample Locations (Fall 2020) (Sheet 1 of 2)

I:\GIS\Projects\RT-Holden\MXD\ACAR\2020\Figure 3.2 COC Results from Sediment Sample Locations (Fall 2020) (Sheet 1 of 2).mxd
1/25/2021

Legend

- Sediment Sample Location
- Approximate Location of Subsurface Barrier Wall
- Surface Water Flow Direction
- 100-foot Elevation Index Contour

Sample Key

Location ID → **RC-1**
Analyte → Ag: 0.0300 ← Result and Qualifier

Bioassay Results

Chironomid Mortality
Hyalella Mortality
Hyalella Growth

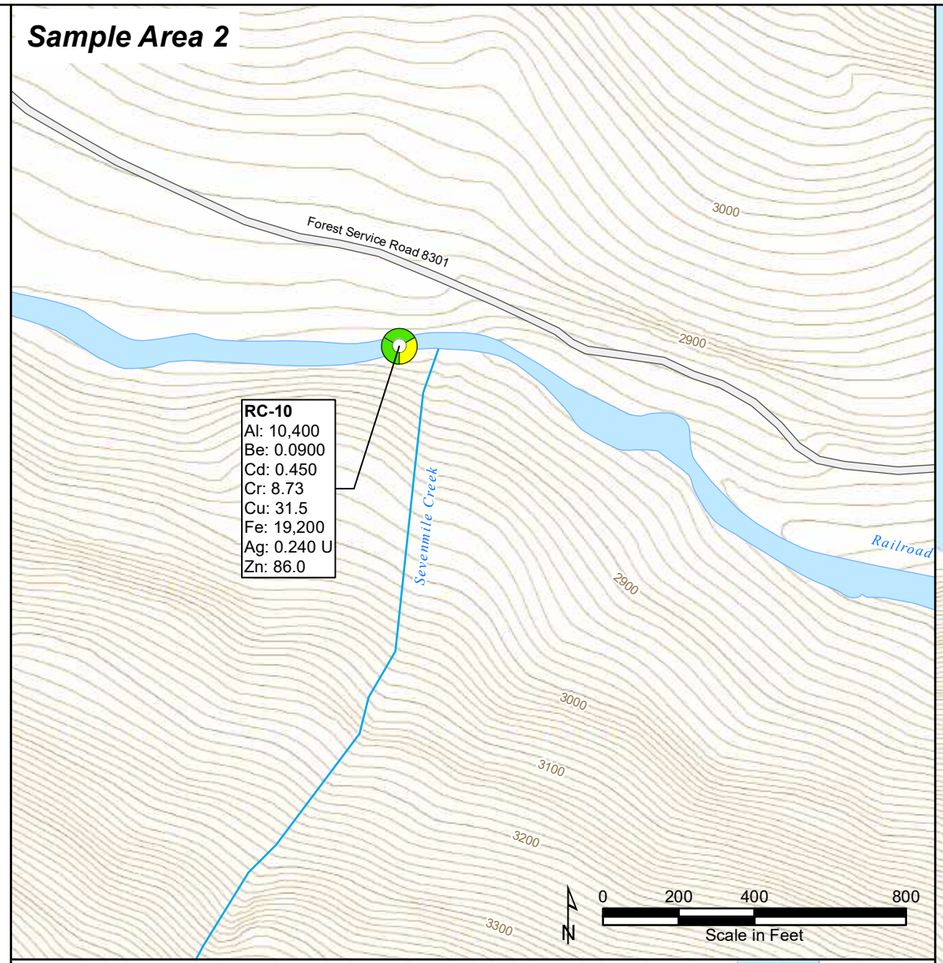
- Fail CSL
- Fail SCO
- Pass

Notes:
· All results presented in mg/kg dry weight.
· All sediment chemistry results are less than the SMS and SQV criteria for freshwater sediment (WAC 173-204-563 and USFS 2010).
· Elevation contours provided by Stantec. Contours are shown in feet above mean sea level.

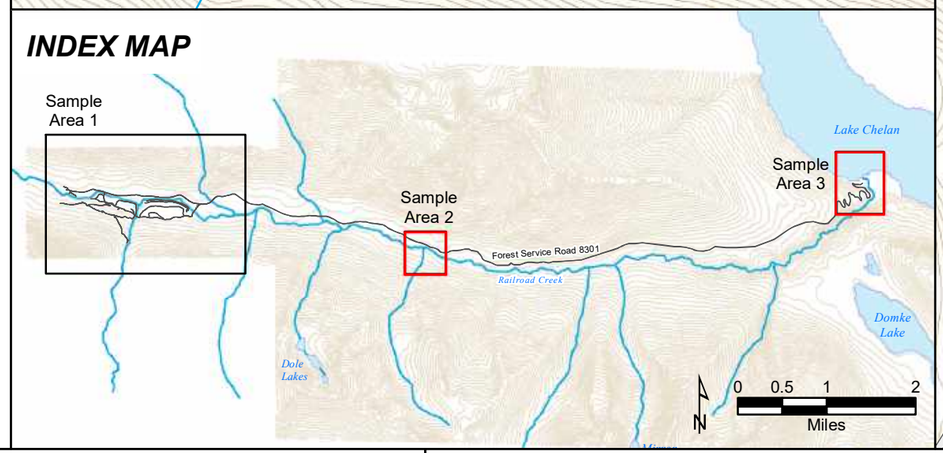
Abbreviations:
Ag = Silver
Al = Aluminum
Be = Beryllium
Cd = Cadmium
COC = Contaminant of concern
Cr = Chromium
CSL = Cleanup Screening Level
Cu = Copper
Fe = Iron
mg/kg = Milligrams per kilogram
SCO = Sediment Cleanup Objective
SMS = Sediment Management Standard
SQV = Sediment Quality Values
USFS = United States Forest Service
WAC = Washington Administrative Code
Zn = Zinc

Qualifier:
U Analyte was not detected at the given reporting limit.

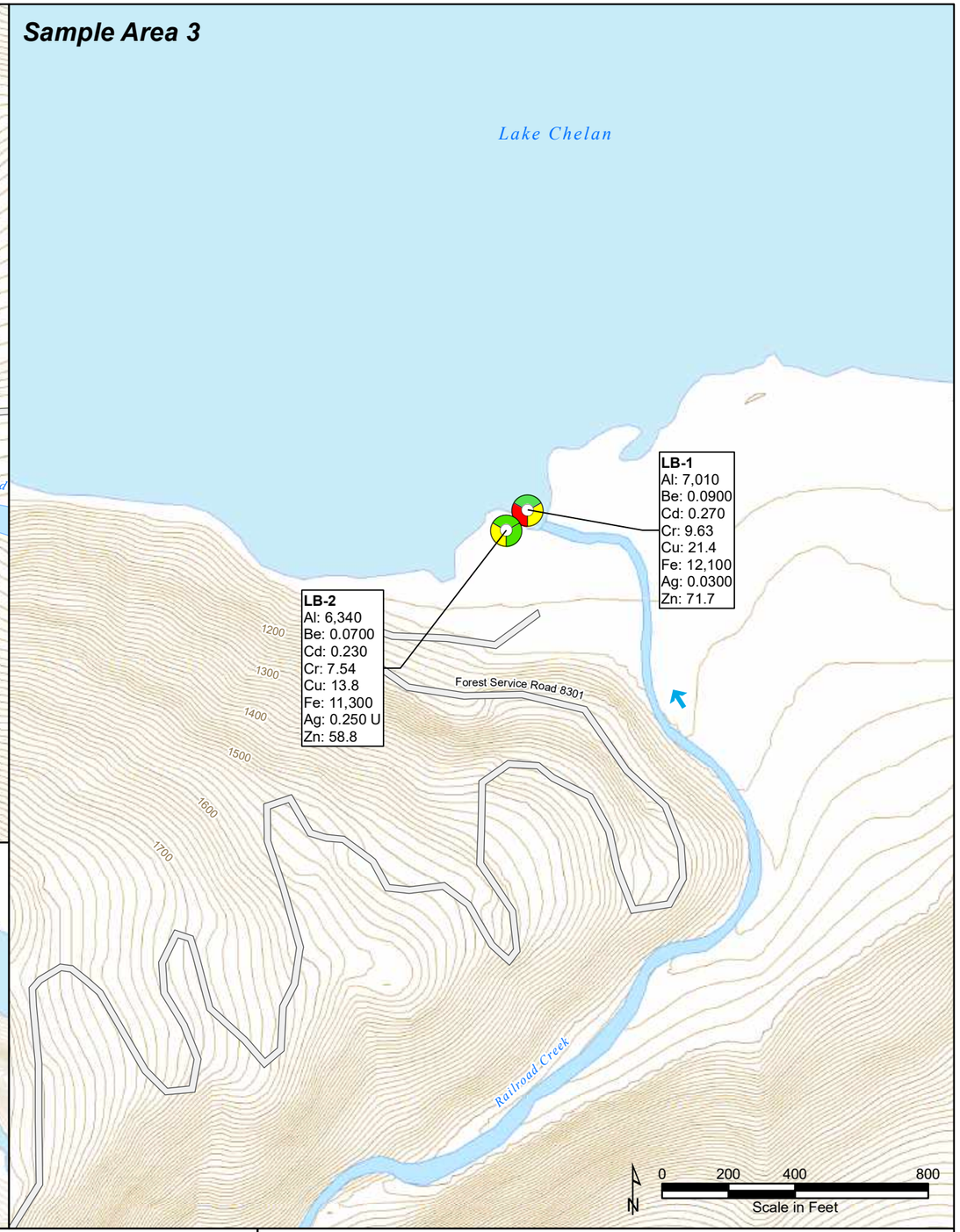
Sample Area 2



INDEX MAP



Sample Area 3

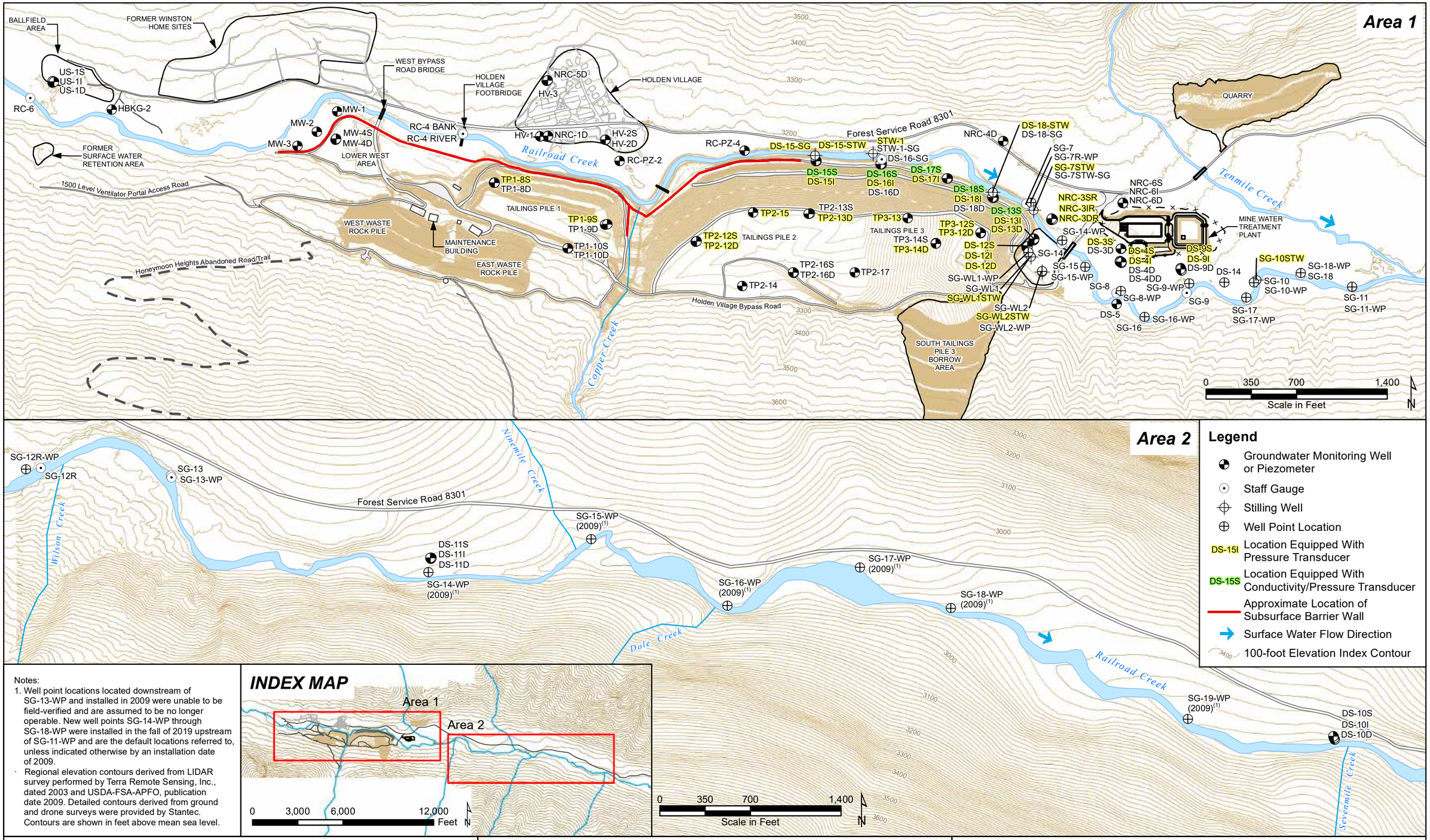


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Figure 3.2
COC and Bioassay Results from Sediment Sample Locations (Fall 2020) (Sheet 2 of 2)

I:\GIS\Projects\RT-Holden\MXD\ACAR\2020\Figure 3.2 COC Results from Sediment Sample Locations (Fall 2020) (Sheet 2 of 2).mxd
1/25/2021



Notes:

1. Well point locations located downstream of SG-13-WP and installed in 2009 were unable to be field-verified and are assumed to be no longer operable. New well points SG-14-WP through SG-18-WP were installed in the fall of 2019 upstream of SG-11-WP and are the default locations referred to, unless indicated otherwise by an installation date of 2009.

· Regional elevation contours derived from LIDAR survey performed by Terra Remote Sensing, Inc., dated 2003 and USDA-FSA-APFO, publication date 2009. Detailed contours derived from ground and drone surveys were provided by Stantec. Contours are shown in feet above mean sea level.

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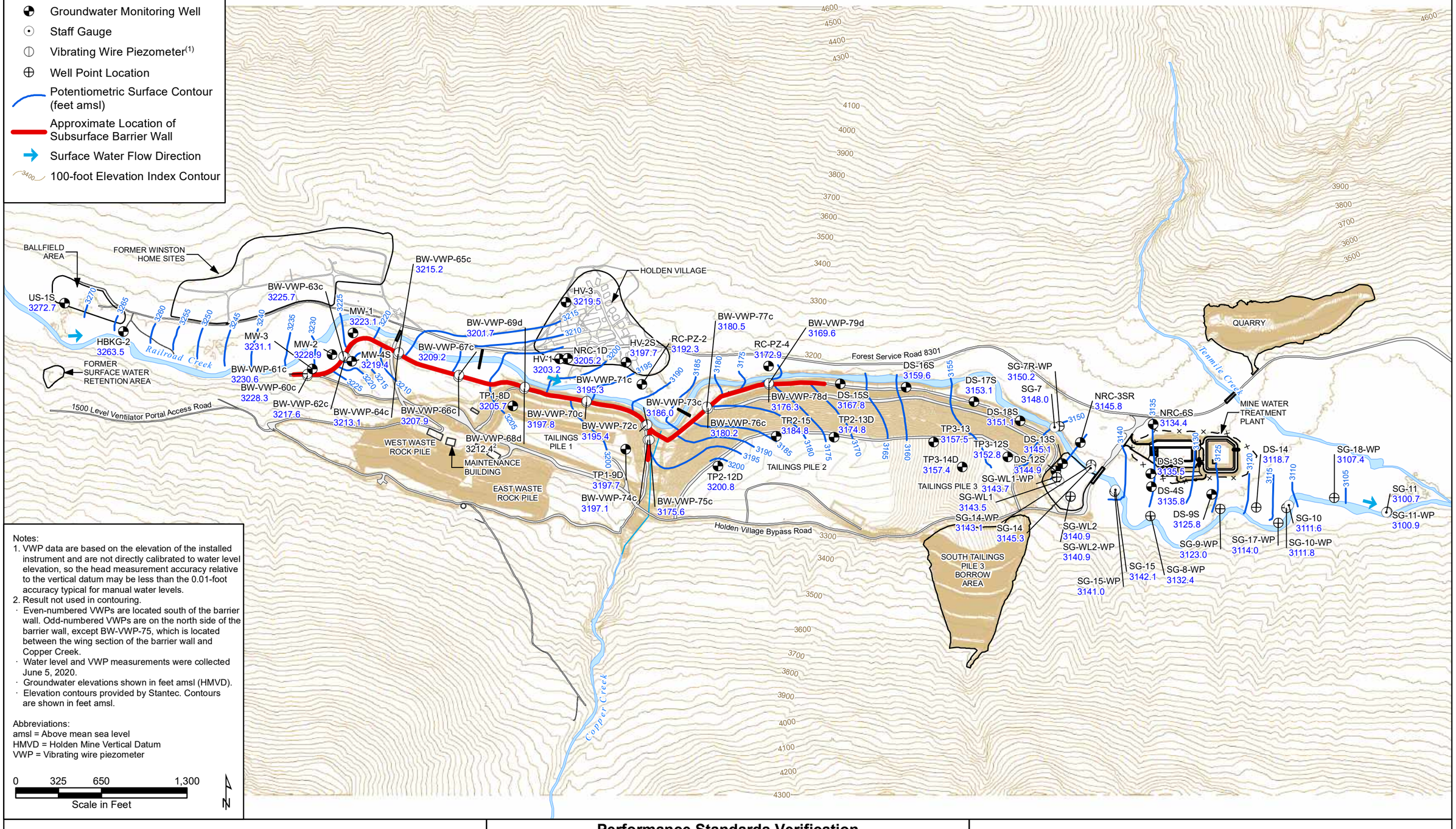
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Figure 4.1
Monitoring Well, Well Point, Staff Gauge, and Stilling Well Inventory Map

I:\GIS\Projects\RT-Holden\MXD\ACAR\2020\Figure 4.1 MW, WP, SG, and STW Inventory Map.mxd
1/25/2021

Legend

- Groundwater Monitoring Well
- Staff Gauge
- Vibrating Wire Piezometer(1)
- Well Point Location
- Potentiometric Surface Contour (feet amsl)
- Approximate Location of Subsurface Barrier Wall
- Surface Water Flow Direction
- 100-foot Elevation Index Contour



Notes:
1. VWP data are based on the elevation of the installed instrument and are not directly calibrated to water level elevation, so the head measurement accuracy relative to the vertical datum may be less than the 0.01-foot accuracy typical for manual water levels.
2. Result not used in contouring.

- Even-numbered VWPs are located south of the barrier wall. Odd-numbered VWPs are on the north side of the barrier wall, except BW-VWP-75, which is located between the wing section of the barrier wall and Copper Creek.
- Water level and VWP measurements were collected June 5, 2020.
- Groundwater elevations shown in feet amsl (HMVD).
- Elevation contours provided by Stantec. Contours are shown in feet amsl.

Abbreviations:
amsl = Above mean sea level
HMVD = Holden Mine Vertical Datum
VWP = Vibrating wire piezometer

0 325 650 1,300
Scale in Feet

N

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Figure 4.2
Potentiometric Surface—Shallow Zone (Spring 2020)

I:\GIS\Projects\RT-Holden\MXD\ACAR\2020\Figure 4.2 Potentiometric Surface—Shallow Zone (Spring 2020).mxd
1/25/2021

Legend

- Groundwater Monitoring Well
- Staff Gauge
- Stilling Well
- Vibrating Wire Piezometer(1)
- Well Point Location
- Potentiometric Surface Contour (feet amsl)
- Approximate Location of Subsurface Barrier Wall
- Surface Water Flow Direction
- 100-foot Elevation Index Contour

Notes:
1. VWP data are based on the elevation of the installed instrument and are not directly calibrated to water level elevation, so the head measurement accuracy relative to the vertical datum may be less than the 0.01-foot accuracy typical for manual water levels.
2. Water level collected on September 22, 2020.
   - Even-numbered VWPs are located south of the barrier wall. Odd-numbered VWPs are on the north side of the barrier wall, except BW-VWP-75, which is located between the wing section of the barrier wall and Copper Creek.
   - Water level and VWP measurements were collected September 24, 2020 unless otherwise noted.
   - Groundwater elevations shown in feet amsl (HMVD).
   - Elevation contours provided by Stantec. Contours are shown in feet amsl.

Abbreviations:
amsl = Above mean sea level
HMVD = Holden Mine Vertical Datum
VWP = Vibrating wire piezometer

0 325 650 1,300
Scale in Feet

N

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Figure 4.3
Potentiometric Surface—Shallow Zone (Fall 2020)

I:\GIS\Projects\RT-Holden\MXD\ACAR\2020\Figure 4.3 Potentiometric Surface—Shallow Zone (Fall 2020).mxd
1/25/2021

Legend

- Groundwater Monitoring Well
- Vibrating Wire Piezometer[1]
- Potentiometric Surface Contour (feet amsl)
- Approximate Location of Subsurface Barrier Wall
- Surface Water Flow Direction
- 100-foot Elevation Index Contour

Notes:
1. VWP data are based on the elevation of the installed instrument and are not directly calibrated to water level elevation, so the head measurement accuracy relative to the vertical datum may be less than the 0.01-foot accuracy typical for manual water levels.
- Even-numbered VWPs are located south of the barrier wall. Odd-numbered VWPs are on the north side of the barrier wall, except BW-VWP-75, which is located between the wing section of the barrier wall and Copper Creek.
- Water level and VWP measurements were collected June 5, 2020.
- Groundwater elevations shown in feet amsl (HMVD).
- Elevation contours provided by Stantec. Contours are shown in feet amsl.

Abbreviations:
amsl = Above mean sea level
HMVD = Holden Mine Vertical Datum
VWP = Vibrating wire piezometer

0 300 600 1,200
Scale in Feet

N

BALLFIELD AREA
FORMER WINSTON HOME SITES
US-1I 3271.9
HOLDEN VILLAGE
WEST BYPASS ROAD BRIDGE
Railroad Creek
FORMER SURFACE WATER RETENTION AREA
LOWER WEST AREA
BW-VWP-67b 3207.7
BW-VWP-69c 3201.8
BW-VWP-66b 3206.4
BW-VWP-68c 3210.5
1500 Level Ventilator Portal Access Road
BW-VWP-73b 3187.0
BW-VWP-72b 3194.6
TAILINGS PILE 1
WEST WASTE ROCK PILE
MAINTENANCE BUILDING
EAST WASTE ROCK PILE
TAILINGS PILE 2
Forest Service Road 8301
DS-15I 3167.7
DS-16I 3157.2
DS-17I 3152.8
DS-18I 3150.3
NRC-4D 3150.2
NRC-3IR 3145.5
NRC-6I 3131.8
MINE WATER TREATMENT PLANT
QUARRY
Tenmile Creek
TAILINGS PILE 3
TP3-12D 3152.1
DS-13I 3145.7
DS-12D 3144.4
DS-3D 3134.5
DS-4I 3132.9
DS-9I 3125.6
Holden Village Bypass Road
EAST BYPASS ROAD BRIDGE
WETLANDS EAST OF TAILINGS PILE 3
SOUTH TAILINGS PILE 3 BORROW AREA
Copper Creek

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Figure 4.4
Potentiometric Surface—Intermediate Zone (Spring 2020)

I:\GIS\Projects\RT-Holden\MXD\ACAR\2020\Figure 4.4 Potentiometric Surface—Intermediate Zone (Spring 2020).mxd
1/25/2021

Legend

- Groundwater Monitoring Well
- Vibrating Wire Piezometer[1]
- Potentiometric Surface Contour (feet amsl)
- Approximate Location of Subsurface Barrier Wall
- Surface Water Flow Direction
- 100-foot Elevation Index Contour

Notes:
1. VWP data are based on the elevation of the installed instrument and are not directly calibrated to water level elevation, so the head measurement accuracy relative to the vertical datum may be less than the 0.01-foot accuracy typical for manual water levels.
- Even-numbered VWPs are located south of the barrier wall. Odd-numbered VWPs are on the north side of the barrier wall, except BW-VWP-75, which is located between the wing section of the barrier wall and Copper Creek.
- Water level and VWP measurements were collected September 24, 2020.
- Groundwater elevations shown in feet amsl (HMVD).
- Elevation contours provided by Stantec. Contours are shown in feet amsl.

Abbreviations:
amsl = Above mean sea level
HMVD = Holden Mine Vertical Datum
VWP = Vibrating wire piezometer

0 300 600 1,200
Scale in Feet

N

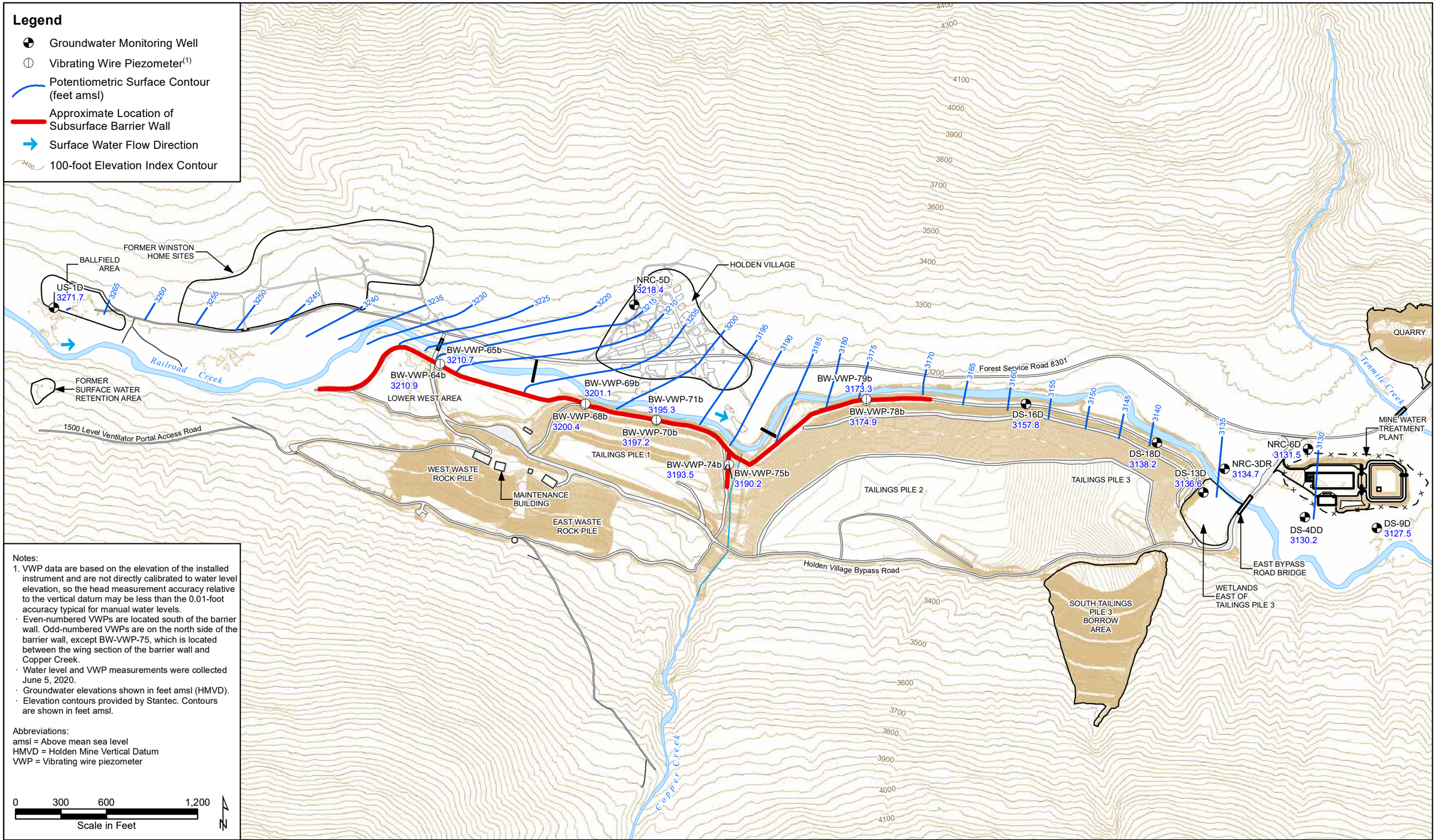
BALLFIELD AREA
FORMER WINSTON HOME SITES
US-1I 3268.7
FORMER SURFACE WATER RETENTION AREA
1500 Level Ventilator Portal Access Road
Railroad Creek
MW-4D 3214.5
LOWER WEST AREA
WEST BYPASS ROAD BRIDGE
BW-VWP-67b 3205.5
BW-VWP-69c 3200.1
BW-VWP-68c 3207.5
HOLDEN VILLAGE
BW-VWP-73b 3185.5
BW-VWP-72b 3189.3
TAILINGS PILE 1
WEST WASTE ROCK PILE
MAINTENANCE BUILDING
EAST WASTE ROCK PILE
BW-VWP-79c 3169.2
BW-VWP-78c 3171.6
DS-15I 3165.5
DS-16I 3154.8
Forest Service Road 8301
DS-17I 3150.1
DS-18I 3148.2
TAILINGS PILE 2
TAILINGS PILE 3
TP3-12D 3148.7
DS-13I 3144.3
DS-12D 3141.8
NRC-4D 3148.0
NRC-3IR 3143.7
NRC-6I 3126.9
MINE WATER TREATMENT PLANT
QUARRY
Tenmile Creek
DS-3D 3130.7
DS-4D 3130.1
DS-4I 3129.3
DS-9I 3123.1
EAST BYPASS ROAD BRIDGE
WETLANDS EAST OF TAILINGS PILE 3
SOUTH TAILINGS PILE 3 BORROW AREA
Holden Village Bypass Road
Copper Creek

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Figure 4.5
Potentiometric Surface—Intermediate Zone (Fall 2020)

I:\GIS\Projects\RT-Holden\MXD\ACAR\2020\Figure 4.5 Potentiometric Surface—Intermediate Zone (Fall 2020).mxd
1/25/2021



Notes:
1. VWP data are based on the elevation of the installed instrument and are not directly calibrated to water level elevation, so the head measurement accuracy relative to the vertical datum may be less than the 0.01-foot accuracy typical for manual water levels.
- Even-numbered VWPs are located south of the barrier wall. Odd-numbered VWPs are on the north side of the barrier wall, except BW-VWP-75, which is located between the wing section of the barrier wall and Copper Creek.
- Water level and VWP measurements were collected June 5, 2020.
- Groundwater elevations shown in feet amsl (HMVD).
- Elevation contours provided by Stantec. Contours are shown in feet amsl.

Abbreviations:
amsl = Above mean sea level
HMVD = Holden Mine Vertical Datum
VWP = Vibrating wire piezometer

0 300 600 1,200
Scale in Feet

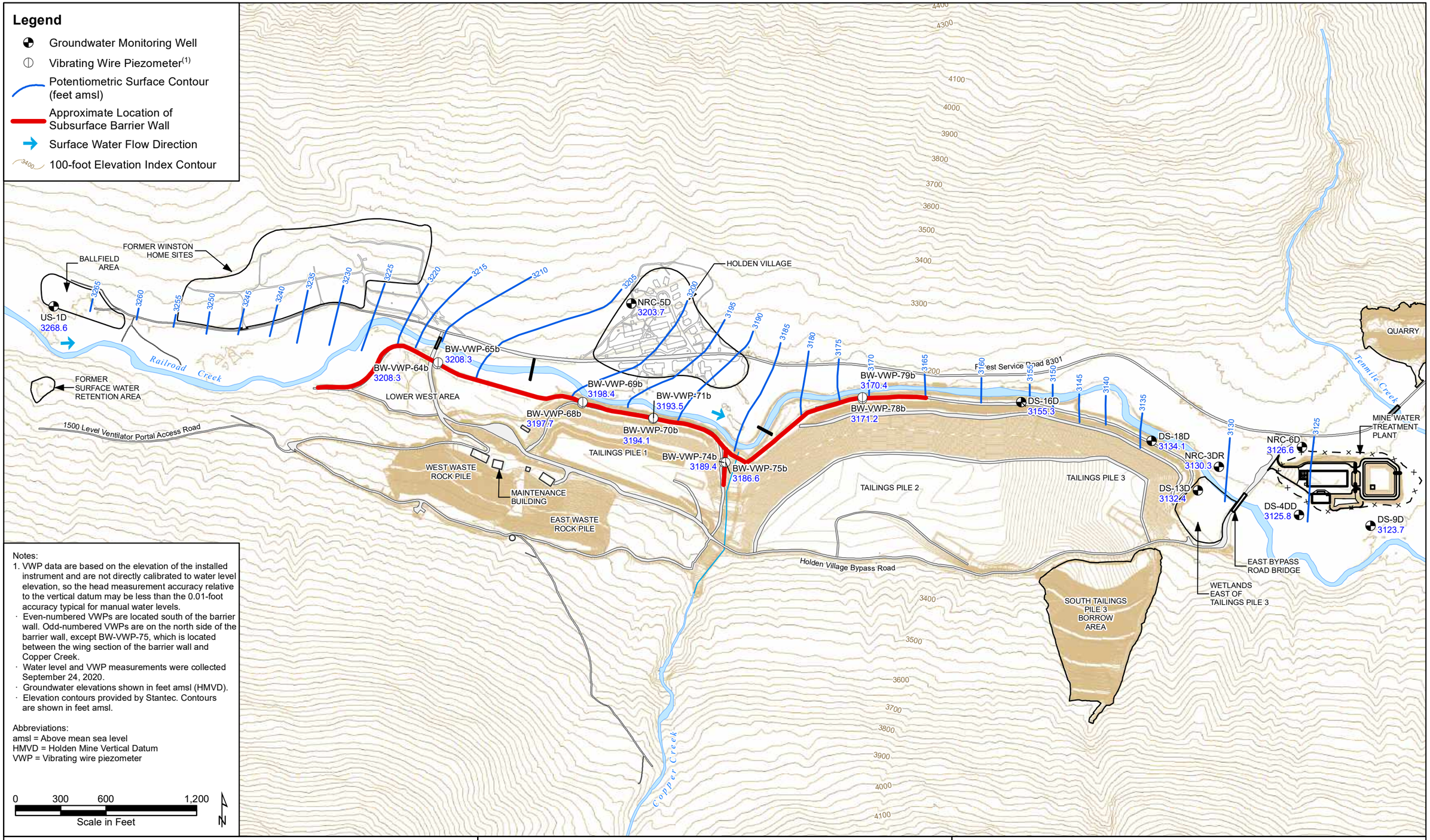
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Figure 4.6
Potentiometric Surface—Deep Zone (Spring 2020)

I:\GIS\Projects\RT-Holden\MXD\ACAR\2020\Figure 4.6 Potentiometric Surface—Deep Zone (Spring 2020).mxd
1/25/2021



Notes:
1. VWP data are based on the elevation of the installed instrument and are not directly calibrated to water level elevation, so the head measurement accuracy relative to the vertical datum may be less than the 0.01-foot accuracy typical for manual water levels.
- Even-numbered VWPs are located south of the barrier wall. Odd-numbered VWPs are on the north side of the barrier wall, except BW-VWP-75, which is located between the wing section of the barrier wall and Copper Creek.
- Water level and VWP measurements were collected September 24, 2020.
- Groundwater elevations shown in feet amsl (HMVD).
- Elevation contours provided by Stantec. Contours are shown in feet amsl.

Abbreviations:
amsl = Above mean sea level
HMVD = Holden Mine Vertical Datum
VWP = Vibrating wire piezometer

0 300 600 1,200
Scale in Feet
N

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Chelan County, Washington

Figure 4.7
Potentiometric Surface—Deep Zone (Fall 2020)

I:\GIS\Projects\RT-Holden\MXD\ACAR\2020\Figure 4.7 Potentiometric Surface—Deep Zone (Fall 2020).mxd
1/25/2021

Legend

- Monitoring Well
- Vibrating Wire Piezometer
- Approximate Location of Subsurface Barrier Wall
- Waste Management Area
- Portal
- Surface Water Flow Direction
- 3400 — 100-foot Elevation Index Contour

Sample Key

2020 Seasonal Event → **US-1** *Spring* 0.06 ↓ ← Location ID

Vertical Gradient (feet per foot)[1] → ← Direction of Vertical Gradient

INDEX MAP

SHEET 1

SHEET 2

0 1,250 2,500 5,000 Feet

N

BALLFIELD AREA

FORMER WINSTON HOME SITES

HOLDEN VILLAGE

3300

US-1
Spring
0.06 ↓
Fall
<0.01 ↓

Forest Service Road 8301

EAST BYPASS ROAD BRIDGE

BW-VWP-65
Spring
0.12 ↓
Fall
0.14 ↓

HV-3 & NRC-5D
Spring
0.02 ↓
Fall
<0.01 ↓

HOLDEN VILLAGE FOOTBRIDGE

BW-VWP-67
Spring
0.06 ↓
Fall
0.08 ↓

HV-2
Spring
0.08 ↓
Fall
0.01 ↓

Railroad Creek

3300

BW-VWP-61
Spring
-0.05 ↑
Fall
0.05 ↓

MW-4
Spring
>-0.01 ↑

LOWER WEST AREA

BW-VWP-64
Spring
0.06 ↓
Fall
0.06 ↓

BW-VWP-69
Spring
-0.01 ↑
Fall
0.01 ↓

FORMER SURFACE WATER RETENTION AREA

3400

BW-VWP-60
Spring
-0.01 ↑
Fall
-0.11 ↑

BW-VWP-66
Spring
0.05 ↓

BW-VWP-71
Spring
0.00 ↓
Fall
0.02 ↓

1500 Level Ventilator Portal Access Road

1500 LEVEL VENTILATOR PORTAL

BW-VWP-68
Spring
0.10 ↓
Fall
0.08 ↓

BW-VWP-70
Spring
0.01 ↓
Fall
<0.01 ↓

TAILINGS PILE 1

WEST WASTE ROCK PILE

MAINTENANCE BUILDING

1500 LEVEL MAIN PORTAL

Honeymoon Heights Abandoned Road/Trail

EAST WASTE ROCK PILE

Notes:
1. Vertical gradients are shown to two decimal places as measured between the Shallow Zone monitoring well or VWP and the next shallowest well at the cluster (Intermediate or Deep Zone). Refer to Tables 4.5 and 4.6.
· Elevation contours provided by Stantec. Contours are shown in feet above mean sea level.

Abbreviation:
VWP = Vibrating wire piezometer

0 150 300 600
Scale in Feet

N

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Figure 4.8
Vertical Gradients Map (Spring and Fall 2020)
(Sheet 1 of 2)

I:\GIS\Projects\RT-Holden\MXD\ACAR\2020\Figure 4.8 Vertical Gradients Map (Spring and Fall 2020).mxd
1/25/2021

Legend

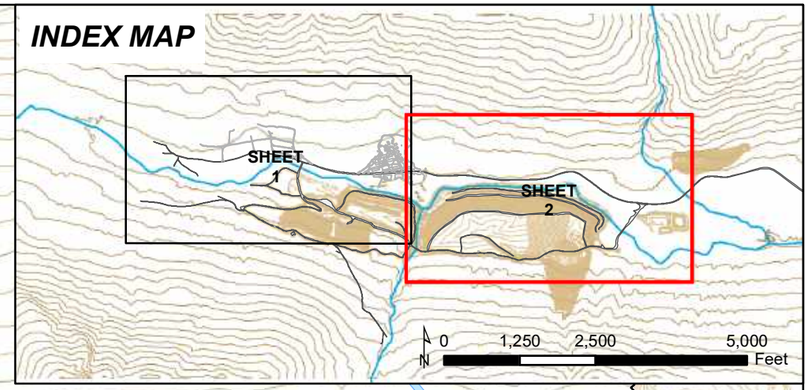
- Monitoring Well
- Vibrating Wire Piezometer
- Approximate Location of Subsurface Barrier Wall
- Waste Management Area
- Portal
- Surface Water Flow Direction
- 3400 100-foot Elevation Index Contour

Sample Key

2020 Seasonal Event → **US-1** *Spring* 0.06 ↓ ← Location ID

Vertical Gradient (feet per foot)[1] → ← Direction of Vertical Gradient

INDEX MAP



Notes:
1. Vertical gradients are shown to two decimal places as measured between the Shallow Zone monitoring well or VWP and the next shallowest well at the cluster (Intermediate or Deep Zone). Refer to Tables 4.5 and 4.6.
· Elevation contours provided by Stantec. Contours are shown in feet above mean sea level.

Abbreviation:
VWP = Vibrating wire piezometer

0 150 300 600
Scale in Feet
N

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Figure 4.8
Vertical Gradients Map (Spring and Fall 2020)
(Sheet 2 of 2)

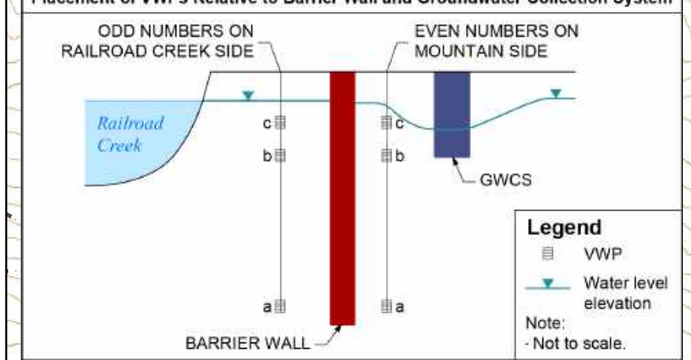
I:\GIS\Projects\RT-Holden\MXD\ACAR\2020\Figure 4.8 Vertical Gradients Map (Spring and Fall 2020).mxd
1/25/2021

Legend

- Approximate Location of Subsurface Barrier Wall
- Groundwater Collection System Collection Pipe
- Collection Sump
- Groundwater Monitoring Well or Piezometer
- Multiple Completion Vibrating Wire Piezometer
- 3400 100-foot Elevation Index Contour

WEST BYPASS ROAD BRIDGE
HOLDEN VILLAGE FOOTBRIDGE
HOLDEN VILLAGE
Railroad Creek
Forest Service Road 8301
Forest Service Road 8301
Railroad Creek
Holden Village Bypass Road
Copper Creek
LOWER WEST AREA - WEST
LOWER WEST AREA - EAST
WEST WASTE ROCK PILE
EAST WASTE ROCK PILE
TAILINGS PILE 1
TAILINGS PILE 2
TAILINGS PILE 3
HV-3
NRC-5D
HV-1
NRC-1D
HV-2S
HV-2D
RC-PZ-4
RC-PZ-2
MW-1
MW-2
MW-3
MW-4S
MW-4D
BW-VWP-60
BW-VWP-61
BW-VWP-62
BW-VWP-63
BW-VWP-64
BW-VWP-65
BW-VWP-66
BW-VWP-67
BW-VWP-68
BW-VWP-69
BW-VWP-70
BW-VWP-71
BW-VWP-72
BW-VWP-73
BW-VWP-74
BW-VWP-75
BW-VWP-76
BW-VWP-77
BW-VWP-78
BW-VWP-79
CS1
CS2
CS3
TP1-8D
TP1-9S
TP1-9D
TP1-10S
TP1-10D
TP2-12S
TP2-12D
TP2-13S
TP2-13D
TP2-14
TP2-15
TP2-16S
TP2-16D
TP2-17
TP3-13
TP3-14S
TP3-14D
DS-15S
DS-15I
DS-16S
DS-16I
DS-16D
3600
3500
3400
3300
3200

Placement of VWPs Relative to Barrier Wall and Groundwater Collection System



Notes:
- Even-numbered VWPs are located between the barrier wall and the GWCS collection pipe. Odd-numbered VWPs are located between the barrier wall and Railroad Creek, except BW-VWP-75, which is located between the wing section of the barrier wall and Copper Creek.
- Elevation contours provided by Stantec. Contours are shown in feet above mean sea level.

Abbreviations:
CS = Collection Sump
GWCS = Groundwater Collection System
VWP = Vibrating wire piezometer

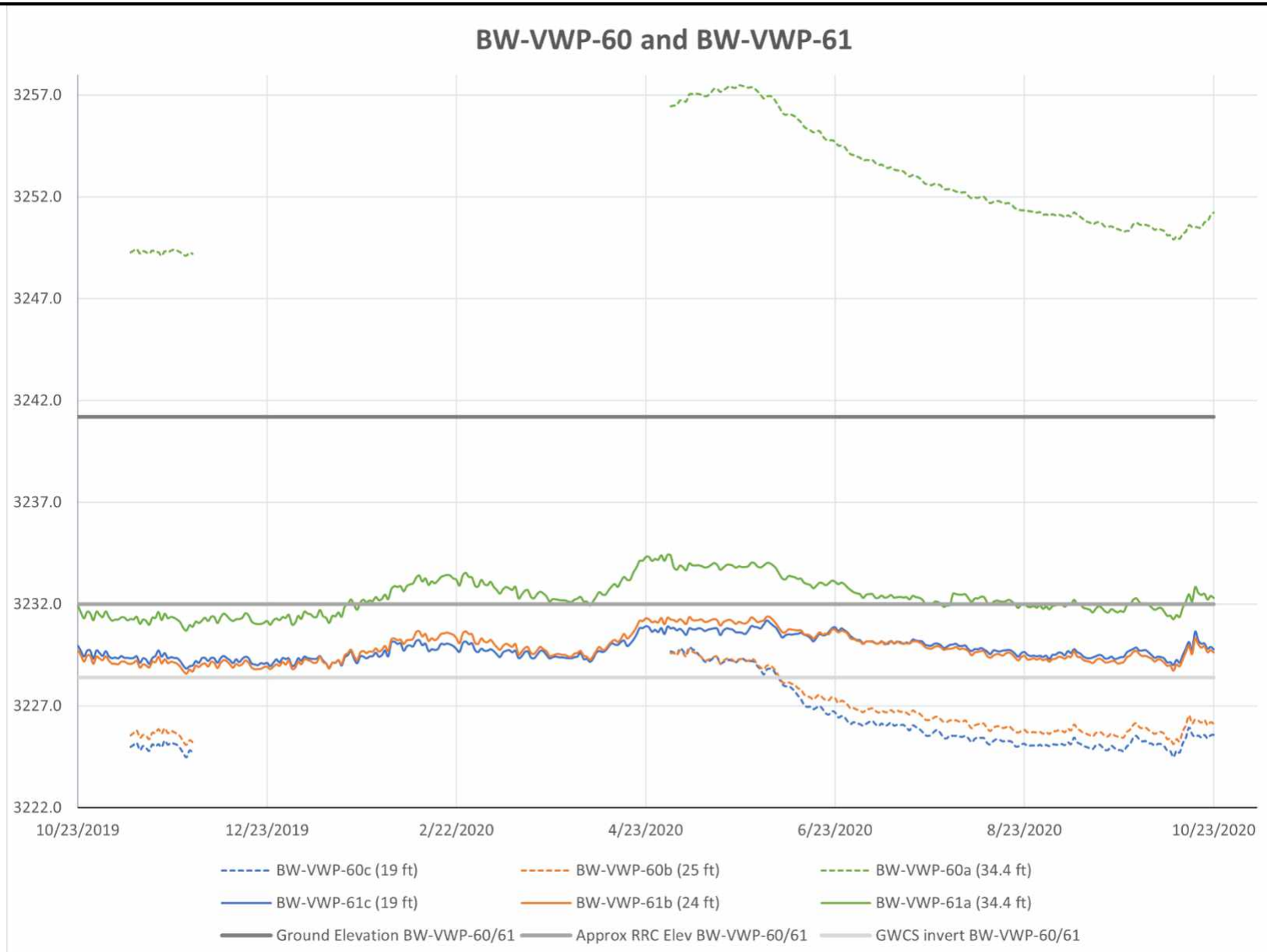
N
0 175 350 700
Scale in Feet

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Figure 4.9
Vibrating Wire Piezometers

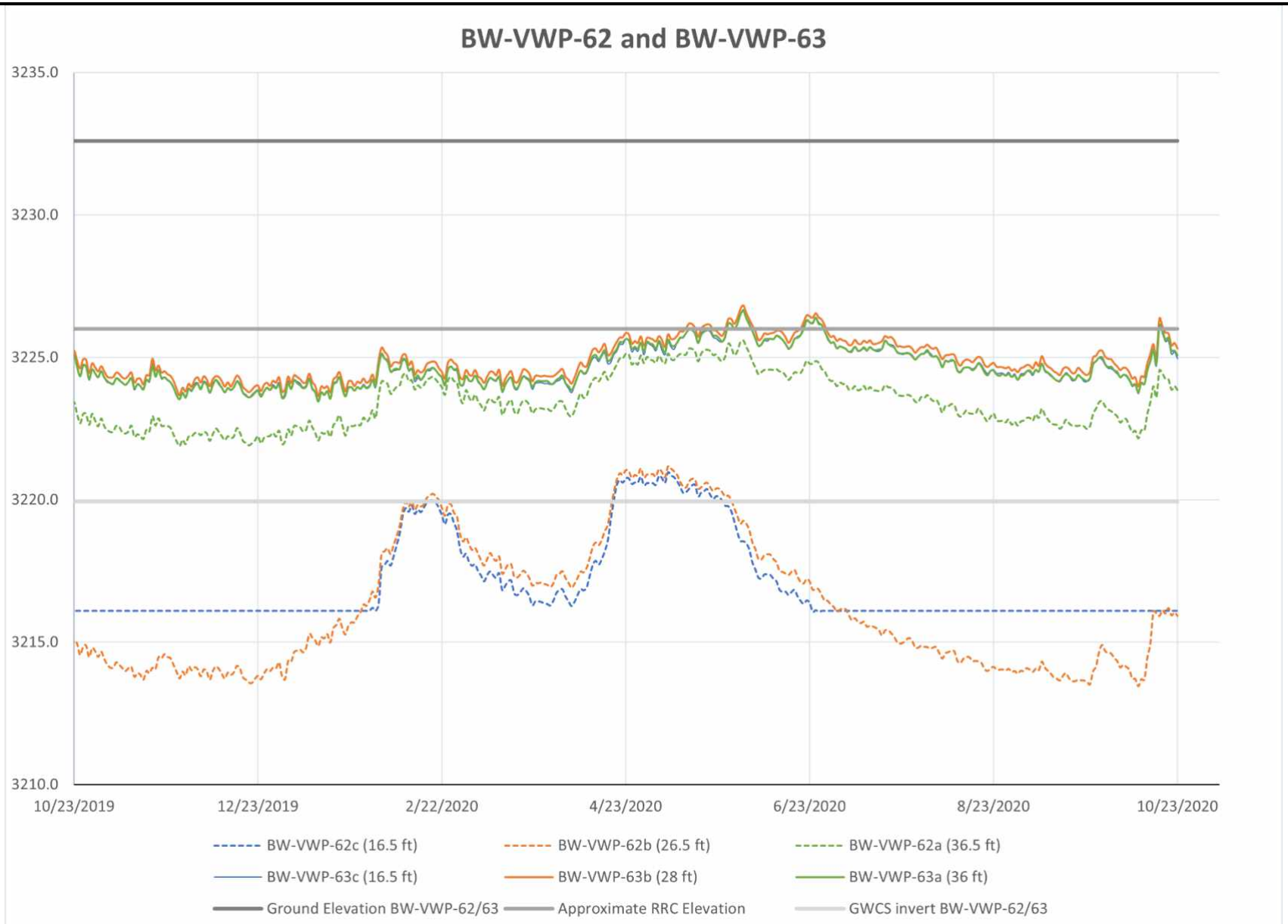
I:\GIS\Projects\RT-Holden\MXD\ACAR\2020\Figure 4.9 Vibrating Wire Piezometers.mxd
1/25/2021



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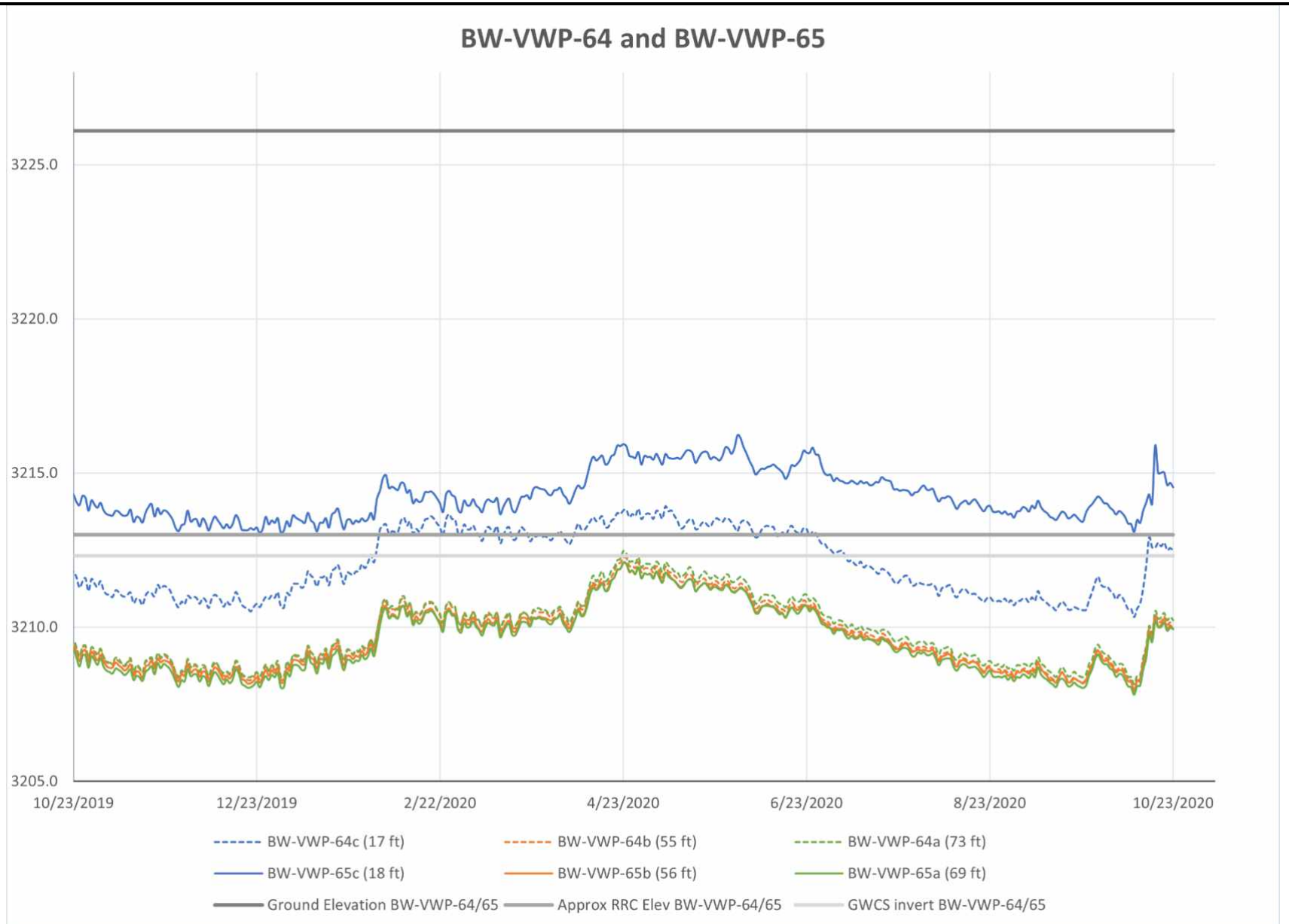
Figure 4.10
Hydrograph of BW-VWP-60 and BW-VWP-61
(October 2019 – October 2020)



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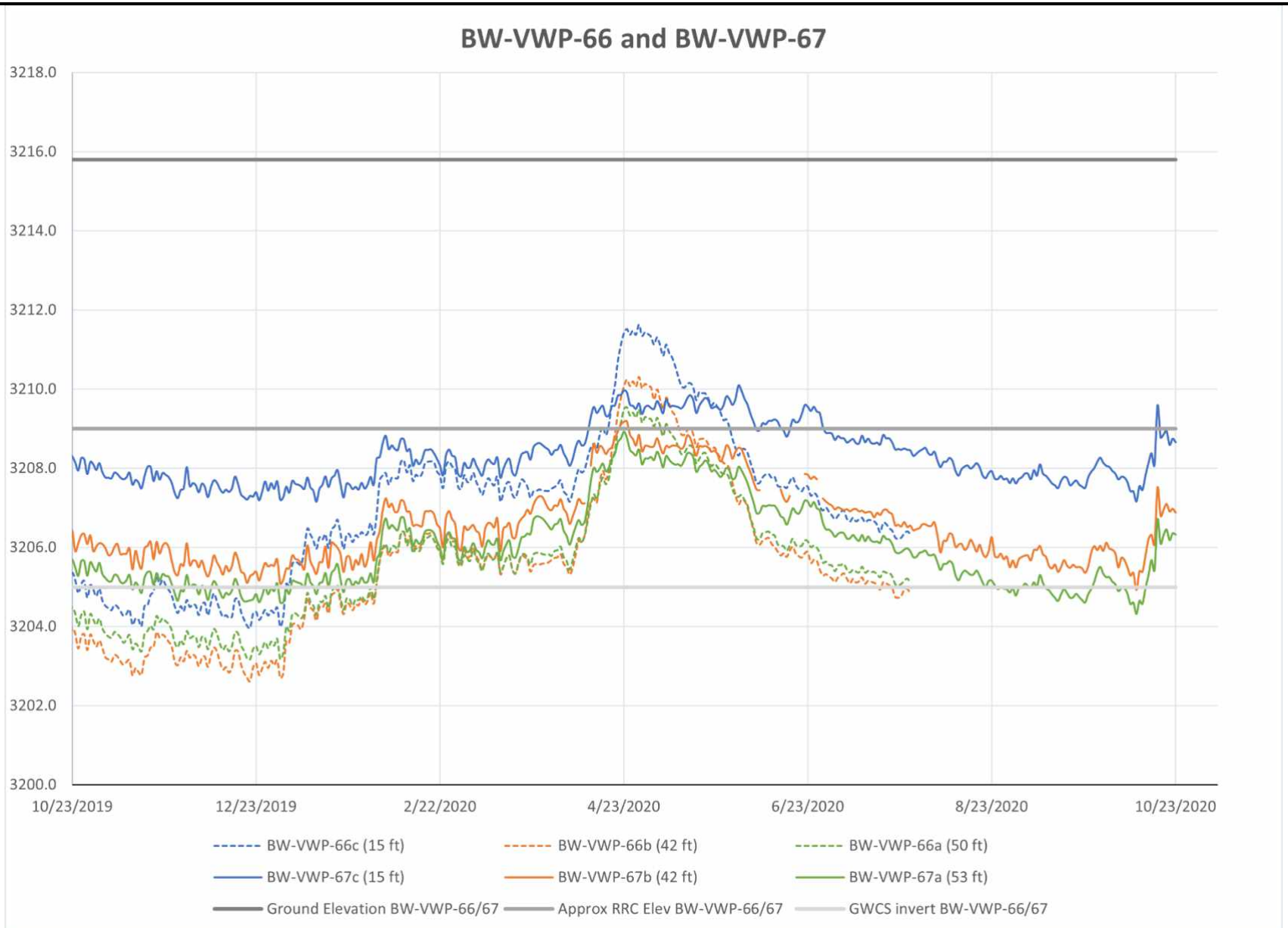
Figure 4.11
Hydrograph of BW-VWP-62 and BW-VWP-63
(October 2019 – October 2020)



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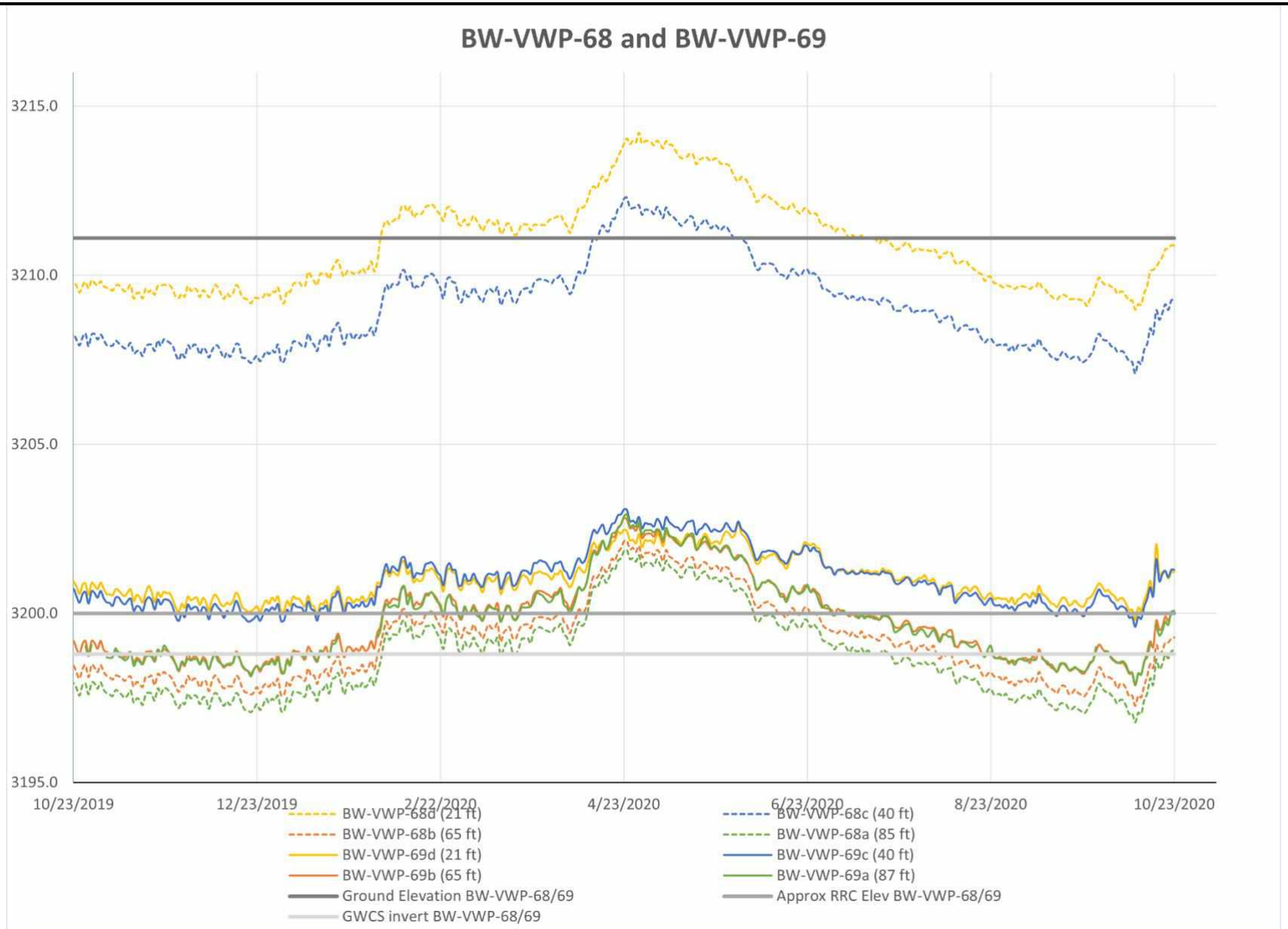
Figure 4.12
Hydrograph of BW-VWP-64 and BW-VWP-65
(October 2019 – October 2020)



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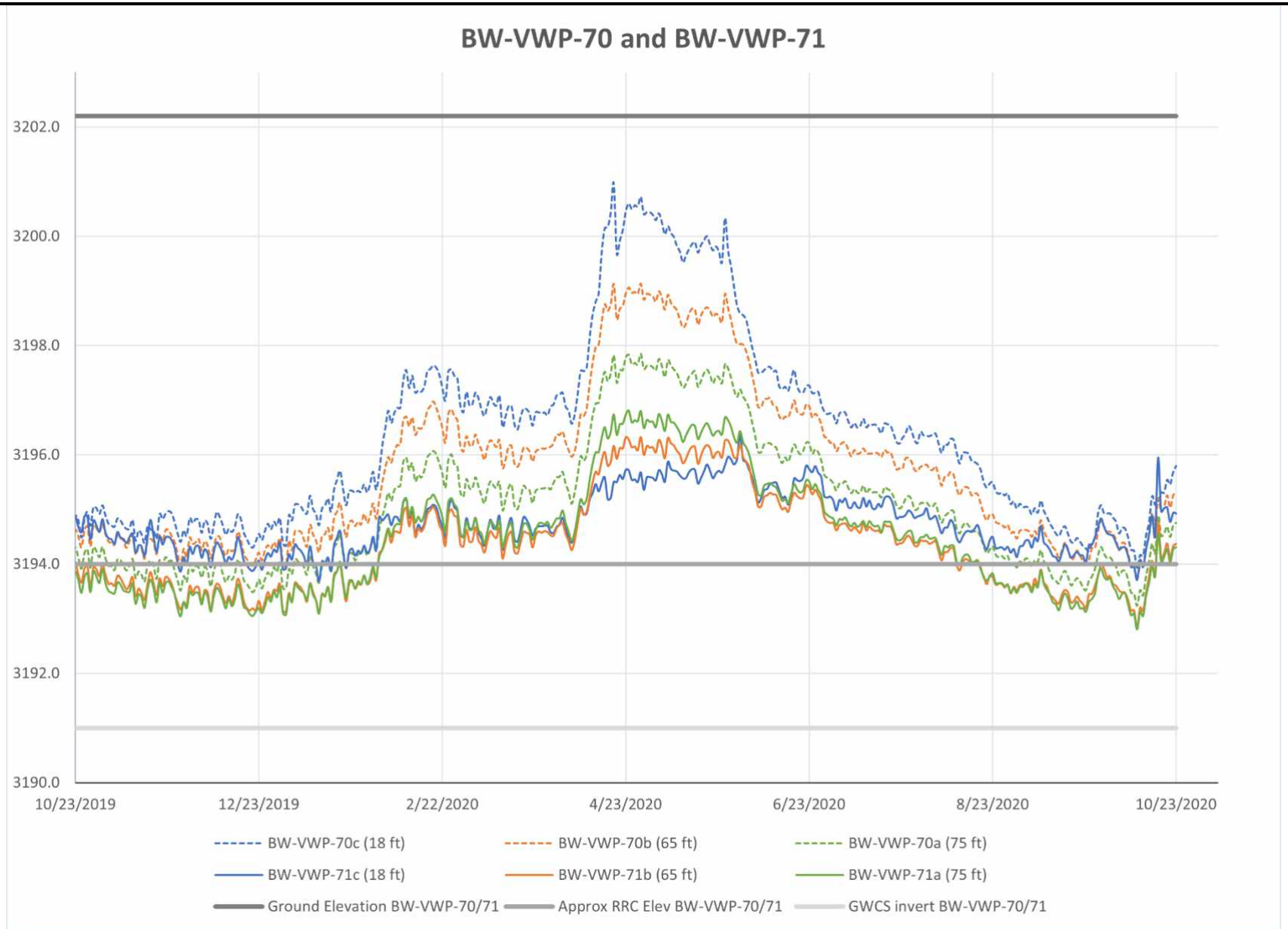
Figure 4.13
Hydrograph of BW-VWP-66 and BW-VWP-67
(October 2019 – October 2020)



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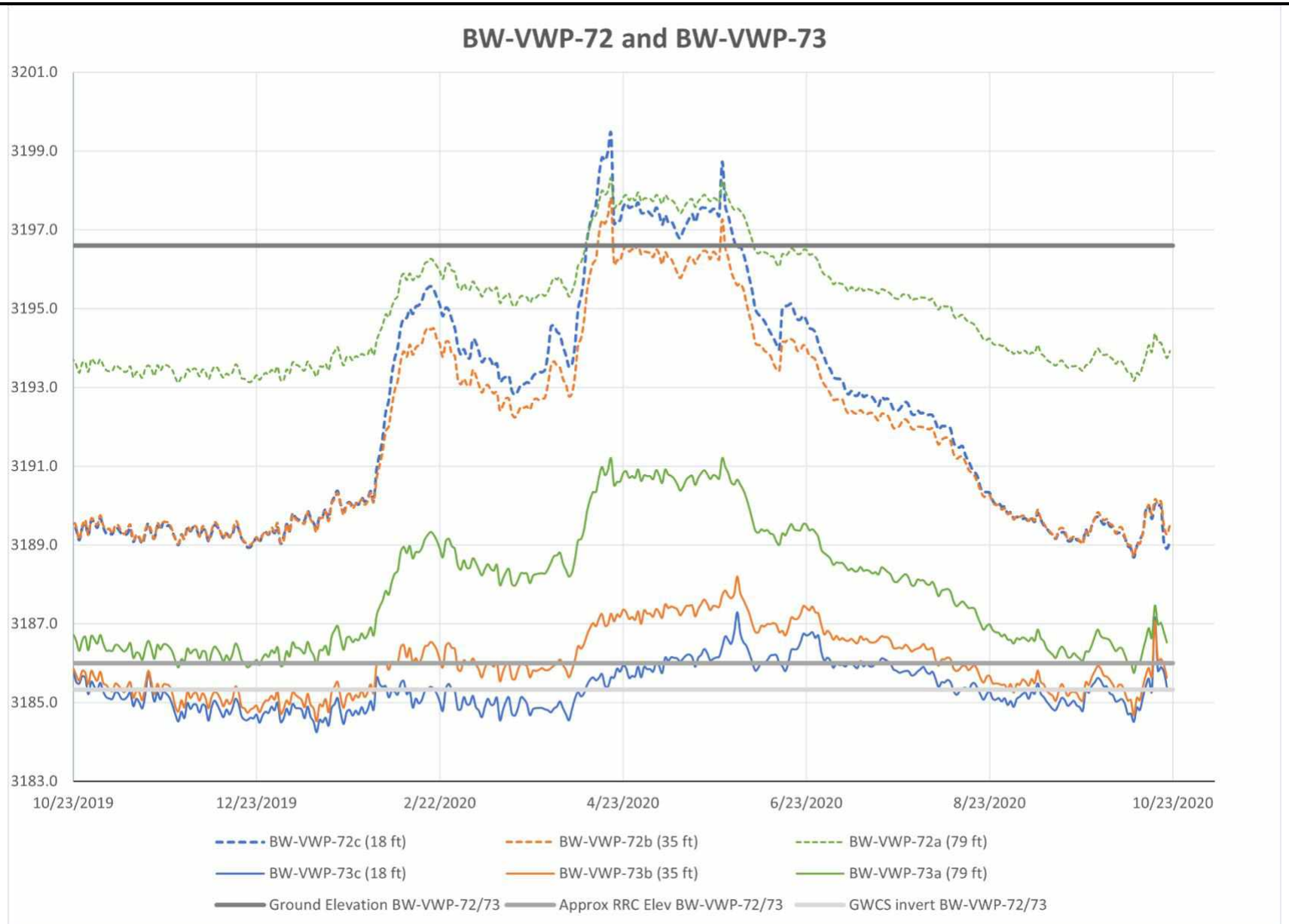
Figure 4.14
Hydrograph of BW-VWP-68 and BW-VWP-69
(October 2019 – October 2020)



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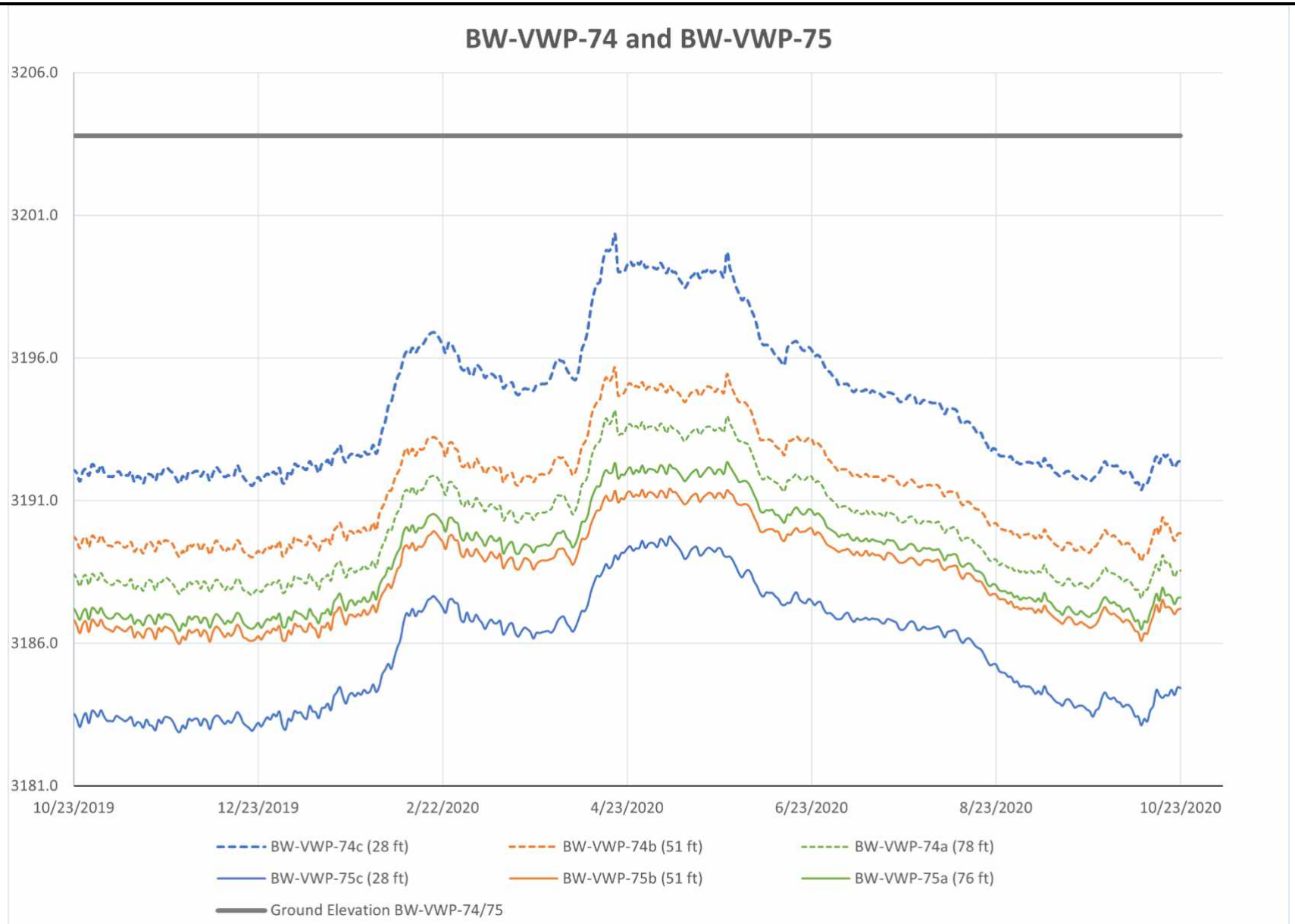
Figure 4.15
Hydrograph of BW-VWP-70 and BW-VWP-71
(October 2019 – October 2020)



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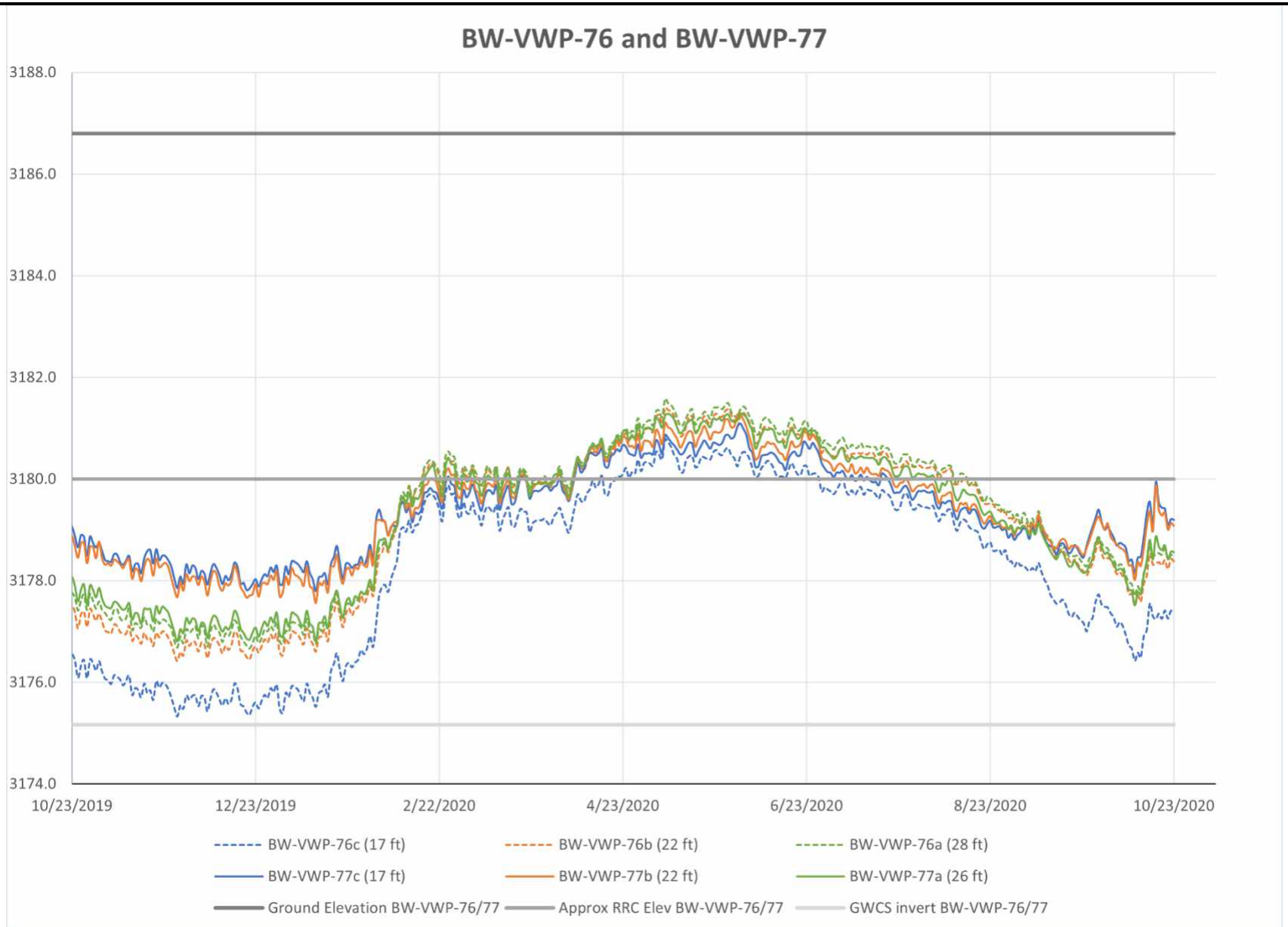
Figure 4.16
Hydrograph of BW-VWP-72 and BW-VWP-73
(October 2019 – October 2020)



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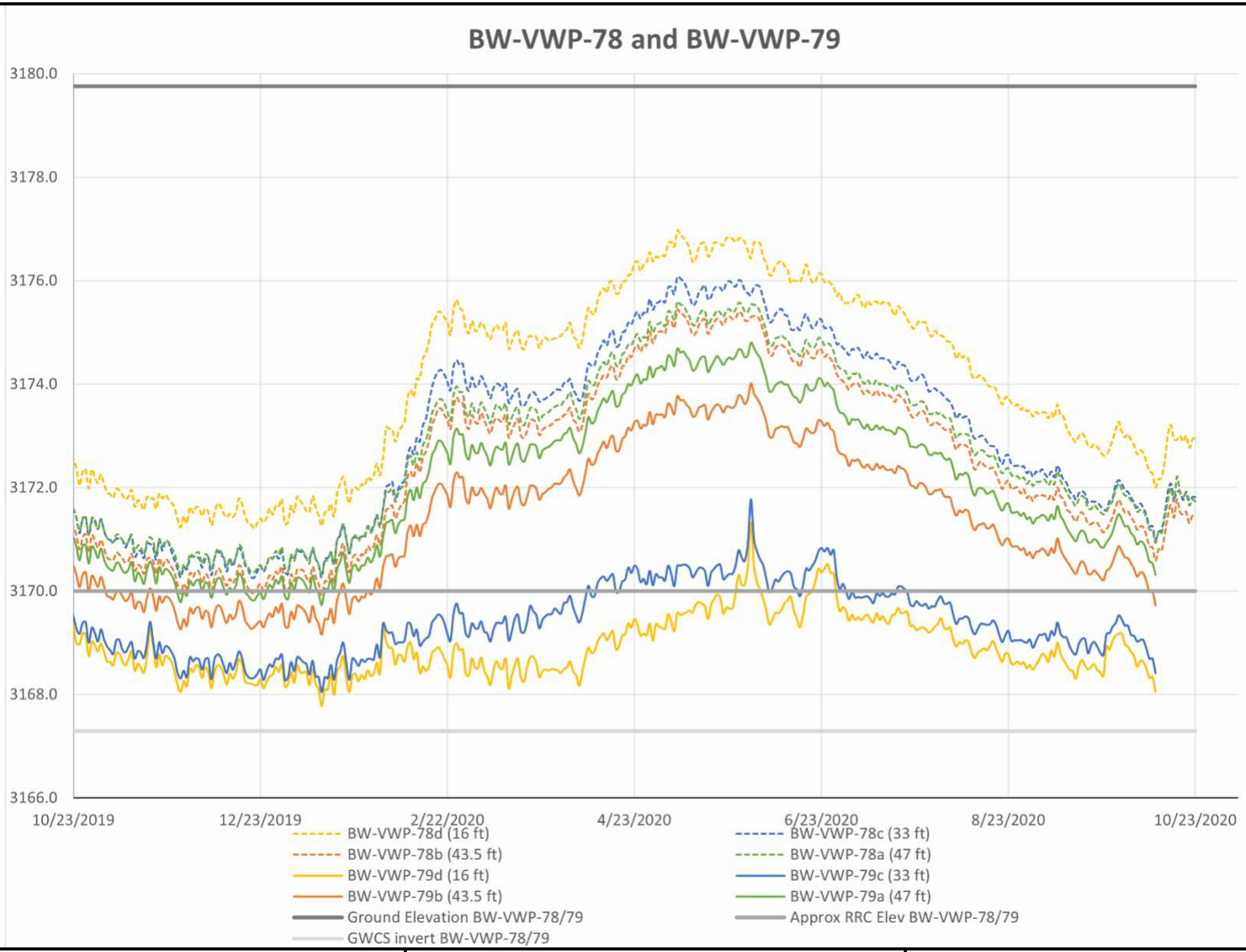
Figure 4.17
Hydrograph of BW-VWP-74 and BW-VWP-75
(October 2019 – October 2020)



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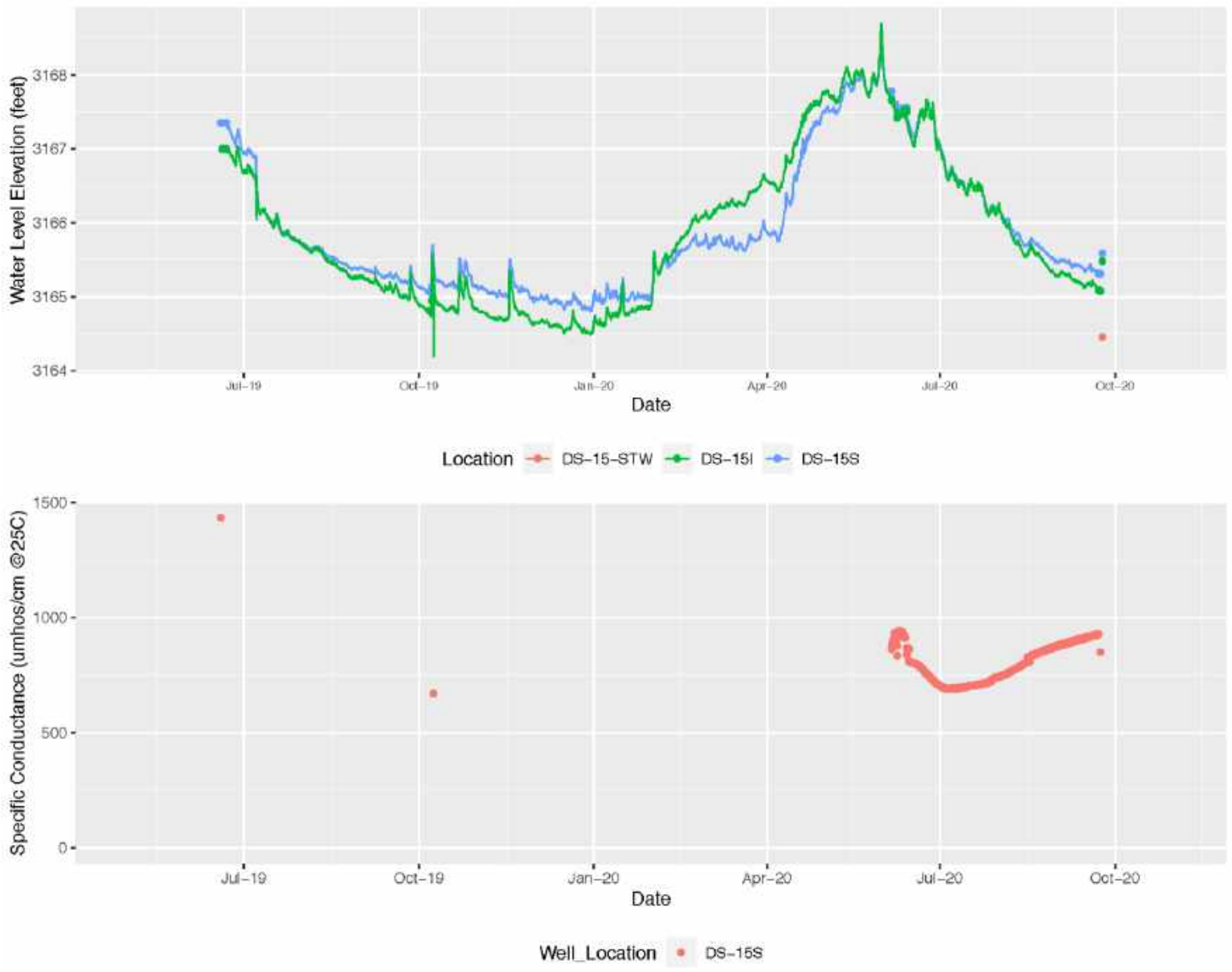
Figure 4.18
Hydrograph of BW-VWP-76 and BW-VWP-77
(October 2019 – October 2020)



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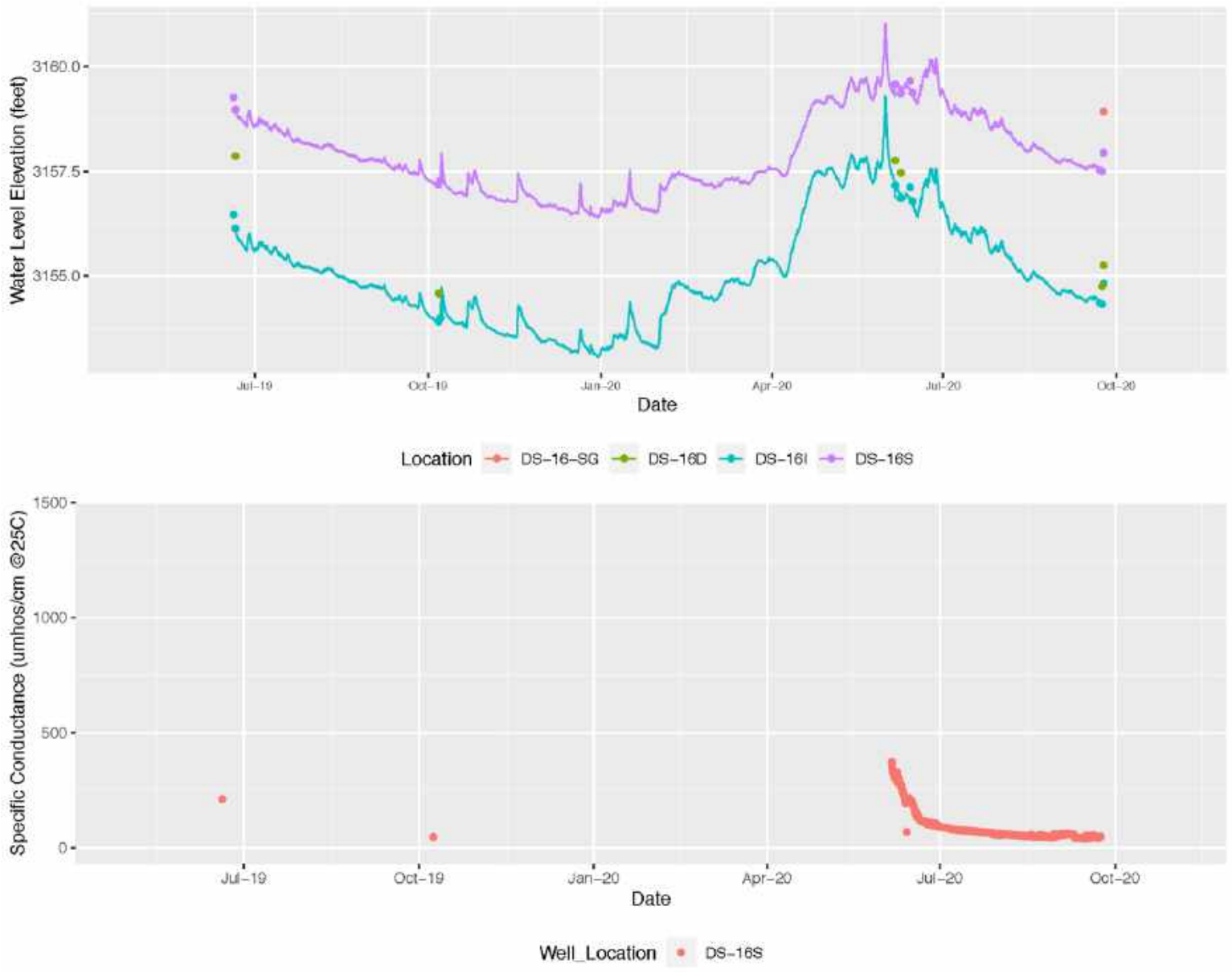
Figure 4.19
Hydrograph of BW-VWP-78 and BW-VWP-79
(October 2019 – October 2020)



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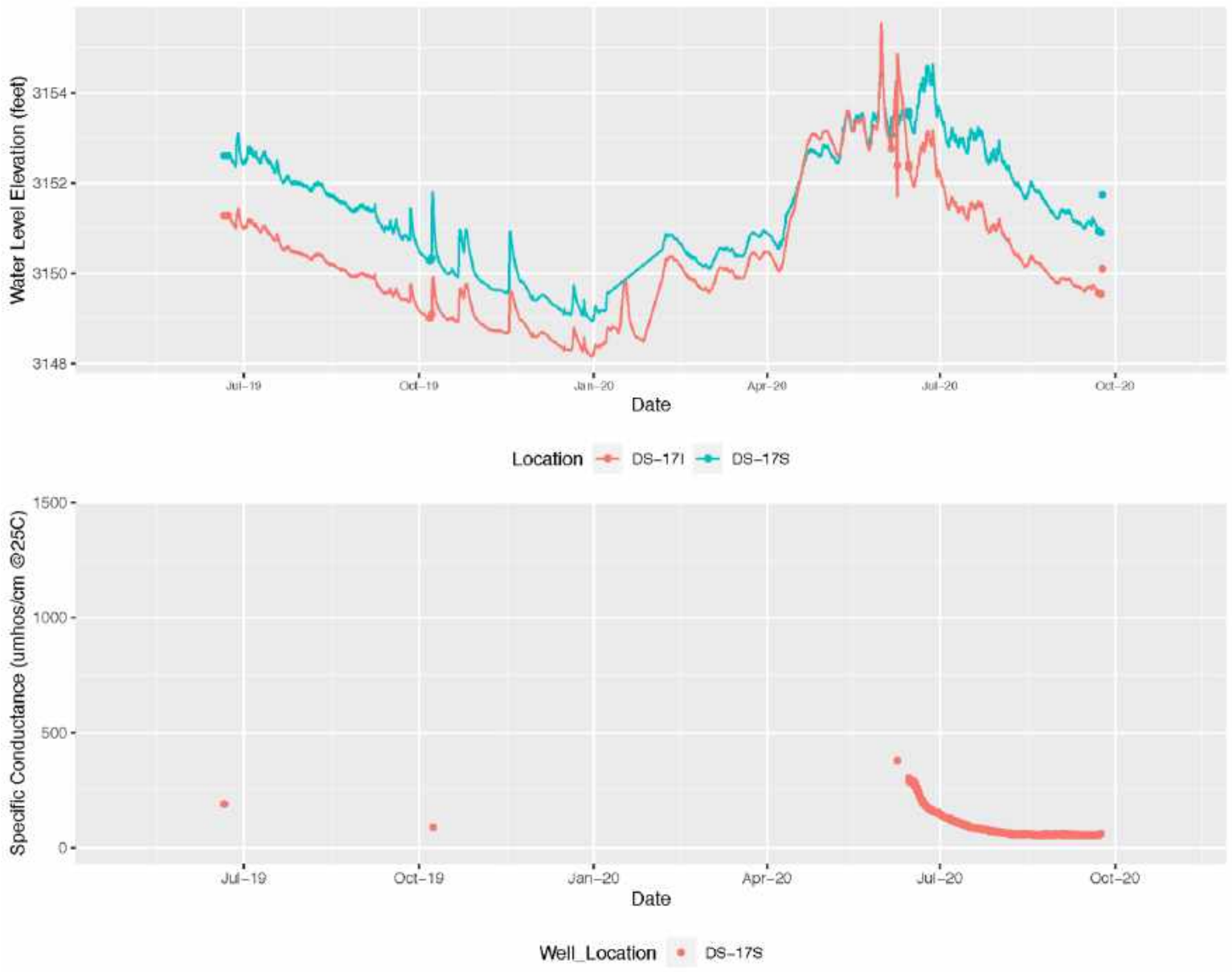
Figure 4.20
Hydrograph of DS-15S and DS-15I
(June 2019 – October 2020)
Showing DS-15S Conductivity
(June 2020 – October 2020)



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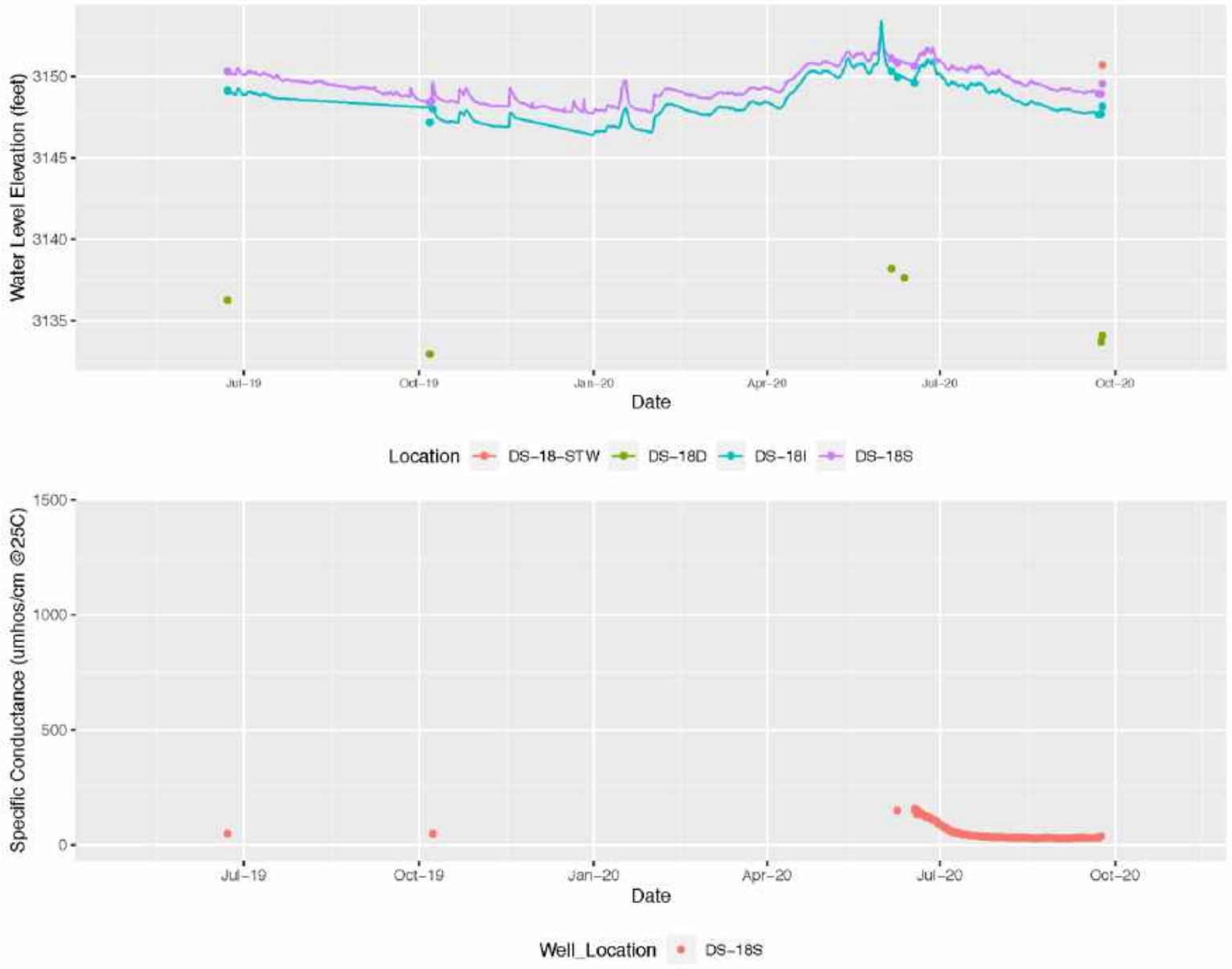
Figure 4.21
Hydrograph of DS-16S and DS-16I
(June 2019 – October 2020)
Showing DS-16S Conductivity
(June 2020 – October 2020)



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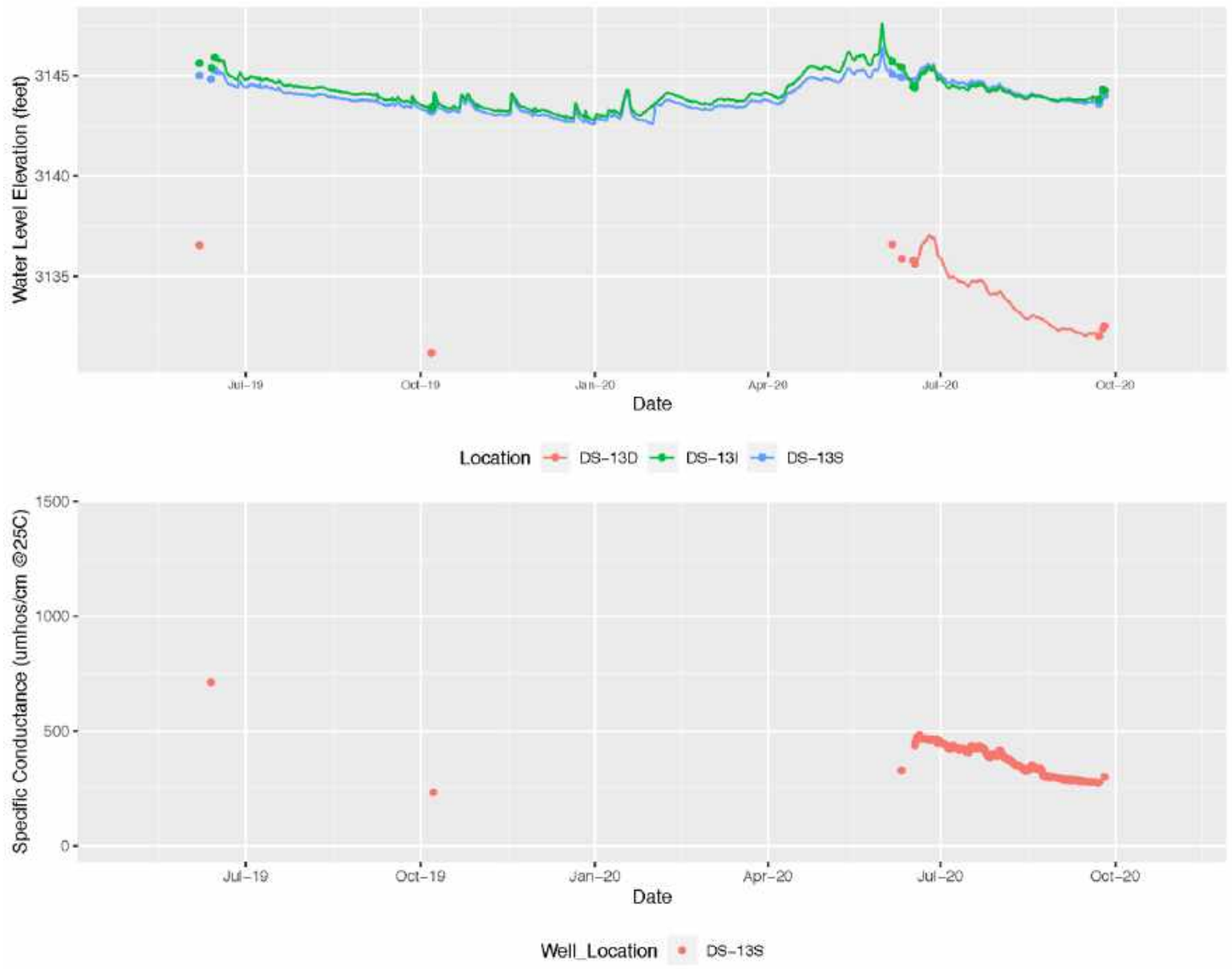
Figure 4.22
Hydrograph of DS-17S and DS-17I
(June 2019 – October 2020)
Showing DS-17S Conductivity
(June 2020 – October 2020)



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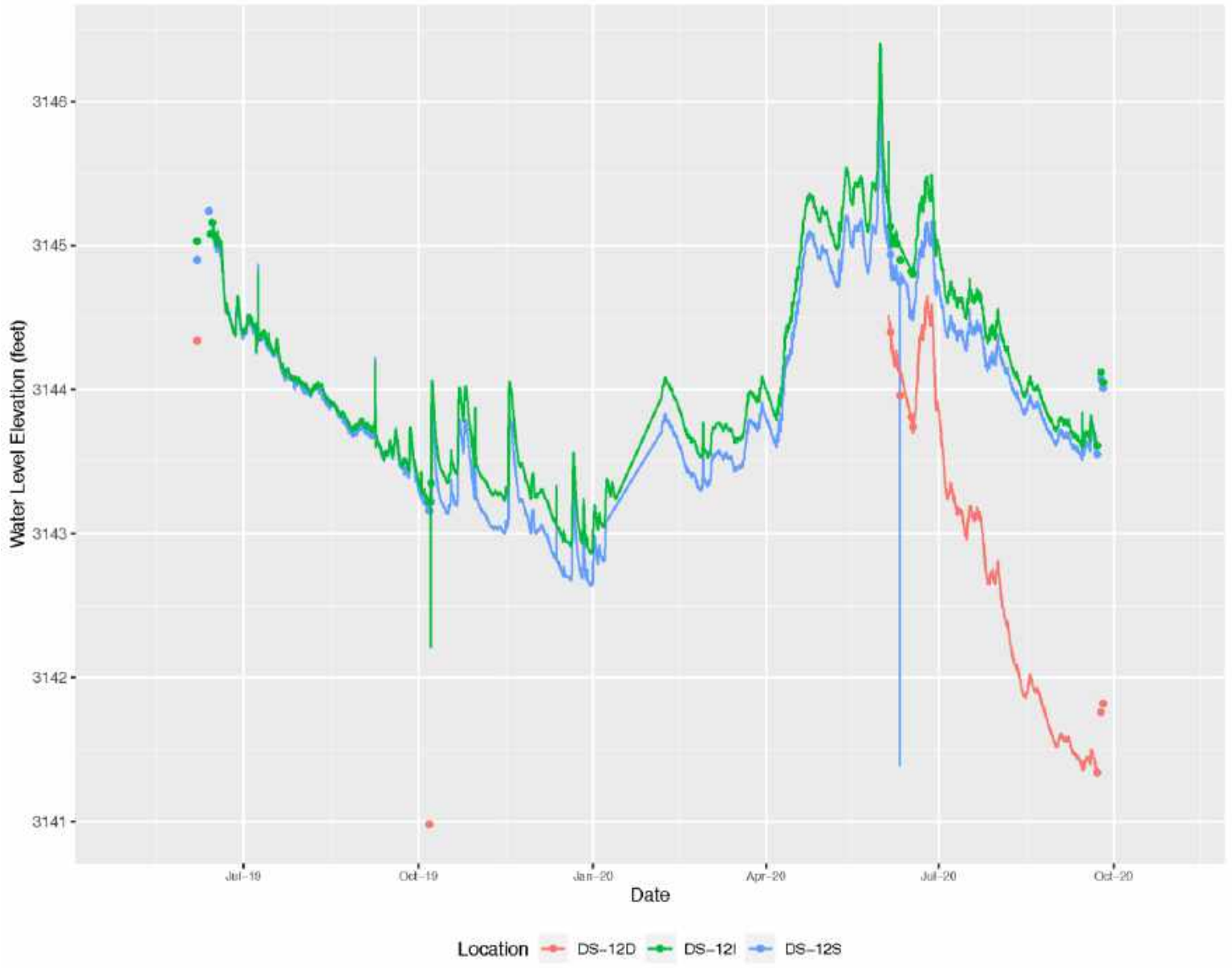
Figure 4.23
Hydrograph of DS-18S and DS-18I
(June 2019 – October 2020)
Showing DS-18S Conductivity
(June 2020 – October 2020)



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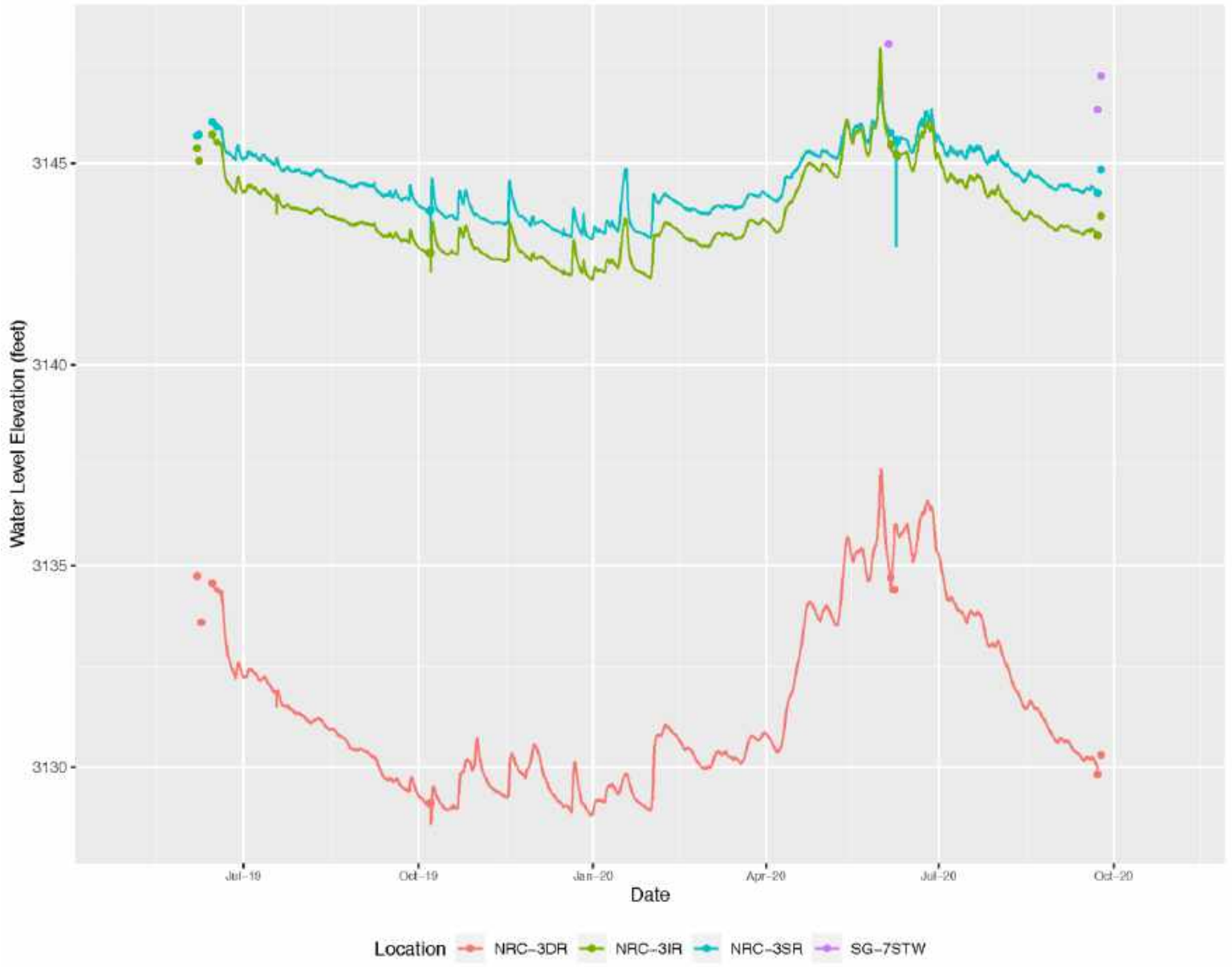
Figure 4.24
Hydrograph of DS-13S, DS-13I, and DS-13D
(June 2019 – October 2020)
Showing DS-13S Conductivity
(June 2020 – October 2020)



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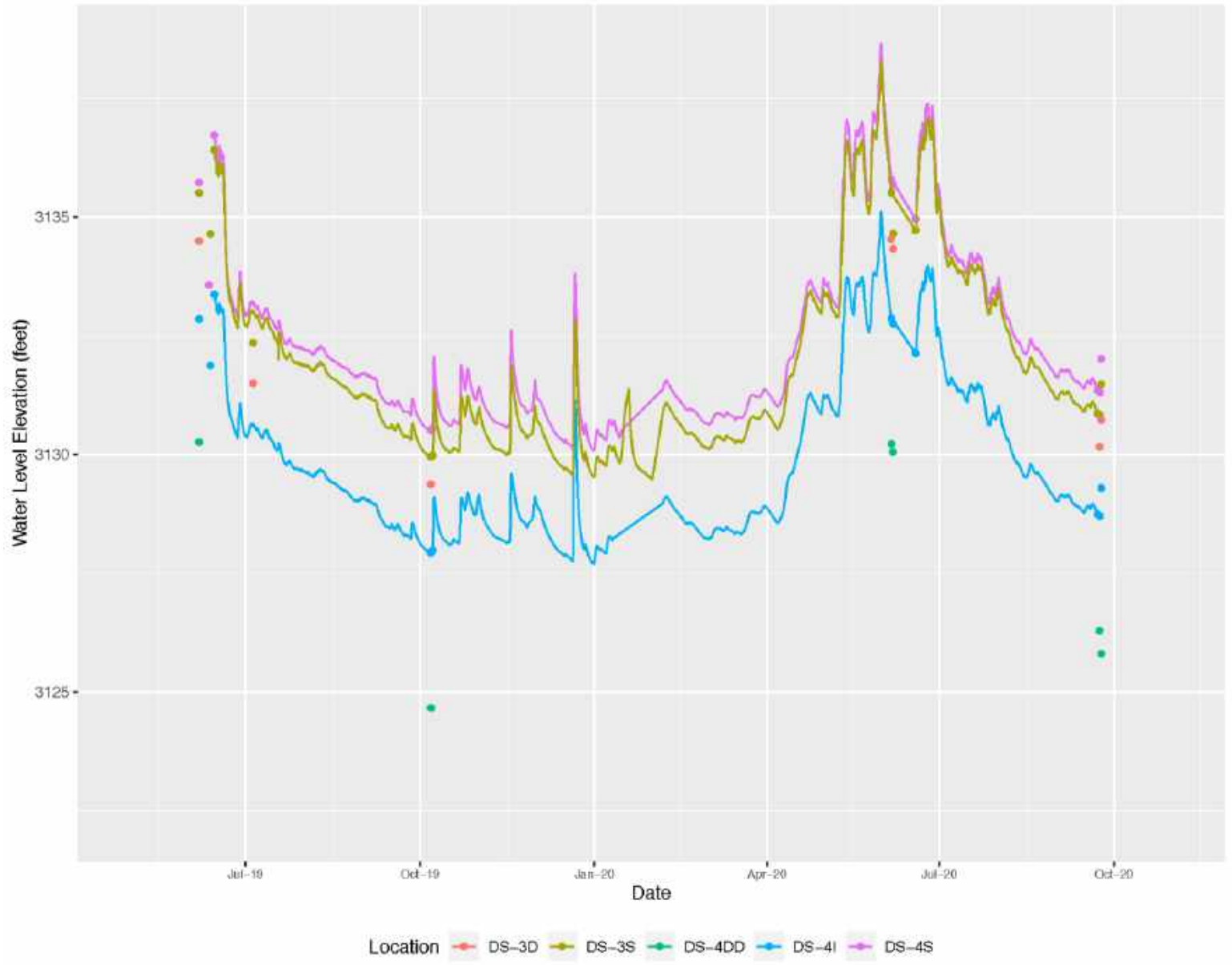
Figure 4.25
Hydrograph of DS-12S, DS-12I, and DS-12D
(June 2019 – October 2020)



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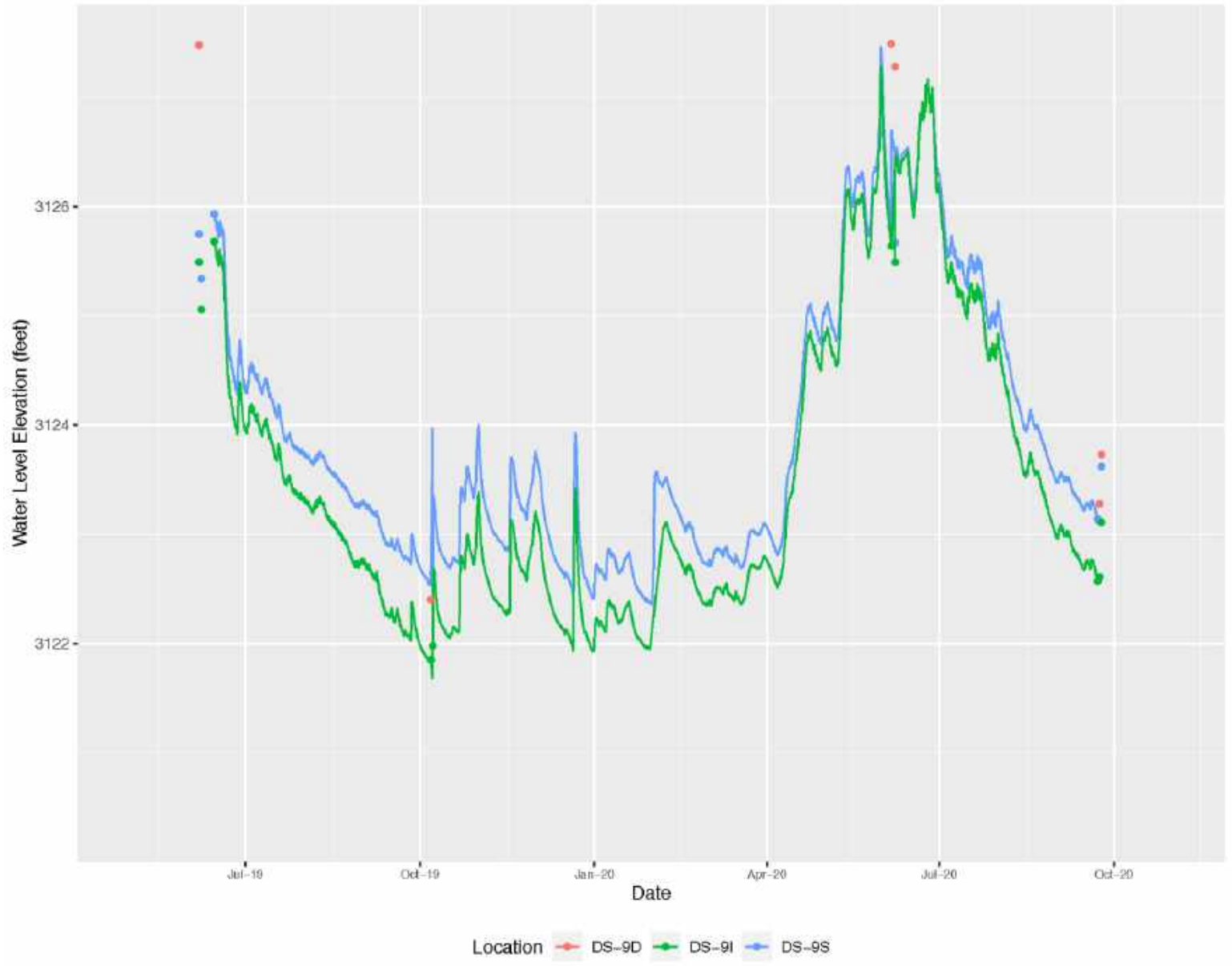
Figure 4.26
Hydrograph of NRC-3SR, NRC-3IR, and NRC-3DR
(June 2019 – October 2020)



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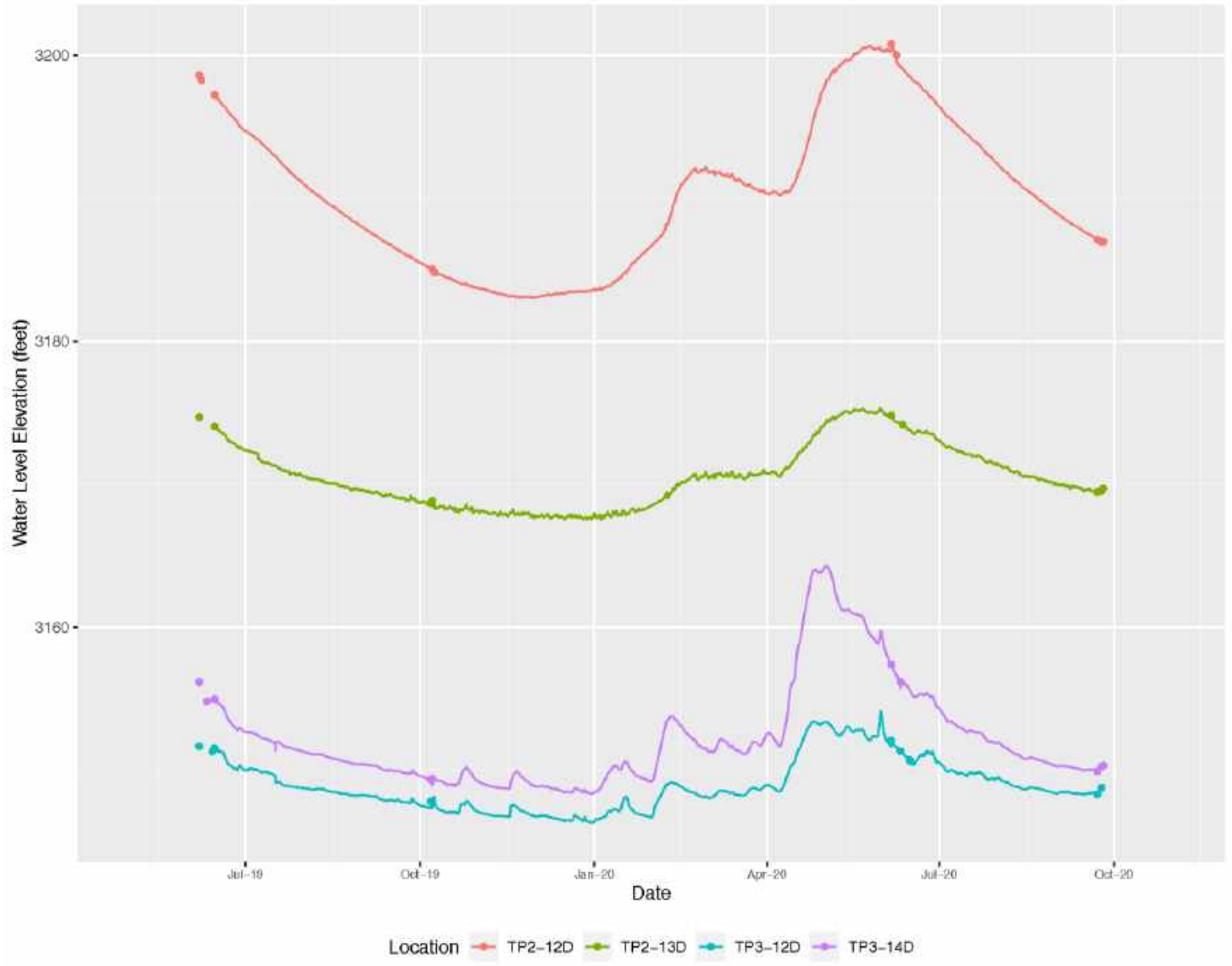
Figure 4.27
Hydrograph of DS-4S, DS-4I and DS-3S
(June 2019 – October 2020)



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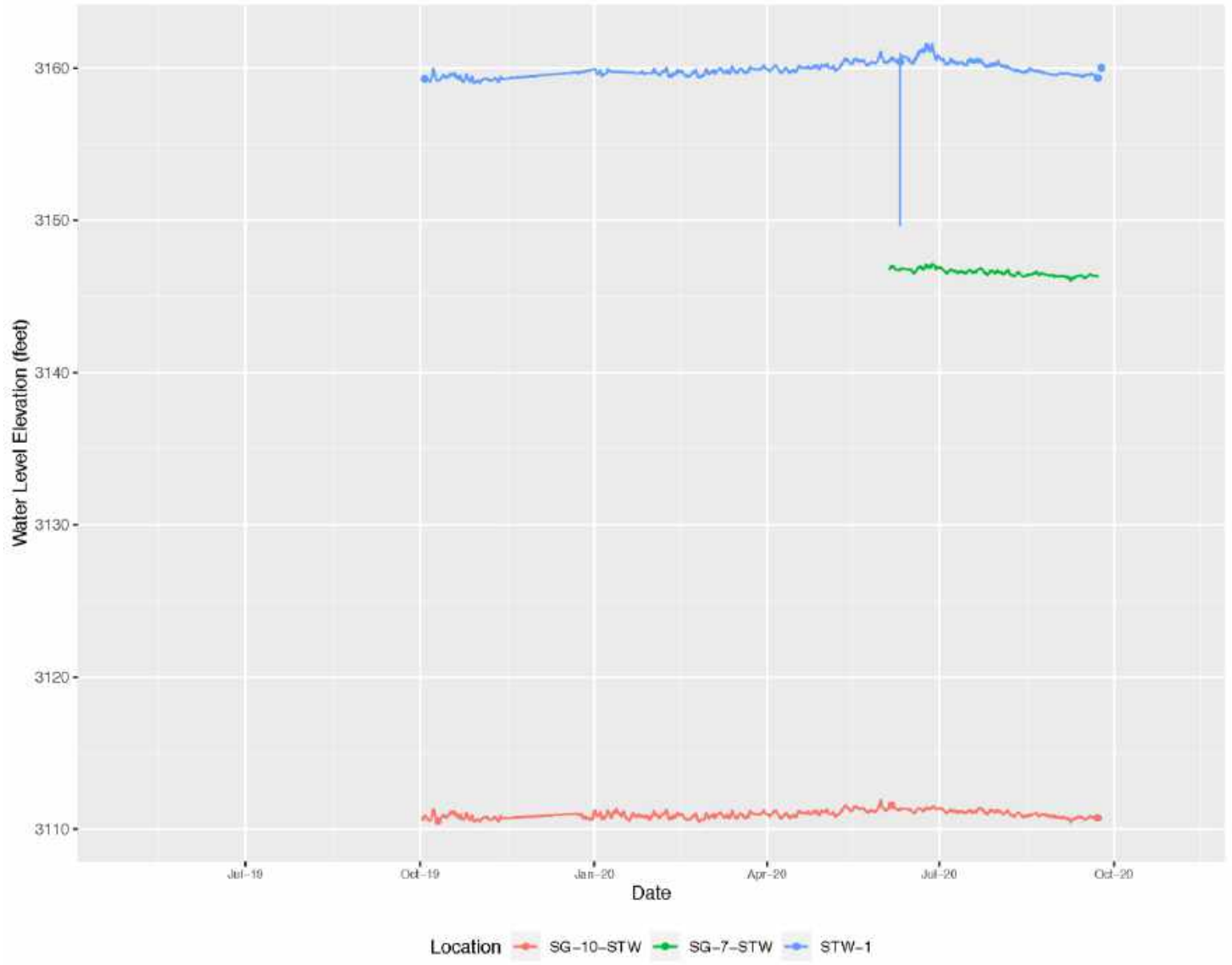
Figure 4.28
Hydrograph of DS-9S and DS-9I
(June 2019 – October 2020)



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Figure 4.29
Hydrograph of TP2-12D, TP2-13D, TP3-12D, and TP3-14D
(June 2019 – October 2020)



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Figure 4.30
Hydrograph of STW-1,
SG-7STW, and SG-10STW
(October 2019 – October 2020)

Legend

- Groundwater Monitoring Well
- Seep Sample Location
- Well Point Location
- Wetland Surface Water Sample Location
- West Area Seeps Collection Trench
- Approximate Location of Subsurface Barrier Wall
- Seep Survey Zone
- West Area Seeps Survey Zone
- Waste Management Area
- Portal
- Surface Water Flow Direction
- 100-foot Elevation Index Contour

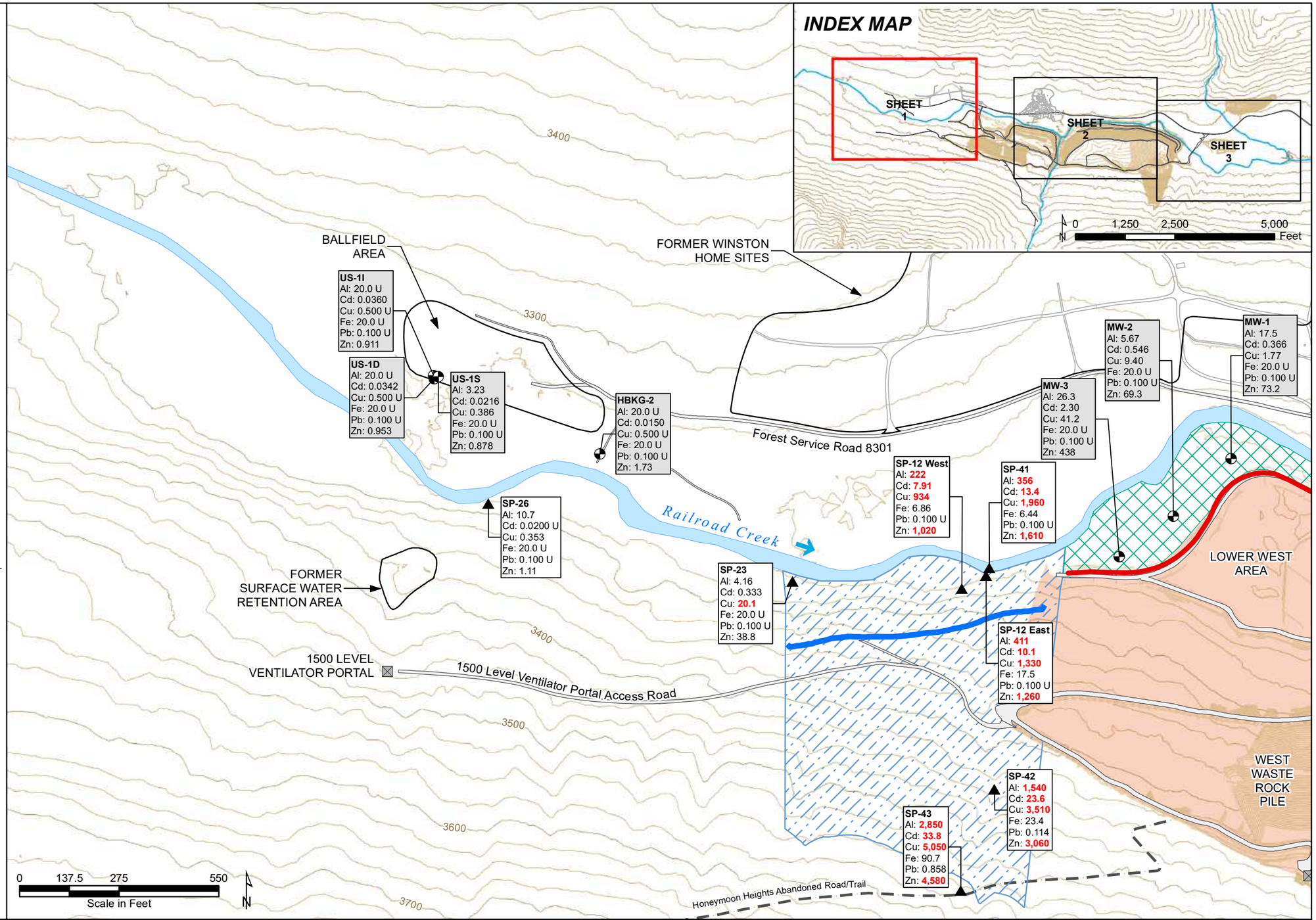
Sample Key

Location ID → **SP-26**
Analyte → Pb: 0.100 U ← Result and Qualifier

Notes:
* Dissolved metals results presented; turbidity was measured to be 5 NTU or greater.
· All results presented in µg/L.
· Total metals results are presented, except where noted by an asterisk.
· Results presented in **RED** indicate an exceedance of applicable criteria. Monitoring well groundwater results are shown in grey boxes and compared to the cleanup levels protective of the drinking water pathway based on ARARs in ROD Table 2. Seep water, wetland surface water, and well point groundwater results are compared to criteria for surface water and groundwater discharging to surface water, which are hardness-adjusted for copper, lead, and zinc, based on ARARs in ROD Table 3. Cadmium results are compared to the National Recommended Water Quality Criteria (NRWQC) hardness-adjusted freshwater chronic criteria for protection of aquatic organisms, the ROD Table 3 ARAR that was updated by USEPA in 2016.
· For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
· Elevation contours provided by Stantec. Contours are shown in feet above mean sea level.

Abbreviations:
Al = Aluminum
ARAR = Applicable or Relevant and Appropriate Requirement
Cd = Cadmium
COC = Contaminant of concern
Cu = Copper
Fe = Iron
µg/L = Micrograms per liter
NTU = Nephelometric turbidity units
Pb = Lead
ROD = Record of Decision
USEPA = U.S. Environmental Protection Agency
Zn = Zinc

Qualifier:
U Analyte was not detected at the given reporting limit.



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Figure 4.31
COC Results from Monitoring Wells, Well Points, Seeps, and Wetlands Surface Water (Spring 2020) (Sheet 1 of 3)

I:\GIS\Projects\RT-Holden\MXD\ACAR\2020\Figure 4.31 COC Results from Monitoring Wells, Well Points, Seeps, and Wetlands Surface Water (Spring 2020).mxd
1/25/2021

Legend

- Groundwater Monitoring Well
- Seep Sample Location
- Well Point Location
- Wetland Surface Water Sample Location
- West Area Seeps Collection Trench
- Approximate Location of Subsurface Barrier Wall
- Seep Survey Zone
- West Area Seeps Survey Zone
- Waste Management Area
- Portal
- Surface Water Flow Direction
- 100-foot Elevation Index Contour

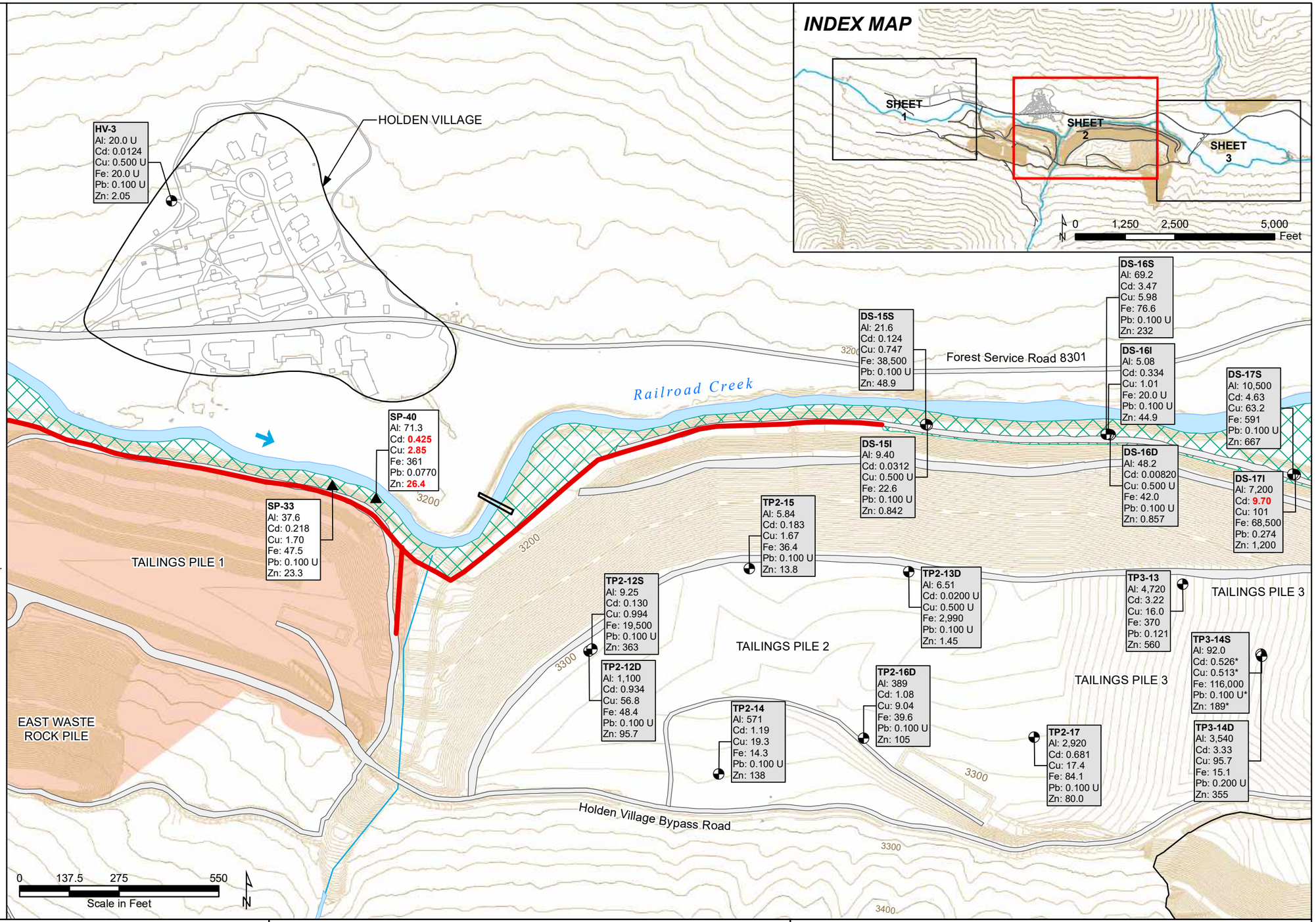
Sample Key

Location ID → **SP-26**
Analyte → Pb: 0.100 U ← Result and Qualifier

Notes:
* Dissolved metals results presented; turbidity was measured to be 5 NTU or greater.
· All results presented in µg/L.
· Total metals results are presented, except where noted by an asterisk.
· Results presented in **RED** indicate an exceedance of applicable criteria. Monitoring well groundwater results are shown in grey boxes and compared to the cleanup levels protective of the drinking water pathway based on ARARs in ROD Table 2. Seep water, wetland surface water, and well point groundwater results are compared to criteria for surface water and groundwater discharging to surface water, which are hardness-adjusted for copper, lead, and zinc, based on ARARs in ROD Table 3. Cadmium results are compared to the National Recommended Water Quality Criteria (NRWQC) hardness-adjusted freshwater chronic criteria for protection of aquatic organisms, the ROD Table 3 ARAR that was updated by USEPA in 2016.
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· Elevation contours provided by Stantec. Contours are shown in feet above mean sea level.

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NTU = Nephelometric turbidity units
Pb = Lead
ROD = Record of Decision
USEPA = U.S. Environmental Protection Agency
Zn = Zinc

Qualifier:
U Analyte was not detected at the given reporting limit.



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Figure 4.31
COC Results from Monitoring Wells, Well Points, Seeps, and Wetlands Surface Water (Spring 2020) (Sheet 2 of 3)

I:\GIS\Projects\RT-Holden\MXD\ACAR\2020\Figure 4.31 COC Results from Monitoring Wells, Well Points, Seeps, and Wetlands Surface Water (Spring 2020).mxd
1/25/2021

Legend

- Groundwater Monitoring Well
- Seep Sample Location
- Well Point Location
- Wetland Surface Water Sample Location
- West Area Seeps Collection Trench
- Approximate Location of Subsurface Barrier Wall
- Seep Survey Zone
- West Area Seeps Survey Zone
- Waste Management Area
- Portal
- Surface Water Flow Direction
- 100-foot Elevation Index Contour

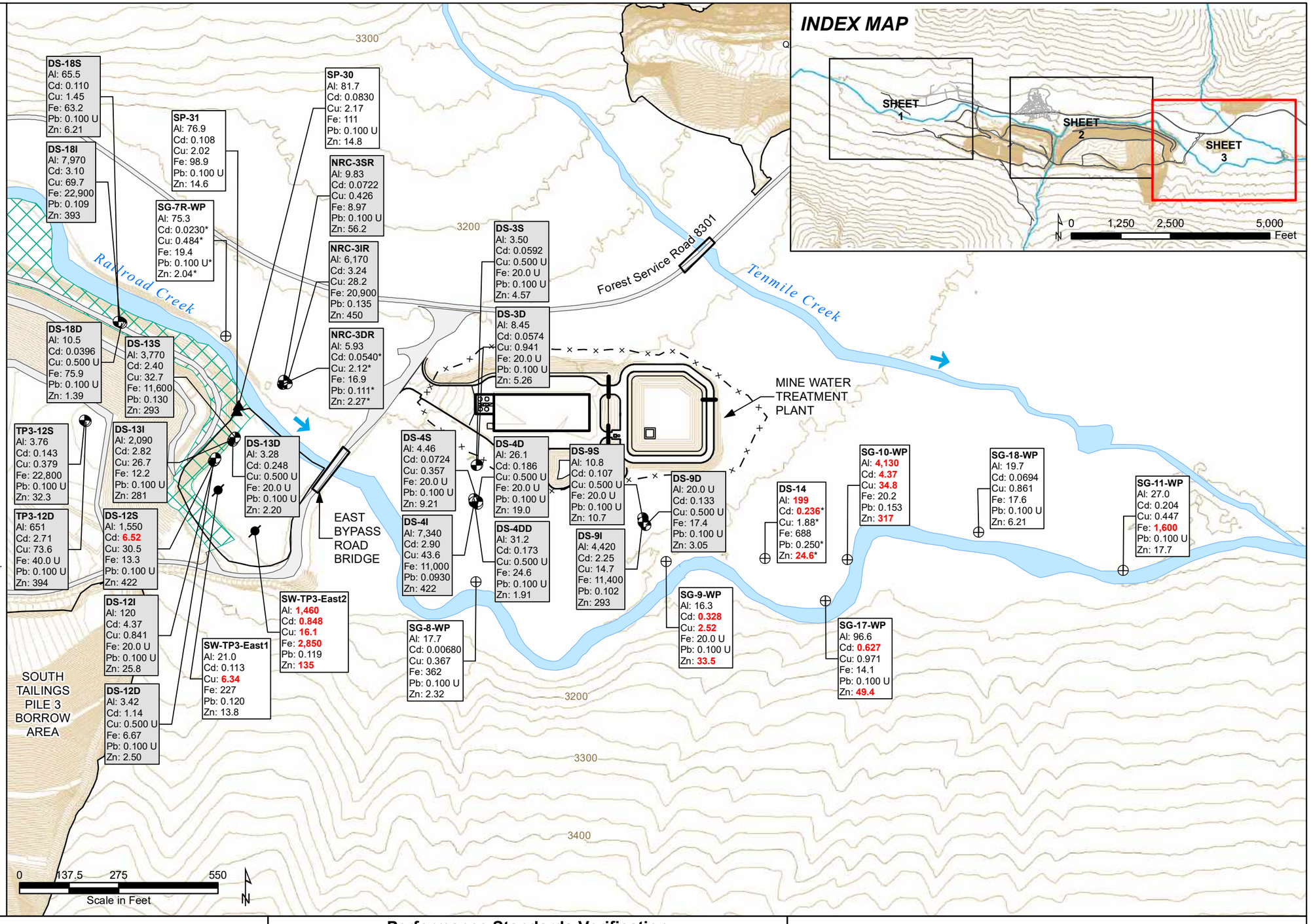
Sample Key

Location ID → **SP-26**
Analyte → Pb: 0.100 U ← Result and Qualifier

Notes:
* Dissolved metals results presented; turbidity was measured to be 5 NTU or greater.
· All results presented in µg/L.
· Total metals results are presented, except where noted by an asterisk.
· Results presented in **RED** indicate an exceedance of applicable criteria. Monitoring well groundwater results are shown in grey boxes and compared to the cleanup levels protective of the drinking water pathway based on ARARs in ROD Table 2. Seep water, wetland surface water, and well point groundwater results are compared to criteria for surface water and groundwater discharging to surface water, which are hardness-adjusted for copper, lead, and zinc, based on ARARs in ROD Table 3. Cadmium results are compared to the National Recommended Water Quality Criteria (NRWQC) hardness-adjusted freshwater chronic criteria for protection of aquatic organisms, the ROD Table 3 ARAR that was updated by USEPA in 2016.
· For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
· Elevation contours provided by Stantec. Contours are shown in feet above mean sea level.

Abbreviations:
Al = Aluminum
ARAR = Applicable or Relevant and Appropriate Requirement
Cd = Cadmium
COC = Contaminant of concern
Cu = Copper
Fe = Iron
µg/L = Micrograms per liter
NTU = Nephelometric turbidity units
Pb = Lead
ROD = Record of Decision
USEPA = U.S. Environmental Protection Agency
Zn = Zinc

Qualifier:
U Analyte was not detected at the given reporting limit.



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Figure 4.31
COC Results from Monitoring Wells, Well Points, Seeps, and Wetlands Surface Water (Spring 2020) (Sheet 3 of 3)

I:\GIS\Projects\RT-Holden\MXD\ACAR\2020\Figure 4.31 COC Results from Monitoring Wells, Well Points, Seeps, and Wetlands Surface Water (Spring 2020).mxd
1/25/2021

Legend

- Seep Sample Location
- Wetland Surface Water Sample Location
- West Area Seeps Collection Trench
- Approximate Location of Subsurface Barrier Wall
- Seep Survey Zone
- West Area Seeps Survey Zone
- Waste Management Area
- Portal
- Surface Water Flow Direction
- 100-foot Elevation Index Contour

Sample Key

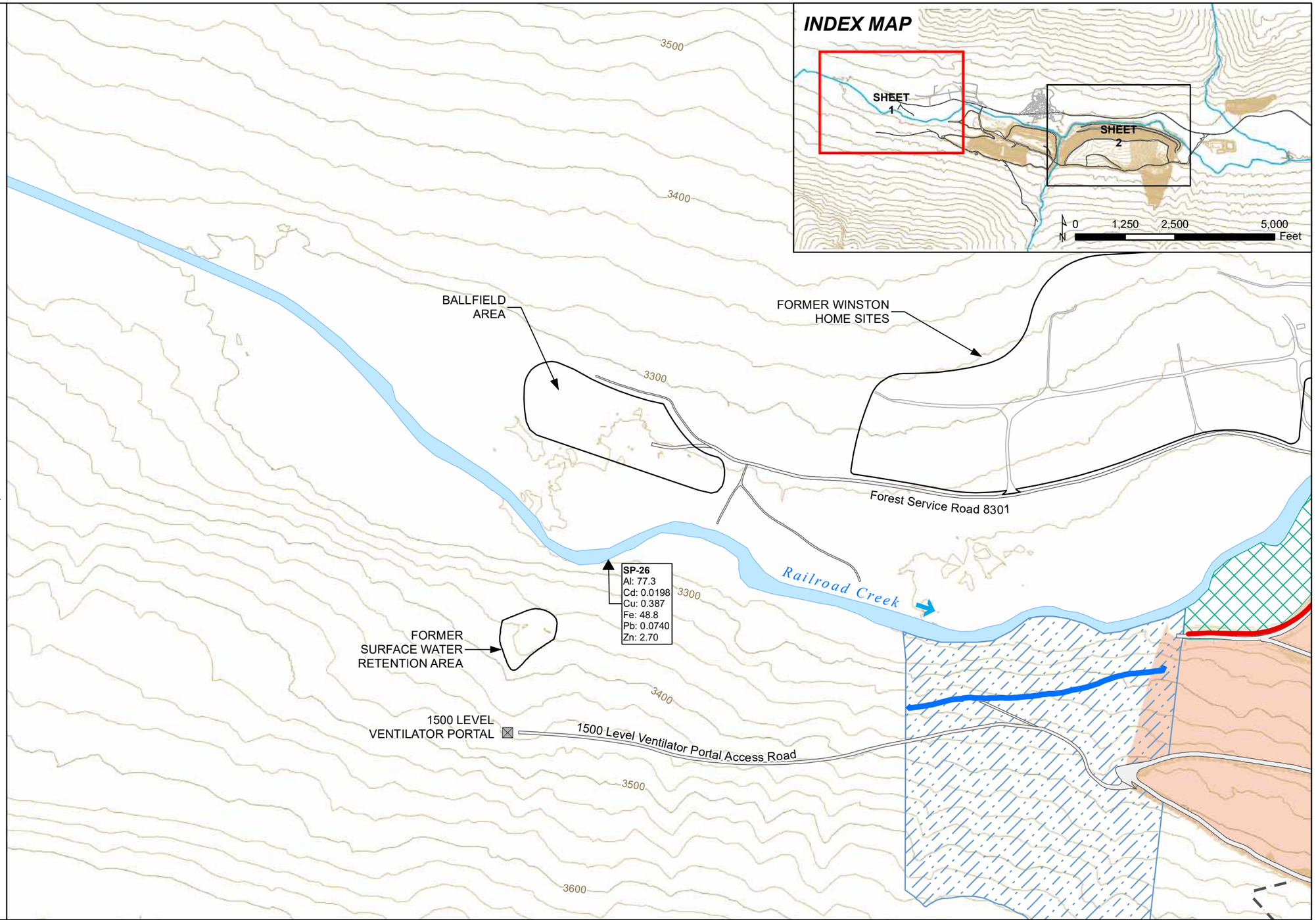
Location ID → **SP-26**
Analyte → Pb: 0.100 U ← Result and Qualifier

Notes:
· All results presented in µg/L.
· Total metals results are presented.
· Results presented in **RED** indicate an exceedance of applicable criteria. Seep water and wetland surface water results are compared to criteria for surface water and groundwater discharging to surface water, which are hardness-adjusted for copper, lead, and zinc, based on ARARs in ROD Table 3. Cadmium results are compared to the National Recommended Water Quality Criteria (NRWQC) hardness-adjusted freshwater chronic criteria for protection of aquatic organisms, the ROD Table 3 ARAR that was updated by USEPA in 2016.
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Cu = Copper
Fe = Iron
µg/L = Micrograms per liter
Pb = Lead
ROD = Record of Decision
Zn = Zinc

Qualifier:
U Analyte was not detected at the given reporting limit.

0 137.5 275 550
Scale in Feet
N



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Figure 4.32
COC Results from Seeps and Wetlands Surface Water (Summer 2020) (Sheet 1 of 2)

I:\GIS\Projects\RT-Holden\MXD\ACAR\2020\Figure 4.32 COC Results from Seeps and Wetlands Surface Water (Summer 2020).mxd
1/25/2021

Legend

- Seep Sample Location
- Wetland Surface Water Sample Location
- West Area Seeps Collection Trench
- Approximate Location of Subsurface Barrier Wall
- Seep Survey Zone
- West Area Seeps Survey Zone
- Waste Management Area
- Portal
- Surface Water Flow Direction
- 100-foot Elevation Index Contour

Sample Key

Location ID → **SP-26**
Analyte → Pb: 0.100 U ← Result and Qualifier

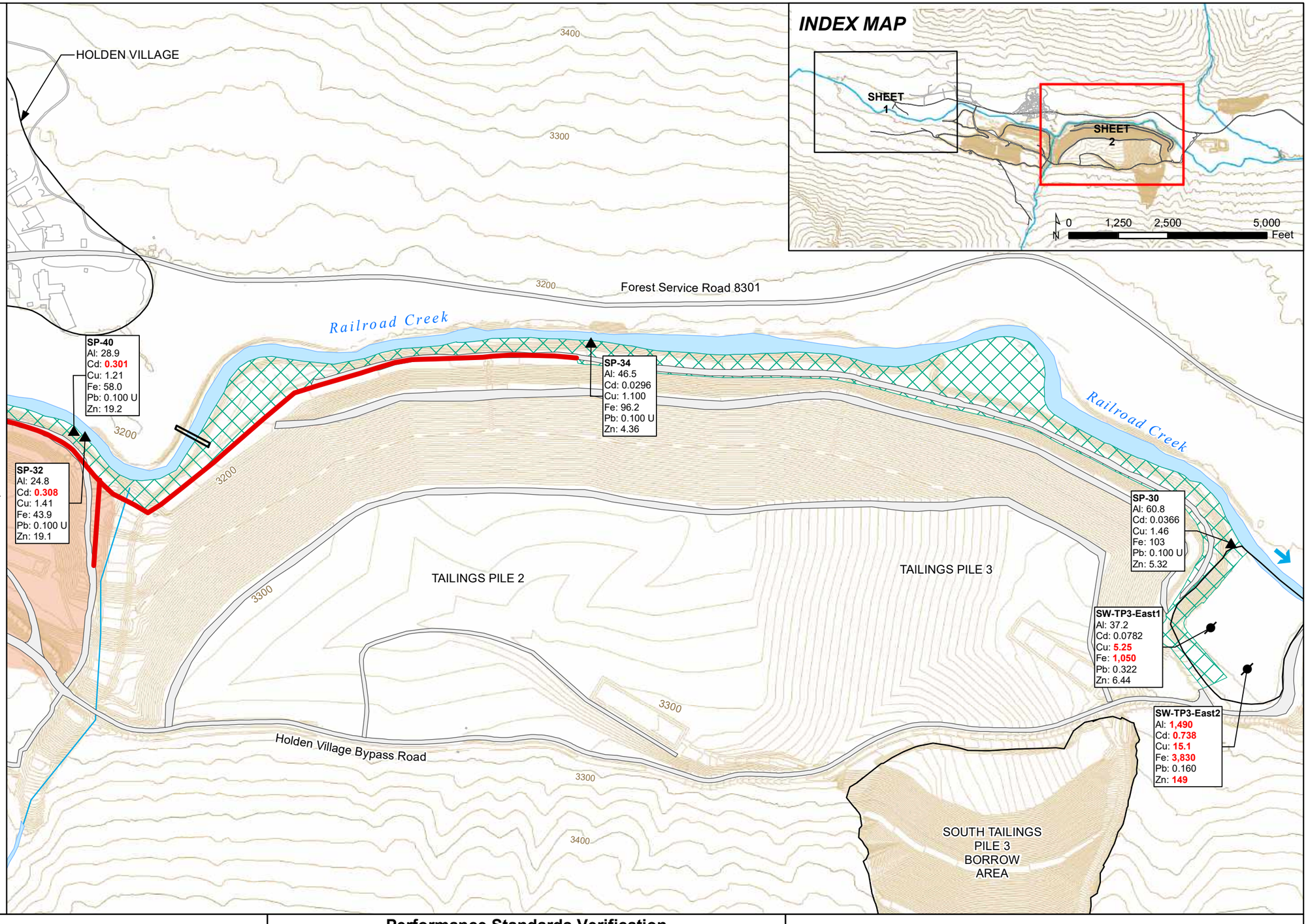
Notes:
· All results presented in µg/L.
· Total metals results are presented.
· Results presented in **RED** indicate an exceedance of applicable criteria. Seep water and wetland surface water results are compared to criteria for surface water and groundwater discharging to surface water, which are hardness-adjusted for copper, lead, and zinc, based on ARARs in ROD Table 3. Cadmium results are compared to the National Recommended Water Quality Criteria (NRWQC) hardness-adjusted freshwater chronic criteria for protection of aquatic organisms, the ROD Table 3 ARAR that was updated by USEPA in 2016.
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COC = Contaminant of concern
Cu = Copper
Fe = Iron
µg/L = Micrograms per liter
Pb = Lead
ROD = Record of Decision
Zn = Zinc

Qualifier:
U Analyte was not detected at the given reporting limit.

0 137.5 275 550
Scale in Feet

N



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Figure 4.32
COC Results from Seeps and Wetlands Surface Water (Summer 2020) (Sheet 2 of 2)

I:\GIS\Projects\RT-Holden\MXD\ACAR\2020\Figure 4.32 COC Results from Seeps and Wetlands Surface Water (Summer 2020).mxd
1/25/2021

Legend

- Groundwater Monitoring Well
- Seep Sample Location
- Well Point Location
- Wetland Surface Water Sample Location
- West Area Seeps Collection Trench
- Approximate Location of Subsurface Barrier Wall
- Seep Survey Zone
- West Area Seeps Survey Zone
- Waste Management Area
- Portal
- Surface Water Flow Direction
- 100-foot Elevation Index Contour

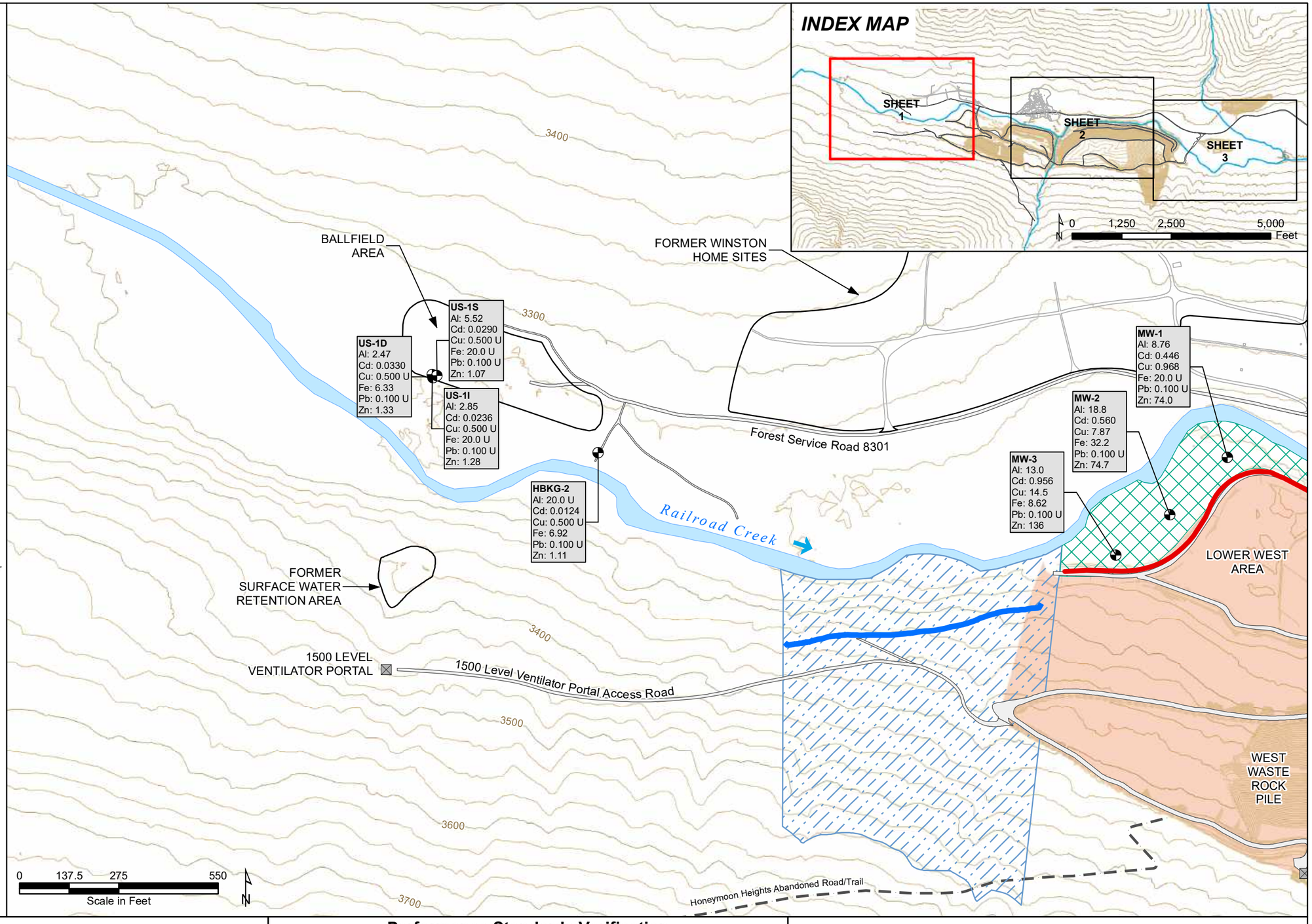
Sample Key

Location ID → **SP-44**
Analyte → Pb: 0.100 U ← Result and Qualifier

Notes:
* Dissolved metals results presented; turbidity was measured to be 5 NTU or greater.
· All results presented in µg/L.
· Total metals results are presented, except where noted by an asterisk.
· Results presented in **RED** indicate an exceedance of applicable criteria. Monitoring well groundwater results are shown in grey boxes and compared to the cleanup levels protective of the drinking water pathway based on ARARs in ROD Table 2. Seep water, wetland surface water, and well point groundwater results are compared to criteria for surface water and groundwater discharging to surface water, which are hardness-adjusted for copper, lead, and zinc, based on ARARs in ROD Table 3. Cadmium results are compared to the National Recommended Water Quality Criteria (NRWQC) hardness-adjusted freshwater chronic criteria for protection of aquatic organisms, the ROD Table 3 ARAR that was updated by USEPA in 2016.
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COC = Contaminant of concern
Cu = Copper
Fe = Iron
µg/L = Micrograms per liter
NTU = Nephelometric turbidity units
Pb = Lead
ROD = Record of Decision
USEPA = U.S. Environmental Protection Agency
Zn = Zinc

Qualifier:
U Analyte was not detected at the given reporting limit.



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Figure 4.33
COC Results from Monitoring Wells, Well Points, Seeps, and Wetlands Surface Water (Fall 2020) (Sheet 1 of 3)

I:\GIS\Projects\RT-Holden\MXD\ACAR\2020\Figure 4.33 COC Results from Monitoring Wells, Well Points, Seeps, and Wetlands Surface Water (Fall 2020).mxd
1/25/2021

Legend

- Groundwater Monitoring Well
- Seep Sample Location
- Well Point Location
- Wetland Surface Water Sample Location
- West Area Seeps Collection Trench
- Approximate Location of Subsurface Barrier Wall
- Seep Survey Zone
- West Area Seeps Survey Zone
- Waste Management Area
- Portal
- Surface Water Flow Direction
- 100-foot Elevation Index Contour

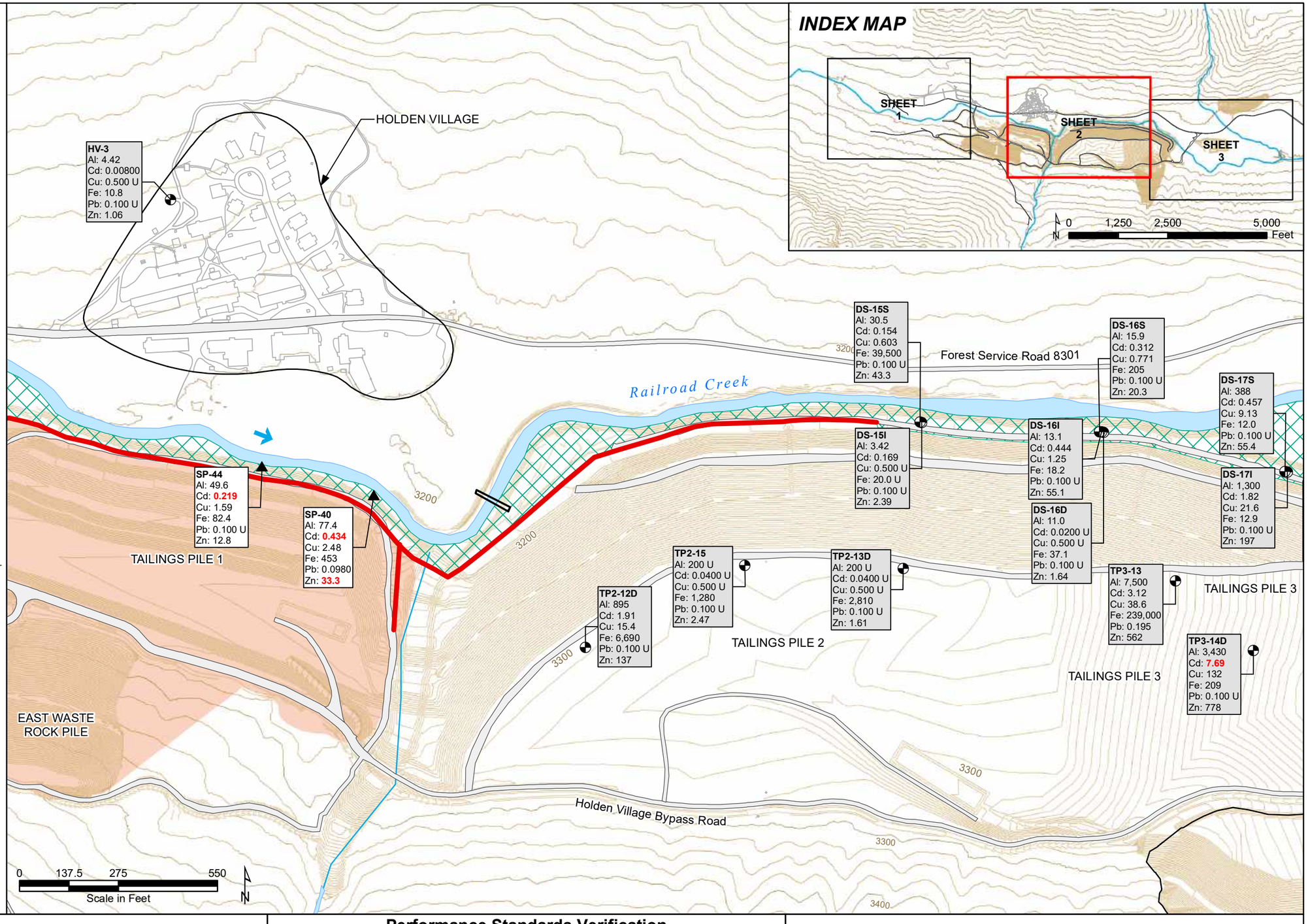
Sample Key

Location ID → **SP-44**
Analyte → Pb: 0.100 U ← Result and Qualifier

Notes:
* Dissolved metals results presented; turbidity was measured to be 5 NTU or greater.
· All results presented in µg/L.
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· Results presented in **RED** indicate an exceedance of applicable criteria. Monitoring well groundwater results are shown in grey boxes and compared to the cleanup levels protective of the drinking water pathway based on ARARs in ROD Table 2. Seep water, wetland surface water, and well point groundwater results are compared to criteria for surface water and groundwater discharging to surface water, which are hardness-adjusted for copper, lead, and zinc, based on ARARs in ROD Table 3. Cadmium results are compared to the National Recommended Water Quality Criteria (NRWQC) hardness-adjusted freshwater chronic criteria for protection of aquatic organisms, the ROD Table 3 ARAR that was updated by USEPA in 2016.
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Fe = Iron
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Qualifier:
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Figure 4.33
COC Results from Monitoring Wells, Well Points, Seeps, and Wetlands Surface Water (Fall 2020) (Sheet 2 of 3)

I:\GIS\Projects\RT-Holden\MXD\ACAR\2020\Figure 4.33 COC Results from Monitoring Wells, Well Points, Seeps, and Wetlands Surface Water (Fall 2020).mxd
1/25/2021

Legend

- Groundwater Monitoring Well
- Seep Sample Location
- Well Point Location
- Wetland Surface Water Sample Location
- West Area Seeps Collection Trench
- Approximate Location of Subsurface Barrier Wall
- Seep Survey Zone
- West Area Seeps Survey Zone
- Waste Management Area
- Portal
- Surface Water Flow Direction
- 100-foot Elevation Index Contour

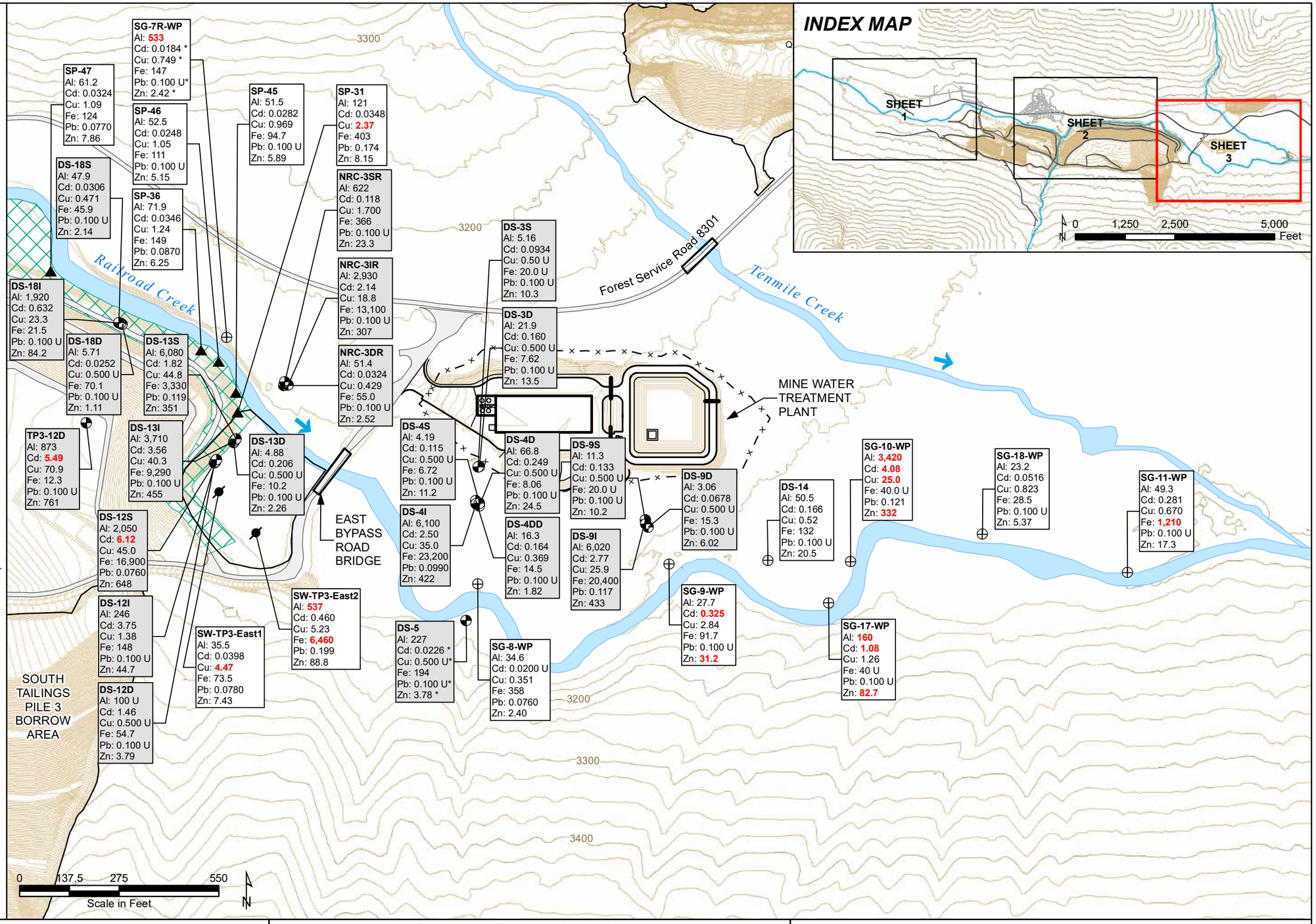
Sample Key

Location ID → **SP-44**
Analyte → Pb: 0.100 U ← Result and Qualifier

Notes:
* Dissolved metals results presented; turbidity was measured to be 5 NTU or greater.
· All results presented in µg/L.
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· Elevation contours provided by Stantec. Contours are shown in feet above mean sea level.

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Fe = Iron
µg/L = Micrograms per liter
NTU = Nephelometric turbidity units
Pb = Lead
ROD = Record of Decision
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Zn = Zinc

Qualifier:
U Analyte was not detected at the given reporting limit.



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Figure 4.33
COC Results from Monitoring Wells, Well Points, Seeps, and Wetlands Surface Water (Fall 2020) (Sheet 3 of 3)

I:\GIS\Projects\RT-Holden\MXD\ACAR\2020\Figure 4.33 COC Results from Monitoring Wells, Well Points, Seeps, and Wetlands Surface Water (Fall 2020).mxd
1/25/2021

Legend

- Porewater Sample Cluster
- Surface Water Sample Location
- Well Point Location
- Seep Survey Zone
- Surface Water Flow Direction
- 3400 100-foot Elevation Index Contour

Sample Key

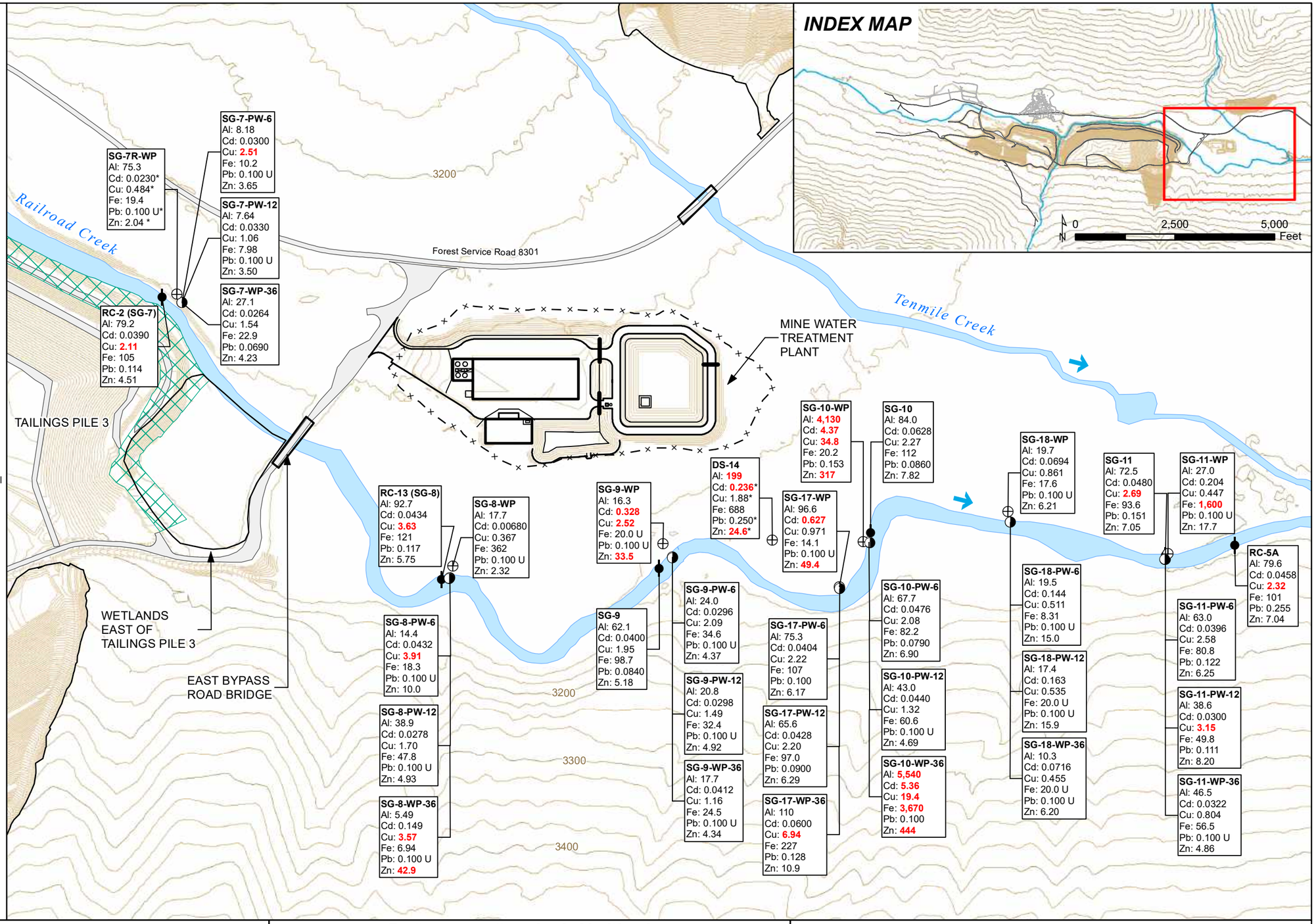
Location ID → **SG-17-WP**
Analyte → Pb: 0.100 U ← Result and Qualifier

Notes:
- All results presented in µg/L.
- Total metals results are presented.
- Results presented in **RED** indicate an exceedance of applicable criteria. Porewater,surface water, and well point groundwater results are compared to criteria for surface water and groundwater discharging to surface water, which are hardness-adjusted for copper, lead, and zinc, based on ARARs in ROD Table 3. Cadmium results are compared to the National Recommended Water Quality Criteria (NRWQC) hardness-adjusted freshwater chronic criteria for protection of aquatic organisms, the ROD Table 3 ARAR that was updated by USEPA in 2016.
- For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
- Elevation contours provided by Stantec. Contours are shown in feet above mean sea level.

Abbreviations:
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ARAR = Applicable or Relevant and Appropriate Requirement
Cd = Cadmium
COC = Contaminant of concern
Cu = Copper
Fe = Iron
µg/L = Micrograms per liter
Pb = Lead
ROD = Record of Decision
USEPA = U.S. Environmental Protection Agency
Zn = Zinc

Qualifier:
U Analyte was not detected at the given reporting limit.

0 125 250 500
Scale in Feet
N



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Chelan County, Washington

Figure 4.34
COC Results from Porewater Sampling Locations, Well Points, and Surface Water Locations (Spring 2020)

I:\GIS\Projects\RT-Holden\MXD\ACAR\2020\Figure 4.34 COC Results from Porewater Sampling Locations, Well Points, and Surface Water Locations (Spring 2020).mxd
1/25/2021

Legend

- Porewater Sample Cluster
- Surface Water Sample Location
- Well Point Location
- Seep Survey Zone
- Surface Water Flow Direction
- 100-foot Elevation Index Contour

Sample Key

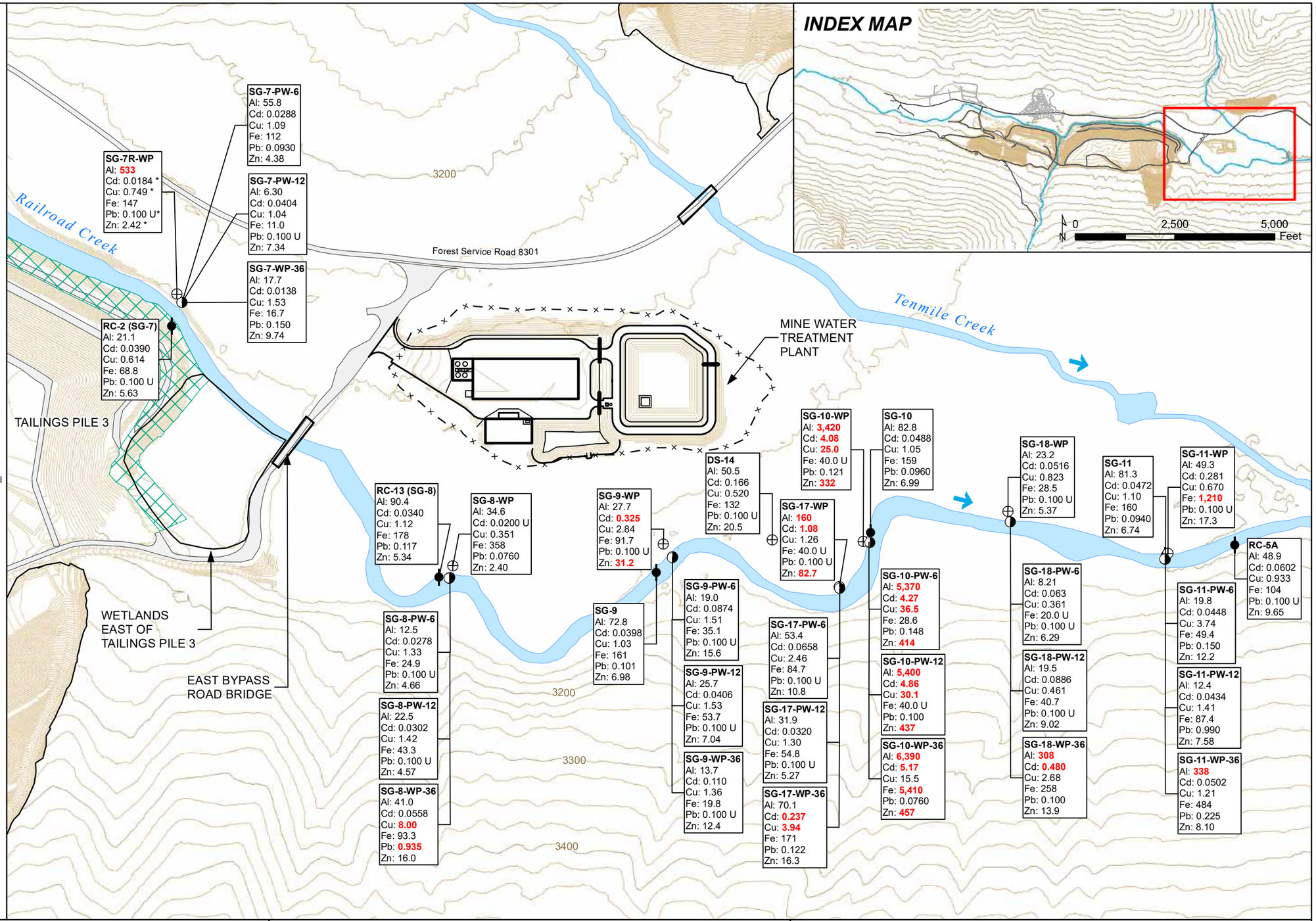
Location ID → **SG-17-WP**
Analyte → Pb: 0.100 U ← Result and Qualifier

Notes:
· All results presented in µg/L.
· Total metals results are presented.
· Results presented in **RED** indicate an exceedance of applicable criteria. Porewater,surface water, and well point groundwater results are compared to criteria for surface water and groundwater discharging to surface water, which are hardness-adjusted for copper, lead, and zinc, based on ARARs in ROD Table 3. Cadmium results are compared to the National Recommended Water Quality Criteria (NRWQC) hardness-adjusted freshwater chronic criteria for protection of aquatic organisms, the ROD Table 3 ARAR that was updated by USEPA in 2016.
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Cu = Copper
Fe = Iron
µg/L = Micrograms per liter
Pb = Lead
ROD = Record of Decision
USEPA = U.S. Environmental Protection Agency
Zn = Zinc

Qualifier:
U Analyte was not detected at the given reporting limit.

0 125 250 500
Scale in Feet
N



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Figure 4.35
COC Results from Porewater Sampling Locations, Well Points, and Surface Water Locations (Fall 2020)

I:\GIS\Projects\RT-Holden\MXD\ACAR\2020\Figure 4.35 COC Results from Porewater Sampling Locations, Well Points, and Surface Water Locations (Fall 2020).mxd
1/25/2021

Legend

- Groundwater Monitoring Well
- Porewater Cluster
- Seep Sample Location
- Staff Gauge
- Well Point Location
- Wetlands Surface Water
- Approximate Location of Subsurface Barrier Wall
- Surface Water Flow Direction

Approximate Extent of COCs Exceeding Surface Water-Based Criteria(1)

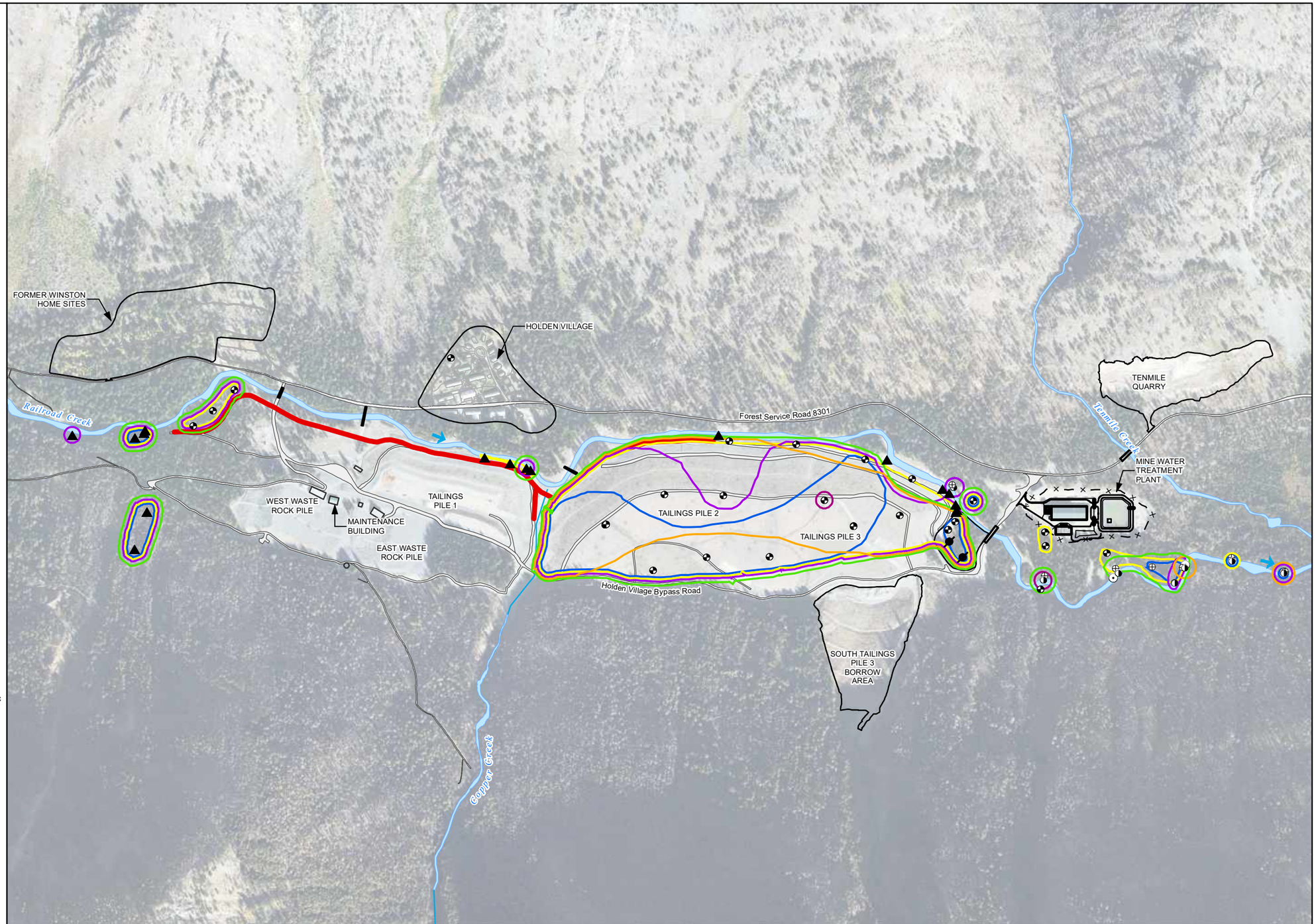
- Aluminum
- Cadmium
- Copper
- Iron
- Lead
- Zinc

Notes:
1. The approximate extent of exceedances are inferred based on available data and intended to show areas with mining-influenced water based on exceedances of surface-water based criteria, which are not applicable ROD compliance criteria in all areas of the Site. The approximate extent shown is representational. Some areas are exaggerated to show overlapping extents, and no impacts to Railroad Creek surface water should be inferred from these lines. The extent of mining-influenced water is not shown beneath the Lower West Area, Tailings Pile 1, and areas south of these locations and west of Copper Creek, or south of the barrier wall along Tailings Pile 2 where data are unavailable. The greatest concentration measured in 2020 for each location was used, including field duplicates. The extent is based on total metals results, except for selected locations where dissolved results were used for cadmium, copper, lead, and zinc where turbidity was measured to be 5 NTU or greater. Seep water, wetland surface water, porewater, and well point groundwater results are compared to sample-specific hardness-adjusted surface-water based ROD criteria for cadmium, copper, lead, and zinc, and surface-water based ROD criteria for iron and aluminum; cadmium results are compared to the National Recommended Water Quality Criteria (NRWQC) hardness-adjusted freshwater chronic criteria for protection of aquatic organisms, the ROD Table 3 ARAR that was updated by USEPA in 2016. For illustrative purposes, monitoring well results are compared to unadjusted ROD surface water-based criteria, which may not be applicable for compliance.
- Aerial imagery provided by Arcadis 2017.

Abbreviations:
ARAR = Applicable or Relevant and Appropriate Requirements
COC = Contaminant of concern
NTU = Nephelometric turbidity units
ROD = Record of Decision
Site = Holden Mine Site
USEPA = U.S. Environmental Protection Agency

0 375 750 1,500
Scale in Feet

N



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Figure 4.36
Approximate Extent of COCs in Shallow Zone Groundwater, Porewater, Seeps, and Wetlands Surface Water

I:\GIS\Projects\RT-Holden\MXD\ACAR\2020\Figure 4.36 Approx Extent of COCs in Shallow Zone GW, PW, Seeps, and Wetlands SW.mxd
1/25/2021

Legend

- Groundwater Monitoring Well
- Approximate Location of Subsurface Barrier Wall
- Surface Water Flow Direction

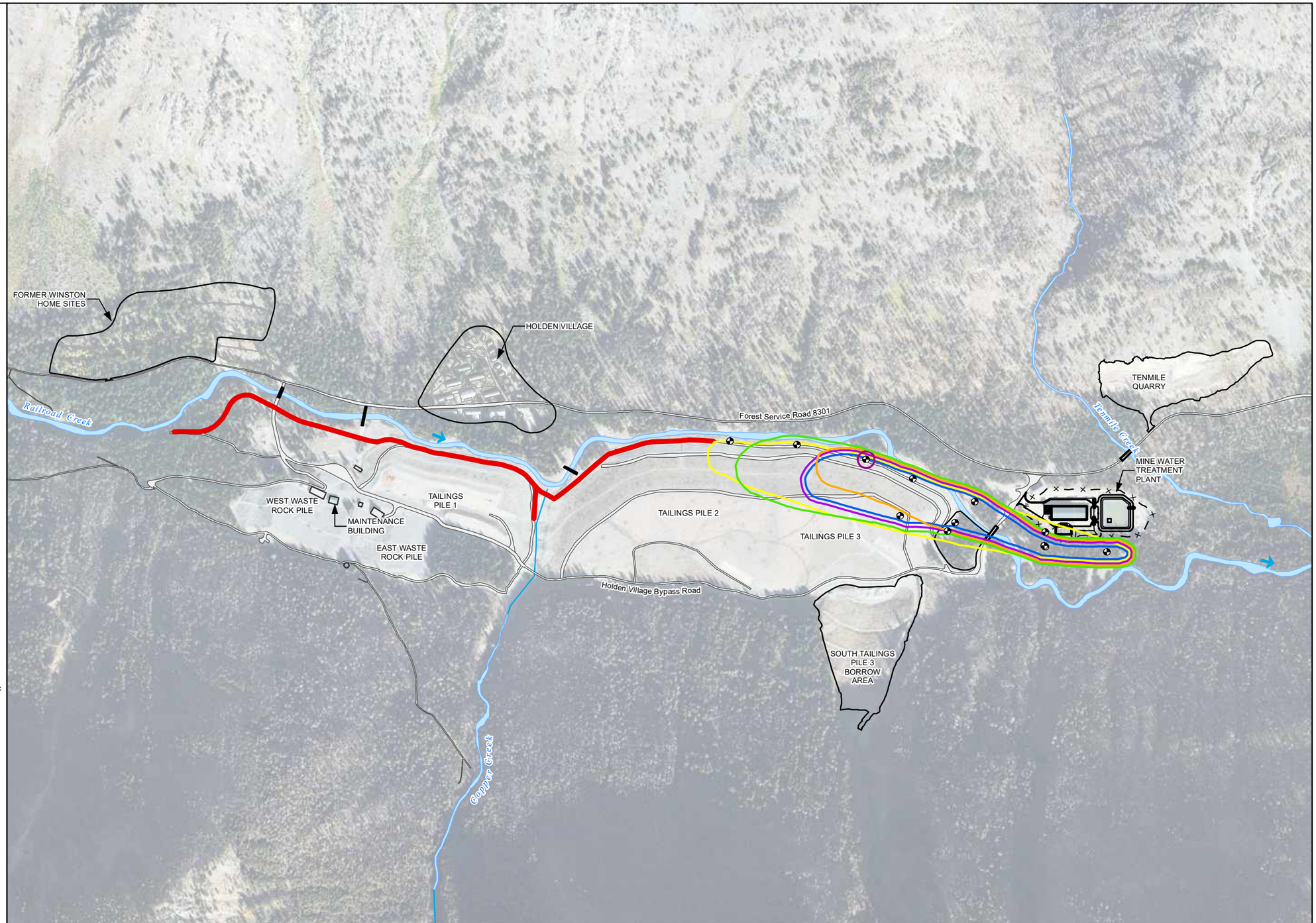
Approximate Extent of COCs Exceeding Surface Water-Based Criteria[(1)]

- Aluminum
- Cadmium
- Copper
- Iron
- Lead
- Zinc

Notes:
1. The approximate extent of exceedances are inferred based on available data and intended to show areas with mining-influenced water based on exceedances of surface-water based criteria, which are not applicable ROD compliance criteria in all areas of the Site. The approximate extent shown is representational. Some areas are exaggerated to show overlapping extents, and no impacts to Railroad Creek surface water should be inferred from these lines. The extent of mining-influenced water is not shown beneath the Lower West Area, Tailings Pile 1, and areas south of these locations and west of Copper Creek, or south of the barrier wall along Tailings Pile 2 where data are unavailable. The greatest concentration measured in 2020 for each location was used, including field duplicates. The extent is based on total metals results, except for selected locations where dissolved results were used for cadmium, copper, lead, and zinc where turbidity was measured to be 5 NTU or greater. Seep water, wetland surface water, porewater, and well point groundwater results are compared to sample-specific hardness-adjusted surface-water based ROD criteria for cadmium, copper, lead, and zinc, and surface-water based ROD criteria for iron and aluminum; cadmium results are compared to the National Recommended Water Quality Criteria (NRWQC) hardness-adjusted freshwater chronic criteria for protection of aquatic organisms, the ROD Table 3 ARAR that was updated by USEPA in 2016. For illustrative purposes, monitoring well results are compared to unadjusted ROD surface water-based criteria, which may not be applicable for compliance.
- Aerial imagery provided by Arcadis 2017.

Abbreviations:
ARAR = Applicable or Relevant and Appropriate Requirements
COC = Contaminant of concern
NTU = Nephelometric turbidity units
ROD = Record of Decision
Site = Holden Mine Site
USEPA = U.S. Environmental Protection Agency

0 375 750 1,500
Scale in Feet
N



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Figure 4.37
Approximate Extent of COCs in Intermediate Zone Groundwater

I:\GIS\Projects\RT-Holden\MXD\ACAR\2020\Figure 4.37 Approx Extent of COCs in Intermedate Zone GW.mxd
1/25/2021

Legend

- Groundwater Monitoring Well
- Approximate Location of Subsurface Barrier Wall
- Surface Water Flow Direction

Approximate Extent of COCs Exceeding Surface Water-Based Criteria[(1)]

- Cadmium
- Copper

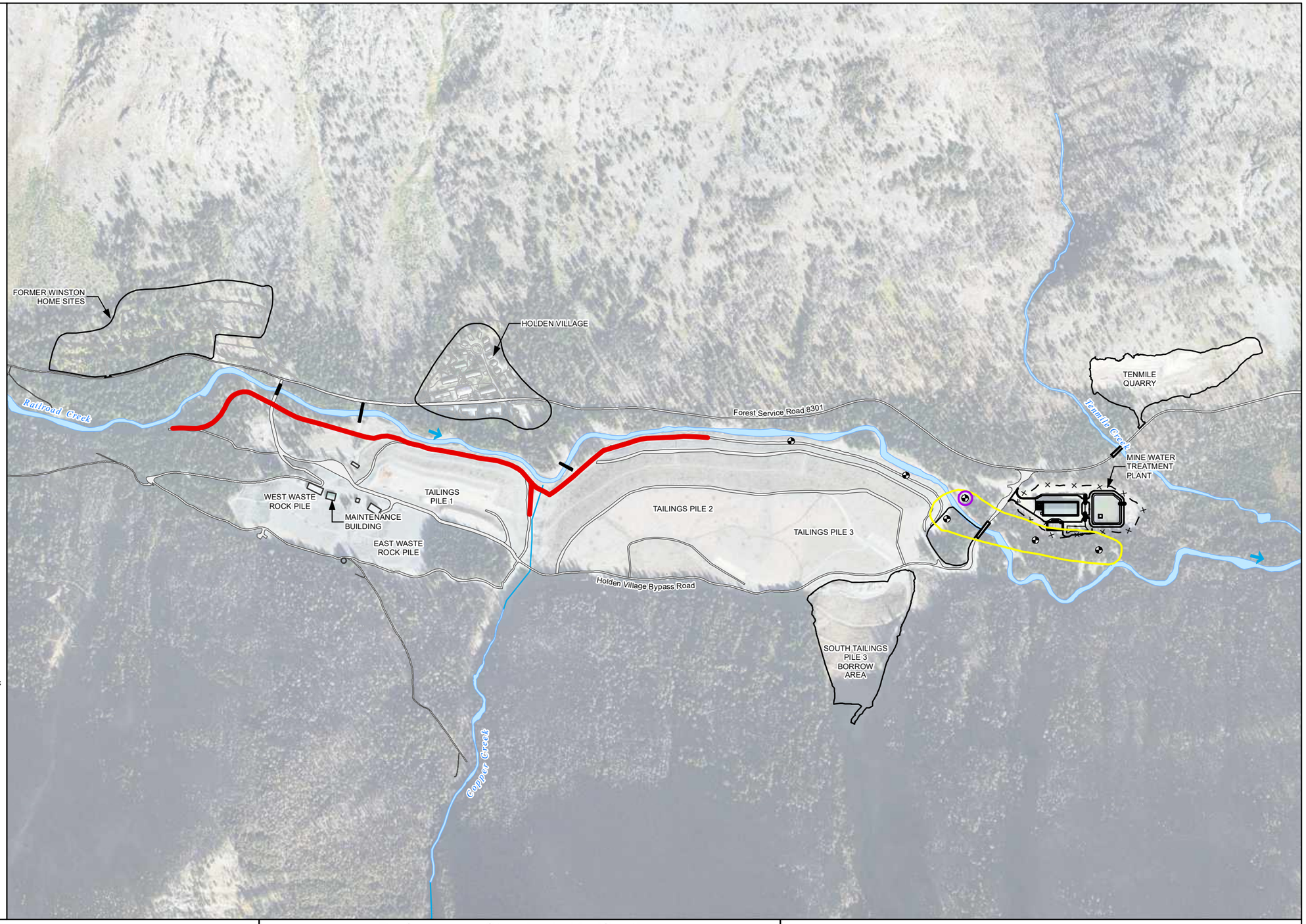
Notes:

1. The approximate extent of exceedances are inferred based on available data and intended to show areas with mining-influenced water based on exceedances of surface-water based criteria, which are not applicable ROD compliance criteria in all areas of the Site. The approximate extent shown is representational. Some areas are exaggerated to show overlapping extents, and no impacts to Railroad Creek surface water should be inferred from these lines. The extent of mining-influenced water is not shown beneath the Lower West Area, Tailings Pile 1, and areas south of these locations and west of Copper Creek, or south of the barrier wall along Tailings Pile 2 where data are unavailable. The greatest concentration measured in 2020 for each location was used, including field duplicates. The extent is based on total metals results, except for selected locations where dissolved results were used for cadmium, copper, lead, and zinc where turbidity was measured to be 5 NTU or greater. Seep water, wetland surface water, porewater, and well point groundwater results are compared to sample-specific hardness-adjusted surface-water based ROD criteria for cadmium, copper, lead, and zinc, and surface-water based ROD criteria for iron and aluminum; cadmium results are compared to the National Recommended Water Quality Criteria (NRWQC) hardness-adjusted freshwater chronic criteria for protection of aquatic organisms, the ROD Table 3 ARAR that was updated by USEPA in 2016. For illustrative purposes, monitoring well results are compared to unadjusted ROD surface water-based criteria, which may not be applicable for compliance.

· Aerial imagery provided by Arcadis 2017.

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NTU = Nephelometric turbidity units
ROD = Record of Decision
Site = Holden Mine Site
USEPA = U.S. Environmental Protection Agency

0 375 750 1,500
Scale in Feet
N



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Figure 4.38
Approximate Extent of COCs in Deep Zone Groundwater

I:\GIS\Projects\RT-Holden\MXD\ACAR\2020\Figure 4.38 Approx Extent of COCs in Deep Zone GW.mxd
1/25/2021

West

A

East

A'

Feet Above Mean Sea Level (AMSL, Holden Mine Vertical Datum)

3,300
3,275
3,250
3,225
3,200
3,175
3,150
3,125
3,100
3,075
3,050
3,025
3,000
2,975
2,950

Tailings Piles 2 and 3 (South of Section A-A')

End of Barrier Wall

DS-15 S/I

DS-16 S/I/D

DS-17 S/I

DS-18 S/I/D

Railroad Creek

SG-7R-WP

NRC-3SR/3IR/3DR

EAST BYPASS ROAD

DS-4 S/D/I/DD

DS-9 S/I/D

DS-14

SG-17-WP

SG-10-WP

Railroad Creek

SG-11-WP

Railroad Creek

RC-5A/BEDROCK OUTCROP

Fll

Qal

Qgt

Brk

Qgo

Qgd

?

Qal

Qgd

Qgt

Qgo

Brk

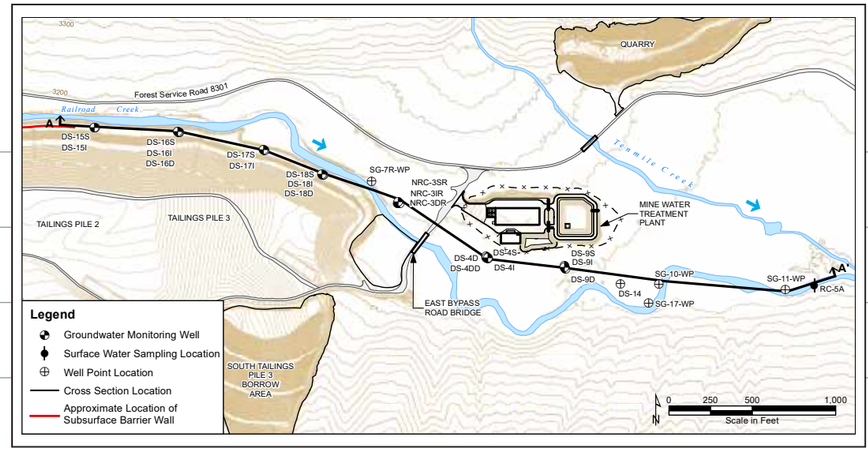
Qal

Qal

?

Qgt

Brk



(Vertical exaggeration 6x)
50
25
0
VERTICAL
HORIZONTAL
0 150 300
SCALE IN FEET

Legend

Fll	Fill/Residual Soil	Qgt	Glacial Till	Color Code	Shallow
Qal	Alluvium	Brk	Bedrock		Intermediate
Qgd	Glacial Moraine		Barrier Wall		Deep
Qgo	Glacial Outwash	?	Inferred Low-Permeability Layer		

Soil boring with monitoring well screen intervals

Shallow Zone Water Level Elevation, Spring 2020

Shallow Zone Water Level Elevation, Fall 2020

Notes:

- Lithology based on boring logs and previous cross sections (MWH 2013a, Stantec 2017, URS 2009, URS 2010).
- Ground surface based on 2019 survey of monitoring locations and elevation contours provided by Stantec.

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Figure 4.39
Generalized Cross Section A-A' from End of Barrier Wall to SG-11 Area

I:\GIS\Projects\RT-Holden\AI\ACAR 2020\Cross-Sections\Figure 4.39 Generalized Cross Section A-A' from End of Barrier Wall to SG-11 Area.ai
01/25/2021

South **B**

North **B'**

Feet Above Mean Sea Level (AMSL, Holden Mine Vertical Datum)

3,300 3,275 3,250 3,225 3,200 3,175 3,150 3,125 3,100 3,075 3,050 3,025 3,000

Approximate Extent of Wetlands and Restored Tailings-Impacted Wetlands (1)

East Seeps Collection System (not shown) (2)

6-inch Conveyance Pipe from STP-3 Diversion Channel Stilling Basin (approximate) (1)

Distribution Box with Gate (approximate) (1)

6-inch Perforated Pipe (approximate) (1)

Tailings Pile 3 (West of Section B-B')

DS-8 D

SW-TP3-East2 (Projected 50 Feet West)

DS-12 S/I/D/DS-6DR

DS-13 S/I/D

NRC-3SR/3IR/3DR

Railroad Creek

Fll

Qcdf

Qod

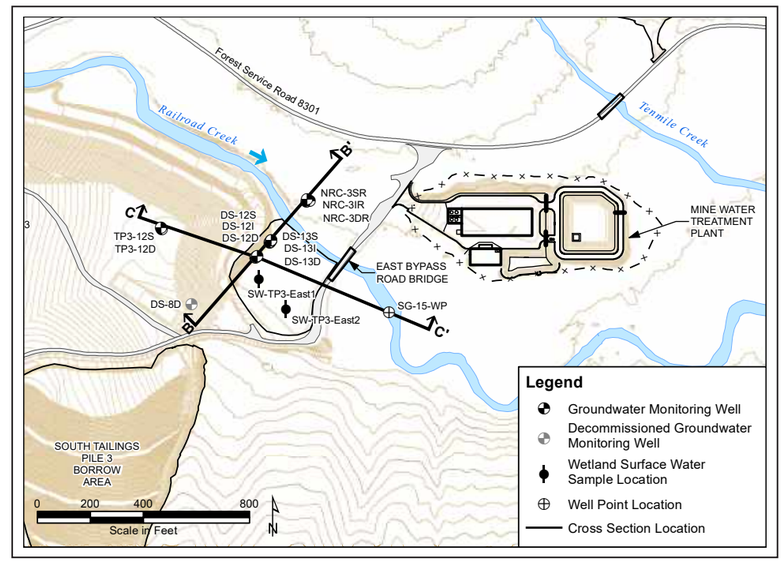
Qal

Qgt

Qgd

Brk

?



(Vertical exaggeration 2x)
50
25
0
VERTICAL
HORIZONTAL
0 50 100
SCALE IN FEET

Legend

Fll	Fill/Residual Soil	Qal	Alluvium
Qod	Overbank Deposits	Qgd	Glacial Moraine
Qcdf	Colluvium/Debris Flow Deposits	Qgt	Glacial Till
		Brk	Bedrock
		?	Inferred Low-Permeability Layer

Color Code: Shallow, Intermediate, Deep

Soil boring with monitoring well screen intervals

Shallow Zone Water Level Elevation, Spring 2020

Shallow Zone Water Level Elevation, Fall 2020

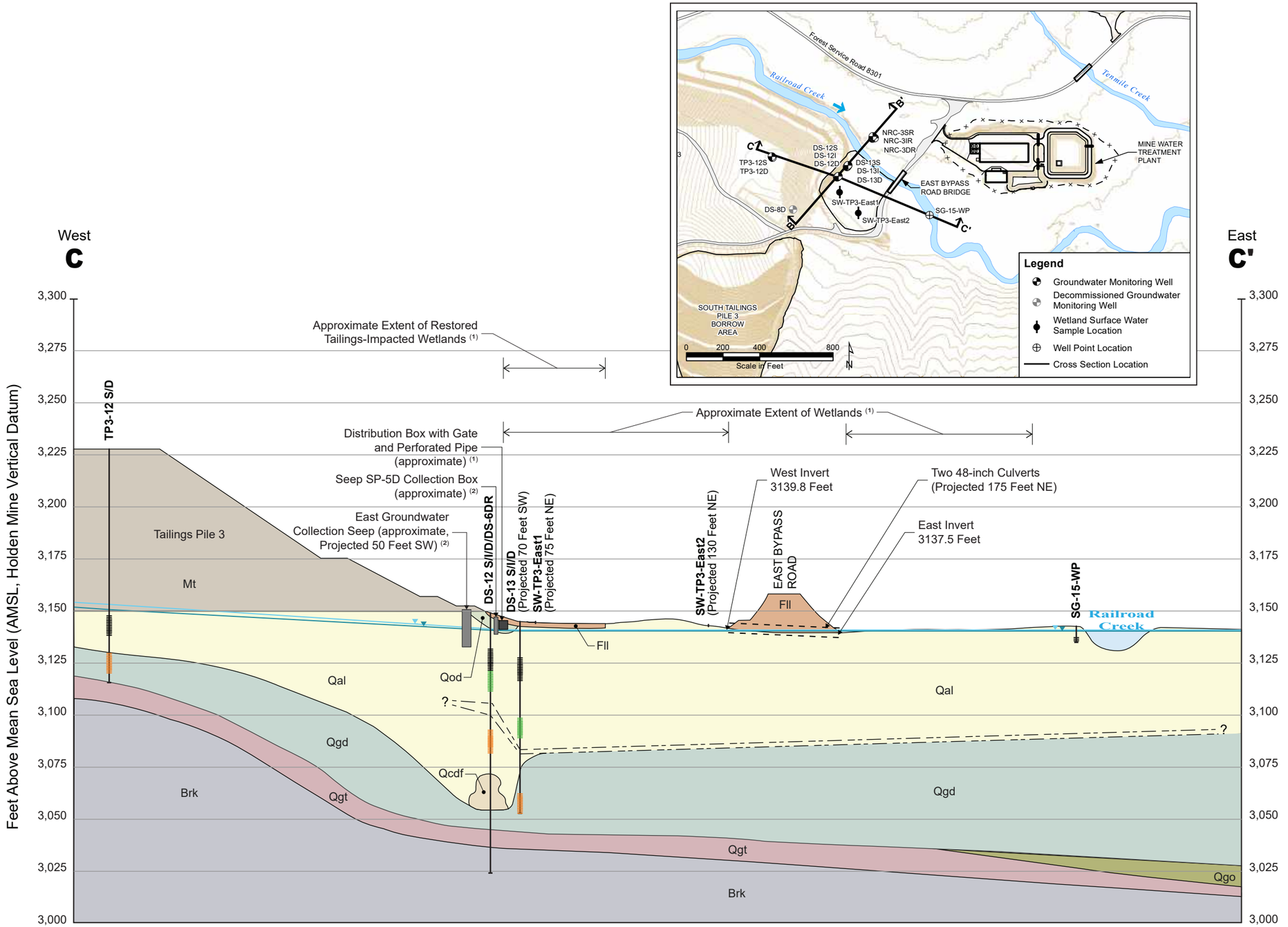
Notes:
1 Based on Stantec 2016, “Wetlands East of TP-3 Remediation Plan” for Holden Mine, Chelan, WA.
2 Based on 2016 Record of Construction (Stantec 2017).
- Lithology based on boring logs and previous cross sections (MWH 2013b, Stantec 2017, URS 2009, URS 2010).
- Ground surface based on 2019 survey of monitoring locations and elevation contours provided by Stantec.
- Refer to Figure 4.41 for Cross Section C-C'.

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Figure 4.40
Generalized Cross Section B-B' Between Tailings Pile 3 and Adjacent Wetlands

I:\GIS\Projects\RT-Holden\AI\ACAR 2020\Figure 4.40 Generalized Cross Section B-B' Between TP-3 and Adjacent Wetlands.ai
01/25/2021



Legend

- Brk — Bedrock
- Mt — Tailings/Riprap
- Fll — Fill/Residual Soil
- Qal — Alluvium
- Qcdf — Colluvium/Debris Flow Deposits
- Qod — Overbank Deposits
- Qgd — Glacial Moraine
- Qgo — Glacial Outwash
- Qgt — Glacial Till
- Inferred Low-Permeability Layer
- Soil boring with monitoring well screen intervals
- Color Code: Shallow, Intermediate, Deep
- Shallow Zone Water Level Elevation, Spring 2020
- Shallow Zone Water Level Elevation, Fall 2020

Notes:

1 Based on Stantec 2016, "Wetlands East of TP-3 Remediation Plan" for Holden Mine, Chelan, WA.

2 Based on 2016 Record of Construction (Stantec 2017).

- Lithology based on boring logs and previous cross sections (MWH 2013b, Stantec 2017, URS 2009, URS 2010).
- Ground surface based on 2019 survey of monitoring locations and elevation contours provided by Stantec.
- Refer to Figure 4.40 for Cross Section B-B'.

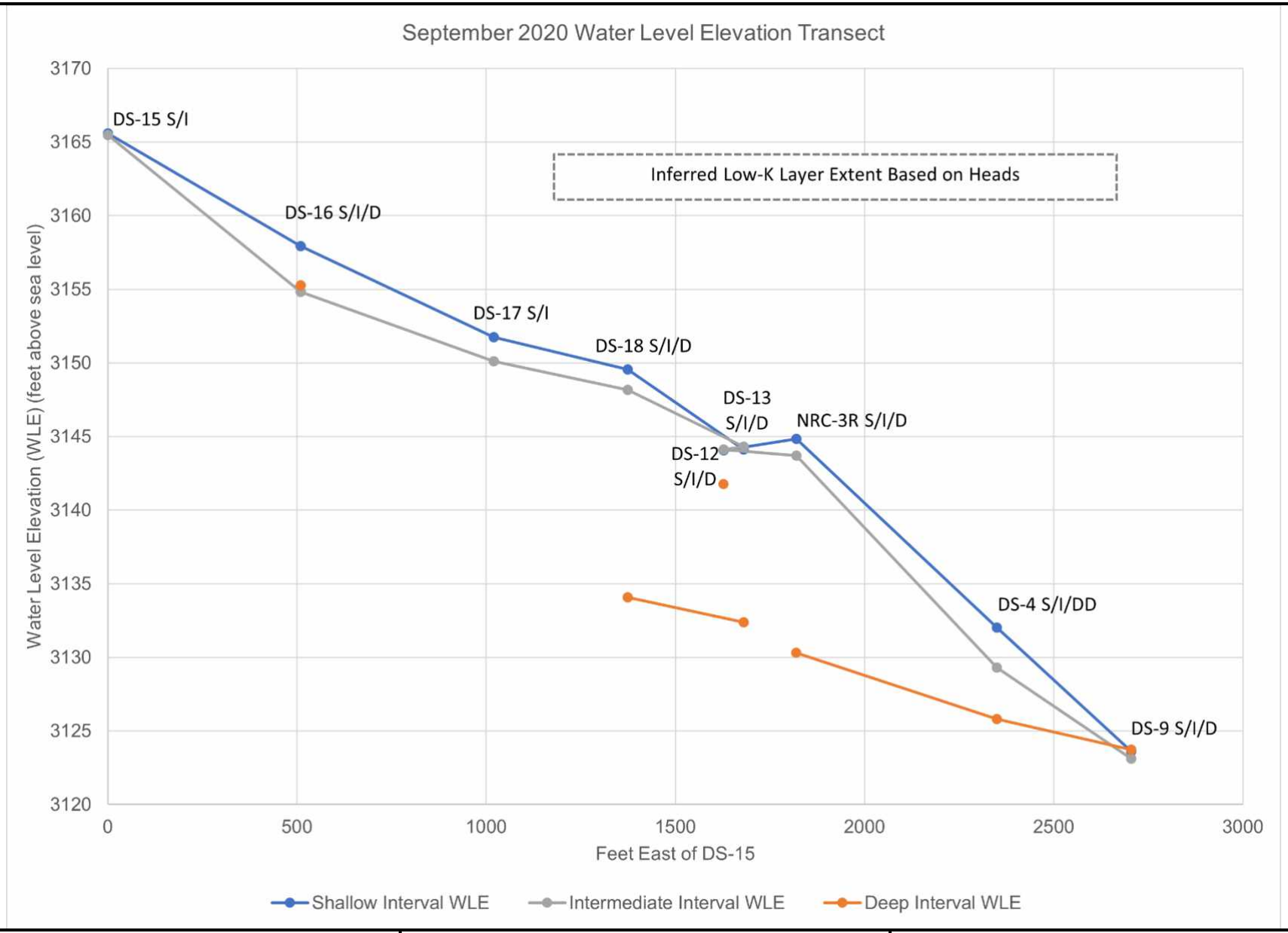
(Vertical exaggeration 2x)
50
25
0
VERTICAL
HORIZONTAL
0 50 100
SCALE IN FEET

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Figure 4.41
Generalized Cross Section C-C' from Tailings Pile 3 through Adjacent Wetlands

I:\GIS\Projects\RT-Holden\AI\ACAR\Figure 4.41 Generalized Cross Section C-C' from TP-3 through Adjacent Wetlands.ai
01/25/2021

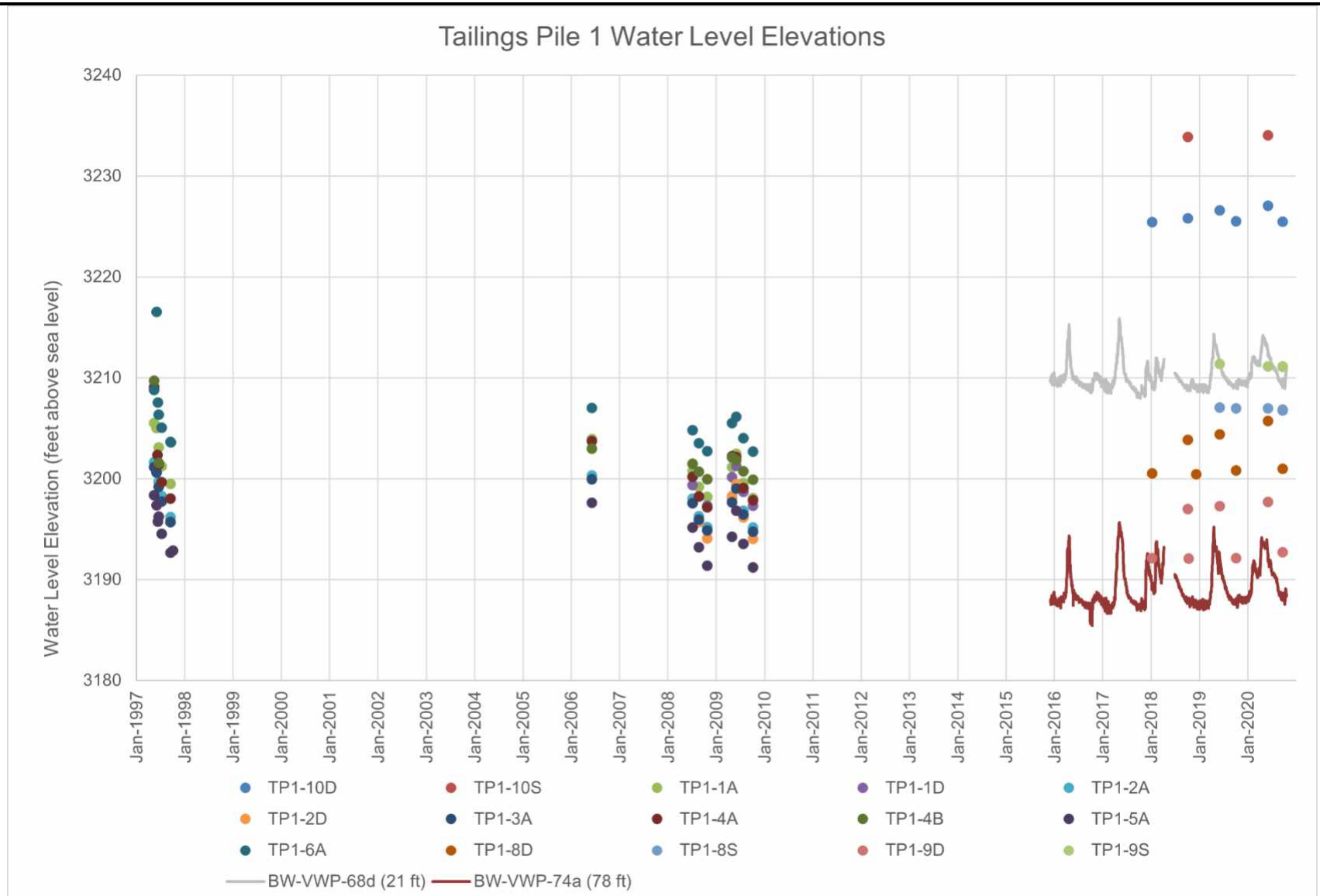


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Figure 4.42
September 2020 Water Level Elevation Transect

1/25/2021

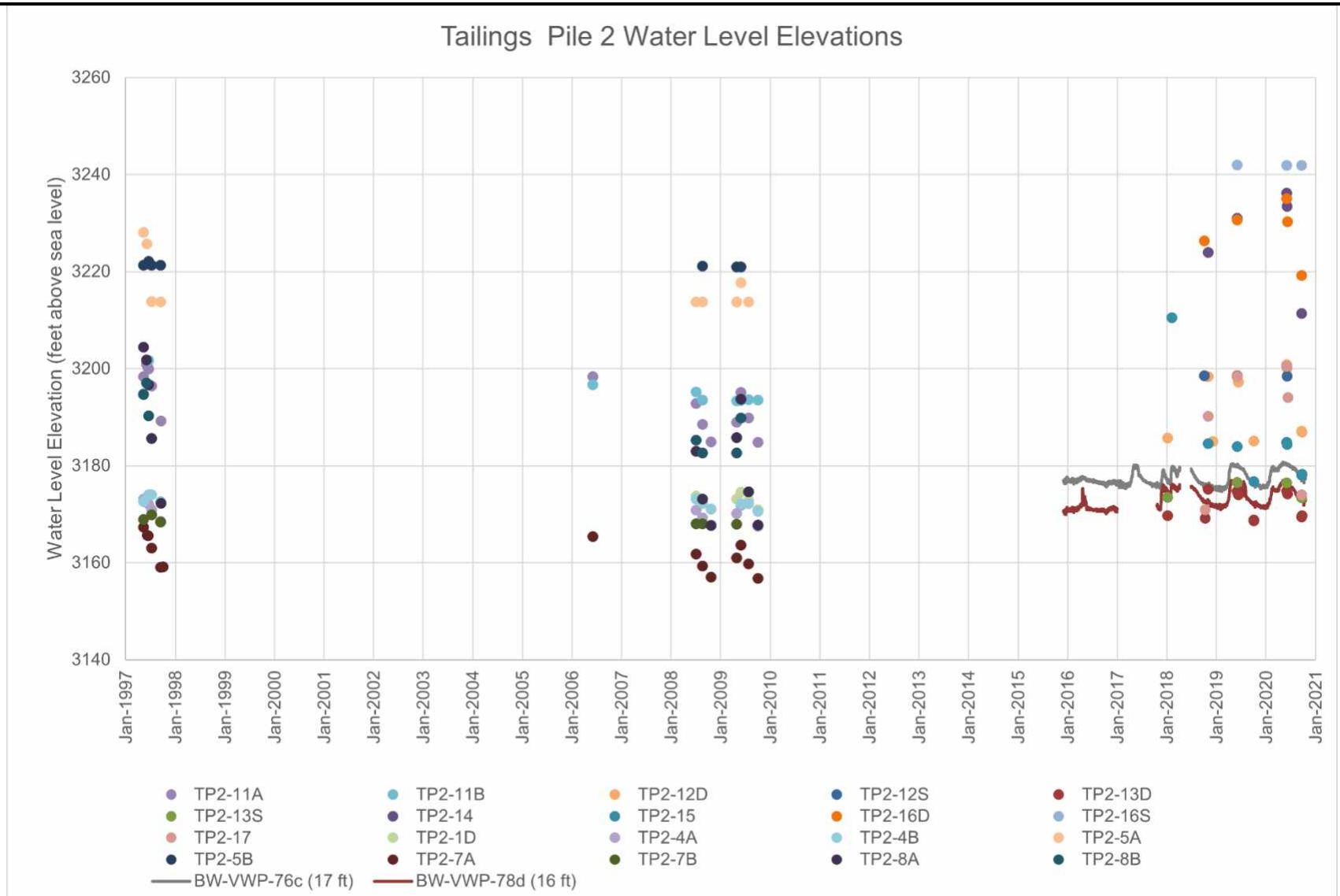


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Figure 4.43
Tailings Pile 1 Water Level Elevations

1/25/2021

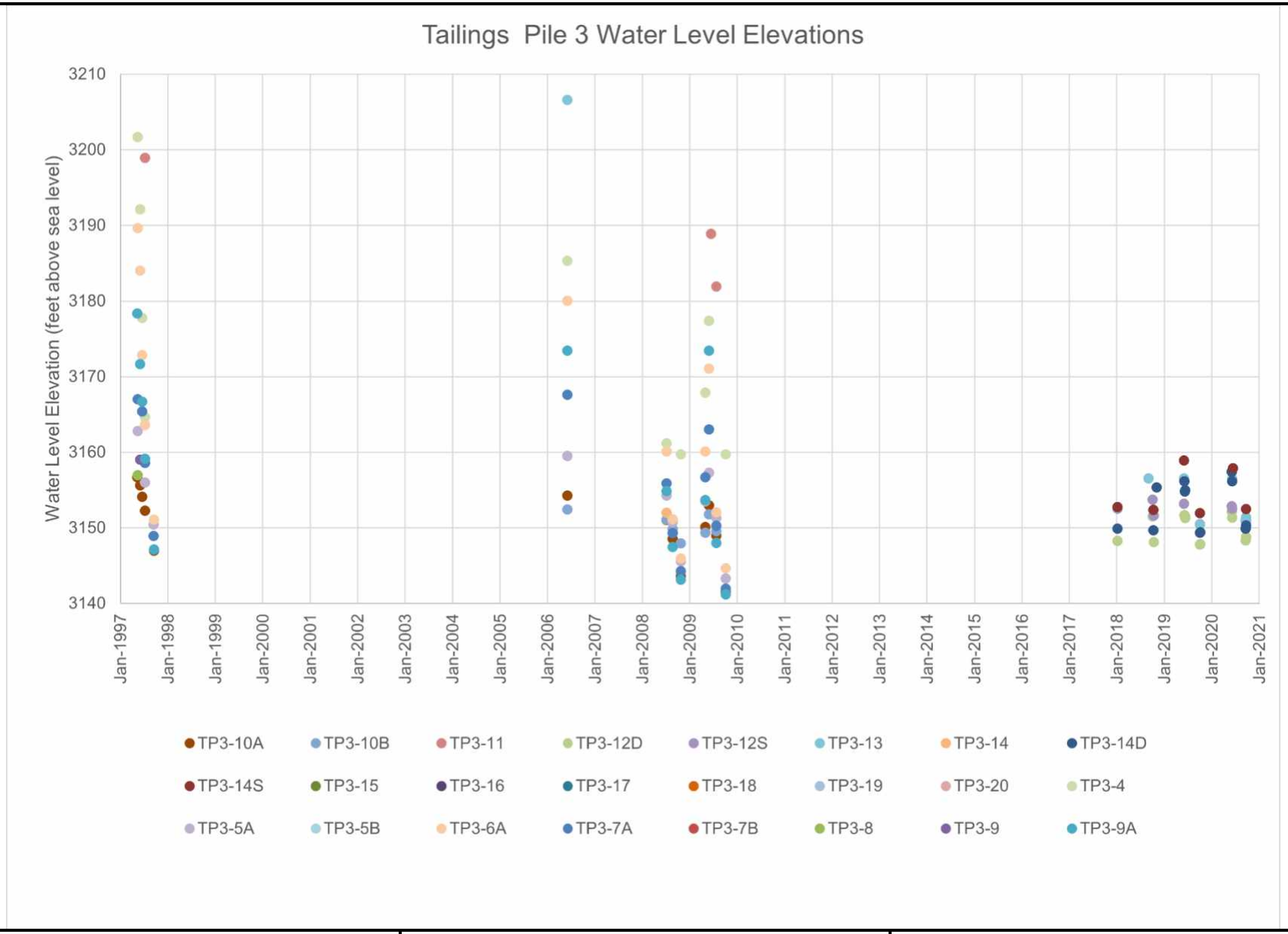


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Figure 4.44
Tailings Pile 2 Water Level Elevations

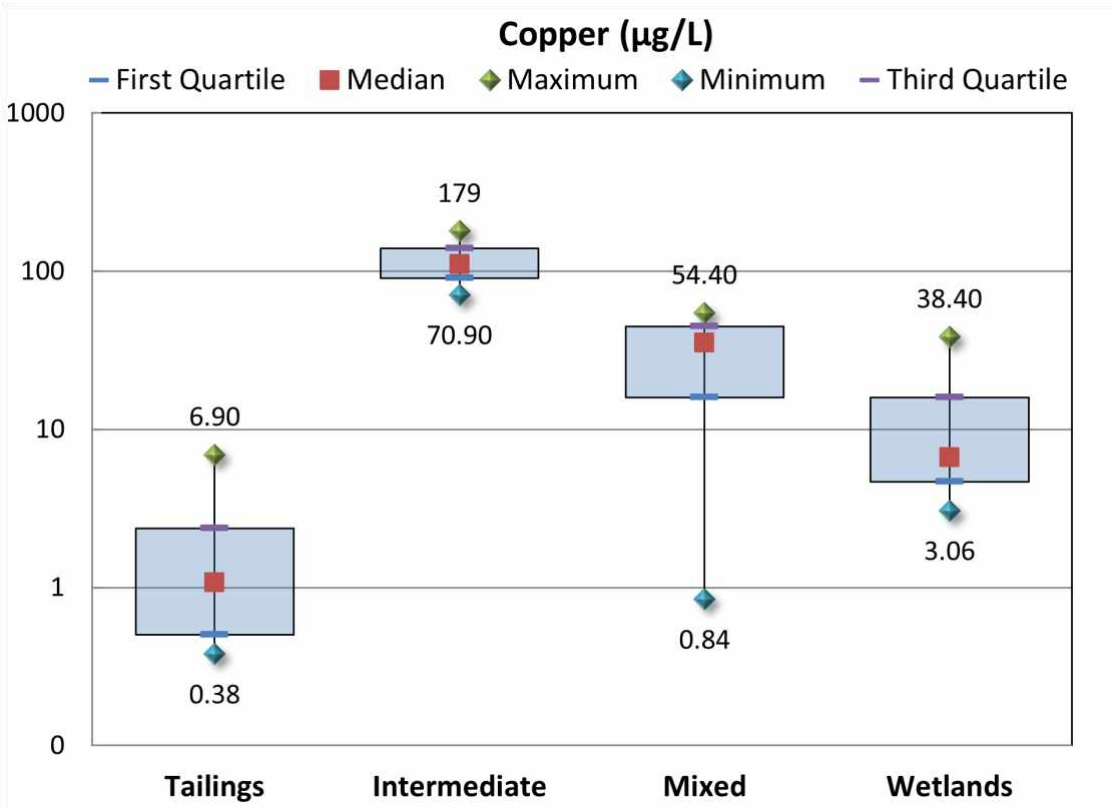
1/25/2021

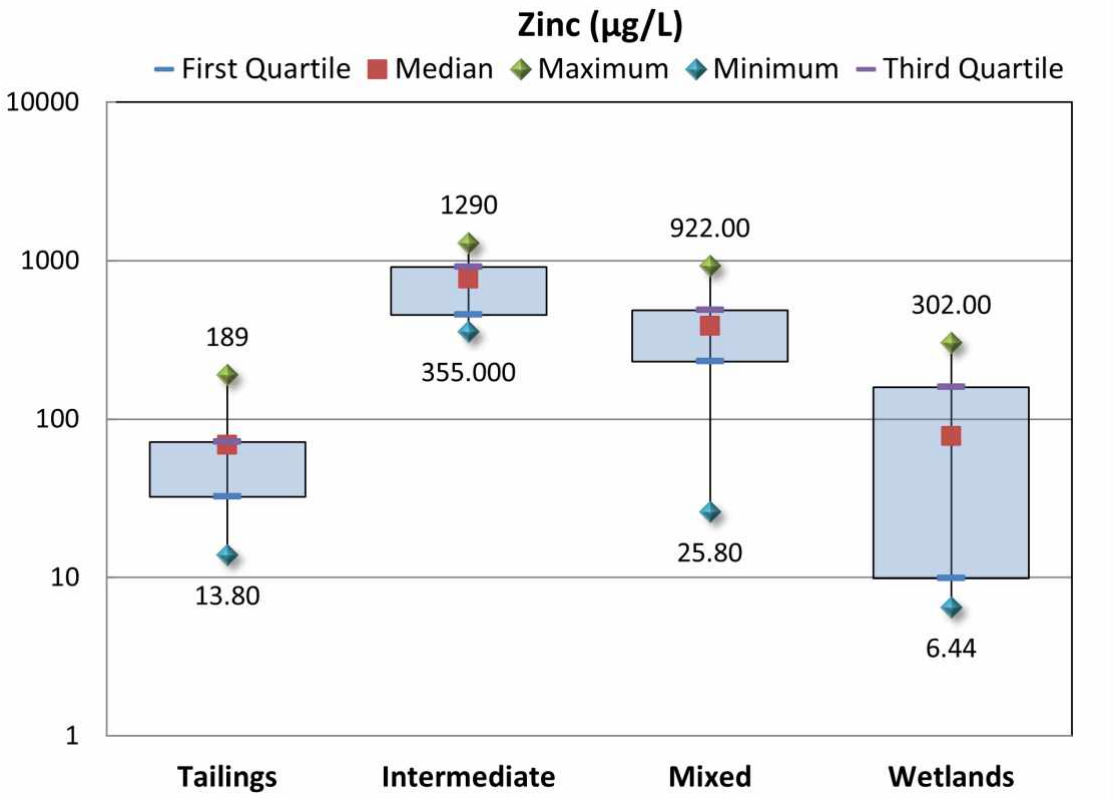


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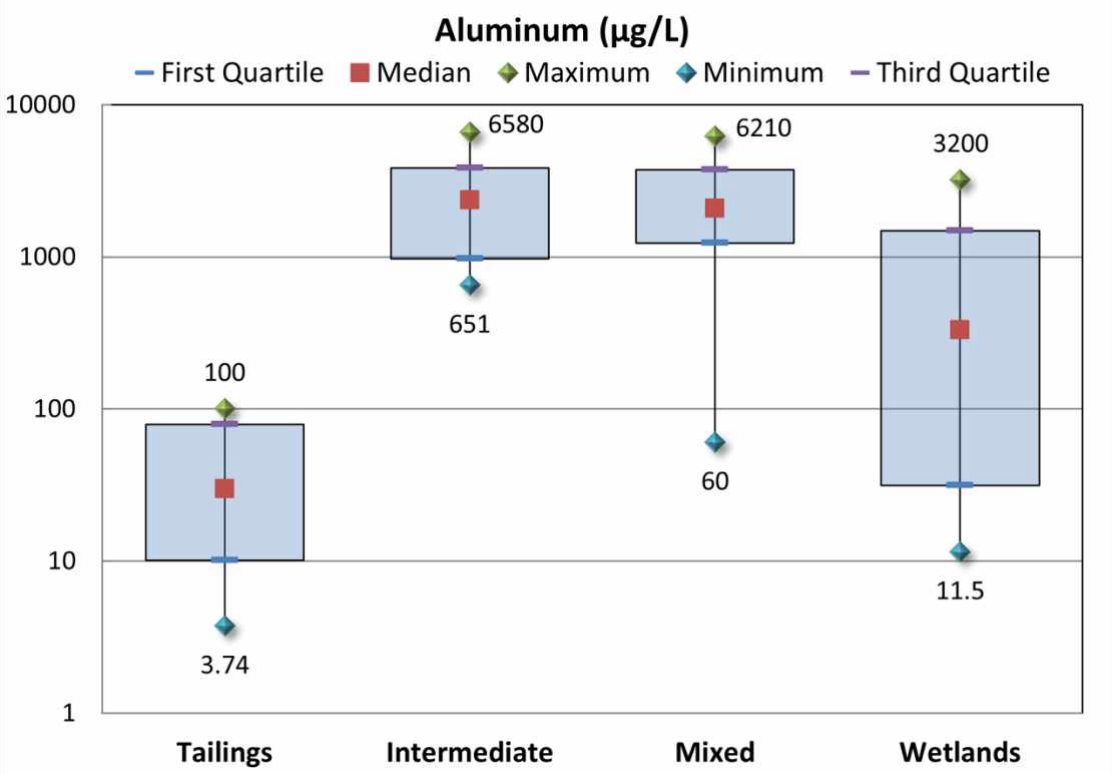
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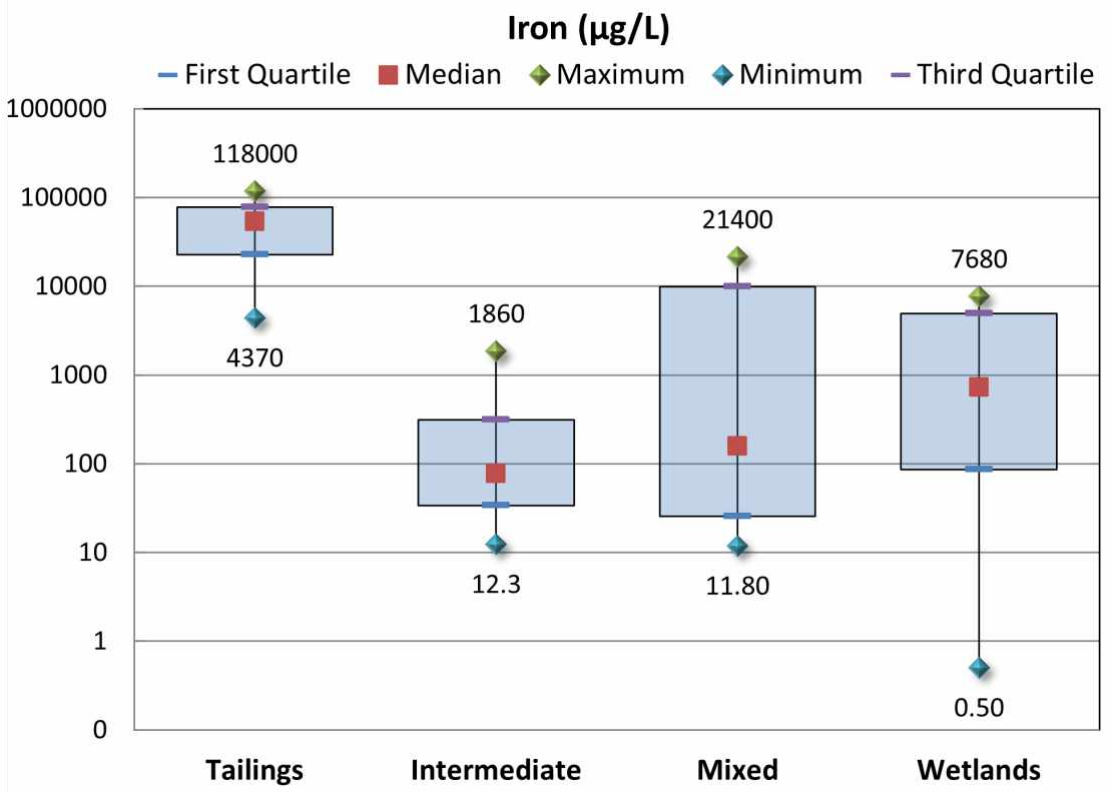
Figure 4.45
Tailings Pile 3 Water Level Elevations



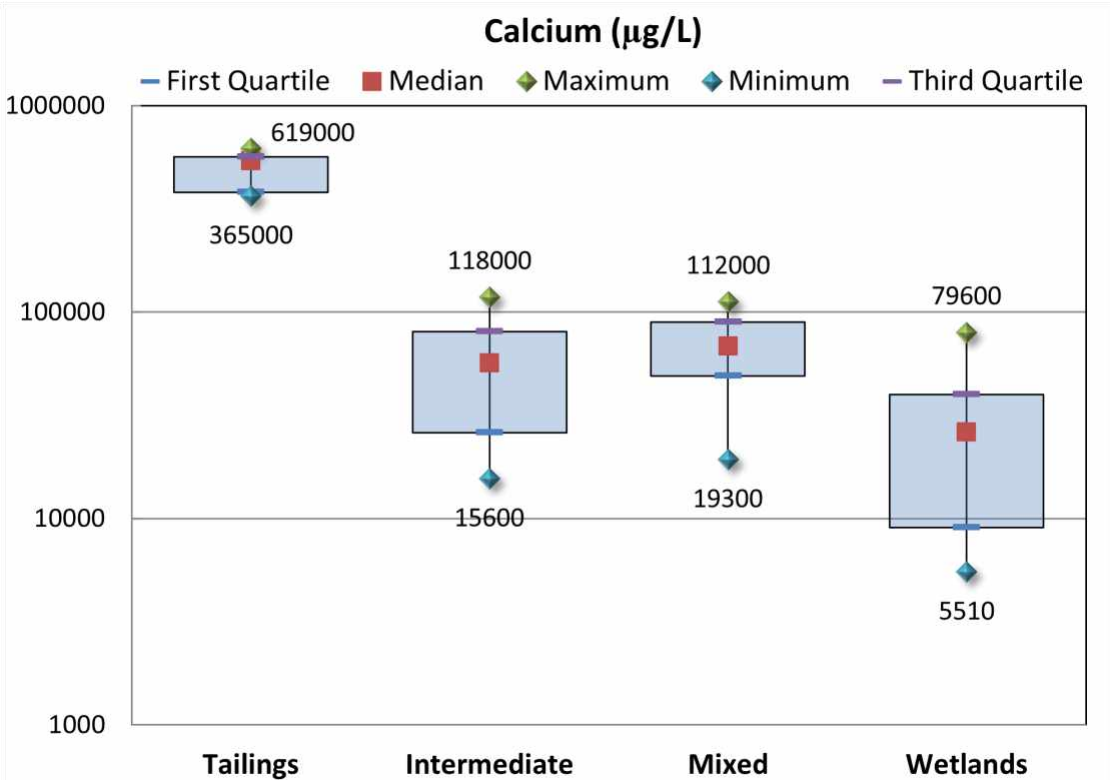


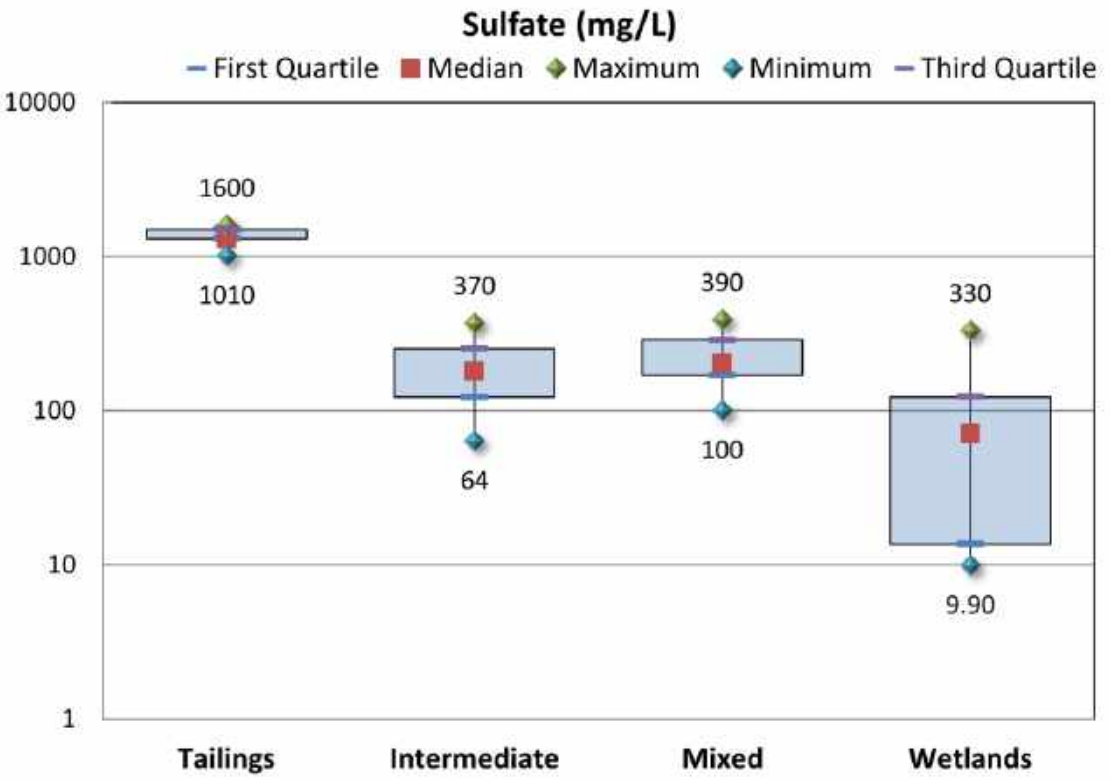
FLOYD | SNIDER strategy • science • engineering	**Performance Standards Verification** **2020 Annual Compliance Assessment Report** **Holden Mine Site** **Chelan County, Washington**	Figure 4.46 Box and Whisker Plots for Copper and Zinc for Selected Well Groups



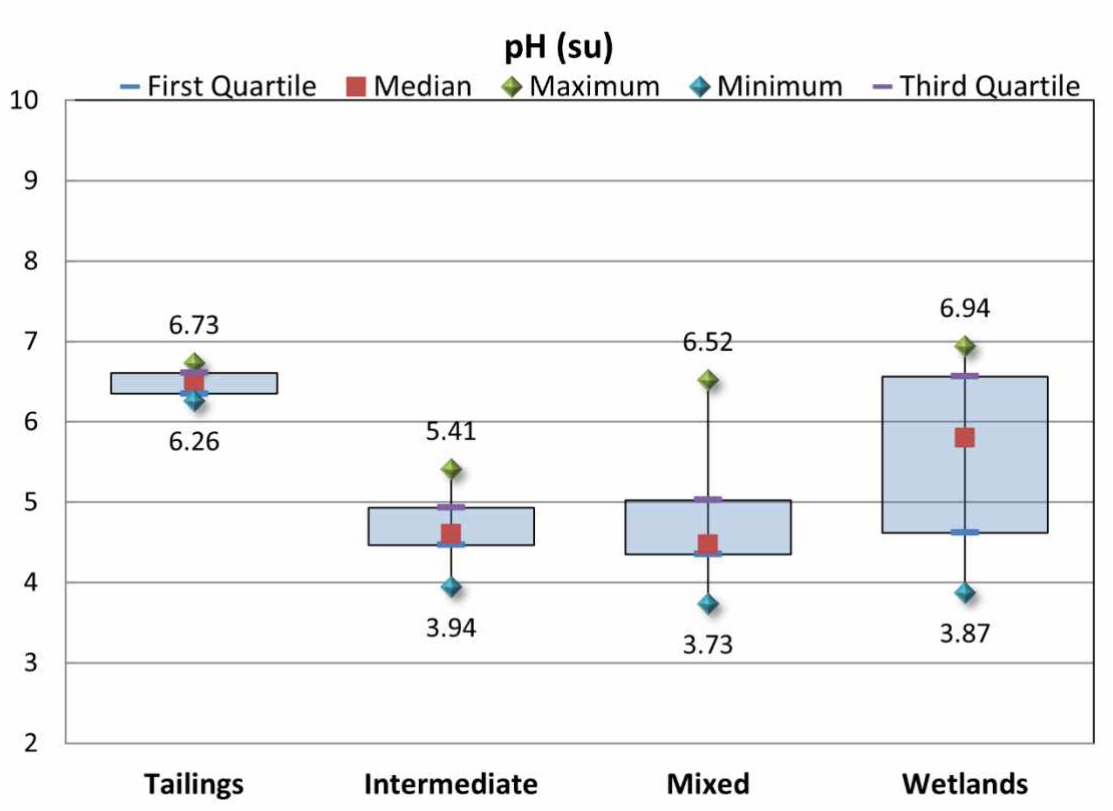


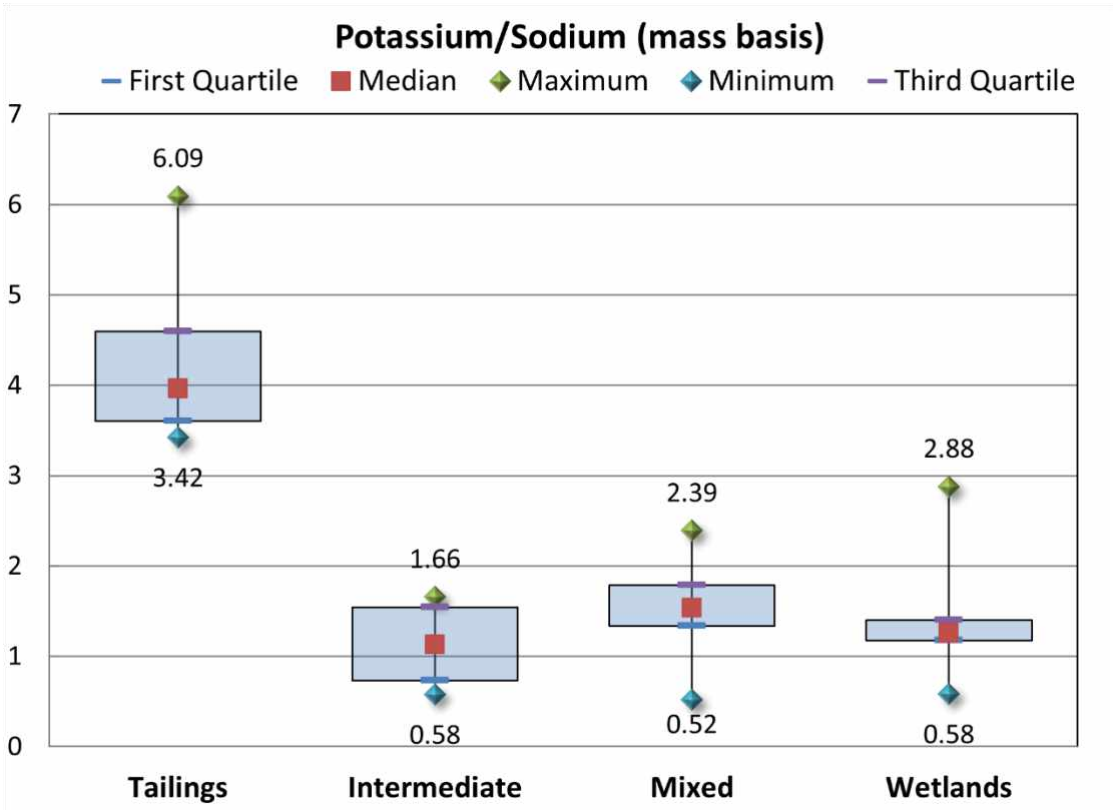
FLOYD | SNIDER strategy • science • engineering	**Performance Standards Verification** **2020 Annual Compliance Assessment Report** **Holden Mine Site** **Chelan County, Washington**	Figure 4.47 Box and Whisker Plots for Aluminum and Iron for Selected Well Groups





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Appendix A
Summer and Fall 2020 Field Forms

DRAFT

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Appendix A
Summer and Fall 2020 Field Forms

Attachment A.1
Summer 2020 Field Forms

DRAFT

SEEP SAMPLE COLLECTION FORM

Project Name: RT-Holden
Date of Collection: 7/22/20
Task: 5.3 summer seep survey
Field Personnel: P.O. + K.H.

Seep Details and Observations

Location ID: SP-26
Seep Type: pool; moist to wet surface area; sheet flow; other: sheet flow
GPS Coordinates: same as 2019
Location Description: South bank RRC ~3' above creek level on east side of landslide
Seep Description (width, length, depth of pool) 3-10' wide sheet flow w/ multiple expressions.
Photo taken? yes - orange camera
Location marked on field map?

Field Measurements

Time	Flow (calculate or estimate)	pH	Dissolved Oxygen (mg/L)	Specific Conductivity (µS/cm)	Turbidity (NTU)	Temp (°C)	ORP (mV)
09:31	~10 gpm	5.57	11.22 (90.5%)	74.0	3.29	6.1	189.3
09:34	|	5.82	11.29 (90.7%)	71.8	3.13	6.0	176.8
09:37	|	5.99	11.32 (90.9%)	71.7	3.04	6.0	173.1
09:42	|	6.18	11.32 (90.9%)	71.7	2.88	6.0	168.9

Flow Measurement Method: visual
Distance from creek or river drainage, if applicable: 4'
Water Quality Instrument Data Collected with: Type: ☑ YSI Pro DSS ☐ LaMotte Turbidity Meter Other:
Parameters measured by: ☑ Directly in seep pool ☐ Dam ☐ Collection into bucket Water Quality Parameters Collected after sample collected? ☐ Yes ☑ No

Seep Sampling Data

Sample No: SP-26-072220
Location and Depth: middle of seep area
Date Collected (mo/dy/yr): 7/22/20
Time Collected: 09:37
Weather: Sunny, 65°F
Duplicate Sample No. SP-126-072220
Duplicate Sample Time Collected: 09:42
Sample: ☑ Filtered ☑ Unfiltered Other: DOC FF
Filter Type: 0.45 micron, disposable
Sample Collected with: ☐ Syringe ☐ Direct Collection ☑ Pump Other: Type: peristaltic
Sample Description (Color, Turbidity, Odor, Other): clear

Sample Analyses

TPH-D	(HCl) ☐	Chlor / Fluor	(unpres) ☐	DOC FF	(H2SO4) ☒	Anions	(unpres) ☒	Alkalinity	(no head) ☒
TPH-G	(HCl) ☐	BTEX	(HCl) ☐	Total Metals	(HNO3) ☒	Diss Metals	(HNO3) ☐	VOCs	(HCl) ☐

Additional Information

Types of Sample Containers:	Preservative:	Quantity:
500mL HDPE	HNO3	2
250mL HDPE	—	~~X~~ 4
250mL G.A.	H_2SO_4	2

Comments:
Ferrous Iron = ND
Spring sample area (about 10' up slope) is dry

Signature:
Date: 7/22/20

SEEP SAMPLE COLLECTION FORM

Project Name: RT-Holden
Date of Collection: 7/20/2020
Task: 5.3
Field Personnel: P.O.

Seep Details and Observations

Location ID: SP-30
Seep Type: pool; moist to wet surface area; sheet flow; other: pool + sheet flow in river rock
GPS Coordinates: 48.197128° N, 120.7600208° W
Location Description: East extent of SP-30 area (west side of boulder) Directly across from NRC-3
Seep Description (width, length, depth of pool) on south bank. Expression 6-10 inches wide, ~2" above creek
Photo taken? yes - orange camera
Location marked on field map?

Field Measurements

Time	Flow (calculate or estimate)	pH	Dissolved Oxygen (mg/L)	Specific Conductivity (µS/cm)	Turbidity (NTU)	Temp (°C)	ORP (mV)
1739	2-4 L/min	6.85	8.65	17.3	4.35	14.8	129.0
1743	|	6.84	8.63	17.3	2.93	14.8	126.7
1747		6.84	8.64	17.3	1.54	14.7	125.1

Flow Measurement Method: Visual estimate
Distance from creek or river drainage, if applicable: 4 Feet
Water Quality Instrument Data Collected with: Type: ☒ YSI Pro DSS ~~☒ LaMotte Turbidity Meter~~ Other:
Parameters measured by: ☒ Directly in seep pool ☐ Dam ☐ Collection into bucket
Water Quality Parameters Collected after sample collected? ☐ Yes ☒ No

Seep Sampling Data

Sample No: SP-30-072020
Location and Depth:
Date Collected (mo/dy/yr): 7/20/2020
Time Collected: 1750
Weather: sunny, 90°F
Duplicate Sample No: None
Duplicate Sample Time Collected:
Sample: ☑ Filtered ☑ Unfiltered Other: DOC, FF
Filter Type: 0.45 micron disposable
Sample Collected with: ☐ Syringe ☐ Direct Collection ☑ Pump Other: Type: peristaltic
Sample Description (Color, Turbidity, Odor, Other): clear

Sample Analyses

TPH-D	(HCl) ☐	Chlor / Fluor	(unpres) ☐	DOC / TOC	(H2SO4) ☑	Anions	(unpres) ☑	Alkalinity	(no head) ☑
TPH-G	(HCl) ☐	BTEX	(HCl) ☐	Total Metals	(HNO3) ☑	* Diss Metals	(HNO3) ☐	VOCs	(HCl) ☐

Additional Information

Types of Sample Containers:	Preservative:	Quantity:
500 mL poly	w/ HNO_3	1
250 mL poly		2
250 mL GA	w/ H_2SO_4	1

Comments: Ferrous Iron = 0 mg/L (ND)

Signature:
Date: 7/20/20

SEEP SAMPLE COLLECTION FORM

Project Name: Holden
Date of Collection: 7/21/20
Task: Summer Seep Survey 2020
Field Personnel: KH, PD

Seep Details and Observations

Location ID: SP-32
Seep Type: pool; moist to wet surface area; sheet flow; other:
GPS Coordinates: same as previous
Location Description: West of Copper Creek, south bank of RRC
Seep Description (width, length, depth of pool): Bubbling up from ground at the edge of the creek
Photo taken? No
Location marked on field map? Yes

Field Measurements

Time	Flow (calculate or estimate)	pH	Dissolved Oxygen (mg/L)	Specific Conductivity (µS/cm)	Turbidity (NTU)	Temp (°C)	ORP (mV)
13:15	1 gal/min	6.80	8.60	29.7	1.60	12.8	130.9
13:22	1 gal/min	6.69	8.57	29.7	1.63	12.8	136.2

Flow Measurement Method: Visual estimate
Distance from creek or river drainage, if applicable: At creek edge
Water Quality Instrument Data Collected with: Type: ☑ YSI Pro DSS ☐ LaMotte Turbidity Meter Other:
Parameters measured by: ☑ Directly in seep pool ☐ Dam ☐ Collection into bucket & Tubing
Water Quality Parameters Collected after sample collected? ☐ Yes ☑ No

Seep Sampling Data

Sample No: SP-32-072120
Location and Depth: SP-32
Date Collected (mo/dy/yr): 7/21/20
Time Collected: 13:25
Weather: Sunny, 81°F
Duplicate Sample No. NA
Duplicate Sample Time Collected: NA
Sample ☑ Filtered ☐ Unfiltered Other: ~~0.45~~ for DOC
Filter Type: 0.45
Sample Collected with: ☐ Syringe ☐ Direct Collection ☑ Pump Other: Type: peristaltic
Sample Description (Color, Turbidity, Odor, Other): clear, no odor

Sample Analyses

TPH-D	(HCl) ☐	Chlor / Fluor	(unpres) ☐	DOC / TOC	(H2SO4) ☑	Anions	(unpres) ☑	Alkalinity	(no head) ☑
TPH-G	(HCl) ☐	BTEX	(HCl) ☐	Total Metals	(HNO3) ☑	Diss Metals	(HNO3) ☐	VOCs	(HCl) ☐

Additional Information

Types of Sample Containers:	Preservative:	Quantity:
500 mL poly	—	2
250 mL AG	H_2SO_4	1
500 mL poly	HNO_3	1
Total count = 4		

Comments: Fe^{2+} = 0.0 mg/L

Signature: Kam Holden
Date: 7/21/20

SEEP SAMPLE COLLECTION FORM

Project Name: RT-Holden
Date of Collection: 7/21/20
Task: 5.3 Summer Seep survey
Field Personnel: P.D. + K.H.

Seep Details and Observations

Location ID: SP-34
Seep Type: pool; moist to wet surface area; sheet flow; other: Spring
GPS Coordinates: 48.198692 · N, 120.71671662 · W
Location Description: South bank RRC at creek level in riprap. ~ 10' west of bedrock
Seep Description (width, length, depth of pool) ~ 4"x12" expression in rip rap
Photo taken? _____ Location marked on field map? on GPS

Field Measurements

Time	Flow (calculate or estimate)	pH	Dissolved Oxygen (mg/L)	Specific Conductivity (µS/cm)	Turbidity (NTU)	Temp (°C)	ORP (mV)
12:10	5-10 gpm	7.48	9.49	20.9	8.91	12.3	98.8
12:13	|	7.25	9.49	20.9	0.38 w/ LaMotte	12.3	101.4
12:17	|	7.10	9.53	20.9	NM	12.3	101.8

Flow Measurement Method: visual estimate
Ferrous Iron = ND
Distance from creek or river drainage, if applicable: ~1 foot
Water Quality Instrument Data Collected with: Type: ☑ YSI Pro DSS : ☑ LaMotte Turbidity Meter Other: _____
Parameters measured by: ☑ Directly in seep pool ☐ Dam ☐ Collection into bucket Water Quality Parameters Collected after sample collected? ☐ Yes ☑ No

Seep Sampling Data

Sample No: SP-34-072120
Location and Depth: Directly in expression
Date Collected (mo/dy/yr): 7/21/20
Time Collected: 12:20
Weather: sunny, 80+ °F
Duplicate Sample No: —
Duplicate Sample Time Collected: _____
Sample: ☑ Filtered ☑ Unfiltered Other: DOC FF
Filter Type: 0.45 micron disposable
Sample Collected with: ☐ Syringe ☐ Direct Collection ☑ Pump Other: _____ Type: peristaltic
Sample Description (Color, Turbidity, Odor, Other): Clear.

Sample Analyses

TPH-D	(HCl) ☐	Chlor / Fluor	(unpres) ☐	(DOC) ~~TOC~~	(H2SO4) ☒	Anions	(unpres) ☒	Alkalinity	(no head) ☒
TPH-G	(HCl) ☐	BTEX	(HCl) ☐	Total Metals	(HNO3) ☒	Diss Metals	(HNO3) ☐	VOCs	(HCl) ☐

Additional Information

Types of Sample Containers:	Preservative:	Quantity:
500mL HDPE w/	HNO_3	1
250 mL HDPE	—	2
250 mL G.A. w/	H_2SO_4	1

Comments: Initially collected water quality at bubbling seep ~7 feet east. Water quality similar to SW at both expressions. The western one appears less likely to be influenced by creek water. Collected sample here b/c SP-34 exceeded for 2 metals during previous events

Signature: [signature] Date: 7/20/21

SEEP SAMPLE COLLECTION FORM

Project Name: RT-Holden
Date of Collection: 7/21/20
Task: 5.3 : Summer Seep Survey
Field Personnel: P.O

Seep Details and Observations

Location ID: SP-34
Seep Type: pool; moist to wet surface area; sheet flow; other: Spring
GPS Coordinates:
Location Description: South bank just west of bedrock outcrop
Seep Description (width, length, depth of pool) 4"x4" Spring at edge of riprap / creek channel
Photo taken? No
Location marked on field map?

Field Measurements

Time	Flow (calculate or estimate)	pH	Dissolved Oxygen (mg/L)	Specific Conductivity (µS/cm)	Turbidity (NTU)	Temp (°C)	ORP (mV)
09:42	5-10 gpm	7.03	9.73	20.5	2.5	11.8	108.8
09:45		7.05	9.72	20.5	10.9 (bubbles)	11.3	106.3
SW at	SG-7	7.50	9.93	18.2	0.59	10.8	100.1

Flow Measurement Method: visual estimate
Distance from creek or river drainage, if applicable:
Water Quality Instrument Data Collected with: Type: ☑ YSI Pro DSS : ☐ LaMotte Turbidity Meter Other:
Parameters measured by: ☑ Directly in seep pool ☐ Dam ☐ Collection into bucket Water Quality Parameters Collected after sample collected? ☐ Yes ☑ No

Seep Sampling Data

Sample No: Location and Depth:
Date Collected (mo/dy/yr): Time Collected: Weather: 75° F, Sunny
Duplicate Sample No: Duplicate Sample Time Collected:
Sample: ☐ Filtered ☐ Unfiltered Other: Filter Type:
Sample Collected with: ☐ Syringe ☐ Direct Collection ☐ Pump Other: Type:
Sample Description (Color, Turbidity, Odor, Other):

Sample Analyses

TPH-D	(HCl) ☐	Chlor / Fluor	(unpres) ☐	DOC / TOC	(H2SO4) ☐	Anions	(unpres) ☐	Alkalinity	(no head) ☐
TPH-G	(HCl) ☐	BTEX	(HCl) ☐	Total Metals	(HNO3) ☐	Diss Metals	(HNO3) ☐	VOCs	(HCl) ☐

Additional Information

Types of Sample Containers: Preservative: Quantity:

Comments: Water quality similar to SW.

Signature: Date: 7/21/20

SEEP SAMPLE COLLECTION FORM

Project Name: RT-Holden
Date of Collection: 7/21/20
Task: 5.3 Summer seep survey
Field Personnel: P.O.

Seep Details and Observations

Location ID: SP-40
Seep Type: pool; moist to wet surface area; sheet flow; other: Bubbly spring / sheet flow
GPS Coordinates: 48.197997 °N, 120.773426 °W
Location Description: West of ferricrete outcrop, South side of RRC
Seep Description (width, length, depth of pool): 4" wide bubbly spring + 2' away 2" sheet flow expression
Photo taken? yes
Location marked on field map?

Field Measurements

Time	Flow (calculate or estimate)	pH	Dissolved Oxygen (mg/L)	Specific Conductivity (µS/cm)	Turbidity (NTU)	Temp (°C)	ORP (mV)
13:08	~5 gpm	6.99	8.85	25.8	5.76	12.6	151.7
13:12	"	6.92	8.96	25.8	7.70	12.5	157.9
13:16	"	6.84	8.94	25.8	7.77	12.6	163.7
					0.04 w/ LaMotte		
SW 13:02		7.26	9.29	16.5	-1.14	13.0	133.1

Flow Measurement Method: visual estimate

Distance from creek or river drainage, if applicable: at creek

Water Quality Instrument Data Collected with: Type: ☑ YSI Pro DSS : ☑ LaMotte Turbidity Meter Other:

Parameters measured by: ☑ Directly in seep pool ☐ Dam ☐ Collection into bucket
Water Quality Parameters Collected after sample collected? ☐ Yes ☑ No

Seep Sampling Data

Sample No: SP-40-072120
Location and Depth: Directly in expression
Date Collected (mo/dy/yr): 7/21/20
Time Collected: 13:18
Weather: Sunny 85°F
Duplicate Sample No: —
Duplicate Sample Time Collected:
Sample: ☑ Filtered ☑ Unfiltered Other:
Filter Type: 0.45 micron disposable
Sample Collected with: ☐ Syringe ☐ Direct Collection ☑ Pump Other: Type: peristaltic
Sample Description (Color, Turbidity, Odor, Other): Clear

Sample Analyses

TPH-D	(HCl) ☐	Chlor / Fluor	(unpres) ☐	DOC / ~~TOC~~	(H2SO4) ☑	Anions	(unpres) ☑	Alkalinity	(no head) ☑
TPH-G	(HCl) ☐	BTEX	(HCl) ☐	Total Metals	(HNO3) ☑	Diss Metals	(HNO3) ☐	VOCs	(HCl) ☐

Additional Information

Types of Sample Containers:	Preservative:	Quantity:
500 mL HDPE	HNO_3	1
250 mL HDPE	—	2
250 mL Gl.	H_2SO_4	1

Comments: Ferrous Iron = ND

Signature: [signature]
Date: 7/21/20

GROUNDWATER, POREWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name: RT-Holden Mine Date of Collection: 7/22/20

Field Event: S-3 Summer Field Personnel: P.O. + K.H.

Purge Data

Location ID: SW-TP3-East 1

Ecology Tag

Diameter: NA Screened Interval:

GPS:

Total Depth: Transducer S/N:

Location Condition (Well damage, creek level, iron staining, fire damage):

Secure: ☐ Yes ☐ No NA Depth Sounder decontaminated prior to use: ☐ Yes ☐ No

Photograph Numbers:

One Casing Volume (gal):

Depth of water (from top of casing): SG-WL2 = 1.01'

After 5 minutes of purging (from TOC):

Begin purge (time): 13:24 End purge (time): 14:08

Volume purged: Purge water disposal method: ground

Volume of Schedule 40 PVC Pipe				
Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
¾	1.050"	0.804"	0.0229	0.2916
2"	2.375"	2.067"	0.17	1.45
2.5"	2.875"	2.445"	0.255	2.129
4"	4.500"	4.026"	0.66	5.51

Time	DTW (decimal ft below TOC)	Vol. Purged (L / gal)	pH (s.u.)	DO (mg/L)	Specific Conductivity (uS/cm)	Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments
1329	1.01	NM	6.36	8.37	67.2	18.04	22.4	120.1	
1331	"	"	6.44	8.37	67.2	1.32 *	22.4	113.4	
1334	"	"	6.54	8.58	67.0	1.54 *	22.5	106.6	
1339	"	"	6.61	8.62	66.9	1.54 *	22.7	103.2	
1344	"	"	6.68	8.72	66.4	1.55 *	22.7	102.8	

Ferrous Iron Field Test mg/L or ☒ Not Detected LaMotte Turbidimeter Reading: 1.55 NTU

Sampling Data

Sample No: SW-TP3-East 1-072220 Depth of tubing/distance from shore: 3' from edge of pond, 2" deep

Date Collected (mo/dy/yr): 7/22/20 Time Sample Collected: 1345 Weather: Sunny, 75° F

Duplicate Sample No: MS/MSD Time Duplicate Sample Collected:

Type: ☐ Groundwater ☒ Surface Water ☐ Porewater (6"/red, 12"/green, 36"/black) Sample: ☑ Unfiltered ☑ Filtered DOC Filter Type: ☑ Disposable 0.45-um ☐

Sample Collected with: ☐ Grab ☒ Pump Other: Type: ☐ Peristaltic ☐ Bladder Other: Flow Rate (L/min):

Water Quality Instrument Data Collected with: Type: ☒ YSI Pro DSS ☐ Horiba U-50 ☆ LaMotte (Turbidity only) Other:

Sample Decon Procedure: Sample collected with: ☒ disposable and/or dedicated silicon and poly tubing ☐ Tubing replaced

Sample Description (Color, Turbidity, Odor, Other): Clear, slight tannin discoloration

Sample Analyses

Total Metals	(HNO3)	☒	TDS/TSS	(unpres)	☒	TOC	(H2SO4)	☒	Cl/SO4/NO3	(unpres)	☒		( ) ☐
Diss Metals (filtered)	(HNO3)	☐	Alkalinity (no headspace)	(unpres)	☒	DOC (filtered)	(H2SO4)	☒	Hardness	(calculated)	☒		( ) ☐

Additional Information

Type of Sample Containers:	Preservative	Quantity:	QA/QC Samples:	Comments:
1000 mL HDPE	none	4	☐ Field Duplicate	Tadpoles living in pond
500 mL HDPE	HNO3	2	☒ MS/MSD	
500 mL HDPE	none	2	☐ Field Blank	
250 mL Glass Amber	H2SO4	4	☐ Rinsate	

Signature: Date: 7/22/20

GROUNDWATER, POREWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name: RT-Holden Mine Date of Collection: 7/22/20

Field Event: S-3 Summer Field Personnel: P.O.

Purge Data

Location ID: SW-TP3-East2

Ecology Tag: X

Diameter: X Screened Interval:

GPS:

Total Depth: Transducer S/N:

Location Condition (Well damage, creek level, iron staining, fire damage): Heavy red staining

Secure: ☐ Yes ☐ No Depth Sounder decontaminated prior to use: ☐ Yes ☐ No

Photograph Numbers: NA

One Casing Volume (gal):

Depth of water (from top of casing): SG-WL2 = 1.70'

After 5 minutes of purging (from TOC):

Begin purge (time): 14:40 End purge (time): 15:09

Volume purged: Purge water disposal method: ground

Volume of Schedule 40 PVC Pipe				
Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
¾	1.050"	0.804"	0.0229	0.2916
2"	2.375"	2.067"	0.17	1.45
2.5"	2.875"	2.445"	0.255	2.129
4"	4.500"	4.026"	0.66	5.51

Time	DTW (decimal ft below TOC)	Vol. Purged L / gal	pH (s.u.)	DO (mg/L)	Specific Conductivity (uS/cm)	Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments
1444	NA	NM	4.95	5.73	227.1	7.64 (0.41)	11.6	241.5	
1448			4.77	5.71	230.5	4.09	11.7	259.9	
1452			4.80	5.74	224.4	4.01	11.5	268.8	
1456			4.74	5.67	227.3	(0.32)	11.5	279.8	

Ferrous Iron Field Test 3.0 mg/L or ☐ Not Detected LaMotte Turbidimeter Reading: 0.32 NTU

Sampling Data

Sample No: SW-TP3-East2-072220 Depth of tubing/distance from shore:

Date Collected (mo/dy/yr): 7/22/20 Time Sample Collected: 1500 Weather: Sunny, 75°F

Duplicate Sample No: — Time Duplicate Sample Collected: —

Type: ☐ Groundwater ☒ Surface Water ☐ Porewater (6"/red, 12"/green, 36"/black) Sample: ☒ Unfiltered ☒ Filtered DOC Filter Type: ☒ disposable 0.45-um ☐

Sample Collected with: ☐ Grab ☒ Pump Other: Type: ☒ Peristaltic ☐ Bladder Other: Flow Rate (L/min):

Water Quality Instrument Data Collected with: Type: ☒ YSI Pro DSS ☐ Horiba U-50 ☒ LaMotte (Turbidity only) Other:

Sample Decon Procedure: Sample collected with: ☒ disposable and/or dedicated silicon and poly tubing ☐ Tubing replaced

Sample Description (Color, Turbidity, Odor, Other): Clear, no discoloration

Sample Analyses

Total Metals	(HNO3) ☒	TDS/TSS	(unpres) ☒	TOC	(H2SO4) ☒	Cl/SO4/NO3	(unpres) ☒		( ) ☐
Diss Metals (filtered)	(HNO3) ☐	Alkalinity (no headspace)	(unpres) ☒	DOC (filtered)	(H2SO4) ☒	Hardness	(calculated) ☒		( ) ☐

Additional Information

Type of Sample Containers:	Preservative	Quantity:	QA/QC Samples:	Comments:
1000 mL HDPE	none	2	☐ Field Duplicate	
500 mL HDPE	HNO3		☐ MS/MSD	
500 mL HDPE	none	1	☐ Field Blank	
250 mL Glass Amber	H2SO4	2	☐ Rinsate	

Signature: [signature] Date: 7/22/20

Holden Mine Site

Performance Standards Verification
2020 Annual Compliance Assessment Report

Appendix A
Summer and Fall 2020 Field Forms

Attachment A.2
Fall 2020 Field Forms

DRAFT

GROUNDWATER, POREWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name: RT-Holden Mine Date of Collection: 9/26/20

Field Event: ~~RI~~ FALL-2020 Field Personnel: B. Beaulieu

Purge Data

Location ID: RC-1

Ecology Tag

Diameter: Screened interval:

Total Depth: Transducer S/N:

Location Condition (Well damage, creek level, iron staining, fire damage): Creek is relatively high following rain this week

Secure: ☐ Yes ☐ No Depth Sounder decontaminated prior to use: ☐ Yes ☐ No

Photograph Numbers:

One Casing Volume (gal):

Depth of water (from TOC or staff gauge): Time:

After 5 minutes of purging (from TOC):

Begin purge (time): End purge (time):

Volume purged: Purge water disposal method:

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Linear Ft.)
¾	1.050"	0.804"	0.0229	0.2916
2"	2.375"	2.067"	0.17	1.45
2.5"	2.875"	2.445"	0.255	2.129
4"	4.500"	4.026"	0.66	5.51

Time	DTW (decimal ft below TOC)	Vol. Purged (L/gal)	pH (s.u.)	DO (mg/L)	Specific Conductivity (µS/cm)	LaMotte Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments
14:20	—	—	6.97	10.38	32.1	1.21	8.2	203.3	
14:25	—	—	6.67	10.41	32.1	1.21	8.2	184.7	

Ferrous Iron Field Test mg/L or ☑ Not Detected

Sampling Data

Sample No: RC-1-SW-092620 Depth of tubing/distance from shore: 10' from shore

Date Collected (mo/dy/yr): 9/26/20 Time Sample Collected: 1432 Weather: light rain

Duplicate Sample No: Time Duplicate Sample Collected:

Type: ☐ Groundwater ☑ Surface Water ☐ Porewater (6"/red, 12"/green, 36"/black) Sample: ☑ Unfiltered ☐ Filtered Filter Type: ☐ disposable 0.45-µm ☐

Sample Collected with: ☐ Grab ☑ Pump Other: Type: ☑ Peristaltic ☐ Bladder Other: Flow Rate (L/min): .5 L/min

Water Quality Instrument Data Collected with: Type: : ☑ YSI Pro DSS ☐ Horiba U-50 : ☑ LaMotte (Turbidity only) Other:

Sample Decon Procedure: Sample collected with: ☑ disposable tubing ☐ dedicated silicon and poly tubing ☐ Tubing replaced

Sample Description (Color, Turbidity, Odor, Other): Clear

Sample Analyses

Total Metals	(HNO3)	☑	TDS/TSS	(unpres)	☑	TOC	(H2SO4)	☑	Cl/SO4/NO3	(unpres)	☐		( ) ☐
Diss Metals (filtered)	(HNO3)	☐	Alkalinity (no headspace)	(unpres)	☑	DOC (filtered)	(H2SO4)	☑	Hardness	(calculated)	☑		( ) ☐

Additional Information

Type of Sample Containers:	Preservative	Quantity:	QA/QC Samples:	Comments:
1000 mL HDPE	none	2	☐ Field Duplicate	
500 mL HDPE	HNO3	1	☐ MS/MSD	
500 mL HDPE	none		☐ Field Blank	
250 mL Glass Amber	H2SO4	2	☐ Rinsate	

Signature: **Date:** 9/26/20

GROUNDWATER, POREWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name: RT-Holden Mine Date of Collection: 9-26-2020

Field Event: Fall 2020 Field Personnel: RC + TS

Purge Data

Location ID: RC-4

Ecology Tag

Diameter: Screened Interval:

Total Depth: Transducer S/N:

Location Condition (Well damage, creek level, iron staining, fire damage):

Secure: ☐ Yes ☐ No Depth Sounder decontaminated prior to use: ☐ Yes ☐ No

Photograph Numbers:

One Casing Volume (gal):

Depth of water (from TOC or staff gauge): 0.85 (SG) Time: 1332

After 5 minutes of purging (from TOC):

Begin purge (time): 1332 End purge (time): 1345

Volume purged: / Purge water disposal method: /

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
¾	1.050"	0.804"	0.0229	0.2916
2"	2.375"	2.067"	0.17	1.45
2.5"	2.875"	2.445"	0.255	2.129
4"	4.500"	4.026"	0.66	5.61

Time	DTW (decimal ft below TOC)	Vol. Purged (L / gal)	pH (s.u.)	DO (mg/L)	Specific Conductivity (uS/cm)	LaMotte Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments
1335	/	/	8.10	10.66	32.600	1.72	8.6	169.0	
1338	/	/	8.13	10.91	32.44	1.27	8.5	168.8	
1341	/	/	8.14	11.64	32.50	1.44	8.5	168.4	

Ferrous Iron Field Test _____ mg/L or ☑ Not Detected

Sampling Data

Sample No: RC-4-SW-092620 Depth of tubing/distance from shore: ~2'

Date Collected (mo/dy/yr): 9-26-2020 Time Sample Collected: 1345 Weather:

Duplicate Sample No: Time Duplicate Sample Collected:

Type: ☐ Groundwater ☑ Surface Water ☐ Porewater (6"/red, 12"/green, 36"/black) Sample: ☐ Unfiltered ☐ Filtered Filter Type: ☑ disposable 0.45-µm ☐ _____

Sample Collected with: ☐ Grab ☑ Pump Other: Type: ☑ Peristaltic ☐ Bladder Other: Flow Rate (L/min):

Water Quality Instrument Data Collected with: Type: : ☐ YSI Pro DSS ☐ Horiba U-50 : ☐ LaMotte (Turbidity only) Other:

Sample Decon Procedure: Sample collected with: ☑ disposable tubing ☐ dedicated silicon and poly tubing ☐ Tubing replaced

Sample Description (Color, Turbidity, Odor, Other): Clear odorless

Sample Analyses

Total Metals	(HNO3) ☑	TDS/TSS	(unpres) ☐	TOC	(H2SO4) ☑	Cl/SO4/NO3	(unpres.) ☐		( ) ☐
Diss Metals (filtered)	(HNO3) ☐	Alkalinity (no headspace)	(unpres) ☑	DOC (filtered)	(H2SO4) ☐	Hardness	(calculated) ☐		( ) ☐

Additional Information

Type of Sample Containers:	Preservative	Quantity:	QA/QC Samples:	Comments:
1000 mL HDPE	none	4	☐ Field Duplicate	
500 mL HDPE	HNO3	2	☑ MS/MSD	Staff gauge = 0.85 Feet
500 mL HDPE	none	2	☐ Field Blank	
250 mL Glass Amber	H2SO4	4	☐ Rinsate	
		12		

Signature: Ryan Crosby Date: 9-26-2020

GROUNDWATER, POREWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name: RT-Holden Mine Date of Collection: 9/23/20

Field Event: Fall 2020 Field Personnel: B. Beaulieu

Purge Data

Location ID: RC 5A

Ecology Tag: —

Diameter: — Screened Interval: —

Total Depth: — Transducer S/N: —

Location Condition (Well damage, creek level, iron staining, fire damage): Creek rising

Secure: ☐ Yes ☐ No Depth Sounder decontaminated prior to use: ☐ Yes ☐ No

Photograph Numbers: —

One Casing Volume (gal): —

Depth of water (from TOC or staff gauge): — Time: —

After 5 minutes of purging (from TOC): —

Begin purge (time): — End purge (time): —

Volume purged: — Purge water disposal method: —

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
¾	1.050"	0.804"	0.0229	0.2916
2"	2.375"	2.067"	0.17	1.45
2.5"	2.875"	2.445"	0.255	2.129
4"	4.500"	4.026"	0.66	5.51

Time	DTW (decimal ft below TOC)	Vol. Purged L / gal	pH (s.u.)	DO (mg/L)	Specific Conductivity (uS/cm)	LaMotte Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments
15[illegible]	—	—	6.91	10.08	64.6	1.19	9.9	241.4	—

Ferrous Iron Field Test ____ mg/L or ☒ Not Detected

Sampling Data

Sample No: RC-5A-SW-092320 Depth of tubing/distance from shore: —

Date Collected (mo/dy/yr): 9/23/20 Time Sample Collected: 15:00 Weather: Heavy Rain

Duplicate Sample No: — Time Duplicate Sample Collected: —

Type: ☐ Groundwater ☒ Surface Water ☐ Porewater (6"/red, 12"/green, 36"/black) Sample: ☐ Unfiltered ☒ Filtered Filter Type: ☐ disposable 0.45-µm ☐ ____

Sample Collected with: ☐ Grab ☒ Pump Other: ____ Type: ☒ Peristaltic ☐ Bladder Other: ____ Flow Rate (L/min): ____

Water Quality Instrument Data Collected with: Type: : ☒ YSI Pro DSS ☐ Horiba U-50 : ☐ LaMotte (Turbidity only) Other: ____

Sample Decon Procedure: Sample collected with: ☒ disposable tubing ☐ dedicated silicon and poly tubing ☐ Tubing replaced

Sample Description (Color, Turbidity, Odor, Other): Clear

Sample Analyses

Total Metals	(HNO3) ☒	TDS/TSS	(unpres) ☒	TOC	(H2SO4) ☒	Cl/SO4/NO3	(unpres) ☒	____	(____) ☐
Diss Metals (filtered)	(HNO3) ☐	Alkalinity (no headspace)	(unpres) ☒	DOC (filtered)	(H2SO4) ☐	Hardness	(calculated) ☐	____	(____) ☐

Additional Information

Type of Sample Containers:	Preservative	Quantity:	QA/QC Samples:	Comments:
1000 mL HDPE	none	2	☐ Field Duplicate	
500 mL HDPE	HNO3	1	☐ MS/MSD	
500 mL HDPE	none	1	☐ Field Blank	
250 mL Glass Amber	H2SO4	2	☐ Rinsate	

Signature: [signature] Date: 9/23/20

GROUNDWATER, POREWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name: RT-Holden Mine Date of Collection: 9/27/20

Field Event: Fall 2020 Field Personnel: G.C. / B.B

Purge Data

Location ID: RC-6-SW

Ecology Tag

Diameter: Screened Interval:

GPS:

Total Depth: Transducer S/N:

Location Condition (Well damage, creek level, iron staining, fire damage): N/A

Secure: ☐ Yes ☐ No Depth Sounder decontaminated prior to use: ☐ Yes ☐ No N/A

Photograph Numbers:

One Casing Volume (gal): N/A

Depth of water (from top of casing): 0.75 Staff Gauge

After 5 minutes of purging (from TOC):

Begin purge (time): 1009 End purge (time):

Volume purged: Purge water disposal method:

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
¾	1.050"	0.804"	0.0229	0.2916
2"	2.375"	2.067"	0.17	1.45
2.5"	2.875"	2.445"	0.255	2.129
4"	4.500"	4.026"	0.66	5.51

Time	DTW (decimal ft below TOC)	Vol. Purged (L/gal)	pH (s.u.)	DO (mg/L)	Specific Conductivity (µS/cm)	Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments
1010	N/A	N/A	7.15	11.12	30.8	1.76	6.7	105.7	
	↓	↓							

Ferrous Iron Field Test mg/L or ☐ Not Detected LaMotte Turbidimeter Reading: NTU

Sampling Data

Sample No: RC-6-SW-092720 Depth of tubing/distance from shore: 6 feet

Date Collected (mo/dy/yr): 9/27/20 Time Sample Collected: 1010 Weather: SUNNY 45°

Duplicate Sample No: Time Duplicate Sample Collected:

Type: ☐ Groundwater ☒ Surface Water ☐ Porewater (6"/red, 12"/green, 36"/black) Sample: ☐ Unfiltered ☒ Filtered Filter Type: ☐ disposable 0.45-µm ☐

Sample Collected with: ☐ Grab ☒ Pump Other: Type: ☒ Peristaltic ☐ Bladder Other: Flow Rate (L/min): 0.25

Water Quality Instrument Data Collected with: Type: ☒ YSI Pro DSS ☐ Horiba U-50 ; ☒ LaMotte (Turbidity only) Other:

Sample Decon Procedure: Sample collected with: ☒ disposable and/or dedicated silicon and poly tubing ☐ Tubing replaced

Sample Description (Color, Turbidity, Odor, Other): Clear No Odor

Sample Analyses

Total Metals	(HNO3) ☒	TDS/TSS	(unpres) ☒	TOC	(H2SO4) ☒	Cl/SO4/NO3	(unpres) ☐		( ) ☐
Diss Metals (filtered)	(HNO3) ☐	Alkalinity (no headspace)	(unpres) ☒	DOC (filtered)	(H2SO4) ☒	Hardness	(calculated) ☐		( ) ☐

Additional Information

Type of Sample Containers:	Preservative	Quantity:	QA/QC Samples:	Comments:
1000 mL HDPE	none	2	☐ Field Duplicate	
500 mL HDPE	HNO3	1	☐ MS/MSD	
500 mL HDPE	none	1	☐ Field Blank	
250 mL Glass Amber	H2SO4	2	☐ Rinsate	

Signature: Date: 9/27/20

GROUNDWATER, POREWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name: RT-Holden Mine Date of Collection: 9-20-2020

Field Event: Fall 2020 Field Personnel: RC - TS

Purge Data

Location ID: RC-7

Ecology Tag

Diameter: Screened Interval:

GPS:

Total Depth: Transducer S/N:

Location Condition (Well damage, creek level, iron staining, fire damage):

Secure: ☐ Yes ☐ No Depth Sounder decontaminated prior to use: ☐ Yes ☐ No

Photograph Numbers:

One Casing Volume (gal):

Depth of water (from top of casing):

After 5 minutes of purging (from TOC):

Begin purge (time): 1490 End purge (time): 1515

Volume purged: Purge water disposal method: Ground

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
¾	1.050"	0.804"	0.0229	0.2916
2"	2.375"	2.067"	0.17	1.45
2.5"	2.875"	2.445"	0.255	2.129
4"	4.500"	4.026"	0.66	5.51

Time	DTW (decimal ft below TOC)	Vol. Purged L / gal	pH (s.u.)	DO (mg/L)	Specific Conductivity (µS/cm)	Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments
1495	\	\	8.23	10.85	52.8	1.80	8.3	163.5	
1498	\	\	8.21	10.82	52.8	1.75	8.3	161.6	
1451	\	\	8.20	10.83	52.8	1.75	8.3	159.5	

Ferrous Iron Field Test mg/L or ☑ Not Detected LaMotte Turbidimeter Reading: NTU

Sampling Data

Sample No: RC-7-SW-092020 Depth of tubing/distance from shore: 2'

Date Collected (mo/dy/yr): 9-20-2020 Time Sample Collected: 1500 Weather: RAIN!!! ☹

Duplicate Sample No: RC-107-SW-092020 Time Duplicate Sample Collected: 1505

Type: ☐ Groundwater ☑ Surface Water ☐ Porewater (6"/red, 12"/green, 36"/black) Sample: ☐ Unfiltered ☐ Filtered Filter Type: ☑ disposable 0.45-µm ☐

Sample Collected with: ☐ Grab ☑ Pump Other: Type: ☐ Peristaltic ☐ Bladder Other: Flow Rate (L/min):

Water Quality Instrument Data Collected with: Type: ☑ YSI Pro DSS ☐ Horiba U-50 ☐ LaMotte (Turbidity only) Other:

Sample Decon Procedure: Sample collected with ☐ disposable and/or dedicated silicon and poly tubing ☐ Tubing replaced

Sample Description (Color, Turbidity, Odor, Other): Clear, odorless

Sample Analyses

Total Metals	(HNO3)	☑	TDS/TSS	(unpres)	☑	TOC	(H2SO4)	☑	Cl/SO4/NO3	(unpres) ☐	( ) ☐
Diss Metals (filtered)	(HNO3)	☐	Alkalinity (no headspace)	(unpres)	☑	DOC (filtered)	(H2SO4)	☐	Hardness	(calculated) ☐	( ) ☐

Additional Information

Type of Sample Containers:	Preservative	Quantity:	QA/QC Samples:	Comments:
1000 mL HDPE	none	4	☑ Field Duplicate	
500 mL HDPE	HNO3	2	☐ MS/MSD	
500 mL HDPE	none	2	☐ Field Blank	
250 mL Glass Amber	H2SO4	4	☐ Rinsate	

Signature: Ryan Croty Date: 9-20-2020

GROUNDWATER, POREWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name: RT-Holden Mine Date of Collection: 9/26/20

Field Event: Fall 2020 Field Personnel: Nick Bendo & Glen Wallace

Purge Data

Location ID: RC-10

Ecology Tag: N/A

Diameter: N/A Screened Interval: N/A

Total Depth: N/A Transducer S/N: N/A

Location Condition (Well damage, creek level, iron staining, fire damage): Creek low

Secure: ☐ Yes ☐ No Depth Sounder decontaminated prior to use. ☐ Yes ☐ No

Photograph Numbers:

One Casing Volume (gal):

Depth of water (from TOC or staff gauge): — Time: —

After 5 minutes of purging (from TOC): —

Begin purge (time): — End purge (time): —

Volume purged: — Purge water disposal method: —

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
¼	1.050"	0.804"	0.0229	0.2816
2"	2.375"	2.067"	0.17	1.45
2.5"	2.875"	2.445"	0.255	2.129
4"	4.500"	4.026"	0.66	5.51

Time	DTW (decimal ft below TOC)	Vol. Purged L / gal	pH (s.u.)	DO (mg/L)	Specific Conductivity (uS/cm)	LaMotte Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments
1401	—	—	6.64	10.54	50.0	0.89	8.8	98.1	

Ferrous Iron Field Test _____ mg/L or ☒ Not Detected

Sampling Data

Sample No: RC-10-SW-092620 Depth of tubing/distance from shore: 10 ft

Date Collected (mo/dy/yr): 9/26/20 Time Sample Collected: 1400 Weather: showers

Duplicate Sample No: Time Duplicate Sample Collected:

Type: ☐ Groundwater ☒ Surface Water ☐ Porewater (6"/red, 12"/green, 36"/black) Sample: ☒ Unfiltered ☐ Filtered Filter Type: ☐ disposable 0.45-um ☐ _____

Sample Collected with: ☐ Grab ☒ Pump Other: Type: ☒ Peristaltic ☐ Bladder Other: Flow Rate (L/min):

Water Quality Instrument Data Collected with: Type: ; ☒ YSI Pro DSS ☐ Horiba U-50 ; ☒ LaMotte (Turbidity only) Other:

Sample Decon Procedure: Sample collected with: ☒ disposable tubing ☐ dedicated silicon and poly tubing ☐ Tubing replaced

Sample Description (Color, Turbidity, Odor, Other): clear

Sample Analyses

Total Metals	(HNO3) ☒	TDS/TSS	(unpres) ☒	TOC	(H2SO4) ☒	Cl/SO4/NO3	(unpres) ☒		☐
Diss Metals (filtered)	(HNO3) ☐	Alkalinity (no headspace)	(unpres) ☒	DOC (filtered)	(H2SO4) ☒	Hardness	(calculated) ☐		☐

Additional Information

Type of Sample Containers:	Preservative	Quantity:	QA/QC Samples:	Comments:
1000 mL HDPE	none	2	☐ Field Duplicate	
500 mL HDPE	HNO3	1	☐ MS/MSD	
500 mL HDPE	none	1	☐ Field Blank	
250 mL Glass Amber	H2SO4	2	☐ Rinsate	

Signature: [signature] Date: 9/26/20

GROUNDWATER, POREWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name: RT-Holden Mine

Date of Collection: 9/26/20

Field Event: Fall 2020

Field Personnel: Nick Wold & Glen Wallace

Purge Data

Location ID: ~~HD-15E~~ RC-15E

Ecology Tag N/A

Diameter: N/A Screened Interval: N/A

GPS:

Total Depth: N/A Transducer S/N: N01C

Location Condition (Well damage, creak level, iron staining, fire damage): N/A

Secure: ☐ Yes ☐ No Depth Sounder decontaminated prior to use: ☐ Yes ☐ No

Photograph Numbers:

One Casing Volume (gal):

Depth of water (from top of casing): N/A

After 5 minutes of purging (from TOC): N/A

Begin purge (time): N/A End purge (time): N/A

Volume purged: N/A Purge water disposal method: N/A

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Linear Ft.)
¾	1.050"	0.804"	0.0229	0.2916
2"	2.375"	2.067"	0.17	1.45
2.5"	2.875"	2.445"	0.255	2.129
4"	4.500"	4.026"	0.66	5.51

Time	DTW (decimal ft below TOC)	Vol. Purged L / gal	pH (s.u.)	DO (mg/L)	Specific Conductivity (uS/cm)	Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments
1302	N/A	N/A	6.47	10.50	49.9	1.83	8.9	97.3	

Ferrous Iron Field Test mg/L or ☒ Not Detected LaMotte Turbidimeter Reading: NTU

Sampling Data

Sample No: ~~HD-15E-SW-092620~~ RC-15E-SW-092620 Depth of tubing/distance from shore: 4 ft in Fe+H2O

Date Collected (mo/dy/yr): 9/26/20 Time Sample Collected: 1300 Weather: cloudy

Duplicate Sample No: Time Duplicate Sample Collected:

Type: ☐ Groundwater ☒ Surface Water ☐ Porewater (6"/red, 12"/green, 36"/black) Sample: ☒ Unfiltered ☒ Filtered Filter Type: ☒ disposable 0.45-µm ☐

Sample Collected with: ☐ Grab ☒ Pump Other: Type: ☒ Peristaltic ☐ Bladder Other: Flow Rate (L/min):

Water Quality Instrument Data Collected with: Type: : ☒ YSI Pro DSS ☐ Horiba U-50 : ☒ LaMotte (Turbidity only) Other:

Sample Decon Procedure: Sample collected with: ☐ disposable and/or dedicated silicon and poly tubing ☐ Tubing replaced

Sample Description (Color, Turbidity, Odor, Other): clear

Sample Analyses

Total Metals	(HNO3) ☒	TDS/TSS	(unpres) ☒	TOC	(H2SO4) ☒	Cl/SO4/NO3	(unpres) ☒		( ) ☐
Diss Metals (filtered)	(HNO3) ☐	Alkalinity (no headspace)	(unpres) ☒	DOC (filtered)	(H2SO4) ☒	Hardness	(calculated) ☐		( ) ☐

Additional Information

Type of Sample Containers:	Preservative	Quantity:	QA/QC Samples:	Comments:
1000 mL HDPE	none	2	☐ Field Duplicate	
500 mL HDPE	HNO3	1	☐ MS/MSD	
500 mL HDPE	none	1	☐ Field Blank	
250 mL Glass Amber	H2SO4	2	☐ Rinsate	

Signature: Nick Wold Date: 9/26/20

GROUNDWATER, POREWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name: RT-Holden Mine Date of Collection: 9-26-2020

Field Event: Fall 2020 Field Personnel: RC + TJ

Purge Data

Location ID: RC-16

Ecology Tag

Diameter: Screened Interval:

GPS:

Total Depth: Transducer S/N:

Location Condition (Well damage, creek level, iron staining, fire damage):

Secure: ☐ Yes ☐ No Depth Sounder decontaminated prior to use: ☐ Yes ☐ No

Photograph Numbers:

One Casing Volume (gal):

Depth of water (from top of casing):

After 5 minutes of purging (from TOC): ✓

Begin purge (time): 1555 End purge (time):

Volume purged: Purge water disposal method: Gun

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Linear Ft.)
¾	1.050"	0.804"	0.0229	0.2916
2"	2.375"	2.067"	0.17	1.45
2.5"	2.875"	2.445"	0.255	2.179
4"	4.500"	4.026"	0.66	5.51

Time	DTW (decimal ft below TOC)	Vol. Purged L / gal	pH (s.u.)	DO (mg/L)	Specific Conductivity (µS/cm)	Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments
1558	\	\	8.18	11.01	30.00	1.30	7.3	100.5	
1603	\	\	8.22	11.07	30.5	1.25	7.2	104.0	
1608	\	\	8.22	11.06	30.5	1.20	7.2	104.7	

Ferrous Iron Field Test mg/L or ☑ Not Detected LaMotte Turbidimeter Reading: NTU

Sampling Data

Sample No. RC-16-Sw-092620 Depth of tubing/distance from shore. 2'

Date Collected (mo/dy/yr): 9-26-2020 Time Sample Collected: 1620 Weather: RAIN

Duplicate Sample No: Time Duplicate Sample Collected.

Type: ☐ Groundwater ☑ Surface Water ☐ Porewater (5"/red, 12"/green, 36"/black) Sample: ☐ Unfiltered ☐ Filtered Filter Type: ☑ disposable 0.45-µm ☐

Sample Collected with: ☐ Grab ☑ Pump Other: Type: ☐ Peristaltic ☐ Bladder Other: Flow Rate (L/min):

Water Quality Instrument Data Collected with: Type: : ☐ YSI Pro DSS ☐ Horiba U-50 : ☐ LaMotte (Turbidity only) Other:

Sample Decon Procedure: Sample collected with: ☐ disposable and/or dedicated silicon and poly tubing ☐ Tubing replaced

Sample Description (Color, Turbidity, Odor, Other): Clear odorless

Sample Analyses

Total Metals	(HNO3) ☐	TDS/TSS	(unpres) ☐	TOC	(H2SO4) ☑	Cl/SO4/NO3	(unpres) ☐		☐
Diss Metals (filtered)	(HNO3) ☐	Alkalinity (no headspace)	(unpres) ☑	DOC (filtered)	(H2SO4) ☐	Hardness	(calculated) ☐		☐

Additional Information

Type of Sample Containers:	Preservative	Quantity:	QA/QC Samples:	Comments:
1000 mL HDPE	none	2	☐ Field Duplicate	
500 mL HDPE	HNO3	1	☐ MS/MSD	
500 mL HDPE	none	1	☐ Field Blank	
250 mL Glass Amber	H2SO4	2	☐ Rinsate	

Signature: Ryan Cross Date: 9-26-2020

GROUNDWATER, POREWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name: RT-Holden Mine Date of Collection: 9-27-20

Field Event: Fall 2020 Field Personnel: GW / NW

Purge Data

Location ID: RC-24 Stickup Location Condition (Well damage, creek level, iron staining, fire damage): N/A

Ecology Tag: —

Diameter: — Screened Interval: —

GPS: —

Total Depth: — Transducer S/N: —

Secure: ☐ Yes ☐ No Depth Sounder decontaminated prior to use: ☐ Yes ☐ No N/A

Photograph Numbers: N/A

One Casing Volume (gal): —

Depth of water (from top of casing): N/A

After 5 minutes of purging (from TOC): N/A

Begin purge (time): 11:11 End purge (time): 1115

Volume purged: — Purge water disposal method: Ground

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
¾	1.050"	0.804"	0.0229	0.2916
2"	2.375"	2.067"	0.17	1.45
2.5"	2.875"	2.445"	0.255	2.129
4"	4.500"	4.026"	0.66	5.51

Time	DTW (decimal ft below TOC)	Vol. Purged L / gal	pH (s.u.)	DO (mg/L)	Specific Conductivity (uS/cm)	Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments
1113	N/A	N/A	7.12 7.10	11.00	33.1	1.64	7.5	77.0	

Ferrous Iron Field Test — mg/L or ☒ Not Detected LaMotte Turbidimeter Reading: — NTU

Sampling Data

Sample No: RC-24-SW-092720 Depth of tubing/distance from shore: —

Date Collected (mo/dy/yr): 9-27-20 Time Sample Collected: 1115 Weather: Sunny ~55°

Duplicate Sample No: — Time Duplicate Sample Collected: —

Type: ☐ Groundwater ☑ Surface Water ☐ Porewater (6"/red, 12"/green, 36"/black) Sample: ☐ Unfiltered ☑ Filtered Filter Type: ☑ disposable 0.45-um ☐ —

Sample Collected with: ☐ Grab ☑ Pump Other: — Type: ☐ Peristaltic ☐ Bladder Other: — Flow Rate (L/min): 0.3

Water Quality Instrument Data Collected with: Type: ☑ YSI Pro DSS ☐ Horiba U-50 ☑ LaMotte (Turbidity only) Other: —

Sample Decon Procedure: Sample collected with: ☑ disposable and/or dedicated silicon and poly tubing ☐ Tubing replaced

Sample Description (Color, Turbidity, Odor, Other): Clear

Sample Analyses

Total Metals	(HNO3) ☑	TDS/TSS	(unpres) ☑	TOC	(H2SO4) ☑	Cl/SO4/NO3	(unpres) ☑	—	( ) ☐
Diss Metals (filtered)	(HNO3) ☐	Alkalinity (no headspace)	(unpres) ☑	DOC (filtered)	(H2SO4) ☑	Hardness	(calculated) ☐	—	( ) ☐

Additional Information

Type of Sample Containers:	Preservative	Quantity:	QA/QC Samples:	Comments:
1000 mL HDPE	none	2	☐ Field Duplicate	
500 mL HDPE	HNO3	1	☐ MS/MSD	
500 mL HDPE	none	1	☐ Field Blank	
250 mL Glass Amber	H2SO4	2	☐ Rinsate	

Signature: — Date: 9/22/20

GROUNDWATER, POREWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name: RT-Holden Mine Date of Collection: 9/22/2020

Field Event: Fall Field Personnel: Ryan Crotty

Purge Data

Location ID: SG-7-SW

Ecology Tag

Diameter: Screened Interval:

GPS:

Total Depth: Transducer S/N:

Location Condition (Well damage, creek level, iron staining, fire damage):

Secure: ☐ Yes ☐ No Depth Sounder decontaminated prior to use: ☐ Yes ☐ No

Photograph Numbers:

One Casing Volume (gal):

Depth of water (from top of casing): N/A

After 5 minutes of purging (from TOC): N/A

Begin purge (time): 1547 End purge (time): 1620

Volume purged: 8 Purge water disposal method: ground

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
¼	1.050"	0.804"	0.0229	0.2916
2"	2.375"	2.067"	0.17	1.45
2.5"	2.875"	2.445"	0.255	2.129
4"	4.500"	4.026"	0.66	5.51

Time	DTW (decimal ft below TOC)	Vol. Purged L / gal	pH (s.u.)	DO (mg/L)	Specific Conductivity (µS/cm)	Turbidity (NTU)	Temp (C)	ORP (mV)	Comments
1552		3	6.62	10.15	40.2	4.2	11.2	163.5	
1557		4	6.65	10.13	40.2	4.0	11.0	139.5	
1603		5	6.71	10.17	10.2	4.4	10.9	137.9	
1606		6	6.78	10.17	40.2	3.9	11.0	136.2	

Ferrous Iron Field Test mg/L or ☑ Not Detected LaMotte Turbidimeter Reading: NTU

Sampling Data

Sample No: SG-7-SW-092220 Depth of tubing/distance from shore: 3' from Shore

Date Collected (mo/dy/yr): 9/22/2020 Time Sample Collected: 1612 Weather: partly sunny

Duplicate Sample No: Time Duplicate Sample Collected:

Type: ☐ Groundwater ☑ Surface Water ☐ Porewater (6"/red, 12"/green, 36"/black) Sample: ☐ Unfiltered ☐ Filtered Filter Type: ☐ disposable 0.45-µm ☐

Sample Collected with: ☐ Grab ☐ Pump Other: Type: ☑ Peristaltic ☐ Bladder Other: Flow Rate (L/min).

Water Quality Instrument Data Collected with: Type: ☑ YSI Pro DSS ☐ Horiba U-50 : ☑ LaMotte (Turbidity only) Other:

Sample Decon Procedure: Sample collected with ☐ disposable and/or dedicated silicon and poly tubing ☐ Tubing replaced

Sample Description (Color, Turbidity, Odor, Other): Clear, odorless

Sample Analyses

Total Metals	(HNO3) ☑	TDS/TSS	(unpres) ☑	TOC	(H2SO4) ☑	Cl/SO4/NO3	(unpres) ☐		( ) ☐
Diss Metals (filtered)	(HNO3) ☐	Alkalinity (no headspace)	(unpres) ☑	DOC (filtered)	(H2SO4) ☑	Hardness	(calculated) ☐		( ) ☐

Additional Information

Type of Sample Containers:	Preservative	Quantity:	QA/QC Samples:	Comments:
1000 mL HDPE	none	2	☐ Field Duplicate	down river Staff gauge
500 mL HDPE	HNO3	1	☐ MS/MSD	0.12 feet
500 mL HDPE	none	1	☐ Field Blank	
250 mL Glass Amber	H2SO4	2	☐ Rinsate	SG-7 = 1 Foot

Signature: Ryan Crotty Date: 9/22/2020

GROUNDWATER, POREWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name: RT-Holden Mine Date of Collection: 9/26/20

Field Event: Field Personnel: G Wallace

Purge Data

Location ID: SGB-SW-092620

Ecology Tag N/A

Diameter: — Screened Interval: —

Total Depth: — Transducer S/N: —

Location Condition (Well damage, creek level, iron staining, fire damage): Good

Secure: ☐ Yes ☐ No Depth Sounder decontaminated prior to use: ☐ Yes ☐ No N/A

Photograph Numbers:

One Casing Volume (gal):

Depth of water (from TOC or staff gauge): 0.8Ft Time: 745

After 5 minutes of purging (from TOC):

Begin purge (time): End purge (time):

Volume purged: Purge water disposal method: Pour

Volume of Schedule 40 PVC Pipe				
Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
¾	1.050"	0.804"	0.0229	0.2916
2"	2.375"	2.067"	0.17	1.45
2.5"	2.875"	2.445"	0.255	2.129
4"	4.500"	4.026"	0.66	5.51

Time	DTW (decimal ft below TOC)	Vol. Purged (L/gal)	pH (s.u.)	DO (mg/L)	Specific Conductivity (uS/cm)	Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments
820	—	Instrm	6.22	10.55	32.5	1.7	7.3	72.3	
830	—	"	6.24	10.56	32.5	1.7	7.3	70.8	YSI DTW

Ferrous Iron Field Test mg/L or ☑ Not Detected

Sampling Data

Sample No: SGB-SW-092620 Depth of tubing/distance from shore: ~8Ft into Water

Date Collected (mo/dy/yr): 9-26-20 Time Sample Collected: 0820 Weather: Clear 45F

Duplicate Sample No: — Time Duplicate Sample Collected: —

Type: ☐ Groundwater ☑ Surface Water ☐ Porewater (6"/red, 12"/green, 36"/black) Sample: ☐ Unfiltered ☑ Filtered Filter Type: ☑ disposable 0.45-µm ☐ _____

Sample Collected with: ☐ Grab ☑ Pump Other: Type: ☑ Peristaltic ☐ Bladder Other: Flow Rate (L/min):

Water Quality Instrument Data Collected with: Type: ☑ YSI Pro DSS ☐ Horiba U-50 ☐ LaMotte (Turbidity only) Other:

Sample Decon Procedure: Sample collected with: ☑ disposable tubing ☐ dedicated silicon and poly tubing ☐ Tubing replaced

Sample Description (Color, Turbidity, Odor, Other): Clear.

Sample Analyses

Total Metals	(HNO3) ☑	TDS/TSS	(unpres) ☑	TOC	(H2SO4) ☑	Cl/SO4/NO3	(unpres) ☑		( ) ☐
Diss Metals (filtered)	(HNO3) ☐	Alkalinity (no headspace)	(unpres) ☑	DOC (filtered)	(H2SO4) ☑	Hardness	(calculated) ☐		( ) ☐

Additional Information

Type of Sample Containers:	Preservative	Quantity:	QA/QC Samples:	Comments:
1000 mL HDPE	none	2	☐ Field Duplicate	
500 mL HDPE	HNO3	1	☐ MS/MSD	
500 mL HDPE	none	1	☐ Field Blank	
250 mL Glass Amber	H2SO4	2	☐ Rinsate	
		(6)		

Signature: GSW Date: 9/26/20

GROUNDWATER, POREWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name: RT-Holden Mine Date of Collection: 9/27/20

Field Event: Fall 2020 Field Personnel: G. Cisneros

Purge Data

Location ID: SG-9-SW

Ecology Tag

Diameter: Screened Interval:

GPS:

Total Depth: Transducer S/N:

Location Condition (Well damage, creek level, iron staining, fire damage): N/A

Secure: ☐ Yes ☐ No Depth Sounder decontaminated prior to use: ☐ Yes ☐ No

Photograph Numbers.

One Casing Volume (gal): N/A

Depth of water (from top of casing): 1.40 Staff Gauge

After 5 minutes of purging (from TOC): N/A

Begin purge (time): 0920 End purge (time):

Volume purged: Purge water disposal method: Ground

Volume of Schedule 40 PVC Pipe				
Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
¾	1.050"	0.804"	0.0229	0.2916
2"	2.375"	2.067"	0.17	1.45
2.5"	2.875"	2.445"	0.255	2.129
4"	4.500"	4.026"	0.66	5.51

Time	DTW (decimal ft below TOC)	Vol. Purged L / gal	pH (s.u.)	DO (mg/L)	Specific Conductivity (µS/cm)	Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments
0922	N/A		6.82	11.16	68.0	~~3~~ 1.40	6.4	116.8	
	↓								

Ferrous Iron Field Test mg/L or ☒ Not Detected LaMotte Turbidimeter Reading: NTU

Sampling Data

Sample No: SG-9-SW-092720 Depth of tubing/distance from shore: 8'

Date Collected (mo/dy/yr): Time Sample Collected: 0923 Weather: Sunny

Duplicate Sample No: Time Duplicate Sample Collected:

Type: ☐ Groundwater ☒ Surface Water ☐ Porewater (6"/red, 12"/green, 36"/black) Sample: ☐ Unfiltered ☐ Filtered Filter Type: ☐ disposable 0.45-µm ☒

Sample Collected with: ☐ Grab ☒ Pump Other: Type: ☒ Peristaltic ☐ Bladder Other: Flow Rate (L/min): 0.2

Water Quality Instrument Data Collected with: Type: ☒ YSI Pro DSS ☐ Horiba U-50 ☐ LaMotte (Turbidity only) Other:

Sample Decon Procedure: Sample collected with ☒ disposable and/or dedicated silicon and poly tubing ☐ Tubing replaced

Sample Description (Color, Turbidity, Odor, Other): Clear

Sample Analyses

Total Metals	(HNO3) ☒	TDS/TSS	(unpres) ☒	TOC	(H2SO4) ☒	Cl/SO4/NO3	(unpres) ☐		( ) ☐
Diss Metals (filtered)	(HNO3) ☐	Alkalinity (no headspace)	(unpres) ☒	DOC (filtered)	(H2SO4) ☒	Hardness	(calculated) ☐		( ) ☐

Additional Information

Type of Sample Containers:	Preservative	Quantity:	QA/QC Samples:	Comments:
1000 mL HDPE	none	2	☐ Field Duplicate	
500 mL HDPE	HNO3	1	☐ MS/MSD	
500 mL HDPE	none		☐ Field Blank	
250 mL Glass Amber	H2SO4	2	☐ Rinsate	

Signature: Date: 9/27/20

GROUNDWATER, POREWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name: RT-Holden Mine — Date of Collection: 9-27-20

Field Event: Fall 2020 — Field Personnel: ~~NW~~ / GW B. Beaulieu

Purge Data

Location ID: SG-10 SFc. H20 — Location Condition (Well damage, creek level, iron staining, fire damage): Normal

Ecology Tag: —

Diameter: — Screened Interval: —

Total Depth: — Transducer S/N: —

Secure: ☐ Yes ☐ No — Depth Sounder decontaminated prior to use: ☐ Yes ☐ No N/A

Photograph Numbers:

One Casing Volume (gal):

Depth of water (from TOC or staff gauge): 0.76ft — Time: 9:45

After 5 minutes of purging (from TOC):

Begin purge (time): — End purge (time):

Volume purged: — Purge water disposal method:

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
¼	1.050"	0.804"	0.0229	0.2916
2"	2.375"	2.067"	0.17	1.45
2.5"	2.875"	2.445"	0.255	2.129
4"	4.500"	4.026"	0.66	5.51

Time	DTW (decimal ft below TOC)	Vol. Purged L/gal	pH (s.u.)	DO (mg/L)	Specific Conductivity (uS/cm)	LaMotte Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments
8:37	-	-	5.96	11.26	48.2	1.26 (HACH)	6.5	184.6	
8:42			5.95	11.27	47.4	1.01	6.5	189.6	

Ferrous iron Field Test ____ mg/L or ☐ Not Detected

Sampling Data

Sample No: SG-10-SW-092720 — Depth of tubing/distance from shore: 10' from shore, just below surface

Date Collected (mo/dy/yr): 9-27-20 — Time Sample Collected: 8:47 — Weather: clear

Duplicate Sample No: — Time Duplicate Sample Collected:

Type: ☐ Groundwater ☑ Surface Water ☐ Porewater (6"/red, 12"/green, 36"/black) — Sample: ☐ Unfiltered ☑ Filtered — Filter Type: ☑ disposable 0.45-µm ☐ ____

Sample Collected with: ☐ Grab ☑ Pump Other: — Type: ☑ Peristaltic ☐ Bladder Other: — Flow Rate (L/min): ~.5 L/min

Water Quality Instrument Data Collected with: Type: ☑ YSI Pro DSS ☐ Horiba U-50 ☑ LaMotte (Turbidity only) Other:

Sample Decon Procedure: Sample collected with: ☑ disposable tubing ☐ dedicated silicon and poly tubing ☐ Tubing replaced

Sample Description (Color, Turbidity, Odor, Other): Clear

Sample Analyses

Total Metals	(HNO3) ☑	TDS/TSS	(unpres) ☑	TOC	(H2SO4) ☑	Cl/SO4/NO3	(unpres) ☑			☐
Diss Metals (filtered)	(HNO3) ☐	Alkalinity (no headspace)	(unpres) ☑	DOC (filtered)	(H2SO4) ☑	Hardness	(calculated) ☐			☐

Additional Information

Type of Sample Containers:	Preservative	Quantity:	QA/QC Samples:	Comments:
1000 mL HDPE	none	2	☐ Field Duplicate	
500 mL HDPE	HNO3	1	☐ MS/MSD	
500 mL HDPE	none	1	☐ Field Blank	
250 mL Glass Amber	H2SO4	2	☐ Rinsate	
		(6)		

Signature: [signature] **Date:** 9/27/20

GROUNDWATER, POREWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name: RT-Holden Mine Date of Collection: 9/27/20

Field Event: Fall 2020 Field Personnel: G. Cisneros

Purge Data

Location ID: SG-11-SW

Ecology Tag

Diameter: N/A Screened Interval:

GPS:

Total Depth: Transducer S/N:

Location Condition (Well damage, creek level, iron staining, fire damage): N/A

Secure: ☐ Yes ☐ No Depth Sounder decontaminated prior to use: ☐ Yes ☐ No

Photograph Numbers: N/A

One Casing Volume (gal):

Depth of water (from top of casing): N/A

After 5 minutes of purging (from TOC):

Begin purge (time): 0835 End purge (time):

Volume purged: Purge water disposal method:

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
¾	1.050"	0.804"	0.0229	0.2916
2"	2.375"	2.067"	0.17	1.45
2.5"	2.875"	2.445"	0.255	2.129
4"	4.500"	4.026"	0.66	5.51

Time	DTW (decimal ft below TOC)	Vol. Purged L / gal	pH (s.u.)	DO (mg/L)	Specific Conductivity (uS/cm)	Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments
0840	N/A	0.5L	6.61	11.11	49.4	2.15	6.4	148	

Ferrous Iron Field Test mg/L or ☒ Not Detected LaMotte Turbidimeter Reading: NTU

Sampling Data

Sample No: SG-11-SW-092720 Depth of tubing/distance from shore: 10'

Date Collected (mo/dy/yr): 9/27/20 Time Sample Collected: 0840 Weather: Sunny 40°

Duplicate Sample No: Time Duplicate Sample Collected:

Type: ☐ Groundwater ☒ Surface Water ☐ Porewater (6"/red, 12"/green, 36"/black) Sample: ☐ Unfiltered ☒ Filtered Filter Type: ☐ disposable 0.45-µm ☒

Sample Collected with: ☐ Grab ☒ Pump Other: Type: ☒ Peristaltic ☐ Bladder Other: Flow Rate (L/min): 0.2

Water Quality Instrument Data Collected with: Type: ☒ YSI Pro DSS ☐ Horiba U-50 ☒ LaMotte (Turbidity only) Other:

Sample Decon Procedure: Sample collected with ☒ disposable and/or dedicated silicon and poly tubing ☐ Tubing replaced

Sample Description (Color, Turbidity, Odor, Other): Clear

Sample Analyses

Total Metals	(HNO3) ☒	TDS/TSS	(unpres) ☒	TOC	(H2SO4) ☒	Cl/SO4/NO3	(unpres) ☐			☐
Diss Metals (filtered)	(HNO3) ☐	Alkalinity (no headspace)	(unpres) ☒	DOC (filtered)	(H2SO4) ☒	Hardness	(calculated) ☐			☐

Additional Information

Type of Sample Containers:	Preservative	Quantity:	QA/QC Samples:	Comments:
1000 mL HDPE	none	2	☐ Field Duplicate	
500 mL HDPE	HNO3	1	☐ MS/MSD	
500 mL HDPE	none	1	☐ Field Blank	
250 mL Glass Amber	H2SO4	2	☐ Rinsate	

Signature: **Date:** 9/27/20

GROUNDWATER, POREWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name: RT-Holden Mine Date of Collection: 9/26/20

Field Event: Fall 2020 Field Personnel: Nick Waldo & Glen Wallace

Purge Data

Location ID: SG-12R

Ecology Tag N/A

Diameter: N/A Screened Interval: N/A

Total Depth: N/A Transducer S/N: N/A

Location Condition (Well damage, creek level, iron staining, fire damage): creek low

Secure: ☐ Yes ☐ No Depth Sounder decontaminated prior to use: ☐ Yes ☐ No

Photograph Numbers:

One Casing Volume (gal):

Depth of water (from TOC or staff gauge): 1.10 Time: 1455

After 5 minutes of purging (from TOC):

Begin purge (time): N/A End purge (time): N/A

Volume purged: N/A Purge water disposal method: N/A

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
¾	1.050"	0.804"	0.0229	0.2916
2"	2.375"	2.067"	0.17	1.45
2.5"	2.875"	2.445"	0.255	2.129
4"	4.500"	4.026"	0.66	5.51

Time	DTW (decimal ft below TOC)	Vol. Purged (L / gal)	pH (s.u.)	DO (mg/L)	Specific Conductivity (uS/cm)	LaMotte Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments
1456	—	—	6.52	10.49	50.2	1.16	8.4	69.2	

Ferrous Iron Field Test mg/L or ☒ Not Detected

Sampling Data

Sample No: SG-12R-SW-092620 Depth of tubing/distance from shore: 10'

Date Collected (mo/dy/yr): 9/26/20 Time Sample Collected: 1500 Weather: Rain

Duplicate Sample No: Time Duplicate Sample Collected:

Type: ☐ Groundwater ☒ Surface Water ☐ Porewater (6"/red, 12"/green, 36"/black) Sample: ☒ Unfiltered ☒ Filtered Filter Type: ☒ disposable 0.45-µm ☐ _____

Sample Collected with: ☐ Grab ☒ Pump Other: Type: ☒ Peristaltic ☐ Bladder Other: Flow Rate (L/min):

Water Quality Instrument Data Collected with: Type: : ☒ YSI Pro DSS ☐ Horiba U-50 ☒ LaMotte (Turbidity only) Other:

Sample Decon Procedure: Sample collected with: ☒ disposable tubing ☐ dedicated silicon and poly tubing ☐ Tubing replaced

Sample Description (Color, Turbidity, Odor, Other): clear

Sample Analyses

Total Metals	(HNO3) ☒	TDS/TSS	(unpres) ☒	TOC	(H2SO4) ☒	Cl/SO4/NO3	(unpres) ☒			☐
Diss Metals (filtered)	(HNO3) ☐	Alkalinity (no headspace)	(unpres) ☒	DOC (filtered)	(H2SO4) ☒	Hardness	(calculated) ☐			☐

Additional Information

Type of Sample Containers:	Preservative	Quantity:	QA/QC Samples:	Comments:
1000 mL HDPE	none	2	☐ Field Duplicate	
500 mL HDPE	HNO3	1	☐ MS/MSD	
500 mL HDPE	none	1	☐ Field Blank	
250 mL Glass Amber	H2SO4	2	☐ Rinsate	

Signature: NWW **Date:** 9/26/20

GROUNDWATER, POREWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name: RT-Holden Mine Date of Collection: 9/26/20

Field Event: Fall 2020 Field Personnel: Nick Waldo & Glen Wallace

Purge Data

Location ID: SG-13

Ecology Tag: —

Diameter: — Screened Interval: —

Total Depth: — Transducer S/N: —

Location Condition (Well damage, creek level, iron staining, fire damage): creek low

Secure: ☐ Yes ☐ No Depth Sounder decontaminated prior to use: ☒ Yes ☐ No

Photograph Numbers: —

One Casing Volume (gal): —

Depth of water (~~from TOC or staff gauge~~): WP: 8.83 Time: —

After 5 minutes of purging (from TOC): —

Begin purge (time): — End purge (time): —

Volume purged: — Purge water disposal method: —

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
¾	1.050"	0.804"	0.0229	0.2916
2"	2.375"	2.067"	0.17	1.45
2.5"	2.875"	2.445"	0.255	2.129
4"	4.500"	4.026"	0.66	5.51

Time	DTW (decimal ft below TOC)	Vol. Purged L / gal	pH (s.u.)	DO (mg/L)	Specific Conductivity (µS/cm)	LaMotte Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments
1553	—	—	6.52	10.54	50.6	1.03	8.3	82.8	Staff
									Large metal, woody debris obstruct base.

Ferrous Iron Field Test — mg/L or ☐ Not Detected

Sampling Data

Sample No: SG-13-SW-092620 Depth of tubing/distance from shore: —

Date Collected (mo/dy/yr): 9/26/20 Time Sample Collected: 1600 Weather: Rain

Duplicate Sample No: — Time Duplicate Sample Collected: —

Type: ☐ Groundwater ☒ Surface Water ☐ Porewater (5'/red, 12'/green, 36'/black) Sample: ☒ Unfiltered ☒ Filtered Filter Type: ☐ disposable 0.45-µm ☐ —

Sample Collected with: ☐ Grab ☒ Pump Other: — Type: ☒ Peristaltic ☐ Bladder Other: — Flow Rate (L/min): —

Water Quality Instrument Data Collected with: Type: ☒ YSI Pro DSS ☐ Horiba U-50 : ☒ LaMotte (Turbidity only) Other: —

Sample Decon Procedure: Sample collected with: ☒ disposable tubing ☐ dedicated silicon and poly tubing ☐ Tubing replaced

Sample Description (Color, Turbidity, Odor, Other): clear

Sample Analyses

Total Metals	(HNO3) ☒	TDS/TSS	(unpres) ☒	TOC	(H2SO4) ☒	Cl/SO4/NO3	(unpres) ☒	—	( ) ☐
Diss Metals (filtered)	(HNO3) ☐	Alkalinity (no headspace)	(unpres) ☒	DOC (filtered)	(H2SO4) ☒	Hardness	(calculated) ☐	—	( ) ☐

Additional Information

Type of Sample Containers:	Preservative	Quantity:	QA/QC Samples:	Comments:
1000 mL HDPE	none	2	☐ Field Duplicate	
500 mL HDPE	HNO3	1	☐ MS/MSD	
500 mL HDPE	none	1	☐ Field Blank	
250 mL Glass Amber	H2SO4	2	☐ Rinsate	

Signature: [signature] **Date:** 9/26/20

GROUNDWATER, POREWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name: RT-Holden Mine Date of Collection: 9/26/20

Field Event: CALL 2020 Field Personnel: B. Beaulieu

Purge Data

Location ID: SW-TP3-EAST 1

Ecology Tag

Diameter: Screened Interval:

Total Depth: Transducer S/N:

Location Condition (Well damage, creek level, iron staining, fire damage):

Secure: ☐ Yes ☐ No Depth Sounder decontaminated prior to use: ☐ Yes ☐ No

Photograph Numbers:

One Casing Volume (gal):

Depth of water (from TOC or staff gauge): Time:

After 5 minutes of purging (from TOC):

Begin purge (time): End purge (time):

Volume purged: Purge water disposal method:

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
¾	1.050"	0.804"	0.0229	0.2916
2"	2.375"	2.067"	0.17	1.45
2.5"	2.875"	2.445"	0.255	2.129
4"	4.500"	4.026"	0.66	5.51

Time	DTW (decimal ft below TOC)	Vol. Purged L / gal	pH (s.u.)	DO (mg/L)	Specific Conductivity (uS/cm)	LaMotte Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments
15:15	—	—	6.94	10.60	98.3	0.23	9.1	168.2	

Ferrous Iron Field Test mg/L or ☑ Not Detected

Sampling Data

Sample No: SW-TP3-EAST 1-SW-092620 Depth of tubing/distance from shore:

Date Collected (mo/dy/yr): 9/26/20 Time Sample Collected: 15:32 Weather: RAIN

Duplicate Sample No: Time Duplicate Sample Collected:

Type: ☐ Groundwater ☒ Surface Water ☐ Porewater (6"/red, 12"/green, 36"/black) Sample: ☒ Unfiltered ☐ Filtered Filter Type: ☐ disposable 0.45-um ☐

Sample Collected with: ☐ Grab ☒ Pump Other: Type: ☒ Peristaltic ☐ Bladder Other: Flow Rate (L/min): ~2.5 L/min

Water Quality Instrument Data Collected with: Type: : ☒ YSI Pro DSS ☐ Horiba U-50 : ☒ LaMotte (Turbidity only) Other:

Sample Decon Procedure: Sample collected with: ☒ disposable tubing ☐ dedicated silicon and poly tubing ☐ Tubing replaced

Sample Description (Color, Turbidity, Odor, Other): clear

Sample Analyses

Total Metals	(HNO3) ☑	TDS/TSS	(unpres) ☑	TOC	(H2SO4) ☑	Cl/SO4/NO3	(unpres) ☑		( ) ☐
Diss Metals (filtered)	(HNO3) ☐	Alkalinity (no headspace)	(unpres) ☑	DOC (filtered)	(H2SO4) ☐	Hardness	(calculated) ☐		( ) ☐

Additional Information

Type of Sample Containers:	Preservative	Quantity:	QA/QC Samples:	Comments:
1000 mL HDPE	none	2	☐ Field Duplicate	
500 mL HDPE	HNO3	1	☐ MS/MSD	
500 mL HDPE	none	1	☐ Field Blank	
250 mL Glass Amber	H2SO4	2	☐ Rinsate	

Signature: Date: 9/26/20

GROUNDWATER, POREWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name: RT-Holden Mine Date of Collection: 9/26/20

Field Event: Fall 2020 Field Personnel: G. Cisnnos

Purge Data

Location ID: ~~TP3~~ SW-TP3-East2

Ecology Tag

Diameter: Screened Interval:

GPS:

Total Depth: Transducer S/N:

Location Condition (Well damage, creek level, iron staining, fire damage):

Secure: ☐ Yes ☐ No Depth Sounder decontaminated prior to use: ☐ Yes ☐ No

Photograph Numbers:

One Casing Volume (gal):

Depth of water (from top of casing):

After 5 minutes of purging (from TOC):

Begin purge (time): End purge (time):

Volume purged: Purge water disposal method:

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
¾	1.050"	0.804"	0.0229	0.2916
2"	2.375"	2.067"	0.17	1.45
2.5"	2.875"	2.445"	0.255	2.129
4"	4.500"	4.026"	0.66	5.51

Time	DTW (decimal ft below TOC)	Vol. Purged L / gal	pH (s.u.)	DO (mg/L)	Specific Conductivity (µS/cm)	Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments
1528	N/A	N/A	5.60	5.80	289.8	0.20	8.6	57.0	
						1.15			

Ferrous Iron Field Test 0.5 mg/L or ☐ Not Detected LaMotte Turbidimeter Reading: NTU

Sampling Data

Sample No: SW-TP3-EAST2-SW-092620 Depth of tubing/distance from shore:

Date Collected (mo/dy/yr): 9/26/20 Time Sample Collected: 1531 Weather: Rainy

Duplicate Sample No: Time Duplicate Sample Collected:

Type: ☐ Groundwater ☒ Surface Water ☐ Porewater (6"/red, 12"/green, 36"/black) Sample: ☐ Unfiltered ☒ Filtered Filter Type: ☐ disposable 0.45-µm ☐

Sample Collected with: ☐ Grab ☒ Pump Other: Type: ☒ Peristaltic ☐ Bladder Other: Flow Rate (L/min): 0.2

Water Quality Instrument Data Collected with: Type: : ☒ YSI Pro DSS ☐ Horiba U-50 ☒ LaMotte (Turbidity only) Other:

Sample Decon Procedure: Sample collected with: ☒ disposable and/or dedicated silicon and poly tubing ☐ Tubing replaced

Sample Description (Color, Turbidity, Odor, Other): Clear w/ slight Red Orange tint

Sample Analyses

Total Metals	(HNO3) ☒	TDS/TSS	(unpres) ☒	TOC	(H2SO4) ☒	Cl/SO4/NO3	(unpres) ☐		☐
Diss Metals (filtered)	(HNO3) ☐	Alkalinity (no headspace)	(unpres) ☒	DOC (filtered)	(H2SO4) ☐	Hardness	(calculated) ☐		☐

Additional Information

Type of Sample Containers:	Preservative	Quantity:	QA/QC Samples:	Comments:
1000 mL HDPE	none	2	☐ Field Duplicate	
500 mL HDPE	HNO3	1	☐ MS/MSD	
500 mL HDPE	none	1	☐ Field Blank	
250 mL Glass Amber	H2SO4	2	☐ Rinsate	

Signature: Date: 9/26/20

SURFACE SEDIMENT SAMPLE COLLECTION FORM

Project: Holden	**Event:** Fall 2020
Field Staff: KH, EM	**Station ID:** RC-6
Contractor: NA	**Date:** 9/29/20
Sampling Method: Trowel, shovel	**Weather:** Sunny
Sample Type: Surface Sample (0 - 30 cm)	

Comp #	Time	Latitude (Northing)	Longitude (Easting)	Recovery Depth (cm)	Location Description (depositional area, etc.)
1	10:45	See GPS	—	0-12	Depositional area near ~~bank~~ undercut bank, near tree roots (Douglas Fir) Shovel x3
2	10:50	See GPS	—	0-4	Depositional area near bank under alders Trowell x3

Sediment Sample Description (surface material, density, moisture, color, minor constituents, major constituents, odor, sheen, plant matter, shells, biota):

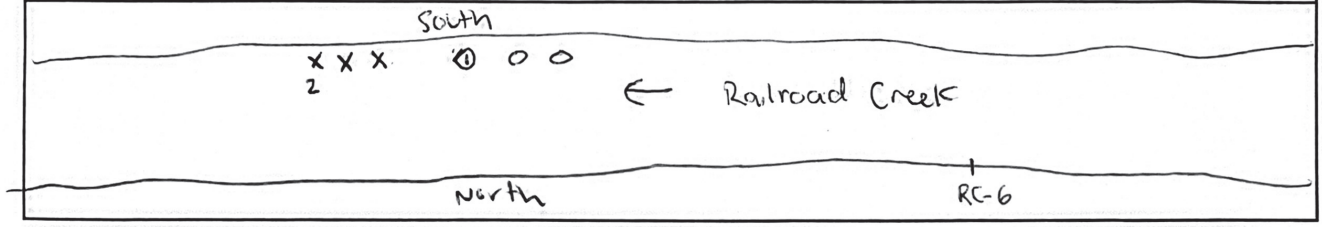
SAND w/ gravel: loose, wet, brown-gray, 85% m-sand, 15% f-gravel, poorly graded, occasional to moderate vegetative material (sticks, roots, twigs, bark), no odor

Sample containers: 1x8 oz, 2x16 oz, 1-gal poly

Analysis: Metals, AVS/SEM, TOC, total solids, grain size. Collected equipment rinse blank.

Notes: Depositional area along south bank under trees and ~~tree~~ near tree roots. ~~All composite soon~~ Refusal hit at all composite locations.

Station Diagram and Approximate Locations of Composite Samples:



X = trowell

O = Shovel

RC-6-SS-092920

@11:00

SURFACE SEDIMENT SAMPLE COLLECTION FORM

Project: Holden	**Event:** Fall 2020
Field Staff: KH, EM	**Station ID:** RC-1
Contractor: NA	**Date:** 9/26/20
Sampling Method: Hand auger/shovel/trowell	**Weather:** partly sunny, drizzling, ~40°F
Sample Type: Surface Sample (0 - 30 cm)	

Comp #	Time	Latitude (Northing)	Longitude (Easting)	Recovery Depth (cm)	Location Description (depositional area, etc.)	
1	11:40	collected with GPS		0-5cm	Depositional area on shoreline. 4 to 5 composite grabs with trowell	Trowell
2	11:45	"	"	0-20 cm	Depositional area along cut bank near logs and vegetation	Hand Auger
3	11:55	"	"	0-10cm	Depositional area along cut bank near logs and vegetation	Shovel
					~~Dipo~~	

Sediment Sample Description (surface material, density, moisture, color, minor constituents, major constituents, odor, sheen, plant matter, shells, biota):

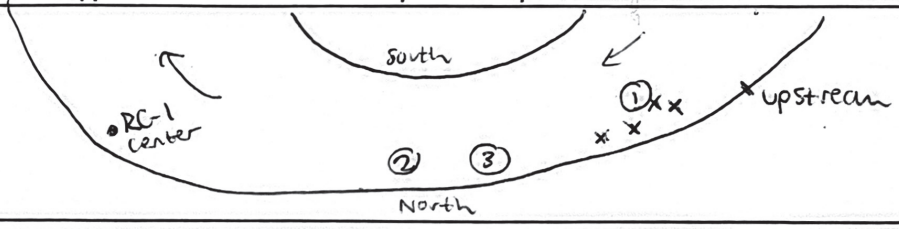
SAND w/ Gravel, loose, wet, gray brown, 60% M-C Sand, 40% gravel, poorly graded, trace vegetative matter, fine needles, twigs, roots
(desc. pre-gravel removed)

Sample containers: 2x16oz, 1x8oz, 1x 1-gallon poly

Analysis: Metals, AVS/SEM, TOC, total solids, grain size, Bioassay tests

Notes: Riverbed is compact gravel and cobbles with ~5cm sand in pockets. Larger depositional area of sand near composites 2 and 3. Refusal hit at all composite locations. *Removed large gravel from composite sample

Station Diagram and Approximate Locations of Composite Samples:



Sample ID: RC-1-SS-092620
Time: 12:02

SURFACE SEDIMENT SAMPLE COLLECTION FORM

Project: Holden	**Event:** Fall 2020
Field Staff: KH, EM	**Station ID:** RC-4
Contractor: NA	**Date:** 9/26/20
Sampling Method: Composite sed. w/ shovel and hand auger	**Weather:** partly sunny, drizzling ~40°F
Sample Type: Surface Sample (0 - 30 cm)	

Comp #	Time	Latitude (Northing)	Longitude (Easting)	Recovery Depth (cm)	Location Description (depositional area, etc.)	
1	8:52	Collected with GPS		0-25 cm	Depositional area near log	Hand auger
2	8:55	"	"	0-20 cm	Depositional area on bank	Hand auger
3	9:23	"	"	0-20 cm	Depositional area on bank	Hand auger
4	9:37	NA - multiple (GPS) grabs along dep. area	NA - multiple (GPS) grabs along dep area	0-10cm	Depositional areas along bank	Trowell

Sediment Sample Description (surface material, density, moisture, color, minor constituents, major constituents, odor, sheen, plant matter, shells, biota):

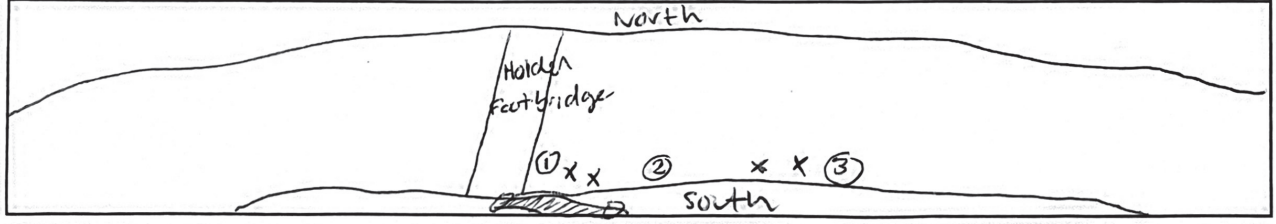
Sandy Gravel - GRAVEL w/ sand, loose, wet, brown w/ multicolored rocks, trace fines, trace organics (needles, sticks), 70% gravel, 30% sand, poorly graded (desc. pre gravel removal)

Sample containers: 1 gal ~~poly~~, 2x 16oz, 1x 8oz

Analysis: Metals, AVS/SEM, Grain size, TOC, total solids
Bioassay tests

Notes: 3 composite samples collected with hand auger. Refusal reached between 20-25 cm. Pockets of depositional sediment collected ~~for~~ between 1st and 3rd composite sample with hand trowell (see X's).

Station Diagram and Approximate Locations of Composite Samples: Refusal at all composite locations.



(#) = collected with hand auger or shovel

x = collected with trowell

Sample ID: RC-4-SS-092620

Time: 9:48

* Notes cont: Removed large gravel from composite sample

SURFACE SEDIMENT SAMPLE COLLECTION FORM

Project: Holden	**Event:** Fall 2020
Field Staff: KH, EM	**Station ID:** RC-2(SG-7)
Contractor: NA	**Date:** 9/29/20
Sampling Method:	**Weather:** sunny

Sample Type: Surface Sample (0 - 30 cm)

Comp #	Time	Latitude (Northing)	Longitude (Easting)	Recovery Depth (cm)	Location Description (depositional area, etc.)	
1	9:00	See GPS	—	0-15	Depositional area - sandy pool	Shovel - 5 locations
2	9:08	See GPS	—	0-4	Depositional pockets on gravel bank	Trowel 4 locations

Sediment Sample Description (surface material, density, moisture, color, minor constituents, major constituents, odor, sheen, plant matter, shells, biota):

SAND: loose, wet, brown-gray, 95% M-sand, 5% gravel, occasional organics/vegetative material (twigs, sticks, roots), trace fines, no odor

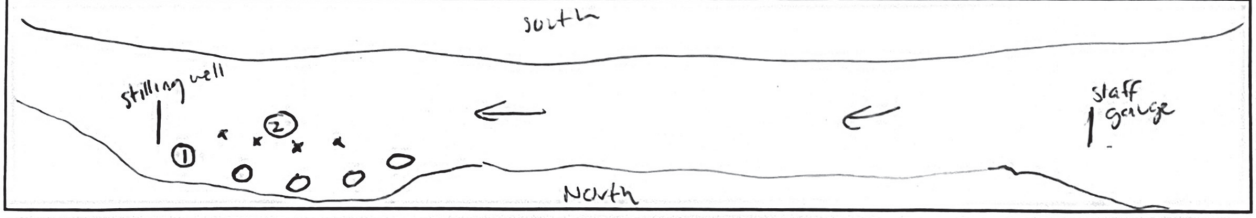
Sample containers: RC-2(SG-7): 1x8oz, 3x16oz, 1-gal poly @9:21

RC-102(SG-107): 1x8oz, x16oz @9:25

Analysis: Metals, AVS/SEM, total solids, TOC, Grain size
Bioassay tests

Notes: Refusal met (cobbles) at all ~~samp~~ composite sample locations.
Collected field duplicate, ~~and~~ MS/MSD, ~~and rinse blank~~.

Station Diagram and Approximate Locations of Composite Samples:



x - Composite sample w/ trowell

O - Composite sample w/ shovel

Sample ID: RC-2(SG-7)-SS-092920
@9:21

RC-102(SG-107)-SS-092920
@9:25

SURFACE SEDIMENT SAMPLE COLLECTION FORM

Project: Holden	**Event:** Fall 2020
Field Staff: KH, EM	**Station ID:** RC-SA
Contractor: NA	**Date:** 9/26/20
Sampling Method: Hand auger, shovel, trowell	**Weather:** Raining
Sample Type: Surface Sample (0 - 30 cm)	

Comp #	Time	Latitude (Northing)	Longitude (Easting)	Recovery Depth (cm)	Location Description (depositional area, etc.)	
1	15:35	Collected with GPS		0-23	Depositional area, sand accumulated under overhanging alder	Hand auger x2
2	15:45	Depositional (GFS) areas	Depositional (GFS) areas	0-5 cm	Depositional area along creek bank; 3 grabs w/ trowell	
3	15:50	Collected with GPS		0-23	Depositional area along creek bank	Hand auger x2

Sediment Sample Description (surface material, density, moisture, color, minor constituents, major constituents, odor, sheen, plant matter, shells, biota):

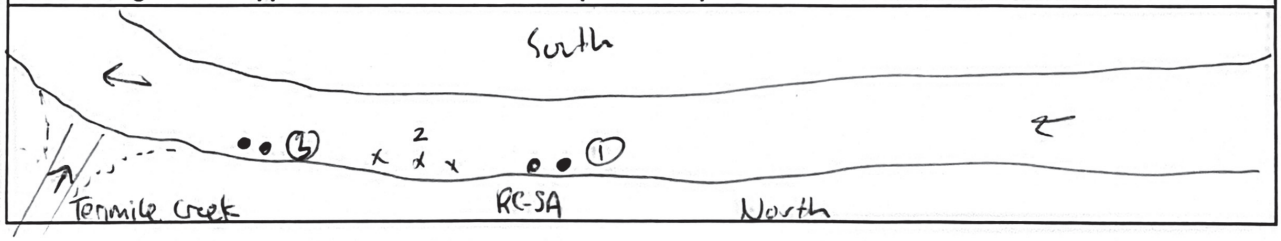
Gravel w/ Sand, loose, wet, brown w/ multicolor rocks, 70% gravel, poorly graded 30% m - lo c- sand, trace fines, trace vegetative matter (pine needles, twigs, roots)

Sample containers: 2x16oz, 1x8oz, 1x1-gallon poly

Analysis: Metals, AVS-SEM, TOC, total solids, grain size, Bioassay tests

Notes: Refusal met at all locations. Very few depositional areas, water is high and current is swift. composite

Station Diagram and Approximate Locations of Composite Samples:



Sample ID = RC-SA-SS-092620

Time: 16:05

SURFACE SEDIMENT SAMPLE COLLECTION FORM

Project: Holden	**Event:** Fall 2020
Field Staff: KH, EM	**Station ID:** RC-10
Contractor: NA	**Date:** 9/27/20
Sampling Method: Hand augers/trowel/shovel	**Weather:** Partly Sunny, ~55°F
Sample Type: Surface Sample (0 - 30 cm)	

Comp #	Time	Latitude (Northing)	Longitude (Easting)	Recovery Depth (cm)	Location Description (depositional area, etc.)	
1	14:15	Collected with GPS		0-2 cm	Depositional area near log	Trowel x3
2	14:18	"	"	0-30 cm	Depositional area; sandy eddy, very slow moving water	Hand x3 augers
3	14:30	"	"	0-25 cm	Depositional area; sandy ~~eddy~~	Shovel x1

Sediment Sample Description (surface material, density, moisture, color, minor constituents, major constituents, odor, sheen, plant matter, shells, biota):

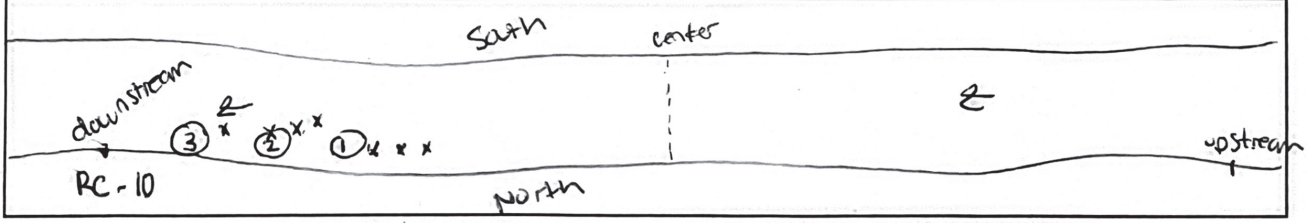
SAND w/ gravel, loose, wet, brown-gray, 85% m- c- sand, 15% f- to c- gravel, poorly graded, trace vegetative/woody debris (twigs, bark, roots, sticks up to ½ inch), no odor

Sample containers: 1x8oz, 2x16oz, 1-gal poly

Analysis: Metals, AVS/SEM, TOC, total solids, grain size
Bioassay tests

Notes: Refusal hit at all composite locations

Station Diagram and Approximate Locations of Composite Samples:



Sample ID: RC-10-SS-092720
Time: 14:45

SURFACE SEDIMENT SAMPLE COLLECTION FORM

Project: Holden	**Event:** Fall 2020
Field Staff: KH, EM	**Station ID:** LB-1
Contractor: NA	**Date:** 9/27/20
Sampling Method: Shovel and hand core	**Weather:** sunny, ~62°F
Sample Type: Surface Sample (0 - 30 cm)	

Comp #	Time	Latitude (Northing)	Longitude (Easting)	Recovery Depth (cm)	Location Description (depositional area, etc.)	
1	11:45	Collected ~~on~~ with GPS		0-30	Depositional area near log jam. Shovel and 2 cores	Shovel and hand core
2	11:55	"	"	0-20	Depositional area off rocky shoreline.	Shovel
3	12:00	"	"	0-10	Depositional area off rocky shoreline.	Shovel

Sediment Sample Description (surface material, density, moisture, color, minor constituents, major constituents, odor, sheen, plant matter, shells, biota):

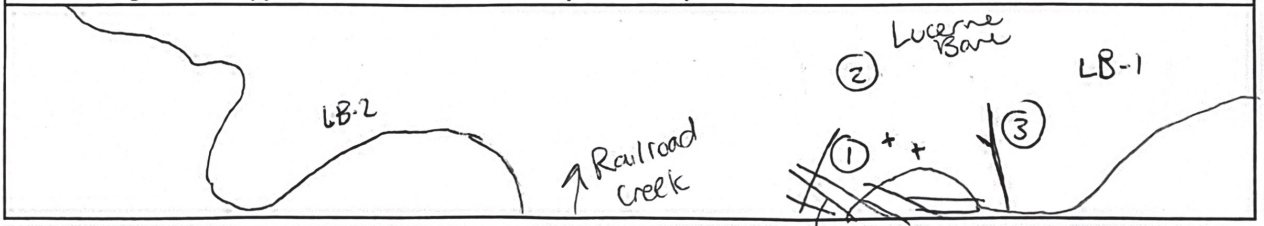
SAND: loose, wet, brown-gray, 100% M-sand, ~~trace~~ occasional vegetative material/woody debris (twigs, sticks, chips/bark up to 2inches)

Sample containers: 1x8oz, 2x16oz, 1-gal poly

Analysis: Metals, AVS/SEM, TOC, ~~total~~ solids, Grain size, Bioassay tests

Notes: Refusal hit at each composite sample location

Station Diagram and Approximate Locations of Composite Samples:



Sample ID: LB-1-SS-092720
Time: 12:06

SURFACE SEDIMENT SAMPLE COLLECTION FORM

Project: Holden	**Event:** Fall 2020
Field Staff: KH, EM	**Station ID:** LB-2
Contractor: NA	**Date:** 9/27/20
Sampling Method: Shovel (drain spade)	**Weather:** Partly sunny, 52°F
Sample Type: Surface Sample (0 - 30 cm)	

Comp #	Time	Latitude (Northing)	Longitude (Easting)	Recovery Depth (cm)	Location Description (depositional area, etc.)
1	10:20	collected with	GPS	0-20	Depositional area at Lucerne Bar - sandy back eddy; 2½ ft water
2	10:30	"	"	0-10	Depositional area on rocky point
3	10:35	"	"	0-10	Depositional area on rocky point

Sediment Sample Description (surface material, density, moisture, color, minor constituents, major constituents, odor, sheen, plant matter, shells, biota):

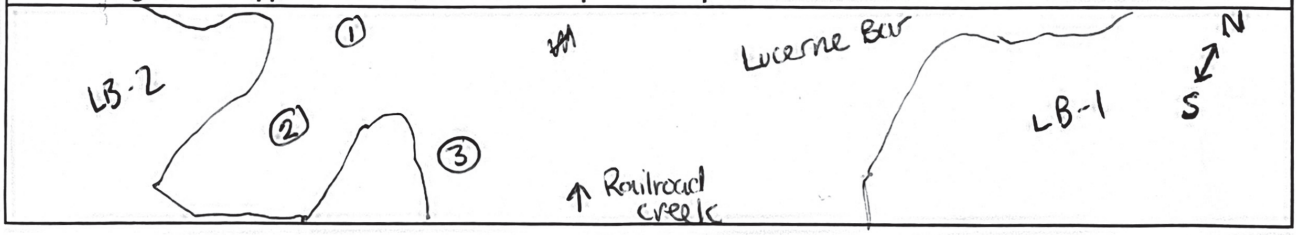
SAND; ~~m-fsand~~ loose, wet, multi-colored brown, 95% m- c- sand, poorly graded, 5% gravel

Sample containers: 1x8 oz, 2x16 oz, 1-gal poly

Analysis: Metals, AVS/SEM, total solids, TOC, grain size
Bioassay tests

Notes: Refusal hit at all composite locations (cobbles).

Station Diagram and Approximate Locations of Composite Samples:



Sample ID: LB-2-SS-092720

Time: 10:49

Project: RT-Holo...ie

Event: FALL 2020

Groundwater Level Collection Form

Field Personnel: B. BEAUFU
G. CISNEROS

Location ID	Ecology Tag	Date	Time	Static Depth to Water 1	Static Depth to Water 2	Total Depth	Dry?	Transducer?	Overgrown?	Damaged?	Well Condition/Remarks (well ok, missing caps, bolts, not accessible, etc)
SG-12R		9/24/20	0950	1.25							
SG-12R-WP		9/24/20	0951	DRY		9.5	Y				GOOD
NRC-3SR	BLN 931		9:05	17.43		27.0		Y			GOOD
NRC-3IR	BLN 932		9:06	19.35		73.41		Y			GOOD
NRC-3DR	BLN 930		9:09	31.68		111.79		Y			GOOD
SG-7			9:12	1.85							GOOD
SG-7R WP			9:13	3.75		6.34					GOOD
SG-7SW-S			9:15	1.0							GOOD
SG-7SW			9:16	3.54							GOOD
SG-14			9:27	0.80							NEW FALL 2020
SG-14 WP			9:28	5.52		9.49					GOOD
SG-15			9:39	1.31							DEBRIS / CLEARED
SG-15WP			9:40	7.05		9.50					GOOD
DS-3S	AFS 845		9:50	18.36		28.94		Y			GOOD, FLAKING PAINT
DS-3D	AFS 844		9:52	19.11		52.15		Y			" " "
DS-4DD	BBS-111		957	20.56		160.		Y SB			GOOD
DS-4I	BLN-929		10:00	17.62		67.30		Y			GOOD + SAND/DEBRIS
DS-4S	AFS-843		1005	14.35		26.90		Y			GOOD
DS-4D	AFS 842		1008	16.13							GOOD
SS-8			1011			0.9					NEW FALL 2020
SG-8WP			1013	4.59		6.64					GOOD
DS-5											UNSAFE TO CROSS
SG-16			1021	0.75							NEW FALL 2020
SG-16WP			1022	5.40		9.25					REPAIRED FALL 2020
DS-14			1041	5.25		12.46					
SG-11			1051	0.91							GOOD
SG-11-WP			1052	4.62		6.15					GOOD
SS-18			1057	1.25							NEW FALL 2020
SS-18WP			1058	5.65		9.54					

Project: RT-Holden Mine

Event: FALL 2020

Groundwater Level Collection Form

Field Personnel: B Bentley, G. Cisneros

Location ID	Ecology Tag	Date	Time	Static Depth to Water 1	Static Depth to Water 2	Total Depth	Dry?	Transducer?	Overgrown?	Damaged?	Well Condition/Remarks (well ok, missing caps, bolts, not accessible, etc)
SG-10STW		9/24/20	11:09	1.05				Y			STAFF GAUGE ONLY; WATER TOO DEEP FOR TOC Measurement.
SG-10-WP			11:08	4.54	~~7.15~~	7.15					GOOD
SG-17			11:11	1.35							NEW FALL 2020
SG-17-WP			11:12	4.98		9.20					GOOD
SG-9			11:20	1.82							GOOD - NEW FALL 2020
SG-9-WP			11:19	4.15		6.99			A LITTLE		GOOD. WILL NEED CUTTING IN 2021
DS-9S	BBB 117		11:33	13.09		27.90		Y			GOOD
DS-9I	BBB 116		11:31	13.95		54.97		Y			GOOD
DS-9D	BBB 118		11:35	12.79		76.64					GOOD
NRC-6S	BAN 480		11:43	43.79		50.45					GOOD
NRC-6I	BAN 479		11:44	46.49		89.50					
NRC-6D	BAN 478		11:46	46.30		137.0					CONTAINS ~~GLOBE~~ "MINI LOGGER" IN MONUMENT.
NRC-4D	BAN 474		11:56	27.01		72					GOOD. CONTAINS 2" [illegible]
STW-1			12:02	3.93							GOOD
STW-1 (STAFF G.)			12:03	1.27							GOOD
SG-WL1-WP			12:16	1.98		9.49					GOOD
SG-WL1-STW			12:17	4.80							NEW STILLING WELL FALL 2020
SG-WL1-STW (STAFF G.)			12:18	1.03							~~Add~~
SG-WL2-WP			12:25	1.56		6.48					
SG-WL2-STW			12:26	3.33							
SG-WL2-STW (STAFF G.)			12:26	1.67							

Table 1. Pressure Transducer Deployment Summary
Rio Tinto Holden Mine, Chelan County, Washington

Date: 9/22/20
Field Personnel: NBW / GSV

Levelogger Data Capacity	40,000 readings	Projected # of Data Points	30,492		
Max Recording Duration	14 months or 423.5 days	Transducer Start Time			
Recording Interval	20 minutes or 72 weeks	Barologger Install Location	DS-4I well monument.		

Well	ECY ID	Set Depth (ft btoc)	Date	Time of removal	TD (ft btoc)	Spring 2019 DTW	Spring 2020 DTW	Fall 2020 DTW	Time of water level	Serial # (last 5)	Reinstall DTW	Reinstall Time	Notes
DS-4I BAROLOGGER	--	NA	9/22	1351	N/A	--	N/A	N/A	N/A	08911	N/A	1357	in DS-4I
DS-12I	BIO-847	15	9/22	1143	36.75	5.59	———	7.14	1138	07073	—	1149	
DS-12S	BIO-848	15	9/22	1132	27.52	6.36	—	7.89	1136	07044	—	1139	
DS-12D	BIO-849	13	9/22	1139	66.24	6.20	6.10	9.21	1141	120360	—	1143	
DS-13I	BIO-851	15	9/22	1151	62.39	8.5	—	8.60	1152	07036	—	1157	
★ DS-13S	BIO 854	15	9/22	1153	33.43	6.96	—	8.62	1155	[illegible]	—	1203	conductivity logger
DS-15I	BLW-311	30	9/22	1018	53.63	15.13	14.47	17.04	1021	07034	—	1032	
DS-15S	BLW-310	22	9/22	1015	26.72	14.97	14.54	17.01	1018	79599	—	1036	conductivity logger
DS-16I	BLW-313	35	9/22	1042	54.04	21.16	20.13	22.93	1044	07040	—	1049	
DS-16S	BLW-312	25	9/22	1040	31.65	18.35	17.74	19.80	1041	79607	—	1047	conductivity logger
DS-17I	BLW-316	30	9/22	1052	63.14	16.94	15.45	18.66	1054	07072	—	1107	
DS-17S	BLW-315	20	9/22	1052	27.49	15.71	15.25	17.38	1056	79608	—	1101	
DS-18I	BLW-318	30	9/22	1114	58.75	14.84	13.82	16.28	1115	07037	—	NR Not recorded, was installed	
DS-18S	BLW-317	20	9/22	1113	24.17	13.83	13.00	15.17	1117	79595	—	1122	conductivity logger
DS-3S	AFS-845	25	9/22	1404	28.86	13.42	14.32	18.97	1405	07028	—	1408	
DS-4I	BLN-829	25	9/22	1357	68.20	13.54	14.05	18.17	1353	07031	—	[illegible]	NR
DS-4S	AFS-843	20	9/22	1351	26.88	9.84	10.57	15.01	1356	07035	—	1358	
DS-9I	BBB-116	20	9/22	1338	54.93	11.36	11.49	1337 ≠	14.49	07039	—	1341	
DS-9S	BBB-117	20	9/22	1342	27.85	10.78	10.92	1344 ≠	13.57	07071	—	1345	
NRC-3DR	BLN-930	37	9/22	1454	~111.6	27.41	27.27	32.16	1456	07085	—	1500	~~sample in progress~~
NRC-3IR	BLN-931	25	9/22	1449	73.33	16.33	16.58	18.84	1451	07041	—	1454	
NRC-3SR	BLN-932	25	9/22	1501	—	16.25	16.52	18.01	1449	07026	—	1509	Sample in progress
TP1-8S	BIO-871	48.3	9/22	816	48.49	48.03	48.1	43.22	815	120351	48.22	823	
TP1-9S	BIO-852	36.6	9/22	831	36.95	36.62	36.9	36.88	832	120341	—	835	
TP2-12S	BIO-856	101.2	9/22	851	~103.1	94.21	42.2	Dry to 63	845	7056	Dry	857	Bright red sludge
TP2-12D	BIO-855	115	9/22	844	~~105.04~~	94.92	91.37	851 ≠	105.04	07134	—	847	TD 115.4
TP2-13D	BIO-863	130	9/22	911	132.95	116.28	115.5	120.84	913	07140	—	917	~~Logger Fail~~
TP2-15	BIO-868	116	9/22	901	129.24	106.98	106.09	112.80	903	7030	—	907	
TP3-12S	BIO-870	84.5	9/22	948	81.29	77.4	77.78	79.70	951	7027	—	956	sounder hit pump @ 47'
TP3-12D	BIO-869	99	9/22	957	102.05	78.86	78.3	82.08	1000	07137	—	1003	OK
TP3-13	BIO-861	115	9/22	923	~122	106.52	105.56	112.07	925	7064	—	946	~~Transducer not reading~~
TP3-14D	BIO-853	98	9/22	938	103.58	86.81	84.46	91.96	940	07135	—	943	
STW-1	--	—	9/22	1425	5.07	--	—	4.50	1426	1008	—	1430	SG: 0.56 Winterized
SG-7STW	--	—	9/22	1503	4.53	--	2.75	4.38	1507	10993	—	1515	SG: 0.12, * Winterized
SG-10STW	--	—	9/22	1325	3.90	--	3.05	1326 ≠	3.90	10996	—	1328	SG: 0.68 * Winterized
SG-WL2STW	--	4.3	9/22	1218	—	--	3.29	3.02	1218	120354	—	NR	SG: 2.68 Winterized
SG-WL1STW	--	—	9/22			--	--	Not installed yet			—		SG: 0.80 [illegible]
DS-15-STW	--					--	--						Installed today
DS-18-STW	--					--	--						Installed today
DS-13D	BIO-850	—	9/22	1159	18.70	—	—	20.95	1201	7057	—	1205	Not on spreadsheet!

SG-WL2-WP: DTW 1.61 9/22 @ 1222

SG-WL1-WP: DTW 3.36 @ 1534

* Transducer was buried in sand. Had to pull it out/scrape off registered water as it hit bottom. (SG-13 only)

Project: RT-Holden Mine

Event: Fall 2020

Groundwater Level Collection Form

Field Personnel: ~~Nick Waldo~~ with Glen Wallace

Location ID	Ecology Tag	Date	Time	Static Depth to Water 1	Static Depth to Water 2	TD Total Depth	Dry?	Transducer?	Overgrown?	Damaged?	Well Condition/Remarks (well ok, missing caps, bolts, not accessible, etc)
DS-15S	BLW-310	9/24	820	16.73	16.73	—	No	Yes	No	No	Good. All wells w/transducer had total depths measured 9/22, no repeat
DS-15I	BLW-311		822	16.65	16.65	—	No	Yes	No	No	Good
DS-15-SW	N/A		816	2.95	—	—	No	Yes	No	No	SG: 2.48 ft Hard to access
DS-16-SG	N/A		826	—	—	—	—	—	—	—	SG: 0.45 ft
DS-16S	BLW-312		827	19.38	19.38	—	No	Yes	No	No	Good
DS-16I	BLW-313		829	22.47	22.47	—	No	Yes	No	No	Good
DS-16D	BLW-314		831	22.00	22.01	—	No	[redacted] No	No	No	Good DTW3: 22.01
DS-17S	BLW-315		835	16.58	16.58	—	No	Yes	No	No	Good
DS-17I	BLW-316		837	18.12	18.12	—	No	Yes	No	No	Good
DS-18-SW	N/A		841	3.94	3.94	—	No	Yes	No	No	SG: 1.32
DS-18S	BLW-317		843	14.57	14.57	—	No	Yes	No	No	Good
DS-18I	BLW-318		844	15.78	15.78	—	No	Yes	No	No	Good
DS-18D	BLW-319		846	29.62	29.62	—	No	No	No	No	Good. Bladder pump blocks TD.
SG-WL2-VP	N/A		855	2.27↑	2.24↑	—	No	No	No	No	SG: 1.32 DTW3: 2.21↑ 910: 1.97, 1.90, 1.87
DS-12D	B10-849		858	8.71	8.71	—	No	Yes	No	No	Good Note for sampling:
DS-12I	B10-847		854	6.63	6.63	—	No	Yes	No	No	Good BRG tubing, No
DS-12S	B10-848		901	7.37	7.37	—	No	Yes	No	No	Good Kubota: soft road
DS-13D	B10-850		903	2038	20 90	—	No	Yes	No	No	Good DTW3: 2039 DTW4: 20 39
DS-13I	B10-851		905	7.89	8.09	—	No	Yes	No	No	Good DTW3: 8.09
DS-13S	B10-854		906	8.09	8.09	—	No	Yes	No	No	Good
TP3-12D	B10-869		922	81.64	81.64	—	No	Yes	No	No	Good Bladder pump, No TD
TP3-12S	B10-870	↓	924	79.54	79.55	—	No	Yes	No	No	Good Bladder pump, DTW3: 79.55

Project: RT-Holden Mine

Event: Fall 2020

Groundwater Level Collection Form

Field Personnel: Nick Waldo with Ben Wallace

Location ID	Ecology Tag	Date	Time	Static Depth to Water 1	Static Depth to Water 2	TD Total Depth	Dry?	Transducer?	Overgrown?	Damaged?	Well Condition/Remarks (well ok, missing caps, bolts, not accessible, etc)
TP3-14S	B10-860	9/24	924	88.81	88.81	92.06	No	No	No	No	good
TP3-14D	B10-853		932	91.65	91.65	—	No	Yes	No	No	good, Bladder pump, blocks TD
TP3-13	B10-861		938	111.74	111.76	—	No	Yes	No	No	good, Bladder pump. DTW3: 111.76
~~DS-9S~~											
~~DS-9I~~											
~~DS-9D~~											
TP2-13S	B10-862		1100	117.23	117.23	117.35	NO	No	NO	NO	good. CAN NOT SAMPLE
TP2-13D	B10-863		1103	120.77	120.77	—	No	No	No	No	good, Bladder pump
TP2-15	B10-868		1108	112.76	112.75	—	No	Yes	No	No	good DTW3: 112.75 Bladder pump
TP2-12S	B10-856		1112	—	—	101.37	Yes	Yes	No	No	good. DRY
TP2-12D	B10-855		1118	105.19	105.19	—	NO	Yes	NO	No	good. Bladder pump
TP2-16S	—		1127	42.00	42.00	42.24	NO	No	NO	NO	good. Can NOT SAMPLE. Ecology Tag missing.
TP2-16D	B10-858		1129	64.54	64.58	64.78	NO	No	No	NO	good. DTW3: 64.54 CANNOT SAMPLE
TP2-17	B10-857		1136	110.70	110.70	110.78	NO	NO	No	No	good. CANNOT SAMPLE
TP2-14	B10-866		1143	80.29	80.29	80.44	No	NO	NO	NO	good. CANNOT SAMPLE
SG-12R	N/A		1201	5.66	5.65	12.08	No	NO	No	Loose 3/4"	SG: 3.00 DTW3: 5.60, 5.60
DS-10I	BBB-114		1220	12.43	12.43	—	No	*	Yes	No	good. * Prior consultants transducer
DS-10D	BBB-115		1222	15.13	15.13	—	NO	*	Yes	No	good.
DS-10S	BBB-113		1224	12.77	12.77	18.63**	No	NO	very	No	good. ** TD "feels weird", maybe not True Bottom
RC-4	N/A		1337	SG1.15	—	—	—	—	—	Yes	Crooked SG, Partially detached from support
RC-6	N/A	↓	1345	1.1	—	—	—	—	—	—	

Project: RT-Holde...e

Groundwater Level Collection Form

Field Personnel: _____

Event: _____

Location ID	Ecology Tag	Date	Time	Static Depth to Water 1	Static Depth to Water 2	Total Depth	Dry?	Transducer?	Overgrown?	Damaged?	Well Condition/Remarks (well ok, missing caps, bolts, not accessible, etc)
[redacted]		9/24									Pitting on the point
PC-PZ-4			0907	15.54	15.54	32.35					↓
PC-PZ-2			0918	4.18	4.20	19.35					Pitting on casing → 4.20'
HV-25			0924	10.10	10.10	13.89					Water, stb in same
HV-20			0928	10.09	10.06	23.96					flush monument → 10.04'
NPC-10	BAN-497		0954	10.72	10.72	16.99					Broken bolt out
HV-1	None		1000	9.96	9.98	14.85					Old with movement → 9.97
NPC-30			1006	66.84	66.84	—					Submerged in water
HV-3			1010	66.47	66.47	—					Rusty monument
TP1-90	BJO 872		1025	55.47	55.47	66.25					
TP1-95	BJO 852		1030	36.89	36.89	39.0	✓				
TP1-105	BJO 865		1044	—	—	45.65	✓				
TP1-100	BJO-864		1038	47.55	47.55	49.75	✓				
TP1-85	BJO-854		1054	46.10	46.31	48.50	✓				
TP1-80	BJO 871		1045	54.12	54.12	69.33					
MW-1	AHR-109		1107	8.07	8.07	—					Big transducer?
MW-2	AHR 110		1126	9.76	9.76	32.67					
MW-3	AHR 111		1131	10.05	10.05	23.95					
ABK6-2	—		1137	10.82	10.82	23.47					
US-15	BBJ 265		1148	10.49	10.49	28.26					
US-11	BBJ 269		1151	10.42	10.42	38.99					
US-10	BBJ 263		1153	10.69	10.69	62.85					
[redacted]											
NPC-40	BAN-494		0947	27.04	27.04	71.20					
MW-4S	AHR 113		1119	—	—	—	?	transducer in	way		transducer
MW-4D	AHR 112		1114	20.25	20.29	—					Big transducer → 2.29

- If bladder pump, don't take total depth
- Note any damage to well

GROUNDWATER, POREWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name: RT-Holden Mine Date of Collection: 9-23-2020

Field Event: Fall Field Personnel: Ryan C.

Purge Data

Location ID: DS-35

Ecology Tag AFS 895

Diameter: _____ Screened Interval: _____

GPS: _____

Total Depth: _____ Transducer S/N: _____

Location Condition (Well damage, creek level, iron staining, fire damage): Good

Secure: ☑ Yes ☐ No Depth Sounder decontaminated prior to use: ☑ Yes ☐ No

Photograph Numbers: _____

One Casing Volume (gal): _____

Depth of water (from top of casing): 19.01

After 5 minutes of purging (from TOC): 19.01

Begin purge (time): 1309 End purge (time): _____

Volume purged: 12.25 Purge water disposal method: Ground

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
¾	1.050"	0.804"	0.0229	0.2916
2"	2.375"	2.067"	0.17	1.45
2.5"	2.875"	2.445"	0.255	2.129
4"	4.500"	4.026"	0.66	5.51

Time	DTW (decimal ft below TOC)	Vol. Purged L / gal	pH (s.u.)	DO (mg/L)	Specific Conductivity (µS/cm)	Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments
1320	19.01	2.75	6.31	7.40	38.0	1.66	11.0	156.5	
1325	19.01	4	6.13	7.34	38.3	0.97	11.5	160.8	
1330		5.50	6.10	7.31	38.2	0.80	11.5	162.7	
1335		7	6.08	7.32	38.2	0.82	11.5	164.0	
1340		8.50	6.07	7.28	38.2	0.80	11.5	165.1	
1345		10	6.07	7.23	38.1	0.79	11.0	166.8	

Ferrous Iron Field Test _____ mg/L or ☑ Not Detected LaMotte Turbidimeter Reading: _____ NTU

Sampling Data

Sample No: DS-35-GW-092320 Depth of tubing/distance from shore: _____

Date Collected (mo/dy/yr): 9-23-2020 Time Sample Collected: 1355 Weather: Heavy rain

Duplicate Sample No: _____ Time Duplicate Sample Collected: _____

Type: ☑ Groundwater ☐ Surface Water ☐ Porewater (6"/red, 12"/green, 36"/black) Sample: ☐ Unfiltered ☐ Filtered Filter Type: ☑ disposable 0.45-µm ☐ _____

Sample Collected with: ☐ Grab ☑ Pump Other: _____ Type: ☑ Peristaltic ☐ Bladder Other: _____ Flow Rate (L/min): _____

Water Quality Instrument Data Collected with: Type: ☑ YSI Pro DSS ☐ Horiba U-50 ☐ LaMotte (Turbidity only) Other: _____

Sample Decon Procedure: Sample collected with: ☑ disposable and/or dedicated silicon and poly tubing ☐ Tubing replaced

Sample Description (Color, Turbidity, Odor, Other): Clear, odorless

Sample Analyses

Total Metals	(HNO3) ☑	TDS/TSS	(unpres) ☑	TOC	(H2SO4) ☑	Cl/SO4/NO3	(unpres) ☐	_____	(_____) ☐
Diss Metals (Filtered)	(HNO3) ☐	Alkalinity (no headspace)	(unpres) ☑	DOC (filtered)	(H2SO4) ☑	Hardness	(calculated) ☐	_____	(_____) ☐

Additional Information

Type of Sample Containers:	Preservative	Quantity:	QA/QC Samples:	Comments:
1000 mL HDPE	none	2	☐ Field Duplicate	
500 mL HDPE	HNO3	1	☐ MS/MSD	
500 mL HDPE	none	1	☐ Field Blank	
250 mL Glass Amber	H2SO4	2	☐ Rinsate	

Signature: Ryan Cuthbert Date: 9-23-2020

GROUNDWATER, POREWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name: RT-Holden Mine Date of Collection: 9/23/2020

Field Event: Fall 2020 Field Personnel: TS

Purge Data

Location ID: DS-3D

Ecology Tag AFS 844

Diameter: 2" Screened Interval: _____

Total Depth: _____ Transducer S/N: _____

Location Condition (Well damage, creek level, iron staining, fire damage): good

Secure: ☑ Yes ☐ No Depth Sounder decontaminated prior to use: ☑ Yes ☐ No

Photograph Numbers: _____

One Casing Volume (gal): _____

Depth of water (from TOC or staff gauge): 19.67' Time: _____

After 5 minutes of purging (from TOC): 19.69'

Begin purge (time): 12:55 End purge (time): _____

Volume purged: _____ Purge water disposal method: _____

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
¾"	1.050"	0.804"	0.0229	0.2916
2"	2.375"	2.067"	0.17	1.45
2.5"	2.875"	2.445"	0.255	2.129
4"	4.500"	4.026"	0.66	5.51

Time	DTW (decimal ft below TOC)	Vol. Purged L / gal	pH (s.u.)	DO (mg/L)	Specific Conductivity (uS/cm)	LaMotte Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments
13:10	19.69	4.75	5.94	6.83	47.3	0.54	10.7	172.1	
13:15	19.69	6.5	5.96	6.79	49.2	0.47	10.8	176.8	Pump slowed
13:20	19.69	7.75	5.97	6.72	49.7	0.46	10.8	179.5	
13:25	19.69	9.0	5.98	6.67	49.5	0.40	10.8	182.7	

Ferrous Iron Field Test _____ mg/L or ☒ Not Detected

Sampling Data

Sample No: DS-3D-SW-092320 Depth of tubing/distance from shore: _____

Date Collected (mo/dy/yr): 09/23/20 Time Sample Collected: 1330 Weather: Rain

Duplicate Sample No: _____ Time Duplicate Sample Collected: _____

Type: ☑ Groundwater ☐ Surface Water ☐ Porewater (6"/red, 12"/green, 36"/black) Sample: ☑ Unfiltered ☐ Filtered Filter Type: ☑ disposable 0.45-um ☐ _____

Sample Collected with: ☐ Grab ☑ Pump Other: _____ Type: ☑ Peristaltic ☐ Bladder Other: _____ Flow Rate (L/min): _____

Water Quality Instrument Data Collected with: Type: ☐ YSI Pro DSS ☐ Horiba U-50 ☑ LaMotte (Turbidity only) Other: _____

Sample Decon Procedure: Sample collected with: ☐ disposable tubing ☑ dedicated silicon and poly tubing ☐ Tubing replaced

Sample Description (Color, Turbidity, Odor, Other): clear, no odor

Sample Analyses

Total Metals	(HNO3) ☑	TDS/TSS	(unpres) ☑	TOC	(H2SO4) ☑	Cl/SO4/NO3	(unpres) ☐	_____	(____) ☐
Diss Metals (filtered)	(HNO3) ☐	Alkalinity (no headspace)	(unpres) ☑	DOC (filtered)	(H2SO4) ☑	Hardness	(calculated) ☐	_____	(____) ☐

Additional Information

Type of Sample Containers:	Preservative	Quantity:	QA/QC Samples:	Comments:
1000 mL HDPE	none	2	☐ Field Duplicate	
500 mL HDPE	HNO3	1	☐ MS/MSD	
500 mL HDPE	none	1	☐ Field Blank	
250 mL Glass Amber	H2SO4	1	☐ Rinsate	

Signature: _____ Date: _____

GROUNDWATER, POREWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name: RT-Holden Mine Date of Collection: 9/23/20

Field Event: Fall 2020 Field Personnel: TS + RC

Purge Data

Location ID: DS-45

Ecology Tag AFS 843

Diameter: 2" Screened Interval:

GPS:

Total Depth: Transducer S/N:

Location Condition (Well damage, creek level, iron staining, fire damage):

Secure: ☐ Yes ☐ No Depth Sounder decontaminated prior to use: ☐ Yes ☐ No

Photograph Numbers:

One Casing Volume (gal):

Depth of water (from top of casing): 15.06

After 5 minutes of purging (from TOC): 15.00

Begin purge (time): 15:50 End purge (time): 1640

Volume purged: 11.75 Purge water disposal method: ground

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
¾	1.050"	0.804"	0.0229	0.2916
2"	2.375"	2.067"	0.17	1.45
2.5"	2.875"	2.445"	0.255	2.129
4"	4.500"	4.026"	0.66	5.51

Time	DTW (decimal ft below TOC)	Vol. Purged L / gal	pH (s.u.)	DO (mg/L)	Specific Conductivity (µS/cm)	Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments
1602	15.06	3.5	6.20	6.51	39.9	0.09	11.3	177.0	
1607	15.06	5	6.21	6.51	39.9	0.15	11.3	178.1	
1612	15.06	6.5	6.21	6.52	39.9	0.12	11.3	179.1	
1617	15.06	8.25	6.21	6.52	39.9	0.15	11.3	180.2	[illegible]
1622	15.06	9.25	6.21	6.52	39.9	0.09	11.3	181.2	[illegible] -TS

Ferrous Iron Field Test mg/L or ☑ Not Detected LaMotte Turbidimeter Reading: NTU

Sampling Data

Sample No: DS-45-GW-092320 Depth of tubing/distance from shore:

Date Collected (mo/dy/yr): 9-23-2020 Time Sample Collected: 16:27 Weather: Heavy rain

Duplicate Sample No: Time Duplicate Sample Collected:

Type: ☑ Groundwater ☐ Surface Water ☐ Porewater (6"/red, 12"/green, 36"/black) Sample: ☐ Unfiltered ☑ Filtered Filter Type: ☑ disposable 0.45-µm ☐

Sample Collected with: ☐ Grab ☑ Pump Other: Type: ☑ Peristaltic ☐ Bladder Other: Flow Rate (L/min):

Water Quality Instrument Data Collected with: Type: ☑ YSI Pro DSS ☐ Horiba U-50 ☑ LaMotte (Turbidity only) Other:

Sample Decon Procedure: Sample collected with: ☐ disposable and/or dedicated silicon and poly tubing ☐ Tubing replaced

Sample Description (Color, Turbidity, Odor, Other): clear; no odor

Sample Analyses

Total Metals	(HNO3) ☑	TDS/TSS	(unpres) ☑	TOC	(H2SO4) ☐	Cl/SO4/NO3	(unpres) ☑		( ) ☐
Diss Metals (filtered)	(HNO3) ☐	Alkalinity (no headspace)	(unpres) ☐	DOC (filtered)	(H2SO4) ☑	Hardness	(calculated) ☐		( ) ☐

Additional Information

Type of Sample Containers:	Preservative	Quantity:	QA/QC Samples:	Comments:
1000 mL HDPE	none	2	☐ Field Duplicate	
500 mL HDPE	HNO3	1	☐ MS/MSD	
500 mL HDPE	none	1	☐ Field Blank	
250 mL Glass Amber	H2SO4	2	☐ Rinsate	

Signature: TS Date: 9-23-2020

GROUNDWATER, POREWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name: RT-Holden Mine Date of Collection: 09/23/2020

Field Event: Fall 2020 Field Personnel: TS

Purge Data

Location ID: DS-[redacted]4I

Ecology Tag: BLN 929

Diameter: 2" Screened Interval: _____

Total Depth: _____ Transducer S/N: _____

Location Condition (Well damage, creek level, iron staining, fire damage): good

Secure: ☑ Yes ☐ No Depth Sounder decontaminated prior to use: ☑ Yes ☐ No

Photograph Numbers: _____

One Casing Volume (gal): _____

Depth of water (from TOC or staff gauge): 18.21 Time: 2:15

After 5 minutes of purging (from TOC): 18.27

Begin purge (time): 2:15 End purge (time): 15:45

Volume purged: 13.25 Purge water disposal method: ground

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
¾	1.050"	0.804"	0.0229	0.2916
2"	2.375"	2.067"	0.17	1.45
2.5"	2.875"	2.445"	0.255	2.129
4"	4.500"	4.026"	0.66	5.51

Time	DTW (decimal ft below TOC)	Vol. Purged L/gal	pH (s.u.)	DO (mg/L)	Specific Conductivity (µS/cm)	LaMotte Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments
14.25	18.29	0.5	4.36	0.33	560	25.6	8.4	223.2	
14.40	18.29	6	4.34	0.27	566	49.0	8.4	222.9	
14.44	18.29	7.25	4.35	0.24	561	17.81	8.3	222.6	
14:50	18.29	8.75	4.33	0.23	561	5.20	8.2	222.2	
14.55	18.29	10	4.33	0.22	561	4.31	8.3	221.7	

Ferrous Iron Field Test 2 mg/L or ☐ Not Detected

Sampling Data

Sample No: DS-4I-092320 GW

Depth of tubing/distance from shore: _____

Date Collected (mo/dy/yr): 09/23/20 Time Sample Collected: 15:00 Weather: Rain

Duplicate Sample No: _____ Time Duplicate Sample Collected: _____

Type: ☑ Groundwater ☐ Surface Water ☐ Porewater (6"/red, 12"/green, 36"/black) Sample: ☐ Unfiltered ☑ Filtered Filter Type: ☐ disposable 0.45-µm ☐ _____

Sample Collected with: ☐ Grab ☑ Pump Other: _____ Type: ☑ Peristaltic ☐ Bladder Other: _____ Flow Rate (L/min): _____

Water Quality Instrument Data Collected with: Type: ☑ YSI Pro DSS ☐ Horiba U-50 ☑ LaMotte (Turbidity only) Other: _____

Sample Decon Procedure: Sample collected with: ☐ disposable tubing ☑ dedicated silicon and poly tubing ☐ Tubing replaced

Sample Description (Color, Turbidity, Odor, Other): _____

Sample Analyses

Total Metals	(HNO3) ☑	TDS/TSS	(unpres) ☑	TOC	(H2SO4) ☐	Cl/SO4/NO3	(unpres) ☐			( ) ☐
Diss Metals (filtered)	(HNO3) ☐	Alkalinity (no headspace)	(unpres) ☑	DOC (filtered)	(H2SO4) ☑	Hardness	(calculated) ☐			( ) ☐

Additional Information

Type of Sample Containers:	Preservative	Quantity:	QA/QC Samples:	Comments:
1000 mL HDPE	none	4	☐ Field Duplicate	
500 mL HDPE	HNO3	2	☑ MS/MSD	
500 mL HDPE	none	3	☐ Field Blank	
250 mL Glass Amber	H2SO4	4	☐ Rinsate	

Signature: _____ Date: 09/23/20

GROUNDWATER, POREWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name: RT-Holden Mine Date of Collection: 9-23-2020

Field Event: Fall Field Personnel: Ryan C.

Purge Data

Location ID: OS - 40

Ecology Tag AFS 842

Diameter: _____ Screened Interval: _____

GPS: _____

Total Depth: _____ Transducer S/N: _____

Location Condition (Well damage, creek level, iron staining, fire damage): Good

Secure: ☑ Yes ☐ No Depth Sounder decontaminated prior to use: ☑ Yes ☐ No

Photograph Numbers: _____

One Casing Volume (gal): _____

Depth of water (from top of casing): 16.73

After 5 minutes of purging (from TOC): 16.73

Begin purge (time): 1420 End purge (time): 1540

Volume purged: 15 L Purge water disposal method: ground

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
¾	1.050"	0.804"	0.0229	0.2916
2"	2.375"	2.067"	0.17	1.45
2.5"	2.875"	2.445"	0.255	2.129
4"	4.500"	4.026"	0.66	5.51

Time	DTW (decimal ft below TOC)	Vol. Purged L / gal	pH (s.u.)	DO (mg/L)	Specific Conductivity (µS/cm)	Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments
1435	16.73	2.75	5.98	0.89	40.2	0.06	10.7	172.3	
1440		3.75	5.93	0.46	37.9	0.46	11.7	196.7	
1445		4.95	5.90	0.30	37.9	0.50	10.6	181.4	
1450		5.75	5.88	0.26	35.0	0.49	10.5	184.4	
1455		6.75	5.85	0.24	38.2	0.55	10.5	190.12	
1500		7.75	5.84	0.19	36.9	0.56	10.5	193.69	
1505		9	5.82	0.12	37.2	0.49	10.5	196.1	
1510		10.25	5.80	0.10	37.5	0.57	10.4	200.1	

Ferrous Iron Field Test _____ mg/L or ☑ Not Detected LaMotte Turbidimeter Reading: _____ NTU

Sampling Data

Sample No: OS-40-GW-09232020 Depth of tubing/distance from shore: _____

Date Collected (mo/dy/yr): 9-23-2020 Time Sample Collected: 1520 Weather: Rain

Duplicate Sample No: _____ Time Duplicate Sample Collected: _____

Type: ☑ Groundwater ☐ Surface Water ☐ Porewater (6"/red, 12"/green, 36"/black) Sample: ☐ Unfiltered ☑ Filtered Filter Type: ☑ disposable 0.45-µm ☐ _____

Sample Collected with: ☐ Grab ☑ Pump Other: _____ Type: ☑ Peristaltic ☐ Bladder Other: _____ Flow Rate (L/min): _____

Water Quality Instrument Data Collected with: Type: : ☑ YSI Pro DSS ☐ Horiba U-50 : ☐ LaMotte (Turbidity only) Other: _____

Sample Decon Procedure: Sample collected with: ☑ disposable and/or dedicated silicon and poly-tubing ☐ Tubing replaced

Sample Description (Color, Turbidity, Odor, Other): Clear, odorless

Sample Analyses

Total Metals	(HNO3) ☑	TDS/TSS	(unpres) ☑	TOC	(H2SO4) ☑	Cl/SO4/NO3	(unpres) ☐	_____	(_____) ☐
Diss Metals (filtered)	(HNO3) ☐	Alkalinity (no headspace)	(unpres) ☑	DOC (filtered)	(H2SO4) ☑	Hardness	(calculated) ☐	_____	(_____) ☐

Additional Information

Type of Sample Containers:	Preservative	Quantity:	QA/QC Samples:	Comments:
1000 mL HDPE	none	2	☐ Field Duplicate	
500 mL HDPE	HNO3	1	☐ MS/MSD	
500 mL HDPE	none	1	☐ Field Blank	
250 mL Glass Amber	H2SO4	2	☐ Rinsate	

Signature: Ryan Crotty Date: 9/23/2020

GROUNDWATER, POREWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Purge Data Continued

Time	DTW	Vol. Purged	pH	DO	Specific Conductivity	Turbidity	Temp	ORP	Comments
Units:	Decimal ft	L or gal				NTU	°C	mV	
1515		11.25	5.79	0.20	74.0	0.50	16.9	202.5	

Additional Notes/Comments: DS-4D Cont

GROUNDWATER, POREWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name: RT-Holden Mine Date of Collection: 9-26-20

Field Event: Fall 2020 Field Personnel: GWelch / D Weldy

Purge Data

Location ID: DS-4DD

Ecology Tag B58 P1

Diameter: 2" Screened Interval: _____

Total Depth: _____ Transducer S/N: _____

Location Condition (Well damage, creek level, iron staining, fire damage): Good

Secure: ☒ Yes ☐ No Depth Sounder decontaminated prior to use: ☒ Yes ☐ No

Photograph Numbers: _____

One Casing Volume (gal): _____

Depth of water (from TOC or staff gauge): 20.07 Time: 739

After 5 minutes of purging (from TOC): _____

Begin purge (time): 741 End purge (time): 1120

Volume purged: >9 gal Purge water disposal method: Ground

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
¾	1.050"	0.804"	0.0229	0.2916
2"	2.375"	2.067"	0.17	1.45
2.5"	2.875"	2.445"	0.255	2.129
4"	4.500"	4.026"	0.66	5.51

Time	DTW (decimal ft below TOC)	Vol. Purged L/(gal)	pH (s.u.)	DO (mg/L)	Specific Conductivity (uS/cm)	LaMotte Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments
1003	20.12	5	5.85	5.30	372.9	4.77	8.4	79.7	5 gal bucket over flowing
1008	20.12	5.5	5.90	4.24	378.4	—	8.4	89.0	Turbid
1102	20.12	8	6.06	3.10	380.0	0.54	8.4	115.9	clear
1115	20.12	9	6.02	3.08	380.5	0.60	8.5	115.2	

Ferrous Iron Field Test _____ mg/L or ☒ Not Detected

Sampling Data

Sample No: DS-4DD-GW-092620 Depth of tubing/distance from shore: _____

Date Collected (mo/dy/yr): 9/26/20 Time Sample Collected: 1000 Weather: Sunny

Duplicate Sample No: _____ Time Duplicate Sample Collected: _____

Type: ☐ Groundwater ☐ Surface Water ☐ Porewater (6"/red, 12"/green, 36"/black) Sample: ☐ Unfiltered ☐ Filtered Filter Type: ☐ disposable 0.45-um ☐ _____

Sample Collected with: ☐ Grab ☑ Pump Other: _____ Type: ☐ Peristaltic ☒ Bladder Other: IG/21 Flow Rate (L/min): ~300 mL/min

Water Quality Instrument Data Collected with: Type: ☑ YSI Pro DSS ☐ Horiba U-50 ☐ LaMotte (Turbidity only) Other: _____

Sample Decon Procedure: Sample collected with: ☐ disposable tubing ☒ dedicated silicon and poly tubing ☐ Tubing replaced

Sample Description (Color, Turbidity, Odor, Other): clear

Sample Analyses

Total Metals	(HNO3) ☒	TDS/TSS	(unpres) ☒	TOC	(H2SO4) ☒	Cl/SO4/NO3	(unpres) ☒	_____	(____) ☐
Diss Metals (filtered)	(HNO3) ☒ NO	Alkalinity (no headspace)	(unpres) ☒	DOC (filtered)	(H2SO4) ☒	Hardness	(calculated) ☐	_____	(____) ☐

Additional Information

Type of Sample Containers:	Preservative	Quantity:	QA/QC Samples:	Comments:
1000 mL HDPE	none	2	☐ Field Duplicate	
500 mL HDPE	HNO3	1	☐ MS/MSD	
500 mL HDPE	none	1	☐ Field Blank	
250 mL Glass Amber	H2SO4	2	☐ Rinsate	

Signature: M WH Date: 9/26/20

GROUNDWATER, POREWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name: RT-Holden Mine Date of Collection: 09/22/2020

Field Event: Fall 2020 Field Personnel: TS + RL

Purge Data

Location ID: DS-5

Ecology Tag AFS 841

Diameter: 2" Screened Interval: ____

Total Depth: 24.09 Transducer S/N: ____

Location Condition (Well damage, creek level, iron staining, fire damage): Avalanche, well lid broken, casing broken

Secure: ☐ Yes ☒ No Depth Sounder decontaminated prior to use: ☒ Yes ☐ No

Photograph Numbers: ____

One Casing Volume (gal): ____

Depth of water (from TOC or staff gauge): 9.33 Time: 10:44

After 5 minutes of purging (from TOC): 9.33

Begin purge (time): 10:45 End purge (time): 12:00

Volume purged: 8.25 Purge water disposal method: to ground

Volume of Schedule 40 PVC Pipe				
Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
¾	1.050"	0.804"	0.0229	0.2916
2"	2.375"	2.067"	0.17	1.45
2.5"	2.875"	2.445"	0.255	2.129
4"	4.500"	4.026"	0.66	5.51

Time	DTW (decimal ft below TOC)	Vol Purged L / gal	pH (s.u.)	DO (mg/L)	Specific Conductivity (uS/cm)	LaMotte Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments
10:55	~~9.32~~ 9.33	1	6.36	7.97	48.0	12.30	11.3	136.7	
11:00	9.33	1.75	6.31	7.98	46.8	9.84	11.3	141.7	
11:05	9.33	2.5	6.33	7.95	46.1	8.42	11.3	144.0	
11:10	9.33	3.25	6.34	8.00	45.1	9.01	11.4	145.9	
11:15	9.33	4.2	6.35	7.99	45.1	8.51	11.3	148.1	
11:20	9.33	5.25	6.36	8.06	44.6	8.21	11.3	149.8	
11:25	9.33	6	6.36	8.01	44.8	8.30	11.3	150.8	

Ferrous Iron Field Test ____ mg/L or ☒ Not Detected

Sampling Data

Sample No: DS-5-MW-092220 Depth of tubing/distance from shore: 20' from TOC

Date Collected (mo/dy/yr): 09/22/20 Time Sample Collected: 11:25 Weather: overcast

Duplicate Sample No: ← Time Duplicate Sample Collected: ____

Type: ☒ Groundwater ☐ Surface Water ☐ Porewater (6"/red, 12"/green, 36"/black) Sample: ☐ Unfiltered ☒ Filtered Filter Type: ☒ disposable 0.45-µm ☐ ____

Sample Collected with: ☐ Grab ☒ Pump Other: ____ Type: ☒ Peristaltic ☐ Bladder Other: ____ Flow Rate (L/min): ____

Water Quality Instrument Data Collected with: Type: : ☒ YSI Pro DSS ☐ Horiba U-50 : ☒ LaMotte (Turbidity only) Other: ____

Sample Decon Procedure: Sample collected with: ☐ disposable tubing ☐ dedicated silicon and poly tubing ☒ Tubing replaced 25'

Sample Description (Color, Turbidity, Odor, Other): Clear; no odor

Sample Analyses

Total Metals / Diss Metals (filtered)	(HNO3) ☒ / (HNO3) ☒	TDS/TSS / Alkalinity (no headspace)	(unpres) ☒ / (unpres) ☒	TOC / DOC (filtered)	(H2SO4) ☒ / (H2SO4) ☒	Cl/SO4/NO3 / Hardness	(unpres) ☐ / (calculated) ☐	____ / ____	(____) ☐ / (____) ☐

Additional Information

Type of Sample Containers:	Preservative	Quantity:	QA/QC Samples:	Comments:
1000 mL HDPE	none	2	☐ Field Duplicate	
500 mL HDPE	HNO3	2	☐ MS/MSD	
500 mL HDPE	none	1	☐ Field Blank	
250 mL Glass Amber	H2SO4	2	☐ Rinsate	

Signature: TS Date: 09/22/20

GROUNDWATER, POREWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name: RT-Holden Mine Date of Collection: 09/23/20

Field Event: Fall 2020 Field Personnel: JS

Purge Data

Location ID: DS-95

Ecology Tag BBB117

Diameter: 2" Screened Interval: _____

Total Depth: _____ Transducer S/N: _____

Location Condition (Well damage, creek level, iron staining, fire damage): good

Secure: ☑ Yes ☐ No Depth Sounder decontaminated prior to use: ☒ Yes ☐ No

Photograph Numbers: _____

One Casing Volume (gal): _____

Depth of water (from TOC or staff gauge): 13.59' Time: 08:46

After 5 minutes of purging (from TOC): 13.60

Begin purge (time): 08:47 End purge (time): 09:46

Volume purged: 11.75 Purge water disposal method: ground

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
¾	1.050"	0.804"	0.0229	0.2916
2"	2.375"	2.067"	0.17	1.45
2.5"	2.875"	2.445"	0.255	2.129
4"	4.500"	4.026"	0.66	5.51

Time	DTW (decimal ft below TOC)	Vol. Purged L / gal	pH (s.u.)	DO (mg/L)	Specific Conductivity (uS/cm)	LaMotte Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments
0900	13.60	4	5.54	5.83	55.2	0.37	9.9	178.3	Pump started
0905	13.60	5.5	5.56	5.84	55.4	0.45	9.9	181.6	
0910	13.60	7	5.39	5.85	55.4	0.12	9.9	184.8	
0915	13.60	8	5.60	5.86	55.3	0.32	9.9	187.3	
0920	13.60	9.25	5.62	5.86	55.3	0.01	9.9	190.9	

Ferrous Iron Field Test _____ mg/L or ☑ Not Detected

Sampling Data

Sample No: DS-95-GW-092320 Depth of tubing/distance from shore: _____

Date Collected (mo/dy/yr): 9-23-2020 Time Sample Collected: 0925 Weather: Cloudy + rain

Duplicate Sample No: _____ Time Duplicate Sample Collected: _____

Type: ☑ Groundwater ☐ Surface Water ☐ Porewater (6"/red, 12"/green, 36"/black) Sample: ☐ Unfiltered ☑ Filtered Filter Type: ☑ disposable 0.45-µm ☐ _____

Sample Collected with: ☐ Grab ☑ Pump Other: _____ Type: ☑ Peristaltic ☐ Bladder Other: _____ Flow Rate (L/min): 1

Water Quality Instrument Data Collected with: Type: ☑ YSI Pro DSS ☐ Horiba U-50 ☐ LaMotte (Turbidity only) Other: _____

Sample Decon Procedure: Sample collected with: ☐ disposable tubing ☑ dedicated silicon and poly tubing ☐ Tubing replaced

Sample Description (Color, Turbidity, Odor, Other): Clear, Odorless

Sample Analyses

Total Metals	(HNO3) ☑	TDS/TSS	(unpres) ☑	TOC	(H2SO4) ☑	Cl/SO4/NO3	(unpres) ☐	_____	(_____) ☐
Diss Metals (filtered)	(HNO3) ☐	Alkalinity (no headspace)	(unpres) ☑	DOC (filtered)	(H2SO4) ☑	Hardness	(calculated) ☐	_____	(_____) ☐

Additional Information

Type of Sample Containers:	Preservative	Quantity:	QA/QC Samples:	Comments:
1000 mL HDPE	none	2	☐ Field Duplicate	
500 mL HDPE	HNO3	1	☐ MS/MSD	
500 mL HDPE	none	1	☐ Field Blank	
250 mL Glass Amber	H2SO4	2	☐ Rinsate	

Signature: _____ Date: 9-23-2020

GROUNDWATER, POREWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name: RT-Holden Mine Date of Collection: 9-23-2020

Field Event: Fall Field Personnel: Ryan Crosby

Purge Data

Location ID: OS-9I

Ecology Tag BBB 1160

Diameter: _____ Screened Interval: _____

GPS: _____

Total Depth: _____ Transducer S/N: _____

Location Condition (Well damage, creek level, iron staining, fire damage): Good

Secure: ☑ Yes ☐ No Depth Sounder decontaminated prior to use: ☑ Yes ☐ No

Photograph Numbers: _____

One Casing Volume (gal): _____

Depth of water (from top of casing): 14.95'

After 5 minutes of purging (from TOC): 14.45'

Begin purge (time): 0850 End purge (time): _____

Volume purged: _____ Purge water disposal method: Ground

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
¾	1.050"	0.804"	0.0229	0.2916
2"	2.375"	2.067"	0.17	1.45
2.5"	2.875"	2.445"	0.255	2.129
4"	4.500"	4.026"	0.66	5.51

Time	DTW (decimal ft below TOC)	Vol. Purged L / gal	pH (s.u.)	DO (mg/L)	Specific Conductivity (µS/cm)	Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments
0905	Pump	(fire)							
0915	14.45	5	4.28	0.50	575	0.32	8.1	254.0	
0920	14.45	6	4.26	0.48	583	0.41	8.0	275.8	
0925	14.46	7	4.25	0.47	582	0.29	8.1	176.2	
0930	14.46	8	4.26	0.46	583	0.32	8.0	179.6	
0935	14.46	9	4.26	0.43	583	0.35	8.1	184.2	

Ferrous Iron Field Test 4 mg/L or ☐ Not Detected LaMotte Turbidimeter Reading: _____ NTU

Sampling Data

Sample No: OS-9I-GW-092320 Depth of tubing/distance from shore: _____

Date Collected (mo/dy/yr): 9/23/2020 Time Sample Collected: 0950 Weather: rain

Duplicate Sample No: _____ Time Duplicate Sample Collected: _____

Type: ☑ Groundwater ☐ Surface Water ☐ Porewater (6"/red, 12"/green, 36"/black) Sample: ☐ Unfiltered ☐ Filtered Filter Type: ☐ disposable 0.45-µm ☐ _____

Sample Collected with: ☐ Grab ☑ Pump Other: _____ Type: ☑ Peristaltic ☐ Bladder Other: _____ Flow Rate (L/min): _____

Water Quality Instrument Data Collected with: Type: ☑ YSI Pro DSS ☐ Horiba U-50 ☐ LaMotte (Turbidity only) Other: _____

Sample Decon Procedure: Sample collected with: ☐ disposable and/or dedicated silicon and poly tubing ☐ Tubing replaced

Sample Description (Color, Turbidity, Odor, Other): Clear, odorless

Sample Analyses

Total Metals	(HNO3) ☑	TDS/TSS	(unpres) ☑	TOC	(H2SO4) ☑	Cl/SO4/NO3	(unpres) ☐	_____	(_____) ☐
Diss Metals (filtered)	(HNO3) ☐	Alkalinity (no headspace)	(unpres) ☑	DOC (filtered)	(H2SO4) ☑	Hardness	(calculated) ☐	_____	(_____) ☐

Additional Information

Type of Sample Containers:	Preservative	Quantity:	QA/QC Samples:	Comments:
1000 mL HDPE	none	2	☐ Field Duplicate	
500 mL HDPE	HNO3	1	☐ MS/MSD	
500 mL HDPE	none	1	☐ Field Blank	
250 mL Glass Amber	H2SO4	2	☐ Rinsate	

Signature: Ryan Crosby Date: 9/23/2020

GROUNDWATER, POREWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name: RT-Holden Mine Date of Collection: 09/23/2020

Field Event: Fall 2020 Field Personnel: TS

Purge Data

Location ID: DS-9D

Ecology Tag BBB118

Diameter: 2" Screened Interval: _____

Total Depth: _____ Transducer S/N. _____

Location Condition (Well damage, creek level, iron staining, fire damage): _____

Secure: ☒ Yes ☐ No Depth Sounder decontaminated prior to use: ☒ Yes ☐ No

Photograph Numbers: _____

One Casing Volume (gal): _____

Depth of water (from TOC or staff gauge): 13.23' Time: 09:57

After 5 minutes of purging (from TOC): 13.25

Begin purge (time): 10:00 End purge (time): 10:49

Volume purged: 10 Purge water disposal method: ground

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
¾	1.050"	0.804"	0.0229	0.2916
2"	2.375"	2.067"	0.17	1.45
2.5"	2.875"	2.445"	0.255	2.129
4"	4.500"	4.026"	0.66	5.51

Time	DTW (decimal ft below TOC)	Vol. Purged L / gal	pH (s.u.)	DO (mg/L)	Specific Conductivity (µS/cm)	LaMotte Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments
1010	13.26	3	6.32	1.41	329.0	0.06	8.2	157.4	
1015	13.26	4	6.33	1.78	337.4	0.16	8.2	156.6	
1020	13.26	5.5	6.35	1.67	339.0	0.03	8.1	156.0	
1025	13.26	7	6.35	1.32	339.2	0.15	8.1	155.6	
1030	13.26	8.2	6.35	1.08	339.4	0.10	8.0	155.4	

Ferrous Iron Field Test _____ mg/L or ☒ Not Detected

Sampling Data

Sample No: DS-9D-GW-092320 Depth of tubing/distance from shore: _____

Date Collected (mo/dy/yr): 09/23/20 Time Sample Collected: 10:35 Weather: raining

Duplicate Sample No: ——— Time Duplicate Sample Collected: _____

Type: ☒ Groundwater ☐ Surface Water ☐ Porewater (6"/red, 12"/green, 36"/black) Sample: ☒ Unfiltered ☒ Filtered Filter Type: ☒ disposable 0.45-µm ☐ _____

Sample Collected with: ☐ Grab ☒ Pump Other: _____ Type: ☒ Peristaltic ☐ Bladder Other: _____ Flow Rate (L/min): _____

Water Quality Instrument Data Collected with: Type: ☐ YSI Pro DSS ☐ Horiba U-50 ☐ LaMotte (Turbidity only) Other: _____

Sample Decon Procedure: Sample collected with: ☐ disposable tubing ☒ dedicated silicon and poly tubing ☐ Tubing replaced

Sample Description (Color, Turbidity, Odor, Other): clear; no odor

Sample Analyses

Total Metals	(HNO3) ☒	TDS/TSS	(unpres) ☒	TOC	(H2SO4) ☒	Cl/SO4/NO3	(unpres) ☐	_____	(_____) ☐
Diss Metals (filtered)	(HNO3) ☐	Alkalinity (no headspace)	(unpres) ☒	DOC (filtered)	(H2SO4) ☒	Hardness	(calculated) ☐	_____	(_____) ☐

Additional Information

Type of Sample Containers:	Preservative	Quantity:	QA/QC Samples:	Comments:
1000 mL HDPE	none	2	☐ Field Duplicate	
500 mL HDPE	HNO3	1	☐ MS/MSD	
500 mL HDPE	none	1	☐ Field Blank	
250 mL Glass Amber	H2SO4	2	☐ Rinsate	

Signature: TS Date: 9/23/20

GROUNDWATER, POREWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name: RT-Holden Mine Date of Collection: 9-25-2020

Field Event: Fall 2020 Field Personnel: Ryan Crotty

Purge Data

Location ID: OS-12S

Ecology Tag

Diameter: Screened Interval:

GPS:

Total Depth: Transducer S/N:

Location Condition (Well damage, creek level, iron staining, fire damage): Good

Secure: ☑ Yes ☐ No Depth Sounder decontaminated prior to use: ☑ Yes ☐ No

Photograph Numbers:

One Casing Volume (gal):

Depth of water (from top of casing): 7.43'

After 5 minutes of purging (from TOC): 7.43'

Begin purge (time): 1200 End purge (time): 1300

Volume purged: 12.5 Purge water disposal method: Ground

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
¾	1.050"	0.804"	0.0229	0.2916
2"	2.375"	2.067"	0.17	1.45
2.5"	2.875"	2.445"	0.255	2.129
4"	4.500"	4.026"	0.66	5.51

Time	DTW (decimal ft below TOC)	Vol. Purged L / gal	pH (s.u.)	DO (mg/L)	Specific Conductivity (uS/cm)	Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments
1210	7.43'	2.25	4.35	0.92	0.03	0.19	0.8	241.5	
1215	7.44'	3.75	4.35	0.62	0.03	0.23	0.7	239.3	
1220	7.44'	5.50	4.35	0.51	0.02	0.22	0.6	237.9	
1225	7.44'	7	4.35	0.46	0.02	0.20	0.7	237.3	
1230		8.5	4.35	0.43	0.01	0.21	0.7	236.5	
1235	↓	10	4.35	0.41	0.01	0.19	0.7	236.2	

Ferrous Iron Field Test 3 mg/L or ☐ Not Detected LaMotte Turbidimeter Reading: NTU

Sampling Data

Sample No: OS-12S-GW-092520 Depth of tubing/distance from shore:

Date Collected (mo/dy/yr): 9-25-2020 Time Sample Collected: 1245 Weather: Cloudy

Duplicate Sample No: Time Duplicate Sample Collected:

Type: ☑ Groundwater ☐ Surface Water ☐ Porewater (6"/red, 12"/green, 36"/black) Sample: ☐ Unfiltered ☐ Filtered Filter Type: ☐ disposable 0.45-µm ☐

Sample Collected with: ☐ Grab ☑ Pump Other: Type: ☑ Peristaltic ☐ Bladder Other: Flow Rate (L/min):

Water Quality Instrument Data Collected with: Type: ☑ YSI Pro DSS ☐ Horiba U-50 ☐ LaMotte (Turbidity only) Other:

Sample Decon Procedure: Sample collected with: ☑ disposable and/or dedicated silicon and poly tubing ☐ Tubing replaced

Sample Description (Color, Turbidity, Odor, Other): Clear, odorless

Sample Analyses

Total Metals	(HNO3) ☑	TDS/TSS	(unpres) ☑	TOC	(H2SO4) ☑	Cl/SO4/NO3	(unpres) ☐		( ) ☐
Diss Metals (filtered)	(HNO3) ☐	Alkalinity (no headspace)	(unpres) ☑	DOC (filtered)	(H2SO4) ☑	Hardness	(calculated) ☐		( ) ☐

Additional Information

Type of Sample Containers:	Preservative	Quantity:	QA/QC Samples:	Comments:
1000 mL HDPE	none	2	☐ Field Duplicate	
500 mL HDPE	HNO3	1	☐ MS/MSD	
500 mL HDPE	none	1	☐ Field Blank	
250 mL Glass Amber	H2SO4	2	☐ Rinsate	

Signature: Ryan Crotty Date: 9-25-2020

GROUNDWATER, POREWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name: RT-Holden Mine Date of Collection: 9-25-2020

Field Event: Fall 2020 Field Personnel:

Purge Data

Location ID: DS-12I Location Condition (Well damage, creek level, iron staining, fire damage): Good

Ecology Tag: Secure: ☑ Yes ☐ No Depth Sounder decontaminated prior to use: ☑ Yes ☐ No

Diameter: Screened Interval: Photograph Numbers:

GPS: One Casing Volume (gal):

Total Depth: Transducer S/N:

Depth of water (from top of casing): 0.70

After 5 minutes of purging (from TOC): 0.71

Begin purge (time): 1305 End purge (time): 1404

Volume purged: 13L Purge water disposal method: Ground

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
¾	1.050"	0.804"	0.0223	0.2916
2"	2.375"	2.067"	0.17	1.45
2.5"	2.875"	2.445"	0.255	2.129
4"	4.500"	4.026"	0.66	5.51

Time	DTW (decimal ft below TOC)	Vol. Purged L / gal	pH (s.u.)	DO (mg/L)	Specific Conductivity (µS/cm)	Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments
1313	0.73	3	5.04	0.52	388.1	1.17	0.00	226.8	
1318	0.73	4.25	5.06	0.38	385.9	1.34	0.00	238.6	
1323	0.73	5.75	5.05	0.35	387.4	1.25	0.00	249.6	
1328	0.73	7.25	5.02	0.33	417.2	1.29	0.00	248.2	
1333	0.71	8.75	5.02	0.32	420.1	1.30	0.00	246.5	
1338	0.73	10.25	5.02	0.31	420.1	1.31	0.00	245.4	

Ferrous Iron Field Test mg/L or ☑ Not Detected LaMotte Turbidimeter Reading: NTU

Sampling Data

Sample No: DS-12I-GW-092520 Depth of tubing/distance from shore:

Date Collected (mo/dy/yr): 9-25-2020 Time Sample Collected: 1350 Weather: Rain

Duplicate Sample No: Time Duplicate Sample Collected:

Type: ☑ Groundwater ☐ Surface Water ☐ Porewater (6"/red, 12"/green, 36"/black) Sample: ☐ Unfiltered ☐ Filtered Filter Type: ☐ disposable 0.45-µm ☐

Sample Collected with: ☐ Grab ☐ Pump Other: Type ☑ Peristaltic ☐ Bladder Other: Flow Rate (L/min):

Water Quality Instrument Data Collected with: Type: ☑ YSI Pro DSS ☐ Horiba U-50 ☐ LaMotte-Turbidity only) Other:

Sample Decon Procedure: Sample collected with: ☐ disposable and/or dedicated silicon and poly tubing. ☑ Tubing replaced

Sample Description (Color, Turbidity, Odor, Other): Clear Odorless

Sample Analyses

Total Metals	(HNO3) ☑	TDS/TSS	(unpres) ☑	TOC	(H2SO4) ☑	Cl/SO4/NO3	(unpres) ☐		( ) ☐
Diss Metals (filtered)	(HNO3) ☐	Alkalinity (no headspace)	(unpres) ☑	DOC (filtered)	(H2SO4) ☑	Hardness	(calculated) ☐		( ) ☐

Additional Information

Type of Sample Containers:	Preservative	Quantity:	QA/QC Samples:	Comments:
1000 mL HDPE	none	2	☐ Field Duplicate	
500 mL HDPE	HNO3	1	☐ MS/MSD	
500 mL HDPE	none	1	☐ Field Blank	
250 mL Glass Amber	H2SO4	2	☐ Rinsate	

Signature: Ryan Cooley Date: 9-25-2020

GROUNDWATER, POREWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name: RT-Holden Mine Date of Collection: 09/25/2020

Field Event: Fall 2020 Field Personnel: TS

Purge Data

Location ID: DS-12D

Ecology Tag BIO 849

Diameter: 2" Screened Interval: _____

GPS: _____

Total Depth: _____ Transducer S/N: _____

Location Condition (Well damage, creek level, iron staining, fire damage): rr-access

Secure: ☒ Yes ☐ No Depth Sounder decontaminated prior to use: ☒ Yes ☐ No

Photograph Numbers: _____

One Casing Volume (gal): _____

Depth of water (from top of casing): 8.73

After 5 minutes of purging (from TOC): 8.86

Begin purge (time): 13:17 End purge (time): 14:09

Volume purged: 13.5 L Purge water disposal method: ground

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Linear Ft.)
¾	1.050"	0.804"	0.0229	0.2916
2"	2.375"	2.067"	0.17	1.45
2.5"	2.875"	2.445"	0.255	2.129
4"	4.500"	4.026"	0.66	5.51

Time	DTW (decimal ft below TOC)	Vol. Purged L / gal	pH (s.u.)	DO (mg/L)	Specific Conductivity (uS/cm)	Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments
13:30	8.86	3.5	5.59	1.70	351.6	0.47	6.3	182.9	
13:35	8.86	5.25	5.62	1.11	350.6	0.39	6.2	189.2	
13:40	8.86	7	5.61	1.01	349.1	0.32	6.3	194.8	
13:45	8.86	8.75	5.62	0.98	347.0	0.27	6.2	198.1	
13:50	8.86	10.5	5.61	0.93	350.1	0.21	6.2	201.1	

Ferrous Iron Field Test _____ mg/L or ☒ Not Detected LaMotte Turbidimeter Reading: _____ NTU

Sampling Data

Sample No: DS-12D-GW-092520 Depth of tubing/distance from shore: _____

Date Collected (mo/dy/yr): 09/25/20 Time Sample Collected: 13:55 Weather: Rain

Duplicate Sample No: _____ Time Duplicate Sample Collected: _____

Type: ☒ Groundwater ☐ Surface Water ☐ Porewater (6"/red, 12"/green, 36"/black) Sample: ☒ Unfiltered ☒ Filtered Filter Type: ☒ disposable 0.45-µm ☐ _____

Sample Collected with: ☐ Grab ☒ Pump Other: _____ Type: ☒ Peristaltic ☐ Bladder Other: _____ Flow Rate (L/min): _____

Water Quality Instrument Data Collected with: Type: ☒ YSI Pro DSS ☐ Horiba U-50 ☒ LaMotte (Turbidity only) Other: _____

Sample Decon Procedure: Sample collected with: ☒ disposable and/or dedicated silicon and poly tubing ☐ Tubing replaced

Sample Description (Color, Turbidity, Odor, Other): clear; no odor

Sample Analyses

Total Metals	(HNO3) ☒	TDS/TSS	(unpres) ☒	TOC	(H2SO4) ☒	Cl/SO4/NO3	(unpres) ☐	_____	(_____) ☐
Diss Metals (filtered)	(HNO3) ☐	Alkalinity (no headspace)	(unpres) ☒	DOC (filtered)	(H2SO4) ☒	Hardness	(calculated) ☐	_____	(_____) ☐

Additional Information

Type of Sample Containers:	Preservative	Quantity:	QA/QC Samples:	Comments:
1000 mL HDPE	none	2	☐ Field Duplicate	
500 mL HDPE	HNO3	1	☐ MS/MSD	
500 mL HDPE	none	1	☐ Field Blank	
250 mL Glass Amber	H2SO4	2	☐ Rinsate	

Signature: _____ Date: 09/25/2020

GROUNDWATER, POREWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name: RT-Holden Mine
Date of Collection: 9-25-2020
Field Event: Fall 2020
Field Personnel: Ryan Crotty

Purge Data

Location ID: DS-135
Ecology Tag
Diameter: Screened Interval:
Total Depth: Transducer S/N:

Location Condition (Well damage, creek level, iron staining, fire damage): Good
Secure: ☑ Yes ☐ No
Depth Sounder decontaminated prior to use: ☑ Yes ☐ No
Photograph Numbers:
One Casing Volume (gal):

Depth of water (from TOC or staff gauge): 8.21' Time: 0950
After 5 minutes of purging (from TOC): 8.20'
Begin purge (time): 0950 End purge (time): 1055
Volume purged: 14 Purge water disposal method: Ground

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
¾	1.050"	0.804"	0.0229	0.2916
2"	2.375"	2.067"	0.17	1.45
2.5"	2.875"	2.445"	0.255	2.129
4"	4.500"	4.026"	0.66	5.51

Time	DTW (decimal ft below TOC)	Vol. Purged (L / gal)	pH (s.u.)	DO (mg/L)	Specific Conductivity (uS/cm)	LaMotte Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments
1002	10.20	4	3.56	0.88	2983	0.35	9.4	393.9	
1007	10.21	5.5	3.58	0.000	298.9	0.40	9.2	382.2	
1012	10.21	7	3.64	0.51	298.3	0.37	9.0	374.2	
1017	10.21	8.5	3.69	0.52	298.7	0.46	8.9	351.3	
1023		10	3.72	0.51	299.3	0.40	8.9	352.3	
1028		11.5	3.73	0.49	299.9	0.39	8.9	350.3	

Ferrous Iron Field Test 1.5 mg/L or ☐ Not Detected

Sampling Data

Sample No: DS-135-GW-092520
Depth of tubing/distance from shore:
Date Collected (mo/dy/yr): 9-25-2020 Time Sample Collected: 1035 Weather: Rainy
Duplicate Sample No: Time Duplicate Sample Collected:
Type: ☑ Groundwater ☐ Surface Water ☐ Porewater (6"/red, 12"/green, 36"/black) Sample: ☐ Unfiltered ☐ Filtered Filter Type: ☑ disposable 0.45-µm ☐
Sample Collected with: ☐ Grab ☑ Pump Other: Type: ☑ Peristaltic ☐ Bladder Other: Flow Rate (L/min):
Water Quality Instrument Data Collected with: Type: : ☑ YSI Pro DSS ☐ Horiba U-50 : ☐ LaMotte (Turbidity only) Other:
Sample Decon Procedure: Sample collected with: ☐ disposable tubing ☐ dedicated silicon and poly tubing ☐ Tubing replaced
Sample Description (Color, Turbidity, Odor, Other): clear odor-less

Sample Analyses

Total Metals	(HNO3) ☑	TDS/TSS	(unpres) ☑	TOC	(H2SO4) ☑	Cl/SO4/NO3	(unpres) ☐		( ) ☐
Diss Metals (filtered)	(HNO3) ☐	Alkalinity (no headspace)	(unpres) ☑	DOC (filtered)	(H2SO4) ☑	Hardness	(calculated) ☐		( ) ☐

Additional Information

Type of Sample Containers:	Preservative	Quantity:	QA/QC Samples:	Comments:
1000 mL HDPE	none	4	☐ Field Duplicate	
500 mL HDPE	HNO3	2	☑ MS/MSD	MS/MSD
500 mL HDPE	none	2	☐ Field Blank	
250 mL Glass Amber	H2SO4	4	☐ Rinsate	

Signature: Ryan Crotty Date: 9-25-2020

GROUNDWATER, POREWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name: RT-Holden Mine Date of Collection: 9/25/2020

Field Event: Fall 2020 Field Personnel: TS

Purge Data

Location ID: DS-13I

Ecology Tag BIO 951

Diameter: 2" Screened Interval: _____

Total Depth: _____ Transducer S/N: _____

Location Condition (Well damage, creek level, iron staining, fire damage): re-paint monuments in future visit.

Secure: ☒ Yes ☐ No Depth Sounder decontaminated prior to use: ☒ Yes ☐ No

Photograph Numbers: _____

One Casing Volume (gal): _____

Depth of water (from TOC or staff gauge): 8.16 Time: 11:40

After 5 minutes of purging (from TOC): 8.18

Begin purge (time): 11:42 End purge (time): 12:54

Volume purged: 15.5 L Purge water disposal method: ground

Volume of Schedule 40 PVC Pipe				
Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
¾	1.050"	0.804"	0.0229	0.2916
2"	2.375"	2.067"	0.17	1.45
2.5"	2.875"	2.445"	0.255	2.129
4"	4.500"	4.026"	0.66	5.51

Time	DTW (decimal ft below TOC)	Vol. Purged L/gal	pH (s.u.)	DO (mg/L)	Specific Conductivity (uS/cm)	LaMotte Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments
11:55	8.18	3.25	4.40	0.74	462.8	0.27	7.4	207.4	
12:00	8.18	5	4.39	0.52	461.7	0.06	7.2	225.2	Pump slowed
12:05	8.18	7	4.39	0.48	462.3	0.31	7.3	226.2	
12:10	8.18	8.25	4.39	0.46	461.4	0.63	7.4	231.2	
12:15	8.19	9.75	4.39	0.43	459.7	0.48	7.4	232.8	
12:20	8.18	11	4.39	0.41	460.6	0.40	7.3	234.5	

Ferrous Iron Field Test 1.5 mg/L or ☐ Not Detected

Sampling Data

Sample No: DS-13I-GW-092520 Depth of tubing/distance from shore: _____

Date Collected (mo/dy/yr): 09/25/20 Time Sample Collected: 12:25 Weather: Rain

Duplicate Sample No: DS-113I-GW-092520 Time Duplicate Sample Collected: 12:35

Type: ☒ Groundwater ☐ Surface Water ☐ Porewater (6"/red, 12"/green, 36"/black) Sample: ☒ Unfiltered ☒ Filtered Filter Type: ☒ disposable 0.45-µm ☐ _____

Sample Collected with: ☐ Grab ☒ Pump Other: _____ Type: ☒ Peristaltic ☐ Bladder Other: _____ Flow Rate (L/min): _____

Water Quality Instrument Data Collected with: Type: ☒ YSI Pro DSS ☐ Horiba U-50 ☒ LaMotte (Turbidity only) Other: _____

Sample Decon Procedure: Sample collected with: ☐ disposable tubing ☐ dedicated silicon and poly tubing ☒ tubing replaced ≈ 70'

Sample Description (Color, Turbidity, Odor, Other): clear; no odor

Sample Analyses

Total Metals	(HNO3) ☒	TDS/TSS	(unpres) ☒	TOC	(H2SO4) ☒	Cl/SO4/NO3	(unpres) ☐	_____	(____) ☐
Diss Metals (filtered)	(HNO3) ☐	Alkalinity (no headspace)	(unpres) ☒	DOC (filtered)	(H2SO4) ☒	Hardness	(calculated) ☐	_____	(____) ☐

Additional Information

Type of Sample Containers:	Preservative	Quantity:	QA/QC Samples:	Comments:
1000 mL HDPE	none	4	☒ Field Duplicate	
500 mL HDPE	HNO3	2	☐ MS/MSD	
500 mL HDPE	none	2	☐ Field Blank	
250 mL Glass Amber	H2SO4	4	☐ Rinsate	

Signature: _____ Date: 09/25/20

GROUNDWATER, POREWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name: RT-Holden Mine Date of Collection: 9/25/2020

Field Event: Fall 2020 Field Personnel: TS

Purge Data

Location ID: DS-13D

Ecology Tag

Diameter: 2" Screened Interval:

Total Depth: 100' Transducer S/N:

Location Condition (Well damage, creek level, iron staining, fire damage): DS-paint

Secure: ☒ Yes ☐ No Depth Sounder decontaminated prior to use: ☒ Yes ☐ No

Photograph Numbers:

One Casing Volume (gal):

Depth of water (from TOC or staff gauge): 20.25 Time: 9:36

After 5 minutes of purging (from TOC): 20.25

Begin purge (time): 9:36 End purge (time): 10:42

Volume purged: 16 L/gal Purge water disposal method: ground

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
¾	1.050"	0.804"	0.0229	0.2916
2"	2.375"	2.067"	0.17	1.45
2.5"	2.875"	2.445"	0.255	2.129
4"	4.500"	4.026"	0.66	5.51

Time	DTW (decimal ft below TOC)	Vol. Purged L / gal	pH (s.u.)	DO (mg/L)	Specific Conductivity (µS/cm)	LaMotte Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments
1000	20.25	5.5	6.08	5.92	307.4	0.89	6.4	189.4	
1005	20.25	6.75	6.11	5.58	320.4	0.28	6.4	189.6	
1010	20.25	8.5	6.16	5.27	331.6	0.28	6.3	189.3	
1015	20.25	10.25	6.18	5.18	332.4	0.30	6.3	189.3	
1020	20.25	12	6.19	5.12	333.7	0.29	6.3	189.5	

Ferrous Iron Field Test mg/L or ☒ Not Detected

Sampling Data

Sample No: DS-13D-GW-092520 Depth of tubing/distance from shore: ~45'

Date Collected (mo/dy/yr): 09/25/20 Time Sample Collected: 10:25 Weather: rain

Duplicate Sample No: — Time Duplicate Sample Collected:

Type: ☒ Groundwater ☐ Surface Water ☐ Porewater (6"/red, 12"/green, 36"/black) Sample: ☒ Unfiltered ☒ Filtered Filter Type: ☒ disposable 0.45-µm ☐

Sample Collected with: ☐ Grab ☒ Pump Other: Type: ☒ Peristaltic ☐ Bladder Other: Flow Rate (L/min):

Water Quality Instrument Data Collected with: Type: ☒ YSI Pro DSS ☐ Horiba U-50 ☒ LaMotte (Turbidity only) Other:

Sample Decon Procedure: Sample collected with: ☐ disposable tubing ☐ dedicated silicon and poly tubing ☒ Tubing replaced 1035'

Sample Description (Color, Turbidity, Odor, Other):

Sample Analyses

Total Metals	(HNO3) ☒	TDS/TSS	(unpres) ☒	TOC	(H2SO4) ☒	Cl/SO4/NO3	(unpres) ☐		( ) ☐
Diss Metals (filtered)	(HNO3) ☐	Alkalinity (no headspace)	(unpres) ☒	DOC (filtered)	(H2SO4) ☒	Hardness	(calculated) ☐		( ) ☐

Additional Information

Type of Sample Containers:	Preservative	Quantity:	QA/QC Samples:	Comments:
1000 mL HDPE	none	2	☐ Field Duplicate	
500 mL HDPE	HNO3	1	☐ MS/MSD	
500 mL HDPE	none	1	☐ Field Blank	
250 mL Glass Amber	H2SO4	2	☐ Rinsate	

Signature: Date: 09/25/20

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GROUNDWATER, POREWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name: RT-Holden Mine Date of Collection: 9/23/20

Field Event: Fall 2020 Field Personnel: Nick Waldo

Purge Data

Location ID: DS-153

Ecology Tag: BLW-310

Diameter: 2" Screened Interval: 13.9-23.9

GPS:

Total Depth: 26.7 Transducer S/N:

Location Condition (Well damage, creek level, iron staining, fire damage): Good, locked

Secure: ☒ Yes ☐ No Depth Sounder decontaminated prior to use: ☐ Yes ☒ No, fresh in bag

Photograph Numbers:

One Casing Volume (gal): 1.7

Depth of water (from top of casing): 17.01

After 5 minutes of purging (from TOC): 17.03

Begin purge (time): ~~757~~ 805 End purge (time): 840

Volume purged: 8L Purge water disposal method: Ground

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
¾	1.050"	0.804"	0.0229	0.2916
2"	2.375"	2.067"	0.17	1.45
2.5"	2.875"	2.445"	0.255	2.129
4"	4.500"	4.026"	0.66	5.51

Time	DTW (decimal ft below TOC)	Vol. Purged (gal)	pH (s.u.)	DO (mg/L)	Specific Conductivity (µS/cm)	Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments
806	17.03	0.5	6.31	0.82	858	—	7.1	-47.8	
816	17.03	2	6.31	0.51	854	0.34	6.9	-47.5	
817	17.03	3	6.34	0.43	854	0.25	6.9	-51.2	
826	17.03	5	6.39	0.39	853	0.22	6.9	-55.2	
834	17.03	7	6.37	0.36	852	0.44	6.9	-55.8	
839	17.03	8	6.37	0.36	851	—	6.9	-56.1	

Ferrous Iron Field Test 4.0 mg/L or ☐ Not Detected LaMotte Turbidimeter Reading: NTU

Sampling Data

Sample No: DS-153-GW-092320 Depth of tubing/distance from shore: 22

Date Collected (mo/dy/yr): 09/23/20 Time Sample Collected: 840 Weather: Rainy

Duplicate Sample No: Time Duplicate Sample Collected:

Type: ☒ Groundwater ☐ Surface Water ☐ Porewater (8"/red, 12"/green, 36"/black) Sample: ☐ Unfiltered ☐ Filtered Filter Type: ☐ disposable 0.45-µm ☐

Sample Collected with: ☐ Grab ☒ Pump Other: Type: ☒ Peristaltic ☐ Bladder Other: Flow Rate (L/min):

Water Quality Instrument Data Collected with: Type: ☒ YSI Pro DSS ☐ Horiba U-50 ☒ LaMotte (Turbidity only) Other:

Sample Decon Procedure: Sample collected with: ☒ disposable and/or dedicated silicon and poly tubing ☐ Tubing replaced

Sample Description (Color, Turbidity, Odor, Other): Clear

Sample Analyses

Total Metals	(HNO3) ☒	TDS/TSS	(unpres) ☒	TOC	(H2SO4) ☒	Cl/SO4/NO3	(unpres) ☐		( ) ☐
Diss Metals (filtered)	(HNO3) ☐	Alkalinity (no headspace)	(unpres) ☒	DOC (filtered)	(H2SO4) ☒	Hardness	(calculated) ☐		( ) ☐

Additional Information

Type of Sample Containers:	Preservative	Quantity:	QA/QC Samples:	Comments:
1000 mL HDPE	none	2	☐ Field Duplicate	
500 mL HDPE	HNO3	1	☐ MS/MSD	
500 mL HDPE	none	1	☐ Field Blank	
250 mL Glass Amber	H2SO4	2	☐ Rinsate	

Signature: N Wk Date: 9/27/20

GROUNDWATER, POREWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name: RT-Holden Mine Date of Collection: 9-23-20

Field Event: Fall 2020 Field Personnel: GSW

Purge Data

Location ID: DS-15I

Ecology Tag: BLK 311

Diameter: 2 Screened Interval:

GPS:

Total Depth: Transducer S/N:

Location Condition (Well damage, creek level, iron staining, fire damage):

Secure: ☑ Yes ☐ No Depth Sounder decontaminated prior to use: ☐ Yes ☐ No

Photograph Numbers:

One Casing Volume (gal):

Depth of water (from top of casing): 17.05

After 5 minutes of purging (from TOC): 17.48

Begin purge (time): 750 End purge (time):

Volume purged: Purge water disposal method: Pour

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
¾	1.050"	0.804"	0.0229	0.2916
2"	2.375"	2.067"	0.17	1.45
2.5"	2.875"	2.445"	0.255	2.129
4"	4.500"	4.026"	0.66	5.51

Time	DTW (decimal ft below TOC)	Vol. Purged (L / gal)	pH (s.u.)	DO (mg/L)	Specific Conductivity (uS/cm)	Turbidity (NTU)	Temp (C)	ORP (mV)	Comments
751		0.2	7.04	3.11	360	33	7.8	148	YSI #1
759		2.5	6.54	2.20	295	4.86	7.6	170	YSI #1
805	17.48	5	6.64	2.17	283.5	2.26	7.6	173.5	LaMotte
810	17.48	6	6.69	2.13	283.4	0.62	7.6	176.8	"
814	↓	7.1	6.73	2.10	284.2	1.05	7.6	179.0	
817	↓	8	6.75	2.07	284.6	~	7.6	180.2	
825		10.4	6.78	1.99	286	6.7	7.6	146.3	Rosa #1
828			6.60	1.45	332.4		7.7	154.8	→ to Ind

Ferrous Iron Field Test mg/L or ☑ Not Detected LaMotte Turbidimeter Reading: 1.05 NTU

Sampling Data

Sample No: DS-15I-GW-092320 Depth of tubing/distance from shore: Screen.

Date Collected (mo/dy/yr): 9/23/20 Time Sample Collected: 830 Weather: Rain

Duplicate Sample No: Time Duplicate Sample Collected:

Type: ☐ Groundwater ☐ Surface Water ☐ Porewater (6"/red, 12"/green, 36"/black) Sample: ☐ Unfiltered ☐ Filtered Filter Type: ☐ disposable 0.45-µm ☐

Sample Collected with: ☐ Grab ☐ Pump Other: Type: ☐ Peristaltic ☐ Bladder Other: Flow Rate (L/min):

Water Quality Instrument Data Collected with: Type: : ☐ YSI Pro DSS ☐ Horiba U-50 : ☐ LaMotte (Turbidity only) Other:

Sample Decon Procedure: Sample collected with: ☐ disposable and/or dedicated silicon and poly tubing ☐ Tubing replaced

Sample Description (Color, Turbidity, Odor, Other):

Sample Analyses

Total Metals	(HNO3)	☑	TDS/TSS	(unpres)	☑	TOC	(H2SO4)	☑	Cl/SO4/NO3	(unpres)	☑		( ) ☐
Diss Metals (filtered)	(HNO3)	☐	Alkalinity (no headspace)	(unpres)	☑	DOC (filtered)	(H2SO4)	☑	Hardness	(calculated)	☐		( ) ☐

Additional Information

Type of Sample Containers:	Preservative	Quantity:	QA/QC Samples:	Comments:
1000 mL HDPE	none	2	☑ Field Duplicate	
500 mL HDPE	HNO3	2	☐ MS/MSD	
500 mL HDPE	none	1	☐ Field Blank	
250 mL Glass Amber	H2SO4	1	☐ Rinsate	
		6		

Signature: GSW Date: 9/23/20

GROUNDWATER, POREWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Purge Data Continued

Time	DTW	Vol. Purged	pH	DO	Specific Conductivity	Turbidity	Temp	ORP	Comments
Units:	Decimal ft	(L or gal)				NTU	°C	mV	
830		12	6.50	1.13	330.6		7.6	154.8	
833		13.3	6.44	1.16	327.6		7.7	163.5	
836		14	6.41	1.19	328.3	0.55	7.7	166.1	
839		15	6.36	1.17	330.2		7.7	171.7	
842		~16	6.36	1.27	322.9		7.7	174.3	
847		~19	6.35	1.31	323.1		7.7	177.8	4

Additional Notes/Comments:

pH Meter Reads (Pump OFF). Valves Shutoff @ Restart

DS-15I Cont

GROUNDWATER, POREWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name: RT-Holden Mine Date of Collection: 9/23/20

Field Event: Fall 2020 Field Personnel: Nick Waldo

Purge Data

Location ID: DS-165

Ecology Tag BLW-312

Diameter: 2" Screened Interval: 11-21

GPS:

Total Depth: 24 Transducer S/N:

Location Condition (Well damage, creek level, iron staining, fire damage): Good, Locked

Secure ☒ Yes ☐ No Depth Sounder decontaminated prior to use: ☒ Yes ☐ No

Photograph Numbers:

One Casing Volume (gal): .68

Depth of water (from top of casing): 19.82

After 5 minutes of purging (from TOC):

Begin purge (time): ~~931~~ 1004 End purge (time):

Volume purged: 16 Purge water disposal method: Ground

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
¾	1.050"	0.804"	0.0229	0.2916
2"	2.375"	2.067"	0.17	1.45
2.5"	2.875"	2.445"	0.256	2.129
4"	4.500"	4.026"	0.66	5.51

Time	DTW (decimal ft below TOC)	Vol. Purged (gal)	pH (s.u.)	DO (mg/L)	Specific Conductivity (µS/cm)	Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments
1005	19.82	<1	5.91	1.65	250	—	11.1	64.4	Turbid, reddish
1011	19.82	1.5	6.09	6.92	48.1	7.30	10.6	122.3	clear
1020	19.82	4	6.06	6.64	48.6	4.92	10.6	146.8	
1030	19.82	7	6.03	6.59	48.3	3.49	10.6	158.6	
1039	19.82	9	6.00	6.56	48.6	2.22	10.6	162.8	
1047	19.82	11	6.02	6.60	48.2	1.03	10.6	163.7	
1056	19.82	14	6.06	6.68	48.2	1.33	10.6	157.8	

Ferrous Iron Field Test _____ mg/L or ☒ Not Detected LaMotte Turbidimeter Reading: _____ NTU

Sampling Data

Sample No: DS-165-GW-092320 Depth of tubing/distance from shore: 21

Date Collected (mo/dy/yr): 9/23/20 Time Sample Collected: 1100 Weather: Rain

Duplicate Sample No: Time Duplicate Sample Collected:

Type: ☒ Groundwater ☐ Surface Water ☐ Porewater (6"/red, 12"/green, 36"/black) Sample: ☒ Unfiltered ☒ Filtered Filter Type: ☒ disposable 0.45-µm ☐ ____

Sample Collected with: ☐ Grab ☒ Pump Other: Type: ☒ Peristaltic ☐ Bladder Other: Flow Rate (L/min):

Water Quality Instrument Data Collected with: Type: ☒ YSI Pro DSS ☐ Horiba U-50 : ☐ LaMotte (Turbidity only) Other:

Sample Decon Procedure: Sample collected with: ☒ disposable and/or dedicated silicon and poly tubing ☐ Tubing replaced

Sample Description (Color, Turbidity, Odor, Other): clear

Sample Analyses

Total Metals	(HNO3) ☒	TDS/TSS	(unpres) ☒	TOC	(H2SO4) ☒	Cl/SO4/NO3	(unpres) ☒			☐
Diss Metals (filtered)	(HNO3) ☐	Alkalinity (no headspace)	(unpres) ☒	DOC (filtered)	(H2SO4) ☒	Hardness	(calculated) ☐			☐

Additional Information

Type of Sample Containers:	Preservative	Quantity:	QA/QC Samples:	Comments:
1000 mL HDPE	none	2	☐ Field Duplicate	
500 mL HDPE	HNO3	1	☐ MS/MSD	
500 mL HDPE	none	1	☐ Field Blank	
250 mL Glass Amber	H2SO4	2	☐ Rinsate	

Signature: NW Date: 9/23/20

GROUNDWATER, POREWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name: RT-Holden Mine Date of Collection: 9-23-20

Field Event: Fall 2020 Field Personnel: GSW

Purge Data

Location ID: DS-16I

Ecology Tag

Diameter: 2 Screened Interval:

GPS:

Total Depth: Transducer S/N:

Location Condition (Well damage, creek level, iron staining, fire damage):

Secure: ☑ Yes ☐ No Depth Sounder decontaminated prior to use: ☑ Yes ☐ No

Photograph Numbers:

One Casing Volume (gal):

Depth of water (from top of casing): 22.96

After 5 minutes of purging (from TOC): 23.13

Begin purge (time): 1008 End purge (time):

Volume purged: Purge water disposal method: Pour

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
¾	1.050"	0.804"	0.0229	0.2916
2"	2.375"	2.067"	0.17	1.45
2.5"	2.875"	2.445"	0.255	2.129
4"	4.500"	4.026"	0.66	5.51

Time	DTW (decimal ft below TOC)	Vol. Purged L / gal	pH (s.u.)	DO (mg/L)	Specific Conductivity (uS/cm)	Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments
1010		1.6	6.80	6.23	65.7	0.34	7.9	154.0	
1018	23.13	7.7	6.14	6.16	65.4	0.16	7.6	194.2	
1028	23.12	15	5.90	6.16	65.8	0.10	7.6	197.7	
1031	SM.bk	~17	5.96	6.15	66.2	0.12	7.6	200.1	ϕ
1034									

Ferrous Iron Field Test mg/L or ☑ Not Detected LaMotte Turbidimeter Reading: NTU

Sampling Data

Sample No: DS-16I-GW-092320 Depth of tubing/distance from shore: 1ft off Bottom

Date Collected (mo/dy/yr): 9-23-20 Time Sample Collected: 1050 Weather: Rain

Duplicate Sample No: DS-16I DUP-GW-092320 Time Duplicate Sample Collected: 1050

Type: ☑ Groundwater ☐ Surface Water ☐ Porewater (6"/red, 12"/green, 36"/black) Sample: ☐ Unfiltered ☐ Filtered Filter Type: ☐ disposable 0.45-um ☐

Sample Collected with: ☐ Grab ☑ Pump Other: Type: ☑ Peristaltic ☐ Bladder Other: Flow Rate (L/min): 200

Water Quality Instrument Data Collected with: Type: ☑ YSI Pro DSS ☐ Horiba U-50 : ☐ LaMotte (Turbidity only) Other:

Sample Decon Procedure: Sample collected with: ☑ disposable and/or dedicated silicon and poly tubing ☐ Tubing replaced

Sample Description (Color, Turbidity, Odor, Other): Clear/Clear no odor.

Sample Analyses

Total Metals	(HNO3) ☐	TDS/TSS	(unpres) ☐	TOC	(H2SO4) ☐	Cl/SO4/NO3	(unpres) ☐		( ) ☐
Diss Metals (filtered)	(HNO3) ☐	Alkalinity (no headspace)	(unpres) ☐	DOC (filtered)	(H2SO4) ☐	Hardness	(calculated) ☐		( ) ☐

Additional Information

Type of Sample Containers:	Preservative	Quantity:	QA/QC Samples:	Comments:
1000 mL HDPE	none	4	☑ Field Duplicate	
500 mL HDPE	HNO3	#2	☐ MS/MSD	
500 mL HDPE	none	2	☐ Field Blank	
250 mL Glass Amber	H2SO4	4	☐ Rinsate	
		12		

Signature: GSW Date: 9/23/20

GROUNDWATER, POREWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name: RT-Holden Mine Date of Collection: 9-23-20

Field Event: Fall 2020 Field Personnel: BSW

Purge Data

Location ID: DS-16D

Ecology Tag: BLW-314

Diameter: 2 Screened Interval:

GPS:

Total Depth: Transducer S/N:

Location Condition (Well damage, creek level, iron staining, fire damage):

Secure: ☑ Yes ☐ No Depth Sounder decontaminated prior to use: ☑ Yes ☐ No

Photograph Numbers:

One Casing Volume (gal):

Depth of water (from top of casing): 22.51

After 5 minutes of purging (from TOC):

Begin purge (time): 1115 End purge (time):

Volume purged: Purge water disposal method:

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Linear Ft.)
¾	1.050"	0.804"	0.0229	0.2916
2"	2.375"	2.067"	0.17	1.45
2.5"	2.875"	2.445"	0.255	2.129
4"	4.500"	4.026"	0.66	5.51

Time	DTW (decimal ft below TOC)	Vol. Purged (L/gal)	pH (s.u.)	DO (mg/L)	Specific Conductivity (uS/cm)	Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments
1118	25.16	1.5	6.73	0.68	296.1	0.11	8.2	-18.0	Reduce Q
1125	26.58	3	7.07	0.69	296.2	0.02	8.7	-18.9	
1133	26.90	5							
1142	27.19	6	7.34	0.36	290.4	0.-	9.4	-50.4	
1150	27.41	7.4	7.41	0.49	287.1	0.2	9.4	-85.3	
									Stop Recirc to DO & Sample

Ferrous Iron Field Test mg/L or ☑ Not Detected LaMotte Turbidimeter Reading: 0.61 NTU

Sampling Data

Sample No: DS-16D-GW-092320 Depth of tubing/distance from shore: Dedicated

Date Collected (mo/dy/yr): 9-23-20 Time Sample Collected: 1210 1215 Weather: Rain

Duplicate Sample No: — Time Duplicate Sample Collected:

Type: ☑ Groundwater ☐ Surface Water ☐ Porewater (6"/red, 12"/green, 36"/black) Sample: ☐ Unfiltered ☑ Filtered Filter Type: ☑ disposable 0.45-um ☐ DOC

Sample Collected with: ☐ Grab ☑ Pump Other: Type: ☑ Peristaltic ☐ Bladder Other: Flow Rate (L/min): ~1 L/min

Water Quality Instrument Data Collected with: Type: ☑ YSI Pro DSS ☐ Horiba U-50 : ☐ LaMotte (Turbidity only) Other:

Sample Decon Procedure: Sample collected with: ☑ disposable and/or dedicated silicon and poly tubing ☐ Tubing replaced

Sample Description (Color, Turbidity, Odor, Other): Slight sulfur smell

Sample Analyses

Total Metals	(HNO3) ☐	TDS/TSS	(unpres) ☐	TOC	(H2SO4) ☐	Cl/SO4/NO3	(unpres) ☐		( ) ☐
Diss Metals (filtered)	(HNO3) ☐	Alkalinity (no headspace)	(unpres) ☐	DOC (filtered)	(H2SO4) ☐	Hardness	(calculated) ☐		( ) ☐

Additional Information

Type of Sample Containers:	Preservative	Quantity:	QA/QC Samples:	Comments:
1000 mL HDPE	none	2	☐ Field Duplicate	
500 mL HDPE	HNO3	1	☐ MS/MSD	
500 mL HDPE	none	1	☐ Field Blank	
250 mL Glass Amber	H2SO4	2	☐ Rinsate	
		(6)		

Signature: BSW Date: 9/23/20

GROUNDWATER, POREWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name: RT-Holden Mine Date of Collection: 9/23/20

Field Event: Fall 2020 Field Personnel: Nick Waldo

Purge Data

Location ID: DS-175

Ecology Tag

Diameter: 2" Screened Interval: 14.5-24.5

GPS:

Total Depth: 27.5 Transducer S/N:

Location Condition (Well damage, creek level, iron staining, fire damage): Good

Secure: ☒ Yes ☐ No Depth Sounder decontaminated prior to use: ☒ Yes ☐ No

Photograph Numbers:

One Casing Volume (gal): 1.7

Depth of water (from top of casing): 17.42

After 5 minutes of purging (from TOC): 17.42

Begin purge (time): 1159 End purge (time): 1230

Volume purged: 11 L Purge water disposal method:

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
¼	1.050"	0.804"	0.0229	0.2916
2"	2.375"	2.067"	0.17	1.45
2.5"	2.875"	2.445"	0.255	2.129
4"	4.500"	4.026"	0.66	5.51

Time	DTW (decimal ft below TOC)	Vol. Purged L / gal	pH (s.u.)	DO (mg/L)	Specific Conductivity (µS/cm)	Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments
1201	17.42	1	4.49	5.79	61.1	—	12.3	363.2	
1207	17.42	3	4.49	5.91	60.8	0.07	12.3	375.6	
1215	17.42	5	4.48	5.91	61.5	0.11	12.3	366.6	
1229	17.42	11	4.48	5.96	60.4	—	12.3		

Ferrous Iron Field Test ____ mg/L or ☒ Not Detected LaMotte Turbidimeter Reading: ____ NTU

Sampling Data

Sample No: DS-175-GW-092320 Depth of tubing/distance from shore:

Date Collected (mo/dy/yr): 9/23/20 Time Sample Collected: 1230 Weather: Rain

Duplicate Sample No: Time Duplicate Sample Collected:

Type: ☒ Groundwater ☐ Surface Water ☐ Porewater (6"/red, 12"/green, 36"/black) Sample: ☒ Unfiltered ☒ Filtered Filter Type: ☒ disposable 0.45-µm ☐ ____

Sample Collected with: ☐ Grab ☒ Pump Other: Type: ☒ Peristaltic ☐ Bladder Other: Flow Rate (L/min):

Water Quality Instrument Data Collected with: Type: ☒ YSI Pro DSS ☐ Horiba U-50 ☐ LaMotte (Turbidity only) Other:

Sample Decon Procedure: Sample collected with: ☒ disposable and/or dedicated silicon and poly tubing ☐ Tubing replaced

Sample Description (Color, Turbidity, Odor, Other): clear

Sample Analyses

Total Metals (HNO3) ☒ TDS/TSS (unpres) ☒ TOC (H2SO4) ☒ Cl/SO4/NO3 (unpres) ☒ ____ ( ) ☐

Diss Metals (filtered) (HNO3) ☐ Alkalinity (no headspace) (unpres) ☒ DOC (filtered) (H2SO4) ☒ Hardness (calculated) ☐ ____ ( ) ☐

Additional Information

Type of Sample Containers:	Preservative	Quantity:	QA/QC Samples:	Comments:
1000 mL HDPE	none	2	☐ Field Duplicate	
500 mL HDPE	HNO3	1	☐ MS/MSD	
500 mL HDPE	none	1	☐ Field Blank	
250 mL Glass Amber	H2SO4	2	☐ Rinsate	

Signature: NW Date: 9/23/20

GROUNDWATER, POREWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name: RT-Holden Mine Date of Collection: 9/23/20

Field Event: Fall 2020 Field Personnel: Nick Waldo

Purge Data

Location ID: DS-171

Ecology Tag BLW-316

Diameter: 2" Screened Interval: 16.6-26.6

GPS.

Total Depth: 29.6 Transducer S/N:

Location Condition (Well damage, creek level, iron staining, fire damage): Good

Secure: ☒ Yes ☐ No Depth Sounder decontaminated prior to use: ☒ Yes ☐ No

Photograph Numbers:

One Casing Volume (gal): 1.7

Depth of water (from top of casing): 18.68

After 5 minutes of purging (from TOC):

Begin purge (time): 1305 End purge (time): 1345

Volume purged: 11 Purge water disposal method: Ground

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Linear Ft.)
¾	1.050"	0.804"	0.0229	0.2916
2"	2.375"	2.067"	0.17	1.45
2.5"	2.875"	2.445"	0.255	2.129
4"	4.500"	4.026"	0.66	5.51

Time	DTW (decimal ft below TOC)	Vol. Purged (L / gal)	pH (s.u.)	DO (mg/L)	Specific Conductivity (µS/cm)	Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments
1307	18.68	<1	3.38	5.90	730.6	—	11.7	513.7	
1315	18.68	2	4.35	6.00	126.7	1.43	9.0	452.2	
1323	18.68	4	4.45	6.04	119.7	0.35	8.4	421.0	
1345	18.69	10	4.47	6.00	119.0	0.43	8.2	421.1	

Ferrous Iron Field Test ____ mg/l or ☒ Not Detected LaMotte Turbidimeter Reading: ____ NTU

Sampling Data

Sample No: DS-171-GW-092320 Depth of tubing/distance from shore:

Date Collected (mo/dy/yr): 9/23/20 Time Sample Collected: 1400 Weather: Heavy Rain

Duplicate Sample No: Time Duplicate Sample Collected:

Type: ☒ Groundwater ☐ Surface Water ☐ Porewater (6"/red, 12"/green, 36"/black) Sample: ☒ Unfiltered ☒ Filtered Filter Type: ☒ disposable 0.45-µm ☐ ____

Sample Collected with: ☐ Grab ☒ Pump Other: Type: ☒ Peristaltic ☐ Bladder Other: Flow Rate (L/min):

Water Quality Instrument Data Collected with: Type: ☒ YSI Pro DSS ☐ Horiba U-50 ☐ LaMotte (Turbidity only) Other:

Sample Decon Procedure: Sample collected with: ☒ disposable and/or dedicated silicon and poly tubing ☐ Tubing replaced

Sample Description (Color, Turbidity, Odor, Other): Clear

Sample Analyses

Total Metals	(HNO3) ☒	TDS/TSS	(unpres) ☒	TOC	(H2SO4) ☒	Cl/SO4/NO3	(unpres) ☒	____	( ) ☐
Diss Metals (filtered)	(HNO3) ☐	Alkalinity (no headspace)	(unpres) ☒	DOC (filtered)	(H2SO4) ☒	Hardness	(calculated) ☐	____	( ) ☐

Additional Information

Type of Sample Containers:	Preservative	Quantity:	QA/QC Samples:	Comments:
1000 mL HDPE	none	2	☐ Field Duplicate	
500 mL HDPE	HNO3	1	☐ MS/MSD	
500 mL HDPE	none	1	☐ Field Blank	
250 mL Glass Amber	H2SO4	2	☐ Rinsate	

Signature: NW Date: 9/23/20

GROUNDWATER, POREWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name: RT-Holden Mine — Date of Collection: 9/23/2020

Field Event: Fall 2020 — Field Personnel: GSW / NBW

Purge Data

Location ID: DS-185

Ecology Tag: BLW317

Diameter: 2" — Screened Interval: 13.1-22.1

GPS: _____

Total Depth: 25.0 — Transducer S/N: _____

Location Condition (Well damage, creek level, iron staining, fire damage): Good

Secure: ☒ Yes ☐ No — Depth Sounder decontaminated prior to use: ☒ Yes ☐ No

Photograph Numbers: _____

One Casing Volume (gal): _____

Depth of water (from top of casing): 15.18

After 5 minutes of purging (from TOC): _____

Begin purge (time): 1356 — End purge (time): 1510

Volume purged: 23 — Purge water disposal method: ground

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
¾	1.050"	0.804"	0.0229	0.2916
2"	2.375"	2.067"	0.17	1.45
2.5"	2.875"	2.445"	0.255	2.129
4"	4.500"	4.026"	0.66	5.51

Time	DTW (decimal ft below TOC)	Vol. Purged (L/gal)	pH (s.u.)	DO (mg/L)	Specific Conductivity (uS/cm)	Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments
1459	15.16	20	5.27	7.06	45.7	0.04	12.1	273.6	vol. est.; Bucket over Hand
1507	15.15	22	5.50	7.14	35.8	0.06	12.1	265.1	

Ferrous Iron Field Test _____ mg/L or ☒ Not Detected — LaMotte Turbidimeter Reading: _____ NTU

Sampling Data

Sample No: DS-185-GW-092320 — Depth of tubing/distance from shore: _____

Date Collected (mo/dy/yr): 9/23/20 — Time Sample Collected: 1515 — Weather: Heavy Rain

Duplicate Sample No: _____ — Time Duplicate Sample Collected: _____

Type: ☒ Groundwater ☐ Surface Water ☐ Porewater (6"/red, 12"/green, 36"/black) — Sample: ☒ Unfiltered ☒ Filtered — Filter Type: ☒ disposable 0.45-µm ☐ _____

Sample Collected with: ☐ Grab ☒ Pump Other: _____ — Type: ☒ Peristaltic ☐ Bladder Other: _____ — Flow Rate (L/min): _____

Water Quality Instrument Data Collected with: Type: ☒ YSI Pro DSS ☐ Horiba U-50 ☐ LaMotte (Turbidity only) Other: _____

Sample Decon Procedure: Sample collected with: ☒ disposable and/or dedicated silicon and poly tubing ☐ Tubing replaced

Sample Description (Color, Turbidity, Odor, Other): _____

Sample Analyses

Total Metals	(HNO3) ☒	TDS/TSS	(unpres) ☒	TOC	(H2SO4) ☒	Cl/SO4/NO3	(unpres) ☒	_____	( ) ☐
Diss Metals (filtered)	(HNO3) ☐	Alkalinity (no headspace)	(unpres) ☒	DOC (filtered)	(H2SO4) ☒	Hardness	(calculated) ☐	_____	( ) ☐

Additional Information

Type of Sample Containers:	Preservative	Quantity:	QA/QC Samples:	Comments:
1000 mL HDPE	none	2	☐ Field Duplicate	
500 mL HDPE	HNO3	1	☐ MS/MSD	
500 mL HDPE	none	1	☐ Field Blank	
250 mL Glass Amber	H2SO4	2	☐ Rinsate	

Signature: _____ Date: 9/23/20

GROUNDWATER, POREWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name: RT-Holden Mine Date of Collection: 9/23/20

Field Event: Holden Fall 2020 Field Personnel: GSW

Purge Data

Location ID: DS-1GI Location Condition (Wall damage, creek level, iron staining, fire damage):

Ecology Tag BLW319

Diameter: _____ Screened Interval: _____ Secure: ☐ Yes ☐ No Depth Sounder decontaminated prior to use: ☐ Yes ☐ No

GPS: _____ Photograph Numbers: _____

Total Depth: _____ Transducer S/N: _____ One Casing Volume (gal): _____

Depth of water (from top of casing): 16.26

After 5 minutes of purging (from TOC): _____

Begin purge (time): 1256 End purge (time): _____

Volume purged: _____ Purge water disposal method: _____

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal FL)
¼	1.050"	0.804"	0.0226	0.2916
2"	2.375"	2.067"	0.17	1.45
2.5"	2.875"	2.445"	0.255	2.129
4"	4.500"	4.026"	0.66	5.51

Time	DTW (decimal ft below TOC)	Vol. Purged L / gal	pH (s.u.)	DO (mg/L)	Specific Conductivity (uS/cm)	Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments
1258	16.27	1.2	5.06	6.98	102.1	0.02	10.3	74.1	
1305	16.26	4.5	4.38	7.12	101.5	0.04	10.1	117.4	
1313	16.26	8.3	4.20	7.06	109.8	0.04	9.8	219.0	
1322	Stable	12	4.13	6.90	116.7	0.06	9.7	246.7	
1325	-	14	4.13	6.90	115.0	0.06	9.7	253.4	
1328	-	16	4.16	6.90	116.9	0.02	9.7	227.4	Pole-ORP/DO YSI

Ferrous Iron Field Test _____ mg/L or ☒ Not Detected LaMotte Turbidimeter Reading: _____ NTU

Sampling Data

Sample No: DS-1GI-GW-092320 Depth of tubing/distance from shore: Bedrock

Date Collected (mo/dy/yr): _____ Time Sample Collected: 1330 Weather: Rain

Duplicate Sample No: _____ Time Duplicate Sample Collected: _____

Type: ☑ Groundwater ☐ Surface Water ☐ Porewater (6"/red, 12"/green, 36"/black) Sample: ☐ Unfiltered ☑ Filtered Filter Type: ☑ disposable 0.45-um ☐ 0.45 Dx

Sample Collected with: ☐ Grab ☑ Pump Other: _____ Type: ☑ Peristaltic ☐ Bladder Other: _____ Flow Rate (L/min): _____

Water Quality Instrument Data Collected with: Type: ☑ YSI Pro DSS ☐ Horiba U-50 ☐ LaMotte (Turbidity only) Other: _____

Sample Decon Procedure: Sample collected with: ☐ disposable and/or dedicated silicon and poly tubing ☐ Tubing replaced

Sample Description (Color, Turbidity, Odor, Other): _____

Sample Analyses

Total Metals	(HNO3)	☐	TDS/TSS	(unpres)	☐	TOC	(H2SO4)	☐	Cl/SO4/NO3	(unpres)	☐	_____	(_____) ☐
Diss Metals (filtered)	(HNO3)	☐	Alkalinity (no headspace)	(unpres)	☐	DOC (filtered)	(H2SO4)	☐	Hardness	(calculated)	☐	_____	(_____) ☐

Additional Information

Type of Sample Containers:	Preservative	Quantity:	QA/QC Samples:	Comments:
1000 mL HDPE	none	2	☐ Field Duplicate	
500 mL HDPE	HNO3	1	☐ MS/MSD	
500 mL HDPE	none	1	☐ Field Blank	
250 mL Glass Amber	H2SO4	2	☐ Rinsate	
		(6)		

Signature: GSW Date: 9/23/20

GROUNDWATER, POREWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name: RT-Holden Mine Date of Collection: 9-23-20

Field Event: Fall 2020 Field Personnel: GSW/NW

Purge Data

Location ID: DS-18D
Ecology Tag BLW-319
Diameter: 2 Screened Interval:
GPS:
Total Depth: Transducer S/N:

Location Condition (Well damage, crack level, iron staining, fire damage):

Secure: ☑ Yes ☐ No Depth Sounder decontaminated prior to use: ☑ Yes ☐ No

Photograph Numbers:

One Casing Volume (gal):

Depth of water (from top of casing): 29.99

After 5 minutes of purging (from TOC):

Begin purge (time): 1500 End purge (time):

Volume purged: Purge water disposal method:

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Lineal Ft.)	Weight of Water (Lbs/Lineal Ft.)
¾	1.050"	0.804"	0.0229	0.2916
2"	2.375"	2.067"	0.17	1.45
2.5"	2.875"	2.445"	0.255	2.129
4"	4.500"	4.026"	0.66	5.51

Time	DTW (decimal ft below TOC)	Vol. Purged @ gal	pH (s.u.)	DO (mg/L)	Specific Conductivity (uS/cm)	Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments
1526	30.00	4.6	5.84	0.48	341.2	0.1	9.6	218.3	
1532	Stable	6	5.90	0.38	342.6	0.1	9.6	192.5	
1537	↓		5.92	0.36	342.7	0.1	9.5	177.1	
1542		8	5.93	0.33	342.5	0.1	9.5	165.1	
1548			5.94	0.31	342.5		9.6	153.9	
1551			5.94	0.30	342.8		9.6	149.3	

Ferrous Iron Field Test 0.05 mg/L or ☐ Not Detected LaMotte Turbidimeter Reading: 0.06 NTU

Sampling Data

Sample No: DS-18D-GW-092320 Depth of tubing/distance from shore: Bladder Pump

Date Collected (mo/dy/yr): 9/23/20 Time Sample Collected: 1600 Weather: Rain/Rain/Rain

Duplicate Sample No: Time Duplicate Sample Collected:

Type: ☑ Groundwater ☐ Surface Water ☐ Porewater (6"/red, 12"/green, 36"/black) Sample: ☐ Unfiltered ☐ Filtered Filter Type: ☐ disposable 0.45-µm ☐

Sample Collected with: ☐ Grab ☑ Pump Other: Type: ☐ Peristaltic ☑ Bladder Other: Flow Rate (L/min):

Water Quality Instrument Data Collected with: Type: ☑ YSI Pro DSS ☐ Horiba U-50 : ☐ LaMotte (Turbidity only) Other:

Sample Decon Procedure: Sample collected with: ☐ disposable and/or dedicated silicon and poly tubing ☐ Tubing replaced

Sample Description (Color, Turbidity, Odor, Other): Clear

Sample Analyses

Total Metals	(HNO3) ☑	TDS/TSS	(unpres) ☑	TOC	(H2SO4) ☑	Cl/SO4/NO3	(unpres) ☑			☐
Diss Metals (filtered)	(HNO3) ☐	Alkalinity (no headspace)	(unpres) ☑	DOC (filtered)	(H2SO4) ☐ (FF)	Hardness	(calculated) ☐			☐

Additional Information

Type of Sample Containers:	Preservative	Quantity:	QA/QC Samples:	Comments:
1000 mL HDPE	none	2	☐ Field Duplicate	
500 mL HDPE	HNO3	1	☐ MS/MSD	
500 mL HDPE	none	1	☐ Field Blank	
250 mL Glass Amber	H2SO4	2 (6)	☐ Rinsate	

Signature: Date: 9/23/20

GROUNDWATER, POREWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name: RT-Holden Mine Date of Collection: 9-26-2020

Field Event: Fall 2020 Field Personnel: RC/TS

Purge Data

Location ID: HBKG-2

Ecology Tag: n/a

Diameter: 2" Screened Interval: ____

Total Depth: ____ Transducer S/N: ____

Location Condition (Well damage, creek level, iron staining, fire damage): Good

Secure: ☑ Yes ☐ No Depth Sounder decontaminated prior to use: ☑ Yes ☐ No

Photograph Numbers: ____

One Casing Volume (gal): ____

Depth of water (from TOC or staff gauge): 10.95 Time: 11:17

After 5 minutes of purging (from TOC): 10.95

Begin purge (time): 11:19 End purge (time): 12:14

Volume purged: 10.5 L Purge water disposal method: ground

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
¾	1.050"	0.804"	0.0229	0.2916
2"	2.375"	2.067"	0.17	1.45
2.5"	2.875"	2.445"	0.255	2.129
4"	4.500"	4.026"	0.66	5.51

Time	DTW (decimal ft below TOC)	Vol. Purged L / gal	pH (s.u.)	DO (mg/L)	Specific Conductivity (uS/cm)	LaMotte Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments
11:30	10.95	3	7.55	1.57	72.9	0.10	8.1	176.4	
11:35	10.95	4.5	7.43	1.23	72.6	0.07	8.1	180.7	
11:40	10.95	5.75	7.42	1.16	72.6	0.13	8.1	182.9	
11:45	10.96	7.25	7.42	1.12	72.5	0.09	8.1	184.3	
11:50	10.96	9	7.42	1.11	72.6	0.05	8.1	185.2	

Ferrous Iron Field Test ____ mg/L or ☒ Not Detected

Sampling Data

Sample No: HBKG-2-GW-092620 Depth of tubing/distance from shore: ____

Date Collected (mo/dy/yr): 09/26/20 Time Sample Collected: 11:55 Weather: Overcast; light rain

Duplicate Sample No: ____ Time Duplicate Sample Collected: ____

Type: ☒ Groundwater ☐ Surface Water ☐ Porewater (6"/red, 12"/green, 36"/black) Sample: ☒ Unfiltered ☒ Filtered Filter Type: ☒ disposable 0.45-µm ☐ ____

Sample Collected with: ☐ Grab ☒ Pump Other: ____ Type: ☒ Peristaltic ☐ Bladder Other: ____ Flow Rate (L/min): ____

Water Quality Instrument Data Collected with: Type: ☒ YSI Pro DSS ☐ Horiba U-50 : ☒ LaMotte (Turbidity only) Other: ____

Sample Decon Procedure: Sample collected with: ☐ disposable tubing ☒ dedicated silicon and poly tubing ☐ Tubing replaced

Sample Description (Color, Turbidity, Odor, Other): clear; no odor

Sample Analyses

Total Metals	(HNO3) ☒	TDS/TSS	(unpres) ☒	TOC	(H2SO4) ☒	Cl/SO4/NO3	(unpres) ☐	____	(____) ☐
Diss Metals (filtered)	(HNO3) ☐	Alkalinity (no headspace)	(unpres) ☒	DOC (filtered)	(H2SO4) ☒	Hardness	(calculated) ☐	____	(____) ☐

Additional Information

Type of Sample Containers:	Preservative	Quantity:	QA/QC Samples:	Comments:
1000 mL HDPE	none	2	☐ Field Duplicate	
500 mL HDPE	HNO3	1	☐ MS/MSD	
500 mL HDPE	none	1	☐ Field Blank	
250 mL Glass Amber	H2SO4	2	☐ Rinsate	

Signature: [signature] Date: 09/26/2020

GROUNDWATER, POREWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name: RT-Holden Mine Date of Collection: 9/24/20

Field Event: Fall 2020 Field Personnel: Nick Waldo

Purge Data

Location ID: HV-3

Ecology Tag: No tag

Diameter: 2" Screened Interval: 64.57-74.57

GPS:

Total Depth: 77.07 Transducer S/N:

Location Condition (Well damage, creek level, iron staining, fire damage): Good

Secure: ☒ Yes ☐ No Depth Sounder decontaminated prior to use: ☒ Yes ☐ No

Photograph Numbers:

One Casing Volume (gal): 1.45

Depth of water (from top of casing): 68.57

After 5 minutes of purging (from TOC): 68.57

Begin purge (time): ~1550 End purge (time):

Volume purged: Purge water disposal method: Ground

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
¾	1.050"	0.804"	0.0220	0.2916
2"	2.375"	2.067"	0.17	1.45
2.5"	2.875"	2.445"	0.255	2.129
4"	4.500"	4.026"	0.65	5.51

Time	DTW (decimal ft below TOC)	Vol. Purged L / Gal	pH (s.u.)	DO (mg/L)	Specific Conductivity (uS/cm)	Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments
1557	68.57	1/2	6.87	9.68	96.0	0.56	8.1	82.4	
1603	68.57	3/4	6.75	9.75	88.3	-0.07	7.8	105.9	
1608	68.57	1	6.69	9.78	87.6	—	7.8	121.3	
1613	68.57	1 1/4	6.66	9.79	87.4	—	7.8	129.0	
1618	68.57	1 1/2	6.63	9.80	87.2	0.50	7.8	137.1	
1623	68.57	1 3/4	6.62	9.81	87.0	-0.20	7.8	143.9	
1619	68.57	2	6.61	9.82	87.0	0.07	7.7	149.3	

Ferrous Iron Field Test mg/L or ☐ Not Detected LaMotte Turbidimeter Reading: NTU

Sampling Data

Sample No: HV-3-GW-092420 Depth of tubing/distance from shore:

Date Collected (mo/dy/yr): 9/24/20 Time Sample Collected: 1630 Weather: cloudy

Duplicate Sample No: Time Duplicate Sample Collected:

Type: ☒ Groundwater ☐ Surface Water ☐ Porewater (6"/red, 12"/green, 36"/black) Sample: ☒ Unfiltered ☒ Filtered Filter Type: ☒ disposable 0.45-um ☐

Sample Collected with: ☐ Grab ☒ Pump Other: Type: ☐ Peristaltic ☒ Bladder Other: Flow Rate (L/min):

Water Quality Instrument Data Collected with: Type: ☒ YSI Pro DSS ☐ Horiba U-50 ☒ LaMotte (Turbidity only) Other:

Sample Decon Procedure: Sample collected with: ☒ disposable and/or dedicated silicon and poly tubing ☐ Tubing replaced

Sample Description (Color, Turbidity, Odor, Other): Clear

Sample Analyses

Total Metals	(HNO3) ☒	TDS/TSS	(unpres) ☒	TOC	(H2SO4) ☒	Cl/SO4/NO3	(unpres) ☒			☐
Diss Metals (filtered)	(HNO3) ☐	Alkalinity (no headspace)	(unpres) ☒	DOC (filtered)	(H2SO4) ☒	Hardness	(calculated) ☐			☐

Additional Information

Type of Sample Containers:	Preservative	Quantity:	QA/QC Samples:	Comments:
1000 mL HDPE	none	2	☐ Field Duplicate	
500 mL HDPE	HNO3	1	☐ MS/MSD	
500 mL HDPE	none	1	☐ Field Blank	
250 mL Glass Amber	H2SO4	2	☐ Rinsate	

Signature: Date: 9/24/20

GROUNDWATER, POREWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name: RT-Holden Mine Date of Collection: 09/24/2020

Field Event: Fall 2020 Field Personnel: TS + RC

Purge Data

Location ID: MW-1
Ecology Tag: AYR107
Diameter: 2" Screened Interval:
GPS:
Total Depth: Transducer S/N:

Location Condition (Well damage, creek level, iron staining, fire damage): good

Secure: ☒ Yes ☐ No Depth Sounder decontaminated prior to use: ☒ Yes ☐ No

Photograph Numbers:

One Casing Volume (gal):

Depth of water (from top of casing): 7.96

After 5 minutes of purging (from TOC): 8.02

Begin purge (time): 15:32 End purge (time): 16:32

Volume purged: 9 liters Purge water disposal method: ground

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
¾	1.050"	0.804"	0.0229	0.2916
2"	2.375"	2.067"	0.17	1.45
2.5"	2.875"	2.445"	0.255	2.129
4"	4.500"	4.026"	0.66	5.51

Time	DTW (decimal ft below TOC)	Vol. Purged (L / gal)	pH (s.u.)	DO (mg/L)	Specific Conductivity (uS/cm)	Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments
15:45	8.04	2.25	6.03	7.09	48.2	0.35	9.9	247.8	
15:50	8.04	3.5	5.94	7.02	48.2	0.22	9.9	249.8	
15:55	8.04	4.5	5.83	7.01	48.2	0.30	9.9	250.2	
16:00	8.04	6	5.83	6.99	48.1	0.32	9.9	250.6	
16:05	8.04	7	5.84	6.99	48.1	0.30	9.9	251.0	

Ferrous Iron Field Test mg/L or ☒ Not Detected LaMotte Turbidimeter Reading: NTU

Sampling Data

Sample No: MW-1-GW-092420 Depth of tubing/distance from shore:

Date Collected (mo/dy/yr): 09/24/20 Time Sample Collected: 16:10 Weather: Overcast/light rain

Duplicate Sample No: — Time Duplicate Sample Collected:

Type: ☒ Groundwater ☐ Surface Water ☐ Porewater (6"/red, 12"/green, 36"/black) Sample: ☒ Unfiltered ☒ Filtered Filter Type: ☒ disposable 0.45-µm ☐

Sample Collected with: ☐ Grab ☒ Pump Other: Type: ☒ Peristaltic ☐ Bladder Other: Flow Rate (L/min):

Water Quality Instrument Data Collected with: Type: ☒ YSI Pro DSS ☐ Horiba U-50 ☒ LaMotte (Turbidity only) Other:

Sample Decon Procedure: Sample collected with: ☐ disposable and/or dedicated silicon and poly tubing ☐ Tubing replaced

Sample Description (Color, Turbidity, Odor, Other): clear, no odor

Sample Analyses

Total Metals	(HNO3) ☒	TDS/TSS	(unpres) ☒	TOC	(H2SO4) ☒	Cl/SO4/NO3	(unpres) ☐		( ) ☐
Diss Metals (filtered)	(HNO3) ☐	Alkalinity (no headspace)	(unpres) ☒	DOC (filtered)	(H2SO4) ☒	Hardness	(calculated) ☐		( ) ☐

Additional Information

Type of Sample Containers:	Preservative	Quantity:	QA/QC Samples:	Comments:
1000 mL HDPE	none	2	☐ Field Duplicate	
500 mL HDPE	HNO3	1	☐ MS/MSD	
500 mL HDPE	none	1	☐ Field Blank	
250 mL Glass Amber	H2SO4	2	☐ Rinsate	

Signature: Date: 9/24/20

GROUNDWATER, POREWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name: RT-Holden Mine Date of Collection: 9/24/20

Field Event: Fall 2020 Field Personnel: TS

Purge Data

Location ID: MW-2

Ecology Tag AHR 110

Diameter: 2" Screened Interval: _____

Total Depth: _____ Transducer S/N: _____

Location Condition (Well damage, creek level, iron staining, fire damage): _____

Secure: ☒ Yes ☐ No Depth Sounder decontaminated prior to use: ☒ Yes ☐ No

Photograph Numbers: _____

One Casing Volume (gal): _____

Depth of water (from TOC or staff gauge): 9.70 Time: 14:20

After 5 minutes of purging (from TOC): 9.70

Begin purge (time): 14:24 End purge (time): 15:24

Volume purged: ~~[illegible]~~ 13.5 liters Purge water disposal method: ground

Volume of Schedule 40 PVC Pipe				
Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
¾	1.050"	0.804"	0.0229	0.2916
2"	2.375"	2.067"	0.17	1.45
2.5"	2.875"	2.445"	0.255	2.129
4"	4.500"	4.026"	0.66	5.51

Time	DTW (decimal ft below TOC)	Vol. Purged L / gal	pH (s.u.)	DO (mg/L)	Specific Conductivity (uS/cm)	LaMotte Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments
14:30	9.70	2.75	6.09	8.58	46.1	0.0	10.5	173.9	
14:35	9.70	5	6.09	8.68	45.9	0.07	10.5	176.7	pump slowed
14:40	9.70	6.25	6.09	8.69	45.8	0.07	10.5	178.3	
14:45	9.70	8	6.10	8.68	45.6	0.10	10.5	179.6	
14:50	9.70	9.75	6.11	8.64	45.5	0.09	10.5	180.6	
14:55	9.70	11	6.11	8.62	45.4	0.07	10.5	181.3	

Ferrous Iron Field Test _____ mg/L or ☒ Not Detected

Sampling Data

Sample No: MW-2-GW-092420 Depth of tubing/distance from shore: ≃100'

Date Collected (mo/dy/yr): 09/24/20 Time Sample Collected: 15:00 Weather: Overcast

Duplicate Sample No: MW-102-GW-092420 Time Duplicate Sample Collected: 15:10

Type: ☒ Groundwater ☐ Surface Water ☐ Porewater (6"/red, 12"/green, 36"/black) Sample: ☒ Unfiltered ☒ Filtered Filter Type: ☒ disposable 0.45-um ☐ _____

Sample Collected with: ☐ Grab ☒ Pump Other: _____ Type: ☒ Peristaltic ☐ Bladder Other: _____ Flow Rate (L/min): .35

Water Quality Instrument Data Collected with: Type: ☒ YSI Pro DSS ☐ Horiba U-50 ☒ LaMotte (Turbidity only) Other: _____

Sample Decon Procedure: Sample collected with: ☐ disposable tubing ☒ dedicated silicon and poly tubing ☐ Tubing replaced

Sample Description (Color, Turbidity, Odor, Other): clear; no odor

Sample Analyses

Total Metals	(HNO3) ☒	TDS/TSS	(unpres) ☒	TOC	(H2SO4) ☒	Cl/SO4/NO3	(unpres) ☐	_____	( ) ☐
Diss Metals (filtered)	(HNO3) ☐	Alkalinity (no headspace)	(unpres) ☒	DOC (filtered)	(H2SO4) ☒	Hardness	(calculated) ☐	_____	( ) ☐

Additional Information

Type of Sample Containers:	Preservative	Quantity:	QA/QC Samples:	Comments:
1000 mL HDPE	none	4	☒ Field Duplicate	
500 mL HDPE	HNO3	2	☐ MS/MSD	
500 mL HDPE	none	2	☐ Field Blank	
250 mL Glass Amber	H2SO4	4	☐ Rinsate	

Signature: _____ Date: 9/24/2020

GROUNDWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project: Tahlen
Task Number: Fall 2020
Date of Collection: 9-24-2020
Field Personnel: Ryan Crotty

Purge Data

Well ID: MW-3 Secure: ☑ Yes ☐ No Ecology Tag #: _____ Casing Type/Diameter/Screened Interval _____

Replacement Required: ☐ Monument ☐ Lid ☐ Lock ☐ Bolts: Missing (#) ____ Stripped (#) ____ Other Damage: _____

Depth Sounder decontaminated Prior to Placement in Well: ☑ Yes ☐ No One Casing Volume (gal): _____

Depth of water (from top of well casing): 10.03 Total Depth (from log or field measurement): _____

After 5 minutes of purging (from top of casing): 10.03

Begin purge (time): 1352

End purge (time): 1515

Volume purged: 13.25

Purge water disposal method: Ground

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
1 ¼"	1.660"	1.380"	0.08	0.64
2"	2.375"	2.067"	0.17	1.45
3"	3.500"	3.068"	0.38	3.2
4"	4.500"	4.026"	0.66	5.51
6"	6.625"	6.065"	1.5	12.5

Lamm, HW

Time	Depth to Water (ft)	Vol Purged (L)	pH (s.u.)	DO (mg/L)	Specific Conductivity (ms/cm)	Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments
1406	10.03	3.25	7.00	9.25	53.0	0.59	10.3	191.8	
1411	10.03	4.25	6.42	9.27	51.2	0.607	10.3	206.8	
1416	10.03	5.50	6.04	9.18	50.6	0.600	10.3	217.2	
1421	↓	6.75	5.93	9.16	50.7	0.606	10.3	222.5	
1426	↓	8	5.82	9.22	50.4	0.71	10.3	228.1	
1431	↓	9.26	5.75	9.19	50.2	0.605	10.3	233.1	
1436		10.50	5.72	9.16	50.3	0.60	10.3	237.1	

Sampling Data

Sample No: MW-3-GW-092420 Location and Depth: _____

Date Collected (mo/dy/yr): 9-24-2020 Time Collected: 1440 Weather: Cloudy

Type: ☑ Ground Water ☐ Surface Water Other: _____ Sample: ☑ Filtered ☐ Unfiltered Other: 0.45

Sample Collected with: ☐ Bailer ☑ Pump Other: _____ Type: ☑ Peristaltic ☐ Bladder ☐ Submersible Other: _____

Water Quality Instrument Data Collected with: Type: ☑ YSI ProDSS Other: _____

Sample Decon Procedure: Sample collected with (circle one): decontaminated all tubing; disposable and/or dedicated silicon and poly tubing; new tubing

Sample Description (Color, Turbidity, Odor, Other): Clear, odorless

Sample Analyses

Analyte	Analysis Method	Sample Container	Quantity	Preservative
total Metals		500 ml poly	2	HNO3
TOC / DOC		250 ml Amber	4	H2SO4
Anions		500 ml poly	2	
TSS / TDS		1L poly	4	
				ferrous iron - 0.1 mg/L

QC samples

Duplicate Sample No: _____ Duplicate Time: _____ MS/MSD: ☑ Yes ☐ No Other QC Sample: _____

Ryan Crotty

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GROUNDWATER, POREWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name: RT-Holden Mine Date of Collection: 9/22/2020

Field Event: Fall Field Personnel: Ryan C

Purge Data

Location ID: NRC-35R

Ecology Tag BLN-932

Diameter: _____ Screened Interval: _____

GPS: _____

Total Depth: _____ Transducer S/N: _____

Location Condition (Well damage, creek level, iron staining, fire damage): Good

Secure: ☑ Yes ☐ No Depth Sounder decontaminated prior to use: ☑ Yes ☐ No

Photograph Numbers: _____

One Casing Volume (gal): _____

Depth of water (from top of casing): 16.01

After 5 minutes of purging (from TOC): 16.01

Begin purge (time): 1434 End purge (time): _____

Volume purged: _____ Purge water disposal method: Ground

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
¾	1.050"	0.804"	0.0229	0.2916
2"	2.375"	2.067"	0.17	1.45
2.5"	2.875"	2.445"	0.255	2.179
4"	4.500"	4.026"	0.66	5.51

Time	DTW (decimal ft below TOC)	Vol. Purged L / gal	pH (s.u.)	DO (mg/L)	Specific Conductivity (µS/cm)	Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments
1440	16.01	1.5	6.07	8.85	38.6	0.02	11.8	159.0	
1445	16.01	2.75	6.21	9.33	37.3	0.03	11.7	158.4	
1450		4	6.26	9.23	37.3	0.03	11.9	160.1	
1455		5.50	6.26	9.10	37.2	0.03	11.9	149.9	
1500		6.75	6.30	9.02	37.1	0.03	11.7	159.1	

Ferrous Iron Field Test _____ mg/L or ☑ Not Detected LaMotte Turbidimeter Reading: _____ NTU

Sampling Data

Sample No: NRC-35R-GW-092220 Depth of tubing/distance from shore: N/A

Date Collected (mo/dy/yr): 9-22-2020 Time Sample Collected: 1505 Weather: Sunny

Duplicate Sample No: _____ Time Duplicate Sample Collected: _____

Type: ☑ Groundwater ☐ Surface Water ☐ Porewater (6"/red, 12"/green, 36"/black) Sample: ☐ Unfiltered ☐ Filtered Filter Type: ☑ disposable 0.45-µm ☐ _____

Sample Collected with: ☐ Grab ☑ Pump Other: _____ Type: ☑ Peristaltic ☐ Bladder Other: _____ Flow Rate (L/min): _____

Water Quality Instrument Data Collected with: Type: ☑ YSI Pro DSS ☐ Horiba U-50 ☐ LaMotte (Turbidity only) Other: _____

Sample Decon Procedure: Sample collected with: ☐ disposable and/or dedicated silicon and poly tubing ☐ Tubing replaced

Sample Description (Color, Turbidity, Odor, Other): Clear, odorless

Sample Analyses

Total Metals	(HNO3) ☑	TDS/TSS	(unpres) ☑	TOC	(H2SO4) ☐	Cl/SO4/NO3	(unpres) ☐	_____	(__ __) ☐
Diss Metals (filtered)	(HNO3) ☐	Alkalinity (no headspace)	(unpres) ☑	DOC (filtered)	(H2SO4) ☑	Hardness	(calculated) ☐	_____	(_____) ☐

Additional Information

Type of Sample Containers:	Preservative	Quantity:	QA/QC Samples:	Comments:
1000 mL HDPE	none	2	☐ Field Duplicate	
500 mL HDPE	HNO3	1	☐ MS/MSD	
500 mL HDPE	none	1	☐ Field Blank	
250 mL Glass Amber	H2SO4	2	☐ Rinsate	

Signature: Ryan C Date: 9/22/2020

GROUNDWATER, POREWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name: RT-Holden Mine Date of Collection: 9/22/20

Field Event: Fall Field Personnel: Ryan C.

Purge Data

Location ID: NRC-3IR

Ecology Tag: BLN-931

Diameter: _____ Screened Interval: _____

GPS: _____

Total Depth: 93' Transducer S/N: _____

Location Condition (Well damage, creek level, iron staining, fire damage): Good

Secure: ☑ Yes ☐ No Depth Sounder decontaminated prior to use: ☑ Yes ☐ No

Photograph Numbers: _____

One Casing Volume (gal): _____

Depth of water (from top of casing): 18.82'

After 5 minutes of purging (from TOC): 18.82'

Begin purge (time): 1325 End purge (time): 1419

Volume purged: 13 Purge water disposal method: ground

Volume of Schedule 40 PVC Pipe				
Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
¾	1.050"	0.804"	0.0229	0.2916
2"	2.375"	2.067"	0.17	1.45
2.5"	2.875"	2.445"	0.255	2.129
4"	4.500"	4.026"	0.66	5.51

Time	DTW (decimal ft below TOC)	Vol. Purged L / gal	pH (s.u.)	DO (mg/L)	Specific Conductivity (uS/cm)	Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments
1335	18.82'	3L	4.42	0.54	417.5	0.31	9.6	156.9	
1339		4.20	4.29	0.38	417.6	0.37	9.4	160.3	
1345		5.50	4.26	0.32	416.6	0.36	9.3	177.2	
1350		7	4.26	0.24	416.7	0.40	9.4	163.6	
1355		8.30	9.26	0.29	415.2	0.43	9.3	161.0	

Ferrous Iron Field Test 3 mg/L or ☐ Not Detected LaMotte Turbidimeter Reading: _____ NTU

Sampling Data

Sample No: NRC-3IR-GW-092220 Depth of tubing/distance from shore: N/A

Date Collected (mo/dy/yr): 9/22/2020 Time Sample Collected: 1400 Weather: Rain

Duplicate Sample No: _____ Time Duplicate Sample Collected: _____

Type: ☑ Groundwater ☐ Surface Water ☐ Porewater (6"/red, 12"/green, 36"/black) Sample: ☐ Unfiltered ☑ Filtered Filter Type: ☑ disposable 0.45-um ☐ _____

Sample Collected with: ☐ Grab ☑ Pump Other: _____ Type: ☑ Peristaltic ☐ Bladder Other: _____ Flow Rate (L/min): _____

Water Quality Instrument Data Collected with: Type: : ☑ YSI Pro DSS ☐ Horiba U-50 : ☐ LaMotte (Turbidity only) Other: _____

Sample Decon Procedure: Sample collected with: ☐ disposable and/or dedicated silicon and poly tubing ☐ Tubing replaced

Sample Description (Color, Turbidity, Odor, Other): Clear, odorless

Sample Analyses

Total Metals	(HNO3) ☑	TDS/TSS	(unpres) ☑	TOC	(H2SO4) ☑	Cl/SO4/NO3	(unpres) ☐		( ) ☐
Diss Metals (filtered)	(HNO3) ☐	Alkalinity (no headspace)	(unpres) ☑	DOC (filtered)	(H2SO4) ☑	Hardness	(calculated) ☐		( ) ☐

Additional Information

Type of Sample Containers:	Preservative	Quantity:	QA/QC Samples:	Comments:
1000 mL HDPE	none	2	☐ Field Duplicate	
500 mL HDPE	HNO3	1	☐ MS/MSD	Ferrous Iron = 3
500 mL HDPE	none	1	☐ Field Blank	
250 mL Glass Amber	H2SO4	2	☐ Rinsate	

Signature: Ryan Crotty Date: 9/22/2020

GROUNDWATER, POREWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name: RT-Holden Mine Date of Collection: 09/22/20

Field Event: Fall 2020 Field Personnel: TS

Purge Data

Location ID: NRC-3DR

Ecology Tag BLN930

Diameter: 2" Screened Interval: _____

Total Depth: _____ Transducer S/N: _____

Location Condition (Well damage, creek level, iron staining, fire damage): _____

Secure: ☒ Yes ☐ No Depth Sounder decontaminated prior to use: ☒ Yes ☐ No

Photograph Numbers: _____

One Casing Volume (gal): _____

Depth of water (from TOC or staff gauge): 32.16 Time: 13:25

After 5 minutes of purging (from TOC): 32.13

Begin purge (time): 13:25 End purge (time): 14:40

Volume purged: 5 Purge water disposal method: to ground

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
¾	1.050"	0.804"	0.0228	0.2916
2"	2.375"	2.067"	0.17	1.45
2.5"	2.875"	2.445"	0.255	2.129
4"	4.500"	4.026"	0.66	5.51

Time	DTW (decimal ft below TOC)	Vol. Purged L/gal	pH (s.u.)	DO (mg/L)	Specific Conductivity (uS/cm)	LaMotte Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments
13:40	32.14	1.75	6.14	1.24	460.4	8.08	12.0	138.7	
13:45	32.14	2.2	6.12	1.16	457.5	7.82	11.8	142.6	
13:50	32.14	3	6.11	1.03	458.3	5.60	11.9	142.6	
13:55	32.14	3.5	6.11	0.98	458.6	4.75	11.6	134.4	

Ferrous Iron Field Test _____ mg/L or ☒ Not Detected

Sampling Data

Sample No: NRC-3DR-GW-092220 Depth of tubing/distance from shore: _____

Date Collected (mo/dy/yr): 09/22/20 Time Sample Collected: 14:00 Weather: light rain/overcast

Duplicate Sample No: — Time Duplicate Sample Collected: _____

Type: ☒ Groundwater ☐ Surface Water ☐ Porewater (6"/red, 12"/green, 36"/black) Sample: ☒ Unfiltered ☒ Filtered Filter Type: ☒ disposable 0.45 µm ☐ _____

Sample Collected with: ☐ Grab ☒ Pump Other: _____ Type: ☐ Peristaltic ☒ Bladder Other: _____ Flow Rate (L/min): _____

Water Quality Instrument Data Collected with: Type: ☒ YSI Pro DSS ☐ Horiba U-50 : ☒ LaMotte (Turbidity only) Other: _____

Sample Decon Procedure. Sample collected with ☐ disposable tubing ☒ dedicated silicon and poly tubing ☐ Tubing replaced

Sample Description (Color, Turbidity, Odor, Other): clear, no odor

Sample Analyses

Total Metals	(HNO3) ☒	TDS/TSS	(unpres) ☒	TOC	(H2SO4) ☒	Cl/SO4/NO3	(unpres) ☐	_____	(_____) ☐
Diss Metals (filtered)	(HNO3) ☐	Alkalinity (no headspace)	(unpres) ☒	DOC (filtered)	(H2SO4) ☒	Hardness	(calculated) ☐	_____	(_____) ☐

Additional Information

Type of Sample Containers:	Preservative	Quantity:	QA/QC Samples:	Comments:
1000 mL HDPE	none	2	☐ Field Duplicate	
500 mL HDPE	HNO3	1	☐ MS/MSD	
500 mL HDPE	none	1	☐ Field Blank	
250 mL Glass Amber	H2SO4	2	☐ Rinsate	

Signature: _____ Date: 09/22/20

GROUNDWATER, POREWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name: RT-Holden Mine Date of Collection: 9-25-20

Field Event: Fall 2020 Field Personnel: Glen Wallace

Purge Data

Location ID: TP2-12D-

Ecology Tag

Diameter: Screened Interval:

GPS:

Total Depth: Transducer S/N:

Location Condition (Well damage, creek level, iron staining, fire damage): Good

Secure: ☑ Yes ☐ No Depth Sounder decontaminated prior to use: ☑ Yes ☐ No

Photograph Numbers:

One Casing Volume (gal):

Depth of water (from top of casing): 105.20

After 5 minutes of purging (from TOC): 105.21

Begin purge (time): 1130 End purge (time):

Volume purged: Purge water disposal method:

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
¾	1.050"	0.804"	0.0229	0.2918
2"	2.375"	2.067"	0.17	1.45
2.5"	2.875"	2.445"	0.255	2.129
4"	4.500"	4.026"	0.66	5.51

Time	DTW (decimal ft below TOC)	Vol. Purged L/gal	pH (s.u.)	DO (mg/L)	Specific Conductivity (µS/cm)	Turbidity (NTU) LaMotte	Temp (°C)	ORP (mV)	Comments
1145	106.21	1.5	4.73	6.96	340.0	—	10.0	211.1	
1157	105.20	2.5	4.91	1.57	587	2.42	8.7	189.0	
1209	Stable	3.5	4.93	0.75	615	0.73	8.5	185.4	
1213	"	4	4.94	0.60	617	0.76	8.5	184.9	
1218	"	4.5	4.94	0.48	617	0.56	8.3	184.6	

Ferrous Iron Field Test 3.0 mg/L or ☐ Not Detected LaMotte Turbidimeter Reading: 0.56 NTU

Sampling Data

Sample No: TP2-12D-GW-092520 Depth of tubing/distance from shore: Deleted

Date Collected (mo/dy/yr): 9-25-20 Time Sample Collected: 1230 Weather: Rain

Duplicate Sample No: Time Duplicate Sample Collected:

Type: ☑ Groundwater ☐ Surface Water ☐ Porewater (6"/red, 12"/green, 36"/black) Sample: ☐ Unfiltered ☐ Filtered Filter Type: ☐ disposable 0.45-µm ☐

Sample Collected with: ☐ Grab ☑ Pump Other: Type: ☐ Peristaltic ☑ Bladder Other: 25/32 Flow Rate (L/min):

Water Quality Instrument Data Collected with: Type: ☑ YSI Pro DSS ☐ Horiba U-50 ☐ LaMotte (Turbidity only) Other:

Sample Decon Procedure: Sample collected with: ☐ disposable and/or dedicated silicon and poly tubing ☐ Tubing replaced

Sample Description (Color, Turbidity, Odor, Other): clear

Sample Analyses

Total Metals	(HNO3) ☑	TDS/TSS	(unpres) ☑	TOC	(H2SO4) ☑	Cl/SO4/NO3	(unpres) ☑		( ) ☐
Diss Metals (filtered)	(HNO3) ☐	Alkalinity (no headspace)	(unpres) ☑	DOC (filtered)	(H2SO4) ☑	Hardness	(calculated) ☐		( ) ☐

Additional Information

Type of Sample Containers:	Preservative	Quantity:	QA/QC Samples:	Comments:
1000 mL HDPE	none	2	☐ Field Duplicate	
500 mL HDPE	HNO3	1	☐ MS/MSD	
500 mL HDPE	none	1	☐ Field Blank	
250 mL Glass Amber	H2SO4	2	☐ Rinsate	
		2		

Signature: GBW Date: 9/25/20

GROUNDWATER, POREWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name: RT-Holden Mine Date of Collection: 9-25-20

Field Event: Fall 2020 Field Personnel: Glen Wallace

Purge Data

Location ID: TP2-130- Location Condition (Well damage, creek level, iron staining, fire damage): _____

Ecology Tag # L0863

Diameter: _____ Screened Interval: _____ Secure: ☑ Yes ☐ No Depth Sounder decontaminated prior to use: ☑ Yes ☐ No

GPS: _____ Photograph Numbers: _____

Total Depth: _____ Transducer S/N: _____ One Casing Volume (gal): 1.7 in Screen

Depth of water (from top of casing): 120.60

After 5 minutes of purging (from TOC): _____

Begin purge (time): 920 End purge (time): 11am

Volume purged: U-known Purge water disposal method: Ron

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
¾	1.050"	0.804"	0.0229	0.2916
2"	2.375"	2.067"	0.17	1.45
2.5"	2.875"	2.445"	0.255	2.129
4"	4.500"	4.026"	0.66	5.51

Time	DTW (decimal ft below TOC)	Vol. Purged L/(gal)	pH (s.u.)	DO (mg/L)	Specific Conductivity (uS/cm)	Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments
933		0.2	6.61	8.23	747	6.6	9	202.4	LaMotte
946	120.61	1.7	6.46	2.60	853	21.6	8.4	-7.4	0.87 NTU
955	120.61	2.5	6.46	2.27	873	16.6	8.3	-29.7	0.21
1000	Stable	3.0	6.47	1.99	874	—	8.3	-36.7	0.14
1012	"	4.0	6.48	1.72	876	—	8.3	-47.6	0.29
1019		5.0	6.48	1.60	875	—	8.3	-51.6	
FAIL Stable 1020 → 11am									

Ferrous Iron Field Test 3.0 mg/L or ☐ Not Detected LaMotte Turbidimeter Reading: 0.29 NTU

Sampling Data

Sample No: TP2-13D-GW-092520 Depth of tubing/distance from shore: Dedicated

Date Collected (mo/dy/yr): 9-25-20 Time Sample Collected: 900 (Labs) Weather: Rain 45F

Duplicate Sample No: _____ Time Duplicate Sample Collected: _____

Type: ☑ Groundwater ☐ Surface Water ☐ Porewater (6"/red, 12"/green, 36"/black) Sample: ☐ Unfiltered ☑ Filtered Filter Type: ☐ disposable 0.45-µm ☐ _____

Sample Collected with: ☐ Grab ☑ Pump Other: _____ Type: ☐ Peristaltic ☑ Bladder Other: 35/32 Flow Rate (L/min): _____ → Produced @ 6gpm

Water Quality Instrument Data Collected with: Type: ☑ YSI Pro DSS ☐ Horiba U-50 ☐ LaMotte (Turbidity only) Other: _____

Sample Decon Procedure: Sample collected with: ☐ disposable and/or dedicated silicon and poly tubing ☐ Tubing replaced

Sample Description (Color, Turbidity, Odor, Other): _____

Sample Analyses

Total Metals	(HNO3) ☑	TDS/TSS	(unpres) ☑	TOC	(H2SO4) ☑	Cl/SO4/NO3	(unpres) ☑	_____	( ) ☐
Diss Metals (filtered)	(HNO3) ☑	Alkalinity (no headspace)	(unpres) ☑	DOC (filtered)	(H2SO4) ☑	Hardness	(calculated) ☐	_____	( ) ☐

Additional Information

Type of Sample Containers:	Preservative	Quantity:	QA/QC Samples:	Comments:
1000 mL HDPE	none	2	☐ Field Duplicate	Field Blank 1-GW-092520 @ 820
500 mL HDPE	HNO3	1	☐ MS/MSD	9/25/20 6 Bottles
500 mL HDPE	none	1	☐ Field Blank	
250 mL Glass Amber	H2SO4	2	☐ Rinsate	
		6		

Signature: GSW Date: 9/24/20

GROUNDWATER, POREWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name: RT-Holden Mine Date of Collection: 9/25/20

Field Event: Fall 2020 Field Personnel: Nick Waldo

Purge Data

Location ID: TP2-15
Ecology Tag: BIO-868
Diameter: 2" Screened Interval: 125.4-135.4
GPS:
Total Depth: 137.2 Transducer S/N:

Location Condition (Well damage, creek level, iron staining, fire damage): Good

Secure: ☒ Yes ☐ No Depth Sounder decontaminated prior to use: ☒ Yes ☐ No

Photograph Numbers:

One Casing Volume (gal): 4.1

Depth of water (from top of casing): 112.66

After 5 minutes of purging (from TOC):

Begin purge (time): 1126 End purge (time): 1245

Volume purged: 7.5 Purge water disposal method: Ground

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
¾	1.050"	0.804"	0.0229	0.2916
2"	2.375"	2.067"	0.17	1.45
2.5"	2.875"	2.445"	0.255	2.129
4"	4.500"	4.026"	0.66	5.51

Time	DTW (decimal ft below TOC)	Vol. Purged (L/gal)	pH (s.u.)	DO (mg/L)	Specific Conductivity (uS/cm)	Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments
1140	—	1.	6.05	8.58	291.9	0.25	9.1	81.7	
1201	—	3	6.35	0.90	669	0.38	8.6	53.8	
1213	112.68	4	6.41	0.71	680	0.15	8.8	37.7	
1221	112.68	5	6.44	0.59	682	0.06	8.6	29.4	
1230	—	6	6.46	0.53	682	0.79	8.6	22.6	
1239	—	7	6.47	0.56	682	22.7/-0.99/0.13	8.6	18.8	Lamotte inconsistant
1244	—	7.5	6.47	0.52	682	—	8.6	18.2	

Ferrous Iron Field Test 2.5 mg/L or ☐ Not Detected LaMotte Turbidimeter Reading: NTU

Sampling Data

Sample No: TP2-15-GW-092520 Depth of tubing/distance from shore:

Date Collected (mo/dy/yr): 9/25/20 Time Sample Collected: 1230 Weather: Rain

Duplicate Sample No: Time Duplicate Sample Collected:

Type: ☒ Groundwater ☐ Surface Water ☐ Porewater (6"/red, 12"/green, 36"/black) Sample: ☒ Unfiltered ☒ Filtered Filter Type: ☒ disposable 0.45-µm ☐

Sample Collected with: ☐ Grab ☒ Pump Other: Type: ☐ Peristaltic ☒ Bladder Other: Flow Rate (L/min):

Water Quality Instrument Data Collected with: Type: ☒ YSI Pro DSS ☐ Horiba U-50 ☒ LaMotte (Turbidity only) Other:

Sample Decon Procedure: Sample collected with: ☒ disposable and/or dedicated silicon and poly tubing ☐ Tubing replaced

Sample Description (Color, Turbidity, Odor, Other): Clear

Sample Analyses

Total Metals	(HNO3) ☒	TDS/TSS	(unpres) ☒	TOC	(H2SO4) ☒	Cl/SO4/NO3	(unpres) ☒		( ) ☐
Diss Metals (filtered)	(HNO3) ☐	Alkalinity (no headspace)	(unpres) ☒	DOC (filtered)	(H2SO4) ☒	Hardness	(calculated) ☐		( ) ☐

Additional Information

Type of Sample Containers:	Preservative	Quantity:	QA/QC Samples:	Comments:
1000 mL HDPE	none	2	☐ Field Duplicate	
500 mL HDPE	HNO3	1	☐ MS/MSD	
500 mL HDPE	none	1	☐ Field Blank	
250 mL Glass Amber	H2SO4	2	☐ Rinsate	

Signature: Date: 9/25/20

GROUNDWATER, POREWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name: RT-Holden Mine — Date of Collection: 9/24/20

Field Event: Fall 2020 — Field Personnel: GSW/NW

Purge Data

Location ID: TP3-12D

Ecology Tag

Diameter: 2 Screened Interval:

GPS:

Total Depth: Transducer S/N:

Location Condition (Well damage, creek level, iron staining, fire damage): Good

Secure: ☑ Yes ☐ No — Depth Sounder decontaminated prior to use: ☑ Yes ☐ No

Photograph Numbers:

One Casing Volume (gal): 1.71 in Screen Manual

Depth of water (from top of casing): 81.60

After 5 minutes of purging (from TOC):

Begin purge (time): 1405 — End purge (time):

Volume purged: — Purge water disposal method:

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Linear Ft.)
¾	1.050"	0.804"	0.0229	0.2916
2"	2.375"	2.067"	0.17	1.45
2.5"	2.875"	2.445"	0.255	2.129
4"	4.500"	4.026"	0.66	5.51

Time	DTW (decimal ft below TOC)	Vol. Purged (Dgal)	pH (s.u.)	DO (mg/L)	Specific Conductivity (uS/cm)	Turbidity (NTU)	Temp (C)	ORP (mV)	Comments
1411	NR	0.5	5.05	4.86	214.4	0.71	9.1	280.1	
1423		2	5.05	2.16	520	0.98	8	297.8	
1429		3	5.06	1.94	521	2.30	7.8	297.2	0.37 NTU LaMotte
1435		4	5.06	1.87	519	—	7.6	297.7	0.94
1443		5.2	5.07	1.68	518	—	7.6	298.6	
#1448		6	5.07	1.62	518		7.5	297.5	

Ferrous Iron Field Test ____ mg/L or ☐ Not Detected — LaMotte Turbidimeter Reading: 0.94 NTU

Sampling Data

Sample No: TP3-12D-GW-092420 — Depth of tubing/distance from shore: Bladder

Date Collected (mo/dy/yr): 9/24/20 — Time Sample Collected: 1450 — Weather: Windy 55F

Duplicate Sample No: N/A — Time Duplicate Sample Collected:

Type: ☑ Groundwater ☐ Surface Water ☐ Porewater (6"/red, 12"/green, 36"/black) — Sample: ☐ Unfiltered ☑ Filtered — Filter Type: ☑ disposable 0.45-um ☐ ____

Sample Collected with: ☐ Grab ☑ Pump Other: — Type: ☐ Peristaltic ☑ Bladder Other: — Flow Rate (L/min): ____

Water Quality Instrument Data Collected with: Type: ☑ YSI Pro DSS ☐ Horiba U-50 ☐ LaMotte (Turbidity only) Other:

Sample Decon Procedure: Sample collected with: ☐ disposable and/or dedicated silicon and poly tubing ☐ Tubing replaced

Sample Description (Color, Turbidity, Odor, Other): Clear

Sample Analyses

Total Metals	(HNO3) ☑	TDS/TSS	(unpres) ☑	TOC	(H2SO4) ☑	Cl/SO4/NO3	(unpres) ☑	____	( ) ☐
Diss Metals (filtered)	(HNO3) ☐	Alkalinity (no headspace)	(unpres) ☑	DOC (filtered)	(H2SO4) ☑	Hardness	(calculated) ☐	____	( ) ☐

Additional Information

Type of Sample Containers:	Preservative	Quantity:	QA/QC Samples:	Comments:
1000 mL HDPE	none	2	☐ Field Duplicate	
500 mL HDPE	HNO3	1	☐ MS/MSD	
500 mL HDPE	none	1	☐ Field Blank	
250 mL Glass Amber	H2SO4	2	☐ Rinsate	
		(6)		

Signature: GSW — Date: 9/24/20

GROUNDWATER, POREWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name: RT-Holden Mine Date of Collection: 9/24/20

Field Event: Fall 2020 Field Personnel: NBW

Purge Data

Location ID: TB3-125

Ecology Tag B10-870

Diameter: 2" Screened Interval: 74.1-84.1

GPS:

Total Depth: 85.4 Transducer S/N:

Location Condition (Well damage, creek level, iron staining, fire damage): Good

Secure: ☒ Yes ☐ No Depth Sounder decontaminated prior to use: ☒ Yes ☐ No

Photograph Numbers:

One Casing Volume (gal): 0.9

Depth of water (from top of casing): 79.75

After 5 minutes of purging (from casing): 80.19

Begin purge (time): 1410 End purge (time): 1510

Volume purged: 2 1/4 gal Purge water disposal method: Ground

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
¾	1.050"	0.804"	0.0229	0.2916
2"	2.375"	2.067"	0.17	1.45
2.5"	2.875"	2.445"	0.255	2.129
4"	4.500"	4.026"	0.66	5.51

Time	DTW (decimal ft below casing)	Vol. Purged L / (gal)	pH (s.u.)	DO (mg/L)	Specific Conductivity (µS/cm)	Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments
1417	80.19	1/4	6.43	2.32	2311	8.70	8.4	79.0	
1425	80.52	1/2	6.28	1.26	2336	3.48	8.0	44.5	
1441	81.10	1 1/4	6.31	1.10	2397	1.75	7.9	29.2	
1447	81.26	1 1/2	6.29	1.07	2395 *	—	8.0	35.9	
1457	Dry (bottom of screen)	1 3/4	6.26	1.06	2392	—	8.0	43.4	Pump returns decreasing
1509	Dry	—	—	—	—	—	—	—	No returns
	water under	2 1/4							

Ferrous Iron Field Test 2.5 mg/L at 1508 ☐ Not Detected LaMotte Turbidimeter Reading: ____ NTU

Sampling Data

Sample No: ~~TB3-125-GW-092420~~ Depth of tubing/distance from shore:

Date Collected (mo/dy/yr): 9/24/20 Time Sample Collected: ~~1440~~ Weather: cloudy / wind

Duplicate Sample No: Time Duplicate Sample Collected:

Type: ☒ Groundwater ☐ Surface Water ☐ Porewater (6"/red, 12"/green, 36"/black) Sample: ☒ Unfiltered ☐ Filtered Filter Type: ☒ disposable 0.45-µm ☐

Sample Collected with: ☐ Grab ☒ Pump Other: Type: ☐ Peristaltic ☒ Bladder Other: Flow Rate (L/min):

Water Quality Instrument Data Collected with: Type: ☒ YSI Pro DSS ☐ Horiba U-50 ☒ LaMotte (Turbidity only) Other:

Sample Decon Procedure: Sample collected with: ☒ disposable and/or dedicated silicon and poly tubing ☐ Tubing replaced

Sample Description (Color, Turbidity, Odor, Other): clear

9/24 Not sampled

Sample Analyses

Total Metals	(HNO3) ☒	TDS/TSS	(unpres) ☒	TOC	(H2SO4) ☒	Cl/SO4/NO3	(unpres) ☒		( ) ☐
Diss Metals (filtered)	(HNO3) ☐	Alkalinity (no headspace)	(unpres) ☒	DOC (filtered)	(H2SO4) ☒	Hardness	(calculated) ☐		( ) ☐

Additional Information

Type of Sample Containers:	Preservative	Quantity:	QA/QC Samples:	Comments:
1000 mL HDPE	none	0 ~~2~~ 1	☐ Field Duplicate	
500 mL HDPE	HNO3	0 1	☐ MS/MSD	
500 mL HDPE	none	0 1	☐ Field Blank	
250 mL Glass Amber	H2SO4	0 ~~2~~ 1	☐ Rinsate	

Signature: NBW Date: 9/24/20

GROUNDWATER, POREWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Purge Data Continued

Time	DTW	Vol. Purged	pH	DO	Specific Conductivity	Turbidity	Temp	ORP	Comments
Units:	Decimal ft	L or gal				NTU	°C	mV	

Additional Notes/Comments:

RC-4 for synoptic: 1337

Staff gauge crooked, partially detached.

Lower water level approx. 1.15

Upper staff gauge dry, out of river.

RC-6 @ 1345

1.1 ft

GROUNDWATER, POREWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name: RT-Holden Mine Date of Collection: 9/25/20

Field Event: Fall 2020 Field Personnel: Nick Waldo

Purge Data

Location ID: TP3-13

Ecology Tag: BIO-861

Diameter: 2" Screened Interval: 117.8-127.8

GPS:

Total Depth: 130.2 Transducer S/N:

Location Condition (Well damage, creek level, iron staining, fire damage): Good

Secure: ☒ Yes ☐ No Depth Sounder decontaminated prior to use: ☒ Yes ☐ No

Photograph Numbers:

One Casing Volume (gal): 3.2 (~13L)

Depth of water (from top of casing): 111.67 (used other sounder)

After 5 minutes of purging (from TOC): —

Begin purge (time): 913 End purge (time): 1037

Volume purged: 8.5L Purge water disposal method: Ground

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Linear Ft.)
¾	1.050"	0.804"	0.0229	0.2916
2"	2.375"	2.067"	0.17	1.45
2.5"	2.875"	2.445"	0.255	2.129
4"	4.500"	4.026"	0.66	5.51

Time	DTW (decimal ft below TOC)	Vol. Purged (L/gal)	pH (s.u.)	DO (mg/L)	Specific Conductivity (µS/cm)	Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments
917	—	0.5	3.77	10.2	4043	0.58	10.0	270.8	sounder failed, new battery did not fix
945	—	2.5	4.07	0.84	1925	0.08	8.5	182.5	
958	—	3.5	4.09	0.64	1944	0.59	8.5	179.1	
1005	— 111.67	5.0	4.11	0.55	1950	0.26	8.4	177.8	
1018	— 111.67	6.5	4.12	0.50	1948	0.02	8.5	177.2	
1026	—	7.5	4.12	0.49	1950	0.26	8.5	177.2	
	—								
	—								

Ferrous Iron Field Test: 5.0 mg/L or ☐ Not Detected LaMotte Turbidimeter Reading: _____ NTU

Sampling Data

Sample No: TP3-13-GW-092520 Depth of tubing/distance from shore:

Date Collected (mo/dy/yr): 9/25/20 Time Sample Collected: 915 Weather: Heavy Rain

Duplicate Sample No: Time Duplicate Sample Collected:

Type: ☒ Groundwater ☐ Surface Water ☐ Porewater (6"/red, 12"/green, 36"/black) Sample: ☒ Unfiltered ☒ Filtered Filter Type: ☒ disposable 0.45-µm ☐ _____

Sample Collected with: ☐ Grab ☒ Pump Other: Type: ☐ Peristaltic ☒ Bladder Other: Flow Rate (L/min):

Water Quality Instrument Data Collected with: Type: ☒ YSI Pro DSS ☐ Horiba U-50 : ☒ LaMotte (Turbidity only) Other:

Sample Decon Procedure: Sample collected with: ☒ disposable and/or dedicated silicon and poly tubing ☐ Tubing replaced

Sample Description (Color, Turbidity, Odor, Other): Clear

Sample Analyses

Total Metals	(HNO3) ☒	TDS/TSS	(unpres) ☒	TOC	(H2SO4) ☒	Cl/SO4/NO3	(unpres) ☒		☐
Diss Metals (filtered)	(HNO3) ☐	Alkalinity (no headspace)	(unpres) ☒	DOC (filtered)	(H2SO4) ☒	Hardness	(calculated) ☐		☐

Additional Information

Type of Sample Containers:	Preservative	Quantity:	QA/QC Samples:	Comments:
1000 mL HDPE	none	2	☐ Field Duplicate	
500 mL HDPE	HNO3	1	☐ MS/MSD	
500 mL HDPE	none	1	☐ Field Blank	
250 mL Glass Amber	H2SO4	2	☐ Rinsate	

Signature: N Wa Date: 9/25/20

GROUNDWATER, POREWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name: RT-Holden Mine Date of Collection: 9-25-20

Field Event: Fall 2020 Field Personnel: GbnW / NickW

Purge Data

Location ID: TP3-14D

Ecology Tag BIO 953

Diameter: _____ Screened Interval: _____

GPS: _____

Total Depth: _____ Transducer S/N: _____

Location Condition (Well damage, creek level, iron staining, fire damage): Good.

Secure: ☐ Yes ☐ No Depth Sounder decontaminated prior to use: ☑ Yes ☐ No

Photograph Numbers: _____

One Casing Volume (gal): _____

Depth of water (from top of casing): 91.56

After 5 minutes of purging (from TOC): _____

Begin purge (time): 1338 End purge (time): 14

Volume purged: 10L Purge water disposal method: Ground

Volume of Schedule 40 PVC Pipe				
Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
¾	1.050"	0.804"	0.0229	0.2916
2"	2.375"	2.067"	0.17	1.45
2.5"	2.875"	2.445"	0.255	2.129
4"	4.500"	4.026"	0.66	5.51

Time	DTW (decimal ft below TOC)	Vol. Purged (L) gal	pH (s.u.)	DO (mg/L)	Specific Conductivity (uS/cm)	Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments
						LaMotte			
1347	91.56	0.7	4.82	7.10	269.7	2.42	8.9	152.0	
1400	91.56	2.8	4.52	0.73	466.7	1.26	7.3	186.2	
1407	91.57	4	4.49	0.53	480.5	1.38	7.2	194.7	
1411	91.57	5	4.48	0.46	482.6	1.00	7.3	200.0	
1417	5[illegible]	6	4.47	0.44	483.7	0.95	7.2	204.4	
1422	11	7	4.47	0.43	486.4	1.00	7.0	208.2	
purged 8L then stopped for lightning at ~1425. Returned at approx. 1540, purged 2L more then sampled									

Ferrous Iron Field Test <0.5 mg/L or ☒ Not Detected LaMotte Turbidimeter Reading: _____ NTU

Sampling Data

Sample No: TP3-14D-GW-092520 Depth of tubing/distance from shore: _____

Date Collected (mo/dy/yr): 9/25/20 Time Sample Collected: 1445 Weather: _____

Duplicate Sample No: _____ Time Duplicate Sample Collected: _____

Type: ☑ Groundwater ☐ Surface Water ☐ Porewater (6"/red, 12"/green, 36"/black) Sample: ☐ Unfiltered ☑ Filtered Filter Type: ☑ disposable 0.45-um ☐ _____

Sample Collected with: ☐ Grab ☑ Pump Other: _____ Type: ☐ Peristaltic ☑ Bladder Other: _____ Flow Rate (L/min): _____

Water Quality Instrument Data Collected with: Type: ☑ YSI Pro DSS ☐ Horiba U-50 ☐ LaMotte (Turbidity only) Other: _____

Sample Decon Procedure: Sample collected with: ☐ disposable and/or dedicated silicon and poly tubing ☐ Tubing replaced

Sample Description (Color, Turbidity, Odor, Other): _____

Sample Analyses

Total Metals	(HNO3) ☑	TDS/TSS	(unpres) ☑	TOC	(H2SO4) ☑	Cl/SO4/NO3	(unpres) ☑	_____	☐
Diss Metals (filtered)	(HNO3) ☐	Alkalinity (no headspace)	(unpres) ☑	DOC (filtered)	(H2SO4) ☑	Hardness	(calculated) ☐	_____	☐

Additional Information

Type of Sample Containers:	Preservative	Quantity:	QA/QC Samples:	Comments:
1000 mL HDPE	none	2	☐ Field Duplicate	
500 mL HDPE	HNO3	1	☐ MS/MSD	
500 mL HDPE	none	1	☐ Field Blank	
250 mL Glass Amber	H2SO4	2	☐ Rinsate	

Signature: _____ Date: _____

GROUNDWATER, POREWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name: RT-Holden Mine Date of Collection: 9-26-2020

Field Event: Fall 2020 Field Personnel: Ryan C.

Purge Data

Location ID: US-15

Ecology Tag

Diameter: _____ Screened Interval: _____

GPS: _____

Total Depth: _____ Transducer S/N: _____

Location Condition (Well damage, creek level, iron staining, fire damage): Good

Secure: ☑ Yes ☐ No Depth Sounder decontaminated prior to use: ☑ Yes ☐ No

Photograph Numbers: _____

One Casing Volume (gal): _____

Depth of water (from top of casing): 10.24'

After 5 minutes of purging (from TOC): 10.25'

Begin purge (time): 0838 End purge (time): 0945

Volume purged: 11.25 Purge water disposal method: Ground

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
¾	1.050"	0.804"	0.0229	0.2916
2"	2.375"	2.067"	0.17	1.45
2.5"	2.875"	2.445"	0.255	2.129
4"	4.500"	4.026"	0.66	5.51

Time	DTW (decimal ft below TOC)	Vol. Purged L / gal	pH (s.u.)	DO (mg/L)	Specific Conductivity (µS/cm)	Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments
0848	10.25	2.5	7.54	2.14	86.6	0.40	9.0	167.1	
0853	10.25	3.75	7.51	1.96	86.7	0.35	9.0	180.7	
0858	10.25	5	7.52	1.91	87.1	0.32	9.0	181.9	
0903		6.25	7.53	1.86	87.5	0.32	9.0	184.9	
0908		7.50	7.55	1.88	87.2	0.33	9.0	182.3	
0913		8.75	7.54	1.89	86.7	0.31	9.1	180.1	

Ferrous Iron Field Test _____ mg/L or ☑ Not Detected LaMotte Turbidimeter Reading: _____ NTU

Sampling Data

Sample No: US-15-GW-092620 Depth of tubing/distance from shore: _____

Date Collected (mo/dy/yr): 9-26-2020 Time Sample Collected: 0920 Weather: partly cloudy

Duplicate Sample No: _____ Time Duplicate Sample Collected: _____

Type: ☑ Groundwater ☐ Surface Water ☐ Porewater (6"/red, 12"/green, 36"/black) Sample: ☐ Unfiltered ☐ Filtered Filter Type: ☑ disposable 0.45-µm ☐ _____

Sample Collected with: ☐ Grab ☑ Pump Other: _____ Type: ☑ Peristaltic ☐ Bladder Other: _____ Flow Rate (L/min): ___.___

Water Quality Instrument Data Collected with: Type: ☑ YSI Pro DSS ☐ Horiba U-50 ☐ LaMotte (Turbidity only) Other: _____

Sample Decon Procedure: Sample collected with: ☐ disposable and/or dedicated silicon and poly tubing ☐ Tubing replaced

Sample Description (Color, Turbidity, Odor, Other): _____

Sample Analyses

Total Metals	(HNO3) ☑	TDS/TSS	(unpres) ☑	TOC	(H2SO4) ☑	Cl/SO4/NO3	(unpres) ☐	_____	(_____) ☐
Diss Metals (filtered)	(HNO3) ☐	Alkalinity (no headspace)	(unpres) ☑	DOC (filtered)	(H2SO4) ☑	Hardness	(calculated) ☐	_____	(_____) ☐

Additional Information

Type of Sample Containers:	Preservative	Quantity:	QA/QC Samples:	Comments:
1000 mL HDPE	none	2	☐ Field Duplicate	
500 mL HDPE	HNO3	1	☐ MS/MSD	
500 mL HDPE	none	1	☐ Field Blank	
250 mL Glass Amber	H2SO4	2	☐ Rinsate	

Signature: Ryan Crosby Date: 9-26-2020

GROUNDWATER, POREWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name: RT-Holden Mine Date of Collection: 09/26/2020

Field Event: Fall 2020 Field Personnel: TS + RC

Purge Data

Location ID: US-1-I

Ecology Tag: BBJ264

Diameter: 2" Screened Interval:

GPS:

Total Depth: Transducer S/N:

Location Condition (Well damage, creek level, iron staining, fire damage): Good

Secure: ☒ Yes ☐ No Depth Sounder decontaminated prior to use: ☒ Yes ☐ No

Photograph Numbers:

One Casing Volume (gal):

Depth of water (from top of casing): 10.34 @ 09:52

After 5 minutes of purging (from TOC): 10.36

Begin purge (time): 09:53 End purge (time): 10:50

Volume purged: 16.5 L Purge water disposal method: ground

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
¾	1.050"	0.804"	0.0229	0.2916
2"	2.375"	2.067"	0.17	1.45
2.5"	2.875"	2.445"	0.255	2.129
4"	4.500"	4.026"	0.66	5.51

Time	DTW (decimal ft below TOC)	Vol. Purged L / gal	pH (s.u.)	DO (mg/L)	Specific Conductivity (µS/cm)	Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments
1000	10.38	2.5	7.34	4.92	91.1	0.16	9.3	201.9	
1005	10.38	4.5	7.00	4.42	92.0	0.16	9.1	205.9	
1010	10.38	6	6.87	4.31	92.0	0.15	8.9	207.8	
1015	10.38	7.75	6.79	4.25	91.7	0.10	8.6	209.2	
1020	" "	9.5	6.74	4.20	91.5	0.12	8.3	210.5	
1025	" "	11	6.71	4.19	91.9	0.19	8.2	211.7	
1030	" "	13	6.68	4.19	92.1	0.16	8.2	211.1	
1035	" "	15	6.67	4.19	92.1	0.14	8.1	211.6	

Ferrous Iron Field Test mg/L or ☒ Not Detected LaMotte Turbidimeter Reading: NTU

Sampling Data

Sample No: US-1I-[redacted] GW-092620 Depth of tubing/d stance from shore:

Date Collected (mo/dy/yr): 09/26/20 Time Sample Collected: 10:40 Weather: light rain

Duplicate Sample No: Time Duplicate Sample Collected:

Type: ☒ Groundwater ☐ Surface Water ☐ Porewater (6"/red, 12"/green, 36"/black) Sample: ☐ Unfiltered ☒ Filtered Filter Type: ☐ disposable 0.45-µm ☐

Sample Collected with: ☐ Grab ☒ Pump Other: Type: ☒ Peristaltic ☐ Bladder Other: Flow Rate (L/min):

Water Quality Instrument Data Collected with: Type: ☒ YSI Pro DSS ☐ Horiba U-50 ; ☒ LaMotte (Turbidity only) Other:

Sample Decon Procedure: Sample collected with: ☒ disposable and/or dedicated silicon and poly tubing ☐ Tubing replaced

Sample Description (Color, Turbidity, Odor, Other): Clear, odorless

Sample Analyses

Total Metals	(HNO3) ☒	TDS/TSS	(unpres) ☒	TOC	(H2SO4) ☒	Cl/SO4/NO3	(unpres) ☐		( ) ☐
Diss Metals (filtered)	(HNO3) ☐	Alkalinity (no headspace)	(unpres) ☒	DOC (filtered)	(H2SO4) ☒	Hardness	(calculated) ☐		( ) ☐

Additional Information

Type of Sample Containers:	Preservative	Quantity:	QA/QC Samples:	Comments:
1000 mL HDPE	none	2	☐ Field Duplicate	
500 mL HDPE	HNO3	1	☐ MS/MSD	
500 mL HDPE	none	1	☐ Field Blank	
250 mL Glass Amber	H2SO4	2	☐ Rinsate	

Signature: Date: 09/25/20

GROUNDWATER, POREWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name: RT-Holden Mine Date of Collection: 09/26/2020

Field Event: Fall 2020 Field Personnel: TS

Purge Data

Location ID: US-1D

Ecology Tag: BBJ263

Diameter: 2" Screened Interval: _____

Total Depth: _____ Transducer S/N: _____

Location Condition (Well damage, creek level, iron staining, fire damage): good

Secure: ☒ Yes ☐ No Depth Sounder decontaminated prior to use: ☒ Yes ☐ No

Photograph Numbers: _____

One Casing Volume (gal): _____

Depth of water (from TOC or staff gauge): 10.60 Time: 09:36

After 5 minutes of purging (from TOC): 10.61

Begin purge (time): 08:37 End purge (time): 09:33

Volume purged: 14.5 Liters Purge water disposal method: ground

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
¾	1.050"	0.804"	0.0229	0.2916
2"	2.375"	2.067"	0.17	1.45
2.5"	2.875"	2.445"	0.255	2.129
4"	4.500"	4.026"	0.66	5.51

Time	DTW (decimal ft below TOC)	Vol Purged L / gal	pH (s.u.)	DO (mg/L)	Specific Conductivity (uS/cm)	LaMotte Turbidity (NTU)	Temp (C)	ORP (mV)	Comments
0855	10.61	5	6.84	5.91	187.9	0.17	7.6	188.5	
0900	10.61	7	6.84	5.93	187.9	0.19	7.5	192.8	
0905	10.61	8.5	6.84	5.94	187.9	0.13	7.5	196.7	
0910	10.61	10	6.85	5.94	187.9	0.0	7.5	200.5	
0915	10.61	11.5	6.85	5.94	187.9	0.10	7.5	203.5	

Ferrous Iron Field Test _____ mg/L or ☒ Not Detected

Sampling Data

Sample No: US-1D-GW-092620 Depth of tubing/distance from shore: _____

Date Collected (mo/dy/yr): 09/26/20 Time Sample Collected: 0922 Weather: rain

Duplicate Sample No: _____ Time Duplicate Sample Collected: _____

Type: ☒ Groundwater ☐ Surface Water ☐ Porewater (6"/red, 12"/green, 36"/black) Sample: ☒ Unfiltered ☒ Filtered Filter Type: ☒ disposable 0.45-um ☐ _____

Sample Collected with: ☐ Grab ☒ Pump Other: _____ Type: ☒ Peristaltic ☐ Bladder Other: _____ Flow Rate (L/min): _____

Water Quality Instrument Data Collected with: Type: ☒ YSI Pro DSS ☐ Horiba U-50 ☒ LaMotte (Turbidity only) Other: _____

Sample Decon Procedure: Sample collected with: ☐ disposable tubing ☒ dedicated silicon and poly tubing ☐ Tubing replaced

Sample Description (Color, Turbidity, Odor, Other): clear; no odor

Sample Analyses

Total Metals	(HNO3) ☒	TDS/TSS	(unpres) ☒	TOC	(H2SO4) ☒	Cl/SO4/NO3	(unpres) ☐	_____	(____) ☐
Diss Metals (filtered)	(HNO3) ☐	Alkalinity (no headspace)	(unpres) ☒	DOC (filtered)	(H2SO4) ☒	Hardness	(calculated) ☐	_____	(____) ☐

Additional Information

Type of Sample Containers:	Preservative	Quantity:	QA/QC Samples:	Comments:
1000 mL HDPE	none	2	☐ Field Duplicate	
500 mL HDPE	HNO3	1	☐ MS/MSD	
500 mL HDPE	none	1	☐ Field Blank	
250 mL Glass Amber	H2SO4	2	☐ Rinsate	

Signature: _____ Date: 09/26/2020

GROUNDWATER, POREWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name: RT-Holden Mine Date of Collection: 9/25/20

Field Event: FALL 2020 Field Personnel: B Beaulieu

Purge Data

Location ID: DS-14

Ecology Tag

Diameter: 3/4" Screened Interval:

Total Depth: Transducer S/N:

Location Condition (Well damage, creek level, iron staining, fire damage): GOOD

Secure: ☐ Yes ☑ No Depth Sounder decontaminated prior to use: ☑ Yes ☐ No

Photograph Numbers:

One Casing Volume (gal):

Depth of water (from TOC or staff gauge): 5.51 Time: 1300

After 5 minutes of purging (from TOC):

Begin purge (time): 13:13 End purge (time):

Volume purged: Purge water disposal method:

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
¾	1.050"	0.804"	0.0229	0.2916
2"	2.375"	2.067"	0.17	1.45
2.5"	2.875"	2.445"	0.255	2.129
4"	4.500"	4.026"	0.66	5.51

Time	DTW (decimal ft below TOC)	Vol. Purged L/gal	pH (s.u.)	DO (mg/L)	Specific Conductivity (uS/cm)	LaMotte Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments
13:10		1L	5.58	3.83	71.6		8.0	222.2	
13:23		1.75L	5.55	3.53	71.1	17.35 (YSI)	7.9	224.9	
	Begins running dry → lower rate					to ~0.1 L/min			
1333		2.5	5.50	3.47	69.3		8.0	146.4	
1343		3	5.49	3.76	69.3		8.0	203.4	
1353		3.5	5.48	3.89	69.3	0.81	8.1	217.7	

Ferrous Iron Field Test mg/L or ☑ Not Detected

Sampling Data

Sample No: DS-14-GW-092520 Depth of tubing/distance from shore: ~9 FT / Screened Interval

Date Collected (mo/dy/yr): 9/25/20 Time Sample Collected: 1400 Weather: LT RAIN

Duplicate Sample No: Time Duplicate Sample Collected:

Type: ☑ Groundwater ☐ Surface Water ☐ Porewater (6"/red, 12"/green, 36"/black) Sample: ☑ Unfiltered ☑ Filtered Filter Type: ☐ disposable 0.45-µm ☐

Sample Collected with: ☐ Grab ☑ Pump Other: Type: ☑ Peristaltic ☐ Bladder Other: Flow Rate (L/min): ~1 L/min

Water Quality Instrument Data Collected with: Type: : ☐ YSI Pro DSS ☐ Horiba U-50 : ☑ LaMotte (Turbidity only) Other:

Sample Decon Procedure: Sample collected with: ☑ disposable tubing ☑ dedicated silicon and poly tubing ☐ Tubing replaced

Sample Description (Color, Turbidity, Odor, Other): ORANGE INITIALLY, INCREASINGLY CLEAR

Sample Analyses

Total Metals	(HNO3) ☑	TDS/TSS	(unpres) ☑	TOC	(H2SO4) ☑	Cl/SO4/NO3	(unpres) ☑		( ) ☐
Diss Metals (filtered)	(HNO3) ☐	Alkalinity (no headspace)	(unpres) ☑	DOC (filtered)	(H2SO4) ☑	Hardness	(calculated) ☑		( ) ☐

Additional Information

Type of Sample Containers:	Preservative	Quantity:	QA/QC Samples:	Comments:
1000 mL HDPE	none	2	☐ Field Duplicate	
500 mL HDPE	HNO3	1	☐ MS/MSD	
500 mL HDPE	none	1	☐ Field Blank	
250 mL Glass Amber	H2SO4	2	☐ Rinsate	

Signature: Date: 9/25/20

GROUNDWATER, POREWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name: RT-Holden Mine Date of Collection: 09/22/20

Field Event: Fall 2020 Field Personnel: TS

Purge Data

Location ID: SG-7R-WP

Ecology Tag: —

Diameter: ____ Screened Interval: ____

Total Depth: 6.05' Transducer S/N: —

Location Condition (Well damage, creak level, iron staining, fire damage): See notes on back of page.

Secure: ☒ Yes ☐ No Depth Sounder decontaminated prior to use: ☒ Yes ☐ No

Photograph Numbers: ____

One Casing Volume (gal): ____

Depth of water (from TOC or staff gauge): 4.28' Time: 15:15

After 5 minutes of purging (from TOC): —

Begin purge (time): 15:27 End purge (time): 16:36

Volume purged: 6.75 Purge water disposal method: ground

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Linear Ft.)
¼	1.050"	0.804"	0.0229	0.2918
2"	2.375"	2.067"	0.17	1.45
2.5"	2.875"	2.445"	0.255	2.129
4"	4.500"	4.026"	0.66	5.51

Time	DTW (decimal ft below TOC)	Vol. Purged (L/gal)	pH (s.u.)	DO (mg/L)	Specific Conductivity (uS/cm)	LaMotte Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments
15:40		1.5	6.91	9.16	38.6	54.5	12.0	89.7	
15:45		2	6.81	9.81	37.7	32.7	11.7	100.6	
15:50		2.75	6.77	9.17	37.4	11.7	11.5	108.8	
15:55		3.5	6.74	9.16	37.3	18.2	11.5	113.2	
16:00		4.5	6.72	9.17	37.3	29.1	11.5	117.6	

Ferrous Iron Field Test ____ mg/L or ☒ Not Detected

Sampling Data

Sample No: SG-7R-WP-092220 Depth of tubing/distance from shore: ≈5.5' x 20'

Date Collected (mo/dy/yr): 09/22/20 Time Sample Collected: 16:05 Weather: Sun / overcast

Duplicate Sample No: ____ Time Duplicate Sample Collected: ____

Type: ☒ Groundwater ☐ Surface Water ☐ Porewater (6"/red, 12"/green, 36"/black) Sample: ☒ Unfiltered ☒ Filtered Filter Type: ☒ disposable 0.45-µm ☐ ____

Sample Collected with: ☐ Grab ☒ Pump Other: ____ Type: ☒ Peristaltic ☐ Bladder Other: ____ Flow Rate (L/min): ____

Water Quality Instrument Data Collected with: Type: ☒ YSI Pro DSS ☐ Horiba U-50 : ☒ LaMotte (Turbidity only) Other: ____

Sample Decon Procedure: Sample collected with: ☐ disposable tubing ☐ dedicated silicon and poly tubing ☒ tubing replaced

Sample Description (Color, Turbidity, Odor, Other): clear; no odor;

Sample Analyses

Total Metals	(HNO3) ☒	TDS/TSS	(unpres) ☒	TOC	(H2SO4) ☒	Cl/SO4/NO3	(unpres) ☐	____	(____) ☐
Diss Metals (filtered)	(HNO3) ☒	Alkalinity (no headspace)	(unpres) ☒	DOC (filtered)	(H2SO4) ☒	Hardness	(calculated) ☐	____	(____) ☐

Additional Information

Type of Sample Containers:	Preservative	Quantity:	QA/QC Samples:	Comments:
1000 mL HDPE	none	2	☐ Field Duplicate	
500 mL HDPE	HNO3	2	☐ MS/MSD	
500 mL HDPE	none	1	☐ Field Blank	
250 mL Glass Amber	H2SO4	2	☐ Rinsate	

Signature: TS Date: 9/22/20

GROUNDWATER, POREWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Purge Data Continued

Time	DTW	Vol. Purged	pH	DO	Specific Conductivity	Turbidity	Temp	ORP	Comments
Units:	Decimal ft	L or gal				NTU	°C	mV	

Additional Notes/Comments:

Downriver Staff Gauge 0.12' - Upriver SG damaged

GROUNDWATER, POREWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name: RT-Holden Mine
Date of Collection: 9/26/20
Field Event: Fall 2020
Field Personnel: Nick Wald

Purge Data

Location ID: SG-8-WP
Ecology Tag N/A
Diameter: ____ Screened Interval: ____
GPS: ____
Total Depth: ____ Transducer S/N: ____

Location Condition (Well damage, creek level, iron staining, fire damage): Good, Cap on but not lockable
Secure: ☐ Yes ☒ No Depth Sounder decontaminated prior to use: ☒ Yes ☐ No
Photograph Numbers: ____
One Casing Volume (gal): ____

Depth of water (from top of casing): 4.43
After 5 minutes of purging (from TOC): —
Begin purge (time): 820 End purge (time): 917
Volume purged: 3.0 Purge water disposal method: ground

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
¾	1.050"	0.804"	0.0226	0.2916
2"	2.375"	2.067"	0.17	1.45
2.5"	2.875"	2.445"	0.255	2.129
4"	4.500"	4.026"	0.66	5.51

Time	DTW (decimal ft below TOC)	Vol. Purged L/gal	pH (s.u.)	DO (mg/L)	Specific Conductivity (µS/cm)	Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments
829	—	0.5	5.57	8.09	39.1	—	10.2	46.5	Turbid, grey
839	—	1.5	5.74	8.99	37.5	—	10.2	29.5	Less turbid still grey
909	—	2	5.92	9.51	37.2	1.36	10.4	15.3	Clear
912	—	2.5	5.88	9.55	36.9	1.96	10.4	16.6	

Ferrous Iron Field Test ____ mg/L or ☒ Not Detected LaMotte Turbidimeter Reading: ____ NTU

Sampling Data

Sample No: SG-8-WP-~~092120~~ GW-092620 Depth of tubing/distance from shore: ____
Date Collected (mo/dy/yr): 9/26/20 Time Sample Collected: 930 Weather: Part Sun
Duplicate Sample No: ____ Time Duplicate Sample Collected: ____
Type: ☒ Groundwater ☐ Surface Water ☐ Porewater (6"/red, 12"/green, 36"/black) Sample: ☒ Unfiltered ☒ Filtered Filter Type: ☒ disposable 0.45-um ☐ ____
Sample Collected with: ☐ Grab ☒ Pump Other: ____ Type: ☒ Peristaltic ☐ Bladder Other: ____ Flow Rate (L/min): ____
Water Quality Instrument Data Collected with: Type: ☒ YSI Pro DSS ☐ Horiba U-50 ☒ LaMotte (Turbidity only) Other: ____
Sample Decon Procedure: Sample collected with: ☐ disposable and/or dedicated silicon and poly tubing ☐ Tubing replaced
Sample Description (Color, Turbidity, Odor, Other): Clear

Sample Analyses

Total Metals	(HNO3) ☒	TDS/TSS	(unpres) ☒	TOC	(H2SO4) ☒	Cl/SO4/NO3	(unpres) ☒	____	☐
Diss Metals (filtered)	(HNO3) ☐	Alkalinity (no headspace)	(unpres) ☒	DOC (filtered)	(H2SO4) ☒	Hardness	(calculated) ☐	____	☐

Additional Information

Type of Sample Containers:	Preservative	Quantity:	QA/QC Samples:	Comments:
1000 mL HDPE	none	2	☐ Field Duplicate	
500 mL HDPE	HNO3	1	☐ MS/MSD	
500 mL HDPE	none	1	☐ Field Blank	
250 mL Glass Amber	H2SO4	2	☐ Rinsate	

Signature: N Wk Date: 9/26/20

GROUNDWATER, POREWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name: RT-Holden Mine Date of Collection: 9/26/20

Field Event: FALL 2020 Field Personnel: B. Beaulieu

Purge Data

Location ID: SG-9-WP

Ecology Tag: —

Diameter: 3/4" Screened Interval: _____

GPS: _____

Total Depth: _____ Transducer S/N: _____

Location Condition (Well damage, creek level, iron staining, fire damage): GOOD

Vegetation encroaching a little

Secure: ☐ Yes ☑ No Depth Sounder decontaminated prior to use: ☑ Yes ☐ No

Photograph Numbers: _____

One Casing Volume (gal): _____

Depth of water (from top of casing): 4.26

After 5 minutes of purging (from TOC): _____

Begin purge (time): 8:07 End purge (time): 8:32

Volume purged: 5 L Purge water disposal method: ground

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
¾	1.050"	0.804"	0.0229	0.2916
2"	2.375"	2.067"	0.17	1.45
2.5"	2.875"	2.445"	0.255	2.129
4"	4.500"	4.026"	0.66	5.51

Time	DTW (decimal ft below TOC)	VoL Purged L / gal	pH (s.u.)	DO (mg/L)	Specific Conductivity (uS/cm)	Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments
8:12		1.5 L	5.36	4.23	99.2	8.2 (HIGH)	9.5	199.2	
8:17		2.5	5.41	4.15	98.4	6.2 (HIGH)	9.6	206.8	
8:22		3.5	5.44	4.13	98.4	3.4 (HIGH)	9.6	212.5	
8:27		4.5	5.45	4.12	98.4	0.53	9.7	217.3	

Ferrous Iron Field Test _____ mg/L or ☑ Not Detected LaMotte Turbidimeter Reading: 0.53 NTU

Sampling Data

Sample No: SG-9-WP-092620 Depth of tubing/distance from shore: _____

Date Collected (mo/dy/yr): 9/26/20 Time Sample Collected: 8:32 Weather: PHy Cloudy

Duplicate Sample No: _____ Time Duplicate Sample Collected: _____

Type: ☑ Groundwater ☐ Surface Water ☐ Porewater (6"/red, 12"/green, 36"/black) Sample: ☐ Unfiltered ☑ Filtered Filter Type: ☑ Disposable 0.45-um ☐ _____

Sample Collected with: ☐ Grab ☑ Pump Other: _____ Type: ☑ Peristaltic ☐ Bladder Other: _____ Flow Rate (L/min): .2 L/min

Water Quality Instrument Data Collected with: Type: ☑ YSI Pro DSS ☐ Horiba U-50 ☑ LaMotte (Turbidity only) Other _____

Sample Decon Procedure. Sample collected with: ☑ disposable and/or dedicated silicon and poly tubing ☐ Tubing replaced

Sample Description (Color, Turbidity, Odor, Other): Clear. Some sediment initially.

Sample Analyses

Total Metals	(HNO3) ☑	TDS/TSS	(unpres) ☑	TOC	(H2SO4) ☑	Cl/SO4/NO3	(unpres) ☑	_____	( ) ☐
Diss Metals (filtered)	(HNO3) ☐	Alkalinity (no headspace)	(unpres) ☑	DOC (filtered)	(H2SO4) ☑	Hardness	(calculated) ☑	_____	( ) ☐

Additional Information

Type of Sample Containers:	Preservative	Quantity:	QA/QC Samples:	Comments:
1000 mL HDPE	none	2	☐ Field Duplicate	
500 mL HDPE	HNO3	1	☐ MS/MSD	
500 mL HDPE	none	1	☐ Field Blank	
250 mL Glass Amber	H2SO4	2	☐ Rinsate	

Signature: _____ Date: 9/26/20

GROUNDWATER, POREWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name: RT-Holden Mine Date of Collection: 9/25/20

Field Event: FALL 2020 Field Personnel: B. Beaulieu

Purge Data

Location ID: SG-10-WP

Ecology Tag

Diameter: 3/4" Screened Interval:

Total Depth: Transducer S/N:

Location Condition (Well damage, creek level, iron staining, fire damage): GOOD.

Secure: ☐ Yes ☑ No Depth Sounder decontaminated prior to use: ☑ Yes ☐ No

Photograph Numbers:

One Casing Volume (gal):

Depth of water (from TOC or staff gauge): 4.65 Time:

After 5 minutes of purging (from TOC):

Begin purge (time): 08:57 End purge (time):

Volume purged: Purge water disposal method:

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
¾	1.050"	0.804"	0.0229	0.2916
2"	2.375"	2.067"	0.17	1.45
2.5"	2.875"	2.445"	0.255	2.129
4"	4.500"	4.026"	0.66	5.51

Time	DTW (decimal ft below TOC)	Vol. Purged L / gal	pH (s.u.)	DO (mg/L)	Specific Conductivity (uS/cm)	LaMotte Turbidity (NTU)	Temp (C)	ORP (mV)	Comments
9:02		1.5L	4.45	1.33	329.7	0.11 (45)	7.2	229.7	
9:07		1.5L	4.42	1.20	342.3	~~0.09 (45)~~	7.3	245.9	
9:13		2.25L	4.42	1.15	348.3	NA	7.3	262.4	
9:23		3.25L	4.43	1.12	351.7	~~0.30~~	7.3	282.7	
9:29		4L	4.44	1.12	353.0	0.30	7.2	294.5	

Ferrous Iron Field Test mg/L or ☑ Not Detected

Sampling Data

Sample No: SG-10-WP-092520 Depth of tubing/distance from shore ~6ft TOC

Date Collected (mo/dy/yr): 9/25/20 Time Sample Collected: 9:30 Weather: Light rain

Duplicate Sample No: Time Duplicate Sample Collected:

Type: ☑ Groundwater ☐ Surface Water ☐ Porewater (6"/red, 12"/green, 36"/black) Sample: ☑ Unfiltered ☑ Filtered Filter Type: ☑ disposable 0.45-um ☑

Sample Collected with: ☐ Grab ☑ Pump Other: Type: ☑ Peristaltic ☐ Bladder Other: Flow Rate (L/min): ~2 L/min

Water Quality Instrument Data Collected with: Type: ☑ YSI Pro DSS ☐ Horiba U-50 . ☑ LaMotte (Turbidity only) Other:

Sample Decon Procedure. Sample collected with: ☑ disposable tubing ☑ dedicated silicon and poly tubing ☐ Tubing replaced

Sample Description (Color, Turbidity, Odor, Other): Clear

Sample Analyses

Total Metals	(HNO3)	☑	TDS/TSS	(unpres)	☑	TOC	(H2SO4)	☑	Cl/SO4/NO3	(unpres)	☑		☐
Diss Metals (filtered)	(HNO3)	☑	Alkalinity (no headspace)	(unpres)	☑	DOC (filtered)	(H2SO4)	☑	Hardness	(calculated)	☑		☐

Additional Information

Type of Sample Containers:	Preservative	Quantity:	QA/QC Samples:	Comments:
1000 mL HDPE	none	2	☐ Field Duplicate	
500 mL HDPE	HNO3	1	☐ MS/MSD	
500 mL HDPE	none	1	☐ Field Blank	
250 mL Glass Amber	H2SO4	2	☐ Rinsate	

Signature: Date: 9/25/20

GROUNDWATER, POREWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name: RT-Holden Mine Date of Collection: 9/23/20

Field Event: Fall 2020 Field Personnel: Brett Beaulieu

Purge Data

Location ID: SG-11-WP Location Condition (Well damage, creek level, iron staining, fire damage): OK

Ecology Tag: Secure: ☐ Yes ☑ No Depth Sounder decontaminated prior to use: ☑ Yes ☐ No

Diameter: 3/4" Screened Interval: Photograph Numbers:

Total Depth: 6.12 DTB Transducer S/N: — One Casing Volume (gal):

Depth of water (from TOC or staff gauge): 5.19 Time:

After 5 minutes of purging (from TOC): 13:43

Begin purge (time): 13:46 End purge (time):

Volume purged: 1.5 Purge water disposal method:

Volume of Schedule 40 PVC Pipe				
Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Linear Ft.)
¾	1.050"	0.804"	0.0229	0.2916
2"	2.375"	2.067"	0.17	1.45
2.5"	2.875"	2.445"	0.255	2.129
4"	4.500"	4.026"	0.66	5.51

Time	DTW (decimal ft below TOC)	Vol. Purged L / gal	pH (s.u.)	DO (mg/L)	Specific Conductivity (µS/cm)	LaMotte Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments
PURGE VERY SLOW, 1 FT WATER RUNS OUT SIDE OF PVC									
1407		1L	6.19	7.58	256.8		10.7	55.0	CAL CUP
1415		1.5L	7.04	6.64	255.0		10.0	54.9	
1430	Sample								
1600			6.68	9.93	252	0.4	11.3	13.2	

Ferrous Iron Field Test 2.0 mg/L or ☐ Not Detected = Suspect Readings

Sampling Data

Sample No: SG-11-WP-092320 Depth of tubing/distance from shore:

Date Collected (mo/dy/yr): 9/23/20 Time Sample Collected: 14:30 Weather: RAIN

Duplicate Sample No: Time Duplicate Sample Collected:

Type: ☑ Groundwater ☐ Surface Water ☐ Porewater (6"/red, 12"/green, 36"/black) Sample: ☐ Unfiltered ☐ Filtered Filter Type: ☐ disposable 0.45-µm ☐

Sample Collected with: ☐ Grab ☑ Pump Other: Type: ☑ Peristaltic ☐ Bladder Other: Flow Rate (L/min):

Water Quality Instrument Data Collected with: Type: : ☑ YSI Pro DSS ☐ Horiba U-50 : ☑ LaMotte (Turbidity only) Other:

Sample Decon Procedure: Sample collected with: ☐ disposable tubing ☐ dedicated silicon and poly tubing ☐ Tubing replaced

Sample Description (Color, Turbidity, Odor, Other): CLEAR

Sample Analyses

Total Metals	(HNO3)	☑	TDS/TSS	(unpres)	☑	TOC	(H2SO4)	☑	Cl/SO4/NO3	(unpres)	☑	( ) ☐
Diss Metals (filtered)	(HNO3)	☐	Alkalinity (no headspace)	(unpres)	☐	DOC (filtered)	(H2SO4)	☐	Hardness	(calculated)	☑	( ) ☐

Additional Information

Type of Sample Containers:	Preservative	Quantity:	QA/QC Samples:	Comments:
1000 mL HDPE	none	2	☐ Field Duplicate	
500 mL HDPE	HNO3	1	☐ MS/MSD	
500 mL HDPE	none	1	☐ Field Blank	
250 mL Glass Amber	H2SO4	2	☐ Rinsate	

Signature: Date: 9/23/20

GROUNDWATER, POREWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name: RT-Holden Mine Date of Collection: 9/25/20

Field Event: FALL 2020 Field Personnel: B. Beaulieu

Purge Data

Location ID: SG-17-WP Location Condition (Well damage, creek level, iron staining, fire damage): GOOD

Ecology Tag: ~

Diameter: 3/4" Screened interval:

Total Depth: Transducer S/N:

Secure: ☐ Yes ☑ No Depth Sounder decontaminated prior to use: ☑ Yes ☐ No

Photograph Numbers:

One Casing Volume (gal):

Depth of water (from TOC or staff gauge): 5.15 Time: 11:25

After 5 minutes of purging (from TOC):

Begin purge (time): 11:33 End purge (time):

Volume purged: Purge water disposal method:

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
¾	1.050"	0.804"	0.0229	0.2916
2"	2.375"	2.067"	0.17	1.45
2.5"	2.875"	2.445"	0.255	2.129
4"	4.500"	4.026"	0.66	5.51

Time	DTW (decimal ft below TOC)	Vol. Purged L / gal	pH (s.u.)	DO (mg/L)	Specific Conductivity (uS/cm)	LaMotte Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments
11:30		.5L	5.45	4.02	274.0	0.71(45)	9.1	197.8	
11:43		1 L	5.51	3.10	271.8	~	9.0	194.0	
11:54		2 L	5.55	2.94	271.6	~	8.9	196.8	
11:59		2.5	5.55	2.91	271.7	0.2	8.8	201.6	

Ferrous Iron Field Test _____ mg/L or ☑ Not Detected

Sampling Data

Sample No: SG-17-WP-092520 Depth of tubing/distance from shore:

Date Collected (mo/dy/yr): 9/25/20 Time Sample Collected: 12:00 Weather: Lt Rain

Duplicate Sample No: Time Duplicate Sample Collected:

Type: ☑ Groundwater ☐ Surface Water ☐ Porewater (6"/red, 12"/green, 36"/black) Sample: ☐ Unfiltered ☑ Filtered Filter Type: ☑ disposable 0.45-um ☐

Sample Collected with: ☐ Grab ☑ Pump Other: Type: ☑ Peristaltic ☐ Bladder Other: Flow Rate (L/min): 0.2 L/min

Water Quality Instrument Data Collected with: Type: : ☐ YSI Pro DSS ☐ Horiba U-50 : ☑ LaMotte (Turbidity only) Other:

Sample Decon Procedure: Sample collected with: ☐ disposable tubing ☑ dedicated silicon and poly tubing ☐ Tubing replaced

Sample Description (Color, Turbidity, Odor, Other): Clear

Sample Analyses

Total Metals	(HNO3) ☐	TDS/TSS	(unpres) ☐	TOC	(H2SO4) ☐	Cl/SO4/NO3	(unpres) ☐			( ) ☐	
Diss Metals (filtered)	(HNO3) ☐	Alkalinity (no headspace)	(unpres) ☐	DOC (filtered)	(H2SO4) ☐	Hardness	(calculated) ☐			( ) ☐	

Additional Information

Type of Sample Containers:	Preservative	Quantity:	QA/QC Samples:	Comments:
1000 mL HDPE	none	2	☐ Field Duplicate	
500 mL HDPE	HNO3	1	☐ MS/MSD	
500 mL HDPE	none	1	☐ Field Blank	
250 mL Glass Amber	H2SO4	2	☐ Rinsate	

Signature: _____ Date: 9/25/20

GROUNDWATER, POREWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name: RT-Holden Mine Date of Collection: 9/24/20

Field Event: Fall 2020 Field Personnel: B. Scanlon

Purge Data

Location ID: SG-18-WP- Location Condition (Well damage, creek level, iron staining, fire damage): Good

Ecology Tag: —

Diameter: 3/4 Screened Interval:

Total Depth: Transducer S/N: —

Secure: ☐ Yes ☐ No Depth Sounder decontaminated prior to use: ☑ Yes ☐ No

Photograph Numbers:

One Casing Volume (gal):

Depth of water (from TOC or staff gauge): Time:

After 5 minutes of purging (from TOC):

Begin purge (time): 13:36 End purge (time): 14:01

Volume purged: 2.5 L Purge water disposal method: Ground

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
¾	1.050"	0.804"	0.0229	0.2816
2"	2.375"	2.067"	0.17	1.45
2.5"	2.875"	2.445"	0.255	2.128
4"	4.500"	4.026"	0.66	5.51

Time	DTW (decimal ft below TOC)	Vol. Purged L/gal	pH (s.u.)	DO (mg/L)	Specific Conductivity (uS/cm)	LaMotte Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments
13:46	1 L	1 L	6.25	6.01	78.2	5.76 (HSE)	9.6	196.6	
13:51	1.5	1.5 L	6.10	5.08	76.7	0.73	9.5	195.7	
13:56	2.0	2.0 L	6.07	4.96	76.2	0.37	9.5	197.0	
14:01	2.5	2.5 L	6.04	4.94	75.9	1.24	9.5	199.9	

Ferrous Iron Field Test ____ mg/L or ☑ Not Detected

Sampling Data

Sample No: SG-18-WP-092420 Depth of tubing/distance from shore: 10 ft from REC

Date Collected (mo/dy/yr): 9/24/20 Time Sample Collected: 14:00 Weather: Ptly Cldy, 60s / Lt Rain

Duplicate Sample No: Time Duplicate Sample Collected:

Type: ☑ Groundwater ☐ Surface Water ☐ Porewater (6"/red, 12"/green, 36"/black) Sample: ☑ Unfiltered ☐ Filtered Filter Type: ☐ Disposable 0.45-µm ☐

Sample Collected with: ☐ Grab ☑ Pump Other: Type: ☑ Peristaltic ☐ Bladder Other: Flow Rate (L/min):

Water Quality Instrument Data Collected with: Type: ☑ YSI Pro DSS ☐ Horiba U-50 ☑ LaMotte (Turbidity only) Other:

Sample Decon Procedure: Sample collected with: ☐ disposable tubing ☑ dedicated silicon and poly tubing ☐ Tubing replaced removed tubing after sampling

Sample Description (Color, Turbidity, Odor, Other): CLEAR

Sample Analyses

Total Metals	(HNO3) ☑	TDS/TSS	(unpres) ☑	TOC	(H2SO4) ☑	Cl/SO4/NO3	(unpres) ☑		☐
Diss Metals (filtered)	(HNO3) ☐ BS	Alkalinity (no headspace)	(unpres) ☑	DOC (filtered)	(H2SO4) ☑	Hardness	(calculated) ☑		☐

Additional Information

Type of Sample Containers:	Preservative	Quantity:	QA/QC Samples:	Comments:
1000 mL HDPE	none	2	☐ Field Duplicate	
500 mL HDPE	HNO3	1	☐ MS/MSD	
500 mL HDPE	none	1	☐ Field Blank	
250 mL Glass Amber	H2SO4	2	☐ Rinsate	

Signature: **Date:** 9/24/20

GROUNDWATER, POREWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name: RT-Holden Mine Date of Collection: 9/26/20

Field Event: Fall 2020 Field Personnel: G. Cisneros

Purge Data

Location ID: RC-6-PW-6-092620

Ecology Tag N/A

Diameter: 3/4" Screened Interval: N/A

Total Depth: 6" Transducer S/N: _____

Location Condition (Well damage, creek level, iron staining, fire damage): Good

Secure: ☒ Yes ☐ No Depth Sounder decontaminated prior to use: ☐ Yes ☐ No N/A

Photograph Numbers: N/A

One Casing Volume (gal): _____

Depth of water (from TOC or staff gauge): N/A Time: N/A

After 5 minutes of purging (from TOC): N/A

Begin purge (time): 1235 End purge (time): 1259

Volume purged: 2.8 Purge water disposal method: Ground

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
¾	1.050"	0.804"	0.0229	0.2916
2"	2.375"	2.067"	0.17	1.45
2.5"	2.875"	2.445"	0.255	2.129
4"	4.500"	4.026"	0.66	5.51

Time	DTW (decimal ft below TOC)	Vol. Purged L / gal	pH (s.u.)	DO (mg/L)	Specific Conductivity (uS/cm)	LaMotte Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments
1247	↓	1.5	6.75	9.20	32.7	0.2	8.6	135.3	
1250		1.9	6.71	9.12	32.4	0.21	8.5	135.4	
1253		2.2	6.61	9.05	32.2	0.18	8.5	138.6	
1256		2.5	6.64	9.00	32.1	0.33	8.4	138.7	
1259		2.8	6.57	8.98	32.0	0.25	8.4	~~138.4~~ 138.4	

Ferrous Iron Field Test _____ mg/L or ☒ Not Detected

Sampling Data

Sample No: RC-6-PW-6-092620 Depth of tubing/distance from shore: 4'

Date Collected (mo/dy/yr): 9/26/20 Time Sample Collected 1259 Weather: Rainy 50°

Duplicate Sample No: _____ Time Duplicate Sample Collected: _____

Type: ☐ Groundwater ☐ Surface Water ☒ Porewater (6"/red, 12"/green, 36"/black) Sample: ☐ Unfiltered ☑ Filtered Filter Type: ☐ disposable 0.45-µm ☒ _____

Sample Collected with: ☐ Grab ☒ Pump Other: _____ Type: ☒ Peristaltic ☐ Bladder Other: _____ Flow Rate (L/min): 0.1

Water Quality Instrument Data Collected with: Type: ☒ YSI Pro DSS ☐ Horiba U-50 ☒ LaMotte (Turbidity only) Other: _____

Sample Decon Procedure: Sample collected with: ☐ disposable tubing ☒ dedicated silicon and poly tubing ☐ Tubing replaced

Sample Description (Color, Turbidity, Odor, Other): Clear No Odor

Sample Analyses

Total Metals	(HNO3) ☒	TDS/TSS	(unpres) ☑	TOC	(H2SO4) ☒	Cl/SO4/NO3	(unpres) ☐	_____	(_____) ☐
Diss Metals (filtered)	(HNO3) ☐	Alkalinity (no headspace)	(unpres) ☑	DOC (filtered)	(H2SO4) ☑	Hardness	(calculated) ☐	_____	(_____) ☐

Additional Information

Type of Sample Containers:	Preservative	Quantity:	QA/QC Samples:	Comments:
1000 mL HDPE	none	2	☐ Field Duplicate	
500 mL HDPE	HNO3	1	☐ MS/MSD	
500 mL HDPE	none	1	☐ Field Blank	
250 mL Glass Amber	H2SO4	2	☐ Rinsate	Total = 6

Signature: _____ Date: 9/26/20

GROUNDWATER, POREWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name: RT-Holden Mine Date of Collection: 9/26/20

Field Event: Fall 2020 Field Personnel: G. Lisnes

Purge Data

Location ID: RC-6-PW-12"

Ecology Tag

Diameter: 3/4 Screened Interval:

Total Depth: 12" Transducer S/N:

Location Condition (Well damage, creek level, iron staining, fire damage): Good

Secure: ☐ Yes ☐ No Depth Sounder decontaminated prior to use: ☐ Yes ☐ No N/A

Photograph Numbers:

One Casing Volume (gal):

Depth of water (from TOC or staff gauge): N/A Time: N/A

After 5 minutes of purging (from TOC):

Begin purge (time): 1325 End purge (time): 1349

Volume purged: 2.7 Purge water disposal method: Ground

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
¾	1.050"	0.804"	0.0229	0.2918
2"	2.375"	2.067"	0.17	1.45
2.5"	2.875"	2.445"	0.255	2.129
4"	4.500"	4.026"	0.66	5.51

Time	DTW (decimal ft below TOC)	Vol. Purged L / gal	pH (s.u.)	DO (mg/L)	Specific Conductivity (uS/cm)	LaMotte Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments
1340	N/A	1.8	6.68	9.91	31.2	0.10	8.3	149.4	
1343		2.1	6.69	9.91	31.2	0.12	8.2	149.6	
1346		2.4	6.71	9.91	31.2	0.10	8.2	150.1	
1349		2.7	6.71	9.91	31.2	0.10	8.2	150.4	

Ferrous Iron Field Test _____ mg/L or ☒ Not Detected

Sampling Data

Sample No: RC-6-PW-12-092620 Depth of tubing/distance from shore: 4'

Date Collected (mo/dy/yr): 9/26/20 Time Sample Collected: 1349 Weather: Rainy

Duplicate Sample No: — Time Duplicate Sample Collected: —

Type: ☐ Groundwater ☐ Surface Water ☒ Porewater (6"/red, 12"/green, 36"/black) Sample: ☐ Unfiltered ☒ Filtered Filter Type: ☐ disposable 0.45-um ☐

Sample Collected with: ☐ Grab ☒ Pump Other: Type: ☒ Peristaltic ☐ Bladder Other: Flow Rate (L/min): 0.1

Water Quality Instrument Data Collected with: Type: ☒ YSI Pro DSS ☐ Horiba U-50 ☒ LaMotte (Turbidity only) Other:

Sample Decon Procedure: Sample collected with: ☐ disposable tubing ☒ dedicated silicon and poly tubing ☐ Tubing replaced

Sample Description (Color, Turbidity, Odor, Other): Clear

Sample Analyses

Total Metals	(HNO3) ☒	TDS/TSS	(unpres) ☒	TOC	(H2SO4) ☒	Cl/SO4/NO3	(unpres) ☐		( ) ☐
Diss Metals (filtered)	(HNO3) ☐	Alkalinity (no headspace)	(unpres) ☒	DOC (filtered)	(H2SO4) ☒	Hardness	(calculated) ☐		( ) ☐

Additional Information

Type of Sample Containers:	Preservative	Quantity:	QA/QC Samples:	Comments:
1000 mL HDPE	none	2	☐ Field Duplicate	
500 mL HDPE	HNO3	1	☐ MS/MSD	
500 mL HDPE	none	1	☐ Field Blank	
250 mL Glass Amber	H2SO4	2	☐ Rinsate	

Signature: _____ Date: 9/26/20

GROUNDWATER, POREWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name: RT-Holden Mine Date of Collection: 9/26/20

Field Event: Fall 2020 Field Personnel: B. Seanlan

Purge Data

Location ID: RC-6-WP-36

Ecology Tag: -

Diameter: _____ Screened Interval: _____

GPS: _____

Total Depth: _____ Transducer S/N: _____

Location Condition (Well damage, creek level, iron staining, fire damage): Good

Secure: ☐ Yes ☑ No Depth Sounder decontaminated prior to use: ☐ Yes ☐ No

Photograph Numbers: _____

One Casing Volume (gal): _____

Depth of water (from top of casing): _____

After 5 minutes of purging (from TOC): _____

Begin purge (time): 12:39 End purge (time): _____

Volume purged: _____ Purge water disposal method: _____

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
¾	1.050"	0.804"	0.0229	0.2916
2"	2.375"	2.067"	0.17	1.45
2.5"	2.875"	2.445"	0.255	2.129
4"	4.500"	4.026"	0.66	5.51

Time	DTW (decimal ft below TOC)	Vol. Purged L / gal	pH (s.u.)	DO (mg/L)	Specific Conductivity (uS/cm)	Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments
12:45		.5 L	6.38	6.90	35.4	2.7 (YSI)	8.6	190.2	
12:50		1 L	6.17	7.64	34.3	1.5 (YSI)	8.6	194.	
12:55		1.5 L	6.45	8.43	33.0	1.34 (YSI)	8.7	192.	→ Slow rate
13:00		2 L	6.52	8.57	32.9	0.15	8.7	190.5	

Ferrous Iron Field Test _____ mg/L or ☑ Not Detected LaMotte Turbidimeter Reading: 0.15 NTU

Sampling Data

Sample No: RC-6-WP-36-093620 Depth of tubing/distance from shore: 36" Below creek bed

Date Collected (mo/dy/yr): 9/26/20 Time Sample Collected: 13:02 Weather: light rain

Duplicate Sample No: _____ Time Duplicate Sample Collected: _____

Type: ☐ Groundwater ☐ Surface Water ☑ Porewater (6"/red, 12"/green, 36"/black) Sample: ☐ Unfiltered ☐ Filtered Filter Type: ☐ disposable 0.45-µm ☐ _____

Sample Collected with: ☐ Grab ☑ Pump Other: _____ Type: ☑ Peristaltic ☐ Bladder Other: _____ Flow Rate (L/min): ~1 L/min

Water Quality Instrument Data Collected with: Type: ☑ YSI Pro DSS ☐ Horiba U-50 ☐ LaMotte (Turbidity only) Other: _____

Sample Decon Procedure: Sample collected with: ☑ disposable and/or dedicated silicon and poly tubing ☐ Tubing replaced

Sample Description (Color, Turbidity, Odor, Other): Clear

Sample Analyses

Total Metals	(HNO3) ☑	TDS/TSS	(unpres) ☑	TOC	(H2SO4) ☑	Cl/SO4/NO3	(unpres) ☑	_____	( ) ☐
Diss Metals (filtered)	(HNO3) ☐	Alkalinity (no headspace)	(unpres) ☑	DOC (filtered)	(H2SO4) ☑	Hardness	(calculated) ☑	_____	( ) ☐

Additional Information

Type of Sample Containers:	Preservative	Quantity:	QA/QC Samples:	Comments:
1000 mL HDPE	none	2	☐ Field Duplicate	
500 mL HDPE	HNO3	1	☐ MS/MSD	
500 mL HDPE	none	1	☐ Field Blank	
250 mL Glass Amber	H2SO4	2	☐ Rinsate	

Signature: _____ Date: 9/26/20

GROUNDWATER, POREWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name: RT-Holden Mine Date of Collection: 9/26/20

Field Event: Fall 2020 Field Personnel: G. Cisneros

Purge Data

Location ID: SG-7-PW-6

Ecology Tag N/A

Diameter: 3¼" Screened Interval.

Total Depth: 6" Transducer S/N:

Location Condition (Well damage, creek level, iron staining, fire damage): Good

Secure: ☐ Yes ☐ No Depth Sounder decontaminated prior to use: ☐ Yes ☐ No

Photograph Numbers:

One Casing Volume (gal):

Depth of water (from TOC or staff gauge): N/A Time: N/A

After 5 minutes of purging (from TOC):

Begin purge (time): 1004 End purge (time):

Volume purged: Purge water disposal method:

Volume of Schedule 40 PVC Pipe				
Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal FL)
¼	1.050"	0.804"	0.0229	0.2916
2"	2.375"	2.067"	0.17	1.45
2.5"	2.875"	2.445"	0.255	2.129
4"	4.500"	4.026"	0.66	5.51

Time	DTW (decimal ft below TOC)	Vol. Purged L/gal	pH (s.u.)	DO (mg/L)	Specific Conductivity (µS/cm)	LaMotte Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments
1020	N/A	1.6	6.57	10.39	32.9	0.41	8.8	134.6	
1023		1.9	6.60	10.39	32.8	0.40	8.7	133.8	
1026		2.2	6.62	10.39	32.8	0.41	8.9	132.5	
1029		2.5	6.61	10.38	32.8	0.45	9.0	132.5	
1032		2.8	6.64	10.38	32.8	0.41	9.0	131.5	

Ferrous Iron Field Test _____ mg/L or ☒ Not Detected

Sampling Data

Sample No: SG-7-PW-6-092620 Depth of tubing/distance from shore: ~15'

Date Collected (mo/dy/yr): 9/26/20 Time Sample Collected: 1033 Weather: Cloudy 45°

Duplicate Sample No: — Time Duplicate Sample Collected:

Type: ☐ Groundwater ☐ Surface Water ☑ Porewater (6"/red, 12"/green, 36"/black) Sample: ☐ Unfiltered ☒ Filtered Filter Type: ☒ disposable 0.45-µm ☐

Sample Collected with: ☐ Grab ☑ Pump Other: Type: ☐ Peristaltic ☒ Bladder Other: Flow Rate (L/min): 0.1

Water Quality Instrument Data Collected with: Type: ☑ YSI Pro DSS ☐ Horiba U-50 : ☑ LaMotte (Turbidity only) Other:

Sample Decon Procedure: Sample collected with: ☐ disposable tubing ☒ dedicated silicon and poly tubing ☐ Tubing replaced

Sample Description (Color, Turbidity, Odor, Other): Clear

Sample Analyses

Total Metals	(HNO3) ☒	TDS/TSS	(unpres) ☒	TOC	(H2SO4) ☑	Cl/SO4/NO3	(unpres) ☐		( ) ☐
Diss Metals (filtered)	(HNO3) ☐	Alkalinity (no headspace)	(unpres) ☒	DOC (filtered)	(H2SO4) ☒	Hardness	(calculated) ☐		( ) ☐

Additional Information

Type of Sample Containers:	Preservative	Quantity:	QA/QC Samples:	Comments:
1000 mL HDPE	none	4	☐ Field Duplicate	
500 mL HDPE	HNO3	2	☒ MS/MSD	MS/MSD
500 mL HDPE	none	2	☐ Field Blank	
250 mL Glass Amber	H2SO4	4	☐ Rinsate	
				T8 + 2 = 12

Signature: Date: 9/26/20

GROUNDWATER, POREWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name: RT-Holden Mine Date of Collection: 9/26/20

Field Event: FALL 2020 Field Personnel: B. SEALOCK

Purge Data

Location ID: ~~SG-7-PW-36~~ SG-7-PW-12

Ecology Tag: —

Diameter: 3/4" Screened Interval: 36-42'

GPS:

Total Depth: Transducer S/N:

Location Condition (Well damage, creek level, iron staining, fire damage): GOOD

Secure: ☐ Yes ☑ No Depth Sounder decontaminated prior to use: ☐ Yes ☐ No

Photograph Numbers:

One Casing Volume (gal):

Depth of water (from top of casing): —

After 5 minutes of purging (from TOC): —

Begin purge (time): 10:10 End purge (time):

Volume purged: 3 L Purge water disposal method: GROUND

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
¾	1.050"	0.804"	0.0229	0.2916
2"	2.375"	2.067"	0.17	1.45
2.5"	2.875"	2.445"	0.255	2.129
4"	4.500"	4.026"	0.66	5.51

Time	DTW (decimal ft below TOC)	Vol. Purged L / gal	pH (s.u.)	DO (mg/L)	Specific Conductivity (uS/cm)	Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments
10:15		.5L	6.42	8.73	33.2	2.0 (YSI)	9.1	163.6	
10:20		1.2	6.45	8.67	33.0	1.7 (YSI)	9.0	165.8	
10:25		2 L	6.47	8.64	33.0	1.2 (YSI)	9.0	168.7	
10:30		3 L	6.49	8.61	33.0	0.1	8.9	172.5	

Ferrous Iron Field Test mg/L or ☑ Not Detected LaMotte Turbidimeter Reading: 0.1 NTU

Sampling Data

Sample No: ~~SG-7-PW-36~~ PW SG-7-PW-12-092620 Depth of tubing/distance from shore: 38" below creek bed

Date Collected (mo/dy/yr): 9/26/20 Time Sample Collected: 10:32 Weather: PtCy, Cool, 50s

Duplicate Sample No: SG-107-PW-12-092620 Time Duplicate Sample Collected: 10:42

Type: ☐ Groundwater ☐ Surface Water ☑ Porewater (6"/red, 2"/green, 36"/black) Sample: ☑ Unfiltered ☐ Filtered Filter Type: ☐ disposable 0.45-um ☐

Sample Collected with: ☐ Grab ☑ Pump Other: Type: ☑ Peristaltic ☐ Bladder Other: Flow Rate (L/min): .1/L

Water Quality Instrument Data Collected with: Type: ☑ YSI Pro DSS ☐ Horiba U-50 : ☑ LaMotte (Turbidity only) Other:

Sample Decon Procedure: Sample collected with: ☑ disposable and/or dedicated silicon and poly tubing ☐ Tubing replaced

Sample Description (Color, Turbidity, Odor, Other): Clear

Sample Analyses

Total Metals	(HNO3) ☑	TDS/TSS	(unpres) ☑	TOC	(H2SO4) ☑	Cl/SO4/NO3	(unpres) ☑		☐
Diss Metals (filtered)	(HNO3) ☐	Alkalinity (no headspace)	(unpres) ☑	DOC (filtered)	(H2SO4) ☐	Hardness	(calculated) ☑		☐

Additional Information

Type of Sample Containers:	Preservative	Quantity:	QA/QC Samples:	Comments:
1000 mL HDPE	none	2/2	☑ Field Duplicate	
500 mL HDPE	HNO3	1/1	☐ MS/MSD	Dup SG-107-PW-12
500 mL HDPE	none	1/1	☐ Field Blank	
250 mL Glass Amber	H2SO4	2/2	☐ Rinsate	

Signature: Date: 9/26/20

SG-7-WP-36

GROUNDWATER, POREWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name: RT-Holden Mine Date of Collection: 9/26/20

Field Event: Fall Field Personnel: Gabe Cosnes

Purge Data SG-7-WP-36

Location ID: ~~SG-7 SG-7-PW-2~~ SG-7-WP-36

Ecology Tag SG-7-WP-36

Diameter: 3/4 Screened Interval: _____

Total Depth: 36" Transducer S/N: _____

Location Condition (Well damage, creek level, iron staining, fire damage): Good

Secured? ☑ Yes ☐ No Depth Sounder decontaminated prior to use: ☐ Yes ☐ No N/A

Photograph Numbers: N/A

One Casing Volume (gal): _____

Depth of water (from TOC or staff gauge): N/A Time: N/A

After 5 minutes of purging (from TOC): _____

Begin purge (time): 1118 End purge (time): 1142

Volume purged: 2.5 Purge water disposal method: Ground

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
¾	1.050"	0.804"	0.0229	0.2916
2"	2.375"	2.067"	0.17	1.45
2.5"	2.875"	2.445"	0.255	2.129
4"	4.500"	4.026"	0.66	5.51

Time	DTW (decimal ft below TOC)	Vol. Purged L / gal	pH (s.u.)	DO (mg/L)	Specific Conductivity (µS/cm)	LaMotte Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments
1133	N/A	1.5	6.74	10.15	32.9	0.08	9.5	132.0	
1136		1.8	6.74	10.16	32.9	0.19	9.5	131.5	
1139		2.1	6.75	10.17	32.9	0.19	9.5	131.1	
1142		2.5	6.76	10.17	32.9	0.07	9.6	130.5	

Ferrous Iron Field Test _____ mg/L or ☒ Not Detected

Sampling Data

Sample No: SG-7-WP-36-092620 Depth of tubing/distance from shore: 15'

Date Collected (mo/dy/yr): 9/26/20 Time Sample Collected: 1143 Weather: Rainy

Duplicate Sample No: ~~SG-7-DUP-092620~~ N/A Time Duplicate Sample Collected: N/A

Type: ☐ Groundwater ☐ Surface Water ☒ Porewater (6"/red, 12"/green, 36"/black) Sample: ☐ Unfiltered ☐ Filtered Filter Type: ☐ disposable 0.45-um ☐ _____

Sample Collected with: ☐ Grab ☑ Pump Other: _____ Type: ☑ Peristaltic ☐ Bladder Other: _____ Flow Rate (L/min): 0.1

Water Quality Instrument Data Collected with: Type: : ☑ YSI Pro DSS ☐ Horiba U-50 : ☒ LaMotte (Turbidity only) Other: _____

Sample Decon Procedure: Sample collected with: ☐ disposable tubing ☑ dedicated silicon and poly tubing ☐ Tubing replaced

Sample Description (Color, Turbidity, Odor, Other): Clear No Odor

Sample Analyses

Total Metals	(HNO3) ☒	TDS/TSS	(unpres) ☒	TOC	(H2SO4) ☒	Cl/SO4/NO3	(unpres) ☐	_____	(_____) ☐
Diss Metals (filtered)	(HNO3) ☐	Alkalinity (no headspace)	(unpres) ☑	DOC (filtered)	(H2SO4) ☑	Hardness	(calculated) ☐	_____	(_____) ☐

Additional Information

Type of Sample Containers:	Preservative	Quantity:	QA/QC Samples:	Comments:
1000 mL HDPE	none	2	☒ Field Duplicate	
500 mL HDPE	HNO3	1	☐ MS/MSD	
500 mL HDPE	none	1	☐ Field Blank	
250 mL Glass Amber	H2SO4	2	☐ Rinsate	

Signature: _____ Date: 9/26/20

GROUNDWATER, POREWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name: RT-Holden Mine Date of Collection: 9/26/20

Field Event: F-II 2020 Field Personnel: Glen Wallace

Purge Data

Location ID: SGB-PW-6 (Red)

Ecology Tag: —

Diameter: — Screened Interval: —

GPS: —

Total Depth: — Transducer S/N: —

Location Condition (Well damage, creek level, iron staining, fire damage): Good

Secure: ☑ Yes ☐ No Depth Sounder decontaminated prior to use: ☐ Yes ☐ No N/A

Photograph Numbers: —

One Casing Volume (gal): —

Depth of water (from top of casing): N/A

After 5 minutes of purging (from TOC): —

Begin purge (time): 850 End purge (time): 925

Volume purged: 4L (not pumped) Purge water disposal method: Pour to Grd

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
¾	1.050"	0.804"	0.0229	0.2916
2"	2.375"	2.067"	0.17	1.45
2.5"	2.875"	2.445"	0.255	2.129
4"	4.500"	4.026"	0.66	5.51

Time	DTW (decimal ft below TOC)	Vol. Purged L / gal	pH (s.u.)	DO (mg/L)	Specific Conductivity (uS/cm)	Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments
856	—	0.1	6.07	9.84	33.5	2.3	7.5	77.5	—
900	—	1	6.10	9.89	33.4	2.3	7.5	88.9	YSI NTU
909	—	2	6.13	9.89	33.4	0.12	7.6	99.7	LaMotte
—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—

Ferrous Iron Field Test — mg/L or ☑ Not Detected LaMotte Turbidimeter Reading: 0.12 NTU

Sampling Data

Sample No: SGB-PW-6-092620 Depth of tubing/distance from shore: — Pre Screen

Date Collected (mo/dy/yr): 9/26/20 Time Sample Collected: 925 Weather: Clear 50F

Duplicate Sample No: — Time Duplicate Sample Collected: —

Type: ☐ Groundwater ☐ Surface Water ☑ Porewater (6"/red, 12"/green, 36"/black) Sample: ☐ Unfiltered ☐ Filtered Filter Type: ☐ disposable 0.45-µm ☐ —

Sample Collected with: ☐ Grab ☑ Pump Other: — Type: ☑ Peristaltic ☐ Bladder Other: — Flow Rate (L/min): —

Water Quality Instrument Data Collected with: Type: ☑ YSI Pro DSS ☐ Horiba U-50 ☐ LaMotte (Turbidity only) Other: LaMotte Broken/Replaced

Sample Decon Procedure: Sample collected with: ☑ disposable and/or dedicated silicon and poly tubing ☐ Tubing replaced

Sample Description (Color, Turbidity, Odor, Other): —

Sample Analyses

Total Metals	(HNO3) ☑	TDS/TSS	(unpres) ☑	TOC	(H2SO4) ☑	Cl/SO4/NO3	(unpres) ☑	—	☐
Diss Metals (filtered)	(HNO3) ☐	Alkalinity (no headspace)	(unpres) ☑	DOC (filtered)	(H2SO4) ☑	Hardness	(calculated) ☐	—	☐

Additional Information

Type of Sample Containers:	Preservative	Quantity:	QA/QC Samples:	Comments:
1000 mL HDPE	none	2	☐ Field Duplicate	
500 mL HDPE	HNO3	1	☐ MS/MSD	
500 mL HDPE	none	1	☐ Field Blank	
250 mL Glass Amber	H2SO4	2	☐ Rinsate	
		6		

Signature: [signature] Date: 9/26/20

GROUNDWATER, POREWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name: RT-Holden Mine Date of Collection: 9/26/20

Field Event: F-4 2020 Field Personnel: Glen Wallace

Purge Data

Location ID: SGB-PW-12

Ecology Tag: Green

Diameter: _____ Screened Interval: _____

GPS: _____

Total Depth: _____ Transducer S/N: _____

Location Condition (Well damage, creek level, iron staining, fire damage): _____

Secure: ☑ Yes ☐ No Depth Sounder decontaminated prior to use: ☐ Yes ☐ No

Photograph Numbers: _____

One Casing Volume (gal): _____

Depth of water (from top of casing): _____

After 5 minutes of purging (from TOC): _____

Begin purge (time): 934 End purge (time): _____

Volume purged: _____ Purge water disposal method: _____

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
¾	1.050"	0.804"	0.0229	0.2916
2"	2.375"	2.067"	0.17	1.45
2.5"	2.875"	2.445"	0.255	2.129
4"	4.500"	4.026"	0.66	5.51

Time	DTW (decimal ft below TOC)	Vol. Purged L / gal	pH (s.u.)	DO (mg/L)	Specific Conductivity (uS/cm)	Turbidity (NTU) LaMotte	Temp (°C)	ORP (mV)	Comments
935		0.4	6.04	9.84	33.3	1.16	7.6	88.9	
939		1	6.24	10.24	33.0	—	7.6	99.9	
944		1.6	6.29	10.24	32.9	0.74	7.7	95.2	

Ferrous Iron Field Test _____ mg/L or ☑ Not Detected LaMotte Turbidimeter Reading: 0.74 NTU

Sampling Data

Sample No: SGB-PW-12-092620 Depth of tubing/distance from shore: _____

Date Collected (mo/dy/yr): 9/26/20 Time Sample Collected: 950 Weather: Clear 50F

Duplicate Sample No: — Time Duplicate Sample Collected: —

Type: ☐ Groundwater ☐ Surface Water ☑ Porewater (☐ red ☐ green ☑ black) Sample: ☐ Unfiltered ☐ Filtered Filter Type: ☐ disposable 0.45-µm ☐ _____

Sample Collected with: ☐ Grab ☐ Pump Other: _____ Type: ☑ Peristaltic ☐ Bladder Other: _____ Flow Rate (L/min): 1.50

Water Quality Instrument Data Collected with: Type: ☐ YSI Pro DSS ☐ Horiba U-50 ☐ LaMotte (Turbidity only) Other: _____

Sample Decon Procedure: Sample collected with: ☐ disposable and/or dedicated silicon and poly tubing ☐ Tubing replaced

Sample Description (Color, Turbidity, Odor, Other): Clear

Sample Analyses

Total Metals (HNO3) ☐ TDS/TSS (unpres) ☐ TOC (H2SO4) ☐ Cl/SO4/NO3 (unpres) ☐ _____ ( ) ☐

Diss Metals (filtered) (HNO3) ☐ (no headspace) Alkalinity (unpres) ☑ DOC (filtered) (H2SO4) ☑ Hardness (calculated) ☐ _____ ( ) ☐

Additional Information

Type of Sample Containers:	Preservative	Quantity:	QA/QC Samples:	Comments:
1000 mL HDPE	none	2	☐ Field Duplicate	
500 mL HDPE	HNO3	1	☐ MS/MSD	
500 mL HDPE	none	1	☐ Field Blank	
250 mL Glass Amber	H2SO4	2	☐ Rinsate	

Signature: GSW Date: 9-26-20

GROUNDWATER, POREWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name: RT-Holden Mine Date of Collection: 9-26-20

Field Event: Fall 2020 Field Personnel: Cole Wallace

Purge Data

Location ID: SG8-PW-36

Ecology Tag: Black Tape

Diameter: — Screened Interval: —

GPS: _____

Total Depth: _____ Transducer S/N: _____

Location Condition (Well damage, creek level, iron staining, fire damage): Good

Secure: ☑ Yes ☐ No Depth Sounder decontaminated prior to use: ☐ Yes ☐ No

Photograph Numbers: _____

One Casing Volume (gal): _____

Depth of water (from top of casing): —

After 5 minutes of purging (from TOC): —

Begin purge (time): 1017 End purge (time): _____

Volume purged: _____ Purge water disposal method: Pour

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
¾	1.050"	0.804"	0.0229	0.2916
2"	2.375"	2.067"	0.17	1.45
2.5"	2.875"	2.445"	0.255	2.129
4"	4.500"	4.026"	0.66	5.51

Time	DTW (decimal ft below TOC)	Vol. Purged L/gal	pH (s.u.)	DO (mg/L)	Specific Conductivity (µS/cm)	Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments
1018		0.2	5.95	8.79	34.6	LaMotte —	8.1	102.0	
1023		1	6.12	9.07	34.6	1.12	8.3	107.1	
1028		2.1	6.15	9.10	34.5	1.08	8.4	112.6	

Ferrous Iron Field Test _____ mg/L or ☑ Not Detected LaMotte Turbidimeter Reading: 1.19 NTU

Sampling Data

Sample No: SG8-PW-36-092620 Depth of tubing/distance from shore: —

Date Collected (mo/dy/yr): 9-26-20 Time Sample Collected: 1050 Weather: Clear 50F

Duplicate Sample No: _____ Time Duplicate Sample Collected: _____

Type: ☐ Groundwater ☐ Surface Water ☑ Porewater (6"/red, 12"/green, 36"/black) Sample: ☐ Unfiltered ☑ Filtered Filter Type: ☑ disposable 0.45-um ☐ _____

Sample Collected with: ☐ Grab ☑ Pump Other: _____ Type: ☑ Peristaltic ☐ Bladder Other: _____ Flow Rate (L/min): 200

Water Quality Instrument Data Collected with: Type: ☑ YSI Pro DSS ☐ Horiba U-50 ☑ LaMotte (Turbidity only) Other: _____

Sample Decon Procedure: Sample collected with: ☑ disposable and/or dedicated silicon and poly tubing ☐ Tubing replaced

Sample Description (Color, Turbidity, Odor, Other): Clear

Sample Analyses

Total Metals	(HNO3) ☑	TDS/TSS	(unpres) ☑	TOC	(H2SO4) ☑	Cl/SO4/NO3	(unpres) ☑	_____	( ) ☐
Diss Metals (filtered)	(HNO3) ☐	Alkalinity (no headspace)	(unpres) ☑	DOC (filtered)	(H2SO4) ☑	Hardness	(calculated) ☐	_____	( ) ☐

Additional Information

Type of Sample Containers:	Preservative	Quantity:	QA/QC Samples:	Comments:
1000 mL HDPE	none	2	☐ Field Duplicate	
500 mL HDPE	HNO3	1	☐ MS/MSD	
500 mL HDPE	none	1	☐ Field Blank	
250 mL Glass Amber	H2SO4	2	☐ Rinsate	
		(6)		

Signature: _____ Date: 9-26-20

GROUNDWATER, POREWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name: RT-Holden Mine Date of Collection: 9/26/20

Field Event: Fall 2020 Field Personnel: G. Cisneros

Purge Data

Location ID: SG-9-PW-6

Ecology Tag: N/A

Diameter: 3/4" Screened Interval: N/A

Total Depth: 6" Transducer S/N: _____

Location Condition (Well damage, creek level, iron staining, fire damage): Good

Secure: ☐ Yes ☐ No Depth Sounder decontaminated prior to use: ☐ Yes ☐ No N/A

Photograph Numbers: _____

One Casing Volume (gal): _____

Depth of water (from TOC or staff gauge): N/A Time: N/A

After 5 minutes of purging (from TOC): _____

Begin purge (time): 0758 End purge (time): 0828

Volume purged: 3.2 Purge water disposal method: Ground

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
¾	1.050"	0.804"	0.0229	0.2916
2"	2.375"	2.067"	0.17	1.45
2.5"	2.875"	2.445"	0.255	2.129
4"	4.500"	4.026"	0.66	5.51

Time	DTW (decimal ft below TOC)	Vol. Purged L / gal	pH (s.u.)	DO (mg/L)	Specific Conductivity (uS/cm)	LaMotte Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments
0813	N/A	1.7	5.99	8.56	57.8	0.01	7.9	188.6	
0816	"	2.0	5.92	8.56	57.5	0.27	7.9	188.5	
0819	"	2.2	5.89	8.56	57.4	0.33	7.9	188.3	
0822	"	2.5	5.86	8.55	57.3	0.21	8.0	187.6	
0825	"	2.8	5.85	8.56	57.3	0.17	8.0	187.1	
0828	"	3.2	5.85	8.56	57.3	0.17	8.0	186.9	

Ferrous Iron Field Test _____ mg/L or ☒ Not Detected

Sampling Data

Sample No: SG-9-PW-6-092620 Depth of tubing/distance from shore: 25'

Date Collected (mo/dy/yr): 9/26/20 Time Sample Collected: 0829 Weather: Partly cloudy 45°

Duplicate Sample No: — Time Duplicate Sample Collected: _____

Type: ☐ Groundwater ☐ Surface Water ☒ Porewater (6"/red, 12"/green, 36"/black) Sample: ☐ Unfiltered ☐ Filtered Filter Type: ☐ disposable 0.45-µm ☐ _____

Sample Collected with: ☐ Grab ☒ Pump Other: _____ Type: ☒ Peristaltic ☐ Bladder Other: _____ Flow Rate (L/min): 0.1

Water Quality Instrument Data Collected with: Type: ☒ YSI Pro DSS ☐ Horiba U-50 ☒ LaMotte (Turbidity only) Other: _____

Sample Decon Procedure: Sample collected with: ☐ disposable tubing ☒ dedicated silicon and poly tubing ☐ Tubing replaced

Sample Description (Color, Turbidity, Odor, Other): Clear No Odor

Sample Analyses

Total Metals	(HNO3) ☒	TDS/TSS	(unpres) ☒	TOC	(H2SO4) ☒	Cl/SO4/NO3	(unpres) ☐	_____	( ) ☐
Diss Metals (filtered)	(HNO3) ☐	Alkalinity (no headspace)	(unpres) ☒	DOC (filtered)	(H2SO4) ☒	Hardness	(calculated) ☐	_____	( ) ☐

Additional Information

Type of Sample Containers:	Preservative	Quantity:	QA/QC Samples:	Comments:
1000 mL HDPE	none	2	☐ Field Duplicate	
500 mL HDPE	HNO3	1	☐ MS/MSD	
500 mL HDPE	none	1	☐ Field Blank	
250 mL Glass Amber	H2SO4	2	☐ Rinsate	Total 6

Signature: _____ Date: 9/26/20

GROUNDWATER, POREWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name: RT-Holden Mine Date of Collection: 9/26/20

Field Event: Fall 2020 Field Personnel: G. Cismowski

Purge Data

Location ID: SG-9-PW-12'

Ecology Tag: N/A

Diameter: 3/4 Screened Interval:

Total Depth: 12" Transducer S/N:

Location Condition (Well damage, creek level, iron staining, fire damage): Good

Secure: ☐ Yes ☐ No Depth Sounder decontaminated prior to use: ☐ Yes ☐ No N/A

Photograph Numbers: N/A

One Casing Volume (gal):

Depth of water (from TOC or staff gauge): N/A Time: N/A

After 5 minutes of purging (from TOC):

Begin purge (time): 0851 End purge (time): 0921

Volume purged: 3.0 Purge water disposal method: Ground

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
¾	1.050"	0.804"	0.0229	0.2916
2"	2.375"	2.067"	0.17	1.45
2.5"	2.875"	2.445"	0.255	2.129
4"	4.500"	4.026"	0.66	5.51

Time	DTW (decimal ft below TOC)	VoL Purged L/gal	pH (s.u.)	DO (mg/L)	Specific Conductivity (uS/cm)	LaMotte Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments
0906	N/A	1.7	6.15	10.07	53.1	0.88	7.9	167.0	
0909	"	2.1	6.20	10.08	53.1	0.52	8.0	165.9	
0912	"	2.3	6.22	10.03	53.1	0.02	8.0	165.5	
0915	"	2.6	6.25	10.08	53.2	0.01	8.0	164.8	
0918	"	2.9	6.26	10.08	53.2	0.01	8.0	164.6	

Ferrous Iron Field Test mg/L or ☒ Not Detected

Sampling Data

Sample No: SG-9-PW-12-092620 Depth of tubing/distance from shore: ~25'

Date Collected (mo/dy/yr): 9/26/20 Time Sample Collected: 0921 Weather: Cloudy ~ 46°

Duplicate Sample No: — Time Duplicate Sample Collected: —

Type: ☐ Groundwater ☐ Surface Water ☒ Porewater (6"/red, 12"/green, 36"/black) Sample: ☐ Unfiltered ☒ Filtered Filter Type: ☒ disposable 0.45-um ☐

Sample Collected with: ☐ Grab ☒ Pump Other: Type: ☒ Peristaltic ☐ Bladder Other: Flow Rate (L/min): ~0.1

Water Quality Instrument Data Collected with: Type: : ☒ YSI Pro DSS ☐ Horiba U-50 : ☒ LaMotte (Turbidity only) Other:

Sample Decon Procedure: Sample collected with: ☐ disposable tubing ☒ dedicated silicon and poly tubing ☐ Tubing replaced

Sample Description (Color, Turbidity, Odor, Other): Clear No Odor

Sample Analyses

Total Metals	(HNO3) ☒	TDS/TSS	(unpres) ☒	TOC	(H2SO4) ☒	Cl/SO4/NO3	(unpres) ☐		( ) ☐
Diss Metals (filtered)	(HNO3) ☐	Alkalinity (no headspace)	(unpres) ☐	DOC (filtered)	(H2SO4) ☒	Hardness	(calculated) ☐		( ) ☐

Additional Information

Type of Sample Containers:	Preservative	Quantity:	QA/QC Samples:	Comments:
1000 mL HDPE	none	2	☐ Field Duplicate	
500 mL HDPE	HNO3	1	☐ MS/MSD	
500 mL HDPE	none	1	☐ Field Blank	
250 mL Glass Amber	H2SO4	2	☐ Rinsate	

Signature: Date: 9/26/20

GROUNDWATER, POREWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name: RT-Holden Mine Date of Collection: 9/26/20

Field Event: FALL 2020 Field Personnel: B SEALLIGEN

Purge Data

Location ID: SG-9-WP-36

Ecology Tag: -

Diameter: - Screened Interval: 36-42"

GPS: -

Total Depth: - Transducer S/N: -

Location Condition (Well damage, creek level, iron staining, fire damage): GOOD

Secure: ☐ Yes ☑ No Depth Sounder decontaminated prior to use: ☐ Yes ☐ No

Photograph Numbers:

One Casing Volume (gal):

Depth of water (from top of casing): -

After 5 minutes of purging (from TOC):

Begin purge (time): 9:00 End purge (time): 9:22

Volume purged: 2.5 Purge water disposal method: Ground

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
¾	1.050"	0.804"	0.0229	0.2916
2"	2.375"	2.067"	0.17	1.45
2.5"	2.875"	2.445"	0.255	2.128
4"	4.500"	4.026"	0.66	5.51

Time	DTW (decimal ft below TOC)	Vol. Purged (L/gal)	pH (s.u.)	DO (mg/L)	Specific Conductivity (µS/cm)	Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments
9:05		.75 L	5.91	7.38	67.8	2 (YSI)	7.9	72.7	
9:10		1.25 L	5.87	7.35	68.1	1.5 (YSI)	8.1	113.3	
9:15		2.0 L	5.89	7.32	68.3	1.5 (YSI)	8.1	134.7	
9:20		2.5	5.89	7.31	68.5	0.30	8.2	148.5	

Ferrous Iron Field Test mg/L or ☑ Not Detected LaMotte Turbidimeter Reading: 0.30 NTU

Sampling Data

Sample No: SG-9-WP-36-092620 Depth of tubing/distance from shore: 36" below creek bed

Date Collected (mo/dy/yr): 9/26/20 Time Sample Collected: 9:22 Weather: Partly cloudy

Duplicate Sample No: Time Duplicate Sample Collected:

Type: ☐ Groundwater ☐ Surface Water ☑ Porewater (6"/red, 12"/green, 36"/black) Sample: ☐ Unfiltered ☑ Filtered Filter Type: ☐ disposable 0.45-µm ☐

Sample Collected with: ☐ Grab ☑ Pump Other: Type: ☑ Peristaltic ☐ Bladder Other: Flow Rate (L/min): ~ 2 L/min

Water Quality Instrument Data Collected with: Type: ☑ YSI Pro DSS ☐ Horiba U-50 : ☑ LaMotte (Turbidity only) Other:

Sample Decon Procedure: Sample collected with: ☑ disposable and/or dedicated silicon and poly tubing ☐ Tubing replaced

Sample Description (Color, Turbidity, Odor, Other): clear

Sample Analyses

Total Metals (HNO3) ☑ TDS/TSS (unpres) ☐ TOC (H2SO4) ☑ Cl/SO4/NO3 (unpres) ☐ ☐

Diss Metals (filtered) (HNO3) ☐ Alkalinity (no headspace) (unpres) ☑ DOC (filtered) (H2SO4) ☑ Hardness (calculated) ☑ ☐

Additional Information

Type of Sample Containers:	Preservative	Quantity:	QA/QC Samples:	Comments:
1000 mL HDPE	none	2	☐ Field Duplicate	
500 mL HDPE	HNO3	1	☐ MS/MSD	
500 mL HDPE	none	1	☐ Field Blank	
250 mL Glass Amber	H2SO4	2	☐ Rinsate	Total = 6

Signature: Date: 9/26/20

GROUNDWATER, POREWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name: RT-Holden Mine Date of Collection: 9/25/20

Field Event: Fall 2020 Field Personnel: G Cisneros

Purge Data

Location ID: SG-10-PW-6

Ecology Tag

Diameter: 3/4" Screened Interval:

Total Depth: 6" Transducer S/N:

Location Condition (Well damage, creek level, iron staining, fire damage): ND Good

Secure: ☑ Yes ☐ No Depth Sounder decontaminated prior to use: ☐ Yes ☑ No N/A

Photograph Numbers:

One Casing Volume (gal):

Depth of water (from TOC or staff gauge): N/A Time: N/A

After 5 minutes of purging (from TOC):

Begin purge (time): 0848 End purge (time): 0919

Volume purged: 3.1 Liters Purge water disposal method: Ground

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
¾	1.050"	0.804"	0.0229	0.2916
2"	2.375"	2.067"	0.17	1.45
2.5"	2.875"	2.445"	0.255	2.129
4"	4.500"	4.026"	0.66	5.51

Time	DTW (decimal ft below TOC)	Vol. Purged L / gal	pH (s.u.)	DO (mg/L)	Specific Conductivity ~~(uS/cm)~~ mS/cm	LaMotte Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments
0903	N/A	1.6	4.25	0.85	0.438	1.2	7.2	359.9	
0906		1.9	4.26	0.77	0.437	0.2	7.2	375.1	
0909		2.2	4.26	0.74	0.437	0.2	7.2	383.3	
0912		2.5	4.27	0.70	0.436	0.7	7.2	390.6	
0915		2.8	4.28	0.70	0.435	0.2	7.2	392.7	
0918	↓	3.1	4.28	0.70	0.435	0.2	7.2	393.7	

Ferrous Iron Field Test mg/L or ☒ Not Detected < 0.5

Sampling Data

Sample No: SG-10-PW-6-092520 Depth of tubing/distance from shore: 6'

Date Collected (mo/dy/yr): 9/25/20 Time Sample Collected: 0919 Weather: Rainy

Duplicate Sample No: Time Duplicate Sample Collected:

Type: ☐ Groundwater ☐ Surface Water ☒ Porewater (6"/red, 12"/green, 36"/black) Sample: ☐ Unfiltered ☒ Filtered Filter Type: ☒ disposable 0.45-um ☒

Sample Collected with: ☐ Grab ☒ Pump Other: Type: ☒ Peristaltic ☐ Bladder Other: Flow Rate (L/min): 0.1

Water Quality Instrument Data Collected with: Type: ☒ YSI Pro DSS ☐ Horiba U-50 ☒ LaMotte (Turbidity only) Other:

Sample Decon Procedure: Sample collected with: ☐ disposable tubing ☒ dedicated silicon and poly tubing ☐ Tubing replaced

Sample Description (Color, Turbidity, Odor, Other): Clear No Odor

Sample Analyses

Total Metals	(HNO3) ☒	TDS/TSS	(unpres) ☒	TOC	(H2SO4) ☒	Cl/SO4/NO3	(unpres) ☐		( ) ☐
Diss Metals (filtered)	(HNO3) ☐	Alkalinity (no headspace)	(unpres) ☒	DOC (filtered)	(H2SO4) ☒	Hardness	(calculated) ☐		( ) ☐

Additional Information

Type of Sample Containers:	Preservative	Quantity:	QA/QC Samples:	Comments:
1000 mL HDPE	none	2	☐ Field Duplicate	
500 mL HDPE	HNO3	1	☐ MS/MSD	
500 mL HDPE	none	1 ☒	☐ Field Blank	Total 6
250 mL Glass Amber	H2SO4	2	☐ Rinsate	

Signature: Date: 9/25/20

GROUNDWATER, POREWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name: RT-Holden Mine Date of Collection: 9/25/20

Field Event: Fall 2020 Field Personnel: G. Cisneros

Purge Data

Location ID: N/A SG-10-PW-12

Ecology Tag SG-10-PW-12

Diameter: 3/4" Screened Interval: _____

Total Depth: 12" Transducer S/N: _____

Location Condition (Well damage, creek level, iron staining, fire damage): Good

Secure: ☒ Yes ☐ No Depth Sounder decontaminated prior to use: ☐ Yes ☒ No N/A

Photograph Numbers: _____

One Casing Volume (gal): _____

Depth of water (from TOC or staff gauge): N/A Time: N/A

After 5 minutes of purging (from TOC): _____

Begin purge (time): 0946 End purge (time): 1016

Volume purged: 3.1 Purge water disposal method: Ground

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Linear Ft.)
¾	1.050"	0.804"	0.0229	0.2916
2"	2.375"	2.067"	0.17	1.45
2.5"	2.875"	2.445"	0.255	2.129
4"	4.500"	4.026"	0.66	5.51

Time	DTW (decimal ft below TOC)	Vol. Purged L / gal	pH (s.u.)	DO (mg/L)	Specific Conductivity (mS/cm)	LaMotte Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments
1001	N/A	1.5	4.43	0.83	0.439	0.81	7.1	262.2	
1004		1.8	4.44	0.81	0.435	0.28	7.1	265.6	
1007		2.2	4.44	0.74	0.441	0.13	7.0	302.1	
1010		2.5	4.44	0.72	0.441	0.11	7.0	309.7	
1013		2.8	4.44	0.71	0.441	0.18	7.0	327.6	
1016		3.1	4.44	0.70	0.441	0.13	7.0	339.1	

Ferrous Iron Field Test _____ mg/L or ☒ Not Detected

Sampling Data

Sample No: SG-10-PW-12-092520 Depth of tubing/distance from shore: 6 feet

Date Collected (mo/dy/yr): 9/25/20 Time Sample Collected: 1017 Weather: Rainy

Duplicate Sample No: _____ Time Duplicate Sample Collected: _____

Type: ☐ Groundwater ☐ Surface Water ☒ Porewater (6"/red (12"/green) 36"/black) Sample: ☐ Unfiltered ☒ Filtered Filter Type: ☒ disposable 0.45-µm ☐ _____

Sample Collected with: ☐ Grab ☒ Pump Other: _____ Type: ☒ Peristaltic ☐ Bladder Other: _____ Flow Rate (L/min): 0.1

Water Quality Instrument Data Collected with: Type: ☒ YSI Pro DSS ☐ Horiba U-50 : ☒ LaMotte (Turbidity only) Other: _____

Sample Decon Procedure: Sample collected with: ☐ disposable tubing ☒ dedicated silicon and poly tubing ☐ Tubing replaced

Sample Description (Color, Turbidity, Odor, Other): Clear

Sample Analyses

Total Metals	(HNO3) ☒	TDS/TSS	(unpres) ☒	TOC	(H2SO4) ☐	Cl/SO4/NO3	(unpres) ☒	_____	(____) ☐
Diss Metals (filtered)	(HNO3) ☐	Alkalinity (no headspace)	(unpres) ☒	DOC (filtered)	(H2SO4) ☒	Hardness	(calculated) ☐	_____	(____) ☐

Additional Information

Type of Sample Containers:	Preservative	Quantity:	QA/QC Samples:	Comments:
1000 mL HDPE	none	2	☐ Field Duplicate	
500 mL HDPE	HNO3	1	☐ MS/MSD	
500 mL HDPE	none	1	☐ Field Blank	
250 mL Glass Amber	H2SO4	2	☐ Rinsate	

Signature: _____ **Date:** 9/25/20

GROUNDWATER, POREWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name: RT-Holden Mine Date of Collection: 9/25/20

Field Event: Fall 2020 Field Personnel: B. Brawley

Purge Data

Location ID: SG-10-WP-36

Ecology Tag: ~

Diameter: ~ Screened Interval: 3' long

Total Depth: 36" Transducer S/N: ~

Location Condition (Well damage, creek level, iron staining, fire damage): Good

Secure: ☐ Yes ☑ No Depth Sounder decontaminated prior to use: ☐ Yes ☐ No

Photograph Numbers:

One Casing Volume (gal):

Depth of water (from TOC or staff gauge): ~ Time: ~

After 5 minutes of purging (from TOC): ~

Begin purge (time): 10:05 End purge (time):

Volume purged: Purge water disposal method:

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
¾	1.050"	0.804"	0.0229	0.2918
2"	2.375"	2.067"	0.17	1.45
2.5"	2.875"	2.445"	0.255	2.129
4"	4.500"	4.026"	0.66	5.51

Time	DTW (decimal ft below TOC)	Vol. Purged L/gal	pH (s.u.)	DO (mg/L)	Specific Conductivity (uS/cm)	LaMotte Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments
10:10	~	.5	4.45	0.99	538	0.33 (4.49)	7.4	156.6	
10:16		1 L	4.45	10.60	542	0.68 (11)	7.3	183.2	
10:22		1.75L	4.45	0.46	54	7.81	7.2	192.6	
10:29		2.25	4.45	0.38	546	0.2	7.2	198.6	

Ferrous Iron Field Test 4.0 mg/L or ☐ Not Detected

Sampling Data

Sample No: SG-10-WP-36-092520 Depth of tubing/distance from shore: 36"

Date Collected (mo/dy/yr): 9/25/20 Time Sample Collected: 10:30 Weather: Lt Rain

Duplicate Sample No: ~ Time Duplicate Sample Collected: ~

Type: ☐ Groundwater ☐ Surface Water ☑ Porewater (6"/red, 12"/green, 36"/black) Sample: ☑ Unfiltered ☑ Filtered Filter Type: ☑ disposable 0.45-µm ☐

Sample Collected with: ☐ Grab ☑ Pump Other: Type: ☑ Peristaltic ☐ Bladder Other: Flow Rate (L/min):

Water Quality Instrument Data Collected with: Type: ☑ YSI Pro DSS ☐ Horiba U-50 ☑ LaMotte (Turbidity only) Other:

Sample Decon Procedure: Sample collected with: ☐ disposable tubing ☑ dedicated silicon and poly tubing ☐ Tubing replaced

Sample Description (Color, Turbidity, Odor, Other): Clear

Sample Analyses

Total Metals	(HNO3) ☑	TDS/TSS	(unpres) ☑	TOC	(H2SO4) ☑	Cl/SO4/NO3	(unpres) ☑		( ) ☐
Diss Metals (filtered)	(HNO3) ☐	Alkalinity (no headspace)	(unpres) ☑	DOC (filtered)	(H2SO4) ☑	Hardness	(calculated) ☑		( ) ☐

Additional Information

Type of Sample Containers:	Preservative	Quantity:	QA/QC Samples:	Comments:
1000 mL HDPE	none	2	☐ Field Duplicate	
500 mL HDPE	HNO3	1	☐ MS/MSD	
500 mL HDPE	none	1	☐ Field Blank	
250 mL Glass Amber	H2SO4	2	☐ Rinsate	

Signature: **Date:** 9/25/20

GROUNDWATER, POREWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name: RT-Holden Mine Date of Collection: 9/23/20

Field Event: Fall 2020 Field Personnel: G. Cisneros

Purge Data

Location ID: SG-11-PW-6

Ecology Tag

Diameter: 3/4" Screened Interval:

Total Depth: 6' Transducer S/N: NA

Location Condition (Well damage, creek level, iron staining, fire damage): Good

Secured? ☐ Yes ☐ No Depth Sounder decontaminated prior to use: ☐ Yes ☐ No N/A

Photograph Numbers:

One Casing Volume (gal):

Depth of water (from TOC or staff gauge): N/A Time: 1330

After 5 minutes of purging (from TOC): N/A

Begin purge (time): 1338 End purge (time): 1409

Volume purged: 2.0 L Purge water disposal method: Ground

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
¾	1.050"	0.804"	0.0229	0.2916
2"	2.375"	2.067"	0.17	1.45
2.5"	2.875"	2.445"	0.255	2.129
4"	4.500"	4.026"	0.66	5.51

Time	DTW (decimal ft below TOC)	Vol. Purged L / gal	pH (s.u.)	DO (mg/L)	Specific Conductivity (uS/cm)	LaMotte Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments
1353	N/A	0.7	7.81	8.66	0.107	2.2	10.1	M2.5	
1354		0.9	7.14	8.67	0.101	1.4	10.1	155.2	
1359		1.0	7.01	8.67	0.100	1.4	10.0	159.5	
1402		1.3	6.87	8.67	0.100	1.6	10.0	166.9	
1405		1.6	6.81	8.66	0.100	0.8	10.0	169.4	
1408		1.9	6.79	8.67	0.100	0.2	10.0	171.5	

Ferrous Iron Field Test N/A mg/L or ☒ Not Detected < 0.5

Sampling Data

Sample No: SG-11-PW-6-092320 Depth of tubing/distance from shore: 6'

Date Collected (mo/dy/yr): 9/23/20 Time Sample Collected: 1409 Weather: Rain 58°

Duplicate Sample No: — Time Duplicate Sample Collected:

Type: ☐ Groundwater ☐ Surface Water ☒ Porewater (6"/red, 12"/green, 36"/black) Sample: ☐ Unfiltered ☒ Filtered Filter Type: ☐ disposable 0.45-um ☒

Sample Collected with: ☐ Grab ☐ Pump Other: Type: ☒ Peristaltic ☐ Bladder Other: Flow Rate (L/min): 0.2

Water Quality Instrument Data Collected with: Type: ☒ YSI Pro DSS ☐ Horiba U-50 : ☐ LaMotte (Turbidity only) Other:

Sample Decon Procedure: Sample collected with: ☐ disposable tubing ☒ dedicated silicon and poly tubing ☐ Tubing replaced

Sample Description (Color, Turbidity, Odor, Other): Clear

Sample Analyses

Total Metals / Diss Metals (filtered)	(HNO3) ☒ / (HNO3) ☐	TDS/TSS / Alkalinity (no headspace)	(unpres) ☒ / (unpres) ☒	TOC / DOC (filtered)	(H2SO4) ☒ / (H2SO4) ☒	Cl/SO4/NO3 / Hardness	(unpres) ☐ / (calculated) ☐		( ) ☐ / ( ) ☐

Additional Information

Type of Sample Containers:	Preservative	Quantity:	QA/QC Samples:	Comments:
1000 mL HDPE	none	2	☐ Field Duplicate	
500 mL HDPE Metals	HNO3	1	☐ MS/MSD	
500 mL HDPE Alk	none	1	☐ Field Blank	
250 mL Glass Amber	H2SO4	2	☐ Rinsate	

Signature: [signature] Date: 9/23/20

GROUNDWATER, POREWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name: RT-Holden Mine Date of Collection: 9/23/20

Field Event: FALL 2020 Field Personnel: G. CLEMENTS

Purge Data

Location ID: SG-1-PW-12-

Ecology Tag

Diameter: 3/4 Screened Interval:

Total Depth: 12.11 Transducer S/N:

Location Condition (Well damage, creek level, iron staining, fire damage):

Secure: ☐ Yes ☐ No Depth Sounder decontaminated prior to use: ☐ Yes ☐ No

Photograph Numbers:

One Casing Volume (gal):

Depth of water (from TOC or staff gauge): N/A Time: N/A

After 5 minutes of purging (from TOC):

Begin purge (time): 1437 End purge (time): 1511

Volume purged: 3.1 Purge water disposal method: GROUND

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
¼	1.050"	0.804"	0.0229	0.2916
2"	2.375"	2.067"	0.17	1.45
2.5"	2.875"	2.445"	0.255	2.129
4"	4.500"	4.026"	0.66	5.51

Time	DTW (decimal ft below TOC)	Vol. Purged (L / gal)	pH (s.u.)	DO (mg/L)	Specific Conductivity (uS/cm)	LaMotte Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments
1455	N/A	1.9	6.35	7.33	0.152	1.9	9.8	117.3	
1458		2.1	6.34	7.32	0.151	2.0	9.9	119.2	
1501		2.3	6.33	7.30	0.151	1.85	9.9	120.3	
1504		2.6	6.32	7.28	0.151	1.53	9.9	121.4	
1507		2.9	6.32	7.28	0.150	1.75	9.9	122.1	
1510		3.1	6.32	7.28	0.150	1.81	9.9	123.3	

Ferrous Iron Field Test <0.5 mg/L or ☒ Not Detected

Sampling Data

Sample No: SG-1-PW-12-092320 Depth of tubing/distance from shore: 5'

Date Collected (mo/dy/yr): 9/23/20 Time Sample Collected: 1512 Weather: Rainy 60°

Duplicate Sample No: NM Time Duplicate Sample Collected:

Type: ☐ Groundwater ☐ Surface Water ☒ Porewater (6"/red, 12"/green, 36"/black) Sample: ☐ Unfiltered ☐ Filtered Filter Type: ☐ disposable 0.45 µm ☐

Sample Collected with: ☐ Grab ☒ Pump Other: Type: ☒ Peristaltic ☐ Bladder Other: Flow Rate (L/min): 0.1 L/m

Water Quality Instrument Data Collected with: Type: ☒ YSI Pro DSS ☐ Horiba U-50 : ☐ LaMotte (Turbidity only) Other:

Sample Decon Procedure: Sample collected with: ☐ disposable tubing ☒ dedicated silicon and poly tubing ☐ Tubing replaced

Sample Description (Color, Turbidity, Odor, Other): Clear

Sample Analyses

Total Metals	(HNO3) ☒	TDS/TSS	(unpres) ☒	TOC	(H2SO4) ☒	Cl/SO4/NO3	(unpres) ☐		( ) ☐
Diss Metals (filtered)	(HNO3) ☐	Alkalinity (no headspace)	(unpres) ☒	DOC (filtered)	(H2SO4) ☒	Hardness	(calculated) ☐		( ) ☐

Additional Information

Type of Sample Containers:	Preservative	Quantity:	QA/QC Samples:	Comments:
1000 mL HDPE	none	2	☐ Field Duplicate	
500 mL HDPE	HNO3	1	☐ MS/MSD	
500 mL HDPE	none	1	☐ Field Blank	
250 mL Glass Amber	H2SO4	2	☐ Rinsate	
				6 Total

Signature: Date:

GROUNDWATER, POREWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name: RT-Holden Mine Date of Collection: 9/23/20

Field Event: Fall 2020 Field Personnel: G. Cisneros

Purge Data

Location ID: SG-11-WP-36

Ecology Tag

Diameter: 36" Screened Interval:

Total Depth: 36" Transducer S/N:

Location Condition (Well damage, creek level, iron staining, fire damage): Good

Secure: ☒ Yes ☐ No Depth Sounder decontaminated prior to use: ☐ Yes ☐ No N/A

Photograph Numbers:

One Casing Volume (gal):

Depth of water (from TOC or staff gauge): N/A Time:

After 5 minutes of purging (from TOC):

Begin purge (time): 1541 End purge (time): 1611

Volume purged: 2.3 Purge water disposal method: Ground

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
¾	1.050"	0.804"	0.0229	0.2916
2"	2.375"	2.067"	0.17	1.45
2.5"	2.875"	2.445"	0.255	2.129
4"	4.500"	4.026"	0.66	5.51

Time	DTW (decimal ft below TOC)	Vol. Purged L/gal	pH (s.u.)	DO (mg/L)	Specific Conductivity (µS/cm)	LaMotte Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments
1556	N/A	1.5	6.14	4.47	0.235	12.50	9.2	122.7	
1559		1.7	6.14	4.48	0.235	9.71	9.2	122.6	
1602		1.8	6.14	4.50	0.235	6.13	9.2	122.6	
1605		2.0	6.14	4.38	0.236	4.85	9.2	120.8	
1608		2.1	6.14	4.38	0.238	2.68	9.1	117.8	
1611		2.3	6.13	4.32	0.236	1.41	9.2	123.6	

Ferrous Iron Field Test ____ mg/L or ☒ Not Detected ND

Sampling Data

Sample No: SG-11-WP-36-092320 Depth of tubing/distance from shore: 6'

Date Collected (mo/dy/yr): 9/23/20 Time Sample Collected: 1612 Weather: Rainy

Duplicate Sample No: Time Duplicate Sample Collected:

Type: ☐ Groundwater ☐ Surface Water ☒ Porewater (6"/red, 12"/green, 36"/black) Sample: ☐ Unfiltered ☐ Filtered Filter Type: ☐ disposable 0.45-µm ☐

Sample Collected with: ☐ Grab ☒ Pump Other: Type: ☒ Peristaltic ☐ Bladder Other: Flow Rate (L/min): 0.1

Water Quality Instrument Data Collected with: Type: : ☒ YSI Pro DSS ☐ Horiba U-50 : ☐ LaMotte (Turbidity only) Other:

Sample Decon Procedure: Sample collected with: ☐ disposable tubing ☒ dedicated silicon and poly tubing ☐ Tubing replaced

Sample Description (Color, Turbidity, Odor, Other): Clear

Sample Analyses

Total Metals	(HNO3) ☒	TDS/TSS	(unpres) ☐	TOC	(H2SO4) ☒	Cl/SO4/NO3	(unpres) ☐			☐
Diss Metals (filtered)	(HNO3) ☐	Alkalinity (no headspace)	(unpres) ☒	DOC (filtered)	(H2SO4) ☒	Hardness	(calculated) ☐			☐

Additional Information

Type of Sample Containers:	Preservative	Quantity:	QA/QC Samples:	Comments:
1000 mL HDPE	none	2	☐ Field Duplicate	
500 mL HDPE	HNO3	1	☐ MS/MSD	
500 mL HDPE	none	1	☐ Field Blank	
250 mL Glass Amber	H2SO4	2	☐ Rinsate	

Signature: Date: 9/23/20

GROUNDWATER, POREWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name: RT-Holden Mine Date of Collection: 9/25/20

Field Event: Fall 2020 Field Personnel: G. Cisneros

Purge Data

Location ID: SG-17-PW-6

Ecology Tag

Diameter: 3/4" Screened Interval:

Total Depth: 6" Transducer S/N:

Location Condition (Well damage, creek level, iron staining, fire damage): Good

Secure: ☑ Yes ☐ No Depth Sounder decontaminated prior to use: ☐ Yes ☐ No N/A

Photograph Numbers:

One Casing Volume (gal):

Depth of water (from TOC or staff gauge): N/A Time: N/A

After 5 minutes of purging (from TOC):

Begin purge (time): 1047 End purge (time): 1119

Volume purged: 3.1 Purge water disposal method: Ground

Volume of Schedule 40 PVC Pipe				
Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
¾	1.050"	0.804"	0.0229	0.2916
2"	2.375"	2.067"	0.17	1.45
2.5"	2.875"	2.445"	0.255	2.129
4"	4.500"	4.026"	0.66	5.51

Time	DTW (decimal ft below TOC)	Vol. Purged L / gal	pH (s.u.)	DO (mg/L)	Specific Conductivity mS/cm (µS/cm)	LaMotte Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments
1110	N/A	2.1	6.36	7.79	0.040	0.31	8.6	214.3	
1113		2.4	6.36	7.79	0.040	0.40	8.6	213.9	
1116		2.7	6.36	7.81	0.040	0.42	8.6	213.8	
1119		3.0	6.36	7.83	0.40	0.47	8.6	213.6	

Ferrous Iron Field Test mg/L or ☒ Not Detected

Sampling Data

Sample No: SG-17-PW-6-092520 Depth of tubing/distance from shore: 10'

Date Collected (mo/dy/yr): 9/25/20 Time Sample Collected: 1119 Weather: Rain

Duplicate Sample No: Time Duplicate Sample Collected:

Type: ☐ Groundwater ☐ Surface Water ☑ Porewater (6"/red, 12"/green, 36"/black) Sample: ☐ Unfiltered ☑ Filtered Filter Type: ☑ Disposable 0.45-µm ☐

Sample Collected with: ☐ Grab ☑ Pump Other: Type: ☑ Peristaltic ☐ Bladder Other: Flow Rate (L/min): 0.1

Water Quality Instrument Data Collected with: Type: : ☑ YSI Pro DSS ☐ Horiba U-50 : ☑ LaMotte (Turbidity only) Other:

Sample Decon Procedure: Sample collected with: ☐ disposable tubing ☒ dedicated silicon and poly tubing ☐ Tubing replaced

Sample Description (Color, Turbidity, Odor, Other): Clear

Sample Analyses

Total Metals	(HNO3) ☑	TDS/TSS	(unpres) ☑	TOC	(H2SO4) ☑	Cl/SO4/NO3	(unpres) ☐		( ) ☐
Diss Metals (filtered)	(HNO3) ☐	Alkalinity (no headspace)	(unpres) ☑	DOC (filtered)	(H2SO4) ☑	Hardness	(calculated) ☐		( ) ☐

Additional Information

Type of Sample Containers:	Preservative	Quantity:	QA/QC Samples:	Comments:
1000 mL HDPE	none	2	☐ Field Duplicate	
500 mL HDPE	HNO3	1	☐ MS/MSD	
500 mL HDPE	none	1	☐ Field Blank	
250 mL Glass Amber	H2SO4	2	☐ Rinsate	

Signature: Date: 9/25/20

GROUNDWATER, POREWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name: RT-Holden Mine Date of Collection: 9/25/20

Field Event: Fall 2020 Field Personnel: G. Cisneros

Purge Data

Location ID: SG-17-PW-12

Ecology Tag: N/A

Diameter: 3/4 Screened Interval: N/A

Total Depth: 12" Transducer S/N: N/A

Location Condition (Well damage, creek level, iron staining, fire damage): good

Secure: ☒ Yes ☐ No Depth Sounder decontaminated prior to use: ☐ Yes ☐ No N/A

Photograph Numbers:

One Casing Volume (gal):

Depth of water (from TOC or staff gauge): N/A Time: N/A

After 5 minutes of purging (from TOC): N/A

Begin purge (time): 1147 End purge (time): 1217

Volume purged: 3.0 Purge water disposal method: ground

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
¾	1.050"	0.804"	0.0229	0.2916
2"	2.375"	2.067"	0.17	1.45
2.5"	2.875"	2.445"	0.255	2.129
4"	4.500"	4.026"	0.66	5.51

Time	DTW (decimal ft below TOC)	Vol Purged (L/gal)	pH (s.u.)	DO (mg/L)	Specific Conductivity ~~(uS/cm)~~ mS/cm	LaMotte Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments
1202	N/A	1.5	6.74	9.93	0.042	0.24	8.7°	175.9	
1205		1.8	6.76	9.93	0.042	0.41	8.7	177.6	
1208		2.1	6.77	9.94	0.042	0.50	8.7	178.9	
1211		2.4	6.77	9.94	0.042	0.43	8.7	180.2	
1214		2.8	6.78	9.93	0.042	0.20	8.7	180.8	
1217		3.1	6.78	9.94	0.042	0.17	8.8	181.6	

Ferrous Iron Field Test _____ mg/L or ☒ Not Detected

Sampling Data

Sample No: SG-17-PW-12-092520 Depth of tubing/distance from shore: 10'

Date Collected (mo/dy/yr): 9/25/20 Time Sample Collected: 1219 Weather: Cloudy / RAINY

Duplicate Sample No: — Time Duplicate Sample Collected:

Type: ☐ Groundwater ☐ Surface Water ☒ Porewater (6"/red, 12"/green, 36"/black) Sample: ☐ Unfiltered ☒ Filtered Filter Type: ☒ disposable 0.45-µm

Sample Collected with: ☐ Grab ☒ Pump Other: Type: ☒ Peristaltic ☐ Bladder Other: Flow Rate (L/min): 0.1

Water Quality Instrument Data Collected with: Type: : ☒ YSI Pro DSS ☐ Horiba U-50 : ☒ LaMotte (Turbidity only) Other:

Sample Decon Procedure: Sample collected with: ☐ disposable tubing ☒ dedicated silicon and poly tubing ☐ Tubing replaced

Sample Description (Color, Turbidity, Odor, Other): Clear No odor

Sample Analyses

Total Metals	(HNO3) ☒	TDS/TSS	(unpres) ☒	TOC	(H2SO4) ☒	Cl/SO4/NO3	(unpres) ☐		( ) ☐
Diss Metals (filtered)	(HNO3) ☐	Alkalinity (no headspace)	(unpres) ☒	DOC (filtered)	(H2SO4) ☒	Hardness	(calculated) ☐		( ) ☐

Additional Information

Type of Sample Containers:	Preservative	Quantity:	QA/QC Samples:	Comments:
1000 mL HDPE	none	2	☐ Field Duplicate	
500 mL HDPE	HNO3	1	☐ MS/MSD	
500 mL HDPE	none	1	☐ Field Blank	
250 mL Glass Amber	H2SO4	2	☐ Rinsate	

Signature: _____ Date: 9/25/20

GROUNDWATER, POREWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name: RT-Holden Mine Date of Collection: 9/25/20

Field Event: Fall 2020 Field Personnel: G. Clemmons

Purge Data

Location ID: SG-17-WP-36

Ecology Tag: SG-17-WP

Diameter: 3/4 Screened Interval:

Total Depth: 36' Transducer S/N:

Location Condition (Well damage, creek level, iron staining, fire damage): Good

Secure: ☐ Yes ☐ No Depth Sounder decontaminated prior to use: ☐ Yes ☐ No N/A

Photograph Numbers:

One Casing Volume (gal):

Depth of water (from TOC or staff gauge): N/A Time: N/A

After 5 minutes of purging (from TOC):

Begin purge (time): 1242 End purge (time): 1311

Volume purged: 3.2 Purge water disposal method: Ground

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
¾	1.050"	0.804"	0.0229	0.2916
2"	2.375"	2.067"	0.17	1.45
2.5"	2.875"	2.445"	0.255	2.129
4"	4.500"	4.026"	0.66	5.51

Time	DTW (decimal ft below TOC)	Vol. Purged L/gal	pH (s.u.)	DO (mg/L)	Specific Conductivity (µS/cm)	LaMotte Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments
~~1257~~									5mL/min
~~1302~~		Purge dry & recharge ~ 100mL/min.							
~~1307~~									
~~1309~~	N/A								
1342		.60	2.06	89.7	0.052	2.61	9.6	173.8	

Grabbed one Parameter & Metals Bottle

Ferrous Iron Field Test _____ mg/L or ☒ Not Detected

Sampling Data

Sample No: SG-17-WP-36-092520 Depth of tubing/distance from shore: 10'

Date Collected (mo/dy/yr): 9/25/20 Time Sample Collected: 1340 Weather: Rain

Duplicate Sample No: — Time Duplicate Sample Collected:

Type: ☐ Groundwater ☐ Surface Water ☒ Porewater (6"/red, 12"/green, 36"/black) Sample: ☐ Unfiltered ☒ Filtered Filter Type: ☐ disposable 0.45-µm ☒ X

Sample Collected with: ☐ Grab ☒ Pump Other: Type: ☒ Peristaltic ☐ Bladder Other: Flow Rate (L/min): 0.001

Water Quality Instrument Data Collected with: Type: ☒ YSI Pro DSS ☐ Horiba U-50 ☒ LaMotte (Turbidity only) Other

Sample Decon Procedure: Sample collected with: ☐ disposable tubing ☒ dedicated silicon and poly tubing ☐ Tubing replaced

Sample Description (Color, Turbidity, Odor, Other): Clear

Sample Analyses

Total Metals	(HNO3) ☒	TDS/TSS	(unpres) ☒	TOC	(H2SO4) ☒	Cl/SO4/NO3	(unpres) ☐		( ) ☐
Diss Metals (filtered)	(HNO3) ☐	Alkalinity (no headspace)	(unpres) ☒	DOC (filtered)	(H2SO4) ☒	Hardness	(calculated) ☐		( ) ☐

Additional Information

Type of Sample Containers:	Preservative	Quantity:	QA/QC Samples:	Comments:
1000 mL HDPE	none	1	☐ Field Duplicate	
500 mL HDPE	HNO3	1	☐ MS/MSD	
500 mL HDPE	none	1	☐ Field Blank	Total Metals ONLY!
250 mL Glass Amber	H2SO4	1	☐ Rinsate	1 Bottle

Signature: _____ **Date:** 9/25/20

GROUNDWATER, POREWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name: RT-Holden Mine Date of Collection: 9/24/20

Field Event: Fall 2020 Field Personnel: G. Cisneros

Purge Data

Location ID: SG-18

Ecology Tag: N/A

Diameter: 3/4" Screened Interval:

Total Depth: 6" Transducer S/N:

Location Condition (Well damage, creek level, iron staining, fire damage): Good

Secure: ☑ Yes ☐ No Depth Sounder decontaminated prior to use: ☐ Yes ☑ N/A

Photograph Numbers:

One Casing Volume (gal):

Depth of water (from TOC or staff gauge): N/A Time: N/A

After 5 minutes of purging (from TOC):

Begin purge (time): 1328 End purge (time): 1358

Volume purged: 3.0 Purge water disposal method: Ground

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
¾	1.050"	0.804"	0.0229	0.2916
2"	2.375"	2.067"	0.17	1.45
2.5"	2.875"	2.445"	0.255	2.129
4"	4.500"	4.026"	0.66	5.51

Time	DTW (decimal ft below TOC)	Vol. Purged L / gal	pH (s.u.)	DO (mg/L)	Specific Conductivity (uS/cm)	LaMotte Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments
1343	N/A	1.8	6.02	5.85	0.113	2.17	8.7	164.6	
1346		2.0	6.01	5.80	0.112	2.23	8.7	165.3	
1349		2.1	5.98	5.71	0.111	2.20	8.7	167.4	
1352		2.3	5.99	5.63	0.110	0.14	8.6	167.8	
1355		2.6	6.00	5.60	0.110	0.03	8.6	169.1	
1358		2.9	6.00	5.58	0.110	0.04	8.6	169.7	

Ferrous Iron Field Test <0.5 mg/L or ☒ Not Detected

Sampling Data

Sample No: SG-18-PW-6-092420 Depth of tubing/distance from shore:

Date Collected (mo/dy/yr): 9/24/20 Time Sample Collected: ~~1559~~ 1359 Weather: Cloudy Some Rain

Duplicate Sample No: Time Duplicate Sample Collected:

Type: ☐ Groundwater ☐ Surface Water ☑ Porewater (6"/red, 12"/green, 36"/black) Sample: ☐ Unfiltered ☑ Filtered Filter Type: ☐ disposable 0.45-um ☐

Sample Collected with: ☐ Grab ☑ Pump Other: Type: ☑ Peristaltic ☐ Bladder Other: Flow Rate (L/min): 0.1

Water Quality Instrument Data Collected with: Type: ☑ YSI Pro DSS ☐ Horiba U-50 ☒ LaMotte (Turbidity only) Other:

Sample Decon Procedure: Sample collected with: ☐ disposable tubing ☑ dedicated silicon and poly tubing ☐ Tubing replaced

Sample Description (Color, Turbidity, Odor, Other): Clear

Sample Analyses

Total Metals	(HNO3) ☒	TDS/TSS	(unpres) ☒	TOC	(H2SO4) ☒	Cl/SO4/NO3	(unpres) ☐		( ) ☐
Diss Metals (filtered)	(HNO3) ☐	Alkalinity (no headspace)	(unpres) ☒	DOC (filtered)	(H2SO4) ☒	Hardness	(calculated) ☐		( ) ☐

Additional Information

Type of Sample Containers:	Preservative	Quantity:	QA/QC Samples:	Comments:
1000 mL HDPE	none	2	☐ Field Duplicate	Sample * Time should be 1359 Not 1559
500 mL HDPE	HNO3	1	☐ MS/MSD	
500 mL HDPE	none	1	☐ Field Blank	
250 mL Glass Amber	H2SO4	2	☐ Rinsate	

Signature: Date: 9/24/20

GROUNDWATER, POREWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name: RT-Holden Mine Date of Collection: 9/24/20

Field Event: Fall 2020 Field Personnel: G. Cisneros

Purge Data

Location ID: SG-18

Ecology Tag

Diameter: 3/4 Screened Interval:

Total Depth: 12" Transducer S/N:

Location Condition (Well damage, creek level, iron staining, fire damage): Good

Secure: ☒ Yes ☐ No Depth Sounder decontaminated prior to use: ☐ Yes ☐ No N/A

Photograph Numbers:

One Casing Volume (gal):

Depth of water (from TOC or staff gauge): N/A Time: N/A

After 5 minutes of purging (from TOC):

Begin purge (time): 1430 End purge (time): 1500

Volume purged: 3.0 Purge water disposal method: Ground

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
¾	1.050"	0.804"	0.0229	0.2916
2"	2.375"	2.067"	0.17	1.45
2.5"	2.875"	2.445"	0.255	2.129
4"	4.500"	4.026"	0.66	5.51

Time	DTW (decimal ft below TOC)	Vol. Purged L / gal	pH (s.u.)	DO (mg/L)	Specific Conductivity (uS/cm)	LaMotte Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments
1445	N/A	1.5	5.92	6.20	0.123	0.48	8.5	184.9	
1448		1.8	5.92	6.17	0.123	0.35	8.5	185.3	
1451		2.1	5.92	6.16	0.122	0.25	8.5	186.1	
1454		2.4	5.92	6.14	0.123	0.10	8.4	187.6	
1457		2.7	5.92	6.13	0.122	0.12	8.4	188.2	
1500		3.0	5.93	6.13	0.122	0.15	8.5	188.6	

Ferrous Iron Field Test mg/L or ☒ Not Detected

Sampling Data

Sample No: SG-18-PW-12-092420 Depth of tubing/distance from shore:

Date Collected (mo/dy/yr): 9/24 Time Sample Collected: 1501 Weather: Cloudy slight Rain

Duplicate Sample No: N/A Time Duplicate Sample Collected:

Type: ☐ Groundwater ☐ Surface Water ☒ Porewater (6"/red, 12"/green, 36"/black) Sample: ☐ Unfiltered ☒ Filtered Filter Type: ☐ disposable 0.45-µm ☒

Sample Collected with: ☐ Grab ☒ Pump Other: Type: ☒ Peristaltic ☐ Bladder Other: Flow Rate (L/min): 0.1

Water Quality Instrument Data Collected with: Type: ☒ YSI Pro DSS ☐ Horiba U-50 : ☒ LaMotte (Turbidity only) Other:

Sample Decon Procedure: Sample collected with: ☐ disposable tubing ☒ dedicated silicon and poly tubing ☐ Tubing replaced

Sample Description (Color, Turbidity, Odor, Other): Clear

Sample Analyses

Total Metals	(HNO3) ☒	TDS/TSS	(unpres) ☒	TOC	(H2SO4) ☒	Cl/SO4/NO3	(unpres) ☐		☐
Diss Metals (filtered)	(HNO3) ☐	Alkalinity (no headspace)	(unpres) ☒	DOC (filtered)	(H2SO4) ☒	Hardness	(calculated) ☐		☐

Additional Information

Type of Sample Containers:	Preservative	Quantity:	QA/QC Samples	Comments:
1000 mL HDPE	none	2	☐ Field Duplicate	
500 mL HDPE	HNO3	1	☐ MS/MSD	
500 mL HDPE	none	1	☐ Field Blank	
250 mL Glass Amber	H2SO4	2	☐ Rinsate	

Signature: Date: 9/24/20

GROUNDWATER, POREWATER OR SURFACE WATER SAMPLE COLLECTION FORM

Project Name: RT-Holden Mine Date of Collection: 9/24/20

Field Event: FALL 2020 Field Personnel: B. Beaulieu

Purge Data

Location ID: SG-1B-WP-36

Ecology Tag

Diameter: _____ Screened Interval: _____

Total Depth: _____ Transducer S/N: _____

Location Condition (Well damage, creek level, iron staining, fire damage): GOOD

Secure: ☐ Yes ☑ No Depth Sounder decontaminated prior to use: ☐ Yes ☐ No

Photograph Numbers:

One Casing Volume (gal):

Depth of water (from TOC or staff gauge): — Time: —

After 5 minutes of purging (from TOC): —

Begin purge (time): 14:38 End purge (time):

Volume purged: Purge water disposal method: Ground

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume (Gal/Linear Ft.)	Weight of Water (Lbs/Lineal Ft.)
¾	1.050"	0.804"	0.0229	0.2916
2"	2.375"	2.067"	0.17	1.45
2.5"	2.875"	2.445"	0.255	2.129
4"	4.500"	4.026"	0.66	5.51

Time	DTW (decimal ft below TOC)	Vol. Purged (L/gal)	pH (s.u.)	DO (mg/L)	Specific Conductivity (uS/cm)	LaMotte Turbidity (NTU)	Temp (°C)	ORP (mV)	Comments
14:45	—	.75L	6.05	5.15	82.6	11.05 (YSI)	9.2	189.5	
14:50	—	1L	6.07	5.07	82.7	9.44 (YSI)	9.1	191.1	
14:55	—	1.5L	6.07	5.03	82.7	6.02 (YSI)	9.1	193.3	
15:00	—	2L	6.05	5.01	82.7	5.43	9.1	195.9	
Re-sample for turbidity						5.23			(use this value)

Ferrous Iron Field Test _____ mg/L or ☒ Not Detected

Sampling Data

Sample No: SG-1B-WP-36-092420 Depth of tubing/distance from shore: 36" below RAC bed

Date Collected (mo/dy/yr): 9/24/20 Time Sample Collected: 15:00 Weather: Cloudy, light wind

Duplicate Sample No: Time Duplicate Sample Collected:

Type: ☑ Groundwater ☐ Surface Water ☐ Porewater (6"/red, 12"/green, 36"/black) Sample: ☑ Unfiltered ☐ Filtered Filter Type: ☐ disposable 0.45-um ☐

Sample Collected with: ☐ Grab ☑ Pump Other: Type: ☑ Peristaltic ☐ Bladder Other: Flow Rate (L/min): ~1 L/min

Water Quality Instrument Data Collected with: Type: ☑ YSI Pro DSS ☐ Horiba U-50 ☐ LaMotte (Turbidity only) Other:

Sample Decon Procedure: Sample collected with: ☐ disposable tubing ☑ dedicated silicon and poly tubing ☐ Tubing replaced

Sample Description (Color, Turbidity, Odor, Other): Clear; light red-brown in pump water

Sample Analyses

Total Metals	(HNO3) ☑	TDS/TSS	(unpres) ☑	TOC	(H2SO4) ☑	Cl/SO4/NO3	(unpres) ☑		( ) ☐
Diss Metals (filtered)	(HNO3) ☑ 95	Alkalinity (no headspace)	(unpres) ☑	DOC (filtered)	(H2SO4) ☐	Hardness	(calculated) ☑		( ) ☐

Additional Information

Type of Sample Containers:	Preservative	Quantity:	QA/QC Samples:	Comments:
1000 mL HDPE	none	2	☐ Field Duplicate	
500 mL HDPE	HNO3	2	☐ MS/MSD	
500 mL HDPE	none	1	☐ Field Blank	
250 mL Glass Amber	H2SO4	2	☐ Rinsate	

Signature: **Date:** 9/24/20

SEEP SAMPLE COLLECTION FORM

Project Name: Holden Mine Date of Collection: 9-27-20

Task: Seep Sampling Fall 2020 Field Personnel: GSW / NJW

Seep Details and Observations

Location ID: SP-31 SP-31 Seep Type: (pool); moist to wet surface area; (sheet flow); other:

GPS Coordinates:

Location Description: E end TP3, emerges from prominent Boulder 50Ft NE of Black HDPE pipe.

Seep Description (width, length, depth of pool) 10Ft wide, pools ~1Ft wide, 1-4 inches deep.

Photo taken? Yes, 104-472, 473, 474 Location marked on field map? Established location

Field Measurements

Time	Flow (calculate or estimate)	pH	Dissolved Oxygen (mg/L)	Specific Conductivity (µS/cm)	Turbidity (NTU)	Temp (°C)	ORP (mV)
850	~5L/min	6.37	10.91	32.4	0.02	7.5	172.4
853		6.56	11.08	32.4	0.01	7.5	176.0
856		6.63	11.07	32.4	0.01	7.5	179.7
859		6.66	11.14	32.4	0.01	7.5	181.9

Flow Measurement Method: Visual obs.

Distance from creek or river drainage, if applicable: 6Ft.

Water Quality Instrument Data Collected with: Type: ☑ YSI Pro DSS : ☑ LaMotte Turbidity Meter Other:

Parameters measured by: ☑ Directly in seep pool ☐ Dam ☐ Collection into bucket Water Quality Parameters Collected after sample collected? ☑ Yes ☐ No

ReRan.

Seep Sampling Data SP-31

Sample No: SP-31-092720 Location and Depth: SP-31

Date Collected (mo/dy/yr): 9/27/20 Time Collected: 845 Weather: Clear 40F

Duplicate Sample No: SP-131-092720 Duplicate Sample Time Collected: 900

Sample: ☑ Filtered ☐ Unfiltered Other: Filter Type: 0.45µm (Dx)

Sample Collected with: ☐ Syringe ☐ Direct Collection ☑ Pump Other: ____ Type: Pro-Flo Mini

Sample Description (Color, Turbidity, Odor, Other): Clear Fe^{2+} = ND

Sample Analyses

TPH-D	(HCl) ☐	Chlor / Fluor	(unpres) ☐	DOC / TOC	(H_2SO_4) ☐	Anions	(unpres) ☐	Alkalinity	(no head) ☐
TPH-G	(HCl) ☐	BTEX	(HCl) ☐	Total Metals	(HNO_3) ☐	Diss Metals	(HNO_3) ☐	VOCs	(HCl) ☐

Additional Information

Types of Sample Containers:	Preservative:	Quantity:
500mL 03	—	4+2
250AG	H_2SO_4	2+1
500mL Poly	HNO_3	2+1
		SP | SP
		31 | 131

Comments: Includes MS/MSD Volume and SP-131 Dup. Volume

Signature: GSW Date: 9-27-20

SEEP SAMPLE COLLECTION FORM

Project Name: Holden

Date of Collection: 9/27/20

Task: _____

Field Personnel: Nick Valdo & Glen Wallace

Seep Details and Observations

Location ID: SP-35

Seep Type: pool; moist to wet surface area; sheet flow; other: _____

GPS Coordinates: _____

Location Description: _____

Seep Description (width, length, depth of pool): Pool in rip-rap flowing parallel to Rk creek

Photo taken? _____ Location marked on field map? Y

Field Measurements

Time	Flow (calculate or estimate)	pH	Dissolved Oxygen (mg/L)	Specific Conductivity (µS/cm)	Turbidity (NTU)	Temp (°C)	ORP (mV)
1137		7.07	11.39	33.0	—	7.4	105.1
1212		7.07	11.32	33.0	—	7.7	111.8

Flow Measurement Method: _____

Distance from creek or river drainage, if applicable: _____

Water Quality Instrument Data Collected with: Type: ☒ YSI Pro DSS : ☐ LaMotte Turbidity Meter Other: _____

Parameters measured by: ☒ Directly in seep pool ☐ Dam ☐ Collection into bucket Water Quality Parameters Collected after sample collected? ☐ Yes ☐ No

Seep Sampling Data

Sample No: — Location and Depth: —

Date Collected (mo/dy/yr): — Time Collected: — Weather: Sun

Duplicate Sample No: — Duplicate Sample Time Collected: —

Sample: ☐ Filtered ☐ Unfiltered Other: _____ Filter Type: _____

Sample Collected with: ☐ Syringe ☐ Direct Collection ☐ Pump Other: _____ Type: _____

Sample Description (Color, Turbidity, Odor, Other): Non existant

Sample Analyses

TPH-D	(HCl) ☐	Chlor / Fluor	(unpres) ☐	DOC / TOC	(H2SO4) ☐	Anions	(unpres) ☐	Alkalinity	(no head) ☐
TPH-G	(HCl) ☐	BTEX	(HCl) ☐	Total Metals	(HNO3) ☐	Diss Metals	(HNO3) ☐	VOCs	(HCl) ☐

Additional Information

Types of Sample Containers:	Preservative:	Quantity:
None		0

Comments: Not Sampled because no observed flow parallel to Rk Creek, no apparent seep from GW to SW.

Signature: _____ Date: 9/27/20

Seep where meander rejoins road (SP-52)

Time	pH	DO	SPC	Temp.	ORP	
1247	7.09	11.26	330	7.2	129.0	Water in nearby
1254	708	11.24	33.0	7.3	126.4	Rip rap flowing to the east, parallel to Pioneer Road.

Upstream River Base line

1339	7.11	11.30	33.3	8.3	78.6	In flow
1344	7.12	11.35	35.7	8.8	96.0 ↑	in Cup
1348	7.19	11.39	35.7	9.3	102.4 ↑	

SEEP SAMPLE COLLECTION FORM

Project Name: Holden Mine Date of Collection: 9-27-20

Task: Seep Sampling Fall 2020 Field Personnel: GSW / MJW

Seep Details and Observations

Location ID: SP-36 Seep Type: (pool); moist to wet surface area; sheet flow; other:

GPS Coordinates: Established Location on Map

Location Description: Across from SG-7 & SG-7-WP

Seep Description (width, length, depth of pool) 0.8Ft wide at base of large Boulder

Photo taken? No Location marked on field map? Existing Location

Field Measurements

Time	Flow (calculate or estimate)	pH	Dissolved Oxygen (mg/L)	Specific Conductivity (µS/cm)	Turbidity (NTU)	Temp (°C)	ORP (mV)
1130	1 L/min	7.03	11.41	33.0		7.8	115.0
1140		7.07	11.53	33.0		7.6	114.9
1142		7.08	11.55	33.0		7.7	114.9

Flow Measurement Method: V Bucket

Distance from creek or river drainage, if applicable: ~6 Ft

Water Quality Instrument Data Collected with: Type: ☒ YSI Pro DSS ☐ LaMotte Turbidity Meter Other: Dead

Parameters measured by: ☒ Directly in seep pool ☐ Dam ☐ Collection into bucket ☐ Other: Flo-Thru Water Quality Parameters Collected after sample collected? ☑ Yes ☐ No

Seep Sampling Data

Sample No: SP-36-092720 Location and Depth: —

Date Collected (mo/dy/yr): 9-27-20 Time Collected: 1130 Weather: Clear 65F

Duplicate Sample No: — Duplicate Sample Time Collected: —

Sample: ☒ Filtered ☐ Unfiltered Other: — Filter Type: 0.45 µm Disposable

Sample Collected with: ☐ Syringe ☐ Direct Collection ☑ Pump Other: ____ Type: Peristaltic

Sample Description (Color, Turbidity, Odor, Other): Clear

Sample Analyses

TPH-D	(HCl) ☐	Chlor / Fluor	(unpres) ☐	DOC / TOC	(H2SO4) ☑	Anions	(unpres) ☑	Alkalinity	(no head) ☑		
TPH-G	(HCl) ☐	BTEX	(HCl) ☐	Total Metals	(HNO3) ☑	Diss Metals	(HNO3) ☐	VOCs	(HCl) ☐		

Additional Information

Types of Sample Containers:	Preservative:	Quantity:
500mL Poly	—	2
500mL Poly	HNO_3	1
250 mL AG	H_2SO_4	1
		4

Comments: Anions Alk Fe^{2+} test: ND No Reaction

Metals

DOC (FF)

Signature: GSW Date: 9-27-20

SEEP SAMPLE COLLECTION FORM

Project Name: RT - Holden Date of Collection: 9-27-2020

Task: Fall 2020 Field Personnel: RS + TS

Seep Details and Observations

Location ID: SP-40 Seep Type: pool; moist to wet surface area; sheet flow; other: _____

GPS Coordinates: _____

Location Description: ~75' upstream of Copper Creek

Seep Description (width, length, depth of pool): 3' wide of sheetflow; adjacent to Ferricrete (upstream)

Photo taken? Yes, yellow Camera Location marked on field map? Yes (SP-32)

Field Measurements

Time	Flow (calculate or estimate)	pH	Dissolved Oxygen (mg/L)	Specific Conductivity (µS/cm)	Turbidity (NTU)	Temp (°C)	ORP (mV)
1335	10 GPM	6.87	9.40	60.9	1.70	8.0	127.0
1338	↓	6.64	9.44	60.9	1.75	8.0	118.1
1341	↓	6.56	9.44	60.9	1.73	8.0	116.0
1344		6.56	9.42	60.9	1.70	8.0	115.6

Flow Measurement Method: Visual, 10 GPM

Distance from creek or river drainage, if applicable: 1-foot

Water Quality Instrument Data Collected with: Type ☑ YSI Pro DSS : ☑ LaMotte Turbidity Meter Other: _____

Parameters measured by: ☑ Directly in seep pool ☐ Dam ☐ Collection into bucket Water Quality Parameters Collected after sample collected? ☑ Yes ☐ No

Seep Sampling Data

Sample No: SP-40-092720 Location and Depth: _____

Date Collected (mo/dy/yr): 9-27-2020 Time Collected: 1350 Weather: partly Sunny

Duplicate Sample No: _____ Duplicate Sample Time Collected: _____

Sample: ☑ Filtered ☑ Unfiltered Other: _____ Filter Type 0.45

Sample Collected with: ☐ Syringe ☐ Direct Collection ☑ Pump Other: _____ Type: peristaltic

Sample Description (Color, Turbidity, Odor, Other): Clear, odorless

Sample Analyses

TPH-D (HCl) ☐ Chlor / Fluor (unpres) ☐ DOC / TOC (H2SO4) ☑ Anions (unpres) ☑ Alkalinity (no head) ☑

TPH-G (HCl) ☐ BTEX (HCl) ☐ Total Metals (HNO3) ☑ Diss Metals (HNO3) ☐ VOCs (HCl) ☐

Additional Information

Types of Sample Containers:	Preservative:	Quantity:
500 ml poly	none	2
500 ml poly	HNO3	1
250 Amber	H2SO4	1

Comments: Ferrous Iron = 8 mg/L

Signature: Ryan Crotty Date: 9-27-2020

SEEP SAMPLE COLLECTION FORM

Project Name: RT-Holden Date of Collection: 9-27-2020

Task: Fall 2020 Field Personnel: Ryan + Tyler

Seep Details and Observations

Location ID: SP-44 Seep Type: pool; moist to wet surface area, sheet flow; other: pool

* GPS Coordinates:

Location Description: Base TP2

Seep Description (width, length, depth of pool): 1 flowing pool, ~2 feet from edge of creek

Photo taken? Yes, Yellow camera Location marked on field map? Yes

Field Measurements

Time	Flow (calculated or estimate)	pH	Dissolved Oxygen (mg/L)	Specific Conductivity (µS/cm)	Turbidity (NTU)	Temp (°C)	ORP (mV)
1305	2 GPM	6.78	9.99	49.7	1.56	8.3	152.3
1308	↓	6.66	9.95	49.6	1.47	8.1	146.1
1311	↓	6.65	9.98	48.2	1.50	7.9	137.7

Flow Measurement Method: Visual ~2 GPM

Distance from creek or river drainage, if applicable: ~2'

Water Quality Instrument Data Collected with: Type: ☑ YSI Pro DSS ☑ LaMotte Turbidity Meter Other:

Parameters measured by: ☑ Directly in seep pool ☐ Dam ☐ Collection into bucket Water Quality Parameters Collected after sample collected? ☑ Yes ☐ No

Seep Sampling Data

Sample No. SP-44-092720 Location and Depth:

Date Collected (mo/dy/yr): 9-27-2020 Time Collected: 1315 Weather: partly Sunny

Duplicate Sample No: Duplicate Sample Time Collected:

Sample: ☑ Filtered ☐ Unfiltered Other: Filter Type: 0.45

Sample Collected with: ☐ Syringe ☐ Direct Collection ☑ Pump Other: Type:

Sample Description (Color, Turbidity, Odor, Other): Clear, odorless

Sample Analyses

TPH-D (HCl) ☐ Chlor / Fluor (unpres) ☐ DOC, TOC (H2SO4) ☑ Anions (unpres) ☑ Alkalinity (no head) ☑

TPH-G (HCl) ☐ BTEX (HCl) ☐ Total Metals (HNO3) ☑ Diss Metals (HNO3) ☐ VOCs (HCl) ☐

Additional Information

Types of Sample Containers:	Preservative:	Quantity:
500 ml	poly	none	2
500 ml	Poly	HNO3	1
250 ml	amber	H2SO4	1

Comments: Ferrous Iron = 0 mg/L

Signature: Ryan Conley Date: 9-27-2020

SEEP SAMPLE COLLECTION FORM

Project Name: Holden Mine — Date of Collection: 9-27-20

Task: Seep Sampling — Field Personnel: GSW / NJW (PEG)

Seep Details and Observations

Location ID: SP-45 — Seep Type: pool; moist to wet surface area; sheet flow; other: Pool at Margin Stream

GPS Coordinates:

Location Description: Immediately adjacent Log in stream poke out of water 100ft W of SP31

Seep Description (width, length, depth of pool): 1Ft wide 2in deep, good flow

Photo taken? Yes #104-0475, -0476 — Location marked on field map? Yes

Field Measurements

Time	Flow (calculate or estimate)	pH	Dissolved Oxygen (mg/L)	Specific Conductivity (µS/cm)	Turbidity (NTU)	Temp (°C)	ORP (mV)
959		6.99	11.16	32.9	—	7.2	110.1
1007.		6.93	11.17	32.9	0.31	7.2	120.8

Flow Measurement Method: VS dss

Distance from creek or river drainage, if applicable: 0.3 Ft

Water Quality Instrument Data Collected with: Type: ☑ YSI Pro DSS : ☑ LaMotte Turbidity Meter Other:

Parameters measured by: ☑ Directly in seep pool ☐ Dam ☐ Collection into bucket — Water Quality Parameters Collected after sample collected? ☐ Yes ☐ No

Seep Sampling Data

Sample No: SP-45-092720 — Location and Depth:

Date Collected (mo/dy/yr): 9-27-20 — Time Collected: 1010 — Weather: Clear 60F

Duplicate Sample No: — — Duplicate Sample Time Collected: —

Sample: ☑ Filtered ☐ Unfiltered Other: — Filter Type: 0.45µm

Sample Collected with: ☐ Syringe ☐ Direct Collection ☑ Pump Other: — Type: Peristaltic

Sample Description (Color, Turbidity, Odor, Other): Fe^{2+} = ND

Sample Analyses

TPH-D	(HCl) ☐	Chlor / Fluor	(unpres) ☐	DOC / TOC	(H2SO4) ☑	Anions	(unpres) ☑	Alkalinity	(no head) ☐		
TPH-G	(HCl) ☐	BTEX	(HCl) ☐	Total Metals	(HNO3) ☑	Diss Metals	(HNO3) ☐	VOCs	(HCl) ☐		

Additional Information

Types of Sample Containers:	Preservative:	Quantity:	Comments:
500mL Poly	—	2	Alk / Anions
500mL Poly	HNO_3	1	Metals
250mL Amb	H_2SO_4	1	DOC (FF)

Signature: GSW — Date: 9-27-20

		pH	DO	EC	NTU	Temp	ORP
RRC Baseline	943	7.09	11.56	32.8		6.8	131.3
	946	7.10	11.58	32.9		6.9	92.5↓
	949	7.11	11.59	32.9		6.9	80.5
	952	7.09	11.59	32.9		6.9	77.6
	954	7.10	11.59	32.9		6.9	76.1
Seep SP-X1	956	7.05	11.17	32.9		7.2	91.5↑

SEEP SAMPLE COLLECTION FORM

Project Name: Holden

Date of Collection: 9/27/20

Task: Seep Sampling Fall 2020

Field Personnel: Nick Waldo & Glen Wallace

Seep Details and Observations

Location ID: SP-46

Seep Type: pool; moist to wet surface area; sheet flow; other: Bubbling pool, sheet

GPS Coordinates:

Location Description: Across river and 10ft upstream from SG-7 STW

Seep Description (width, length, depth of pool):

Photo taken? 477 to 479

Location marked on field map? Yes

Field Measurements

Time	Flow (calculate or estimate)	pH	Dissolved Oxygen (mg/L)	Specific Conductivity (µS/cm)	Turbidity (NTU)	Temp (°C)	ORP (mV)
(pool 2) 1025		7.08	11.32	32.7	—	6.9	115.9
1033		7.10	11.32	32.7	—	6.9	121.4
(pool 3) 1054		7.09	11.30	32.7	—	7.0	121.1
1100		7.09	11.31	32.8	0.69	7.0	126.9

Flow Measurement Method:

Distance from creek or river drainage, if applicable: 4 ft

Water Quality Instrument Data Collected with: Type: ☒ YSI Pro DSS : ☐ LaMotte Turbidity Meter Other:

Parameters measured by: ☒ Directly in seep pool ☒ Dam ☐ Collection into bucket Water Quality Parameters Collected after sample collected? ☒ Yes ☐ No

Seep Sampling Data

Sample No: SP-46 092720 Location and Depth: SP-51

Date Collected (mo/dy/yr): 9/27/20 Time Collected: 1055 Weather: Sunny

Duplicate Sample No: Duplicate Sample Time Collected:

Sample: ☒ Filtered ☒ Unfiltered Other: Filter Type:

Sample Collected with: ☐ Syringe ☐ Direct Collection ☒ Pump Other: Type: Peristaltic

Sample Description (Color, Turbidity, Odor, Other): clear

Sample Analyses

TPH-D	(HCl) ☐	Chlor / Fluor	(unpres) ☐	(DOC) / TOC	(H2SO4) ☒	Anions	(unpres) ☒	Alkalinity	(no head) ☒		
TPH-G	(HCl) ☐	BTEX	(HCl) ☐	Total Metals	(HNO3) ☒	Diss Metals	(HNO3) ☐	VOCs	(HCl) ☐		

Additional Information

Types of Sample Containers:	Preservative:	Quantity:
Small OJ	None	2
500 mL HDPE	HNO_3	1
Amber glass	H_2SO_4	1

Comments: Ferrous Iron Non-detect

Signature: NW Date: 9/27/20

SEEP SAMPLE COLLECTION FORM

Project Name: Holden Mine Date of Collection: 9-27-2020

Task: Seep Sample FY2020 Field Personnel: GSW / NJW (CPGG)

Seep Details and Observations

Location ID: ~~SP-47~~ SP-47 Seep Type: pool / moist to wet surface area; sheet flow; other: _____

GPS Coordinates: _____

Location Description: _____

Seep Description (width, length, depth of pool): _____

Photo taken? _____ Location marked on field map? Yes

Field Measurements

Time	Flow (calculate or estimate)	pH	Dissolved Oxygen (mg/L)	Specific Conductivity (µS/cm)	Turbidity (NTU)	Temp (°C)	ORP (mV)
1254 Stable	15 min	7.08	11.24	33.0		7.3	126.4
1257		7.07	11.23	33.0	0.43	7.3	129.5

Flow Measurement Method: _____

Distance from creek or river drainage, if applicable: _____

Water Quality Instrument Data Collected with: Type: ☑ YSI Pro DSS ☐ LaMotte Turbidity Meter Other: _____

Parameters measured by: ☑ Directly in seep pool ☐ Dam ☐ Collection into bucket Water Quality Parameters Collected after sample collected? ☐ Yes ☐ No (Before)

Seep Sampling Data SP-47-092920

Sample No: SP-47-092920 Location and Depth: _____

Date Collected (mo/dy/yr): 9-27-20 Time Collected: 1300 Weather: Clear 70F

Duplicate Sample No: — Duplicate Sample Time Collected: _____

Sample: ☑ Filtered ☐ Unfiltered Other: _____ Filter Type: 0.45 µm

Sample Collected with: ☐ Syringe ☐ Direct Collection ☑ Pump Other: _____ Type: Peristaltic

Sample Description (Color, Turbidity, Odor, Other): Clear Fe^{2+} Test = ND

Sample Analyses

TPH-D	(HCl) ☐	Chlor / Fluor	(unpres) ☐	DOC / TOC	(H2SO4) ☑	Anions	(unpres) ☑	Alkalinity	(no head) ☑		
TPH-G	(HCl) ☐	BTEX	(HCl) ☐	Total Metals	(HNO3) ☑	Diss Metals	(HNO3) ☑	VOCs	(HCl) ☐		

Additional Information

Types of Sample Containers:	Preservative:	Quantity:	Comments:
500mL OJ	—	2	Alk. / Anions
500mL Poly	HNO_3	1	Metals
250mL AG	H_2SO_4	1	DOC (FF)

Signature: GSW Date: 9-27-20

Holden Mine Site

Performance Standards Verification
2020 Annual Compliance Assessment Report

Appendix B
Summer and Fall 2020 Laboratory Reports

DRAFT

Holden Mine Site

Performance Standards Verification
2020 Annual Compliance Assessment Report

Appendix B
Summer and Fall 2020 Laboratory Reports

Attachment B.1
Summer 2020 Laboratory Reports

DRAFT

Analytical Resources, Incorporated
Analytical Chemists and Consultants

15 September 2020

Amanda McKay
Floyd - Snider
601 Union Street Two Union Square, Suite 600
Seattle, WA 98101-2341

RE: Rio Tinto Holden Mine Reclamation/Remediation

Please find enclosed sample receipt documentation and analytical results for samples from the project referenced above.

Sample analyses were performed according to ARI's Quality Assurance Plan and any provided project specific Quality Assurance Plan. Each analytical section of this report has been approved and reviewed by an analytical peer, the appropriate Laboratory Supervisor or qualified substitute, and a technical reviewer.

Should you have any questions or problems, please feel free to contact us at your convenience.

Associated Work Order(s)	Associated SDG ID(s)
20G0250	N/A

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed in the enclose Narrative. ARI, an accredited laboratory, certifies that the report results for which ARI is accredited meets all the requirements of the accrediting body. A list of certified analyses, accreditations, and expiration dates is included in this report.

Release of the data contained in this hardcopy data package has been authorized by the Laboratory Manager or his/her designee, as verified by the following signature.

Analytical Resources, Inc.



Amanda Volgardsen Johnson, Project Manager

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

ACCREDITED IN ACCORDANCE WITH nelac
Cert# 100006-012

PJLA Testing
Accreditation # 66169

Chain of Custody Record & Laboratory Analysis Request

ARI Assigned Number: 20G0250	Turn-around Requested: Standard	Date: 7/20/2020	
ARI Client Company: Floyd Snider	Phone: 206-292-2078	Page: 1 of 1	
Client Contact: Amanda McKay or Pamela Osterhout		No. of Coolers: 2	Cooler Temps: 0.6 2.6
Client Project Name: RT-Holden			
Client Project #: RT-Holden Task 5.3	Samplers: P.O. and K.H.		

Analytical Resources, Incorporated
Analytical Chemists and Consultants
4611 South 134th Place, Suite 100
Tukwila, WA 98168
206-695-6200 206-695-6201 (fax)

Sample ID	Date	Time	Matrix	No. Containers	Total Metals Cations	Diss. Metals (FF)	Alkalinity (A2320)	TSS /TDS (SM2540D/C)	TOC (A5310B)	DOC (FF)	Anions (300.0)	Hardness (Calculate)	Notes/Comments
SP-30-072020	7/20/20	1750	W	4	X		X			X	X	X	
SP-34-072120	7/21	1220	W	4	X		X			X	X	X	
SP-40-072120	"	1318	W	4	X		X			X	X	X	
SP-82-072120	↓	1325	W	4	X		X			X	X	X	
SP-26-072220	7/22	0937	W	4	X		X			X	X	X	
SP-126-072220	"	0942	W	4	X		X			X	X	X	
Field-Blank-072220	"	1055	W	4	X		X			X	X	X	
SW-TP3-East1-072220	"	1345	W	~~10~~ 12	X		X	X	X	X	X	X	MS/MSD
SW-TP3-East2-072220	↓	1500	W	6	X		X	X	X	X	X	X	

Comments/Special Instructions

- ~Metals by E6020A include Al, Cd, Cu, Fe, Pb, Zn, Mn, Ca, K, Mg, Na
- ~Anions: Chloride, sulfate and nitrate
- ~DOC and dissolved metals field filtered (FF) at 0.45 micron.
- ~If Cadmium is non-detect, run low-level analysis to PQL of 0.02 ug/L
- ~Alkalinity: report total, carbonate, bicarbonate and hydroxide.

	Relinquished by: (Signature)	Received by: (Signature)	Relinquished by: (Signature)	Received by: (Signature)
Printed Name:	Pamela Osterhout	Jacob Haffe		
Company:	Floyd Snider	ARI		
Date & Time:	7/24/20 @ 12:36	07/24/2020 1236		

Limits of Liability: ARI will perform all requested services in accordance with appropriate methodology following ARI Standard Operating Procedures and the ARI Quality Assurance Program. This program meets standards for the industry. The total liability of ARI, its officers, agents, employees, or successors, arising out of or in connection with the requested services, shall not exceed the invoiced amount for said services. The acceptance by the client of a proposal for services by ARI release ARI from any liability in excess thereof, not withstanding any provision to the contrary in any contract, purchase order or co-signed agreement between ARI and the Client.

Sample Retention Policy: Unless specified by workorder or contract, all water/soil samples submitted to ARI will be discarded or returned, no sooner than 90 days after receipt or 60 days after submission of hardcopy data, whichever is longer. Sediment samples submitted under PSDDA/PSEP/SMS protocol will be stored frozen for up to one year and then discarded.

WORK ORDER

20G0250

Client: Floyd - Snider **Project Manager:** Amanda Volgardsen Johnson

Project: Rio Tinto Holden Mine Reclamation/Remediation **Project Number:** RT-Holden

Preservation Confirmation

Container ID	Container Type	pH	
20G0250-01 A	Small OJ, 500 mL		
20G0250-01 B	Small OJ, 500 mL		
20G0250-01 C	Glass NM, Amber, 250 mL, 9N H2SO4	<2	Pass
20G0250-01 D	HDPE NM, 500 mL, 1:1 HNO3	<2	Pass
20G0250-02 A	Small OJ, 500 mL		
20G0250-02 B	Small OJ, 500 mL		
20G0250-02 C	Glass NM, Amber, 250 mL, 9N H2SO4	<2	Pass
20G0250-02 D	HDPE NM, 500 mL, 1:1 HNO3	<2	Pass
20G0250-03 A	Small OJ, 500 mL		
20G0250-03 B	Small OJ, 500 mL		
20G0250-03 C	Glass NM, Amber, 250 mL, 9N H2SO4	<2	Pass
20G0250-03 D	HDPE NM, 500 mL, 1:1 HNO3	<2	Pass
20G0250-04 A	Small OJ, 500 mL		
20G0250-04 B	Small OJ, 500 mL		
20G0250-04 C	Glass NM, Amber, 250 mL, 9N H2SO4	<2	Pass
20G0250-04 D	HDPE NM, 500 mL, 1:1 HNO3	<2	Pass
20G0250-05 A	Small OJ, 500 mL		
20G0250-05 B	Small OJ, 500 mL		
20G0250-05 C	Glass NM, Amber, 250 mL, 9N H2SO4	<2	Pass
20G0250-05 D	HDPE NM, 500 mL, 1:1 HNO3	<2	Pass
20G0250-06 A	Small OJ, 500 mL		
20G0250-06 B	Small OJ, 500 mL		
20G0250-06 C	Glass NM, Amber, 250 mL, 9N H2SO4	<2	Pass
20G0250-06 D	HDPE NM, 500 mL, 1:1 HNO3	<2	Pass
20G0250-07 A	Small OJ, 500 mL		
20G0250-07 B	Small OJ, 500 mL		
20G0250-07 C	Glass NM, Amber, 250 mL, 9N H2SO4	<2	Pass
20G0250-07 D	HDPE NM, 500 mL, 1:1 HNO3	<2	Pass
20G0250-08 A	Large OJ, 1000 mL		
20G0250-08 B	Large OJ, 1000 mL		
20G0250-08 C	Large OJ, 1000 mL		
20G0250-08 D	Large OJ, 1000 mL		
20G0250-08 E	Small OJ, 500 mL		
20G0250-08 F	Small OJ, 500 mL		
20G0250-08 G	Glass NM, Amber, 250 mL, 9N H2SO4	<2	Pass

Reviewed By

Date

WORK ORDER

20G0250

Client: Floyd - Snider | **Project Manager:** Amanda Volgardsen Johnson

Project: Rio Tinto Holden Mine Reclamation/Remediation | **Project Number:** RT-Holden

20G0250-08 H	Glass NM, Amber, 250 mL, 9N H2SO4	<2	Pass
20G0250-08 I	Glass NM, Amber, 250 mL, 9N H2SO4	<2	Pass
20G0250-08 J	Glass NM, Amber, 250 mL, 9N H2SO4	<2	Pass
20G0250-08 K	HDPE NM, 500 mL, 1:1 HNO3	<2	Pass
20G0250-08 L	HDPE NM, 500 mL, 1:1 HNO3	<2	Pass
20G0250-09 A	Large OJ, 1000 mL		
20G0250-09 B	Large OJ, 1000 mL		
20G0250-09 C	Small OJ, 500 mL		
20G0250-09 D	Glass NM, Amber, 250 mL, 9N H2SO4	<2	Pass
20G0250-09 E	Glass NM, Amber, 250 mL, 9N H2SO4	<2	Pass
20G0250-09 F	HDPE NM, 500 mL, 1:1 HNO3	<2	Pass

Preservation Confirmed By

07/24/2020
Date

Reviewed By

Date

Analytical Resources, Incorporated
Analytical Chemists and Consultants

Cooler Receipt Form

ARI Client: Floyd - Snider

Project Name: RT - Holden mine

COC No(s): NA

Delivered by: Fed-Ex UPS Courier Hand Delivered Other: _____

Assigned ARI Job No: 20G0250

Tracking No: NA

Preliminary Examination Phase:

Were intact, properly signed and dated custody seals attached to the outside of the cooler?	YES	NO
Were custody papers included with the cooler?	YES	NO
Were custody papers properly filled out (ink, signed, etc.)	YES	NO

Temperature of Cooler(s) (°C) (recommended 2.0-6.0 °C for chemistry)

Time 1236 0.6 2.6 ___ ___ ___ ___

If cooler temperature is out of compliance fill out form 00070F

Temp Gun ID#: D00 5206

Cooler Accepted by: JG Date: 07/24/2020 Time: 1236

Complete custody forms and attach all shipping documents

Log-In Phase:

Was a temperature blank included in the cooler?		YES	NO
What kind of packing material was used?	Bubble Wrap Wet Ice Gel Packs Baggies Foam Block Paper Other: _____		
Was sufficient ice used (if appropriate)?	NA	YES	NO
How were bottles sealed in plastic bags?	Individually	Grouped	Not
Did all bottles arrive in good condition (unbroken)?		YES	NO
Were all bottle labels complete and legible?		YES	NO
Did the number of containers listed on COC match with the number of containers received?		YES	NO
Did all bottle labels and tags agree with custody papers?		YES	NO
Were all bottles used correct for the requested analyses?		YES	NO
Do any of the analyses (bottles) require preservation? (attach preservation sheet, excluding VOCs)	NA	YES	NO
Were all VOC vials free of air bubbles?	NA	YES	NO
Was sufficient amount of sample sent in each bottle?		YES	NO
Date VOC Trip Blank was made at ARI	NA		_____

Were the sample(s) split by ARI? NA YES Date/Time: _____ Equipment: _____ Split by: _____

Samples Logged by: JG Date: 07/24/2020 Time: 1258 Labels checked by: JG

*** Notify Project Manager of discrepancies or concerns ***

Sample ID on Bottle	Sample ID on COC	Sample ID on Bottle	Sample ID on COC

Additional Notes, Discrepancies, & Resolutions:

By: Date:

Analytical Resources, Incorporated
Analytical Chemists and Consultants

Corrective Actions
Inorganic Analyses

Criteria Flagged:		ARI Job No.:	BIGΦ648
Unacceptable Blank:	✓	Date of Event:	7/30/20
Unacceptable Duplicate:		Client ID:	
Unacceptable Spike:		Method/Element:	ICP-MS/Mn
Unacceptable Reference:		Prep Code:	REN

Details of Problem/Recommended Corrective Action:

Mn contamination in BIGΦ648-BLK1 (8.194 ppb)

2ΦGΦ25Φ (8+9) >10x contamination

Samples Affected: 2ΦGΦ25Φ (1-7)

Corrective Action Taken: Reprep affected samples for Mn

Analyst Initials: MB **Supervisor:** [signature]

Date: 7/31/20 **Date:** 7-31-20

Floyd - Snider	Project:	Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number:	RT-Holden Task 5.3	**Reported:**
Seattle, WA 98101-2341	Project Manager:	Amanda McKay	09/15/2020 13:20

ANALYTICAL REPORT FOR SAMPLES

Laboratory ID	Sample ID	Matrix	Date Sampled	Date Received
20G0250-01	SP-30-072020	Water	07/20/20 17:50	07/24/20 12:36
20G0250-02	SP-34-072120	Water	07/21/20 12:20	07/24/20 12:36
20G0250-03	SP-40-072120	Water	07/21/20 13:18	07/24/20 12:36
20G0250-04	SP-32-072120	Water	07/21/20 13:25	07/24/20 12:36
20G0250-05	SP-26-072220	Water	07/22/20 09:37	07/24/20 12:36
20G0250-06	SP-126-072220	Water	07/22/20 09:42	07/24/20 12:36
20G0250-07	Field-Blank-072220	Water	07/22/20 10:55	07/24/20 12:36
20G0250-08	SW-TP3-East1-072220	Water	07/22/20 13:45	07/24/20 12:36
20G0250-09	SW-TP3-East2-072220	Water	07/22/20 15:00	07/24/20 12:36

Analytical Report

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden Task 5.3	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	15-Sep-2020 13:20

Case Narrative

Sample receipt

Samples as listed on the preceding page were received 24-Jul-2020 12:36 under ARI work order 20G0250. For details regarding sample receipt, please refer to the Cooler Receipt Form.

Total Metals - EPA Method 6020A

The samples were digested and analyzed within the recommended holding times.

Cadmium samples with an initial non-detect concentration were reanalyzed with a 5x concentration.

Initial and continuing calibrations were within method requirements.

The method blank has Manganese detected above the reporting limit. Associated samples with over 10x the contamintation were report with "B" qualifiers, all other were reanalyzed on a new batch. No further corrective action was taken.

The blank spike (BS/LCS) percent recoveries were within control limits.

Matrix spikes, matrix spike duplicates and duplicates were prepared in conjunction with samples SW-TP3-East1-072220 and SP-30-072020. The duplicate for sample SP-30-072020 has a Cadmium concentration <=5 times the reporting limit which defaults to +/- the reoporting limit instead of 20% of the RPD. The Cadmium has been flagged with an "L" qualifier on the duplicate. The results are advisory. All other matrix spike, matrix spike duplicate and duplicate percent recoveries and/or RPD were within QC limits. No further corrective action was taken.

Wet Chemistry

The Nitrate samples were received outside of the 48 hour recommended holding times have have been flagged with "H" qualifiers.

Initial and continuing calibrations were within method requirements.

The method blanks were clean at the reporting limits.

The blank spike (BS/LCS) percent recoveries were within control limits.

The reference material (SRM) percent recoveries were within control limits.

Matrix spikes, matrix spike duplicates and/or duplicates were prepared in conjunction with sample SW-TP3-East1-072220. The matrix spike, matrix spike duplicate and duplicate percent recoveries and/or RPD were within QC limits.

Analytical Report

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden Task 5.3	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	15-Sep-2020 13:20

Case Narrative

QUALIFIERS AND NOTES

Qualifier	Definition
U	This analyte is not detected above the reporting limit (RL) or if noted, not detected above the limit of detection (LOD).
L	Analyte concentration is <=5 times the reporting limit and the replicate control limit defaults to +/- RL instead of 20% RPD
J	Estimated concentration value detected below the reporting limit.
H	Hold time violation - Hold time was exceeded.
D	The reported value is from a dilution
B	This analyte was detected in the method blank.
DET	Analyte DETECTED
ND	Analyte NOT DETECTED at or above the reporting limit
NR	Not Reported
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference

Form I
INORGANIC ANALYSIS DATA SHEET
EPA 6020A

Total Metals

SP-30-072020

Laboratory:	Analytical Resources, Inc.				
Client:	Floyd - Snider				
Project:	Rio Tinto Holden Mine Reclamation/Remediation				
Matrix:	Water	Laboratory ID:	20G0250-01 D	SDG:	20G0250
Sampled:	07/20/20 17:50	Prepared:	07/30/20 08:11	File ID:	XDT_m1200730-091
% Solids:	0.00	Preparation:	REN_EPA 600/4-79-020 4.1.4 HNO3 matrix	Analyzed:	07/30/20 20:00
Batch:	BIG0648	Sequence:	SIG0428	Initial/Final:	25 mL / 25 mL
Instrument:	ICPMS1			Calibration:	DG00094

CAS NO.	Analyte	Concentration (ug/L)	Dilution Factor	MDL	MRL	Q
7439-92-1	Lead-208	<0.100	1	0.0680	0.100	U

Form I
INORGANIC ANALYSIS DATA SHEET
EPA 6020A

Total Metals

SP-30-072020

Laboratory:	Analytical Resources, Inc.				
Client:	Floyd - Snider				
Project:	Rio Tinto Holden Mine Reclamation/Remediation				
Matrix:	Water	Laboratory ID:	20G0250-01 D	SDG:	20G0250
Sampled:	07/20/20 17:50	Prepared:	07/30/20 08:11	File ID:	XDT_m1200731-065
% Solids:	0.00	Preparation:	REN_EPA 600/4-79-020 4.1.4 HNO3 matrix	Analyzed:	07/31/20 16:23
Batch:	BIG0648	Sequence:	SIG0442	Initial/Final:	25 mL / 25 mL
Instrument:	ICPMS1			Calibration:	DH00001

CAS NO.	Analyte	Concentration (ug/L)	Dilution Factor	MDL	MRL	Q
7429-90-5	Aluminum-27	60.8	1	2.37	20.0	
7440-70-2	Calcium-44	3530	1	1.91	50.0	
7439-89-6	Iron-54	103	1	6.27	20.0	
7439-95-4	Magnesium-24	362	1	0.307	20.0	
7440-09-7	Potassium-39	364	1	1.41	20.0	
7440-23-5	Sodium-23	514	1	7.18	100	

Form I
INORGANIC ANALYSIS DATA SHEET
EPA 6020A

Total Metals

SP-30-072020

Laboratory:	Analytical Resources, Inc.				
Client:	Floyd - Snider				
Project:	Rio Tinto Holden Mine Reclamation/Remediation				
Matrix:	Water	Laboratory ID:	20G0250-01RE1 D	SDG:	20G0250
Sampled:	07/20/20 17:50	Prepared:	08/03/20 06:20	File ID:	XDT_M1200803-044
% Solids:	0.00	Preparation:	REN_EPA 600/4-79-020 4.1.4 HNO3 matrix	Analyzed:	08/03/20 15:59
Batch:	BIH0012	Sequence:	SIH0014	Initial/Final:	25 mL / 25 mL
Instrument:	ICPMS1			Calibration:	DH00003

CAS NO.	Analyte	Concentration (ug/L)	Dilution Factor	MDL	MRL	Q
7439-96-5	Manganese-55	3.92	1	0.0850	0.500	

Form I
INORGANIC ANALYSIS DATA SHEET
EPA 6020A

Total Metals

SP-34-072120

Laboratory:	Analytical Resources, Inc.				
Client:	Floyd - Snider				
Project:	Rio Tinto Holden Mine Reclamation/Remediation				
Matrix:	Water	Laboratory ID:	20G0250-02 D	SDG:	20G0250
Sampled:	07/21/20 12:20	Prepared:	07/30/20 08:11	File ID:	XDT_m1200730-092
% Solids:	0.00	Preparation:	REN_EPA 600/4-79-020 4.1.4 HNO3 matrix	Analyzed:	07/30/20 20:04
Batch:	BIG0648	Sequence:	SIG0428	Initial/Final:	25 mL / 25 mL
Instrument:	ICPMS1			Calibration:	DG00094

CAS NO.	Analyte	Concentration (ug/L)	Dilution Factor	MDL	MRL	Q
7439-92-1	Lead-208	<0.100	1	0.0680	0.100	U

Form I
INORGANIC ANALYSIS DATA SHEET
EPA 6020A

Total Metals

SP-34-072120

Laboratory:	Analytical Resources, Inc.				
Client:	Floyd - Snider				
Project:	Rio Tinto Holden Mine Reclamation/Remediation				
Matrix:	Water	Laboratory ID:	20G0250-02 D	SDG:	20G0250
Sampled:	07/21/20 12:20	Prepared:	07/30/20 08:11	File ID:	XDT_m1200731-066
% Solids:	0.00	Preparation:	REN_EPA 600/4-79-020 4.1.4 HNO3 matrix	Analyzed:	07/31/20 16:28
Batch:	BIG0648	Sequence:	SIG0442	Initial/Final:	25 mL / 25 mL
Instrument:	ICPMS1			Calibration:	DH00001

CAS NO.	Analyte	Concentration (ug/L)	Dilution Factor	MDL	MRL	Q
7429-90-5	Aluminum-27	46.5	1	2.37	20.0	
7440-70-2	Calcium-44	3870	1	1.91	50.0	
7439-89-6	Iron-54	96.2	1	6.27	20.0	
7439-95-4	Magnesium-24	392	1	0.307	20.0	
7440-09-7	Potassium-39	360	1	1.41	20.0	
7440-23-5	Sodium-23	574	1	7.18	100	

Form I
INORGANIC ANALYSIS DATA SHEET
EPA 6020A

Total Metals

SP-34-072120

Laboratory:	Analytical Resources, Inc.				
Client:	Floyd - Snider				
Project:	Rio Tinto Holden Mine Reclamation/Remediation				
Matrix:	Water	Laboratory ID:	20G0250-02RE1 D	SDG:	20G0250
Sampled:	07/21/20 12:20	Prepared:	08/03/20 06:20	File ID:	XDT_M1200803-042
% Solids:	0.00	Preparation:	REN_EPA 600/4-79-020 4.1.4 HNO3 matrix	Analyzed:	08/03/20 15:50
Batch:	BIH0012	Sequence:	SIH0014	Initial/Final:	25 mL / 25 mL
Instrument:	ICPMS1			Calibration:	DH00003

CAS NO.	Analyte	Concentration (ug/L)	Dilution Factor	MDL	MRL	Q
7439-96-5	Manganese-55	3.71	1	0.0850	0.500	

Form I
INORGANIC ANALYSIS DATA SHEET
EPA 6020A

Total Metals

SP-40-072120

Laboratory:	Analytical Resources, Inc.				
Client:	Floyd - Snider				
Project:	Rio Tinto Holden Mine Reclamation/Remediation				
Matrix:	Water	Laboratory ID:	20G0250-03 D	SDG:	20G0250
Sampled:	07/21/20 13:18	Prepared:	07/30/20 08:11	File ID:	XDT_m1200730-093
% Solids:	0.00	Preparation:	REN_EPA 600/4-79-020 4.1.4 HNO3 matrix	Analyzed:	07/30/20 20:08
Batch:	BIG0648	Sequence:	SIG0428	Initial/Final:	25 mL / 25 mL
Instrument:	ICPMS1			Calibration:	DG00094

CAS NO.	Analyte	Concentration (ug/L)	Dilution Factor	MDL	MRL	Q
7439-92-1	Lead-208	<0.100	1	0.0680	0.100	U

Form I
INORGANIC ANALYSIS DATA SHEET
EPA 6020A

Total Metals

SP-40-072120

Laboratory:	Analytical Resources, Inc.				
Client:	Floyd - Snider				
Project:	Rio Tinto Holden Mine Reclamation/Remediation				
Matrix:	Water	Laboratory ID:	20G0250-03 D	SDG:	20G0250
Sampled:	07/21/20 13:18	Prepared:	07/30/20 08:11	File ID:	XDT_m1200731-067
% Solids:	0.00	Preparation:	REN_EPA 600/4-79-020 4.1.4 HNO3 matrix	Analyzed:	07/31/20 16:32
Batch:	BIG0648	Sequence:	SIG0442	Initial/Final:	25 mL / 25 mL
Instrument:	ICPMS1			Calibration:	DH00001

CAS NO.	Analyte	Concentration (ug/L)	Dilution Factor	MDL	MRL	Q
7429-90-5	Aluminum-27	28.9	1	2.37	20.0	
7440-70-2	Calcium-44	5310	1	1.91	50.0	
7439-89-6	Iron-54	58.0	1	6.27	20.0	
7439-95-4	Magnesium-24	624	1	0.307	20.0	
7440-09-7	Potassium-39	415	1	1.41	20.0	
7440-23-5	Sodium-23	815	1	7.18	100	

Form I
INORGANIC ANALYSIS DATA SHEET
EPA 6020A

Total Metals

SP-40-072120

Laboratory:	Analytical Resources, Inc.				
Client:	Floyd - Snider				
Project:	Rio Tinto Holden Mine Reclamation/Remediation				
Matrix:	Water	Laboratory ID:	20G0250-03RE1 D	SDG:	20G0250
Sampled:	07/21/20 13:18	Prepared:	08/03/20 06:20	File ID:	XDT_M1200803-043
% Solids:	0.00	Preparation:	REN_EPA 600/4-79-020 4.1.4 HNO3 matrix	Analyzed:	08/03/20 15:54
Batch:	BIH0012	Sequence:	SIH0014	Initial/Final:	25 mL / 25 mL
Instrument:	ICPMS1			Calibration:	DH00003

CAS NO.	Analyte	Concentration (ug/L)	Dilution Factor	MDL	MRL	Q
7439-96-5	Manganese-55	1.95	1	0.0850	0.500	

Form I
INORGANIC ANALYSIS DATA SHEET
EPA 6020A

Total Metals

SP-32-072120

Laboratory:	Analytical Resources, Inc.				
Client:	Floyd - Snider				
Project:	Rio Tinto Holden Mine Reclamation/Remediation				
Matrix:	Water	Laboratory ID:	20G0250-04 D	SDG:	20G0250
Sampled:	07/21/20 13:25	Prepared:	07/30/20 08:11	File ID:	XDT_m1200730-094
% Solids:	0.00	Preparation:	REN_EPA 600/4-79-020 4.1.4 HNO3 matrix	Analyzed:	07/30/20 20:12
Batch:	BIG0648	Sequence:	SIG0428	Initial/Final:	25 mL / 25 mL
Instrument:	ICPMS1			Calibration:	DG00094

CAS NO.	Analyte	Concentration (ug/L)	Dilution Factor	MDL	MRL	Q
7439-92-1	Lead-208	<0.100	1	0.0680	0.100	U

Form I
INORGANIC ANALYSIS DATA SHEET
EPA 6020A

Total Metals

SP-32-072120

Laboratory:	Analytical Resources, Inc.				
Client:	Floyd - Snider				
Project:	Rio Tinto Holden Mine Reclamation/Remediation				
Matrix:	Water	Laboratory ID:	20G0250-04 D	SDG:	20G0250
Sampled:	07/21/20 13:25	Prepared:	07/30/20 08:11	File ID:	XDT_m1200731-068
% Solids:	0.00	Preparation:	REN_EPA 600/4-79-020 4.1.4 HNO3 matrix	Analyzed:	07/31/20 16:37
Batch:	BIG0648	Sequence:	SIG0442	Initial/Final:	25 mL / 25 mL
Instrument:	ICPMS1			Calibration:	DH00001

CAS NO.	Analyte	Concentration (ug/L)	Dilution Factor	MDL	MRL	Q
7429-90-5	Aluminum-27	24.8	1	2.37	20.0	
7440-70-2	Calcium-44	5380	1	1.91	50.0	
7439-89-6	Iron-54	43.9	1	6.27	20.0	
7439-95-4	Magnesium-24	621	1	0.307	20.0	
7440-09-7	Potassium-39	427	1	1.41	20.0	
7440-23-5	Sodium-23	818	1	7.18	100	

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Total Metals

SP-32-072120

Laboratory:	Analytical Resources, Inc.				
Client:	Floyd - Snider				
Project:	Rio Tinto Holden Mine Reclamation/Remediation				
Matrix:	Water	Laboratory ID:	20G0250-04RE1 D	SDG:	20G0250
Sampled:	07/21/20 13:25	Prepared:	08/03/20 06:20	File ID:	XDT_M1200803-051
% Solids:	0.00	Preparation:	REN_EPA 600/4-79-020 4.1.4 HNO3 matrix	Analyzed:	08/03/20 16:37
Batch:	BIH0012	Sequence:	SIH0014	Initial/Final:	25 mL / 25 mL
Instrument:	ICPMS1			Calibration:	DH00003

CAS NO.	Analyte	Concentration (ug/L)	Dilution Factor	MDL	MRL	Q
7439-96-5	Manganese-55	1.83	1	0.0850	0.500	

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Total Metals

SP-26-072220

Laboratory:	Analytical Resources, Inc.				
Client:	Floyd - Snider				
Project:	Rio Tinto Holden Mine Reclamation/Remediation				
Matrix:	Water	Laboratory ID:	20G0250-05 D	SDG:	20G0250
Sampled:	07/22/20 09:37	Prepared:	07/30/20 08:11	File ID:	XDT_m1200730-095
% Solids:	0.00	Preparation:	REN_EPA 600/4-79-020 4.1.4 HNO3 matrix	Analyzed:	07/30/20 20:16
Batch:	BIG0648	Sequence:	SIG0428	Initial/Final:	25 mL / 25 mL
Instrument:	ICPMS1			Calibration:	DG00094

CAS NO.	Analyte	Concentration (ug/L)	Dilution Factor	MDL	MRL	Q
7439-92-1	Lead-208	<0.100	1	0.0680	0.100	U

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Total Metals

SP-26-072220

Laboratory:	Analytical Resources, Inc.				
Client:	Floyd - Snider				
Project:	Rio Tinto Holden Mine Reclamation/Remediation				
Matrix:	Water	Laboratory ID:	20G0250-05 D	SDG:	20G0250
Sampled:	07/22/20 09:37	Prepared:	07/30/20 08:11	File ID:	XDT_m1200731-069
% Solids:	0.00	Preparation:	REN_EPA 600/4-79-020 4.1.4 HNO3 matrix	Analyzed:	07/31/20 16:41
Batch:	BIG0648	Sequence:	SIG0442	Initial/Final:	25 mL / 25 mL
Instrument:	ICPMS1			Calibration:	DH00001

CAS NO.	Analyte	Concentration (ug/L)	Dilution Factor	MDL	MRL	Q
7429-90-5	Aluminum-27	77.3	1	2.37	20.0	
7440-70-2	Calcium-44	9720	1	1.91	50.0	
7439-89-6	Iron-54	48.8	1	6.27	20.0	
7439-95-4	Magnesium-24	1290	1	0.307	20.0	
7440-09-7	Potassium-39	659	1	1.41	20.0	
7440-23-5	Sodium-23	1470	1	7.18	100	

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Total Metals

SP-26-072220

Laboratory:	Analytical Resources, Inc.				
Client:	Floyd - Snider				
Project:	Rio Tinto Holden Mine Reclamation/Remediation				
Matrix:	Water	Laboratory ID:	20G0250-05RE1 D	SDG:	20G0250
Sampled:	07/22/20 09:37	Prepared:	08/03/20 06:20	File ID:	XDT_M1200803-052
% Solids:	0.00	Preparation:	REN_EPA 600/4-79-020 4.1.4 HNO3 matrix	Analyzed:	08/03/20 16:41
Batch:	BIH0012	Sequence:	SIH0014	Initial/Final:	25 mL / 25 mL
Instrument:	ICPMS1			Calibration:	DH00003

CAS NO.	Analyte	Concentration (ug/L)	Dilution Factor	MDL	MRL	Q
7439-96-5	Manganese-55	1.61	1	0.0850	0.500	

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Total Metals

SP-126-072220

Laboratory:	Analytical Resources, Inc.				
Client:	Floyd - Snider				
Project:	Rio Tinto Holden Mine Reclamation/Remediation				
Matrix:	Water	Laboratory ID:	20G0250-06 D	SDG:	20G0250
Sampled:	07/22/20 09:42	Prepared:	07/30/20 08:11	File ID:	XDT_m1200730-096
% Solids:	0.00	Preparation:	REN_EPA 600/4-79-020 4.1.4 HNO3 matrix	Analyzed:	07/30/20 20:20
Batch:	BIG0648	Sequence:	SIG0428	Initial/Final:	25 mL / 25 mL
Instrument:	ICPMS1			Calibration:	DG00094

CAS NO.	Analyte	Concentration (ug/L)	Dilution Factor	MDL	MRL	Q
7439-92-1	Lead-208	0.0740	1	0.0680	0.100	J

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Total Metals

SP-126-072220

Laboratory:	Analytical Resources, Inc.				
Client:	Floyd - Snider				
Project:	Rio Tinto Holden Mine Reclamation/Remediation				
Matrix:	Water	Laboratory ID:	20G0250-06 D	SDG:	20G0250
Sampled:	07/22/20 09:42	Prepared:	07/30/20 08:11	File ID:	XDT_m1200731-070
% Solids:	0.00	Preparation:	REN_EPA 600/4-79-020 4.1.4 HNO3 matrix	Analyzed:	07/31/20 16:46
Batch:	BIG0648	Sequence:	SIG0442	Initial/Final:	25 mL / 25 mL
Instrument:	ICPMS1			Calibration:	DH00001

CAS NO.	Analyte	Concentration (ug/L)	Dilution Factor	MDL	MRL	Q
7429-90-5	Aluminum-27	54.5	1	2.37	20.0	
7440-70-2	Calcium-44	9910	1	1.91	50.0	
7439-89-6	Iron-54	27.7	1	6.27	20.0	
7439-95-4	Magnesium-24	1290	1	0.307	20.0	
7440-09-7	Potassium-39	656	1	1.41	20.0	
7440-23-5	Sodium-23	1470	1	7.18	100	

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Total Metals

SP-126-072220

Laboratory:	Analytical Resources, Inc.				
Client:	Floyd - Snider				
Project:	Rio Tinto Holden Mine Reclamation/Remediation				
Matrix:	Water	Laboratory ID:	20G0250-06RE1 D	SDG:	20G0250
Sampled:	07/22/20 09:42	Prepared:	08/03/20 06:20	File ID:	XDT_M1200803-053
% Solids:	0.00	Preparation:	REN_EPA 600/4-79-020 4.1.4 HNO3 matrix	Analyzed:	08/03/20 16:45
Batch:	BIH0012	Sequence:	SIH0014	Initial/Final:	25 mL / 25 mL
Instrument:	ICPMS1			Calibration:	DH00003

CAS NO.	Analyte	Concentration (ug/L)	Dilution Factor	MDL	MRL	Q
7439-96-5	Manganese-55	1.83	1	0.0850	0.500	

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Total Metals

Field-Blank-072220

Laboratory:	Analytical Resources, Inc.				
Client:	Floyd - Snider				
Project:	Rio Tinto Holden Mine Reclamation/Remediation				
Matrix:	Water	Laboratory ID:	20G0250-07 D	SDG:	20G0250
Sampled:	07/22/20 10:55	Prepared:	07/30/20 08:11	File ID:	XDT_m1200730-076
% Solids:	0.00	Preparation:	REN_EPA 600/4-79-020 4.1.4 HNO3 matrix	Analyzed:	07/30/20 18:48
Batch:	BIG0648	Sequence:	SIG0428	Initial/Final:	25 mL / 25 mL
Instrument:	ICPMS1			Calibration:	DG00094

CAS NO.	Analyte	Concentration (ug/L)	Dilution Factor	MDL	MRL	Q
7439-92-1	Lead-208	<0.100	1	0.0680	0.100	U

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Total Metals

Field-Blank-072220

Laboratory:	Analytical Resources, Inc.				
Client:	Floyd - Snider				
Project:	Rio Tinto Holden Mine Reclamation/Remediation				
Matrix:	Water	Laboratory ID:	20G0250-07 D	SDG:	20G0250
Sampled:	07/22/20 10:55	Prepared:	07/30/20 08:11	File ID:	XDT_m1200731-064
% Solids:	0.00	Preparation:	REN_EPA 600/4-79-020 4.1.4 HNO3 matrix	Analyzed:	07/31/20 16:19
Batch:	BIG0648	Sequence:	SIG0442	Initial/Final:	25 mL / 25 mL
Instrument:	ICPMS1			Calibration:	DH00001

CAS NO.	Analyte	Concentration (ug/L)	Dilution Factor	MDL	MRL	Q
7429-90-5	Aluminum-27	<20.0	1	2.37	20.0	U
7440-70-2	Calcium-44	<50.0	1	1.91	50.0	U
7439-89-6	Iron-54	<20.0	1	6.27	20.0	U
7439-95-4	Magnesium-24	0.395	1	0.307	20.0	J
7440-09-7	Potassium-39	2.99	1	1.41	20.0	J
7440-23-5	Sodium-23	15.9	1	7.18	100	J

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Total Metals

Field-Blank-072220

Laboratory:	Analytical Resources, Inc.				
Client:	Floyd - Snider				
Project:	Rio Tinto Holden Mine Reclamation/Remediation				
Matrix:	Water	Laboratory ID:	20G0250-07RE1 D	SDG:	20G0250
Sampled:	07/22/20 10:55	Prepared:	08/03/20 06:20	File ID:	XDT_M1200803-041
% Solids:	0.00	Preparation:	REN_EPA 600/4-79-020 4.1.4 HNO3 matrix	Analyzed:	08/03/20 15:46
Batch:	BIH0012	Sequence:	SIH0014	Initial/Final:	25 mL / 25 mL
Instrument:	ICPMS1			Calibration:	DH00003

CAS NO.	Analyte	Concentration (ug/L)	Dilution Factor	MDL	MRL	Q
7439-96-5	Manganese-55	<0.500	1	0.0850	0.500	U

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Total Metals

SW-TP3-East1-072220

Laboratory:	Analytical Resources, Inc.				
Client:	Floyd - Snider				
Project:	Rio Tinto Holden Mine Reclamation/Remediation				
Matrix:	Water	Laboratory ID:	20G0250-08 L	SDG:	20G0250
Sampled:	07/22/20 13:45	Prepared:	07/30/20 08:11	File ID:	XDT_m1200730-032
% Solids:	0.00	Preparation:	REN_EPA 600/4-79-020 4.1.4 HNO3 matrix	Analyzed:	07/30/20 15:08
Batch:	BIG0648	Sequence:	SIG0428	Initial/Final:	25 mL / 25 mL
Instrument:	ICPMS1			Calibration:	DG00094

CAS NO.	Analyte	Concentration (ug/L)	Dilution Factor	MDL	MRL	Q
7439-92-1	Lead-208	0.322	1	0.0680	0.100	
7439-96-5	Manganese-55	87.3	1	0.0850	0.500	B

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Total Metals

SW-TP3-East1-072220

Laboratory:	Analytical Resources, Inc.				
Client:	Floyd - Snider				
Project:	Rio Tinto Holden Mine Reclamation/Remediation				
Matrix:	Water	Laboratory ID:	20G0250-08 L	SDG:	20G0250
Sampled:	07/22/20 13:45	Prepared:	07/30/20 08:11	File ID:	XDT_m1200731-057
% Solids:	0.00	Preparation:	REN_EPA 600/4-79-020 4.1.4 HNO3 matrix	Analyzed:	07/31/20 15:35
Batch:	BIG0648	Sequence:	SIG0442	Initial/Final:	25 mL / 25 mL
Instrument:	ICPMS1			Calibration:	DH00001

CAS NO.	Analyte	Concentration (ug/L)	Dilution Factor	MDL	MRL	Q
7429-90-5	Aluminum-27	37.2	1	2.37	20.0	
7440-70-2	Calcium-44	8850	1	1.91	50.0	
7439-89-6	Iron-54	1050	1	6.27	20.0	
7439-95-4	Magnesium-24	1300	1	0.307	20.0	
7440-09-7	Potassium-39	1300	1	1.41	20.0	
7440-23-5	Sodium-23	1220	1	7.18	100	

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Total Metals

SW-TP3-East2-072220

Laboratory:	Analytical Resources, Inc.				
Client:	Floyd - Snider				
Project:	Rio Tinto Holden Mine Reclamation/Remediation				
Matrix:	Water	Laboratory ID:	20G0250-09 F	SDG:	20G0250
Sampled:	07/22/20 15:00	Prepared:	07/30/20 08:11	File ID:	XDT_m1200730-097
% Solids:	0.00	Preparation:	REN_EPA 600/4-79-020 4.1.4 HNO3 matrix	Analyzed:	07/30/20 20:24
Batch:	BIG0648	Sequence:	SIG0428	Initial/Final:	25 mL / 25 mL
Instrument:	ICPMS1			Calibration:	DG00094

CAS NO.	Analyte	Concentration (ug/L)	Dilution Factor	MDL	MRL	Q
7439-92-1	Lead-208	0.160	1	0.0680	0.100	

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Total Metals

SW-TP3-East2-072220

Laboratory:	Analytical Resources, Inc.				
Client:	Floyd - Snider				
Project:	Rio Tinto Holden Mine Reclamation/Remediation				
Matrix:	Water	Laboratory ID:	20G0250-09 F	SDG:	20G0250
Sampled:	07/22/20 15:00	Prepared:	07/30/20 08:11	File ID:	XDT_m1200731-071
% Solids:	0.00	Preparation:	REN_EPA 600/4-79-020 4.1.4 HNO3 matrix	Analyzed:	07/31/20 16:51
Batch:	BIG0648	Sequence:	SIG0442	Initial/Final:	25 mL / 25 mL
Instrument:	ICPMS1			Calibration:	DH00001

CAS NO.	Analyte	Concentration (ug/L)	Dilution Factor	MDL	MRL	Q
7429-90-5	Aluminum-27	1490	5	11.8	100	D
7440-70-2	Calcium-44	27000	5	9.53	250	D
7439-89-6	Iron-54	3830	5	31.4	100	D
7439-95-4	Magnesium-24	3920	5	1.53	100	D
7439-96-5	Manganese-55	700	5	0.425	2.50	B, D
7440-09-7	Potassium-39	2640	5	7.03	100	D
7440-23-5	Sodium-23	2230	5	35.9	500	D

Analytical Resources, Incorporated
Analytical Chemists and Consultants

PREPARATION BATCH SUMMARY

EPA 6020A

Laboratory: Analytical Resources, Inc. SDG: 20G0250

Client: Floyd - Snider Project: Rio Tinto Holden Mine Reclamation/Remediation

Batch: BIG0648 Batch Matrix: Water Preparation: REN EPA 600/4-79-020 4.1.4 HNO3 matrix

SAMPLE NAME	LAB SAMPLE ID	LAB FILE ID	DATE PREPARED	OBSERVATIONS
SP-30-072020	20G0250-01	XDT_m1200730-091	07/30/20 08:11	water
SP-30-072020	20G0250-01	XDT_m1200731-065	07/30/20 08:11	
SP-30-072020	20G0250-01	XDT_m1200731-065	07/30/20 08:11	water
SP-34-072120	20G0250-02	XDT_m1200731-066	07/30/20 08:11	water
SP-34-072120	20G0250-02	XDT_m1200731-066	07/30/20 08:11	
SP-34-072120	20G0250-02	XDT_m1200730-092	07/30/20 08:11	water
SP-40-072120	20G0250-03	XDT_m1200731-067	07/30/20 08:11	water
SP-40-072120	20G0250-03	XDT_m1200731-067	07/30/20 08:11	
SP-40-072120	20G0250-03	XDT_m1200730-093	07/30/20 08:11	water
SP-32-072120	20G0250-04	XDT_m1200730-094	07/30/20 08:11	water
SP-32-072120	20G0250-04	XDT_m1200731-068	07/30/20 08:11	water
SP-32-072120	20G0250-04	XDT_m1200731-068	07/30/20 08:11	
SP-26-072220	20G0250-05	XDT_m1200730-095	07/30/20 08:11	water
SP-26-072220	20G0250-05	XDT_m1200731-069	07/30/20 08:11	water
SP-26-072220	20G0250-05	XDT_m1200731-069	07/30/20 08:11	
SP-126-072220	20G0250-06	XDT_m1200730-096	07/30/20 08:11	water
SP-126-072220	20G0250-06	XDT_m1200731-070	07/30/20 08:11	
SP-126-072220	20G0250-06	XDT_m1200731-070	07/30/20 08:11	water
Field-Blank-072220	20G0250-07	XDT_m1200730-076	07/30/20 08:11	water
Field-Blank-072220	20G0250-07	XDT_m1200731-064	07/30/20 08:11	
Field-Blank-072220	20G0250-07	XDT_m1200731-064	07/30/20 08:11	water
SW-TP3-East1-072220	20G0250-08	XDT_m1200730-032	07/30/20 08:11	water
SW-TP3-East1-072220	20G0250-08	XDT_m1200731-057	07/30/20 08:11	water
SW-TP3-East1-072220	20G0250-08	XDT_m1200731-057	07/30/20 08:11	
SW-TP3-East2-072220	20G0250-09	XDT_m1200731-071	07/30/20 08:11	
SW-TP3-East2-072220	20G0250-09	XDT_m1200730-097	07/30/20 08:11	water
SW-TP3-East2-072220	20G0250-09	XDT_m1200731-071	07/30/20 08:11	water
Blank	BIG0648-BLK1	XDT_m1200730-028	07/30/20 08:11	
Blank	BIG0648-BLK2	XDT_m1200731-040	07/30/20 08:11	Added 8/3/2020 by MCB
LCS	BIG0648-BS1	XDT_m1200730-029	07/30/20 08:11	
LCS	BIG0648-BS2	XDT_m1200731-041	07/30/20 08:11	Added 8/3/2020 by MCB
SW-TP3-East1-072220	BIG0648-DUP1	XDT_m1200730-033	07/30/20 08:11	
SW-TP3-East1-072220	BIG0648-DUP2	XDT_m1200731-058	07/30/20 08:11	Added 8/3/2020 by MCB

PREPARATION BATCH SUMMARY

EPA 6020A

Laboratory: Analytical Resources, Inc.
SDG: 20G0250
Client: Floyd - Snider
Project: Rio Tinto Holden Mine Reclamation/Remediation
Batch: BIG0648
Batch Matrix: Water
Preparation: REN EPA 600/4-79-020 4.1.4 HNO3 matrix

SAMPLE NAME	LAB SAMPLE ID	LAB FILE ID	DATE PREPARED	OBSERVATIONS
SW-TP3-East1-072220	BIG0648-MS1	XDT_m1200730-034	07/30/20 08:11	
SW-TP3-East1-072220	BIG0648-MS2	XDT_m1200731-059	07/30/20 08:11	Added 8/3/2020 by MCB
SW-TP3-East1-072220	BIG0648-MSD1	XDT_m1200730-035	07/30/20 08:11	
SW-TP3-East1-072220	BIG0648-MSD2	XDT_m1200731-060	07/30/20 08:11	Added 8/3/2020 by MCB

Analytical Resources, Incorporated
Analytical Chemists and Consultants

PREPARATION BATCH SUMMARY

EPA 6020A

Laboratory: Analytical Resources, Inc. SDG: 20G0250

Client: Floyd - Snider Project: Rio Tinto Holden Mine Reclamation/Remediation

Batch: BIH0012 Batch Matrix: Water Preparation: REN EPA 600/4-79-020 4.1.4 HNO3 matrix

SAMPLE NAME	LAB SAMPLE ID	LAB FILE ID	DATE PREPARED	OBSERVATIONS
SP-30-072020	20G0250-01RE1	XDT_M1200803-044	08/03/20 06:20	Re-extract added 7/31/2020 by TCH
SP-34-072120	20G0250-02RE1	XDT_M1200803-042	08/03/20 06:20	Re-extract added 7/31/2020 by TCH
SP-40-072120	20G0250-03RE1	XDT_M1200803-043	08/03/20 06:20	Re-extract added 7/31/2020 by TCH
SP-32-072120	20G0250-04RE1	XDT_M1200803-051	08/03/20 06:20	Re-extract added 7/31/2020 by TCH
SP-26-072220	20G0250-05RE1	XDT_M1200803-052	08/03/20 06:20	Re-extract added 7/31/2020 by TCH
SP-126-072220	20G0250-06RE1	XDT_M1200803-053	08/03/20 06:20	Re-extract added 7/31/2020 by TCH
Field-Blank-072220	20G0250-07RE1	XDT_M1200803-041	08/03/20 06:20	Re-extract added 7/31/2020 by TCH
Blank	BIH0012-BLK1	XDT_M1200803-027	08/03/20 06:20	
LCS	BIH0012-BS1	XDT_M1200803-028	08/03/20 06:20	
SP-30-072020	BIH0012-DUP1	XDT_M1200803-045	08/03/20 06:20	
SP-30-072020	BIH0012-MS1	XDT_M1200803-046	08/03/20 06:20	
SP-30-072020	BIH0012-MSD1	XDT_M1200803-047	08/03/20 06:20	

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METHOD BLANK DATA SHEET

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Total Metals

Blank

Laboratory: Analytical Resources, Inc.
SDG: 20G0250
Client: Floyd - Snider
Project: Rio Tinto Holden Mine Reclamation/I
Batch: BIG0648
Laboratory ID: BIG0648-BLK1
Prepared: 07/30/20 08:11
Matrix: Water
Preparation: REN_EPA 600/4-79-020 4
Analyzed: 07/30/20 14:44
Sequence: SIG0428
Calibration: DG00094
Instrument: ICPMS1

CAS NO.	Analyte	Concentration (ug/L)	Dilution Factor	MDL	MRL	Q
7439-92-1	Lead-208	ND	1	0.0680	0.100	U
7439-96-5	Manganese-55	8.19	1	0.0850	0.500	

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METHOD BLANK DATA SHEET

EPA 6020A

Total Metals

Blank

Laboratory: Analytical Resources, Inc.
SDG: 20G0250
Client: Floyd - Snider
Project: Rio Tinto Holden Mine Reclamation/I
Batch: BIG0648
Laboratory ID: BIG0648-BLK2
Prepared: 07/30/20 08:11
Matrix: Water
Preparation: REN_EPA 600/4-79-020 4
Analyzed: 07/31/20 14:10
Sequence: SIG0442
Calibration: DH00001
Instrument: ICPMS1

CAS NO.	Analyte	Concentration (ug/L)	Dilution Factor	MDL	MRL	Q
7429-90-5	Aluminum-27	ND	1	2.37	20.0	U
7440-70-2	Calcium-44	ND	1	1.91	50.0	U
7439-89-6	Iron-54	ND	1	6.27	20.0	U
7439-89-6	Iron-57	ND	1	1.40	20.0	U
7439-95-4	Magnesium-24	ND	1	0.307	20.0	U
7440-09-7	Potassium-39	8.37	1	1.41	20.0	J
7440-23-5	Sodium-23	ND	1	7.18	100	U

Form I

METHOD BLANK DATA SHEET

EPA 6020A

Total Metals

Blank

Laboratory: Analytical Resources, Inc.
SDG: 20G0250
Client: Floyd - Snider
Project: Rio Tinto Holden Mine Reclamation/I
Batch: BIH0012
Laboratory ID: BIH0012-BLK1
Prepared: 08/03/20 06:20
Matrix: Water
Preparation: REN_EPA 600/4-79-020 4
Analyzed: 08/03/20 14:32
Sequence: SIH0014
Calibration: DH00003
Instrument: ICPMS1

CAS NO.	Analyte	Concentration (ug/L)	Dilution Factor	MDL	MRL	Q
7439-96-5	Manganese-55	ND	1	0.0850	0.500	U

LCS / LCS DUPLICATE RECOVERY

EPA 6020A

Total Metals

Laboratory:	Analytical Resources, Inc.	SDG:	20G0250
Client:	Floyd - Snider	Project:	Rio Tinto Holden Mine Reclamation/Remediation
Matrix:	Water	Analyzed:	07/30/20 14:48
Batch:	BIG0648	Laboratory ID:	BIG0648-BS1
Preparation:	REN EPA 600/4-79-020 4.1.4 HNO3 matrix	Sequence Name:	LCS
Initial/Final:	25 mL / 25 mL		

COMPOUND	SPIKE ADDED (ug/L)	LCS CONCENTRATION (ug/L)	Q	LCS % REC. #	QC LIMITS REC.
Lead-208	25.0	24.4		97.5	80 - 120
Manganese-55	25.0	25.9	B	104	80 - 120

* Indicates values outside of QC limits

* Indicates values outside of QC limits

LCS / LCS DUPLICATE RECOVERY

EPA 6020A

Total Metals

Laboratory:	Analytical Resources, Inc.	SDG:	20G0250
Client:	Floyd - Snider	Project:	Rio Tinto Holden Mine Reclamation/Remediation
Matrix:	Water	Analyzed:	07/31/20 14:14
Batch:	BIG0648	Laboratory ID:	BIG0648-BS2
Preparation:	REN EPA 600/4-79-020 4.1.4 HNO3 matrix	Sequence Name:	LCS
Initial/Final:	25 mL / 25 mL		

COMPOUND	SPIKE ADDED (ug/L)	LCS CONCENTRATION (ug/L)	Q	LCS % REC. #	QC LIMITS REC.
Aluminum-27	5000	4640		92.9	80 - 120
Calcium-44	5000	4600		92.0	80 - 120
Iron-54	5000	4540		90.7	80 - 120
Iron-57	5000	4510		90.1	80 - 120
Magnesium-24	5000	4840		96.8	80 - 120
Potassium-39	5000	4640		92.8	80 - 120
Sodium-23	5000	4530		90.5	80 - 120

* Indicates values outside of QC limits

LCS / LCS DUPLICATE RECOVERY

EPA 6020A

Total Metals

Laboratory:	Analytical Resources, Inc.	SDG:	20G0250
Client:	Floyd - Snider	Project:	Rio Tinto Holden Mine Reclamation/Remediation
Matrix:	Water	Analyzed:	08/03/20 14:36
Batch:	BIH0012	Laboratory ID:	BIH0012-BS1
Preparation:	REN EPA 600/4-79-020 4.1.4 HNO3 matrix	Sequence Name:	LCS
Initial/Final:	25 mL / 25 mL		

COMPOUND	SPIKE ADDED (ug/L)	LCS CONCENTRATION (ug/L)	Q	LCS % REC. #	QC LIMITS REC.
Manganese-55	25.0	28.3		113	80 - 120

* Indicates values outside of QC limits

SW-TP3-East1-072220

DUPLICATES

EPA 6020A

Total Metals

Laboratory: Analytical Resources, Inc.
SDG: 20G0250
Client: Floyd - Snider
Project: Rio Tinto Holden Mine Reclamation/Remediation
Matrix: Water
Laboratory ID: BIG0648-DUP1
Batch: BIG0648
Lab Source ID: 20G0250-08
Preparation: REN EPA 600/4-79-020 4.1.4 HNO3 matrix
Initial/Final: 25 mL / 25 mL
Source Sample Name: SW-TP3-East1-072220
% Solids:

ANALYTE	CONTROL LIMIT	SAMPLE CONCENTRATION (ug/L)	C	DUPLICATE CONCENTRATION (ug/L)	C	RPD %	Q
Lead-208	20	0.322		0.299		7.41	
Manganese-55	20	87.3	B	90.0	B	2.94	

*: Values outside of QC limits
L: Analyte concentration is <=5 times the reporting limit and the replicate control limit defaults to Dup = +/- RL instead of 20% RPD

SW-TP3-East1-072220

DUPLICATES

EPA 6020A

Total Metals

Laboratory: Analytical Resources, Inc.
SDG: 20G0250
Client: Floyd - Snider
Project: Rio Tinto Holden Mine Reclamation/Remediation
Matrix: Water
Laboratory ID: BIG0648-DUP2
Batch: BIG0648
Lab Source ID: 20G0250-08
Preparation: REN EPA 600/4-79-020 4.1.4 HNO3 matrix
Initial/Final: 25 mL / 25 mL
Source Sample Name: SW-TP3-East1-072220
% Solids:

ANALYTE	CONTROL LIMIT	SAMPLE CONCENTRATION (ug/L)	C	DUPLICATE CONCENTRATION (ug/L)	C	RPD %	Q
Aluminum-27	20	37.2		37.9		1.99	
Calcium-44	20	8850		9410		6.16	
Iron-54	20	1050		1070		1.43	
Magnesium-24	20	1300		1320		1.42	
Potassium-39	20	1300		1310		1.17	
Sodium-23	20	1220		1240		1.97	

*: Values outside of QC limits
L: Analyte concentration is <=5 times the reporting limit and the replicate control limit defaults to Dup = +/- RL instead of 20% RPD

SP-30-072020

DUPLICATES

EPA 6020A

Total Metals

Laboratory: Analytical Resources, Inc.
SDG: 20G0250
Client: Floyd - Snider
Project: Rio Tinto Holden Mine Reclamation/Remediation
Matrix: Water
Laboratory ID: BIH0012-DUP1
Batch: BIH0012
Lab Source ID: 20G0250-01RE1
Preparation: REN EPA 600/4-79-020 4.1.4 HNO3 matrix
Initial/Final: 25 mL / 25 mL
Source Sample Name: SP-30-072020
% Solids:

ANALYTE	CONTROL LIMIT	SAMPLE CONCENTRATION (ug/L)	C	DUPLICATE CONCENTRATION (ug/L)	C	RPD %	Q
Manganese-55	20	3.92		4.05		3.36	

*: Values outside of QC limits
L: Analyte concentration is <=5 times the reporting limit and the replicate control limit defaults to Dup = +/- RL instead of 20% RPD

MS / MS DUPLICATE RECOVERY

EPA 6020A

Total Metals

Laboratory:	Analytical Resources, Inc.	SDG:	20G0250
Client:	Floyd - Snider	Project:	Rio Tinto Holden Mine Reclamation/Remediation
Matrix:	Water	Analyzed:	07/30/20 15:20
Batch:	BIG0648	Laboratory ID:	BIG0648-MS1
Preparation:	REN EPA 600/4-79-020 4.1.4 HNO3 matrix	Sequence Name:	Matrix Spike
Initial/Final:	25 mL / 25 mL	Source Sample:	SW-TP3-East1-072220

COMPOUND	SPIKE ADDED (ug/L)	SAMPLE CONCENTRATION (ug/L)	Q	MS CONCENTRATION (ug/L)	Q	MS % REC. #	QC LIMITS REC.
Lead-208	25.0	0.322		24.8		97.8	75 - 125
Manganese-55	25.0	87.3	B	116	B	114	75 - 125

* Values outside of QC limits

MS / MS DUPLICATE RECOVERY

EPA 6020A

Total Metals

Laboratory:	Analytical Resources, Inc.	SDG:	20G0250
Client:	Floyd - Snider	Project:	Rio Tinto Holden Mine Reclamation/Remediation
Matrix:	Water	Analyzed:	07/30/20 15:25
Batch:	BIG0648	Laboratory ID:	BIG0648-MSD1
Preparation:	REN EPA 600/4-79-020 4.1.4 HNO3 matrix	Sequence Name:	Matrix Spike Dup
Initial/Final:	25 mL / 25 mL	Source Sample:	SW-TP3-East1-072220

COMPOUND	SPIKE ADDED (ug/L)	MSD CONCENTRATION (ug/L)	Q	MSD % REC. #	% RPD #	QC LIMITS RPD	QC LIMITS REC.
Lead-208	25.0	25.0		98.7	0.960	20	75 - 125
Manganese-55	25.0	108	B	84.0	6.72	20	75 - 125

* Values outside of QC limits

SW-TP3-East1-072220

MS / MS DUPLICATE RECOVERY

EPA 6020A

Total Metals

Laboratory:	Analytical Resources, Inc.	SDG:	20G0250
Client:	Floyd - Snider	Project:	Rio Tinto Holden Mine Reclamation/Remediation
Matrix:	Water	Analyzed:	07/31/20 15:50
Batch:	BIG0648	Laboratory ID:	BIG0648-MS2
Preparation:	REN EPA 600/4-79-020 4.1.4 HNO3 matrix	Sequence Name:	Matrix Spike
Initial/Final:	25 mL / 25 mL	Source Sample:	SW-TP3-East1-072220

COMPOUND	SPIKE ADDED (ug/L)	SAMPLE CONCENTRATION (ug/L)	Q	MS CONCENTRATION (ug/L)	Q	MS % REC. #	QC LIMITS REC.
Aluminum-27	5000	37.2		4480		88.8	75 - 125
Calcium-44	5000	8850		13800		99.5	75 - 125
Iron-54	5000	1050		5500		89.0	75 - 125
Magnesium-24	5000	1300		6000		94.0	75 - 125
Potassium-39	5000	1300		5940		92.9	75 - 125
Sodium-23	5000	1220		5790		91.5	75 - 125

* Values outside of QC limits

SW-TP3-East1-072220

MS / MS DUPLICATE RECOVERY

EPA 6020A

Total Metals

Laboratory:	Analytical Resources, Inc.	SDG:	20G0250
Client:	Floyd - Snider	Project:	Rio Tinto Holden Mine Reclamation/Remediation
Matrix:	Water	Analyzed:	07/31/20 15:55
Batch:	BIG0648	Laboratory ID:	BIG0648-MSD2
Preparation:	REN EPA 600/4-79-020 4.1.4 HNO3 matrix	Sequence Name:	Matrix Spike Dup
Initial/Final:	25 mL / 25 mL	Source Sample:	SW-TP3-East1-072220

COMPOUND	SPIKE ADDED (ug/L)	MSD CONCENTRATION (ug/L)	Q	MSD % REC. #	% RPD #	QC LIMITS RPD	QC LIMITS REC.
Aluminum-27	5000	4560		90.5	1.93	20	75 - 125
Calcium-44	5000	13600		95.0	1.64	20	75 - 125
Iron-54	5000	5580		90.5	1.40	20	75 - 125
Magnesium-24	5000	6180		97.6	2.93	20	75 - 125
Potassium-39	5000	5950		93.0	0.109	20	75 - 125
Sodium-23	5000	5820		92.0	0.478	20	75 - 125

* Values outside of QC limits

MS / MS DUPLICATE RECOVERY

EPA 6020A

Total Metals

Laboratory:	Analytical Resources, Inc.	SDG:	20G0250
Client:	Floyd - Snider	Project:	Rio Tinto Holden Mine Reclamation/Remediation
Matrix:	Water	Analyzed:	08/03/20 16:07
Batch:	BIH0012	Laboratory ID:	BIH0012-MS1
Preparation:	REN EPA 600/4-79-020 4.1.4 HNO3 matrix	Sequence Name:	Matrix Spike
Initial/Final:	25 mL / 25 mL	Source Sample:	SP-30-072020

COMPOUND	SPIKE ADDED (ug/L)	SAMPLE CONCENTRATION (ug/L)	Q	MS CONCENTRATION (ug/L)	Q	MS % REC. #	QC LIMITS REC.
Manganese-55	25.0	3.92		31.8		112	75 - 125

* Values outside of QC limits

MS / MS DUPLICATE RECOVERY

EPA 6020A

Total Metals

Laboratory:	Analytical Resources, Inc.	SDG:	20G0250
Client:	Floyd - Snider	Project:	Rio Tinto Holden Mine Reclamation/Remediation
Matrix:	Water	Analyzed:	08/03/20 16:13
Batch:	BIH0012	Laboratory ID:	BIH0012-MSD1
Preparation:	REN EPA 600/4-79-020 4.1.4 HNO3 matrix	Sequence Name:	Matrix Spike Dup
Initial/Final:	25 mL / 25 mL	Source Sample:	SP-30-072020

COMPOUND	SPIKE ADDED (ug/L)	MSD CONCENTRATION (ug/L)	Q	MSD % REC. #	% RPD #	QC LIMITS RPD	QC LIMITS REC.
Manganese-55	25.0	32.7		115	2.75	20	75 - 125

* Values outside of QC limits

INITIAL CALIBRATION DATA

EPA 6020A

Laboratory: Analytical Resources, Inc.
SDG: 20G0250
Client: Floyd - Snider
Project: Rio Tinto Holden Mine Reclamation/Remediat
Calibration: DG00094
Instrument: ICPMS1
Calibration Date: 07/30/2020 13:00

Compound	Level 01		Level 02		Level 03		Level 04		Level 05		Level 06	
		RF		RF		RF		RF		RF		RF
Manganese-55	0	0	0.5	38352	10	37413.1	20	36530.5	50	37435.04	100	36331.05
Lead-208	0	0	0.1	136310	10	129449.3	20	127756.5	50	126756.9	100	122085.2

INITIAL CALIBRATION DATA

EPA 6020A

Laboratory:	Analytical Resources, Inc.	SDG:	20G0250
Client:	Floyd - Snider	Project:	Rio Tinto Holden Mine Reclamation/Remediat
Calibration:	DG00094	Instrument:	ICPMS1
Calibration Date:	07/30/2020 13:00		

COMPOUND	Mean RF	RF RSD	Linear COD	Quad COD	COD Limit	Q
Manganese-55	31010.28	49.0	0.9998		0.998	
Lead-208	107059.6	49.2	0.9996		0.998	

INITIAL CALIBRATION DATA

EPA 6020A

Laboratory: Analytical Resources, Inc.
SDG: 20G0250
Client: Floyd - Snider
Project: Rio Tinto Holden Mine Reclamation/Remediat
Calibration: DH00001
Instrument: ICPMS1
Calibration Date: 07/31/2020 10:58

Compound	Level 01		Level 02		Level 03		Level 04		Level 05		Level 06	
		RF		RF		RF		RF		RF		RF
Aluminum-27	0	0	20	48938.55	1000	48467.94	2000	48499.21	5000	49630.32	10000	49519.9
Calcium-44	0	0	50	1632.28	1000	1539.691	2000	1524.135	5000	1521.037	10000	1534.227
Iron-54	0	0	20	13003.95	1000	5119.143	2000	4980.04	5000	4968.652	10000	4864.651
Iron-57	0	0	20	2786.5	1000	1639.814	2000	1686.958	5000	1681.388	10000	1710.316
Potassium-39	0	0	20	61860.15	1000	32364.5	2000	31318.26	5000	31607.34	10000	32318.51
Magnesium-24	0	0	20	41177.25	1000	40156.31	2000	40458.29	5000	40269.72	10000	40081.61
Manganese-55	0	0	0.5	49424	10	49796.8	20	47851.85	50	49079.26	100	48004.19
Sodium-23	0	0	100	29988.46	1000	30848.38	2000	30935.7	5000	31116.84	10000	31136.27

INITIAL CALIBRATION DATA

EPA 6020A

Laboratory:	Analytical Resources, Inc.	SDG:	20G0250
Client:	Floyd - Snider	Project:	Rio Tinto Holden Mine Reclamation/Remediat
Calibration:	DH00001	Instrument:	ICPMS1
Calibration Date:	07/31/2020 10:58		

COMPOUND	Mean RF	RF RSD	Linear COD	Quad COD	COD Limit	Q
Aluminum-27	40842.65	49.0	1.0000		0.998	
Calcium-44	1291.895	49.1	1.0000		0.998	
Iron-54	5489.406	76.3	0.9999		0.998	
Iron-57	1584.163	56.4	0.9999		0.998	
Potassium-39	31578.13	62.0	0.9998		0.998	
Magnesium-24	33690.53	49.0	1.0000		0.998	
Manganese-55	40692.68	49.0	0.9999		0.998	
Sodium-23	25670.94	49.0	1.0000		0.998	

INITIAL CALIBRATION DATA

EPA 6020A

Laboratory:	Analytical Resources, Inc.	SDG:	20G0250
Client:	Floyd - Snider	Project:	Rio Tinto Holden Mine Reclamation/Remediat
Calibration:	DH00003	Instrument:	ICPMS1
Calibration Date:	08/03/2020 12:53		

Compound	Level 01		Level 02		Level 03		Level 04		Level 05		Level 06	
		RF		RF		RF		RF		RF		RF
Manganese-55	0	0	0.5	54794	10	53776.6	20	52063.7	50	46788.04	100	46806.34

INITIAL CALIBRATION DATA

EPA 6020A

Laboratory:	Analytical Resources, Inc.	SDG:	20G0250
Client:	Floyd - Snider	Project:	Rio Tinto Holden Mine Reclamation/Remediat
Calibration:	DH00003	Instrument:	ICPMS1
Calibration Date:	08/03/2020 12:53		

COMPOUND	Mean RF	RF RSD	Linear COD	Quad COD	COD Limit	Q
Manganese-55	42371.45	49.6	0.9994		0.998	

INITIAL AND CONTINUING CALIBRATION CHECK

EPA 6020A

Laboratory: Analytical Resources, Inc.
SDG: 20G0250
Client: Floyd - Snider
Project: Rio Tinto Holden Mine Reclamation/Remediation
Instrument ID: ICPMS1
Calibration: DG00094
Control Limt: +/- 10.00%
Sequence: SIG0428

Lab Sample ID	Analyte	True	Found	%R	Units	Method
SIG0428-ICV1	Lead-208	50.000	51.1	102	ug/L	EPA 6020A
	Manganese-55	50.000	51.6	103	ug/L	EPA 6020A
SIG0428-CCV1	Lead-208	50.000	50.3	101	ug/L	EPA 6020A
	Manganese-55	50.000	49.4	98.8	ug/L	EPA 6020A
SIG0428-CCV2	Lead-208	50.000	49.8	99.6	ug/L	EPA 6020A
	Manganese-55	50.000	49.7	99.5	ug/L	EPA 6020A
SIG0428-CCV3	Lead-208	50.000	48.9	97.8	ug/L	EPA 6020A
	Manganese-55	50.000	49.2	98.3	ug/L	EPA 6020A
SIG0428-CCV4	Lead-208	50.000	49.6	99.2	ug/L	EPA 6020A
	Manganese-55	50.000	51.0	102	ug/L	EPA 6020A
SIG0428-CCV5	Lead-208	50.000	49.6	99.2	ug/L	EPA 6020A
	Manganese-55	50.000	50.5	101	ug/L	EPA 6020A
SIG0428-CCV6	Lead-208	50.000	50.1	100	ug/L	EPA 6020A
	Manganese-55	50.000	50.2	100	ug/L	EPA 6020A
SIG0428-CCV7	Lead-208	50.000	49.9	99.7	ug/L	EPA 6020A
	Manganese-55	50.000	48.3	96.6	ug/L	EPA 6020A
SIG0428-CCV8	Lead-208	50.000	49.8	99.7	ug/L	EPA 6020A
	Manganese-55	50.000	49.5	99.0	ug/L	EPA 6020A
SIG0428-CCV9	Lead-208	50.000	49.2	98.5	ug/L	EPA 6020A
	Manganese-55	50.000	49.6	99.1	ug/L	EPA 6020A
SIG0428-CCVA	Lead-208	50.000	48.0	95.9	ug/L	EPA 6020A
	Manganese-55	50.000	51.2	102	ug/L	EPA 6020A

* Values outside of QC limits

INITIAL AND CONTINUING CALIBRATION CHECK

EPA 6020A

Laboratory: Analytical Resources, Inc.
SDG: 20G0250
Client: Floyd - Snider
Project: Rio Tinto Holden Mine Reclamation/Remediation
Instrument ID: ICPMS1
Calibration: DH00001
Control Limt: +/- 10.00%
Sequence: SIG0442

Lab Sample ID	Analyte	True	Found	%R	Units	Method
SIG0442-ICV1	Aluminum-27	5000.0	4830	96.6	ug/L	EPA 6020A
	Calcium-44	5000.0	4930	98.6	ug/L	EPA 6020A
	Iron-54	5000.0	4950	99.0	ug/L	EPA 6020A
	Iron-57	5000.0	4830	96.5	ug/L	EPA 6020A
	Magnesium-24	5000.0	5010	100	ug/L	EPA 6020A
	Manganese-55	50.000	50.4	101	ug/L	EPA 6020A
	Potassium-39	5000.0	4900	97.9	ug/L	EPA 6020A
	Sodium-23	5000.0	4860	97.2	ug/L	EPA 6020A
SIG0442-CCV1	Aluminum-27	5000.0	4850	96.9	ug/L	EPA 6020A
	Calcium-44	5000.0	4920	98.3	ug/L	EPA 6020A
	Iron-54	5000.0	4990	99.8	ug/L	EPA 6020A
	Iron-57	5000.0	4880	97.6	ug/L	EPA 6020A
	Magnesium-24	5000.0	5010	100	ug/L	EPA 6020A
	Manganese-55	50.000	51.3	103	ug/L	EPA 6020A
	Potassium-39	5000.0	4910	98.3	ug/L	EPA 6020A
	Sodium-23	5000.0	4900	98.0	ug/L	EPA 6020A
SIG0442-CCV2	Aluminum-27	5000.0	4710	94.2	ug/L	EPA 6020A
	Calcium-44	5000.0	4740	94.7	ug/L	EPA 6020A
	Iron-54	5000.0	4710	94.2	ug/L	EPA 6020A
	Iron-57	5000.0	4640	92.9	ug/L	EPA 6020A
	Magnesium-24	5000.0	5030	101	ug/L	EPA 6020A
	Manganese-55	50.000	49.2	98.4	ug/L	EPA 6020A
	Potassium-39	5000.0	4630	92.7	ug/L	EPA 6020A
	Sodium-23	5000.0	4820	96.5	ug/L	EPA 6020A
SIG0442-CCV3	Aluminum-27	5000.0	4780	95.5	ug/L	EPA 6020A
	Calcium-44	5000.0	4680	93.6	ug/L	EPA 6020A
	Iron-54	5000.0	4630	92.7	ug/L	EPA 6020A
	Iron-57	5000.0	4730	94.7	ug/L	EPA 6020A
	Magnesium-24	5000.0	4880	97.7	ug/L	EPA 6020A
	Manganese-55	50.000	47.7	95.4	ug/L	EPA 6020A
	Potassium-39	5000.0	4660	93.2	ug/L	EPA 6020A
	Sodium-23	5000.0	4690	93.8	ug/L	EPA 6020A
SIG0442-CCV4	Aluminum-27	5000.0	4770	95.3	ug/L	EPA 6020A
	Calcium-44	5000.0	4720	94.4	ug/L	EPA 6020A

INITIAL AND CONTINUING CALIBRATION CHECK

EPA 6020A

Laboratory: Analytical Resources, Inc.
SDG: 20G0250
Client: Floyd - Snider
Project: Rio Tinto Holden Mine Reclamation/Remediation
Instrument ID: ICPMS1
Calibration: DH00001
Control Limt: +/- 10.00%
Sequence: SIG0442

Lab Sample ID	Analyte	True	Found	%R	Units	Method
SIG0442-CCV4	Iron-54	5000.0	4770	95.3	ug/L	EPA 6020A
	Iron-57	5000.0	4530	90.5	ug/L	EPA 6020A
	Magnesium-24	5000.0	4880	97.5	ug/L	EPA 6020A
	Manganese-55	50.000	46.6	93.2	ug/L	EPA 6020A
	Potassium-39	5000.0	4810	96.1	ug/L	EPA 6020A
	Sodium-23	5000.0	4700	94.0	ug/L	EPA 6020A
SIG0442-CCV5	Aluminum-27	5000.0	4700	94.0	ug/L	EPA 6020A
	Calcium-44	5000.0	4730	94.6	ug/L	EPA 6020A
	Iron-54	5000.0	4640	92.8	ug/L	EPA 6020A
	Iron-57	5000.0	4610	92.2	ug/L	EPA 6020A
	Magnesium-24	5000.0	4910	98.1	ug/L	EPA 6020A
	Manganese-55	50.000	46.5	93.1	ug/L	EPA 6020A
	Potassium-39	5000.0	4700	94.0	ug/L	EPA 6020A
	Sodium-23	5000.0	4630	92.6	ug/L	EPA 6020A
SIG0442-CCV6	Aluminum-27	5000.0	4840	96.9	ug/L	EPA 6020A
	Calcium-44	5000.0	4770	95.4	ug/L	EPA 6020A
	Iron-54	5000.0	4750	94.9	ug/L	EPA 6020A
	Iron-57	5000.0	4640	92.7	ug/L	EPA 6020A
	Magnesium-24	5000.0	4930	98.6	ug/L	EPA 6020A
	Manganese-55	50.000	47.0	94.0	ug/L	EPA 6020A
	Potassium-39	5000.0	4830	96.6	ug/L	EPA 6020A
	Sodium-23	5000.0	4760	95.3	ug/L	EPA 6020A
SIG0442-CCV7	Aluminum-27	5000.0	4430	88.7	ug/L	EPA 6020A
	Calcium-44	5000.0	4520	90.5	ug/L	EPA 6020A
	Iron-54	5000.0	4320	86.4	ug/L	EPA 6020A
	Iron-57	5000.0	4430	88.7	ug/L	EPA 6020A
	Magnesium-24	5000.0	4670	93.3	ug/L	EPA 6020A
	Manganese-55	50.000	44.1	88.2	ug/L	EPA 6020A
	Potassium-39	5000.0	4540	90.9	ug/L	EPA 6020A
	Sodium-23	5000.0	4510	90.2	ug/L	EPA 6020A
SIG0442-CCV8	Aluminum-27	5000.0	4510	90.1	ug/L	EPA 6020A
	Calcium-44	5000.0	4500	90.0	ug/L	EPA 6020A
	Iron-54	5000.0	4400	88.1	ug/L	EPA 6020A
	Iron-57	5000.0	4390	87.9	ug/L	EPA 6020A

INITIAL AND CONTINUING CALIBRATION CHECK

EPA 6020A

Laboratory: Analytical Resources, Inc.
SDG: 20G0250
Client: Floyd - Snider
Project: Rio Tinto Holden Mine Reclamation/Remediation
Instrument ID: ICPMS1
Calibration: DH00001
Control Limt: +/- 10.00%
Sequence: SIG0442

Lab Sample ID	Analyte	True	Found	%R	Units	Method
SIG0442-CCV8	Magnesium-24	5000.0	4760	95.3	ug/L	EPA 6020A
	Manganese-55	50.000	44.7	89.5	ug/L	EPA 6020A
	Potassium-39	5000.0	4720	94.3	ug/L	EPA 6020A
	Sodium-23	5000.0	4420	88.3	ug/L	EPA 6020A

* Values outside of QC limits

INITIAL AND CONTINUING CALIBRATION CHECK

EPA 6020A

Laboratory: Analytical Resources, Inc.
SDG: 20G0250
Client: Floyd - Snider
Project: Rio Tinto Holden Mine Reclamation/Remediation
Instrument ID: ICPMS1
Calibration: DH00003
Control Limt: +/- 10.00%
Sequence: SIH0014

Lab Sample ID	Analyte	True	Found	%R	Units	Method
SIH0014-ICV1	Manganese-55	50.000	52.3	105	ug/L	EPA 6020A
SIH0014-CCV1	Manganese-55	50.000	51.3	103	ug/L	EPA 6020A
SIH0014-CCV2	Manganese-55	50.000	50.2	100	ug/L	EPA 6020A
SIH0014-CCV3	Manganese-55	50.000	49.7	99.5	ug/L	EPA 6020A
SIH0014-CCV4	Manganese-55	50.000	50.7	101	ug/L	EPA 6020A
SIH0014-CCV5	Manganese-55	50.000	48.0	96.0	ug/L	EPA 6020A
SIH0014-CCV6	Manganese-55	50.000	47.5	95.0	ug/L	EPA 6020A

* Values outside of QC limits

INSTRUMENT BLANKS
EPA 6020A

Laboratory: Analytical Resources, Inc.
Client: Floyd - Snider
Instrument ID: ICPMS1
Sequence: SIG0428

SDG: 20G0250
Project: Rio Tinto Holden Mine Reclamation/R
Calibration: DG00094
Date Analyzed: 07/30/20 13:30

Lab Sample ID	Analyte	Found	MDL	MRL	Units	C
SIG0428-IBL1	Lead-208	0.00700	0.068	0.100	ug/L	
SIG0428-IBL1	Manganese-55	0.00	0.085	0.500	ug/L	
SIG0428-ICB1	Lead-208	0.00400	0.068	0.100	ug/L	
SIG0428-ICB1	Manganese-55	0.00	0.085	0.500	ug/L	
SIG0428-CCB1	Lead-208	0.00400	0.068	0.100	ug/L	
SIG0428-CCB1	Manganese-55	0.00100	0.085	0.500	ug/L	
SIG0428-IBL2	Lead-208	0.0110	0.068	0.100	ug/L	
SIG0428-IBL2	Manganese-55	0.00800	0.085	0.500	ug/L	
SIG0428-CCB2	Lead-208	0.00600	0.068	0.100	ug/L	
SIG0428-CCB2	Manganese-55	0.00100	0.085	0.500	ug/L	
SIG0428-IBL3	Lead-208	0.00700	0.068	0.100	ug/L	
SIG0428-IBL3	Manganese-55	0.00400	0.085	0.500	ug/L	
SIG0428-CCB3	Lead-208	0.00400	0.068	0.100	ug/L	
SIG0428-CCB3	Manganese-55	0.00200	0.085	0.500	ug/L	
SIG0428-IBL4	Lead-208	0.0110	0.068	0.100	ug/L	
SIG0428-IBL4	Manganese-55	0.00400	0.085	0.500	ug/L	
SIG0428-CCB4	Lead-208	0.00800	0.068	0.100	ug/L	
SIG0428-CCB4	Manganese-55	0.00300	0.085	0.500	ug/L	
SIG0428-CCB5	Lead-208	0.00400	0.068	0.100	ug/L	
SIG0428-CCB5	Manganese-55	0.00200	0.085	0.500	ug/L	
SIG0428-CCB6	Lead-208	0.00400	0.068	0.100	ug/L	
SIG0428-CCB6	Manganese-55	0.00200	0.085	0.500	ug/L	
SIG0428-IBL5	Lead-208	0.00	0.068	0.100	ug/L	
SIG0428-IBL5	Manganese-55	0.00100	0.085	0.500	ug/L	
SIG0428-CCB7	Lead-208	0.0180	0.068	0.100	ug/L	
SIG0428-CCB7	Manganese-55	0.0760	0.085	0.500	ug/L	
SIG0428-CCB8	Lead-208	0.00	0.068	0.100	ug/L	
SIG0428-CCB8	Manganese-55	-0.00100	0.085	0.500	ug/L	
SIG0428-IBL6	Lead-208	-0.00500	0.068	0.100	ug/L	
SIG0428-IBL6	Manganese-55	-0.00100	0.085	0.500	ug/L	
SIG0428-IBL7	Lead-208	-0.00500	0.068	0.100	ug/L	
SIG0428-IBL7	Manganese-55	0.00600	0.085	0.500	ug/L	
SIG0428-CCB9	Lead-208	-0.00100	0.068	0.100	ug/L	
SIG0428-CCB9	Manganese-55	0.00	0.085	0.500	ug/L	

INSTRUMENT BLANKS
EPA 6020A

Laboratory: Analytical Resources, Inc.
Client: Floyd - Snider
Instrument ID: ICPMS1
Sequence: SIG0428

SDG: 20G0250
Project: Rio Tinto Holden Mine Reclamation/R
Calibration: DG00094
Date Analyzed: 07/30/20 21:16

Lab Sample ID	Analyte	Found	MDL	MRL	Units	C
SIG0428-IBL8	Lead-208	0.0140	0.068	0.100	ug/L	
SIG0428-IBL8	Manganese-55	0.0980	0.085	0.500	ug/L	
SIG0428-IBL9	Lead-208	-0.00500	0.068	0.100	ug/L	
SIG0428-IBL9	Manganese-55	0.00500	0.085	0.500	ug/L	
SIG0428-CCBA	Lead-208	-0.00100	0.068	0.100	ug/L	
SIG0428-CCBA	Manganese-55	0.00600	0.085	0.500	ug/L	

INSTRUMENT BLANKS
EPA 6020A

Laboratory: Analytical Resources, Inc.
Client: Floyd - Snider
Instrument ID: ICPMS1
Sequence: SIG0442

SDG: 20G0250
Project: Rio Tinto Holden Mine Reclamation/R
Calibration: DH00001
Date Analyzed: 07/31/20 11:29

Lab Sample ID	Analyte	Found	MDL	MRL	Units	C
SIG0442-IBL1	Aluminum-27	-0.192	2.37	20.0	ug/L	
SIG0442-IBL1	Calcium-44	-4.12	1.91	50.0	ug/L	
SIG0442-IBL1	Iron-54	-0.221	6.27	20.0	ug/L	
SIG0442-IBL1	Iron-57	0.146	1.4	20.0	ug/L	
SIG0442-IBL1	Magnesium-24	-0.107	0.307	20.0	ug/L	
SIG0442-IBL1	Manganese-55	-0.0140	0.085	0.500	ug/L	
SIG0442-IBL1	Potassium-39	0.264	1.41	20.0	ug/L	
SIG0442-IBL1	Sodium-23	-0.81	7.18	100	ug/L	
SIG0442-ICB1	Aluminum-27	-0.205	2.37	20.0	ug/L	
SIG0442-ICB1	Calcium-44	-4.32	1.91	50.0	ug/L	
SIG0442-ICB1	Iron-54	-1.36	6.27	20.0	ug/L	
SIG0442-ICB1	Iron-57	0.330	1.4	20.0	ug/L	
SIG0442-ICB1	Magnesium-24	-0.115	0.307	20.0	ug/L	
SIG0442-ICB1	Manganese-55	-0.0130	0.085	0.500	ug/L	
SIG0442-ICB1	Potassium-39	-0.498	1.41	20.0	ug/L	
SIG0442-ICB1	Sodium-23	-0.89	7.18	100	ug/L	
SIG0442-CCB1	Aluminum-27	0.132	2.37	20.0	ug/L	
SIG0442-CCB1	Calcium-44	-3.94	1.91	50.0	ug/L	
SIG0442-CCB1	Iron-54	-0.848	6.27	20.0	ug/L	
SIG0442-CCB1	Iron-57	0.909	1.4	20.0	ug/L	
SIG0442-CCB1	Magnesium-24	0.232	0.307	20.0	ug/L	
SIG0442-CCB1	Manganese-55	-0.00900	0.085	0.500	ug/L	
SIG0442-CCB1	Potassium-39	0.252	1.41	20.0	ug/L	
SIG0442-CCB1	Sodium-23	-0.56	7.18	100	ug/L	
SIG0442-IBL2	Aluminum-27	20.0	2.37	20.0	ug/L	
SIG0442-IBL2	Calcium-44	52.3	1.91	50.0	ug/L	
SIG0442-IBL2	Iron-54	17.0	6.27	20.0	ug/L	
SIG0442-IBL2	Iron-57	16.9	1.4	20.0	ug/L	
SIG0442-IBL2	Magnesium-24	18.5	0.307	20.0	ug/L	
SIG0442-IBL2	Manganese-55	0.288	0.085	0.500	ug/L	
SIG0442-IBL2	Potassium-39	22.8	1.41	20.0	ug/L	
SIG0442-IBL2	Sodium-23	23.7	7.18	100	ug/L	
SIG0442-IBL3	Aluminum-27	13.1	2.37	20.0	ug/L	
SIG0442-IBL3	Calcium-44	40.2	1.91	50.0	ug/L	

INSTRUMENT BLANKS
EPA 6020A

Laboratory: Analytical Resources, Inc.
Client: Floyd - Snider
Instrument ID: ICPMS1
Sequence: SIG0442

SDG: 20G0250
Project: Rio Tinto Holden Mine Reclamation/R
Calibration: DH00001
Date Analyzed: 07/31/20 12:28

Lab Sample ID	Analyte	Found	MDL	MRL	Units	C
SIG0442-IBL3	Iron-54	11.1	6.27	20.0	ug/L	
SIG0442-IBL3	Iron-57	14.6	1.4	20.0	ug/L	
SIG0442-IBL3	Magnesium-24	11.8	0.307	20.0	ug/L	
SIG0442-IBL3	Manganese-55	0.202	0.085	0.500	ug/L	
SIG0442-IBL3	Potassium-39	19.7	1.41	20.0	ug/L	
SIG0442-IBL3	Sodium-23	20.0	7.18	100	ug/L	
SIG0442-IBL4	Aluminum-27	-0.196	2.37	20.0	ug/L	
SIG0442-IBL4	Calcium-44	-6.65	1.91	50.0	ug/L	
SIG0442-IBL4	Iron-54	-1.52	6.27	20.0	ug/L	
SIG0442-IBL4	Iron-57	0.532	1.4	20.0	ug/L	
SIG0442-IBL4	Magnesium-24	-0.193	0.307	20.0	ug/L	
SIG0442-IBL4	Manganese-55	-0.0190	0.085	0.500	ug/L	
SIG0442-IBL4	Potassium-39	-0.576	1.41	20.0	ug/L	
SIG0442-IBL4	Sodium-23	-1.03	7.18	100	ug/L	
SIG0442-CCB2	Aluminum-27	0.187	2.37	20.0	ug/L	
SIG0442-CCB2	Calcium-44	-4.18	1.91	50.0	ug/L	
SIG0442-CCB2	Iron-54	-1.09	6.27	20.0	ug/L	
SIG0442-CCB2	Iron-57	0.864	1.4	20.0	ug/L	
SIG0442-CCB2	Magnesium-24	0.279	0.307	20.0	ug/L	
SIG0442-CCB2	Manganese-55	-0.00700	0.085	0.500	ug/L	
SIG0442-CCB2	Potassium-39	0.640	1.41	20.0	ug/L	
SIG0442-CCB2	Sodium-23	-0.29	7.18	100	ug/L	
SIG0442-IBL5	Aluminum-27	-0.184	2.37	20.0	ug/L	
SIG0442-IBL5	Calcium-44	-5.18	1.91	50.0	ug/L	
SIG0442-IBL5	Iron-54	-1.77	6.27	20.0	ug/L	
SIG0442-IBL5	Iron-57	-0.222	1.4	20.0	ug/L	
SIG0442-IBL5	Magnesium-24	-0.186	0.307	20.0	ug/L	
SIG0442-IBL5	Manganese-55	-0.0170	0.085	0.500	ug/L	
SIG0442-IBL5	Potassium-39	4.53	1.41	20.0	ug/L	
SIG0442-IBL5	Sodium-23	-1.30	7.18	100	ug/L	
SIG0442-IBL6	Aluminum-27	-0.183	2.37	20.0	ug/L	
SIG0442-IBL6	Calcium-44	-6.01	1.91	50.0	ug/L	
SIG0442-IBL6	Iron-54	-1.19	6.27	20.0	ug/L	
SIG0442-IBL6	Iron-57	-1.42	1.4	20.0	ug/L	

INSTRUMENT BLANKS
EPA 6020A

Laboratory: Analytical Resources, Inc.
Client: Floyd - Snider
Instrument ID: ICPMS1
Sequence: SIG0442

SDG: 20G0250
Project: Rio Tinto Holden Mine Reclamation/R
Calibration: DH00001
Date Analyzed: 07/31/20 13:44

Lab Sample ID	Analyte	Found	MDL	MRL	Units	C
SIG0442-IBL6	Magnesium-24	-0.178	0.307	20.0	ug/L	
SIG0442-IBL6	Manganese-55	-0.0170	0.085	0.500	ug/L	
SIG0442-IBL6	Potassium-39	4.19	1.41	20.0	ug/L	
SIG0442-IBL6	Sodium-23	-1.36	7.18	100	ug/L	
SIG0442-CCB3	Aluminum-27	-0.117	2.37	20.0	ug/L	
SIG0442-CCB3	Calcium-44	-4.15	1.91	50.0	ug/L	
SIG0442-CCB3	Iron-54	0.710	6.27	20.0	ug/L	
SIG0442-CCB3	Iron-57	-2.52	1.4	20.0	ug/L	
SIG0442-CCB3	Magnesium-24	-0.033	0.307	20.0	ug/L	
SIG0442-CCB3	Manganese-55	-0.00900	0.085	0.500	ug/L	
SIG0442-CCB3	Potassium-39	3.45	1.41	20.0	ug/L	
SIG0442-CCB3	Sodium-23	-0.84	7.18	100	ug/L	
SIG0442-IBL7	Aluminum-27	-0.308	2.37	20.0	ug/L	
SIG0442-IBL7	Calcium-44	-7.53	1.91	50.0	ug/L	
SIG0442-IBL7	Iron-54	-0.764	6.27	20.0	ug/L	
SIG0442-IBL7	Iron-57	-0.208	1.4	20.0	ug/L	
SIG0442-IBL7	Magnesium-24	-0.173	0.307	20.0	ug/L	
SIG0442-IBL7	Manganese-55	-0.0210	0.085	0.500	ug/L	
SIG0442-IBL7	Potassium-39	0.907	1.41	20.0	ug/L	
SIG0442-IBL7	Sodium-23	-1.26	7.18	100	ug/L	
SIG0442-CCB4	Aluminum-27	-0.132	2.37	20.0	ug/L	
SIG0442-CCB4	Calcium-44	-4.83	1.91	50.0	ug/L	
SIG0442-CCB4	Iron-54	-0.212	6.27	20.0	ug/L	
SIG0442-CCB4	Iron-57	2.86	1.4	20.0	ug/L	
SIG0442-CCB4	Magnesium-24	-0.046	0.307	20.0	ug/L	
SIG0442-CCB4	Manganese-55	-0.0120	0.085	0.500	ug/L	
SIG0442-CCB4	Potassium-39	2.11	1.41	20.0	ug/L	
SIG0442-CCB4	Sodium-23	-0.90	7.18	100	ug/L	
SIG0442-IBL8	Aluminum-27	0.116	2.37	20.0	ug/L	
SIG0442-IBL8	Calcium-44	13.0	1.91	50.0	ug/L	
SIG0442-IBL8	Iron-54	-2.59	6.27	20.0	ug/L	
SIG0442-IBL8	Iron-57	0.256	1.4	20.0	ug/L	
SIG0442-IBL8	Magnesium-24	1.03	0.307	20.0	ug/L	
SIG0442-IBL8	Manganese-55	-0.00900	0.085	0.500	ug/L	

INSTRUMENT BLANKS
EPA 6020A

Laboratory: Analytical Resources, Inc.
Client: Floyd - Snider
Instrument ID: ICPMS1
Sequence: SIG0442

SDG: 20G0250
Project: Rio Tinto Holden Mine Reclamation/R
Calibration: DH00001
Date Analyzed: 07/31/20 15:16

Lab Sample ID	Analyte	Found	MDL	MRL	Units	C
SIG0442-IBL8	Potassium-39	5.72	1.41	20.0	ug/L	
SIG0442-IBL8	Sodium-23	9.75	7.18	100	ug/L	
SIG0442-IBL9	Aluminum-27	-0.306	2.37	20.0	ug/L	
SIG0442-IBL9	Calcium-44	-7.60	1.91	50.0	ug/L	
SIG0442-IBL9	Iron-54	-1.08	6.27	20.0	ug/L	
SIG0442-IBL9	Iron-57	-4.62	1.4	20.0	ug/L	
SIG0442-IBL9	Magnesium-24	-0.201	0.307	20.0	ug/L	
SIG0442-IBL9	Manganese-55	-0.0210	0.085	0.500	ug/L	
SIG0442-IBL9	Potassium-39	1.98	1.41	20.0	ug/L	
SIG0442-IBL9	Sodium-23	-1.61	7.18	100	ug/L	
SIG0442-CCB5	Aluminum-27	0.208	2.37	20.0	ug/L	
SIG0442-CCB5	Calcium-44	-4.18	1.91	50.0	ug/L	
SIG0442-CCB5	Iron-54	-0.777	6.27	20.0	ug/L	
SIG0442-CCB5	Iron-57	-1.84	1.4	20.0	ug/L	
SIG0442-CCB5	Magnesium-24	0.330	0.307	20.0	ug/L	
SIG0442-CCB5	Manganese-55	-0.00600	0.085	0.500	ug/L	
SIG0442-CCB5	Potassium-39	3.09	1.41	20.0	ug/L	
SIG0442-CCB5	Sodium-23	-0.52	7.18	100	ug/L	
SIG0442-IBLA	Aluminum-27	-0.308	2.37	20.0	ug/L	
SIG0442-IBLA	Calcium-44	-7.31	1.91	50.0	ug/L	
SIG0442-IBLA	Iron-54	-0.847	6.27	20.0	ug/L	
SIG0442-IBLA	Iron-57	-3.66	1.4	20.0	ug/L	
SIG0442-IBLA	Magnesium-24	-0.201	0.307	20.0	ug/L	
SIG0442-IBLA	Manganese-55	-0.0200	0.085	0.500	ug/L	
SIG0442-IBLA	Potassium-39	3.50	1.41	20.0	ug/L	
SIG0442-IBLA	Sodium-23	-1.18	7.18	100	ug/L	
SIG0442-CCB6	Aluminum-27	-0.166	2.37	20.0	ug/L	
SIG0442-CCB6	Calcium-44	-5.13	1.91	50.0	ug/L	
SIG0442-CCB6	Iron-54	-0.949	6.27	20.0	ug/L	
SIG0442-CCB6	Iron-57	-1.83	1.4	20.0	ug/L	
SIG0442-CCB6	Magnesium-24	-0.099	0.307	20.0	ug/L	
SIG0442-CCB6	Manganese-55	-0.0110	0.085	0.500	ug/L	
SIG0442-CCB6	Potassium-39	3.04	1.41	20.0	ug/L	
SIG0442-CCB6	Sodium-23	-0.99	7.18	100	ug/L	

INSTRUMENT BLANKS
EPA 6020A

Laboratory: Analytical Resources, Inc.
Client: Floyd - Snider
Instrument ID: ICPMS1
Sequence: SIG0442

SDG: 20G0250
Project: Rio Tinto Holden Mine Reclamation/R
Calibration: DH00001
Date Analyzed: 07/31/20 18:15

Lab Sample ID	Analyte	Found	MDL	MRL	Units	C
SIG0442-IBLB	Aluminum-27	-0.333	2.37	20.0	ug/L	
SIG0442-IBLB	Calcium-44	-7.83	1.91	50.0	ug/L	
SIG0442-IBLB	Iron-54	-2.70	6.27	20.0	ug/L	
SIG0442-IBLB	Iron-57	4.60	1.4	20.0	ug/L	
SIG0442-IBLB	Magnesium-24	-0.078	0.307	20.0	ug/L	
SIG0442-IBLB	Manganese-55	-0.0200	0.085	0.500	ug/L	
SIG0442-IBLB	Potassium-39	1.17	1.41	20.0	ug/L	
SIG0442-IBLB	Sodium-23	-1.47	7.18	100	ug/L	
SIG0442-CCB7	Aluminum-27	-0.290	2.37	20.0	ug/L	
SIG0442-CCB7	Calcium-44	-6.89	1.91	50.0	ug/L	
SIG0442-CCB7	Iron-54	-2.45	6.27	20.0	ug/L	
SIG0442-CCB7	Iron-57	4.89	1.4	20.0	ug/L	
SIG0442-CCB7	Magnesium-24	-0.148	0.307	20.0	ug/L	
SIG0442-CCB7	Manganese-55	-0.0170	0.085	0.500	ug/L	
SIG0442-CCB7	Potassium-39	2.00	1.41	20.0	ug/L	
SIG0442-CCB7	Sodium-23	-1.46	7.18	100	ug/L	
SIG0442-IBLC	Aluminum-27	-0.329	2.37	20.0	ug/L	
SIG0442-IBLC	Calcium-44	-8.08	1.91	50.0	ug/L	
SIG0442-IBLC	Iron-54	-2.33	6.27	20.0	ug/L	
SIG0442-IBLC	Iron-57	1.38	1.4	20.0	ug/L	
SIG0442-IBLC	Magnesium-24	-0.177	0.307	20.0	ug/L	
SIG0442-IBLC	Manganese-55	-0.0190	0.085	0.500	ug/L	
SIG0442-IBLC	Potassium-39	0.072	1.41	20.0	ug/L	
SIG0442-IBLC	Sodium-23	-1.57	7.18	100	ug/L	
SIG0442-IBLD	Aluminum-27	-0.328	2.37	20.0	ug/L	
SIG0442-IBLD	Calcium-44	-8.03	1.91	50.0	ug/L	
SIG0442-IBLD	Iron-54	-0.927	6.27	20.0	ug/L	
SIG0442-IBLD	Iron-57	-2.47	1.4	20.0	ug/L	
SIG0442-IBLD	Magnesium-24	-0.170	0.307	20.0	ug/L	
SIG0442-IBLD	Manganese-55	-0.0140	0.085	0.500	ug/L	
SIG0442-IBLD	Potassium-39	5.82	1.41	20.0	ug/L	
SIG0442-IBLD	Sodium-23	-0.97	7.18	100	ug/L	
SIG0442-CCB8	Aluminum-27	-0.163	2.37	20.0	ug/L	
SIG0442-CCB8	Calcium-44	-6.85	1.91	50.0	ug/L	

INSTRUMENT BLANKS
EPA 6020A

Laboratory: Analytical Resources, Inc.
Client: Floyd - Snider
Instrument ID: ICPMS1
Sequence: SIG0442

SDG: 20G0250
Project: Rio Tinto Holden Mine Reclamation/R
Calibration: DH00001
Date Analyzed: 07/31/20 19:29

Lab Sample ID	Analyte	Found	MDL	MRL	Units	C
SIG0442-CCB8	Iron-54	-0.943	6.27	20.0	ug/L	
SIG0442-CCB8	Iron-57	0.417	1.4	20.0	ug/L	
SIG0442-CCB8	Magnesium-24	0.004	0.307	20.0	ug/L	
SIG0442-CCB8	Manganese-55	-0.0140	0.085	0.500	ug/L	
SIG0442-CCB8	Potassium-39	3.99	1.41	20.0	ug/L	
SIG0442-CCB8	Sodium-23	-1.13	7.18	100	ug/L	

INSTRUMENT BLANKS
EPA 6020A

Laboratory: Analytical Resources, Inc.
SDG: 20G0250
Client: Floyd - Snider
Project: Rio Tinto Holden Mine Reclamation/R
Instrument ID: ICPMS1
Calibration: DH00003
Sequence: SIH0014
Date Analyzed: 08/03/20 13:22

Lab Sample ID	Analyte	Found	MDL	MRL	Units	C
SIH0014-IBL1	Manganese-55	0.00	0.085	0.500	ug/L	
SIH0014-ICB1	Manganese-55	0.00	0.085	0.500	ug/L	
SIH0014-CCB1	Manganese-55	-0.00100	0.085	0.500	ug/L	
SIH0014-IBL2	Manganese-55	0.0650	0.085	0.500	ug/L	
SIH0014-CCB2	Manganese-55	0.00100	0.085	0.500	ug/L	
SIH0014-CCB3	Manganese-55	0.00	0.085	0.500	ug/L	
SIH0014-IBL3	Manganese-55	0.00	0.085	0.500	ug/L	
SIH0014-CCB4	Manganese-55	0.00	0.085	0.500	ug/L	
SIH0014-IBL4	Manganese-55	-0.00100	0.085	0.500	ug/L	
SIH0014-IBL5	Manganese-55	0.00	0.085	0.500	ug/L	
SIH0014-CCB5	Manganese-55	-0.00100	0.085	0.500	ug/L	
SIH0014-IBL6	Manganese-55	0.139	0.085	0.500	ug/L	
SIH0014-CCB6	Manganese-55	-0.00200	0.085	0.500	ug/L	

ANALYSIS BATCH (SEQUENCE) SUMMARY

EPA 6020A

Laboratory: Analytical Resources, Inc.
SDG: 20G0250
Client: Floyd - Snider
Project: Rio Tinto Holden Mine Reclamation/Remediation
Sequence: SIG0428
Instrument: ICPMS1
Calibration: DG00094

Sample Name	Lab Sample ID	Lab File ID	Matrix	Analysis Date/Time
CAL 0	SIG0428-CAL1	XDT_m1200730-007	NA	07/30/20 13:00
CAL 1 - LOW CHECK	SIG0428-CAL2	XDT_m1200730-008	NA	07/30/20 13:04
CAL 2	SIG0428-CAL3	XDT_m1200730-009	NA	07/30/20 13:08
CAL 3	SIG0428-CAL4	XDT_m1200730-010	NA	07/30/20 13:13
CAL 4	SIG0428-CAL5	XDT_m1200730-011	NA	07/30/20 13:17
CAL 5	SIG0428-CAL6	XDT_m1200730-012	NA	07/30/20 13:23
RINSE	SIG0428-IBL1	XDT_m1200730-013	NA	07/30/20 13:30
Initial Cal Check	SIG0428-ICV1	XDT_m1200730-015	NA	07/30/20 13:35
Initial Cal Blank	SIG0428-ICB1	XDT_m1200730-016	NA	07/30/20 13:42
Calibration Check	SIG0428-CCV1	XDT_m1200730-017	NA	07/30/20 13:46
Calibration Blank	SIG0428-CCB1	XDT_m1200730-018	NA	07/30/20 13:53
Instrument RL Check	SIG0428-CRL1	XDT_m1200730-020	NA	07/30/20 14:01
Interference Check A	SIG0428-IFA1	XDT_m1200730-021	NA	07/30/20 14:06
Interference Check B	SIG0428-IFB1	XDT_m1200730-022	NA	07/30/20 14:10
LR200	SIG0428-HCV1	XDT_m1200730-023	NA	07/30/20 14:14
LR300	SIG0428-HCV2	XDT_m1200730-024	NA	07/30/20 14:18
Instrument Blank	SIG0428-IBL2	XDT_m1200730-025	NA	07/30/20 14:25
Calibration Check	SIG0428-CCV2	XDT_m1200730-026	NA	07/30/20 14:31
Calibration Blank	SIG0428-CCB2	XDT_m1200730-027	NA	07/30/20 14:37
Blank	BIG0648-BLK1	XDT_m1200730-028	Water	07/30/20 14:44
LCS	BIG0648-BS1	XDT_m1200730-029	Water	07/30/20 14:48
SW-TP3-East1-072220	20G0250-08	XDT_m1200730-032	Water	07/30/20 15:08
SW-TP3-East1-072220	20G0250-08	XDT_m1200730-032	Water	07/30/20 15:08
SW-TP3-East1-072220	BIG0648-DUP1	XDT_m1200730-033	Water	07/30/20 15:16
SW-TP3-East1-072220	BIG0648-DUP1	XDT_m1200730-033	Water	07/30/20 15:16
SW-TP3-East1-072220	BIG0648-DUP1	XDT_m1200730-033	Water	07/30/20 15:16
SW-TP3-East1-072220	BIG0648-DUP1	XDT_m1200730-033	Water	07/30/20 15:16
SW-TP3-East1-072220	BIG0648-DUP1	XDT_m1200730-033	Water	07/30/20 15:16
SW-TP3-East1-072220	BIG0648-MS1	XDT_m1200730-034	Water	07/30/20 15:20
SW-TP3-East1-072220	BIG0648-MS1	XDT_m1200730-034	Water	07/30/20 15:20

ANALYSIS BATCH (SEQUENCE) SUMMARY

EPA 6020A

Laboratory: Analytical Resources, Inc.
SDG: 20G0250
Client: Floyd - Snider
Project: Rio Tinto Holden Mine Reclamation/Remediation
Sequence: SIG0428
Instrument: ICPMS1
Calibration: DG00094

Sample Name	Lab Sample ID	Lab File ID	Matrix	Analysis Date/Time
SW-TP3-East1-072220	BIG0648-MS1	XDT_m1200730-034	Water	07/30/20 15:20
SW-TP3-East1-072220	BIG0648-MS1	XDT_m1200730-034	Water	07/30/20 15:20
SW-TP3-East1-072220	BIG0648-MS1	XDT_m1200730-034	Water	07/30/20 15:20
SW-TP3-East1-072220	BIG0648-MSD1	XDT_m1200730-035	Water	07/30/20 15:25
SW-TP3-East1-072220	BIG0648-MSD1	XDT_m1200730-035	Water	07/30/20 15:25
SW-TP3-East1-072220	BIG0648-MSD1	XDT_m1200730-035	Water	07/30/20 15:25
SW-TP3-East1-072220	BIG0648-MSD1	XDT_m1200730-035	Water	07/30/20 15:25
SW-TP3-East1-072220	BIG0648-MSD1	XDT_m1200730-035	Water	07/30/20 15:25
Instrument Blank	SIG0428-IBL3	XDT_m1200730-036	NA	07/30/20 15:32
Calibration Check	SIG0428-CCV3	XDT_m1200730-038	NA	07/30/20 15:42
Calibration Blank	SIG0428-CCB3	XDT_m1200730-039	NA	07/30/20 15:49
ZZZZZ	20G0193-02	XDT_m1200730-040	Solid	07/30/20 15:56
ZZZZZ	20G0193-03	XDT_m1200730-041	Solid	07/30/20 16:00
ZZZZZ	20G0193-04	XDT_m1200730-042	Solid	07/30/20 16:04
ZZZZZ	20G0193-01	XDT_m1200730-043	Solid	07/30/20 16:08
Instrument Blank	SIG0428-IBL4	XDT_m1200730-049	NA	07/30/20 16:39
Calibration Check	SIG0428-CCV4	XDT_m1200730-050	NA	07/30/20 16:44
Calibration Blank	SIG0428-CCB4	XDT_m1200730-051	NA	07/30/20 16:51
ZZZZZ	20G0193-05	XDT_m1200730-059	Solid	07/30/20 17:25
ZZZZZ	20G0193-06	XDT_m1200730-060	Solid	07/30/20 17:29
ZZZZZ	20G0193-07	XDT_m1200730-061	Solid	07/30/20 17:33
Calibration Check	SIG0428-CCV5	XDT_m1200730-062	NA	07/30/20 17:41
Calibration Blank	SIG0428-CCB5	XDT_m1200730-063	NA	07/30/20 17:47
Calibration Check	SIG0428-CCV6	XDT_m1200730-074	NA	07/30/20 18:37
Calibration Blank	SIG0428-CCB6	XDT_m1200730-075	NA	07/30/20 18:44
Field-Blank-072220	20G0250-07	XDT_m1200730-076	Water	07/30/20 18:48
Instrument Blank	SIG0428-IBL5	XDT_m1200730-085	NA	07/30/20 19:29
Calibration Check	SIG0428-CCV7	XDT_m1200730-086	NA	07/30/20 19:35
Calibration Blank	SIG0428-CCB7	XDT_m1200730-087	NA	07/30/20 19:41
Calibration Check	SIG0428-CCV8	XDT_m1200730-089	NA	07/30/20 19:49

ANALYSIS BATCH (SEQUENCE) SUMMARY

EPA 6020A

Laboratory: Analytical Resources, Inc.
SDG: 20G0250
Client: Floyd - Snider
Project: Rio Tinto Holden Mine Reclamation/Remediation
Sequence: SIG0428
Instrument: ICPMS1
Calibration: DG00094

Sample Name	Lab Sample ID	Lab File ID	Matrix	Analysis Date/Time
Calibration Blank	SIG0428-CCB8	XDT_m1200730-090	NA	07/30/20 19:56
SP-30-072020	20G0250-01	XDT_m1200730-091	Water	07/30/20 20:00
SP-34-072120	20G0250-02	XDT_m1200730-092	Water	07/30/20 20:04
SP-40-072120	20G0250-03	XDT_m1200730-093	Water	07/30/20 20:08
SP-32-072120	20G0250-04	XDT_m1200730-094	Water	07/30/20 20:12
SP-26-072220	20G0250-05	XDT_m1200730-095	Water	07/30/20 20:16
SP-126-072220	20G0250-06	XDT_m1200730-096	Water	07/30/20 20:20
SW-TP3-East2-072220	20G0250-09	XDT_m1200730-097	Water	07/30/20 20:24
Instrument Blank	SIG0428-IBL6	XDT_m1200730-098	NA	07/30/20 20:32
Instrument Blank	SIG0428-IBL7	XDT_m1200730-100	NA	07/30/20 20:45
Calibration Check	SIG0428-CCV9	XDT_m1200730-101	NA	07/30/20 20:50
Calibration Blank	SIG0428-CCB9	XDT_m1200730-102	NA	07/30/20 20:57
Instrument Blank	SIG0428-IBL8	XDT_m1200730-106	NA	07/30/20 21:16
Instrument Blank	SIG0428-IBL9	XDT_m1200730-112	NA	07/30/20 21:45
Calibration Check	SIG0428-CCVA	XDT_m1200730-113	NA	07/30/20 21:51
Calibration Blank	SIG0428-CCBA	XDT_m1200730-114	NA	07/30/20 21:57

ANALYSIS BATCH (SEQUENCE) SUMMARY

EPA 6020A

Laboratory: Analytical Resources, Inc.
SDG: 20G0250
Client: Floyd - Snider
Project: Rio Tinto Holden Mine Reclamation/Remediation
Sequence: SIG0442
Instrument: ICPMS1
Calibration: DH00001

Sample Name	Lab Sample ID	Lab File ID	Matrix	Analysis Date/Time
CAL 0	SIG0442-CAL1	XDT_m1200731-006	NA	07/31/20 10:58
CAL 1 - LOW CHECK	SIG0442-CAL2	XDT_m1200731-007	NA	07/31/20 11:02
CAL 2	SIG0442-CAL3	XDT_m1200731-008	NA	07/31/20 11:07
CAL 3	SIG0442-CAL4	XDT_m1200731-009	NA	07/31/20 11:11
CAL 4	SIG0442-CAL5	XDT_m1200731-010	NA	07/31/20 11:16
CAL 5	SIG0442-CAL6	XDT_m1200731-011	NA	07/31/20 11:22
RINSE	SIG0442-IBL1	XDT_m1200731-012	NA	07/31/20 11:29
Initial Cal Check	SIG0442-ICV1	XDT_m1200731-014	NA	07/31/20 11:34
Initial Cal Blank	SIG0442-ICB1	XDT_m1200731-015	NA	07/31/20 11:41
Calibration Check	SIG0442-CCV1	XDT_m1200731-016	NA	07/31/20 11:46
Calibration Blank	SIG0442-CCB1	XDT_m1200731-017	NA	07/31/20 11:53
Instrument RL Check	SIG0442-CRL1	XDT_m1200731-018	NA	07/31/20 11:58
Interference Check A	SIG0442-IFA1	XDT_m1200731-019	NA	07/31/20 12:02
Interference Check B	SIG0442-IFB1	XDT_m1200731-020	NA	07/31/20 12:06
LR200	SIG0442-HCV1	XDT_m1200731-021	NA	07/31/20 12:10
LR300	SIG0442-HCV2	XDT_m1200731-022	NA	07/31/20 12:15
Instrument Blank	SIG0442-IBL2	XDT_m1200731-023	NA	07/31/20 12:22
Instrument Blank	SIG0442-IBL3	XDT_m1200731-024	NA	07/31/20 12:28
Instrument Blank	SIG0442-IBL4	XDT_m1200731-025	NA	07/31/20 12:34
Calibration Check	SIG0442-CCV2	XDT_m1200731-026	NA	07/31/20 12:38
Calibration Blank	SIG0442-CCB2	XDT_m1200731-027	NA	07/31/20 12:45
Instrument Blank	SIG0442-IBL5	XDT_m1200731-034	NA	07/31/20 13:21
Instrument Blank	SIG0442-IBL6	XDT_m1200731-037	NA	07/31/20 13:44
Calibration Check	SIG0442-CCV3	XDT_m1200731-038	NA	07/31/20 13:52
Calibration Blank	SIG0442-CCB3	XDT_m1200731-039	NA	07/31/20 13:59
Blank	BIG0648-BLK2	XDT_m1200731-040	Water	07/31/20 14:10
LCS	BIG0648-BS2	XDT_m1200731-041	Water	07/31/20 14:14
ZZZZZ	BIG0495-BLK3	XDT_m1200731-042	Water	07/31/20 14:18
ZZZZZ	20G0119-06	XDT_m1200731-043	Water	07/31/20 14:23
ZZZZZ	20G0119-06	XDT_m1200731-043	Water	07/31/20 14:23

Analytical Resources, Incorporated
Analytical Chemists and Consultants

ANALYSIS BATCH (SEQUENCE) SUMMARY

EPA 6020A

Laboratory: Analytical Resources, Inc.
Client: Floyd - Snider
Sequence: SIG0442

SDG: 20G0250
Project: Rio Tinto Holden Mine Reclamation/Remediation
Instrument: ICPMS1
Calibration: DH00001

Sample Name	Lab Sample ID	Lab File ID	Matrix	Analysis Date/Time
ZZZZZ	20G0119-05	XDT_m1200731-044	Water	07/31/20 14:27
ZZZZZ	20G0119-05	XDT_m1200731-044	Water	07/31/20 14:27
ZZZZZ	20G0119-04	XDT_m1200731-045	Water	07/31/20 14:31
ZZZZZ	20G0119-04	XDT_m1200731-045	Water	07/31/20 14:31
Instrument Blank	SIG0442-IBL7	XDT_m1200731-049	NA	07/31/20 14:51
Calibration Check	SIG0442-CCV4	XDT_m1200731-050	NA	07/31/20 14:56
Calibration Blank	SIG0442-CCB4	XDT_m1200731-051	NA	07/31/20 15:03
Instrument Blank	SIG0442-IBL8	XDT_m1200731-053	NA	07/31/20 15:16
SW-TP3-East1-072220	20G0250-08	XDT_m1200731-057	Water	07/31/20 15:35
SW-TP3-East1-072220	20G0250-08	XDT_m1200731-057	Water	07/31/20 15:35
SW-TP3-East1-072220	20G0250-08	XDT_m1200731-057	Water	07/31/20 15:35
SW-TP3-East1-072220	20G0250-08	XDT_m1200731-057	Water	07/31/20 15:35
SW-TP3-East1-072220	20G0250-08	XDT_m1200731-057	Water	07/31/20 15:35
SW-TP3-East1-072220	20G0250-08	XDT_m1200731-057	Water	07/31/20 15:35
SW-TP3-East1-072220	BIG0648-DUP2	XDT_m1200731-058	Water	07/31/20 15:46
SW-TP3-East1-072220	BIG0648-DUP2	XDT_m1200731-058	Water	07/31/20 15:46
SW-TP3-East1-072220	BIG0648-DUP2	XDT_m1200731-058	Water	07/31/20 15:46
SW-TP3-East1-072220	BIG0648-DUP2	XDT_m1200731-058	Water	07/31/20 15:46
SW-TP3-East1-072220	BIG0648-DUP2	XDT_m1200731-058	Water	07/31/20 15:46
SW-TP3-East1-072220	BIG0648-DUP2	XDT_m1200731-058	Water	07/31/20 15:46
SW-TP3-East1-072220	BIG0648-MS2	XDT_m1200731-059	Water	07/31/20 15:50
SW-TP3-East1-072220	BIG0648-MS2	XDT_m1200731-059	Water	07/31/20 15:50
SW-TP3-East1-072220	BIG0648-MS2	XDT_m1200731-059	Water	07/31/20 15:50
SW-TP3-East1-072220	BIG0648-MS2	XDT_m1200731-059	Water	07/31/20 15:50
SW-TP3-East1-072220	BIG0648-MS2	XDT_m1200731-059	Water	07/31/20 15:50
SW-TP3-East1-072220	BIG0648-MS2	XDT_m1200731-059	Water	07/31/20 15:50
SW-TP3-East1-072220	BIG0648-MSD2	XDT_m1200731-060	Water	07/31/20 15:55
SW-TP3-East1-072220	BIG0648-MSD2	XDT_m1200731-060	Water	07/31/20 15:55
SW-TP3-East1-072220	BIG0648-MSD2	XDT_m1200731-060	Water	07/31/20 15:55
SW-TP3-East1-072220	BIG0648-MSD2	XDT_m1200731-060	Water	07/31/20 15:55

ANALYSIS BATCH (SEQUENCE) SUMMARY

EPA 6020A

Laboratory: Analytical Resources, Inc.
SDG: 20G0250
Client: Floyd - Snider
Project: Rio Tinto Holden Mine Reclamation/Remediation
Sequence: SIG0442
Instrument: ICPMS1
Calibration: DH00001

Sample Name	Lab Sample ID	Lab File ID	Matrix	Analysis Date/Time
SW-TP3-East1-072220	BIG0648-MSD2	XDT_m1200731-060	Water	07/31/20 15:55
SW-TP3-East1-072220	BIG0648-MSD2	XDT_m1200731-060	Water	07/31/20 15:55
Instrument Blank	SIG0442-IBL9	XDT_m1200731-061	NA	07/31/20 16:02
Calibration Check	SIG0442-CCV5	XDT_m1200731-062	NA	07/31/20 16:08
Calibration Blank	SIG0442-CCB5	XDT_m1200731-063	NA	07/31/20 16:15
Field-Blank-072220	20G0250-07	XDT_m1200731-064	Water	07/31/20 16:19
Field-Blank-072220	20G0250-07	XDT_m1200731-064	Water	07/31/20 16:19
Field-Blank-072220	20G0250-07	XDT_m1200731-064	Water	07/31/20 16:19
Field-Blank-072220	20G0250-07	XDT_m1200731-064	Water	07/31/20 16:19
Field-Blank-072220	20G0250-07	XDT_m1200731-064	Water	07/31/20 16:19
Field-Blank-072220	20G0250-07	XDT_m1200731-064	Water	07/31/20 16:19
SP-30-072020	20G0250-01	XDT_m1200731-065	Water	07/31/20 16:23
SP-30-072020	20G0250-01	XDT_m1200731-065	Water	07/31/20 16:23
SP-30-072020	20G0250-01	XDT_m1200731-065	Water	07/31/20 16:23
SP-30-072020	20G0250-01	XDT_m1200731-065	Water	07/31/20 16:23
SP-30-072020	20G0250-01	XDT_m1200731-065	Water	07/31/20 16:23
SP-30-072020	20G0250-01	XDT_m1200731-065	Water	07/31/20 16:23
SP-34-072120	20G0250-02	XDT_m1200731-066	Water	07/31/20 16:28
SP-34-072120	20G0250-02	XDT_m1200731-066	Water	07/31/20 16:28
SP-34-072120	20G0250-02	XDT_m1200731-066	Water	07/31/20 16:28
SP-34-072120	20G0250-02	XDT_m1200731-066	Water	07/31/20 16:28
SP-34-072120	20G0250-02	XDT_m1200731-066	Water	07/31/20 16:28
SP-34-072120	20G0250-02	XDT_m1200731-066	Water	07/31/20 16:28
SP-40-072120	20G0250-03	XDT_m1200731-067	Water	07/31/20 16:32
SP-40-072120	20G0250-03	XDT_m1200731-067	Water	07/31/20 16:32
SP-40-072120	20G0250-03	XDT_m1200731-067	Water	07/31/20 16:32
SP-40-072120	20G0250-03	XDT_m1200731-067	Water	07/31/20 16:32
SP-40-072120	20G0250-03	XDT_m1200731-067	Water	07/31/20 16:32
SP-40-072120	20G0250-03	XDT_m1200731-067	Water	07/31/20 16:32
SP-32-072120	20G0250-04	XDT_m1200731-068	Water	07/31/20 16:37

Analytical Resources, Incorporated
Analytical Chemists and Consultants

ANALYSIS BATCH (SEQUENCE) SUMMARY

EPA 6020A

Laboratory: Analytical Resources, Inc.
SDG: 20G0250
Client: Floyd - Snider
Project: Rio Tinto Holden Mine Reclamation/Remediation
Sequence: SIG0442
Instrument: ICPMS1
Calibration: DH00001

Sample Name	Lab Sample ID	Lab File ID	Matrix	Analysis Date/Time
SP-32-072120	20G0250-04	XDT_m1200731-068	Water	07/31/20 16:37
SP-32-072120	20G0250-04	XDT_m1200731-068	Water	07/31/20 16:37
SP-32-072120	20G0250-04	XDT_m1200731-068	Water	07/31/20 16:37
SP-32-072120	20G0250-04	XDT_m1200731-068	Water	07/31/20 16:37
SP-32-072120	20G0250-04	XDT_m1200731-068	Water	07/31/20 16:37
SP-26-072220	20G0250-05	XDT_m1200731-069	Water	07/31/20 16:41
SP-26-072220	20G0250-05	XDT_m1200731-069	Water	07/31/20 16:41
SP-26-072220	20G0250-05	XDT_m1200731-069	Water	07/31/20 16:41
SP-26-072220	20G0250-05	XDT_m1200731-069	Water	07/31/20 16:41
SP-26-072220	20G0250-05	XDT_m1200731-069	Water	07/31/20 16:41
SP-26-072220	20G0250-05	XDT_m1200731-069	Water	07/31/20 16:41
SP-126-072220	20G0250-06	XDT_m1200731-070	Water	07/31/20 16:46
SP-126-072220	20G0250-06	XDT_m1200731-070	Water	07/31/20 16:46
SP-126-072220	20G0250-06	XDT_m1200731-070	Water	07/31/20 16:46
SP-126-072220	20G0250-06	XDT_m1200731-070	Water	07/31/20 16:46
SP-126-072220	20G0250-06	XDT_m1200731-070	Water	07/31/20 16:46
SP-126-072220	20G0250-06	XDT_m1200731-070	Water	07/31/20 16:46
SW-TP3-East2-072220	20G0250-09	XDT_m1200731-071	Water	07/31/20 16:51
SW-TP3-East2-072220	20G0250-09	XDT_m1200731-071	Water	07/31/20 16:51
SW-TP3-East2-072220	20G0250-09	XDT_m1200731-071	Water	07/31/20 16:51
SW-TP3-East2-072220	20G0250-09	XDT_m1200731-071	Water	07/31/20 16:51
SW-TP3-East2-072220	20G0250-09	XDT_m1200731-071	Water	07/31/20 16:51
SW-TP3-East2-072220	20G0250-09	XDT_m1200731-071	Water	07/31/20 16:51
SW-TP3-East2-072220	20G0250-09	XDT_m1200731-071	Water	07/31/20 16:51
Instrument Blank	SIG0442-IBLA	XDT_m1200731-073	NA	07/31/20 17:07
Calibration Check	SIG0442-CCV6	XDT_m1200731-074	NA	07/31/20 17:13
Calibration Blank	SIG0442-CCB6	XDT_m1200731-075	NA	07/31/20 17:20
Instrument Blank	SIG0442-IBLB	XDT_m1200731-085	NA	07/31/20 18:15
Calibration Check	SIG0442-CCV7	XDT_m1200731-086	NA	07/31/20 18:21
Calibration Blank	SIG0442-CCB7	XDT_m1200731-087	NA	07/31/20 18:28

Analytical Resources, Incorporated
Analytical Chemists and Consultants

ANALYSIS BATCH (SEQUENCE) SUMMARY

EPA 6020A

Laboratory:	Analytical Resources, Inc.	SDG:	20G0250
Client:	Floyd - Snider	Project:	Rio Tinto Holden Mine Reclamation/Remediation
Sequence:	SIG0442	Instrument:	ICPMS1
		Calibration:	DH00001

Sample Name	Lab Sample ID	Lab File ID	Matrix	Analysis Date/Time
Instrument Blank	SIG0442-IBLC	XDT_m1200731-093	NA	07/31/20 18:57
Instrument Blank	SIG0442-IBLD	XDT_m1200731-096	NA	07/31/20 19:16
Calibration Check	SIG0442-CCV8	XDT_m1200731-097	NA	07/31/20 19:22
Calibration Blank	SIG0442-CCB8	XDT_m1200731-098	NA	07/31/20 19:29

ANALYSIS BATCH (SEQUENCE) SUMMARY

EPA 6020A

Laboratory: Analytical Resources, Inc.
SDG: 20G0250
Client: Floyd - Snider
Project: Rio Tinto Holden Mine Reclamation/Remediation
Sequence: SIH0014
Instrument: ICPMS1
Calibration: DH00003

Sample Name	Lab Sample ID	Lab File ID	Matrix	Analysis Date/Time
CAL 0	SIH0014-CAL1	XDT_M1200803-007	NA	08/03/20 12:53
CAL 1 - LOW CHECK	SIH0014-CAL2	XDT_M1200803-008	NA	08/03/20 12:57
CAL 2	SIH0014-CAL3	XDT_M1200803-009	NA	08/03/20 13:00
CAL 3	SIH0014-CAL4	XDT_M1200803-010	NA	08/03/20 13:05
CAL 4	SIH0014-CAL5	XDT_M1200803-011	NA	08/03/20 13:09
CAL 5	SIH0014-CAL6	XDT_M1200803-012	NA	08/03/20 13:15
RINSE	SIH0014-IBL1	XDT_M1200803-013	NA	08/03/20 13:22
Initial Cal Check	SIH0014-ICV1	XDT_M1200803-015	NA	08/03/20 13:27
Initial Cal Blank	SIH0014-ICB1	XDT_M1200803-016	NA	08/03/20 13:34
Calibration Check	SIH0014-CCV1	XDT_M1200803-017	NA	08/03/20 13:38
Calibration Blank	SIH0014-CCB1	XDT_M1200803-018	NA	08/03/20 13:45
Instrument RL Check	SIH0014-CRL1	XDT_M1200803-019	NA	08/03/20 13:52
Interference Check A	SIH0014-IFA1	XDT_M1200803-020	NA	08/03/20 13:57
Interference Check B	SIH0014-IFB1	XDT_M1200803-021	NA	08/03/20 14:01
LR200	SIH0014-HCV1	XDT_M1200803-022	NA	08/03/20 14:05
LR300	SIH0014-HCV2	XDT_M1200803-023	NA	08/03/20 14:09
Instrument Blank	SIH0014-IBL2	XDT_M1200803-024	NA	08/03/20 14:15
Calibration Check	SIH0014-CCV2	XDT_M1200803-025	NA	08/03/20 14:21
Calibration Blank	SIH0014-CCB2	XDT_M1200803-026	NA	08/03/20 14:28
Blank	BIH0012-BLK1	XDT_M1200803-027	Water	08/03/20 14:32
LCS	BIH0012-BS1	XDT_M1200803-028	Water	08/03/20 14:36
Calibration Check	SIH0014-CCV3	XDT_M1200803-037	NA	08/03/20 15:26
Calibration Blank	SIH0014-CCB3	XDT_M1200803-038	NA	08/03/20 15:32
Field-Blank-072220	20G0250-07RE1	XDT_M1200803-041	Water	08/03/20 15:46
SP-34-072120	20G0250-02RE1	XDT_M1200803-042	Water	08/03/20 15:50
SP-40-072120	20G0250-03RE1	XDT_M1200803-043	Water	08/03/20 15:54
SP-30-072020	20G0250-01RE1	XDT_M1200803-044	Water	08/03/20 15:59
SP-30-072020	BIH0012-DUP1	XDT_M1200803-045	Water	08/03/20 16:03
SP-30-072020	BIH0012-DUP1	XDT_M1200803-045	Water	08/03/20 16:03
SP-30-072020	BIH0012-MS1	XDT_M1200803-046	Water	08/03/20 16:07

ANALYSIS BATCH (SEQUENCE) SUMMARY

EPA 6020A

Laboratory: Analytical Resources, Inc.
SDG: 20G0250
Client: Floyd - Snider
Project: Rio Tinto Holden Mine Reclamation/Remediation
Sequence: SIH0014
Instrument: ICPMS1
Calibration: DH00003

Sample Name	Lab Sample ID	Lab File ID	Matrix	Analysis Date/Time
SP-30-072020	BIH0012-MS1	XDT_M1200803-046	Water	08/03/20 16:07
SP-30-072020	BIH0012-MSD1	XDT_M1200803-047	Water	08/03/20 16:13
SP-30-072020	BIH0012-MSD1	XDT_M1200803-047	Water	08/03/20 16:13
Instrument Blank	SIH0014-IBL3	XDT_M1200803-048	NA	08/03/20 16:20
Calibration Check	SIH0014-CCV4	XDT_M1200803-049	NA	08/03/20 16:25
Calibration Blank	SIH0014-CCB4	XDT_M1200803-050	NA	08/03/20 16:32
SP-32-072120	20G0250-04RE1	XDT_M1200803-051	Water	08/03/20 16:37
SP-26-072220	20G0250-05RE1	XDT_M1200803-052	Water	08/03/20 16:41
SP-126-072220	20G0250-06RE1	XDT_M1200803-053	Water	08/03/20 16:45
Instrument Blank	SIH0014-IBL4	XDT_M1200803-054	NA	08/03/20 16:51
Instrument Blank	SIH0014-IBL5	XDT_M1200803-060	NA	08/03/20 17:20
Calibration Check	SIH0014-CCV5	XDT_M1200803-061	NA	08/03/20 17:25
Calibration Blank	SIH0014-CCB5	XDT_M1200803-062	NA	08/03/20 17:32
Instrument Blank	SIH0014-IBL6	XDT_M1200803-067	NA	08/03/20 17:58
Calibration Check	SIH0014-CCV6	XDT_M1200803-068	NA	08/03/20 18:03
Calibration Blank	SIH0014-CCB6	XDT_M1200803-069	NA	08/03/20 18:10

ICP INTERFERENCE CHECK SAMPLE

EPA 6020A

Laboratory: Analytical Resources, Inc.
SDG: 20G0250
Client: Floyd - Snider
Project: Rio Tinto Holden Mine Reclamation/Remediat
Instrument ID: ICPMS1
Calibration: DG00094
Sequence: SIG0428
Standard ID: I006573

Lab Sample ID	Analyte	True	Found	%R	Units
SIG0428-IFA1	Lead-208	0	0.0250		ug/L
	Manganese-55	0	0.0990		ug/L

* Indicates %R outside of QC limits
NOTE: True value and %R are populated only for analytes found in the interference check standards, and will be seen only if those analytes were requested.

ICP INTERFERENCE CHECK SAMPLE

EPA 6020A

Laboratory: Analytical Resources, Inc.
SDG: 20G0250
Client: Floyd - Snider
Project: Rio Tinto Holden Mine Reclamation/Remediat
Instrument ID: ICPMS1
Calibration: DG00094
Sequence: SIG0428
Standard ID: I006573

Lab Sample ID	Analyte	True	Found	%R	Units
SIG0428-IFB1	Lead-208	0	0.0260		ug/L
	Manganese-55	20.000	19.938	99.7	ug/L

* Indicates %R outside of QC limits
NOTE: True value and %R are populated only for analytes found in the interference check standards, and will be seen only if those analytes were requested.

ICP INTERFERENCE CHECK SAMPLE

EPA 6020A

Laboratory: Analytical Resources, Inc.
SDG: 20G0250
Client: Floyd - Snider
Project: Rio Tinto Holden Mine Reclamation/Remediat
Instrument ID: ICPMS1
Calibration: DH00001
Sequence: SIG0442
Standard ID: I006573

Lab Sample ID	Analyte	True	Found	%R	Units
SIG0442-IFA1	Aluminum-27	20000	20036.16	100	ug/L
	Calcium-44	20000	19630.50	98.2	ug/L
	Iron-54	20000	19369.98	96.8	ug/L
	Iron-57	20000	20377.54	102	ug/L
	Magnesium-24	20000	20337.20	102	ug/L
	Manganese-55	0	0.0750		ug/L
	Potassium-39	20000	19704.73	98.5	ug/L
	Sodium-23	20000	20193.09	101	ug/L

* Indicates %R outside of QC limits

NOTE: True value and %R are populated only for analytes found in the interference check standards, and will be seen only if those analytes were requested.

ICP INTERFERENCE CHECK SAMPLE

EPA 6020A

Laboratory: Analytical Resources, Inc.
SDG: 20G0250
Client: Floyd - Snider
Project: Rio Tinto Holden Mine Reclamation/Remediat
Instrument ID: ICPMS1
Calibration: DH00001
Sequence: SIG0442
Standard ID: I006573

Lab Sample ID	Analyte	True	Found	%R	Units
SIG0442-IFB1	Aluminum-27	20000	19724.49	98.6	ug/L
	Calcium-44	20000	18997.69	95.0	ug/L
	Iron-54	20000	18852.62	94.3	ug/L
	Iron-57	20000	19845.38	99.2	ug/L
	Magnesium-24	20000	20311.15	102	ug/L
	Manganese-55	20.000	19.930	99.7	ug/L
	Potassium-39	20000	19440.67	97.2	ug/L
	Sodium-23	20000	20118.10	101	ug/L

* Indicates %R outside of QC limits

NOTE: True value and %R are populated only for analytes found in the interference check standards, and will be seen only if those analytes were requested.

ICP INTERFERENCE CHECK SAMPLE

EPA 6020A

Laboratory: Analytical Resources, Inc.
SDG: 20G0250

Client: Floyd - Snider
Project: Rio Tinto Holden Mine Reclamation/Remediat

Instrument ID: ICPMS1
Calibration: DH00003

Sequence: SIH0014
Standard ID: I006573

Lab Sample ID	Analyte	True	Found	%R	Units
SIH0014-IFA1	Manganese-55	0	0.1070		ug/L

* Indicates %R outside of QC limits
NOTE: True value and %R are populated only for analytes found in the interference check standards, and will be seen only if those analytes were requested.

ICP INTERFERENCE CHECK SAMPLE

EPA 6020A

Laboratory: Analytical Resources, Inc.
SDG: 20G0250
Client: Floyd - Snider
Project: Rio Tinto Holden Mine Reclamation/Remediat
Instrument ID: ICPMS1
Calibration: DH00003
Sequence: SIH0014
Standard ID: I006573

Lab Sample ID	Analyte	True	Found	%R	Units
SIH0014-IFB1	Manganese-55	20.000	21.451	107	ug/L

* Indicates %R outside of QC limits
NOTE: True value and %R are populated only for analytes found in the interference check standards, and will be seen only if those analytes were requested.

DETECTION LEVEL STANDARD
EPA 6020A

Laboratory: Analytical Resources, Inc.
SDG: 20G0250
Client: Floyd - Snider
Project: Rio Tinto Holden Mine Reclamation/Remedi
Instrument ID: ICPMS1
Calibration: DG00094
Sequence: SIG0428
Lab Sample ID: SIG0428-CRL1

Analyte	True	Found	%R	Units	QC Limts
Lead-208	0.10000	0.108	108	ug/L	50 - 150
Manganese-55	0.50000	0.516	103	ug/L	50 - 150

* Values outside of QC limits

DETECTION LEVEL STANDARD
EPA 6020A

Laboratory: Analytical Resources, Inc.
SDG: 20G0250
Client: Floyd - Snider
Project: Rio Tinto Holden Mine Reclamation/Remedia
Instrument ID: ICPMS1
Calibration: DH00001
Sequence: SIG0442
Lab Sample ID: SIG0442-CRL1

Analyte	True	Found	%R	Units	QC Limts
Aluminum-27	20.000	18.8	94.1	ug/L	50 - 150
Calcium-44	50.000	41.6	83.1	ug/L	50 - 150
Iron-54	20.000	18.2	91.0	ug/L	50 - 150
Iron-57	20.000	19.6	97.8	ug/L	50 - 150
Magnesium-24	20.000	19.8	99.1	ug/L	50 - 150
Manganese-55	0.50000	0.463	92.6	ug/L	50 - 150
Potassium-39	20.000	17.7	88.4	ug/L	50 - 150
Sodium-23	100.00	90.1	90.1	ug/L	50 - 150

* Values outside of QC limits

DETECTION LEVEL STANDARD
EPA 6020A

Laboratory: Analytical Resources, Inc.
SDG: 20G0250
Client: Floyd - Snider
Project: Rio Tinto Holden Mine Reclamation/Remedia
Instrument ID: ICPMS1
Calibration: DH00003
Sequence: SIH0014
Lab Sample ID: SIH0014-CRL1

Analyte	True	Found	%R	Units	QC Limts
Manganese-55	0.50000	0.556	111	ug/L	50 - 150

* Values outside of QC limits

Analytical Resources, Incorporated
Analytical Chemists and Consultants

HIGH-CONCENTRATION CALIBRATION VERIFICATION

EPA 6020A

Laboratory: Analytical Resources, Inc.
SDG: 20G0250
Client: Floyd - Snider
Project: Rio Tinto Holden Mine Reclamation/Remed
Calibration: DG00094
Laboratory ID: SIG0428-HCV1
Sequence: SIG0428
Standard ID: I006575

ANALYTE	EXPECTED (ug/L)	FOUND (ug/L)	% DRIFT	QC LIMIT
Lead-208	200.00	194	-2.8	10.00
Manganese-55	200.00	200	-0.2	10.00

* Values outside of QC limits

Analytical Resources, Incorporated
Analytical Chemists and Consultants

HIGH-CONCENTRATION CALIBRATION VERIFICATION

EPA 6020A

Laboratory: Analytical Resources, Inc.
SDG: 20G0250
Client: Floyd - Snider
Project: Rio Tinto Holden Mine Reclamation/Remed
Calibration: DG00094
Laboratory ID: SIG0428-HCV2
Sequence: SIG0428
Standard ID: I006449

ANALYTE	EXPECTED (ug/L)	FOUND (ug/L)	% DRIFT	QC LIMIT
Lead-208	300.00	290	-3.2	10.00
Manganese-55	300.00	303	0.9	10.00

* Values outside of QC limits

Analytical Resources, Incorporated
Analytical Chemists and Consultants

HIGH-CONCENTRATION CALIBRATION VERIFICATION

EPA 6020A

Laboratory: Analytical Resources, Inc.
SDG: 20G0250
Client: Floyd - Snider
Project: Rio Tinto Holden Mine Reclamation/Remed
Calibration: DH00001
Laboratory ID: SIG0442-HCV1
Sequence: SIG0442
Standard ID: I006575

ANALYTE	EXPECTED (ug/L)	FOUND (ug/L)	% DRIFT	QC LIMIT
Aluminum-27	20000	19900	-0.3	10.00
Calcium-44	20000	19300	-3.6	10.00
Iron-54	20000	19200	-4.0	10.00
Iron-57	20000	19900	-0.7	10.00
Magnesium-24	20000	20300	1.4	10.00
Manganese-55	200.00	196	-1.9	10.00
Potassium-39	20000	19500	-2.5	10.00
Sodium-23	20000	19300	-3.4	10.00

* Values outside of QC limits

Analytical Resources, Incorporated
Analytical Chemists and Consultants

HIGH-CONCENTRATION CALIBRATION VERIFICATION

EPA 6020A

Laboratory: Analytical Resources, Inc.
SDG: 20G0250
Client: Floyd - Snider
Project: Rio Tinto Holden Mine Reclamation/Remed
Calibration: DH00001
Laboratory ID: SIG0442-HCV2
Sequence: SIG0442
Standard ID: I006449

ANALYTE	EXPECTED (ug/L)	FOUND (ug/L)	% DRIFT	QC LIMIT
Aluminum-27	30000	0.00		10.00
Calcium-44	30000	28400	-5.3	10.00
Iron-54	30000	28600	-4.6	10.00
Iron-57	30000	30600	1.9	10.00
Magnesium-24	30000	27600	-7.9	10.00
Manganese-55	300.00	291	-2.9	10.00
Potassium-39	30000	29100	-2.9	10.00
Sodium-23	30000	29600	-1.4	10.00

* Values outside of QC limits

Analytical Resources, Incorporated
Analytical Chemists and Consultants

HIGH-CONCENTRATION CALIBRATION VERIFICATION

EPA 6020A

Laboratory: Analytical Resources, Inc.
SDG: 20G0250
Client: Floyd - Snider
Project: Rio Tinto Holden Mine Reclamation/Remed
Calibration: DH00003
Laboratory ID: SIH0014-HCV1
Sequence: SIH0014
Standard ID: I006575

ANALYTE	EXPECTED (ug/L)	FOUND (ug/L)	% DRIFT	QC LIMIT
Manganese-55	200.00	183	-8.3	10.00

* Values outside of QC limits

Analytical Resources, Incorporated
Analytical Chemists and Consultants

HIGH-CONCENTRATION CALIBRATION VERIFICATION

EPA 6020A

Laboratory: Analytical Resources, Inc.
SDG: 20G0250
Client: Floyd - Snider
Project: Rio Tinto Holden Mine Reclamation/Remed
Calibration: DH00003
Laboratory ID: SIH0014-HCV2
Sequence: SIH0014
Standard ID: I006449

ANALYTE	EXPECTED (ug/L)	FOUND (ug/L)	% DRIFT	QC LIMIT
Manganese-55	300.00	269	-10.5	10.00

* Values outside of QC limits

HOLDING TIME SUMMARY

Analysis: EPA 6020A

Laboratory: Analytical Resources, Inc. SDG: 20G0250

Client: Floyd - Snider Project: Rio Tinto Holden Mine Reclamation/Remediation

Sample Name	Date Collected	Date Received	Date Prepared	Days to Prep	Max Days to Prep	Date Analyzed	Days to Analysis	Max Days to Analysis	Q
SP-30-072020 20G0250-01	07/20/20 17:50	07/24/20 12:36	07/30/20 08:11	9	180	07/30/20 20:00	10	180	
SP-30-072020 20G0250-01	07/20/20 17:50	07/24/20 12:36	07/30/20 08:11	9	180	07/31/20 16:23	11	180	
SP-30-072020 20G0250-01RE1	07/20/20 17:50	07/24/20 12:36	08/03/20 06:20	13	180	08/03/20 15:59	14	180	
SP-34-072120 20G0250-02	07/21/20 12:20	07/24/20 12:36	07/30/20 08:11	8	180	07/31/20 16:28	10	180	
SP-34-072120 20G0250-02	07/21/20 12:20	07/24/20 12:36	07/30/20 08:11	8	180	07/30/20 20:04	9	180	
SP-34-072120 20G0250-02RE1	07/21/20 12:20	07/24/20 12:36	08/03/20 06:20	12	180	08/03/20 15:50	13	180	
SP-40-072120 20G0250-03	07/21/20 13:18	07/24/20 12:36	07/30/20 08:11	8	180	07/30/20 20:08	9	180	
SP-40-072120 20G0250-03	07/21/20 13:18	07/24/20 12:36	07/30/20 08:11	8	180	07/31/20 16:32	10	180	
SP-40-072120 20G0250-03RE1	07/21/20 13:18	07/24/20 12:36	08/03/20 06:20	12	180	08/03/20 15:54	13	180	
SP-32-072120 20G0250-04	07/21/20 13:25	07/24/20 12:36	07/30/20 08:11	8	180	07/31/20 16:37	10	180	
SP-32-072120 20G0250-04	07/21/20 13:25	07/24/20 12:36	07/30/20 08:11	8	180	07/30/20 20:12	9	180	
SP-32-072120 20G0250-04RE1	07/21/20 13:25	07/24/20 12:36	08/03/20 06:20	12	180	08/03/20 16:37	13	180	
SP-26-072220 20G0250-05	07/22/20 09:37	07/24/20 12:36	07/30/20 08:11	7	180	07/30/20 20:16	8	180	
SP-26-072220 20G0250-05	07/22/20 09:37	07/24/20 12:36	07/30/20 08:11	7	180	07/31/20 16:41	9	180	
SP-26-072220 20G0250-05RE1	07/22/20 09:37	07/24/20 12:36	08/03/20 06:20	11	180	08/03/20 16:41	12	180	
SP-126-072220 20G0250-06	07/22/20 09:42	07/24/20 12:36	07/30/20 08:11	7	180	07/30/20 20:20	8	180	
SP-126-072220 20G0250-06	07/22/20 09:42	07/24/20 12:36	07/30/20 08:11	7	180	07/31/20 16:46	9	180	
SP-126-072220 20G0250-06RE1	07/22/20 09:42	07/24/20 12:36	08/03/20 06:20	11	180	08/03/20 16:45	12	180	
Field-Blank-072220 20G0250-07	07/22/20 10:55	07/24/20 12:36	07/30/20 08:11	7	180	07/30/20 18:48	8	180	
Field-Blank-072220 20G0250-07	07/22/20 10:55	07/24/20 12:36	07/30/20 08:11	7	180	07/31/20 16:19	9	180	
Field-Blank-072220 20G0250-07RE1	07/22/20 10:55	07/24/20 12:36	08/03/20 06:20	11	180	08/03/20 15:46	12	180	
SW-TP3-East1-072220 20G0250-08	07/22/20 13:45	07/24/20 12:36	07/30/20 08:11	7	180	07/31/20 15:35	9	180	

HOLDING TIME SUMMARY

Analysis: EPA 6020A

Laboratory: Analytical Resources, Inc. SDG: 20G0250

Client: Floyd - Snider Project: Rio Tinto Holden Mine Reclamation/Remediation

Sample Name	Date Collected	Date Received	Date Prepared	Days to Prep	Max Days to Prep	Date Analyzed	Days to Analysis	Max Days to Analysis	Q
SW-TP3-East1-072220 20G0250-08	07/22/20 13:45	07/24/20 12:36	07/30/20 08:11	7	180	07/30/20 15:08	8	180	
SW-TP3-East2-072220 20G0250-09	07/22/20 15:00	07/24/20 12:36	07/30/20 08:11	7	180	07/31/20 16:51	9	180	
SW-TP3-East2-072220 20G0250-09	07/22/20 15:00	07/24/20 12:36	07/30/20 08:11	7	180	07/30/20 20:24	8	180	
Duplicate BIG0648-DUP1	07/22/20 13:45	07/24/20 12:36	07/30/20 08:11	7	180	07/30/20 15:16	8	180	
Duplicate BIG0648-DUP2	07/22/20 13:45	07/24/20 12:36	07/30/20 08:11	7	180	07/31/20 15:46	9	180	
Matrix Spike BIG0648-MS1	07/22/20 13:45	07/24/20 12:36	07/30/20 08:11	7	180	07/30/20 15:20	8	180	
Matrix Spike BIG0648-MS2	07/22/20 13:45	07/24/20 12:36	07/30/20 08:11	7	180	07/31/20 15:50	9	180	
Matrix Spike Dup BIG0648-MSD1	07/22/20 13:45	07/24/20 12:36	07/30/20 08:11	7	180	07/30/20 15:25	8	180	
Matrix Spike Dup BIG0648-MSD2	07/22/20 13:45	07/24/20 12:36	07/30/20 08:11	7	180	07/31/20 15:55	9	180	
Duplicate BIH0012-DUP1	07/20/20 17:50	07/24/20 12:36	08/03/20 06:20	13	180	08/03/20 16:03	14	180	
Matrix Spike BIH0012-MS1	07/20/20 17:50	07/24/20 12:36	08/03/20 06:20	13	180	08/03/20 16:07	14	180	
Matrix Spike Dup BIH0012-MSD1	07/20/20 17:50	07/24/20 12:36	08/03/20 06:20	13	180	08/03/20 16:13	14	180	

* Indicates hold time exceedance.

METHOD DETECTION AND REPORTING LIMITS

EPA 6020A

Laboratory: Analytical Resources, Inc.
SDG: 20G0250
Client: Floyd - Snider
Project: Rio Tinto Holden Mine Reclamation/Rem
Matrix: Water
Instrument: ICPMS1

Analyte	MDL	RL	Units
Aluminum-27	2.37	20.0	ug/L
Calcium-44	1.91	50.0	ug/L
Iron-54	6.27	20.0	ug/L
Iron-57	1.40	20.0	ug/L
Lead-208	0.0680	0.100	ug/L
Magnesium-24	0.307	20.0	ug/L
Manganese-55	0.0850	0.500	ug/L
Potassium-39	1.41	20.0	ug/L
Sodium-23	7.18	100	ug/L

Form I
INORGANIC ANALYSIS DATA SHEET
EPA 6020A UCT-KED

Total Metals

SP-30-072020

Laboratory:	Analytical Resources, Inc.				
Client:	Floyd - Snider				
Project:	Rio Tinto Holden Mine Reclamation/Remediation				
Matrix:	Water	Laboratory ID:	20G0250-01 D	SDG:	20G0250
Sampled:	07/20/20 17:50	Prepared:	07/30/20 08:11	File ID:	XDT_m1200730-091
% Solids:	0.00	Preparation:	REN_EPA 600/4-79-020 4.1.4 HNO3 matrix	Analyzed:	07/30/20 20:00
Batch:	BIG0648	Sequence:	SIG0428	Initial/Final:	25 mL / 25 mL
Instrument:	ICPMS1			Calibration:	DG00094

CAS NO.	Analyte	Concentration (ug/L)	Dilution Factor	MDL	MRL	Q
7440-50-8	Copper-63	1.46	1	0.340	0.500	
7440-66-6	Zinc-66	5.32	1	0.820	4.00	

Form I
INORGANIC ANALYSIS DATA SHEET
EPA 6020A UCT-KED

Total Metals

SP-30-072020

Laboratory:	Analytical Resources, Inc.				
Client:	Floyd - Snider				
Project:	Rio Tinto Holden Mine Reclamation/Remediation				
Matrix:	Water	Laboratory ID:	20G0250-01RE1 D	SDG:	20G0250
Sampled:	07/20/20 17:50	Prepared:	08/03/20 06:28	File ID:	XDT_M1200803-056
% Solids:	0.00	Preparation:	RHN EPA 600/4-79-020 4.1.4 HNO3 matrix 5x	Analyzed:	08/03/20 17:00
Batch:	BIH0014	Sequence:	SIH0014	Initial/Final:	100 mL / 20 mL
Instrument:	ICPMS1			Calibration:	DH00003

CAS NO.	Analyte	Concentration (ug/L)	Dilution Factor	MDL	MRL	Q
7440-43-9	Cadmium-111	0.0366	1	0.00600	0.0200	

Form I
INORGANIC ANALYSIS DATA SHEET
EPA 6020A UCT-KED

Total Metals

SP-34-072120

Laboratory:	Analytical Resources, Inc.				
Client:	Floyd - Snider				
Project:	Rio Tinto Holden Mine Reclamation/Remediation				
Matrix:	Water	Laboratory ID:	20G0250-02 D	SDG:	20G0250
Sampled:	07/21/20 12:20	Prepared:	07/30/20 08:11	File ID:	XDT_m1200731-066
% Solids:	0.00	Preparation:	REN_EPA 600/4-79-020 4.1.4 HNO3 matrix	Analyzed:	07/31/20 16:28
Batch:	BIG0648	Sequence:	SIG0442	Initial/Final:	25 mL / 25 mL
Instrument:	ICPMS1			Calibration:	DH00001

CAS NO.	Analyte	Concentration (ug/L)	Dilution Factor	MDL	MRL	Q
7440-50-8	Copper-63	1.10	1	0.340	0.500	
7440-66-6	Zinc-66	4.36	1	0.820	4.00	

Form I
INORGANIC ANALYSIS DATA SHEET
EPA 6020A UCT-KED

Total Metals

SP-34-072120

Laboratory:	Analytical Resources, Inc.				
Client:	Floyd - Snider				
Project:	Rio Tinto Holden Mine Reclamation/Remediation				
Matrix:	Water	Laboratory ID:	20G0250-02RE1 D	SDG:	20G0250
Sampled:	07/21/20 12:20	Prepared:	08/03/20 06:28	File ID:	XDT_M1200803-057
% Solids:	0.00	Preparation:	RHN EPA 600/4-79-020 4.1.4 HNO3 matrix 5x	Analyzed:	08/03/20 17:05
Batch:	BIH0014	Sequence:	SIH0014	Initial/Final:	100 mL / 20 mL
Instrument:	ICPMS1			Calibration:	DH00003

CAS NO.	Analyte	Concentration (ug/L)	Dilution Factor	MDL	MRL	Q
7440-43-9	Cadmium-111	0.0296	1	0.00600	0.0200	

Form I
INORGANIC ANALYSIS DATA SHEET
EPA 6020A UCT-KED

Total Metals

SP-40-072120

Laboratory:	Analytical Resources, Inc.				
Client:	Floyd - Snider				
Project:	Rio Tinto Holden Mine Reclamation/Remediation				
Matrix:	Water	Laboratory ID:	20G0250-03 D	SDG:	20G0250
Sampled:	07/21/20 13:18	Prepared:	07/30/20 08:11	File ID:	XDT_m1200730-093
% Solids:	0.00	Preparation:	REN_EPA 600/4-79-020 4.1.4 HNO3 matrix	Analyzed:	07/30/20 20:08
Batch:	BIG0648	Sequence:	SIG0428	Initial/Final:	25 mL / 25 mL
Instrument:	ICPMS1			Calibration:	DG00094

CAS NO.	Analyte	Concentration (ug/L)	Dilution Factor	MDL	MRL	Q
7440-43-9	Cadmium-111	0.301	1	0.0300	0.100	
7440-50-8	Copper-63	1.21	1	0.340	0.500	
7440-66-6	Zinc-66	19.2	1	0.820	4.00	

Form I
INORGANIC ANALYSIS DATA SHEET
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Total Metals

SP-32-072120

Laboratory:	Analytical Resources, Inc.				
Client:	Floyd - Snider				
Project:	Rio Tinto Holden Mine Reclamation/Remediation				
Matrix:	Water	Laboratory ID:	20G0250-04 D	SDG:	20G0250
Sampled:	07/21/20 13:25	Prepared:	07/30/20 08:11	File ID:	XDT_m1200730-094
% Solids:	0.00	Preparation:	REN_EPA 600/4-79-020 4.1.4 HNO3 matrix	Analyzed:	07/30/20 20:12
Batch:	BIG0648	Sequence:	SIG0428	Initial/Final:	25 mL / 25 mL
Instrument:	ICPMS1			Calibration:	DG00094

CAS NO.	Analyte	Concentration (ug/L)	Dilution Factor	MDL	MRL	Q
7440-43-9	Cadmium-111	0.308	1	0.0300	0.100	
7440-50-8	Copper-63	1.41	1	0.340	0.500	
7440-66-6	Zinc-66	19.1	1	0.820	4.00	

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INORGANIC ANALYSIS DATA SHEET
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Total Metals

SP-26-072220

Laboratory:	Analytical Resources, Inc.				
Client:	Floyd - Snider				
Project:	Rio Tinto Holden Mine Reclamation/Remediation				
Matrix:	Water	Laboratory ID:	20G0250-05 D	SDG:	20G0250
Sampled:	07/22/20 09:37	Prepared:	07/30/20 08:11	File ID:	XDT_m1200730-095
% Solids:	0.00	Preparation:	REN_EPA 600/4-79-020 4.1.4 HNO3 matrix	Analyzed:	07/30/20 20:16
Batch:	BIG0648	Sequence:	SIG0428	Initial/Final:	25 mL / 25 mL
Instrument:	ICPMS1			Calibration:	DG00094

CAS NO.	Analyte	Concentration (ug/L)	Dilution Factor	MDL	MRL	Q
7440-50-8	Copper-63	0.387	1	0.340	0.500	J
7440-66-6	Zinc-66	1.77	1	0.820	4.00	J

Form I
INORGANIC ANALYSIS DATA SHEET
EPA 6020A UCT-KED

Total Metals

SP-26-072220

Laboratory:	Analytical Resources, Inc.				
Client:	Floyd - Snider				
Project:	Rio Tinto Holden Mine Reclamation/Remediation				
Matrix:	Water	Laboratory ID:	20G0250-05RE1 D	SDG:	20G0250
Sampled:	07/22/20 09:37	Prepared:	08/03/20 06:28	File ID:	XDT_M1200803-058
% Solids:	0.00	Preparation:	RHN EPA 600/4-79-020 4.1.4 HNO3 matrix 5x	Analyzed:	08/03/20 17:10
Batch:	BIH0014	Sequence:	SIH0014	Initial/Final:	100 mL / 20 mL
Instrument:	ICPMS1			Calibration:	DH00003

CAS NO.	Analyte	Concentration (ug/L)	Dilution Factor	MDL	MRL	Q
7440-43-9	Cadmium-111	0.0162	1	0.00600	0.0200	J

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INORGANIC ANALYSIS DATA SHEET
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Total Metals

SP-126-072220

Laboratory:	Analytical Resources, Inc.				
Client:	Floyd - Snider				
Project:	Rio Tinto Holden Mine Reclamation/Remediation				
Matrix:	Water	Laboratory ID:	20G0250-06 D	SDG:	20G0250
Sampled:	07/22/20 09:42	Prepared:	07/30/20 08:11	File ID:	XDT_m1200730-096
% Solids:	0.00	Preparation:	REN_EPA 600/4-79-020 4.1.4 HNO3 matrix	Analyzed:	07/30/20 20:20
Batch:	BIG0648	Sequence:	SIG0428	Initial/Final:	25 mL / 25 mL
Instrument:	ICPMS1			Calibration:	DG00094

CAS NO.	Analyte	Concentration (ug/L)	Dilution Factor	MDL	MRL	Q
7440-50-8	Copper-63	0.346	1	0.340	0.500	J
7440-66-6	Zinc-66	2.70	1	0.820	4.00	J

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INORGANIC ANALYSIS DATA SHEET
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Total Metals

SP-126-072220

Laboratory:	Analytical Resources, Inc.				
Client:	Floyd - Snider				
Project:	Rio Tinto Holden Mine Reclamation/Remediation				
Matrix:	Water	Laboratory ID:	20G0250-06RE1 D	SDG:	20G0250
Sampled:	07/22/20 09:42	Prepared:	08/03/20 06:28	File ID:	XDT_M1200803-059
% Solids:	0.00	Preparation:	RHN EPA 600/4-79-020 4.1.4 HNO3 matrix 5x	Analyzed:	08/03/20 17:15
Batch:	BIH0014	Sequence:	SIH0014	Initial/Final:	100 mL / 20 mL
Instrument:	ICPMS1			Calibration:	DH00003

CAS NO.	Analyte	Concentration (ug/L)	Dilution Factor	MDL	MRL	Q
7440-43-9	Cadmium-111	0.0198	1	0.00600	0.0200	J

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INORGANIC ANALYSIS DATA SHEET
EPA 6020A UCT-KED

Total Metals

Field-Blank-072220

Laboratory:	Analytical Resources, Inc.				
Client:	Floyd - Snider				
Project:	Rio Tinto Holden Mine Reclamation/Remediation				
Matrix:	Water	Laboratory ID:	20G0250-07 D	SDG:	20G0250
Sampled:	07/22/20 10:55	Prepared:	07/30/20 08:11	File ID:	XDT_m1200730-076
% Solids:	0.00	Preparation:	REN_EPA 600/4-79-020 4.1.4 HNO3 matrix	Analyzed:	07/30/20 18:48
Batch:	BIG0648	Sequence:	SIG0428	Initial/Final:	25 mL / 25 mL
Instrument:	ICPMS1			Calibration:	DG00094

CAS NO.	Analyte	Concentration (ug/L)	Dilution Factor	MDL	MRL	Q
7440-50-8	Copper-63	<0.500	1	0.340	0.500	U
7440-66-6	Zinc-66	1.31	1	0.820	4.00	J

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INORGANIC ANALYSIS DATA SHEET
EPA 6020A UCT-KED

Total Metals

Field-Blank-072220

Laboratory:	Analytical Resources, Inc.				
Client:	Floyd - Snider				
Project:	Rio Tinto Holden Mine Reclamation/Remediation				
Matrix:	Water	Laboratory ID:	20G0250-07RE1 D	SDG:	20G0250
Sampled:	07/22/20 10:55	Prepared:	08/03/20 06:28	File ID:	XDT_M1200803-055
% Solids:	0.00	Preparation:	RHN EPA 600/4-79-020 4.1.4 HNO3 matrix 5x	Analyzed:	08/03/20 16:55
Batch:	BIH0014	Sequence:	SIH0014	Initial/Final:	100 mL / 20 mL
Instrument:	ICPMS1			Calibration:	DH00003

CAS NO.	Analyte	Concentration (ug/L)	Dilution Factor	MDL	MRL	Q
7440-43-9	Cadmium-111	<0.0200	1	0.00600	0.0200	U

Form I
INORGANIC ANALYSIS DATA SHEET
EPA 6020A UCT-KED

Total Metals

SW-TP3-East1-072220

Laboratory:	Analytical Resources, Inc.				
Client:	Floyd - Snider				
Project:	Rio Tinto Holden Mine Reclamation/Remediation				
Matrix:	Water	Laboratory ID:	20G0250-08 L	SDG:	20G0250
Sampled:	07/22/20 13:45	Prepared:	07/30/20 08:11	File ID:	XDT_m1200730-032
% Solids:	0.00	Preparation:	REN_EPA 600/4-79-020 4.1.4 HNO3 matrix	Analyzed:	07/30/20 15:08
Batch:	BIG0648	Sequence:	SIG0428	Initial/Final:	25 mL / 25 mL
Instrument:	ICPMS1			Calibration:	DG00094

CAS NO.	Analyte	Concentration (ug/L)	Dilution Factor	MDL	MRL	Q
7440-50-8	Copper-63	5.25	1	0.340	0.500	
7440-66-6	Zinc-66	6.44	1	0.820	4.00	

Form I
INORGANIC ANALYSIS DATA SHEET
EPA 6020A UCT-KED

Total Metals

SW-TP3-East1-072220

Laboratory:	Analytical Resources, Inc.				
Client:	Floyd - Snider				
Project:	Rio Tinto Holden Mine Reclamation/Remediation				
Matrix:	Water	Laboratory ID:	20G0250-08RE1 L	SDG:	20G0250
Sampled:	07/22/20 13:45	Prepared:	08/03/20 06:28	File ID:	XDT_M1200803-063
% Solids:	0.00	Preparation:	RHN EPA 600/4-79-020 4.1.4 HNO3 matrix 5x	Analyzed:	08/03/20 17:36
Batch:	BIH0014	Sequence:	SIH0014	Initial/Final:	100 mL / 20 mL
Instrument:	ICPMS1			Calibration:	DH00003

CAS NO.	Analyte	Concentration (ug/L)	Dilution Factor	MDL	MRL	Q
7440-43-9	Cadmium-111	0.0782	1	0.00600	0.0200	

Form I
INORGANIC ANALYSIS DATA SHEET
EPA 6020A UCT-KED

Total Metals

SW-TP3-East2-072220

Laboratory:	Analytical Resources, Inc.				
Client:	Floyd - Snider				
Project:	Rio Tinto Holden Mine Reclamation/Remediation				
Matrix:	Water	Laboratory ID:	20G0250-09 F	SDG:	20G0250
Sampled:	07/22/20 15:00	Prepared:	07/30/20 08:11	File ID:	XDT_m1200730-097
% Solids:	0.00	Preparation:	REN_EPA 600/4-79-020 4.1.4 HNO3 matrix	Analyzed:	07/30/20 20:24
Batch:	BIG0648	Sequence:	SIG0428	Initial/Final:	25 mL / 25 mL
Instrument:	ICPMS1			Calibration:	DG00094

CAS NO.	Analyte	Concentration (ug/L)	Dilution Factor	MDL	MRL	Q
7440-43-9	Cadmium-111	0.738	1	0.0300	0.100	
7440-50-8	Copper-63	15.1	1	0.340	0.500	
7440-66-6	Zinc-67	149	1	0.940	4.00	

Analytical Resources, Incorporated
Analytical Chemists and Consultants

PREPARATION BATCH SUMMARY

EPA 6020A UCT-KED

Laboratory: Analytical Resources, Inc. SDG: 20G0250

Client: Floyd - Snider Project: Rio Tinto Holden Mine Reclamation/Remediation

Batch: BIG0648 Batch Matrix: Water Preparation: REN EPA 600/4-79-020 4.1.4 HNO3 matrix

SAMPLE NAME	LAB SAMPLE ID	LAB FILE ID	DATE PREPARED	OBSERVATIONS
SP-30-072020	20G0250-01	XDT_m1200730-091	07/30/20 08:11	water
SP-34-072120	20G0250-02	XDT_m1200731-066	07/30/20 08:11	water
SP-40-072120	20G0250-03	XDT_m1200730-093	07/30/20 08:11	water
SP-40-072120	20G0250-03	XDT_m1200730-093	07/30/20 08:11	5x concentration if ND at RL, water
SP-32-072120	20G0250-04	XDT_m1200730-094	07/30/20 08:11	5x concentration if ND at RL, water
SP-32-072120	20G0250-04	XDT_m1200730-094	07/30/20 08:11	water
SP-26-072220	20G0250-05	XDT_m1200730-095	07/30/20 08:11	water
SP-126-072220	20G0250-06	XDT_m1200730-096	07/30/20 08:11	water
Field-Blank-072220	20G0250-07	XDT_m1200730-076	07/30/20 08:11	water
SW-TP3-East1-072220	20G0250-08	XDT_m1200730-032	07/30/20 08:11	water
SW-TP3-East2-072220	20G0250-09	XDT_m1200730-097	07/30/20 08:11	water
SW-TP3-East2-072220	20G0250-09	XDT_m1200730-097	07/30/20 08:11	5x concentration if ND at RL, water
Blank	BIG0648-BLK1	XDT_m1200730-028	07/30/20 08:11	
LCS	BIG0648-BS1	XDT_m1200730-029	07/30/20 08:11	
SW-TP3-East1-072220	BIG0648-DUP1	XDT_m1200730-033	07/30/20 08:11	
SW-TP3-East1-072220	BIG0648-MS1	XDT_m1200730-034	07/30/20 08:11	
SW-TP3-East1-072220	BIG0648-MSD1	XDT_m1200730-035	07/30/20 08:11	

PREPARATION BATCH SUMMARY

EPA 6020A UCT-KED

Laboratory: Analytical Resources, Inc. SDG: 20G0250

Client: Floyd - Snider Project: Rio Tinto Holden Mine Reclamation/Remediation

Batch: BIH0014 Batch Matrix: Water Preparation: RHN EPA 600/4-79-020 4.1.4 HNO3 matrix 5x

SAMPLE NAME	LAB SAMPLE ID	LAB FILE ID	DATE PREPARED	OBSERVATIONS
SP-30-072020	20G0250-01RE1	XDT_M1200803-056	08/03/20 06:28	Re-extract added 7/31/2020 by TCH
SP-34-072120	20G0250-02RE1	XDT_M1200803-057	08/03/20 06:28	Re-extract added 7/31/2020 by TCH
SP-26-072220	20G0250-05RE1	XDT_M1200803-058	08/03/20 06:28	Re-extract added 7/31/2020 by TCH
SP-126-072220	20G0250-06RE1	XDT_M1200803-059	08/03/20 06:28	Re-extract added 7/31/2020 by TCH
Field-Blank-072220	20G0250-07RE1	XDT_M1200803-055	08/03/20 06:28	Re-extract added 7/31/2020 by TCH
SW-TP3-East1-072220	20G0250-08RE1	XDT_M1200803-063	08/03/20 06:28	Re-extract added 7/31/2020 by TCH
Blank	BIH0014-BLK1	XDT_M1200803-039	08/03/20 06:28	
LCS	BIH0014-BS1	XDT_M1200803-040	08/03/20 06:28	
SW-TP3-East1-072220	BIH0014-DUP1	XDT_M1200803-064	08/03/20 06:28	
SW-TP3-East1-072220	BIH0014-MS1	XDT_M1200803-065	08/03/20 06:28	
SW-TP3-East1-072220	BIH0014-MSD1	XDT_M1200803-066	08/03/20 06:28	

Form I

METHOD BLANK DATA SHEET

EPA 6020A UCT-KED

Total Metals

Blank

Laboratory: Analytical Resources, Inc.
SDG: 20G0250
Client: Floyd - Snider
Project: Rio Tinto Holden Mine Reclamation/I
Batch: BIG0648
Laboratory ID: BIG0648-BLK1
Prepared: 07/30/20 08:11
Matrix: Water
Preparation: REN_EPA 600/4-79-020 4
Analyzed: 07/30/20 14:44
Sequence: SIG0428
Calibration: DG00094
Instrument: ICPMS1

CAS NO.	Analyte	Concentration (ug/L)	Dilution Factor	MDL	MRL	Q
7440-43-9	Cadmium-111	ND	1	0.0300	0.100	U
7440-43-9	Cadmium-114	ND	1	0.0400	0.100	U
7440-50-8	Copper-63	ND	1	0.340	0.500	U
7440-50-8	Copper-65	ND	1	0.350	0.500	U
7440-66-6	Zinc-66	0.948	1	0.820	4.00	J
7440-66-6	Zinc-67	ND	1	0.940	4.00	U

Form I

METHOD BLANK DATA SHEET

EPA 6020A UCT-KED

Total Metals

Blank

Laboratory: Analytical Resources, Inc.
SDG: 20G0250
Client: Floyd - Snider
Project: Rio Tinto Holden Mine Reclamation/I
Batch: BIH0014
Laboratory ID: BIH0014-BLK1
Prepared: 08/03/20 06:28
Matrix: Water
Preparation: RHN EPA 600/4-79-020 4.
Analyzed: 08/03/20 15:37
Sequence: SIH0014
Calibration: DH00003
Instrument: ICPMS1

CAS NO.	Analyte	Concentration (ug/L)	Dilution Factor	MDL	MRL	Q
7440-43-9	Cadmium-111	ND	1	0.00600	0.0200	U
7440-43-9	Cadmium-114	ND	1	0.00800	0.0200	U

LCS / LCS DUPLICATE RECOVERY

EPA 6020A UCT-KED

Total Metals

Laboratory:	Analytical Resources, Inc.	SDG:	20G0250
Client:	Floyd - Snider	Project:	Rio Tinto Holden Mine Reclamation/Remediation
Matrix:	Water	Analyzed:	07/30/20 14:48
Batch:	BIG0648	Laboratory ID:	BIG0648-BS1
Preparation:	REN EPA 600/4-79-020 4.1.4 HNO3 matrix	Sequence Name:	LCS
Initial/Final:	25 mL / 25 mL		

COMPOUND	SPIKE ADDED (ug/L)	LCS CONCENTRATION (ug/L)	Q	LCS % REC. #	QC LIMITS REC.
Cadmium-111	25.0	24.7		98.7	80 - 120
Cadmium-114	25.0	24.4		97.8	80 - 120
Copper-63	25.0	25.0		100	80 - 120
Copper-65	25.0	25.3		101	80 - 120
Zinc-66	80.0	81.0		101	80 - 120
Zinc-67	80.0	76.9		96.2	80 - 120

* Indicates values outside of QC limits

LCS / LCS DUPLICATE RECOVERY

EPA 6020A UCT-KED

Total Metals

Laboratory:	Analytical Resources, Inc.	SDG:	20G0250
Client:	Floyd - Snider	Project:	Rio Tinto Holden Mine Reclamation/Remediation
Matrix:	Water	Analyzed:	08/03/20 15:40
Batch:	BIH0014	Laboratory ID:	BIH0014-BS1
Preparation:	RHN EPA 600/4-79-020 4.1.4 HNO3 matrix 5x	Sequence Name:	LCS
Initial/Final:	100 mL / 20 mL		

COMPOUND	SPIKE ADDED (ug/L)	LCS CONCENTRATION (ug/L)	Q	LCS % REC. #	QC LIMITS REC.
Cadmium-111	5.00	4.82		96.4	80 - 120
Cadmium-114	5.00	4.80		96.0	80 - 120

* Indicates values outside of QC limits

SW-TP3-East1-072220

DUPLICATES

EPA 6020A UCT-KED

Total Metals

Laboratory: Analytical Resources, Inc.
SDG: 20G0250
Client: Floyd - Snider
Project: Rio Tinto Holden Mine Reclamation/Remediation
Matrix: Water
Laboratory ID: BIG0648-DUP1
Batch: BIG0648
Lab Source ID: 20G0250-08
Preparation: REN EPA 600/4-79-020 4.1.4 HNO3 matrix
Initial/Final: 25 mL / 25 mL
Source Sample Name: SW-TP3-East1-072220
% Solids:

ANALYTE	CONTROL LIMIT	SAMPLE CONCENTRATION (ug/L)	C	DUPLICATE CONCENTRATION (ug/L)	C	RPD %	Q
Cadmium-111	20	0.0740	J	0.0770	J	3.97	
Copper-63	20	5.25		5.25		0.0381	
Zinc-66	20	6.44		6.37		1.11	

*: Values outside of QC limits
L: Analyte concentration is <=5 times the reporting limit and the replicate control limit defaults to Dup = +/- RL instead of 20% RPD

SW-TP3-East1-072220

DUPLICATES

EPA 6020A UCT-KED

Total Metals

Laboratory: Analytical Resources, Inc.
SDG: 20G0250
Client: Floyd - Snider
Project: Rio Tinto Holden Mine Reclamation/Remediation
Matrix: Water
Laboratory ID: BIH0014-DUP1
Batch: BIH0014
Lab Source ID: 20G0250-08RE1
Preparation: RHN EPA 600/4-79-020 4.1.4 HNO3 matrix 5x
Initial/Final: 100 mL / 20 mL
Source Sample Name: SW-TP3-East1-072220
% Solids:

ANALYTE	CONTROL LIMIT	SAMPLE CONCENTRATION (ug/L)	C	DUPLICATE CONCENTRATION (ug/L)	C	RPD %	Q
Cadmium-111	0.05 - 0.09	0.0782		0.0718	L	8.53	L

*: Values outside of QC limits
L: Analyte concentration is <=5 times the reporting limit and the replicate control limit defaults to Dup = +/- RL instead of 20% RPD

SW-TP3-East1-072220

MS / MS DUPLICATE RECOVERY

EPA 6020A UCT-KED

Total Metals

Laboratory:	Analytical Resources, Inc.	SDG:	20G0250
Client:	Floyd - Snider	Project:	Rio Tinto Holden Mine Reclamation/Remediation
Matrix:	Water	Analyzed:	07/30/20 15:20
Batch:	BIG0648	Laboratory ID:	BIG0648-MS1
Preparation:	REN EPA 600/4-79-020 4.1.4 HNO3 matrix	Sequence Name:	Matrix Spike
Initial/Final:	25 mL / 25 mL	Source Sample:	SW-TP3-East1-072220

COMPOUND	SPIKE ADDED (ug/L)	SAMPLE CONCENTRATION (ug/L)	Q	MS CONCENTRATION (ug/L)	Q	MS % REC. #	QC LIMITS REC.
Cadmium-111	25.0	0.0740	J	24.5		97.8	75 - 125
Copper-63	25.0	5.25		29.6		97.5	75 - 125
Zinc-66	80.0	6.44		83.7		96.6	75 - 125

* Values outside of QC limits

SW-TP3-East1-072220

MS / MS DUPLICATE RECOVERY

EPA 6020A UCT-KED

Total Metals

Laboratory:	Analytical Resources, Inc.	SDG:	20G0250
Client:	Floyd - Snider	Project:	Rio Tinto Holden Mine Reclamation/Remediation
Matrix:	Water	Analyzed:	07/30/20 15:25
Batch:	BIG0648	Laboratory ID:	BIG0648-MSD1
Preparation:	REN EPA 600/4-79-020 4.1.4 HNO3 matrix	Sequence Name:	Matrix Spike Dup
Initial/Final:	25 mL / 25 mL	Source Sample:	SW-TP3-East1-072220

COMPOUND	SPIKE ADDED (ug/L)	MSD CONCENTRATION (ug/L)	Q	MSD % REC. #	% RPD #	QC LIMITS RPD	QC LIMITS REC.
Cadmium-111	25.0	25.0		99.8	1.99	20	75 - 125
Copper-63	25.0	29.1		95.3	1.85	20	75 - 125
Zinc-66	80.0	83.3		96.1	0.441	20	75 - 125

* Values outside of QC limits

SW-TP3-East1-072220

MS / MS DUPLICATE RECOVERY

EPA 6020A UCT-KED

Total Metals

Laboratory:	Analytical Resources, Inc.	SDG:	20G0250
Client:	Floyd - Snider	Project:	Rio Tinto Holden Mine Reclamation/Remediation
Matrix:	Water	Analyzed:	08/03/20 17:46
Batch:	BIH0014	Laboratory ID:	BIH0014-MS1
Preparation:	RHN EPA 600/4-79-020 4.1.4 HNO3 matrix 5x	Sequence Name:	Matrix Spike
Initial/Final:	100 mL / 20 mL	Source Sample:	SW-TP3-East1-072220

COMPOUND	SPIKE ADDED (ug/L)	SAMPLE CONCENTRATION (ug/L)	Q	MS CONCENTRATION (ug/L)	Q	MS % REC. #	QC LIMITS REC.
Cadmium-111	5.00	0.0782		4.45		87.4	75 - 125

* Values outside of QC limits

MS / MS DUPLICATE RECOVERY

EPA 6020A UCT-KED

Total Metals

Laboratory:	Analytical Resources, Inc.	SDG:	20G0250
Client:	Floyd - Snider	Project:	Rio Tinto Holden Mine Reclamation/Remediation
Matrix:	Water	Analyzed:	08/03/20 17:51
Batch:	BIH0014	Laboratory ID:	BIH0014-MSD1
Preparation:	RHN EPA 600/4-79-020 4.1.4 HNO3 matrix 5x	Sequence Name:	Matrix Spike Dup
Initial/Final:	100 mL / 20 mL	Source Sample:	SW-TP3-East1-072220

COMPOUND	SPIKE ADDED (ug/L)	MSD CONCENTRATION (ug/L)	Q	MSD % REC. #	% RPD #	QC LIMITS RPD	QC LIMITS REC.
Cadmium-111	5.00	4.59		90.2	3.08	20	75 - 125

* Values outside of QC limits

INITIAL CALIBRATION DATA

EPA 6020A UCT-KED

Laboratory: Analytical Resources, Inc.
SDG: 20G0250
Client: Floyd - Snider
Project: Rio Tinto Holden Mine Reclamation/Remediat
Calibration: DG00094
Instrument: ICPMS1
Calibration Date: 07/30/2020 13:00

Compound	Level 01		Level 02		Level 03		Level 04		Level 05		Level 06	
		RF		RF		RF		RF		RF		RF
Cadmium-111	0	0	0.1	560	10	387.1	20	386.2	50	384.7	100	364.87
Cadmium-114	0	0	0.1	1090	10	971.7	20	977.85	50	954.88	100	924.11
Copper-63	0	0	0.5	6628	10	6417.5	20	6264.9	50	6197.42	100	5916.02
Copper-65	0	0	0.5	3200	10	3197.6	20	3178.65	50	3061.98	100	2968.52
Zinc-66	0	0	4	844.25	10	854.2	20	839.05	50	813.52	100	773.39
Zinc-67	0	0	4	129	10	139.8	20	135.15	50	134.72	100	128.52

INITIAL CALIBRATION DATA

EPA 6020A UCT-KED

Laboratory:	Analytical Resources, Inc.	SDG:	20G0250
Client:	Floyd - Snider	Project:	Rio Tinto Holden Mine Reclamation/Remediat
Calibration:	DG00094	Instrument:	ICPMS1
Calibration Date:	07/30/2020 13:00		

COMPOUND	Mean RF	RF RSD	Linear COD	Quad COD	COD Limit	Q
Cadmium-111	347.145	53.2	0.9993		0.998	
Cadmium-114	819.7567	49.5	0.9997		0.998	
Copper-63	5237.307	49.2	0.9994		0.998	
Copper-65	2601.125	49.1	0.9996		0.998	
Zinc-66	687.4017	49.2	0.9993		0.998	
Zinc-67	111.1983	49.1	0.9994		0.998	

INITIAL CALIBRATION DATA

EPA 6020A UCT-KED

Laboratory: Analytical Resources, Inc.
SDG: 20G0250
Client: Floyd - Snider
Project: Rio Tinto Holden Mine Reclamation/Remediat
Calibration: DH00001
Instrument: ICPMS1
Calibration Date: 07/31/2020 10:58

Compound	Level 01		Level 02		Level 03		Level 04		Level 05		Level 06	
		RF		RF		RF		RF		RF		RF
Copper-63	0	0	0.5	7250	10	6994.4	20	6771.15	50	6713.34	100	6521.88
Copper-65	0	0	0.5	3460	10	3517.6	20	3446.35	50	3382.76	100	3250.69
Zinc-66	0	0	4	927	10	945.9	20	910.6	50	863.74	100	848.91
Zinc-67	0	0	4	147.25	10	155.6	20	153.25	50	145.84	100	141.96

INITIAL CALIBRATION DATA

EPA 6020A UCT-KED

Laboratory:	Analytical Resources, Inc.	SDG:	20G0250
Client:	Floyd - Snider	Project:	Rio Tinto Holden Mine Reclamation/Remediat
Calibration:	DH00001	Instrument:	ICPMS1
Calibration Date:	07/31/2020 10:58		

COMPOUND	Mean RF	RF RSD	Linear COD	Quad COD	COD Limit	Q
Copper-63	5708.462	49.2	0.9998		0.998	
Copper-65	2842.9	49.1	0.9996		0.998	
Zinc-66	749.3583	49.2	0.9999		0.998	
Zinc-67	123.9833	49.2	0.9997		0.998	

INITIAL CALIBRATION DATA

EPA 6020A UCT-KED

Laboratory: Analytical Resources, Inc.
SDG: 20G0250
Client: Floyd - Snider
Project: Rio Tinto Holden Mine Reclamation/Remediat
Calibration: DH00003
Instrument: ICPMS1
Calibration Date: 08/03/2020 12:53

Compound	Level 01		Level 02		Level 03		Level 04		Level 05		Level 06	
		RF		RF		RF		RF		RF		RF
Cadmium-111	0	0	0.1	590	10	492.5	20	484.25	50	472.78	100	469.26
Cadmium-114	0	0	0.1	1450	10	1274.5	20	1258.35	50	1222.48	100	1206.19

INITIAL CALIBRATION DATA

EPA 6020A UCT-KED

Laboratory:	Analytical Resources, Inc.	SDG:	20G0250
Client:	Floyd - Snider	Project:	Rio Tinto Holden Mine Reclamation/Remediat
Calibration:	DH00003	Instrument:	ICPMS1
Calibration Date:	08/03/2020 12:53		

COMPOUND	Mean RF	RF RSD	Linear COD	Quad COD	COD Limit	Q
Cadmium-111	418.1317	50.2	0.9999		0.998	
Cadmium-114	1068.587	49.7	0.9999		0.998	

INITIAL AND CONTINUING CALIBRATION CHECK

EPA 6020A UCT-KED

Laboratory: Analytical Resources, Inc.
SDG: 20G0250
Client: Floyd - Snider
Project: Rio Tinto Holden Mine Reclamation/Remediation
Instrument ID: ICPMS1
Calibration: DG00094
Control Limt: +/- 10.00%
Sequence: SIG0428

Lab Sample ID	Analyte	True	Found	%R	Units	Method
SIG0428-ICV1	Cadmium-111	50.000	49.5	99.0	ug/L	PA 6020A UCT-KE
	Cadmium-114	50.000	49.7	99.5	ug/L	PA 6020A UCT-KE
	Copper-63	50.000	51.1	102	ug/L	PA 6020A UCT-KE
	Copper-65	50.000	51.3	103	ug/L	PA 6020A UCT-KE
	Zinc-66	50.000	50.1	100	ug/L	PA 6020A UCT-KE
	Zinc-67	50.000	50.0	100	ug/L	PA 6020A UCT-KE
SIG0428-CCV1	Cadmium-111	50.000	50.3	101	ug/L	PA 6020A UCT-KE
	Cadmium-114	50.000	50.1	100	ug/L	PA 6020A UCT-KE
	Copper-63	50.000	50.6	101	ug/L	PA 6020A UCT-KE
	Copper-65	50.000	50.2	100	ug/L	PA 6020A UCT-KE
	Zinc-66	50.000	50.7	101	ug/L	PA 6020A UCT-KE
	Zinc-67	50.000	50.8	102	ug/L	PA 6020A UCT-KE
SIG0428-CCV2	Cadmium-111	50.000	50.4	101	ug/L	PA 6020A UCT-KE
	Cadmium-114	50.000	49.7	99.3	ug/L	PA 6020A UCT-KE
	Copper-63	50.000	50.5	101	ug/L	PA 6020A UCT-KE
	Copper-65	50.000	50.6	101	ug/L	PA 6020A UCT-KE
	Zinc-66	50.000	50.5	101	ug/L	PA 6020A UCT-KE
	Zinc-67	50.000	49.9	99.8	ug/L	PA 6020A UCT-KE
SIG0428-CCV3	Cadmium-111	50.000	49.3	98.6	ug/L	PA 6020A UCT-KE
	Cadmium-114	50.000	49.0	97.9	ug/L	PA 6020A UCT-KE
	Copper-63	50.000	50.1	100	ug/L	PA 6020A UCT-KE
	Copper-65	50.000	51.1	102	ug/L	PA 6020A UCT-KE
	Zinc-66	50.000	50.5	101	ug/L	PA 6020A UCT-KE
	Zinc-67	50.000	50.4	101	ug/L	PA 6020A UCT-KE
SIG0428-CCV4	Cadmium-111	50.000	49.1	98.3	ug/L	PA 6020A UCT-KE
	Cadmium-114	50.000	50.0	99.9	ug/L	PA 6020A UCT-KE
	Copper-63	50.000	49.7	99.5	ug/L	PA 6020A UCT-KE
	Copper-65	50.000	50.0	100	ug/L	PA 6020A UCT-KE
	Zinc-66	50.000	50.3	101	ug/L	PA 6020A UCT-KE
	Zinc-67	50.000	49.2	98.3	ug/L	PA 6020A UCT-KE
SIG0428-CCV5	Cadmium-111	50.000	50.4	101	ug/L	PA 6020A UCT-KE
	Cadmium-114	50.000	50.6	101	ug/L	PA 6020A UCT-KE
	Copper-63	50.000	50.3	101	ug/L	PA 6020A UCT-KE
	Copper-65	50.000	49.4	98.9	ug/L	PA 6020A UCT-KE

INITIAL AND CONTINUING CALIBRATION CHECK

EPA 6020A UCT-KED

Laboratory: Analytical Resources, Inc.
SDG: 20G0250
Client: Floyd - Snider
Project: Rio Tinto Holden Mine Reclamation/Remediation
Instrument ID: ICPMS1
Calibration: DG00094
Control Limt: +/- 10.00%
Sequence: SIG0428

Lab Sample ID	Analyte	True	Found	%R	Units	Method
SIG0428-CCV5	Zinc-66	50.000	49.8	99.6	ug/L	PA 6020A UCT-KE
	Zinc-67	50.000	50.2	100	ug/L	PA 6020A UCT-KE
SIG0428-CCV6	Cadmium-111	50.000	49.8	99.5	ug/L	PA 6020A UCT-KE
	Cadmium-114	50.000	49.8	99.7	ug/L	PA 6020A UCT-KE
	Copper-63	50.000	50.4	101	ug/L	PA 6020A UCT-KE
	Copper-65	50.000	51.1	102	ug/L	PA 6020A UCT-KE
	Zinc-66	50.000	50.3	101	ug/L	PA 6020A UCT-KE
	Zinc-67	50.000	51.4	103	ug/L	PA 6020A UCT-KE
SIG0428-CCV7	Cadmium-111	50.000	49.6	99.2	ug/L	PA 6020A UCT-KE
	Cadmium-114	50.000	49.0	97.9	ug/L	PA 6020A UCT-KE
	Copper-63	50.000	49.9	99.8	ug/L	PA 6020A UCT-KE
	Copper-65	50.000	49.2	98.4	ug/L	PA 6020A UCT-KE
	Zinc-66	50.000	49.4	98.7	ug/L	PA 6020A UCT-KE
	Zinc-67	50.000	50.2	100	ug/L	PA 6020A UCT-KE
SIG0428-CCV8	Cadmium-111	50.000	49.5	98.9	ug/L	PA 6020A UCT-KE
	Cadmium-114	50.000	49.1	98.2	ug/L	PA 6020A UCT-KE
	Copper-63	50.000	49.1	98.1	ug/L	PA 6020A UCT-KE
	Copper-65	50.000	49.2	98.5	ug/L	PA 6020A UCT-KE
	Zinc-66	50.000	49.6	99.2	ug/L	PA 6020A UCT-KE
	Zinc-67	50.000	49.8	99.7	ug/L	PA 6020A UCT-KE
SIG0428-CCV9	Cadmium-111	50.000	50.1	100	ug/L	PA 6020A UCT-KE
	Cadmium-114	50.000	49.3	98.6	ug/L	PA 6020A UCT-KE
	Copper-63	50.000	48.9	97.7	ug/L	PA 6020A UCT-KE
	Copper-65	50.000	49.8	99.5	ug/L	PA 6020A UCT-KE
	Zinc-66	50.000	49.6	99.3	ug/L	PA 6020A UCT-KE
	Zinc-67	50.000	49.6	99.2	ug/L	PA 6020A UCT-KE
SIG0428-CCVA	Cadmium-111	50.000	49.1	98.2	ug/L	PA 6020A UCT-KE
	Cadmium-114	50.000	48.9	97.8	ug/L	PA 6020A UCT-KE
	Copper-63	50.000	49.5	99.0	ug/L	PA 6020A UCT-KE
	Copper-65	50.000	49.5	99.0	ug/L	PA 6020A UCT-KE
	Zinc-66	50.000	50.8	102	ug/L	PA 6020A UCT-KE
	Zinc-67	50.000	51.1	102	ug/L	PA 6020A UCT-KE

* Values outside of QC limits

INITIAL AND CONTINUING CALIBRATION CHECK

EPA 6020A UCT-KED

Laboratory: Analytical Resources, Inc.
SDG: 20G0250
Client: Floyd - Snider
Project: Rio Tinto Holden Mine Reclamation/Remediation
Instrument ID: ICPMS1
Calibration: DH00001
Control Limt: +/- 10.00%
Sequence: SIG0442

Lab Sample ID	Analyte	True	Found	%R	Units	Method
SIG0442-ICV1	Copper-63	50.000	51.4	103	ug/L	PA 6020A UCT-KE
	Copper-65	50.000	52.4	105	ug/L	PA 6020A UCT-KE
	Zinc-66	50.000	51.7	103	ug/L	PA 6020A UCT-KE
	Zinc-67	50.000	51.7	103	ug/L	PA 6020A UCT-KE
SIG0442-CCV1	Copper-63	50.000	50.2	100	ug/L	PA 6020A UCT-KE
	Copper-65	50.000	51.6	103	ug/L	PA 6020A UCT-KE
	Zinc-66	50.000	50.7	101	ug/L	PA 6020A UCT-KE
	Zinc-67	50.000	51.5	103	ug/L	PA 6020A UCT-KE
SIG0442-CCV2	Copper-63	50.000	50.4	101	ug/L	PA 6020A UCT-KE
	Copper-65	50.000	50.4	101	ug/L	PA 6020A UCT-KE
	Zinc-66	50.000	51.2	102	ug/L	PA 6020A UCT-KE
	Zinc-67	50.000	51.9	104	ug/L	PA 6020A UCT-KE
SIG0442-CCV3	Copper-63	50.000	50.2	100	ug/L	PA 6020A UCT-KE
	Copper-65	50.000	50.9	102	ug/L	PA 6020A UCT-KE
	Zinc-66	50.000	51.3	103	ug/L	PA 6020A UCT-KE
	Zinc-67	50.000	51.1	102	ug/L	PA 6020A UCT-KE
SIG0442-CCV4	Copper-63	50.000	51.3	103	ug/L	PA 6020A UCT-KE
	Copper-65	50.000	51.0	102	ug/L	PA 6020A UCT-KE
	Zinc-66	50.000	51.0	102	ug/L	PA 6020A UCT-KE
	Zinc-67	50.000	52.2	104	ug/L	PA 6020A UCT-KE
SIG0442-CCV5	Copper-63	50.000	50.7	101	ug/L	PA 6020A UCT-KE
	Copper-65	50.000	51.8	104	ug/L	PA 6020A UCT-KE
	Zinc-66	50.000	50.7	101	ug/L	PA 6020A UCT-KE
	Zinc-67	50.000	50.2	100	ug/L	PA 6020A UCT-KE
SIG0442-CCV6	Copper-63	50.000	50.8	102	ug/L	PA 6020A UCT-KE
	Copper-65	50.000	51.0	102	ug/L	PA 6020A UCT-KE
	Zinc-66	50.000	52.1	104	ug/L	PA 6020A UCT-KE
	Zinc-67	50.000	51.9	104	ug/L	PA 6020A UCT-KE
SIG0442-CCV7	Copper-63	50.000	50.7	101	ug/L	PA 6020A UCT-KE
	Copper-65	50.000	51.8	104	ug/L	PA 6020A UCT-KE
	Zinc-66	50.000	51.3	103	ug/L	PA 6020A UCT-KE
	Zinc-67	50.000	50.3	101	ug/L	PA 6020A UCT-KE
SIG0442-CCV8	Copper-63	50.000	50.7	101	ug/L	PA 6020A UCT-KE
	Copper-65	50.000	50.9	102	ug/L	PA 6020A UCT-KE

INITIAL AND CONTINUING CALIBRATION CHECK

EPA 6020A UCT-KED

Laboratory: Analytical Resources, Inc.
SDG: 20G0250
Client: Floyd - Snider
Project: Rio Tinto Holden Mine Reclamation/Remediation
Instrument ID: ICPMS1
Calibration: DH00001
Control Limt: +/- 10.00%
Sequence: SIG0442

Lab Sample ID	Analyte	True	Found	%R	Units	Method
SIG0442-CCV8	Zinc-66	50.000	50.9	102	ug/L	PA 6020A UCT-KE
	Zinc-67	50.000	51.7	103	ug/L	PA 6020A UCT-KE

* Values outside of QC limits

INITIAL AND CONTINUING CALIBRATION CHECK

EPA 6020A UCT-KED

Laboratory: Analytical Resources, Inc.
SDG: 20G0250
Client: Floyd - Snider
Project: Rio Tinto Holden Mine Reclamation/Remediation
Instrument ID: ICPMS1
Calibration: DH00003
Control Limt: +/- 10.00%
Sequence: SIH0014

Lab Sample ID	Analyte	True	Found	%R	Units	Method
SIH0014-ICV1	Cadmium-111	50.000	50.0	100	ug/L	PA 6020A UCT-KE
	Cadmium-114	50.000	50.3	101	ug/L	PA 6020A UCT-KE
SIH0014-CCV1	Cadmium-111	50.000	50.3	101	ug/L	PA 6020A UCT-KE
	Cadmium-114	50.000	49.7	99.3	ug/L	PA 6020A UCT-KE
SIH0014-CCV2	Cadmium-111	50.000	49.5	98.9	ug/L	PA 6020A UCT-KE
	Cadmium-114	50.000	48.7	97.3	ug/L	PA 6020A UCT-KE
SIH0014-CCV3	Cadmium-111	50.000	49.6	99.2	ug/L	PA 6020A UCT-KE
	Cadmium-114	50.000	49.4	98.8	ug/L	PA 6020A UCT-KE
SIH0014-CCV4	Cadmium-111	50.000	49.2	98.4	ug/L	PA 6020A UCT-KE
	Cadmium-114	50.000	49.3	98.6	ug/L	PA 6020A UCT-KE
SIH0014-CCV5	Cadmium-111	50.000	50.5	101	ug/L	PA 6020A UCT-KE
	Cadmium-114	50.000	49.5	98.9	ug/L	PA 6020A UCT-KE
SIH0014-CCV6	Cadmium-111	50.000	49.5	98.9	ug/L	PA 6020A UCT-KE
	Cadmium-114	50.000	49.3	98.6	ug/L	PA 6020A UCT-KE

* Values outside of QC limits

INSTRUMENT BLANKS
EPA 6020A UCT-KED

Laboratory: Analytical Resources, Inc.
Client: Floyd - Snider
Instrument ID: ICPMS1
Sequence: SIG0428

SDG: 20G0250
Project: Rio Tinto Holden Mine Reclamation/R
Calibration: DG00094
Date Analyzed: 07/30/20 13:30

Lab Sample ID	Analyte	Found	MDL	MRL	Units	C
SIG0428-IBL1	Cadmium-111	-0.00800	0.03	0.100	ug/L	
SIG0428-IBL1	Cadmium-114	-0.00300	0.04	0.100	ug/L	
SIG0428-IBL1	Copper-63	0.00300	0.34	0.500	ug/L	
SIG0428-IBL1	Copper-65	0.00400	0.35	0.500	ug/L	
SIG0428-IBL1	Zinc-66	-0.0070	0.82	4.00	ug/L	
SIG0428-IBL1	Zinc-67	-0.0570	0.94	4.00	ug/L	
SIG0428-ICB1	Cadmium-111	-0.00300	0.03	0.100	ug/L	
SIG0428-ICB1	Cadmium-114	0.00	0.04	0.100	ug/L	
SIG0428-ICB1	Copper-63	0.00100	0.34	0.500	ug/L	
SIG0428-ICB1	Copper-65	0.00500	0.35	0.500	ug/L	
SIG0428-ICB1	Zinc-66	0.0140	0.82	4.00	ug/L	
SIG0428-ICB1	Zinc-67	-0.0460	0.94	4.00	ug/L	
SIG0428-CCB1	Cadmium-111	-0.0100	0.03	0.100	ug/L	
SIG0428-CCB1	Cadmium-114	0.00	0.04	0.100	ug/L	
SIG0428-CCB1	Copper-63	0.00	0.34	0.500	ug/L	
SIG0428-CCB1	Copper-65	0.00600	0.35	0.500	ug/L	
SIG0428-CCB1	Zinc-66	0.0040	0.82	4.00	ug/L	
SIG0428-CCB1	Zinc-67	-0.0340	0.94	4.00	ug/L	
SIG0428-IBL2	Cadmium-111	-0.00300	0.03	0.100	ug/L	
SIG0428-IBL2	Cadmium-114	0.00200	0.04	0.100	ug/L	
SIG0428-IBL2	Copper-63	0.0130	0.34	0.500	ug/L	
SIG0428-IBL2	Copper-65	0.0130	0.35	0.500	ug/L	
SIG0428-IBL2	Zinc-66	0.163	0.82	4.00	ug/L	
SIG0428-IBL2	Zinc-67	0.122	0.94	4.00	ug/L	
SIG0428-CCB2	Cadmium-111	-0.00200	0.03	0.100	ug/L	
SIG0428-CCB2	Cadmium-114	0.00200	0.04	0.100	ug/L	
SIG0428-CCB2	Copper-63	0.00400	0.34	0.500	ug/L	
SIG0428-CCB2	Copper-65	0.00500	0.35	0.500	ug/L	
SIG0428-CCB2	Zinc-66	0.0060	0.82	4.00	ug/L	
SIG0428-CCB2	Zinc-67	0.0090	0.94	4.00	ug/L	
SIG0428-IBL3	Cadmium-111	-0.0100	0.03	0.100	ug/L	
SIG0428-IBL3	Cadmium-114	-0.00200	0.04	0.100	ug/L	
SIG0428-IBL3	Copper-63	0.0140	0.34	0.500	ug/L	
SIG0428-IBL3	Copper-65	0.00900	0.35	0.500	ug/L	

INSTRUMENT BLANKS
EPA 6020A UCT-KED

Laboratory: Analytical Resources, Inc.
Client: Floyd - Snider
Instrument ID: ICPMS1
Sequence: SIG0428

SDG: 20G0250
Project: Rio Tinto Holden Mine Reclamation/R
Calibration: DG00094
Date Analyzed: 07/30/20 15:32

Lab Sample ID	Analyte	Found	MDL	MRL	Units	C
SIG0428-IBL3	Zinc-66	0.0530	0.82	4.00	ug/L	
SIG0428-IBL3	Zinc-67	0.00	0.94	4.00	ug/L	
SIG0428-CCB3	Cadmium-111	-0.0120	0.03	0.100	ug/L	
SIG0428-CCB3	Cadmium-114	0.00	0.04	0.100	ug/L	
SIG0428-CCB3	Copper-63	0.00200	0.34	0.500	ug/L	
SIG0428-CCB3	Copper-65	0.00700	0.35	0.500	ug/L	
SIG0428-CCB3	Zinc-66	0.0010	0.82	4.00	ug/L	
SIG0428-CCB3	Zinc-67	0.0030	0.94	4.00	ug/L	
SIG0428-IBL4	Cadmium-111	-0.00200	0.03	0.100	ug/L	
SIG0428-IBL4	Cadmium-114	0.00200	0.04	0.100	ug/L	
SIG0428-IBL4	Copper-63	0.0140	0.34	0.500	ug/L	
SIG0428-IBL4	Copper-65	0.0130	0.35	0.500	ug/L	
SIG0428-IBL4	Zinc-66	0.0210	0.82	4.00	ug/L	
SIG0428-IBL4	Zinc-67	0.00	0.94	4.00	ug/L	
SIG0428-CCB4	Cadmium-111	-0.00400	0.03	0.100	ug/L	
SIG0428-CCB4	Cadmium-114	-0.00300	0.04	0.100	ug/L	
SIG0428-CCB4	Copper-63	0.00400	0.34	0.500	ug/L	
SIG0428-CCB4	Copper-65	0.00700	0.35	0.500	ug/L	
SIG0428-CCB4	Zinc-66	0.0230	0.82	4.00	ug/L	
SIG0428-CCB4	Zinc-67	0.0170	0.94	4.00	ug/L	
SIG0428-CCB5	Cadmium-111	-0.00600	0.03	0.100	ug/L	
SIG0428-CCB5	Cadmium-114	0.00100	0.04	0.100	ug/L	
SIG0428-CCB5	Copper-63	0.00200	0.34	0.500	ug/L	
SIG0428-CCB5	Copper-65	0.00800	0.35	0.500	ug/L	
SIG0428-CCB5	Zinc-66	-0.0090	0.82	4.00	ug/L	
SIG0428-CCB5	Zinc-67	-0.0180	0.94	4.00	ug/L	
SIG0428-CCB6	Cadmium-111	-0.00500	0.03	0.100	ug/L	
SIG0428-CCB6	Cadmium-114	-0.00200	0.04	0.100	ug/L	
SIG0428-CCB6	Copper-63	0.00600	0.34	0.500	ug/L	
SIG0428-CCB6	Copper-65	0.00600	0.35	0.500	ug/L	
SIG0428-CCB6	Zinc-66	0.00	0.82	4.00	ug/L	
SIG0428-CCB6	Zinc-67	-0.0410	0.94	4.00	ug/L	
SIG0428-IBL5	Cadmium-111	-0.00300	0.03	0.100	ug/L	
SIG0428-IBL5	Cadmium-114	-0.00100	0.04	0.100	ug/L	

INSTRUMENT BLANKS
EPA 6020A UCT-KED

Laboratory: Analytical Resources, Inc.
Client: Floyd - Snider
Instrument ID: ICPMS1
Sequence: SIG0428

SDG: 20G0250
Project: Rio Tinto Holden Mine Reclamation/R
Calibration: DG00094
Date Analyzed: 07/30/20 19:29

Lab Sample ID	Analyte	Found	MDL	MRL	Units	C
SIG0428-IBL5	Copper-63	0.00100	0.34	0.500	ug/L	
SIG0428-IBL5	Copper-65	0.00700	0.35	0.500	ug/L	
SIG0428-IBL5	Zinc-66	-0.0140	0.82	4.00	ug/L	
SIG0428-IBL5	Zinc-67	-0.0320	0.94	4.00	ug/L	
SIG0428-CCB7	Cadmium-111	0.00600	0.03	0.100	ug/L	
SIG0428-CCB7	Cadmium-114	0.0120	0.04	0.100	ug/L	
SIG0428-CCB7	Copper-63	0.00600	0.34	0.500	ug/L	
SIG0428-CCB7	Copper-65	0.00600	0.35	0.500	ug/L	
SIG0428-CCB7	Zinc-66	0.0070	0.82	4.00	ug/L	
SIG0428-CCB7	Zinc-67	-0.0560	0.94	4.00	ug/L	
SIG0428-CCB8	Cadmium-111	-0.00200	0.03	0.100	ug/L	
SIG0428-CCB8	Cadmium-114	-0.00200	0.04	0.100	ug/L	
SIG0428-CCB8	Copper-63	-0.00100	0.34	0.500	ug/L	
SIG0428-CCB8	Copper-65	0.00200	0.35	0.500	ug/L	
SIG0428-CCB8	Zinc-66	0.0040	0.82	4.00	ug/L	
SIG0428-CCB8	Zinc-67	-0.0010	0.94	4.00	ug/L	
SIG0428-IBL6	Cadmium-111	-0.00100	0.03	0.100	ug/L	
SIG0428-IBL6	Cadmium-114	-0.00200	0.04	0.100	ug/L	
SIG0428-IBL6	Copper-63	-0.00100	0.34	0.500	ug/L	
SIG0428-IBL6	Copper-65	0.00500	0.35	0.500	ug/L	
SIG0428-IBL6	Zinc-66	-0.0300	0.82	4.00	ug/L	
SIG0428-IBL6	Zinc-67	0.0090	0.94	4.00	ug/L	
SIG0428-IBL7	Cadmium-111	-0.00600	0.03	0.100	ug/L	
SIG0428-IBL7	Cadmium-114	0.00200	0.04	0.100	ug/L	
SIG0428-IBL7	Copper-63	-0.00100	0.34	0.500	ug/L	
SIG0428-IBL7	Copper-65	0.00500	0.35	0.500	ug/L	
SIG0428-IBL7	Zinc-66	-0.0210	0.82	4.00	ug/L	
SIG0428-IBL7	Zinc-67	-0.0320	0.94	4.00	ug/L	
SIG0428-CCB9	Cadmium-111	-0.00100	0.03	0.100	ug/L	
SIG0428-CCB9	Cadmium-114	0.00	0.04	0.100	ug/L	
SIG0428-CCB9	Copper-63	-0.00200	0.34	0.500	ug/L	
SIG0428-CCB9	Copper-65	0.00300	0.35	0.500	ug/L	
SIG0428-CCB9	Zinc-66	0.0030	0.82	4.00	ug/L	
SIG0428-CCB9	Zinc-67	0.0760	0.94	4.00	ug/L	

INSTRUMENT BLANKS
EPA 6020A UCT-KED

Laboratory: Analytical Resources, Inc.
SDG: 20G0250
Client: Floyd - Snider
Project: Rio Tinto Holden Mine Reclamation/R
Instrument ID: ICPMS1
Calibration: DG00094
Sequence: SIG0428
Date Analyzed: 07/30/20 21:16

Lab Sample ID	Analyte	Found	MDL	MRL	Units	C
SIG0428-IBL8	Cadmium-111	0.00100	0.03	0.100	ug/L	
SIG0428-IBL8	Cadmium-114	-0.00200	0.04	0.100	ug/L	
SIG0428-IBL8	Copper-63	0.00100	0.34	0.500	ug/L	
SIG0428-IBL8	Copper-65	0.00500	0.35	0.500	ug/L	
SIG0428-IBL8	Zinc-66	-0.0270	0.82	4.00	ug/L	
SIG0428-IBL8	Zinc-67	0.00	0.94	4.00	ug/L	
SIG0428-IBL9	Cadmium-111	0.00500	0.03	0.100	ug/L	
SIG0428-IBL9	Cadmium-114	-0.00300	0.04	0.100	ug/L	
SIG0428-IBL9	Copper-63	0.00100	0.34	0.500	ug/L	
SIG0428-IBL9	Copper-65	0.00400	0.35	0.500	ug/L	
SIG0428-IBL9	Zinc-66	-0.0240	0.82	4.00	ug/L	
SIG0428-IBL9	Zinc-67	-0.0540	0.94	4.00	ug/L	
SIG0428-CCBA	Cadmium-111	0.00	0.03	0.100	ug/L	
SIG0428-CCBA	Cadmium-114	-0.00400	0.04	0.100	ug/L	
SIG0428-CCBA	Copper-63	-0.00200	0.34	0.500	ug/L	
SIG0428-CCBA	Copper-65	0.00300	0.35	0.500	ug/L	
SIG0428-CCBA	Zinc-66	0.0050	0.82	4.00	ug/L	
SIG0428-CCBA	Zinc-67	0.0110	0.94	4.00	ug/L	

INSTRUMENT BLANKS
EPA 6020A UCT-KED

Laboratory: Analytical Resources, Inc.
Client: Floyd - Snider
Instrument ID: ICPMS1
Sequence: SIG0442

SDG: 20G0250
Project: Rio Tinto Holden Mine Reclamation/R
Calibration: DH00001
Date Analyzed: 07/31/20 11:29

Lab Sample ID	Analyte	Found	MDL	MRL	Units	C
SIG0442-IBL1	Copper-63	-0.0230	0.34	0.500	ug/L	
SIG0442-IBL1	Copper-65	-0.0260	0.35	0.500	ug/L	
SIG0442-IBL1	Zinc-66	-0.379	0.82	4.00	ug/L	
SIG0442-IBL1	Zinc-67	-0.204	0.94	4.00	ug/L	
SIG0442-ICB1	Copper-63	-0.0220	0.34	0.500	ug/L	
SIG0442-ICB1	Copper-65	-0.0240	0.35	0.500	ug/L	
SIG0442-ICB1	Zinc-66	-0.383	0.82	4.00	ug/L	
SIG0442-ICB1	Zinc-67	-0.317	0.94	4.00	ug/L	
SIG0442-CCB1	Copper-63	-0.0200	0.34	0.500	ug/L	
SIG0442-CCB1	Copper-65	-0.0250	0.35	0.500	ug/L	
SIG0442-CCB1	Zinc-66	-0.409	0.82	4.00	ug/L	
SIG0442-CCB1	Zinc-67	-0.283	0.94	4.00	ug/L	
SIG0442-IBL2	Copper-63	0.337	0.34	0.500	ug/L	
SIG0442-IBL2	Copper-65	0.318	0.35	0.500	ug/L	
SIG0442-IBL2	Zinc-66	3.25	0.82	4.00	ug/L	
SIG0442-IBL2	Zinc-67	2.99	0.94	4.00	ug/L	
SIG0442-IBL3	Copper-63	0.261	0.34	0.500	ug/L	
SIG0442-IBL3	Copper-65	0.260	0.35	0.500	ug/L	
SIG0442-IBL3	Zinc-66	2.60	0.82	4.00	ug/L	
SIG0442-IBL3	Zinc-67	2.50	0.94	4.00	ug/L	
SIG0442-IBL4	Copper-63	-0.0260	0.34	0.500	ug/L	
SIG0442-IBL4	Copper-65	-0.0320	0.35	0.500	ug/L	
SIG0442-IBL4	Zinc-66	-0.572	0.82	4.00	ug/L	
SIG0442-IBL4	Zinc-67	-0.438	0.94	4.00	ug/L	
SIG0442-CCB2	Copper-63	-0.0210	0.34	0.500	ug/L	
SIG0442-CCB2	Copper-65	-0.0280	0.35	0.500	ug/L	
SIG0442-CCB2	Zinc-66	-0.360	0.82	4.00	ug/L	
SIG0442-CCB2	Zinc-67	-0.242	0.94	4.00	ug/L	
SIG0442-IBL5	Copper-63	-0.0310	0.34	0.500	ug/L	
SIG0442-IBL5	Copper-65	-0.0350	0.35	0.500	ug/L	
SIG0442-IBL5	Zinc-66	-0.577	0.82	4.00	ug/L	
SIG0442-IBL5	Zinc-67	-0.498	0.94	4.00	ug/L	
SIG0442-IBL6	Copper-63	-0.0270	0.34	0.500	ug/L	
SIG0442-IBL6	Copper-65	-0.0330	0.35	0.500	ug/L	

INSTRUMENT BLANKS
EPA 6020A UCT-KED

Laboratory: Analytical Resources, Inc.
SDG: 20G0250
Client: Floyd - Snider
Project: Rio Tinto Holden Mine Reclamation/R
Instrument ID: ICPMS1
Calibration: DH00001
Sequence: SIG0442
Date Analyzed: 07/31/20 13:44

Lab Sample ID	Analyte	Found	MDL	MRL	Units	C
SIG0442-IBL6	Zinc-66	-0.563	0.82	4.00	ug/L	
SIG0442-IBL6	Zinc-67	-0.427	0.94	4.00	ug/L	
SIG0442-CCB3	Copper-63	-0.0210	0.34	0.500	ug/L	
SIG0442-CCB3	Copper-65	-0.0320	0.35	0.500	ug/L	
SIG0442-CCB3	Zinc-66	-0.146	0.82	4.00	ug/L	
SIG0442-CCB3	Zinc-67	-0.0970	0.94	4.00	ug/L	
SIG0442-IBL7	Copper-63	-0.0130	0.34	0.500	ug/L	
SIG0442-IBL7	Copper-65	-0.0180	0.35	0.500	ug/L	
SIG0442-IBL7	Zinc-66	-0.589	0.82	4.00	ug/L	
SIG0442-IBL7	Zinc-67	-0.471	0.94	4.00	ug/L	
SIG0442-CCB4	Copper-63	-0.0180	0.34	0.500	ug/L	
SIG0442-CCB4	Copper-65	-0.0270	0.35	0.500	ug/L	
SIG0442-CCB4	Zinc-66	-0.330	0.82	4.00	ug/L	
SIG0442-CCB4	Zinc-67	-0.206	0.94	4.00	ug/L	
SIG0442-IBL8	Copper-63	-0.0340	0.34	0.500	ug/L	
SIG0442-IBL8	Copper-65	-0.0410	0.35	0.500	ug/L	
SIG0442-IBL8	Zinc-66	-0.635	0.82	4.00	ug/L	
SIG0442-IBL8	Zinc-67	-0.480	0.94	4.00	ug/L	
SIG0442-IBL9	Copper-63	-0.0340	0.34	0.500	ug/L	
SIG0442-IBL9	Copper-65	-0.0410	0.35	0.500	ug/L	
SIG0442-IBL9	Zinc-66	-0.593	0.82	4.00	ug/L	
SIG0442-IBL9	Zinc-67	-0.457	0.94	4.00	ug/L	
SIG0442-CCB5	Copper-63	-0.0210	0.34	0.500	ug/L	
SIG0442-CCB5	Copper-65	-0.0290	0.35	0.500	ug/L	
SIG0442-CCB5	Zinc-66	-0.381	0.82	4.00	ug/L	
SIG0442-CCB5	Zinc-67	-0.234	0.94	4.00	ug/L	
SIG0442-IBLA	Copper-63	-0.0350	0.34	0.500	ug/L	
SIG0442-IBLA	Copper-65	-0.0370	0.35	0.500	ug/L	
SIG0442-IBLA	Zinc-66	-0.599	0.82	4.00	ug/L	
SIG0442-IBLA	Zinc-67	-0.469	0.94	4.00	ug/L	
SIG0442-CCB6	Copper-63	-0.0220	0.34	0.500	ug/L	
SIG0442-CCB6	Copper-65	-0.0260	0.35	0.500	ug/L	
SIG0442-CCB6	Zinc-66	-0.362	0.82	4.00	ug/L	
SIG0442-CCB6	Zinc-67	-0.212	0.94	4.00	ug/L	

INSTRUMENT BLANKS
EPA 6020A UCT-KED

Laboratory: Analytical Resources, Inc.
SDG: 20G0250
Client: Floyd - Snider
Project: Rio Tinto Holden Mine Reclamation/R
Instrument ID: ICPMS1
Calibration: DH00001
Sequence: SIG0442
Date Analyzed: 07/31/20 18:15

Lab Sample ID	Analyte	Found	MDL	MRL	Units	C
SIG0442-IBLB	Copper-63	-0.0370	0.34	0.500	ug/L	
SIG0442-IBLB	Copper-65	-0.0380	0.35	0.500	ug/L	
SIG0442-IBLB	Zinc-66	-0.618	0.82	4.00	ug/L	
SIG0442-IBLB	Zinc-67	-0.484	0.94	4.00	ug/L	
SIG0442-CCB7	Copper-63	-0.0310	0.34	0.500	ug/L	
SIG0442-CCB7	Copper-65	-0.0350	0.35	0.500	ug/L	
SIG0442-CCB7	Zinc-66	-0.532	0.82	4.00	ug/L	
SIG0442-CCB7	Zinc-67	-0.407	0.94	4.00	ug/L	
SIG0442-IBLC	Copper-63	-0.0360	0.34	0.500	ug/L	
SIG0442-IBLC	Copper-65	-0.0410	0.35	0.500	ug/L	
SIG0442-IBLC	Zinc-66	-0.637	0.82	4.00	ug/L	
SIG0442-IBLC	Zinc-67	-0.491	0.94	4.00	ug/L	
SIG0442-IBLD	Copper-63	-0.0350	0.34	0.500	ug/L	
SIG0442-IBLD	Copper-65	-0.0400	0.35	0.500	ug/L	
SIG0442-IBLD	Zinc-66	-0.625	0.82	4.00	ug/L	
SIG0442-IBLD	Zinc-67	-0.481	0.94	4.00	ug/L	
SIG0442-CCB8	Copper-63	-0.0280	0.34	0.500	ug/L	
SIG0442-CCB8	Copper-65	-0.0360	0.35	0.500	ug/L	
SIG0442-CCB8	Zinc-66	-0.526	0.82	4.00	ug/L	
SIG0442-CCB8	Zinc-67	-0.351	0.94	4.00	ug/L	

INSTRUMENT BLANKS
EPA 6020A UCT-KED

Laboratory: Analytical Resources, Inc.
SDG: 20G0250
Client: Floyd - Snider
Project: Rio Tinto Holden Mine Reclamation/R
Instrument ID: ICPMS1
Calibration: DH00003
Sequence: SIH0014
Date Analyzed: 08/03/20 13:22

Lab Sample ID	Analyte	Found	MDL	MRL	Units	C
SIH0014-IBL1	Cadmium-111	0.00200	0.03	0.100	ug/L	
SIH0014-IBL1	Cadmium-114	0.00200	0.04	0.100	ug/L	
SIH0014-ICB1	Cadmium-111	0.00600	0.03	0.100	ug/L	
SIH0014-ICB1	Cadmium-114	0.00200	0.04	0.100	ug/L	
SIH0014-CCB1	Cadmium-111	0.00500	0.03	0.100	ug/L	
SIH0014-CCB1	Cadmium-114	0.00500	0.04	0.100	ug/L	
SIH0014-IBL2	Cadmium-111	0.0240	0.03	0.100	ug/L	
SIH0014-IBL2	Cadmium-114	0.0180	0.04	0.100	ug/L	
SIH0014-CCB2	Cadmium-111	0.00600	0.03	0.100	ug/L	
SIH0014-CCB2	Cadmium-114	0.00100	0.04	0.100	ug/L	
SIH0014-CCB3	Cadmium-111	0.00200	0.03	0.100	ug/L	
SIH0014-CCB3	Cadmium-114	0.00100	0.04	0.100	ug/L	
SIH0014-IBL3	Cadmium-111	0.0120	0.03	0.100	ug/L	
SIH0014-IBL3	Cadmium-114	0.00200	0.04	0.100	ug/L	
SIH0014-CCB4	Cadmium-111	0.00900	0.03	0.100	ug/L	
SIH0014-CCB4	Cadmium-114	0.00300	0.04	0.100	ug/L	
SIH0014-IBL4	Cadmium-111	0.00600	0.03	0.100	ug/L	
SIH0014-IBL4	Cadmium-114	0.00400	0.04	0.100	ug/L	
SIH0014-IBL5	Cadmium-111	0.00200	0.03	0.100	ug/L	
SIH0014-IBL5	Cadmium-114	0.00400	0.04	0.100	ug/L	
SIH0014-CCB5	Cadmium-111	0.00700	0.03	0.100	ug/L	
SIH0014-CCB5	Cadmium-114	0.00200	0.04	0.100	ug/L	
SIH0014-IBL6	Cadmium-111	0.00600	0.03	0.100	ug/L	
SIH0014-IBL6	Cadmium-114	0.00100	0.04	0.100	ug/L	
SIH0014-CCB6	Cadmium-111	0.00400	0.03	0.100	ug/L	
SIH0014-CCB6	Cadmium-114	0.00100	0.04	0.100	ug/L	

ANALYSIS BATCH (SEQUENCE) SUMMARY

EPA 6020A UCT-KED

Laboratory: Analytical Resources, Inc.
SDG: 20G0250
Client: Floyd - Snider
Project: Rio Tinto Holden Mine Reclamation/Remediation
Sequence: SIG0428
Instrument: ICPMS1
Calibration: DG00094

Sample Name	Lab Sample ID	Lab File ID	Matrix	Analysis Date/Time
CAL 0	SIG0428-CAL1	XDT_m1200730-007	NA	07/30/20 13:00
CAL 1 - LOW CHECK	SIG0428-CAL2	XDT_m1200730-008	NA	07/30/20 13:04
CAL 2	SIG0428-CAL3	XDT_m1200730-009	NA	07/30/20 13:08
CAL 3	SIG0428-CAL4	XDT_m1200730-010	NA	07/30/20 13:13
CAL 4	SIG0428-CAL5	XDT_m1200730-011	NA	07/30/20 13:17
CAL 5	SIG0428-CAL6	XDT_m1200730-012	NA	07/30/20 13:23
RINSE	SIG0428-IBL1	XDT_m1200730-013	NA	07/30/20 13:30
Initial Cal Check	SIG0428-ICV1	XDT_m1200730-015	NA	07/30/20 13:35
Initial Cal Blank	SIG0428-ICB1	XDT_m1200730-016	NA	07/30/20 13:42
Calibration Check	SIG0428-CCV1	XDT_m1200730-017	NA	07/30/20 13:46
Calibration Blank	SIG0428-CCB1	XDT_m1200730-018	NA	07/30/20 13:53
Instrument RL Check	SIG0428-CRL1	XDT_m1200730-020	NA	07/30/20 14:01
Interference Check A	SIG0428-IFA1	XDT_m1200730-021	NA	07/30/20 14:06
Interference Check B	SIG0428-IFB1	XDT_m1200730-022	NA	07/30/20 14:10
LR200	SIG0428-HCV1	XDT_m1200730-023	NA	07/30/20 14:14
LR300	SIG0428-HCV2	XDT_m1200730-024	NA	07/30/20 14:18
Instrument Blank	SIG0428-IBL2	XDT_m1200730-025	NA	07/30/20 14:25
Calibration Check	SIG0428-CCV2	XDT_m1200730-026	NA	07/30/20 14:31
Calibration Blank	SIG0428-CCB2	XDT_m1200730-027	NA	07/30/20 14:37
Blank	BIG0648-BLK1	XDT_m1200730-028	Water	07/30/20 14:44
LCS	BIG0648-BS1	XDT_m1200730-029	Water	07/30/20 14:48
SW-TP3-East1-072220	20G0250-08	XDT_m1200730-032	Water	07/30/20 15:08
SW-TP3-East1-072220	20G0250-08	XDT_m1200730-032	Water	07/30/20 15:08
SW-TP3-East1-072220	BIG0648-DUP1	XDT_m1200730-033	Water	07/30/20 15:16
SW-TP3-East1-072220	BIG0648-DUP1	XDT_m1200730-033	Water	07/30/20 15:16
SW-TP3-East1-072220	BIG0648-DUP1	XDT_m1200730-033	Water	07/30/20 15:16
SW-TP3-East1-072220	BIG0648-DUP1	XDT_m1200730-033	Water	07/30/20 15:16
SW-TP3-East1-072220	BIG0648-DUP1	XDT_m1200730-033	Water	07/30/20 15:16
SW-TP3-East1-072220	BIG0648-MS1	XDT_m1200730-034	Water	07/30/20 15:20
SW-TP3-East1-072220	BIG0648-MS1	XDT_m1200730-034	Water	07/30/20 15:20

ANALYSIS BATCH (SEQUENCE) SUMMARY

EPA 6020A UCT-KED

Laboratory: Analytical Resources, Inc.
SDG: 20G0250
Client: Floyd - Snider
Project: Rio Tinto Holden Mine Reclamation/Remediation
Sequence: SIG0428
Instrument: ICPMS1
Calibration: DG00094

Sample Name	Lab Sample ID	Lab File ID	Matrix	Analysis Date/Time
SW-TP3-East1-072220	BIG0648-MS1	XDT_m1200730-034	Water	07/30/20 15:20
SW-TP3-East1-072220	BIG0648-MS1	XDT_m1200730-034	Water	07/30/20 15:20
SW-TP3-East1-072220	BIG0648-MS1	XDT_m1200730-034	Water	07/30/20 15:20
SW-TP3-East1-072220	BIG0648-MSD1	XDT_m1200730-035	Water	07/30/20 15:25
SW-TP3-East1-072220	BIG0648-MSD1	XDT_m1200730-035	Water	07/30/20 15:25
SW-TP3-East1-072220	BIG0648-MSD1	XDT_m1200730-035	Water	07/30/20 15:25
SW-TP3-East1-072220	BIG0648-MSD1	XDT_m1200730-035	Water	07/30/20 15:25
SW-TP3-East1-072220	BIG0648-MSD1	XDT_m1200730-035	Water	07/30/20 15:25
Instrument Blank	SIG0428-IBL3	XDT_m1200730-036	NA	07/30/20 15:32
Calibration Check	SIG0428-CCV3	XDT_m1200730-038	NA	07/30/20 15:42
Calibration Blank	SIG0428-CCB3	XDT_m1200730-039	NA	07/30/20 15:49
Instrument Blank	SIG0428-IBL4	XDT_m1200730-049	NA	07/30/20 16:39
Calibration Check	SIG0428-CCV4	XDT_m1200730-050	NA	07/30/20 16:44
Calibration Blank	SIG0428-CCB4	XDT_m1200730-051	NA	07/30/20 16:51
Calibration Check	SIG0428-CCV5	XDT_m1200730-062	NA	07/30/20 17:41
Calibration Blank	SIG0428-CCB5	XDT_m1200730-063	NA	07/30/20 17:47
Calibration Check	SIG0428-CCV6	XDT_m1200730-074	NA	07/30/20 18:37
Calibration Blank	SIG0428-CCB6	XDT_m1200730-075	NA	07/30/20 18:44
Field-Blank-072220	20G0250-07	XDT_m1200730-076	Water	07/30/20 18:48
Field-Blank-072220	20G0250-07	XDT_m1200730-076	Water	07/30/20 18:48
Instrument Blank	SIG0428-IBL5	XDT_m1200730-085	NA	07/30/20 19:29
Calibration Check	SIG0428-CCV7	XDT_m1200730-086	NA	07/30/20 19:35
Calibration Blank	SIG0428-CCB7	XDT_m1200730-087	NA	07/30/20 19:41
Calibration Check	SIG0428-CCV8	XDT_m1200730-089	NA	07/30/20 19:49
Calibration Blank	SIG0428-CCB8	XDT_m1200730-090	NA	07/30/20 19:56
SP-30-072020	20G0250-01	XDT_m1200730-091	Water	07/30/20 20:00
SP-30-072020	20G0250-01	XDT_m1200730-091	Water	07/30/20 20:00
SP-40-072120	20G0250-03	XDT_m1200730-093	Water	07/30/20 20:08
SP-40-072120	20G0250-03	XDT_m1200730-093	Water	07/30/20 20:08
SP-40-072120	20G0250-03	XDT_m1200730-093	Water	07/30/20 20:08

ANALYSIS BATCH (SEQUENCE) SUMMARY

EPA 6020A UCT-KED

Laboratory: Analytical Resources, Inc.
Client: Floyd - Snider
Sequence: SIG0428

SDG: 20G0250
Project: Rio Tinto Holden Mine Reclamation/Remediation
Instrument: ICPMS1
Calibration: DG00094

Sample Name	Lab Sample ID	Lab File ID	Matrix	Analysis Date/Time
SP-32-072120	20G0250-04	XDT_m1200730-094	Water	07/30/20 20:12
SP-32-072120	20G0250-04	XDT_m1200730-094	Water	07/30/20 20:12
SP-32-072120	20G0250-04	XDT_m1200730-094	Water	07/30/20 20:12
SP-26-072220	20G0250-05	XDT_m1200730-095	Water	07/30/20 20:16
SP-26-072220	20G0250-05	XDT_m1200730-095	Water	07/30/20 20:16
SP-126-072220	20G0250-06	XDT_m1200730-096	Water	07/30/20 20:20
SP-126-072220	20G0250-06	XDT_m1200730-096	Water	07/30/20 20:20
SW-TP3-East2-072220	20G0250-09	XDT_m1200730-097	Water	07/30/20 20:24
SW-TP3-East2-072220	20G0250-09	XDT_m1200730-097	Water	07/30/20 20:24
SW-TP3-East2-072220	20G0250-09	XDT_m1200730-097	Water	07/30/20 20:24
Instrument Blank	SIG0428-IBL6	XDT_m1200730-098	NA	07/30/20 20:32
Instrument Blank	SIG0428-IBL7	XDT_m1200730-100	NA	07/30/20 20:45
Calibration Check	SIG0428-CCV9	XDT_m1200730-101	NA	07/30/20 20:50
Calibration Blank	SIG0428-CCB9	XDT_m1200730-102	NA	07/30/20 20:57
Instrument Blank	SIG0428-IBL8	XDT_m1200730-106	NA	07/30/20 21:16
Instrument Blank	SIG0428-IBL9	XDT_m1200730-112	NA	07/30/20 21:45
Calibration Check	SIG0428-CCVA	XDT_m1200730-113	NA	07/30/20 21:51
Calibration Blank	SIG0428-CCBA	XDT_m1200730-114	NA	07/30/20 21:57

ANALYSIS BATCH (SEQUENCE) SUMMARY

EPA 6020A UCT-KED

Laboratory: Analytical Resources, Inc.
SDG: 20G0250
Client: Floyd - Snider
Project: Rio Tinto Holden Mine Reclamation/Remediation
Sequence: SIG0442
Instrument: ICPMS1
Calibration: DH00001

Sample Name	Lab Sample ID	Lab File ID	Matrix	Analysis Date/Time
CAL 0	SIG0442-CAL1	XDT_m1200731-006	NA	07/31/20 10:58
CAL 1 - LOW CHECK	SIG0442-CAL2	XDT_m1200731-007	NA	07/31/20 11:02
CAL 2	SIG0442-CAL3	XDT_m1200731-008	NA	07/31/20 11:07
CAL 3	SIG0442-CAL4	XDT_m1200731-009	NA	07/31/20 11:11
CAL 4	SIG0442-CAL5	XDT_m1200731-010	NA	07/31/20 11:16
CAL 5	SIG0442-CAL6	XDT_m1200731-011	NA	07/31/20 11:22
RINSE	SIG0442-IBL1	XDT_m1200731-012	NA	07/31/20 11:29
Initial Cal Check	SIG0442-ICV1	XDT_m1200731-014	NA	07/31/20 11:34
Initial Cal Blank	SIG0442-ICB1	XDT_m1200731-015	NA	07/31/20 11:41
Calibration Check	SIG0442-CCV1	XDT_m1200731-016	NA	07/31/20 11:46
Calibration Blank	SIG0442-CCB1	XDT_m1200731-017	NA	07/31/20 11:53
Instrument RL Check	SIG0442-CRL1	XDT_m1200731-018	NA	07/31/20 11:58
Interference Check A	SIG0442-IFA1	XDT_m1200731-019	NA	07/31/20 12:02
Interference Check B	SIG0442-IFB1	XDT_m1200731-020	NA	07/31/20 12:06
LR200	SIG0442-HCV1	XDT_m1200731-021	NA	07/31/20 12:10
LR300	SIG0442-HCV2	XDT_m1200731-022	NA	07/31/20 12:15
Instrument Blank	SIG0442-IBL2	XDT_m1200731-023	NA	07/31/20 12:22
Instrument Blank	SIG0442-IBL3	XDT_m1200731-024	NA	07/31/20 12:28
Instrument Blank	SIG0442-IBL4	XDT_m1200731-025	NA	07/31/20 12:34
Calibration Check	SIG0442-CCV2	XDT_m1200731-026	NA	07/31/20 12:38
Calibration Blank	SIG0442-CCB2	XDT_m1200731-027	NA	07/31/20 12:45
Instrument Blank	SIG0442-IBL5	XDT_m1200731-034	NA	07/31/20 13:21
Instrument Blank	SIG0442-IBL6	XDT_m1200731-037	NA	07/31/20 13:44
Calibration Check	SIG0442-CCV3	XDT_m1200731-038	NA	07/31/20 13:52
Calibration Blank	SIG0442-CCB3	XDT_m1200731-039	NA	07/31/20 13:59
Instrument Blank	SIG0442-IBL7	XDT_m1200731-049	NA	07/31/20 14:51
Calibration Check	SIG0442-CCV4	XDT_m1200731-050	NA	07/31/20 14:56
Calibration Blank	SIG0442-CCB4	XDT_m1200731-051	NA	07/31/20 15:03
Instrument Blank	SIG0442-IBL8	XDT_m1200731-053	NA	07/31/20 15:16
Instrument Blank	SIG0442-IBL9	XDT_m1200731-061	NA	07/31/20 16:02

Analytical Resources, Incorporated
Analytical Chemists and Consultants

ANALYSIS BATCH (SEQUENCE) SUMMARY

EPA 6020A UCT-KED

Laboratory:	Analytical Resources, Inc.	SDG:	20G0250
Client:	Floyd - Snider	Project:	Rio Tinto Holden Mine Reclamation/Remediation
Sequence:	SIG0442	Instrument:	ICPMS1
		Calibration:	DH00001

Sample Name	Lab Sample ID	Lab File ID	Matrix	Analysis Date/Time
Calibration Check	SIG0442-CCV5	XDT_m1200731-062	NA	07/31/20 16:08
Calibration Blank	SIG0442-CCB5	XDT_m1200731-063	NA	07/31/20 16:15
SP-34-072120	20G0250-02	XDT_m1200731-066	Water	07/31/20 16:28
SP-34-072120	20G0250-02	XDT_m1200731-066	Water	07/31/20 16:28
Instrument Blank	SIG0442-IBLA	XDT_m1200731-073	NA	07/31/20 17:07
Calibration Check	SIG0442-CCV6	XDT_m1200731-074	NA	07/31/20 17:13
Calibration Blank	SIG0442-CCB6	XDT_m1200731-075	NA	07/31/20 17:20
Instrument Blank	SIG0442-IBLB	XDT_m1200731-085	NA	07/31/20 18:15
Calibration Check	SIG0442-CCV7	XDT_m1200731-086	NA	07/31/20 18:21
Calibration Blank	SIG0442-CCB7	XDT_m1200731-087	NA	07/31/20 18:28
Instrument Blank	SIG0442-IBLC	XDT_m1200731-093	NA	07/31/20 18:57
Instrument Blank	SIG0442-IBLD	XDT_m1200731-096	NA	07/31/20 19:16
Calibration Check	SIG0442-CCV8	XDT_m1200731-097	NA	07/31/20 19:22
Calibration Blank	SIG0442-CCB8	XDT_m1200731-098	NA	07/31/20 19:29

ANALYSIS BATCH (SEQUENCE) SUMMARY

EPA 6020A UCT-KED

Laboratory: Analytical Resources, Inc.
SDG: 20G0250
Client: Floyd - Snider
Project: Rio Tinto Holden Mine Reclamation/Remediation
Sequence: SIH0014
Instrument: ICPMS1
Calibration: DH00003

Sample Name	Lab Sample ID	Lab File ID	Matrix	Analysis Date/Time
CAL 0	SIH0014-CAL1	XDT_M1200803-007	NA	08/03/20 12:53
CAL 1 - LOW CHECK	SIH0014-CAL2	XDT_M1200803-008	NA	08/03/20 12:57
CAL 2	SIH0014-CAL3	XDT_M1200803-009	NA	08/03/20 13:00
CAL 3	SIH0014-CAL4	XDT_M1200803-010	NA	08/03/20 13:05
CAL 4	SIH0014-CAL5	XDT_M1200803-011	NA	08/03/20 13:09
CAL 5	SIH0014-CAL6	XDT_M1200803-012	NA	08/03/20 13:15
RINSE	SIH0014-IBL1	XDT_M1200803-013	NA	08/03/20 13:22
Initial Cal Check	SIH0014-ICV1	XDT_M1200803-015	NA	08/03/20 13:27
Initial Cal Blank	SIH0014-ICB1	XDT_M1200803-016	NA	08/03/20 13:34
Calibration Check	SIH0014-CCV1	XDT_M1200803-017	NA	08/03/20 13:38
Calibration Blank	SIH0014-CCB1	XDT_M1200803-018	NA	08/03/20 13:45
Instrument RL Check	SIH0014-CRL1	XDT_M1200803-019	NA	08/03/20 13:52
Interference Check A	SIH0014-IFA1	XDT_M1200803-020	NA	08/03/20 13:57
Interference Check B	SIH0014-IFB1	XDT_M1200803-021	NA	08/03/20 14:01
LR200	SIH0014-HCV1	XDT_M1200803-022	NA	08/03/20 14:05
LR300	SIH0014-HCV2	XDT_M1200803-023	NA	08/03/20 14:09
Instrument Blank	SIH0014-IBL2	XDT_M1200803-024	NA	08/03/20 14:15
Calibration Check	SIH0014-CCV2	XDT_M1200803-025	NA	08/03/20 14:21
Calibration Blank	SIH0014-CCB2	XDT_M1200803-026	NA	08/03/20 14:28
Calibration Check	SIH0014-CCV3	XDT_M1200803-037	NA	08/03/20 15:26
Calibration Blank	SIH0014-CCB3	XDT_M1200803-038	NA	08/03/20 15:32
Blank	BIH0014-BLK1	XDT_M1200803-039	Water	08/03/20 15:37
LCS	BIH0014-BS1	XDT_M1200803-040	Water	08/03/20 15:40
Instrument Blank	SIH0014-IBL3	XDT_M1200803-048	NA	08/03/20 16:20
Calibration Check	SIH0014-CCV4	XDT_M1200803-049	NA	08/03/20 16:25
Calibration Blank	SIH0014-CCB4	XDT_M1200803-050	NA	08/03/20 16:32
Instrument Blank	SIH0014-IBL4	XDT_M1200803-054	NA	08/03/20 16:51
Field-Blank-072220	20G0250-07RE1	XDT_M1200803-055	Water	08/03/20 16:55
SP-30-072020	20G0250-01RE1	XDT_M1200803-056	Water	08/03/20 17:00
SP-34-072120	20G0250-02RE1	XDT_M1200803-057	Water	08/03/20 17:05

Analytical Resources, Incorporated
Analytical Chemists and Consultants

ANALYSIS BATCH (SEQUENCE) SUMMARY

EPA 6020A UCT-KED

Laboratory:	Analytical Resources, Inc.	SDG:	20G0250
Client:	Floyd - Snider	Project:	Rio Tinto Holden Mine Reclamation/Remediation
Sequence:	SIH0014	Instrument:	ICPMS1
		Calibration:	DH00003

Sample Name	Lab Sample ID	Lab File ID	Matrix	Analysis Date/Time
SP-26-072220	20G0250-05RE1	XDT_M1200803-058	Water	08/03/20 17:10
SP-126-072220	20G0250-06RE1	XDT_M1200803-059	Water	08/03/20 17:15
Instrument Blank	SIH0014-IBL5	XDT_M1200803-060	NA	08/03/20 17:20
Calibration Check	SIH0014-CCV5	XDT_M1200803-061	NA	08/03/20 17:25
Calibration Blank	SIH0014-CCB5	XDT_M1200803-062	NA	08/03/20 17:32
SW-TP3-East1-072220	20G0250-08RE1	XDT_M1200803-063	Water	08/03/20 17:36
SW-TP3-East1-072220	BIH0014-DUP1	XDT_M1200803-064	Water	08/03/20 17:41
SW-TP3-East1-072220	BIH0014-MS1	XDT_M1200803-065	Water	08/03/20 17:46
SW-TP3-East1-072220	BIH0014-MSD1	XDT_M1200803-066	Water	08/03/20 17:51
Instrument Blank	SIH0014-IBL6	XDT_M1200803-067	NA	08/03/20 17:58
Calibration Check	SIH0014-CCV6	XDT_M1200803-068	NA	08/03/20 18:03
Calibration Blank	SIH0014-CCB6	XDT_M1200803-069	NA	08/03/20 18:10

ICP INTERFERENCE CHECK SAMPLE

EPA 6020A UCT-KED

Laboratory: Analytical Resources, Inc.
SDG: 20G0250
Client: Floyd - Snider
Project: Rio Tinto Holden Mine Reclamation/Remediat
Instrument ID: ICPMS1
Calibration: DG00094
Sequence: SIG0428
Standard ID: I006573

Lab Sample ID	Analyte	True	Found	%R	Units
SIG0428-IFA1	Cadmium-111	0	0.0470		ug/L
	Cadmium-114	0	0.0440		ug/L
	Copper-63	0	0.0770		ug/L
	Copper-65	0	0.0770		ug/L
	Zinc-66	0	0.1920		ug/L
	Zinc-67	0	0.1640		ug/L

* Indicates %R outside of QC limits

NOTE: True value and %R are populated only for analytes found in the interference check standards, and will be seen only if those analytes were requested.

ICP INTERFERENCE CHECK SAMPLE

EPA 6020A UCT-KED

Laboratory: Analytical Resources, Inc.
SDG: 20G0250

Client: Floyd - Snider
Project: Rio Tinto Holden Mine Reclamation/Remediat

Instrument ID: ICPMS1
Calibration: DG00094

Sequence: SIG0428
Standard ID: I006573

Lab Sample ID	Analyte	True	Found	%R	Units
SIG0428-IFB1	Cadmium-111	20.000	19.427	97.1	ug/L
	Cadmium-114	20.000	19.577	97.9	ug/L
	Copper-63	20.000	19.884	99.4	ug/L
	Copper-65	20.000	20.005	100	ug/L
	Zinc-66	20.000	19.453	97.3	ug/L
	Zinc-67	20.000	17.645	88.2	ug/L

* Indicates %R outside of QC limits

NOTE: True value and %R are populated only for analytes found in the interference check standards, and will be seen only if those analytes were requested.

ICP INTERFERENCE CHECK SAMPLE

EPA 6020A UCT-KED

Laboratory: Analytical Resources, Inc.
SDG: 20G0250
Client: Floyd - Snider
Project: Rio Tinto Holden Mine Reclamation/Remediat
Instrument ID: ICPMS1
Calibration: DH00001
Sequence: SIG0442
Standard ID: I006573

Lab Sample ID	Analyte	True	Found	%R	Units
SIG0442-IFA1	Copper-63	0	0.0310		ug/L
	Copper-65	0	0.0380		ug/L
	Zinc-66	0	-0.4780		ug/L
	Zinc-67	0	-0.3720		ug/L

* Indicates %R outside of QC limits

NOTE: True value and %R are populated only for analytes found in the interference check standards, and will be seen only if those analytes were requested.

ICP INTERFERENCE CHECK SAMPLE

EPA 6020A UCT-KED

Laboratory: Analytical Resources, Inc.
SDG: 20G0250
Client: Floyd - Snider
Project: Rio Tinto Holden Mine Reclamation/Remediat
Instrument ID: ICPMS1
Calibration: DH00001
Sequence: SIG0442
Standard ID: I006573

Lab Sample ID	Analyte	True	Found	%R	Units
SIG0442-IFB1	Copper-63	20.000	20.233	101	ug/L
	Copper-65	20.000	20.566	103	ug/L
	Zinc-66	20.000	19.443	97.2	ug/L
	Zinc-67	20.000	17.548	87.7	ug/L

* Indicates %R outside of QC limits

NOTE: True value and %R are populated only for analytes found in the interference check standards, and will be seen only if those analytes were requested.

ICP INTERFERENCE CHECK SAMPLE

EPA 6020A UCT-KED

Laboratory: Analytical Resources, Inc.
SDG: 20G0250
Client: Floyd - Snider
Project: Rio Tinto Holden Mine Reclamation/Remediat
Instrument ID: ICPMS1
Calibration: DH00003
Sequence: SIH0014
Standard ID: I006573

Lab Sample ID	Analyte	True	Found	%R	Units
SIH0014-IFA1	Cadmium-111	0	0.0620		ug/L
	Cadmium-114	0	0.0460		ug/L

* Indicates %R outside of QC limits

NOTE: True value and %R are populated only for analytes found in the interference check standards, and will be seen only if those analytes were requested.

ICP INTERFERENCE CHECK SAMPLE

EPA 6020A UCT-KED

Laboratory: Analytical Resources, Inc.
SDG: 20G0250
Client: Floyd - Snider
Project: Rio Tinto Holden Mine Reclamation/Remediat
Instrument ID: ICPMS1
Calibration: DH00003
Sequence: SIH0014
Standard ID: I006573

Lab Sample ID	Analyte	True	Found	%R	Units
SIH0014-IFB1	Cadmium-111	20.000	19.275	96.4	ug/L
	Cadmium-114	20.000	19.249	96.2	ug/L

* Indicates %R outside of QC limits

NOTE: True value and %R are populated only for analytes found in the interference check standards, and will be seen only if those analytes were requested.

DETECTION LEVEL STANDARD
EPA 6020A UCT-KED

Laboratory: Analytical Resources, Inc.
SDG: 20G0250
Client: Floyd - Snider
Project: Rio Tinto Holden Mine Reclamation/Remedia
Instrument ID: ICPMS1
Calibration: DG00094
Sequence: SIG0428
Lab Sample ID: SIG0428-CRL1

Analyte	True	Found	%R	Units	QC Limts
Cadmium-111	0.10000	0.121	121	ug/L	50 - 150
Cadmium-114	0.10000	0.111	111	ug/L	50 - 150
Copper-63	0.50000	0.515	103	ug/L	50 - 150
Copper-65	0.50000	0.499	99.8	ug/L	50 - 150
Zinc-66	4.0000	4.16	104	ug/L	50 - 150
Zinc-67	4.0000	3.65	91.1	ug/L	50 - 150

* Values outside of QC limits

DETECTION LEVEL STANDARD
EPA 6020A UCT-KED

Laboratory: Analytical Resources, Inc.
SDG: 20G0250
Client: Floyd - Snider
Project: Rio Tinto Holden Mine Reclamation/Remedia
Instrument ID: ICPMS1
Calibration: DH00001
Sequence: SIG0442
Lab Sample ID: SIG0442-CRL1

Analyte	True	Found	%R	Units	QC Limts
Copper-63	0.50000	0.495	99.0	ug/L	50 - 150
Copper-65	0.50000	0.497	99.4	ug/L	50 - 150
Zinc-66	4.0000	3.68	91.9	ug/L	50 - 150
Zinc-67	4.0000	3.45	86.2	ug/L	50 - 150

* Values outside of QC limits

DETECTION LEVEL STANDARD
EPA 6020A UCT-KED

Laboratory: Analytical Resources, Inc.
SDG: 20G0250
Client: Floyd - Snider
Project: Rio Tinto Holden Mine Reclamation/Remedi
Instrument ID: ICPMS1
Calibration: DH00003
Sequence: SIH0014
Lab Sample ID: SIH0014-CRL1

Analyte	True	Found	%R	Units	QC Limts
Cadmium-111	0.10000	0.0950	95.0	ug/L	50 - 150
Cadmium-114	0.10000	0.109	109	ug/L	50 - 150

* Values outside of QC limits

Analytical Resources, Incorporated
Analytical Chemists and Consultants

HIGH-CONCENTRATION CALIBRATION VERIFICATION

EPA 6020A UCT-KED

Laboratory: Analytical Resources, Inc.
SDG: 20G0250
Client: Floyd - Snider
Project: Rio Tinto Holden Mine Reclamation/Remed
Calibration: DG00094
Laboratory ID: SIG0428-HCV1
Sequence: SIG0428
Standard ID: I006575

ANALYTE	EXPECTED (ug/L)	FOUND (ug/L)	% DRIFT	QC LIMIT
Cadmium-111	200.00	193	-3.6	10.00
Cadmium-114	200.00	192	-4.0	10.00
Copper-63	200.00	194	-3.2	10.00
Copper-65	200.00	191	-4.7	10.00
Zinc-66	200.00	192	-4.2	10.00
Zinc-67	200.00	192	-4.1	10.00

* Values outside of QC limits

Analytical Resources, Incorporated
Analytical Chemists and Consultants

HIGH-CONCENTRATION CALIBRATION VERIFICATION

EPA 6020A UCT-KED

Laboratory: Analytical Resources, Inc.
SDG: 20G0250
Client: Floyd - Snider
Project: Rio Tinto Holden Mine Reclamation/Remed
Calibration: DG00094
Laboratory ID: SIG0428-HCV2
Sequence: SIG0428
Standard ID: I006449

ANALYTE	EXPECTED (ug/L)	FOUND (ug/L)	% DRIFT	QC LIMIT
Cadmium-111	300.00	287	-4.4	10.00
Cadmium-114	300.00	283	-5.7	10.00
Copper-63	300.00	287	-4.5	10.00
Copper-65	300.00	286	-4.8	10.00
Zinc-66	300.00	283	-5.8	10.00
Zinc-67	300.00	281	-6.4	10.00

* Values outside of QC limits

Analytical Resources, Incorporated
Analytical Chemists and Consultants

HIGH-CONCENTRATION CALIBRATION VERIFICATION

EPA 6020A UCT-KED

Laboratory: Analytical Resources, Inc.
SDG: 20G0250
Client: Floyd - Snider
Project: Rio Tinto Holden Mine Reclamation/Remed
Calibration: DH00001
Laboratory ID: SIG0442-HCV1
Sequence: SIG0442
Standard ID: I006575

ANALYTE	EXPECTED (ug/L)	FOUND (ug/L)	% DRIFT	QC LIMIT
Copper-63	200.00	197	-1.4	10.00
Copper-65	200.00	199	-0.5	10.00
Zinc-66	200.00	199	-0.5	10.00
Zinc-67	200.00	195	-2.3	10.00

* Values outside of QC limits

Analytical Resources, Incorporated
Analytical Chemists and Consultants

HIGH-CONCENTRATION CALIBRATION VERIFICATION

EPA 6020A UCT-KED

Laboratory: Analytical Resources, Inc.
SDG: 20G0250
Client: Floyd - Snider
Project: Rio Tinto Holden Mine Reclamation/Remed
Calibration: DH00001
Laboratory ID: SIG0442-HCV2
Sequence: SIG0442
Standard ID: I006449

ANALYTE	EXPECTED (ug/L)	FOUND (ug/L)	% DRIFT	QC LIMIT
Copper-63	300.00	288	-4.0	10.00
Copper-65	300.00	290	-3.4	10.00
Zinc-66	300.00	287	-4.5	10.00
Zinc-67	300.00	281	-6.3	10.00

* Values outside of QC limits

Analytical Resources, Incorporated
Analytical Chemists and Consultants

HIGH-CONCENTRATION CALIBRATION VERIFICATION

EPA 6020A UCT-KED

Laboratory: Analytical Resources, Inc.
SDG: 20G0250
Client: Floyd - Snider
Project: Rio Tinto Holden Mine Reclamation/Remed
Calibration: DH00003
Laboratory ID: SIH0014-HCV1
Sequence: SIH0014
Standard ID: I006575

ANALYTE	EXPECTED (ug/L)	FOUND (ug/L)	% DRIFT	QC LIMIT
Cadmium-111	200.00	197	-1.3	10.00
Cadmium-114	200.00	196	-1.9	10.00

* Values outside of QC limits

Analytical Resources, Incorporated
Analytical Chemists and Consultants

HIGH-CONCENTRATION CALIBRATION VERIFICATION

EPA 6020A UCT-KED

Laboratory: Analytical Resources, Inc.
SDG: 20G0250
Client: Floyd - Snider
Project: Rio Tinto Holden Mine Reclamation/Remed
Calibration: DH00003
Laboratory ID: SIH0014-HCV2
Sequence: SIH0014
Standard ID: I006449

ANALYTE	EXPECTED (ug/L)	FOUND (ug/L)	% DRIFT	QC LIMIT
Cadmium-111	300.00	280	-6.6	10.00
Cadmium-114	300.00	281	-6.3	10.00

* Values outside of QC limits

HOLDING TIME SUMMARY

Analysis: EPA 6020A UCT-KED

Laboratory: Analytical Resources, Inc. SDG: 20G0250

Client: Floyd - Snider Project: Rio Tinto Holden Mine Reclamation/Remediation

Sample Name	Date Collected	Date Received	Date Prepared	Days to Prep	Max Days to Prep	Date Analyzed	Days to Analysis	Max Days to Analysis	Q
SP-30-072020 20G0250-01	07/20/20 17:50	07/24/20 12:36	07/30/20 08:11	9	180	07/30/20 20:00	10	180	
SP-30-072020 20G0250-01RE1	07/20/20 17:50	07/24/20 12:36	08/03/20 06:28	13	180	08/03/20 17:00	14	180	
SP-34-072120 20G0250-02	07/21/20 12:20	07/24/20 12:36	07/30/20 08:11	8	180	07/31/20 16:28	10	180	
SP-34-072120 20G0250-02RE1	07/21/20 12:20	07/24/20 12:36	08/03/20 06:28	12	180	08/03/20 17:05	13	180	
SP-40-072120 20G0250-03	07/21/20 13:18	07/24/20 12:36	07/30/20 08:11	8	180	07/30/20 20:08	9	180	
SP-32-072120 20G0250-04	07/21/20 13:25	07/24/20 12:36	07/30/20 08:11	8	180	07/30/20 20:12	9	180	
SP-26-072220 20G0250-05	07/22/20 09:37	07/24/20 12:36	07/30/20 08:11	7	180	07/30/20 20:16	8	180	
SP-26-072220 20G0250-05RE1	07/22/20 09:37	07/24/20 12:36	08/03/20 06:28	11	180	08/03/20 17:10	12	180	
SP-126-072220 20G0250-06	07/22/20 09:42	07/24/20 12:36	07/30/20 08:11	7	180	07/30/20 20:20	8	180	
SP-126-072220 20G0250-06RE1	07/22/20 09:42	07/24/20 12:36	08/03/20 06:28	11	180	08/03/20 17:15	12	180	
Field-Blank-072220 20G0250-07	07/22/20 10:55	07/24/20 12:36	07/30/20 08:11	7	180	07/30/20 18:48	8	180	
Field-Blank-072220 20G0250-07RE1	07/22/20 10:55	07/24/20 12:36	08/03/20 06:28	11	180	08/03/20 16:55	12	180	
SW-TP3-East1-072220 20G0250-08	07/22/20 13:45	07/24/20 12:36	07/30/20 08:11	7	180	07/30/20 15:08	8	180	
SW-TP3-East1-072220 20G0250-08RE1	07/22/20 13:45	07/24/20 12:36	08/03/20 06:28	11	180	08/03/20 17:36	12	180	
SW-TP3-East2-072220 20G0250-09	07/22/20 15:00	07/24/20 12:36	07/30/20 08:11	7	180	07/30/20 20:24	8	180	
Duplicate BIG0648-DUP1	07/22/20 13:45	07/24/20 12:36	07/30/20 08:11	7	180	07/30/20 15:16	8	180	
Matrix Spike BIG0648-MS1	07/22/20 13:45	07/24/20 12:36	07/30/20 08:11	7	180	07/30/20 15:20	8	180	
Matrix Spike Dup BIG0648-MSD1	07/22/20 13:45	07/24/20 12:36	07/30/20 08:11	7	180	07/30/20 15:25	8	180	
Duplicate BIH0014-DUP1	07/22/20 13:45	07/24/20 12:36	08/03/20 06:28	11	180	08/03/20 17:41	12	180	
Matrix Spike BIH0014-MS1	07/22/20 13:45	07/24/20 12:36	08/03/20 06:28	11	180	08/03/20 17:46	12	180	
Matrix Spike Dup BIH0014-MSD1	07/22/20 13:45	07/24/20 12:36	08/03/20 06:28	11	180	08/03/20 17:51	12	180	

* Indicates hold time exceedance.

METHOD DETECTION AND REPORTING LIMITS

EPA 6020A UCT-KED

Laboratory: Analytical Resources, Inc.
SDG: 20G0250
Client: Floyd - Snider
Project: Rio Tinto Holden Mine Reclamation/Rem
Matrix: Water
Instrument: ICPMS1

Analyte	MDL	RL	Units
Cadmium-111	0.0300	0.100	ug/L
Cadmium-114	0.0400	0.100	ug/L
Copper-63	0.340	0.500	ug/L
Copper-65	0.350	0.500	ug/L
Zinc-66	0.820	4.00	ug/L
Zinc-67	0.940	4.00	ug/L

Form I
INORGANIC ANALYSIS DATA SHEET
EPA 300.0

SP-30-072020

Laboratory:	Analytical Resources, Inc.				
Client:	Floyd - Snider				
Project:	Rio Tinto Holden Mine Reclamation/Remediation				
Matrix:	Water	Laboratory ID:	20G0250-01 A	SDG:	20G0250
Sampled:	07/20/20 17:50	Prepared:	07/24/20 13:56	File ID:	SIG0357-20G0250-01
% Solids:	0.00	Preparation:	No Prep Wet Chem	Analyzed:	07/24/20 17:44
Batch:	BIG0559	Sequence:	SIG0357	Initial/Final:	10 mL / 10 mL
Instrument:	IC930			Calibration:	DG00059

CAS NO.	Analyte	Concentration (mg/L)	Dilution Factor	MDL	MRL	Q
16887-00-6	Chloride	0.128	1	0.100	0.100	
14797-55-8	Nitrate-N	<0.100	1	0.100	0.100	H, U
14808-79-8	Sulfate	3.28	1	0.100	0.100	

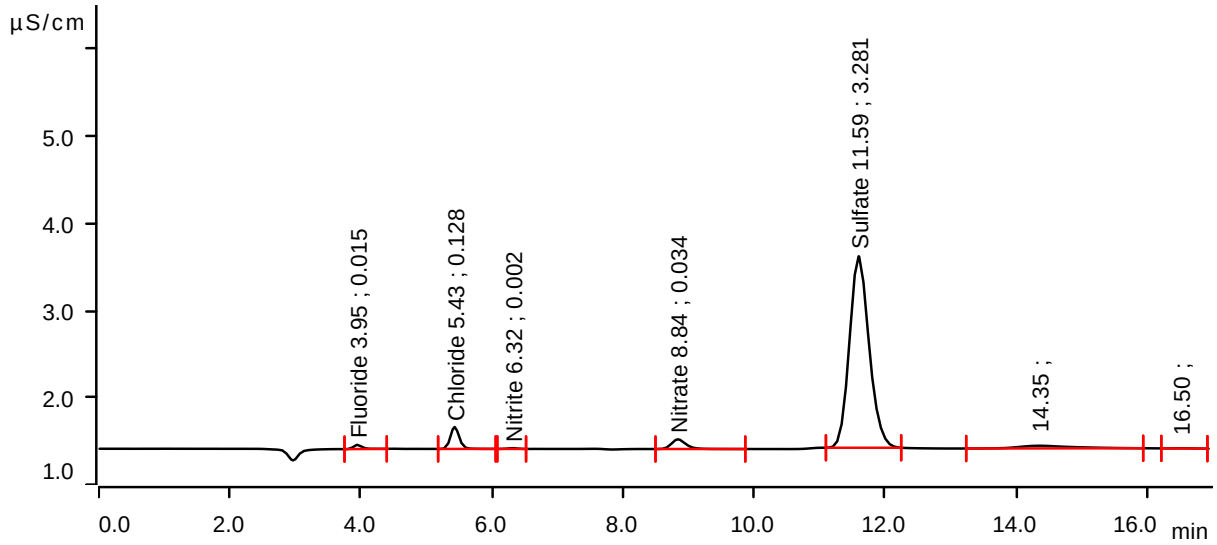
Sample data

Ident	**20G0250-01**
Sample type	Sample
Determination start	2020-07-24 17:44:53 UTC-7
Method / Calibration Date	DG00059-07202020
Operator	IC930
Dilution Factor	**1.00**

Anions

Data source	Conductivity detector 1 (930 Compact IC Flex 1)	
Channel	Conductivity	
Recording time	17.0	min
Integration	Automatically	
Column type	Metrosep A Supp 5 - 150/4.0	
Eluent composition	Carb-BiCarb - 3.2mmol/L Sodium Carbonate 1.0mmol/L Sodium BiCarbonate	
Flow	0.700	mL/min
Maximum flow monitored	yes	
Pressure	8.87	MPa
Maximum pressure monitored	yes	
Temperature	25.5	°C

Anions



Peak number	Retention time min	Area (µS/cm) x min	Height µS/cm	Concentration mg/L	Component name
1	3.945	0.0075	0.048	0.015	Fluoride
2	5.430	0.0396	0.252	0.128	Chloride
3	6.315	0.0015	0.009	0.002	Nitrite
4	8.837	0.0285	0.111	0.034	Nitrate
5	11.593	0.7657	2.198	3.281	Sulfate
6	14.348	0.0291	0.031	invalid	
7	16.498	0.0009	0.003	invalid	

Form I
INORGANIC ANALYSIS DATA SHEET
EPA 300.0

SP-34-072120

Laboratory:	Analytical Resources, Inc.				
Client:	Floyd - Snider				
Project:	Rio Tinto Holden Mine Reclamation/Remediation				
Matrix:	Water	Laboratory ID:	20G0250-02 A	SDG:	20G0250
Sampled:	07/21/20 12:20	Prepared:	07/24/20 13:56	File ID:	SIG0357-20G0250-02
% Solids:	0.00	Preparation:	No Prep Wet Chem	Analyzed:	07/24/20 18:04
Batch:	BIG0559	Sequence:	SIG0357	Initial/Final:	10 mL / 10 mL
Instrument:	IC930			Calibration:	DG00059

CAS NO.	Analyte	Concentration (mg/L)	Dilution Factor	MDL	MRL	Q
16887-00-6	Chloride	0.137	1	0.100	0.100	
14797-55-8	Nitrate-N	<0.100	1	0.100	0.100	H, U
14808-79-8	Sulfate	3.42	1	0.100	0.100	

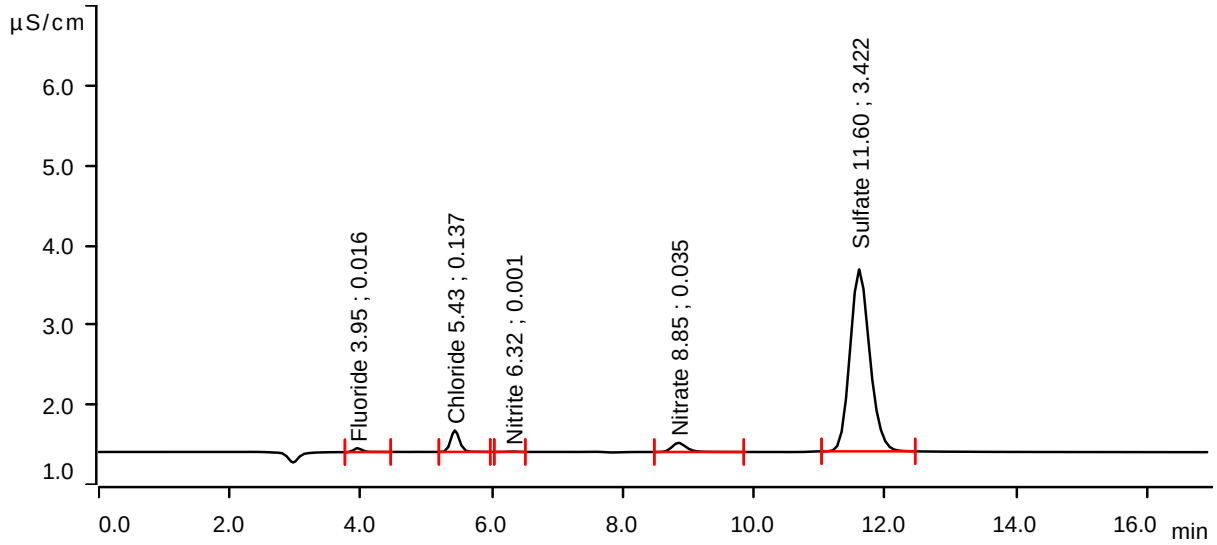
Sample data

Ident	**20G0250-02**
Sample type	Sample
Determination start	2020-07-24 18:04:57 UTC-7
Method / Calibration Date	DG00059-07202020
Operator	IC930
Dilution Factor	**1.00**

Anions

Data source	Conductivity detector 1 (930 Compact IC Flex 1)	
Channel	Conductivity	
Recording time	17.0	min
Integration	Automatically	
Column type	Metrosep A Supp 5 - 150/4.0	
Eluent composition	Carb-BiCarb - 3.2mmol/L Sodium Carbonate 1.0mmol/L Sodium BiCarbonate	
Flow	0.700	mL/min
Maximum flow monitored	yes	
Pressure	8.87	MPa
Maximum pressure monitored	yes	
Temperature	25.5	°C

Anions



Peak number	Retention time min	Area (µS/cm) x min	Height µS/cm	Concentration mg/L	Component name
1	3.948	0.0077	0.049	0.016	Fluoride
2	5.433	0.0423	0.269	0.137	Chloride
3	6.322	0.0008	0.005	0.001	Nitrite
4	8.845	0.0295	0.115	0.035	Nitrate
5	11.603	0.7986	2.278	3.422	Sulfate

Form I
INORGANIC ANALYSIS DATA SHEET
EPA 300.0

SP-40-072120

Laboratory:	Analytical Resources, Inc.				
Client:	Floyd - Snider				
Project:	Rio Tinto Holden Mine Reclamation/Remediation				
Matrix:	Water	Laboratory ID:	20G0250-03 A	SDG:	20G0250
Sampled:	07/21/20 13:18	Prepared:	07/24/20 13:56	File ID:	SIG0357-20G0250-03
% Solids:	0.00	Preparation:	No Prep Wet Chem	Analyzed:	07/24/20 18:24
Batch:	BIG0559	Sequence:	SIG0357	Initial/Final:	10 mL / 10 mL
Instrument:	IC930			Calibration:	DG00059

CAS NO.	Analyte	Concentration (mg/L)	Dilution Factor	MDL	MRL	Q
16887-00-6	Chloride	0.235	1	0.100	0.100	
14797-55-8	Nitrate-N	<0.100	1	0.100	0.100	H, U
14808-79-8	Sulfate	7.27	1	0.100	0.100	

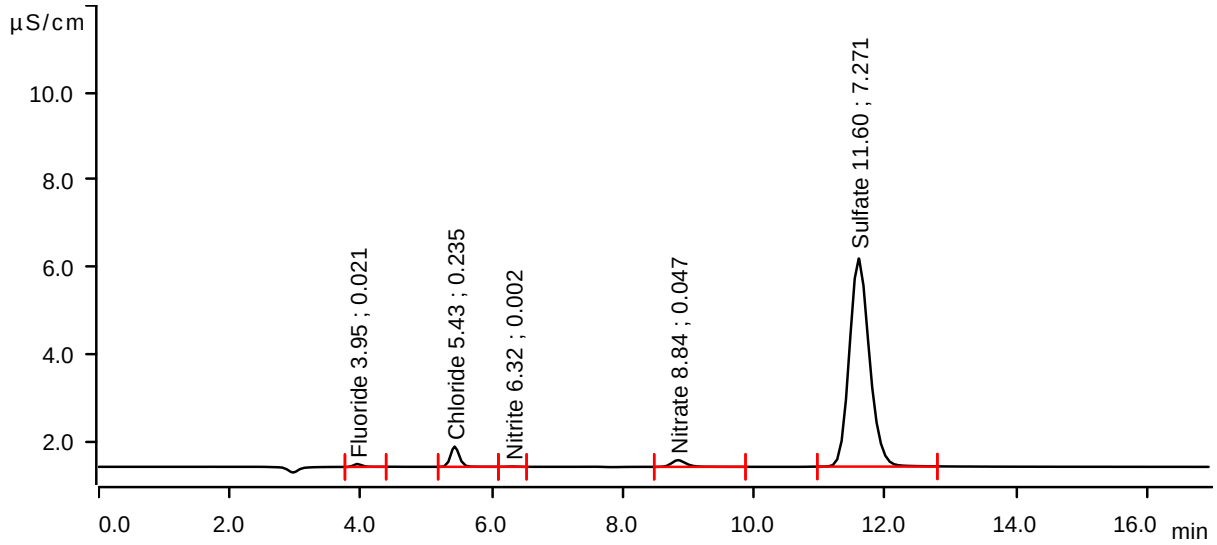
Sample data

Ident	**20G0250-03**
Sample type	Sample
Determination start	2020-07-24 18:24:57 UTC-7
Method / Calibration Date	DG00059-07202020
Operator	IC930
Dilution Factor	**1.00**

Anions

Data source	Conductivity detector 1 (930 Compact IC Flex 1)	
Channel	Conductivity	
Recording time	17.0	min
Integration	Automatically	
Column type	Metrosep A Supp 5 - 150/4.0	
Eluent composition	Carb-BiCarb - 3.2mmol/L Sodium Carbonate 1.0mmol/L Sodium BiCarbonate	
Flow	0.700	mL/min
Maximum flow monitored	yes	
Pressure	8.92	MPa
Maximum pressure monitored	yes	
Temperature	25.5	°C

Anions



Peak number	Retention time min	Area (µS/cm) x min	Height µS/cm	Concentration mg/L	Component name
1	3.947	0.0101	0.067	0.021	Fluoride
2	5.430	0.0725	0.465	0.235	Chloride
3	6.318	0.0011	0.007	0.002	Nitrite
4	8.838	0.0393	0.154	0.047	Nitrate
5	11.595	1.6968	4.778	7.271	Sulfate

Form I
INORGANIC ANALYSIS DATA SHEET
EPA 300.0

SP-32-072120

Laboratory:	Analytical Resources, Inc.				
Client:	Floyd - Snider				
Project:	Rio Tinto Holden Mine Reclamation/Remediation				
Matrix:	Water	Laboratory ID:	20G0250-04 A	SDG:	20G0250
Sampled:	07/21/20 13:25	Prepared:	07/24/20 13:56	File ID:	SIG0357-20G0250-04
% Solids:	0.00	Preparation:	No Prep Wet Chem	Analyzed:	07/24/20 19:25
Batch:	BIG0559	Sequence:	SIG0357	Initial/Final:	10 mL / 10 mL
Instrument:	IC930			Calibration:	DG00059

CAS NO.	Analyte	Concentration (mg/L)	Dilution Factor	MDL	MRL	Q
16887-00-6	Chloride	0.237	1	0.100	0.100	
14797-55-8	Nitrate-N	<0.100	1	0.100	0.100	H, U
14808-79-8	Sulfate	7.29	1	0.100	0.100	

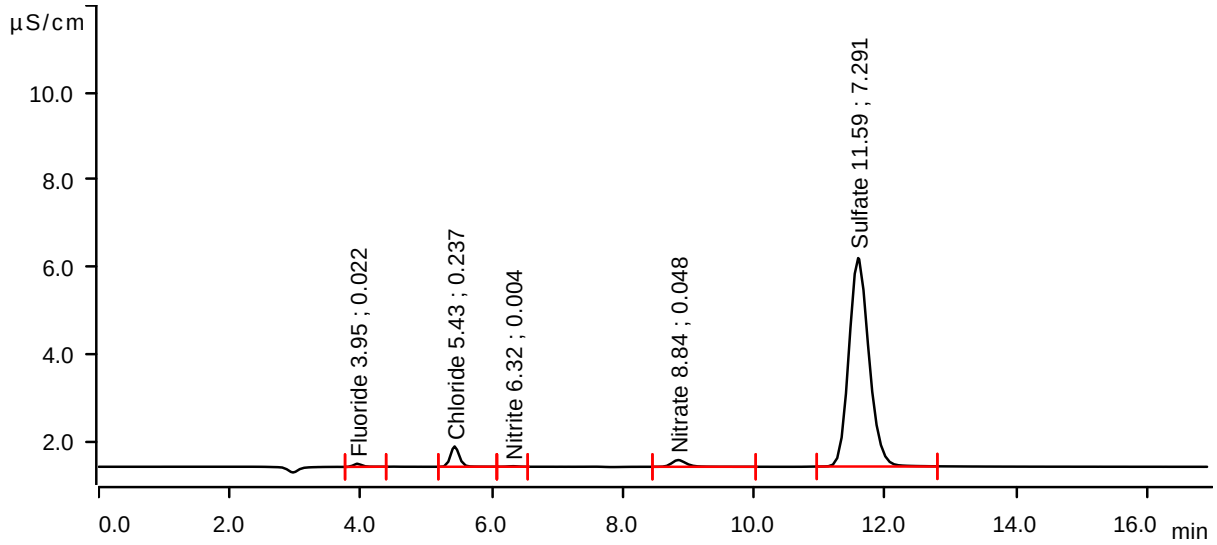
Sample data

Ident	**20G0250-04**
Sample type	Sample
Determination start	2020-07-24 19:25:03 UTC-7
Method / Calibration Date	DG00059-07202020
Operator	IC930
Dilution Factor	**1.00**

Anions

Data source	Conductivity detector 1 (930 Compact IC Flex 1)	
Channel	Conductivity	
Recording time	17.0	min
Integration	Automatically	
Column type	Metrosep A Supp 5 - 150/4.0	
Eluent composition	Carb-BiCarb - 3.2mmol/L Sodium Carbonate 1.0mmol/L Sodium BiCarbonate	
Flow	0.700	mL/min
Maximum flow monitored	yes	
Pressure	9.03	MPa
Maximum pressure monitored	yes	
Temperature	25.4	°C

Anions



Peak number	Retention time min	Area (µS/cm) x min	Height µS/cm	Concentration mg/L	Component name
1	3.947	0.0109	0.071	0.022	Fluoride
2	5.430	0.0729	0.467	0.237	Chloride
3	6.318	0.0022	0.013	0.004	Nitrite
4	8.842	0.0399	0.155	0.048	Nitrate
5	11.587	1.7017	4.787	7.291	Sulfate

Form I
INORGANIC ANALYSIS DATA SHEET
EPA 300.0

SP-26-072220

Laboratory:	Analytical Resources, Inc.				
Client:	Floyd - Snider				
Project:	Rio Tinto Holden Mine Reclamation/Remediation				
Matrix:	Water	Laboratory ID:	20G0250-05 A	SDG:	20G0250
Sampled:	07/22/20 09:37	Prepared:	07/24/20 13:56	File ID:	SIG0374-20G0250-05
% Solids:	0.00	Preparation:	No Prep Wet Chem	Analyzed:	07/27/20 13:52
Batch:	BIG0586	Sequence:	SIG0374	Initial/Final:	10 mL / 10 mL
Instrument:	IC930			Calibration:	DG00059

CAS NO.	Analyte	Concentration (mg/L)	Dilution Factor	MDL	MRL	Q
16887-00-6	Chloride	0.275	1	0.100	0.100	
14797-55-8	Nitrate-N	<0.100	1	0.100	0.100	H, U

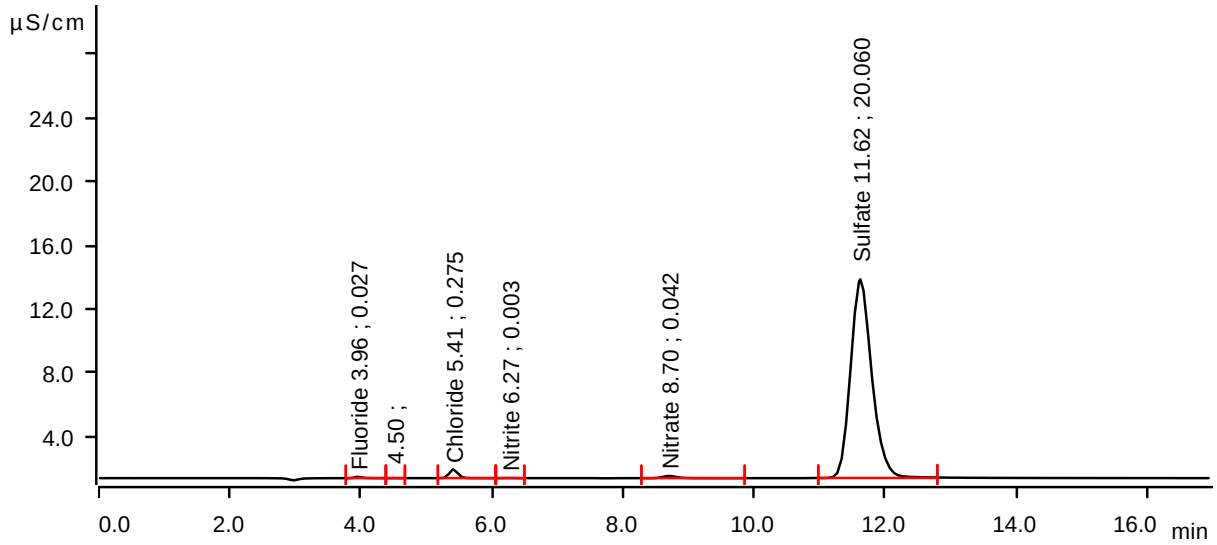
Sample data

Ident	**20G0250-05**
Sample type	Sample
Determination start	2020-07-27 13:52:48 UTC-7
Method / Calibration Date	DG00059-07202020
Operator	IC930
Dilution Factor	**1.00**

Anions

Data source	Conductivity detector 1 (930 Compact IC Flex 1)	
Channel	Conductivity	
Recording time	17.0	min
Integration	Automatically	
Column type	Metrosep A Supp 5 - 150/4.0	
Eluent composition	Carb-BiCarb - 3.2mmol/L Sodium Carbonate 1.0mmol/L Sodium BiCarbonate	
Flow	0.700	mL/min
Maximum flow monitored	yes	
Pressure	8.64	MPa
Maximum pressure monitored	yes	
Temperature	27.2	°C

Anions



Peak number	Retention time min	Area (µS/cm) x min	Height µS/cm	Concentration mg/L	Component name
1	3.955	0.0131	0.085	0.027	Fluoride
2	4.503	0.0003	0.002	invalid	
3	5.410	0.0847	0.551	0.275	Chloride
4	6.270	0.0017	0.010	0.003	Nitrite
5	8.700	0.0347	0.138	0.042	Nitrate
6	11.620	4.6817	12.436	20.060	Sulfate

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INORGANIC ANALYSIS DATA SHEET
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SP-26-072220

Laboratory:	Analytical Resources, Inc.				
Client:	Floyd - Snider				
Project:	Rio Tinto Holden Mine Reclamation/Remediation				
Matrix:	Water	Laboratory ID:	20G0250-05RE1 A	SDG:	20G0250
Sampled:	07/22/20 09:37	Prepared:	07/24/20 13:56	File ID:	SIG0374-20G0250-05RE1
% Solids:	0.00	Preparation:	No Prep Wet Chem	Analyzed:	07/27/20 16:33
Batch:	BIG0586	Sequence:	SIG0374	Initial/Final:	10 mL / 10 mL
Instrument:	IC930			Calibration:	DG00059

CAS NO.	Analyte	Concentration (mg/L)	Dilution Factor	MDL	MRL	Q
14808-79-8	Sulfate	18.0	4	0.400	0.400	D

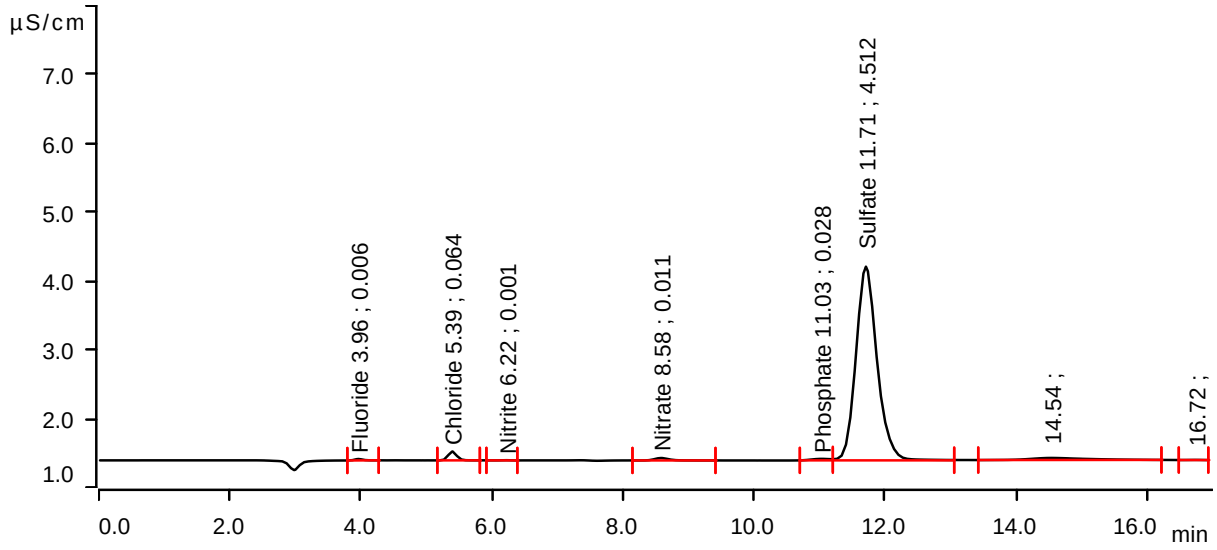
Sample data

Ident	**20G0250-05RE1**	
Sample type	Sample	
Determination start	2020-07-27 16:33:04 UTC-7	
Method / Calibration Date	DG00059-07202020	
Operator	IC930	
Dilution Factor	**4.00**	

Anions

Data source	Conductivity detector 1 (930 Compact IC Flex 1)	
Channel	Conductivity	
Recording time	17.0	min
Integration	Automatically	
Column type	Metrosep A Supp 5 - 150/4.0	
Eluent composition	Carb-BiCarb - 3.2mmol/L Sodium Carbonate 1.0mmol/L Sodium BiCarbonate	
Flow	0.700	mL/min
Maximum flow monitored	yes	
Pressure	8.36	MPa
Maximum pressure monitored	yes	
Temperature	29.1	°C

Anions



Peak number	Retention time min	Area (µS/cm) x min	Height µS/cm	Concentration mg/L	Component name
1	3.963	0.0030	0.021	0.006	Fluoride
2	5.393	0.0198	0.129	0.064	Chloride
3	6.222	0.0005	0.003	0.001	Nitrite
4	8.578	0.0089	0.035	0.011	Nitrate
5	11.027	0.0071	0.022	0.028	Phosphate
6	11.705	1.0530	2.816	4.512	Sulfate
7	14.543	0.0299	0.030	invalid	
8	16.715	0.0005	0.002	invalid	

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INORGANIC ANALYSIS DATA SHEET
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SP-126-072220

Laboratory:	Analytical Resources, Inc.				
Client:	Floyd - Snider				
Project:	Rio Tinto Holden Mine Reclamation/Remediation				
Matrix:	Water	Laboratory ID:	20G0250-06 A	SDG:	20G0250
Sampled:	07/22/20 09:42	Prepared:	07/24/20 13:56	File ID:	SIG0357-20G0250-06
% Solids:	0.00	Preparation:	No Prep Wet Chem	Analyzed:	07/24/20 19:45
Batch:	BIG0559	Sequence:	SIG0357	Initial/Final:	10 mL / 10 mL
Instrument:	IC930			Calibration:	DG00059

CAS NO.	Analyte	Concentration (mg/L)	Dilution Factor	MDL	MRL	Q
16887-00-6	Chloride	0.276	1	0.100	0.100	
14797-55-8	Nitrate-N	<0.100	1	0.100	0.100	H, U

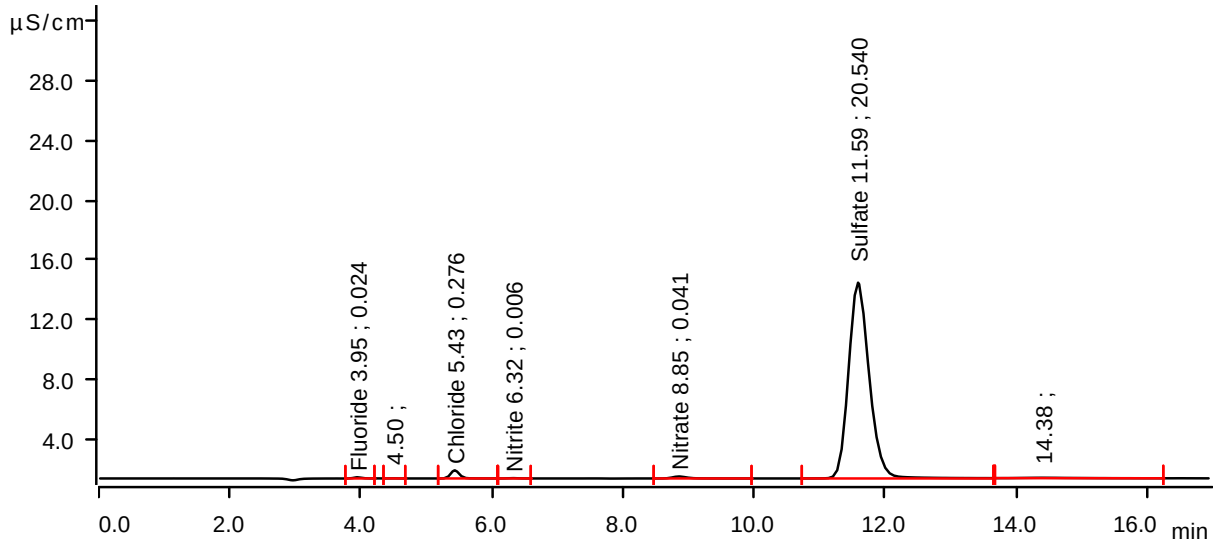
Sample data

Ident	**20G0250-06**
Sample type	Sample
Determination start	2020-07-24 19:45:07 UTC-7
Method / Calibration Date	DG00059-07202020
Operator	IC930
Dilution Factor	**1.00**

Anions

Data source	Conductivity detector 1 (930 Compact IC Flex 1)	
Channel	Conductivity	
Recording time	17.0	min
Integration	Automatically	
Column type	Metrosep A Supp 5 - 150/4.0	
Eluent composition	Carb-BiCarb - 3.2mmol/L Sodium Carbonate 1.0mmol/L Sodium BiCarbonate	
Flow	0.700	mL/min
Maximum flow monitored	yes	
Pressure	8.98	MPa
Maximum pressure monitored	yes	
Temperature	25.4	°C

Anions



Peak number	Retention time min	Area (µS/cm) x min	Height µS/cm	Concentration mg/L	Component name
1	3.947	0.0115	0.079	0.024	Fluoride
2	4.497	0.0007	0.005	invalid	
3	5.432	0.0850	0.547	0.276	Chloride
4	6.323	0.0036	0.021	0.006	Nitrite
5	8.852	0.0341	0.132	0.041	Nitrate
6	11.585	4.7936	13.080	20.540	Sulfate
7	14.382	0.0249	0.027	invalid	

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SP-126-072220

Laboratory:	Analytical Resources, Inc.				
Client:	Floyd - Snider				
Project:	Rio Tinto Holden Mine Reclamation/Remediation				
Matrix:	Water	Laboratory ID:	20G0250-06RE1 A	SDG:	20G0250
Sampled:	07/22/20 09:42	Prepared:	07/24/20 13:56	File ID:	SIG0357-20G0250-06RE1
% Solids:	0.00	Preparation:	No Prep Wet Chem	Analyzed:	07/24/20 21:44
Batch:	BIG0559	Sequence:	SIG0357	Initial/Final:	10 mL / 10 mL
Instrument:	IC930			Calibration:	DG00059

CAS NO.	Analyte	Concentration (mg/L)	Dilution Factor	MDL	MRL	Q
14808-79-8	Sulfate	18.1	4	0.400	0.400	D

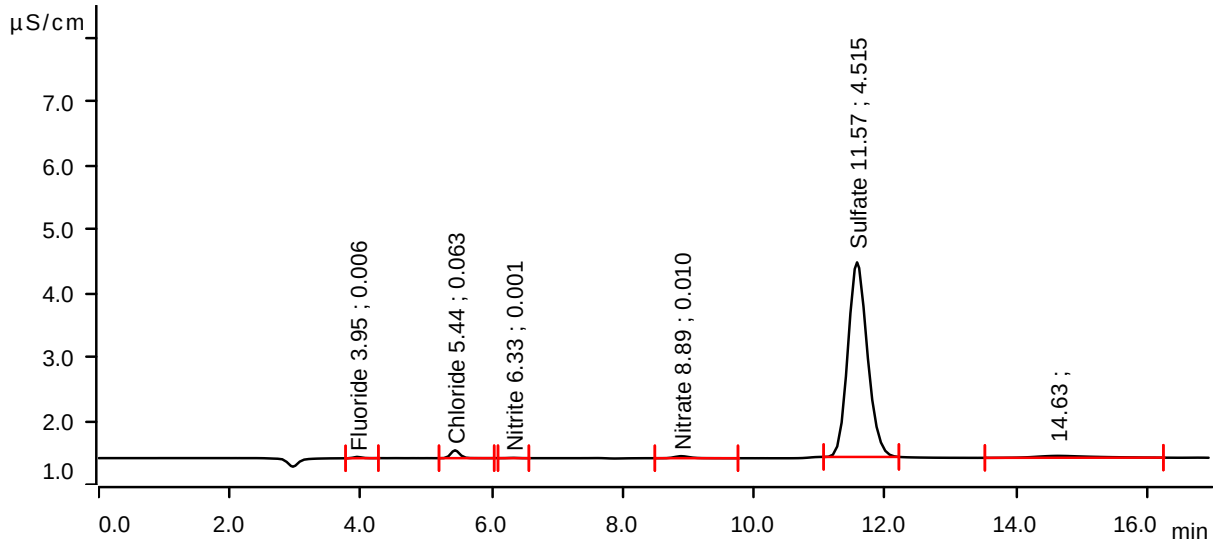
Sample data

Ident	**20G0250-06RE1**
Sample type	Sample
Determination start	2020-07-24 21:44:43 UTC-7
Method / Calibration Date	DG00059-07202020
Operator	IC930
Dilution Factor	**4.00**

Anions

Data source	Conductivity detector 1 (930 Compact IC Flex 1)	
Channel	Conductivity	
Recording time	17.0	min
Integration	Automatically	
Column type	Metrosep A Supp 5 - 150/4.0	
Eluent composition	Carb-BiCarb - 3.2mmol/L Sodium Carbonate 1.0mmol/L Sodium BiCarbonate	
Flow	0.700	mL/min
Maximum flow monitored	yes	
Pressure	9.03	MPa
Maximum pressure monitored	yes	
Temperature	25.0	°C

Anions



Peak number	Retention time min	Area (µS/cm) x min	Height µS/cm	Concentration mg/L	Component name
1	3.945	0.0031	0.021	0.006	Fluoride
2	5.437	0.0195	0.123	0.063	Chloride
3	6.325	0.0008	0.005	0.001	Nitrite
4	8.888	0.0085	0.032	0.010	Nitrate
5	11.570	1.0537	3.046	4.515	Sulfate
6	14.633	0.0295	0.030	invalid	

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Field-Blank-072220

Laboratory:	Analytical Resources, Inc.				
Client:	Floyd - Snider				
Project:	Rio Tinto Holden Mine Reclamation/Remediation				
Matrix:	Water	Laboratory ID:	20G0250-07 A	SDG:	20G0250
Sampled:	07/22/20 10:55	Prepared:	07/24/20 13:56	File ID:	SIG0357-20G0250-07
% Solids:	0.00	Preparation:	No Prep Wet Chem	Analyzed:	07/24/20 20:25
Batch:	BIG0559	Sequence:	SIG0357	Initial/Final:	10 mL / 10 mL
Instrument:	IC930			Calibration:	DG00059

CAS NO.	Analyte	Concentration (mg/L)	Dilution Factor	MDL	MRL	Q
16887-00-6	Chloride	<0.100	1	0.100	0.100	U
14797-55-8	Nitrate-N	<0.100	1	0.100	0.100	H, U
14808-79-8	Sulfate	<0.100	1	0.100	0.100	U

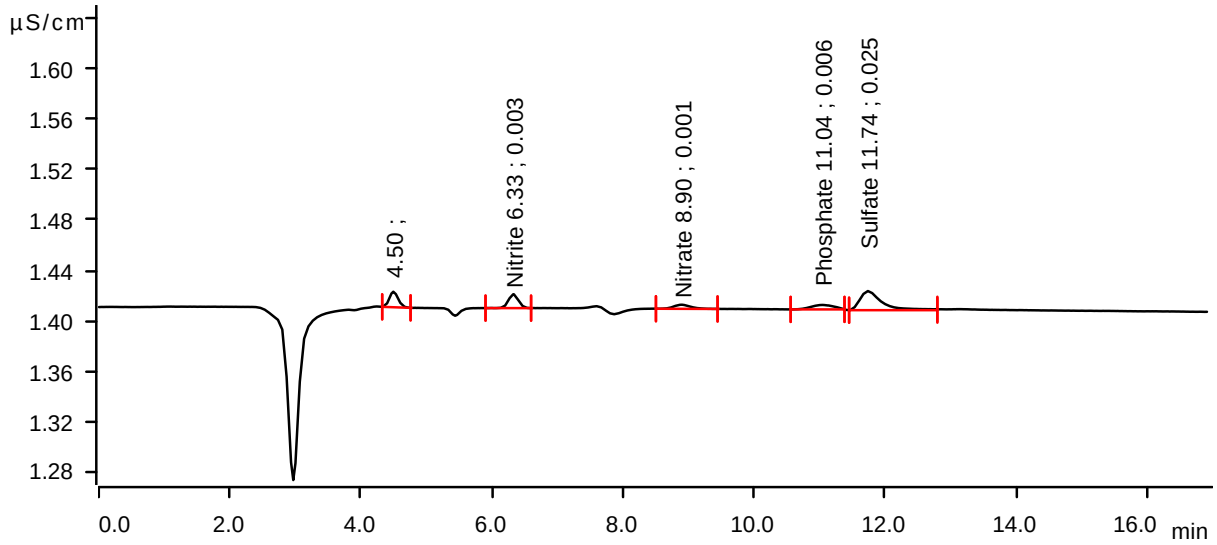
Sample data

Ident	**20G0250-07**
Sample type	Sample
Determination start	2020-07-24 20:25:09 UTC-7
Method / Calibration Date	DG00059-07202020
Operator	IC930
Dilution Factor	**1.00**

Anions

Data source	Conductivity detector 1 (930 Compact IC Flex 1)	
Channel	Conductivity	
Recording time	17.0	min
Integration	Automatically	
Column type	Metrosep A Supp 5 - 150/4.0	
Eluent composition	Carb-BiCarb - 3.2mmol/L Sodium Carbonate 1.0mmol/L Sodium BiCarbonate	
Flow	0.700	mL/min
Maximum flow monitored	yes	
Pressure	8.98	MPa
Maximum pressure monitored	yes	
Temperature	25.3	°C

Anions



Peak number	Retention time min	Area (µS/cm) x min	Height µS/cm	Concentration mg/L	Component name
1	4.495	0.0019	0.012	invalid	
2	6.325	0.0020	0.011	0.003	Nitrite
3	8.900	0.0010	0.003	0.001	Nitrate
4	11.043	0.0014	0.004	0.006	Phosphate
5	11.737	0.0059	0.015	0.025	Sulfate

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SW-TP3-East1-072220

Laboratory:	Analytical Resources, Inc.				
Client:	Floyd - Snider				
Project:	Rio Tinto Holden Mine Reclamation/Remediation				
Matrix:	Water	Laboratory ID:	20G0250-08 A	SDG:	20G0250
Sampled:	07/22/20 13:45	Prepared:	07/24/20 13:56	File ID:	SIG0357-20G0250-08
% Solids:	0.00	Preparation:	No Prep Wet Chem	Analyzed:	07/24/20 16:24
Batch:	BIG0559	Sequence:	SIG0357	Initial/Final:	10 mL / 10 mL
Instrument:	IC930			Calibration:	DG00059

CAS NO.	Analyte	Concentration (mg/L)	Dilution Factor	MDL	MRL	Q
16887-00-6	Chloride	0.100	1	0.100	0.100	
14797-55-8	Nitrate-N	<0.100	1	0.100	0.100	H, U
14808-79-8	Sulfate	9.93	1	0.100	0.100	

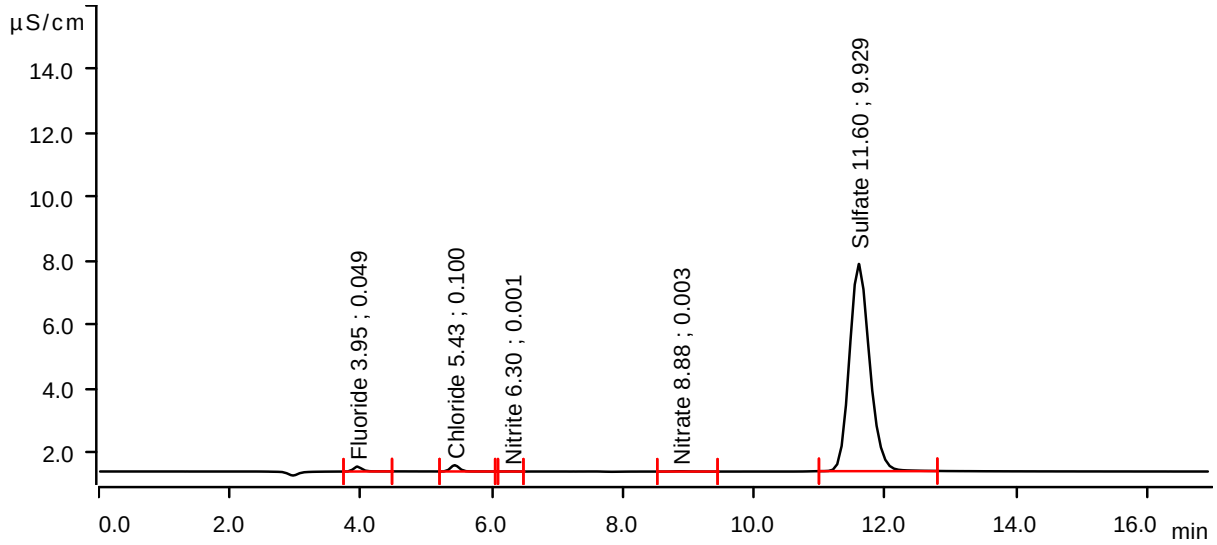
Sample data

Ident	**20G0250-08**
Sample type	Sample
Determination start	2020-07-24 16:24:48 UTC-7
Method / Calibration Date	DG00059-07202020
Operator	IC930
Dilution Factor	**1.00**

Anions

Data source	Conductivity detector 1 (930 Compact IC Flex 1)	
Channel	Conductivity	
Recording time	17.0	min
Integration	Automatically	
Column type	Metrosep A Supp 5 - 150/4.0	
Eluent composition	Carb-BiCarb - 3.2mmol/L Sodium Carbonate 1.0mmol/L Sodium BiCarbonate	
Flow	0.700	mL/min
Maximum flow monitored	yes	
Pressure	9.03	MPa
Maximum pressure monitored	yes	
Temperature	25.5	°C

Anions



Peak number	Retention time min	Area (µS/cm) x min	Height µS/cm	Concentration mg/L	Component name
1	3.947	0.0239	0.155	0.049	Fluoride
2	5.432	0.0309	0.197	0.100	Chloride
3	6.302	0.0005	0.003	0.001	Nitrite
4	8.875	0.0025	0.009	0.003	Nitrate
5	11.597	2.3173	6.489	9.929	Sulfate

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INORGANIC ANALYSIS DATA SHEET
EPA 300.0

SW-TP3-East2-072220

Laboratory:	Analytical Resources, Inc.				
Client:	Floyd - Snider				
Project:	Rio Tinto Holden Mine Reclamation/Remediation				
Matrix:	Water	Laboratory ID:	20G0250-09 A	SDG:	20G0250
Sampled:	07/22/20 15:00	Prepared:	07/24/20 13:56	File ID:	SIG0357-20G0250-09
% Solids:	0.00	Preparation:	No Prep Wet Chem	Analyzed:	07/24/20 20:45
Batch:	BIG0559	Sequence:	SIG0357	Initial/Final:	10 mL / 10 mL
Instrument:	IC930			Calibration:	DG00059

CAS NO.	Analyte	Concentration (mg/L)	Dilution Factor	MDL	MRL	Q
16887-00-6	Chloride	0.191	1	0.100	0.100	
14797-55-8	Nitrate-N	<0.100	1	0.100	0.100	H, U

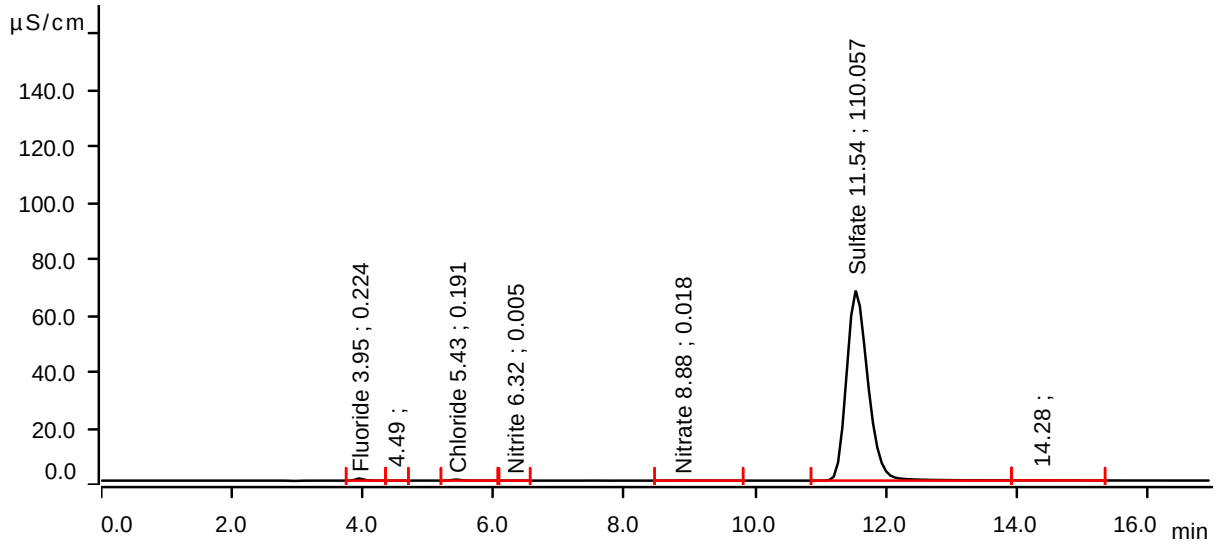
Sample data

Ident	**20G0250-09**
Sample type	Sample
Determination start	2020-07-24 20:45:09 UTC-7
Method / Calibration Date	DG00059-07202020
Operator	IC930
Dilution Factor	**1.00**

Anions

Data source	Conductivity detector 1 (930 Compact IC Flex 1)	
Channel	Conductivity	
Recording time	17.0	min
Integration	Automatically	
Column type	Metrosep A Supp 5 - 150/4.0	
Eluent composition	Carb-BiCarb - 3.2mmol/L Sodium Carbonate 1.0mmol/L Sodium BiCarbonate	
Flow	0.700	mL/min
Maximum flow monitored	yes	
Pressure	8.92	MPa
Maximum pressure monitored	yes	
Temperature	25.3	°C

Anions



Peak number	Retention time min	Area (µS/cm) x min	Height µS/cm	Concentration mg/L	Component name
1	3.945	0.1092	0.735	0.224	Fluoride
2	4.490	0.0018	0.012	invalid	
3	5.430	0.0590	0.377	0.191	Chloride
4	6.320	0.0032	0.019	0.005	Nitrite
5	8.883	0.0151	0.056	0.018	Nitrate
6	11.540	25.6853	67.208	110.057	Sulfate
7	14.275	0.0101	0.015	invalid	

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INORGANIC ANALYSIS DATA SHEET
EPA 300.0

SW-TP3-East2-072220

Laboratory:	Analytical Resources, Inc.				
Client:	Floyd - Snider				
Project:	Rio Tinto Holden Mine Reclamation/Remediation				
Matrix:	Water	Laboratory ID:	20G0250-09RE1 A	SDG:	20G0250
Sampled:	07/22/20 15:00	Prepared:	07/24/20 13:56	File ID:	SIG0357-20G0250-09RE1
% Solids:	0.00	Preparation:	No Prep Wet Chem	Analyzed:	07/24/20 22:24
Batch:	BIG0559	Sequence:	SIG0357	Initial/Final:	10 mL / 10 mL
Instrument:	IC930			Calibration:	DG00059

CAS NO.	Analyte	Concentration (mg/L)	Dilution Factor	MDL	MRL	Q
14808-79-8	Sulfate	93.9	22	2.20	2.20	D

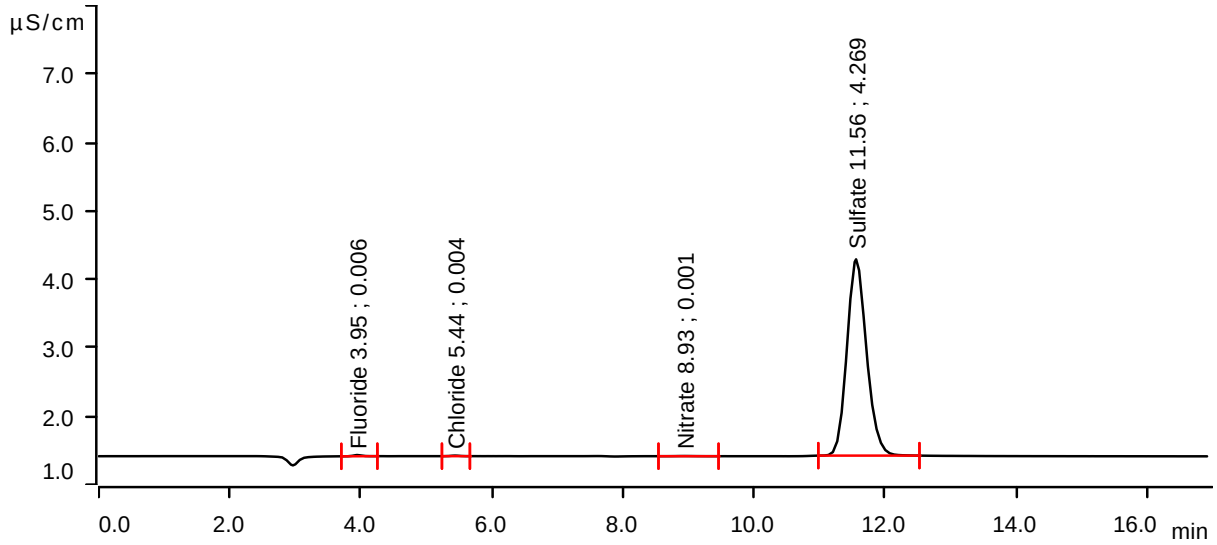
Sample data

Ident	**20G0250-09RE1**
Sample type	Sample
Determination start	2020-07-24 22:24:14 UTC-7
Method / Calibration Date	DG00059-07202020
Operator	IC930
Dilution Factor	**22.00**

Anions

Data source	Conductivity detector 1 (930 Compact IC Flex 1)	
Channel	Conductivity	
Recording time	17.0	min
Integration	Automatically	
Column type	Metrosep A Supp 5 - 150/4.0	
Eluent composition	Carb-BiCarb - 3.2mmol/L Sodium Carbonate 1.0mmol/L Sodium BiCarbonate	
Flow	0.700	mL/min
Maximum flow monitored	yes	
Pressure	9.03	MPa
Maximum pressure monitored	yes	
Temperature	24.9	°C

Anions



Peak number	Retention time min	Area (µS/cm) x min	Height µS/cm	Concentration mg/L	Component name
1	3.945	0.0027	0.018	0.006	Fluoride
2	5.437	0.0013	0.008	0.004	Chloride
3	8.932	0.0008	0.002	0.001	Nitrate
4	11.555	0.9964	2.868	4.269	Sulfate

Analytical Resources, Incorporated
Analytical Chemists and Consultants

PREPARATION BATCH SUMMARY

EPA 300.0

Laboratory: Analytical Resources, Inc. SDG: 20G0250

Client: Floyd - Snider Project: Rio Tinto Holden Mine Reclamation/Remediation

Batch: BIG0559 Batch Matrix: Water Preparation: No Prep Wet Chem

SAMPLE NAME	LAB SAMPLE ID	LAB FILE ID	DATE PREPARED	OBSERVATIONS
SP-30-072020	20G0250-01	SIG0357-20G0250-01	07/24/20 13:56	
SP-34-072120	20G0250-02	SIG0357-20G0250-02	07/24/20 13:56	
SP-40-072120	20G0250-03	SIG0357-20G0250-03	07/24/20 13:56	
SP-32-072120	20G0250-04	SIG0357-20G0250-04	07/24/20 13:56	
SP-126-072220	20G0250-06	SIG0357-20G0250-06	07/24/20 13:56	
SP-126-072220	20G0250-06RE1	IG0357-20G0250-06RE	07/24/20 13:56	Added 7/27/2020 by KOTT
Field-Blank-072220	20G0250-07	SIG0357-20G0250-07	07/24/20 13:56	
SW-TP3-East1-072220	20G0250-08	SIG0357-20G0250-08	07/24/20 13:56	
SW-TP3-East2-072220	20G0250-09	SIG0357-20G0250-09	07/24/20 13:56	
SW-TP3-East2-072220	20G0250-09RE1	IG0357-20G0250-09RE	07/24/20 13:56	Added 7/27/2020 by KOTT
Blank	BIG0559-BLK1	IG0357-BIG0559-BLK1	07/24/20 13:56	
LCS	BIG0559-BS1	SIG0357-BIG0559-BS1	07/24/20 13:56	
SW-TP3-East1-072220	BIG0559-DUP1	IG0357-BIG0559-DUP1	07/24/20 13:56	
MRL Check	BIG0559-MRL1	IG0357-BIG0559-MRL1	07/24/20 13:56	
SW-TP3-East1-072220	BIG0559-MS1	SIG0357-BIG0559-MS1	07/24/20 13:56	
SW-TP3-East1-072220	BIG0559-MS5	SIG0388-BIG0559-MS5	07/24/20 13:56	
SW-TP3-East1-072220	BIG0559-MSD1	IG0357-BIG0559-MSD1	07/24/20 13:56	
SW-TP3-East1-072220	BIG0559-MSD5	IG0388-BIG0559-MSD5	07/24/20 13:56	

Analytical Resources, Incorporated
Analytical Chemists and Consultants

PREPARATION BATCH SUMMARY

EPA 300.0

Laboratory: Analytical Resources, Inc. SDG: 20G0250

Client: Floyd - Snider Project: Rio Tinto Holden Mine Reclamation/Remediation

Batch: BIG0586 Batch Matrix: Water Preparation: No Prep Wet Chem

SAMPLE NAME	LAB SAMPLE ID	LAB FILE ID	DATE PREPARED	OBSERVATIONS
SP-26-072220	20G0250-05	SIG0374-20G0250-05	07/24/20 13:56	From BIG0559 by KOTT on 27-Jul-2020
SP-26-072220	20G0250-05RE1	SIG0374-20G0250-05RE	07/24/20 13:56	Added 7/28/2020 by KOTT
Blank	BIG0586-BLK1	SIG0374-BIG0586-BLK1	07/27/20 12:04	
LCS	BIG0586-BS1	SIG0374-BIG0586-BS1	07/27/20 12:04	
MRL Check	BIG0586-MRL1	SIG0374-BIG0586-MRL1	07/27/20 12:04	

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METHOD BLANK DATA SHEET

EPA 300.0

TotalAnalytes

Blank

Laboratory: Analytical Resources, Inc.
SDG: 20G0250
Client: Floyd - Snider
Project: Rio Tinto Holden Mine Reclamation/I
Batch: BIG0559
Laboratory ID: BIG0559-BLK1
Prepared: 07/24/20 13:56
Matrix: Water
Preparation: No Prep Wet Chem
Analyzed: 07/24/20 15:44
Sequence: SIG0357
Calibration: DG00059
Instrument: IC930

CAS NO.	Analyte	Concentration (mg/L)	Dilution Factor	MDL	MRL	Q
16887-00-6	Chloride	ND	1	0.100	0.100	U
14797-55-8	Nitrate-N	ND	1	0.100	0.100	U
14808-79-8	Sulfate	ND	1	0.100	0.100	U

Form I

METHOD BLANK DATA SHEET

EPA 300.0

TotalAnalytes

Blank

Laboratory: Analytical Resources, Inc.
SDG: 20G0250
Client: Floyd - Snider
Project: Rio Tinto Holden Mine Reclamation/I
Batch: BIG0586
Laboratory ID: BIG0586-BLK1
Prepared: 07/27/20 12:04
Matrix: Water
Preparation: No Prep Wet Chem
Analyzed: 07/27/20 14:32
Sequence: SIG0374
Calibration: DG00059
Instrument: IC930

CAS NO.	Analyte	Concentration (mg/L)	Dilution Factor	MDL	MRL	Q
16887-00-6	Chloride	ND	1	0.100	0.100	U
14797-55-8	Nitrate-N	ND	1	0.100	0.100	U
14808-79-8	Sulfate	ND	1	0.100	0.100	U

LCS / LCS DUPLICATE RECOVERY

EPA 300.0

Laboratory:	Analytical Resources, Inc.	SDG:	20G0250
Client:	Floyd - Snider	Project:	Rio Tinto Holden Mine Reclamation/Remediation
Matrix:	Water	Analyzed:	07/24/20 16:04
Batch:	BIG0559	Laboratory ID:	BIG0559-BS1
Preparation:	No Prep Wet Chem	Sequence Name:	LCS
Initial/Final:	10 mL / 10 mL		

COMPOUND	SPIKE ADDED (mg/L)	LCS CONCENTRATION (mg/L)	Q	LCS % REC. #	QC LIMITS REC.
Chloride	5.00	4.87		97.4	90 - 110
Nitrate-N	5.00	4.76		95.2	90 - 110
Sulfate	5.00	4.95		99.0	90 - 110

* Indicates values outside of QC limits

LCS / LCS DUPLICATE RECOVERY

EPA 300.0

Laboratory:	Analytical Resources, Inc.	SDG:	20G0250
Client:	Floyd - Snider	Project:	Rio Tinto Holden Mine Reclamation/Remediation
Matrix:	Water	Analyzed:	07/27/20 14:52
Batch:	BIG0586	Laboratory ID:	BIG0586-BS1
Preparation:	No Prep Wet Chem	Sequence Name:	LCS
Initial/Final:	10 mL / 10 mL		

COMPOUND	SPIKE ADDED (mg/L)	LCS CONCENTRATION (mg/L)	Q	LCS % REC. #	QC LIMITS REC.
Chloride	5.00	4.92		98.3	90 - 110
Nitrate-N	5.00	4.81		96.2	90 - 110
Sulfate	5.00	4.84		96.9	90 - 110

* Indicates values outside of QC limits

SW-TP3-East1-072220

DUPLICATES

EPA 300.0

Laboratory: Analytical Resources, Inc.
SDG: 20G0250

Client: Floyd - Snider
Project: Rio Tinto Holden Mine Reclamation/Remediation

Matrix: Water
Laboratory ID: BIG0559-DUP1

Batch: BIG0559
Lab Source ID: 20G0250-08

Preparation: No Prep Wet Chem
Initial/Final: 10 mL / 10 mL

Source Sample Name: SW-TP3-East1-072220
% Solids:

ANALYTE	CONTROL LIMIT	SAMPLE CONCENTRATION (mg/L)	C	DUPLICATE CONCENTRATION (mg/L)	C	RPD %	Q
Chloride	20	0.100		0.101		0.995	
Nitrate-N	20	ND	H, U	ND	U		
Sulfate	20	9.93		10.1		1.23	

*: Values outside of QC limits
L: Analyte concentration is <=5 times the reporting limit and the replicate control limit defaults to Dup = +/- RL instead of 20% RPD

MS / MS DUPLICATE RECOVERY
EPA 300.0

Laboratory:	Analytical Resources, Inc.	SDG:	20G0250
Client:	Floyd - Snider	Project:	Rio Tinto Holden Mine Reclamation/Remediation
Matrix:	Water	Analyzed:	07/24/20 17:04
Batch:	BIG0559	Laboratory ID:	BIG0559-MS1
Preparation:	No Prep Wet Chem	Sequence Name:	Matrix Spike
Initial/Final:	10 mL / 10 mL	Source Sample:	SW-TP3-East1-072220

COMPOUND	SPIKE ADDED (mg/L)	SAMPLE CONCENTRATION (mg/L)	Q	MS CONCENTRATION (mg/L)	Q	MS % REC. #	QC LIMITS REC.
Chloride	2.00	0.100		2.04		97.0	75 - 125
Nitrate-N	2.00	ND	H, U	1.84		91.9	75 - 125

* Values outside of QC limits

MS / MS DUPLICATE RECOVERY
EPA 300.0

Laboratory:	Analytical Resources, Inc.	SDG:	20G0250
Client:	Floyd - Snider	Project:	Rio Tinto Holden Mine Reclamation/Remediation
Matrix:	Water	Analyzed:	07/24/20 17:24
Batch:	BIG0559	Laboratory ID:	BIG0559-MSD1
Preparation:	No Prep Wet Chem	Sequence Name:	Matrix Spike Dup
Initial/Final:	10 mL / 10 mL	Source Sample:	SW-TP3-East1-072220

COMPOUND	SPIKE ADDED (mg/L)	MSD CONCENTRATION (mg/L)	Q	MSD % REC. #	% RPD #	QC LIMITS RPD	QC LIMITS REC.
Chloride	2.00	2.04		97.1	0.0490	20	75 - 125
Nitrate-N	2.00	1.84		91.9	0.0544	20	75 - 125

* Values outside of QC limits

MS / MS DUPLICATE RECOVERY
EPA 300.0

Laboratory:	Analytical Resources, Inc.	SDG:	20G0250
Client:	Floyd - Snider	Project:	Rio Tinto Holden Mine Reclamation/Remediation
Matrix:	Water	Analyzed:	07/28/20 16:41
Batch:	BIG0559	Laboratory ID:	BIG0559-MS5
Preparation:	No Prep Wet Chem	Sequence Name:	Matrix Spike
Initial/Final:	10 mL / 10 mL	Source Sample:	SW-TP3-East1-072220

COMPOUND	SPIKE ADDED (mg/L)	SAMPLE CONCENTRATION (mg/L)	Q	MS CONCENTRATION (mg/L)	Q	MS % REC. #	QC LIMITS REC.
Sulfate	8.00	9.93		16.0	D	75.7	75 - 125

* Values outside of QC limits

SW-TP3-East1-072220

MS / MS DUPLICATE RECOVERY
EPA 300.0

Laboratory:	Analytical Resources, Inc.	SDG:	20G0250
Client:	Floyd - Snider	Project:	Rio Tinto Holden Mine Reclamation/Remediation
Matrix:	Water	Analyzed:	07/28/20 17:01
Batch:	BIG0559	Laboratory ID:	BIG0559-MSD5
Preparation:	No Prep Wet Chem	Sequence Name:	Matrix Spike Dup
Initial/Final:	10 mL / 10 mL	Source Sample:	SW-TP3-East1-072220

COMPOUND	SPIKE ADDED (mg/L)	MSD CONCENTRATION (mg/L)	Q	MSD % REC. #	% RPD #	QC LIMITS RPD	QC LIMITS REC.
Sulfate	8.00	16.8	D	86.0	5.04	20	75 - 125

* Values outside of QC limits

Analytical Resources, Incorporated
Analytical Chemists and Consultants

ANALYSIS BATCH (SEQUENCE) SUMMARY

EPA 300.0

Laboratory:	Analytical Resources, Inc.	SDG:	20G0250
Client:	Floyd - Snider	Project:	Rio Tinto Holden Mine Reclamation/Remediation
Sequence:	SIG0276	Instrument:	IC930
		Calibration:	DG00059

Sample Name	Lab Sample ID	Lab File ID	Matrix	Analysis Date/Time
Cal Standard	SIG0276-CAL1	SIG0276-SIG0276-CAL1	NA	07/20/20 12:45
Cal Standard	SIG0276-CAL2	SIG0276-SIG0276-CAL2	NA	07/20/20 13:04
Cal Standard	SIG0276-CAL3	SIG0276-SIG0276-CAL3	NA	07/20/20 13:24
Cal Standard	SIG0276-CAL4	SIG0276-SIG0276-CAL4	NA	07/20/20 13:44
Cal Standard	SIG0276-CAL5	SIG0276-SIG0276-CAL5	NA	07/20/20 14:04
Cal Standard	SIG0276-CAL6	SIG0276-SIG0276-CAL6	NA	07/20/20 14:23
Cal Standard	SIG0276-CAL7	SIG0276-SIG0276-CAL7	NA	07/20/20 14:43
Initial Cal Check	SIG0276-ICV1	SIG0276-SIG0276-ICV1	NA	07/20/20 16:23
Initial Cal Blank	SIG0276-ICB1	SIG0276-SIG0276-ICB1	NA	07/20/20 16:44

ANALYSIS BATCH (SEQUENCE) SUMMARY

EPA 300.0

Laboratory: Analytical Resources, Inc.
SDG: 20G0250
Client: Floyd - Snider
Project: Rio Tinto Holden Mine Reclamation/Remediation
Sequence: SIG0357
Instrument: IC930
Calibration: DG00059

Sample Name	Lab Sample ID	Lab File ID	Matrix	Analysis Date/Time
Initial Cal Check	SIG0357-ICV1	SIG0357-SIG0357-ICV1	NA	07/24/20 14:44
Initial Cal Blank	SIG0357-ICB1	SIG0357-SIG0357-ICB1	NA	07/24/20 15:04
MRL Check	BIG0559-MRL1	SIG0357-BIG0559-MRL1	Water	07/24/20 15:24
Blank	BIG0559-BLK1	SIG0357-BIG0559-BLK1	Water	07/24/20 15:44
LCS	BIG0559-BS1	SIG0357-BIG0559-BS1	Water	07/24/20 16:04
SW-TP3-East1-072220	20G0250-08	SIG0357-20G0250-08	Water	07/24/20 16:24
SW-TP3-East1-072220	20G0250-08	SIG0357-20G0250-08	Water	07/24/20 16:24
SW-TP3-East1-072220	20G0250-08	SIG0357-20G0250-08	Water	07/24/20 16:24
SW-TP3-East1-072220	BIG0559-DUP1	SIG0357-BIG0559-DUP1	Water	07/24/20 16:44
SW-TP3-East1-072220	BIG0559-DUP1	SIG0357-BIG0559-DUP1	Water	07/24/20 16:44
SW-TP3-East1-072220	BIG0559-DUP1	SIG0357-BIG0559-DUP1	Water	07/24/20 16:44
SW-TP3-East1-072220	BIG0559-MS1	SIG0357-BIG0559-MS1	Water	07/24/20 17:04
SW-TP3-East1-072220	BIG0559-MS1	SIG0357-BIG0559-MS1	Water	07/24/20 17:04
SW-TP3-East1-072220	BIG0559-MS1	SIG0357-BIG0559-MS1	Water	07/24/20 17:04
SW-TP3-East1-072220	BIG0559-MSD1	SIG0357-BIG0559-MSD1	Water	07/24/20 17:24
SW-TP3-East1-072220	BIG0559-MSD1	SIG0357-BIG0559-MSD1	Water	07/24/20 17:24
SW-TP3-East1-072220	BIG0559-MSD1	SIG0357-BIG0559-MSD1	Water	07/24/20 17:24
SP-30-072020	20G0250-01	SIG0357-20G0250-01	Water	07/24/20 17:44
SP-30-072020	20G0250-01	SIG0357-20G0250-01	Water	07/24/20 17:44
SP-30-072020	20G0250-01	SIG0357-20G0250-01	Water	07/24/20 17:44
SP-34-072120	20G0250-02	SIG0357-20G0250-02	Water	07/24/20 18:04
SP-34-072120	20G0250-02	SIG0357-20G0250-02	Water	07/24/20 18:04
SP-34-072120	20G0250-02	SIG0357-20G0250-02	Water	07/24/20 18:04
SP-40-072120	20G0250-03	SIG0357-20G0250-03	Water	07/24/20 18:24
SP-40-072120	20G0250-03	SIG0357-20G0250-03	Water	07/24/20 18:24
SP-40-072120	20G0250-03	SIG0357-20G0250-03	Water	07/24/20 18:24
Calibration Check	SIG0357-CCV1	SIG0357-SIG0357-CCV1	NA	07/24/20 18:44
Calibration Blank	SIG0357-CCB1	SIG0357-SIG0357-CCB1	NA	07/24/20 19:05
SP-32-072120	20G0250-04	SIG0357-20G0250-04	Water	07/24/20 19:25
SP-32-072120	20G0250-04	SIG0357-20G0250-04	Water	07/24/20 19:25

Analytical Resources, Incorporated
Analytical Chemists and Consultants

ANALYSIS BATCH (SEQUENCE) SUMMARY

EPA 300.0

Laboratory: Analytical Resources, Inc.
SDG: 20G0250
Client: Floyd - Snider
Project: Rio Tinto Holden Mine Reclamation/Remediation
Sequence: SIG0357
Instrument: IC930
Calibration: DG00059

Sample Name	Lab Sample ID	Lab File ID	Matrix	Analysis Date/Time
SP-32-072120	20G0250-04	SIG0357-20G0250-04	Water	07/24/20 19:25
SP-126-072220	20G0250-06	SIG0357-20G0250-06	Water	07/24/20 19:45
SP-126-072220	20G0250-06	SIG0357-20G0250-06	Water	07/24/20 19:45
Field-Blank-072220	20G0250-07	SIG0357-20G0250-07	Water	07/24/20 20:25
Field-Blank-072220	20G0250-07	SIG0357-20G0250-07	Water	07/24/20 20:25
Field-Blank-072220	20G0250-07	SIG0357-20G0250-07	Water	07/24/20 20:25
SW-TP3-East2-072220	20G0250-09	SIG0357-20G0250-09	Water	07/24/20 20:45
SW-TP3-East2-072220	20G0250-09	SIG0357-20G0250-09	Water	07/24/20 20:45
SP-126-072220	20G0250-06RE1	SIG0357-20G0250-06RE1	Water	07/24/20 21:44
SW-TP3-East2-072220	20G0250-09RE1	SIG0357-20G0250-09RE1	Water	07/24/20 22:24
Calibration Check	SIG0357-CCV2	SIG0357-SIG0357-CCV2	NA	07/24/20 22:44
Calibration Blank	SIG0357-CCB2	SIG0357-SIG0357-CCB2	NA	07/24/20 23:04

Analytical Resources, Incorporated
Analytical Chemists and Consultants

ANALYSIS BATCH (SEQUENCE) SUMMARY

EPA 300.0

Laboratory:	Analytical Resources, Inc.	SDG:	20G0250
Client:	Floyd - Snider	Project:	Rio Tinto Holden Mine Reclamation/Remediation
Sequence:	SIG0374	Instrument:	IC930
		Calibration:	DG00059

Sample Name	Lab Sample ID	Lab File ID	Matrix	Analysis Date/Time
Initial Cal Check	SIG0374-ICV1	SIG0374-SIG0374-ICV1	NA	07/27/20 13:12
Initial Cal Blank	SIG0374-ICB1	SIG0374-SIG0374-ICB1	NA	07/27/20 13:32
SP-26-072220	20G0250-05	SIG0374-20G0250-05	Water	07/27/20 13:52
SP-26-072220	20G0250-05	SIG0374-20G0250-05	Water	07/27/20 13:52
MRL Check	BIG0586-MRL1	SIG0374-BIG0586-MRL1	Water	07/27/20 14:12
Blank	BIG0586-BLK1	SIG0374-BIG0586-BLK1	Water	07/27/20 14:32
LCS	BIG0586-BS1	SIG0374-BIG0586-BS1	Water	07/27/20 14:52
SP-26-072220	20G0250-05RE1	SIG0374-20G0250-05RE1	Water	07/27/20 16:33
Calibration Check	SIG0374-CCV1	SIG0374-SIG0374-CCV1	NA	07/27/20 17:12
Calibration Blank	SIG0374-CCB1	SIG0374-SIG0374-CCB1	NA	07/27/20 17:52
Calibration Check	SIG0374-CCV3	SIG0374-SIG0374-CCV3	NA	07/27/20 18:53
Calibration Blank	SIG0374-CCB2	SIG0374-SIG0374-CCB2	NA	07/27/20 19:33

ANALYSIS BATCH (SEQUENCE) SUMMARY

EPA 300.0

Laboratory: Analytical Resources, Inc.
Client: Floyd - Snider
Sequence: SIG0388

SDG: 20G0250
Project: Rio Tinto Holden Mine Reclamation/Remediation
Instrument: IC930
Calibration: DG00059

Sample Name	Lab Sample ID	Lab File ID	Matrix	Analysis Date/Time
Initial Cal Check	SIG0388-ICV1	SIG0388-SIG0388-ICV1	NA	07/28/20 14:21
Initial Cal Blank	SIG0388-ICB1	SIG0388-SIG0388-ICB1	NA	07/28/20 14:41
SW-TP3-East1-072220	BIG0559-MS5	SIG0388-BIG0559-MS5	Water	07/28/20 16:41
SW-TP3-East1-072220	BIG0559-MSD5	SIG0388-BIG0559-MSD5	Water	07/28/20 17:01
Calibration Check	SIG0388-CCV1	SIG0388-SIG0388-CCV1	NA	07/28/20 18:00
Calibration Blank	SIG0388-CCB1	SIG0388-SIG0388-CCB1	NA	07/28/20 18:20

INITIAL CALIBRATION DATA

EPA 300.0

Laboratory: Analytical Resources, Inc.
SDG: 20G0250
Client: Floyd - Snider
Project: Rio Tinto Holden Mine Reclamation/Remediat
Calibration: DG00059
Instrument: IC930
Calibration Date: 07/20/2020 10:09

Compound	Level 01		Level 02		Level 03		Level 04		Level 05		Level 06	
		RF		RF		RF		RF		RF		RF
Chloride	0.10005	0.1969015	0.2001	0.2233883	0.50025	0.2526737	1.0005	0.2721639	2.001	0.2873063	5.0025	0.3032084
Nitrate-N	0.099976	0.5611347	0.19995	0.6171543	0.49988	0.6947668	0.99976	0.7462791	1.9995	0.7844461	4.9988	0.8206169
Sulfate	0.10002	0.1729654	0.20004	0.1714657	0.5001	0.1879624	1.0002	0.2029594	2.0004	0.2158068	5.001	0.2277145

INITIAL CALIBRATION DATA

EPA 300.0

Laboratory: Analytical Resources, Inc.
SDG: 20G0250
Client: Floyd - Snider
Project: Rio Tinto Holden Mine Reclamation/Remediat
Calibration: DG00059
Instrument: IC930
Calibration Date: 07/20/2020 10:09

Compound	Level 07		Level 08		Level 09		Level 10		Level 11		Level 12	
		RF		RF		RF		RF		RF		RF
Chloride	10.005	0.3103948										
Nitrate-N	9.9976	0.8356706										
Sulfate	10.002	0.2358928										

INITIAL CALIBRATION DATA

EPA 300.0

Laboratory:	Analytical Resources, Inc.	SDG:	20G0250
Client:	Floyd - Snider	Project:	Rio Tinto Holden Mine Reclamation/Remediat
Calibration:	DG00059	Instrument:	IC930
Calibration Date:	07/20/2020 10:09		

COMPOUND	Mean RF	RF RSD	Linear COD	Quad COD	COD Limit	Q
Chloride	0.2637196	15.9	0.9993			
Nitrate-N	0.7228669	14.4	0.9995			
Sulfate	0.2021096	12.7	0.9990			

INSTRUMENT BLANKS
EPA 300.0

Laboratory: Analytical Resources, Inc.
Client: Floyd - Snider
Instrument ID: IC930
Sequence: SIG0276

SDG: 20G0250
Project: Rio Tinto Holden Mine Reclamation/R
Calibration: DG00059
Date Analyzed: 07/20/20 16:44

Lab Sample ID	Analyte	Found	MDL	MRL	Units	C
SIG0276-ICB1	Chloride	0.00	0.1	0.100	mg/L	
SIG0276-ICB1	Sulfate	0.00	0.1	0.100	mg/L	
SIG0276-ICB1	Nitrate-N	0.00	0.1	0.100	mg/L	

INSTRUMENT BLANKS
EPA 300.0

Laboratory: Analytical Resources, Inc.
Client: Floyd - Snider
Instrument ID: IC930
Sequence: SIG0357

SDG: 20G0250
Project: Rio Tinto Holden Mine Reclamation/R
Calibration: DG00059
Date Analyzed: 07/24/20 15:04

Lab Sample ID	Analyte	Found	MDL	MRL	Units	C
SIG0357-ICB1	Chloride	0.00	0.1	0.100	mg/L	
SIG0357-ICB1	Sulfate	0.00	0.1	0.100	mg/L	
SIG0357-ICB1	Nitrate-N	0.00	0.1	0.100	mg/L	
SIG0357-CCB1	Chloride	0.00	0.1	0.100	mg/L	
SIG0357-CCB1	Sulfate	0.00	0.1	0.100	mg/L	
SIG0357-CCB1	Nitrate-N	0.00	0.1	0.100	mg/L	
SIG0357-CCB2	Chloride	0.00	0.1	0.100	mg/L	
SIG0357-CCB2	Sulfate	0.00	0.1	0.100	mg/L	
SIG0357-CCB2	Nitrate-N	0.00	0.1	0.100	mg/L	

INSTRUMENT BLANKS
EPA 300.0

Laboratory: Analytical Resources, Inc.
SDG: 20G0250
Client: Floyd - Snider
Project: Rio Tinto Holden Mine Reclamation/R
Instrument ID: IC930
Calibration: DG00059
Sequence: SIG0374
Date Analyzed: 07/27/20 13:32

Lab Sample ID	Analyte	Found	MDL	MRL	Units	C
SIG0374-ICB1	Chloride	0.00	0.1	0.100	mg/L	
SIG0374-ICB1	Sulfate	0.00	0.1	0.100	mg/L	
SIG0374-ICB1	Nitrate-N	0.00	0.1	0.100	mg/L	
SIG0374-CCB1	Chloride	0.00	0.1	0.100	mg/L	
SIG0374-CCB1	Sulfate	0.00	0.1	0.100	mg/L	
SIG0374-CCB1	Nitrate-N	0.00	0.1	0.100	mg/L	
SIG0374-CCB2	Chloride	0.00	0.1	0.100	mg/L	
SIG0374-CCB2	Sulfate	0.00	0.1	0.100	mg/L	
SIG0374-CCB2	Nitrate-N	0.00	0.1	0.100	mg/L	

INSTRUMENT BLANKS
EPA 300.0

Laboratory: Analytical Resources, Inc.
Client: Floyd - Snider
Instrument ID: IC930
Sequence: SIG0388

SDG: 20G0250
Project: Rio Tinto Holden Mine Reclamation/R
Calibration: DG00059
Date Analyzed: 07/28/20 14:41

Lab Sample ID	Analyte	Found	MDL	MRL	Units	C
SIG0388-ICB1	Sulfate	0.00	0.1	0.100	mg/L	
SIG0388-CCB1	Sulfate	0.00	0.1	0.100	mg/L	

INITIAL AND CONTINUING CALIBRATION CHECK

EPA 300.0

Laboratory: Analytical Resources, Inc.
SDG: 20G0250
Client: Floyd - Snider
Project: Rio Tinto Holden Mine Reclamation/Remediation
Instrument ID: IC930
Calibration: DG00059
Control Limt: +/- 10.00%
Sequence: SIG0276

Lab Sample ID	Analyte	True	Found	%R	Units	Method
SIG0276-ICV1	Chloride	5.0000	4.89	97.8	mg/L	EPA 300.0
	Nitrate-N	5.0000	4.77	95.3	mg/L	EPA 300.0
	Sulfate	5.0000	5.02	100	mg/L	EPA 300.0

* Values outside of QC limits

INITIAL AND CONTINUING CALIBRATION CHECK

EPA 300.0

Laboratory: Analytical Resources, Inc.
SDG: 20G0250
Client: Floyd - Snider
Project: Rio Tinto Holden Mine Reclamation/Remediation
Instrument ID: IC930
Calibration: DG00059
Control Limt: +/- 10.00%
Sequence: SIG0357

Lab Sample ID	Analyte	True	Found	%R	Units	Method
SIG0357-ICV1	Chloride	5.0000	4.87	97.5	mg/L	EPA 300.0
	Nitrate-N	5.0000	4.77	95.3	mg/L	EPA 300.0
	Sulfate	5.0000	4.95	99.0	mg/L	EPA 300.0
SIG0357-CCV1	Chloride	5.0000	4.89	97.8	mg/L	EPA 300.0
	Nitrate-N	5.0000	4.78	95.6	mg/L	EPA 300.0
	Sulfate	5.0000	4.85	96.9	mg/L	EPA 300.0
SIG0357-CCV2	Chloride	5.0000	4.88	97.6	mg/L	EPA 300.0
	Nitrate-N	5.0000	4.77	95.3	mg/L	EPA 300.0
	Sulfate	5.0000	4.87	97.4	mg/L	EPA 300.0

* Values outside of QC limits

INITIAL AND CONTINUING CALIBRATION CHECK

EPA 300.0

Laboratory: Analytical Resources, Inc.
SDG: 20G0250
Client: Floyd - Snider
Project: Rio Tinto Holden Mine Reclamation/Remediation
Instrument ID: IC930
Calibration: DG00059
Control Limt: +/- 10.00%
Sequence: SIG0374

Lab Sample ID	Analyte	True	Found	%R	Units	Method
SIG0374-ICV1	Chloride	5.0000	4.90	98.1	mg/L	EPA 300.0
	Nitrate-N	5.0000	4.80	95.9	mg/L	EPA 300.0
	Sulfate	5.0000	4.95	98.9	mg/L	EPA 300.0
SIG0374-CCV1	Chloride	5.0000	4.92	98.4	mg/L	EPA 300.0
	Nitrate-N	5.0000	4.81	96.3	mg/L	EPA 300.0
	Sulfate	5.0000	4.85	97.1	mg/L	EPA 300.0
SIG0374-CCV3	Chloride	5.0000	4.92	98.5	mg/L	EPA 300.0
	Nitrate-N	5.0000	4.82	96.4	mg/L	EPA 300.0
	Sulfate	5.0000	4.89	97.8	mg/L	EPA 300.0

* Values outside of QC limits

INITIAL AND CONTINUING CALIBRATION CHECK

EPA 300.0

Laboratory: Analytical Resources, Inc.
SDG: 20G0250
Client: Floyd - Snider
Project: Rio Tinto Holden Mine Reclamation/Remediation
Instrument ID: IC930
Calibration: DG00059
Control Limt: +/- 10.00%
Sequence: SIG0388

Lab Sample ID	Analyte	True	Found	%R	Units	Method
SIG0388-ICV1	Sulfate	5.0000	4.75	95.0	mg/L	EPA 300.0
SIG0388-CCV1	Sulfate	5.0000	4.67	93.3	mg/L	EPA 300.0

* Values outside of QC limits

HOLDING TIME SUMMARY

Analysis: EPA 300.0

Laboratory: Analytical Resources, Inc. SDG: 20G0250

Client: Floyd - Snider Project: Rio Tinto Holden Mine Reclamation/Remediation

Sample Name	Date Collected	Date Received	Date Prepared	Days to Prep	Max Days to Prep	Date Analyzed	Days to Analysis	Max Days to Analysis	Q
SP-30-072020 20G0250-01	07/20/20 17:50	07/24/20 12:36	07/24/20 13:56	3	2	07/24/20 17:44	4	2	*
SP-30-072020 20G0250-01	07/20/20 17:50	07/24/20 12:36	07/24/20 13:56	3	28	07/24/20 17:44	4	28	
SP-34-072120 20G0250-02	07/21/20 12:20	07/24/20 12:36	07/24/20 13:56	3	2	07/24/20 18:04	3	2	*
SP-34-072120 20G0250-02	07/21/20 12:20	07/24/20 12:36	07/24/20 13:56	3	28	07/24/20 18:04	3	28	
SP-40-072120 20G0250-03	07/21/20 13:18	07/24/20 12:36	07/24/20 13:56	3	2	07/24/20 18:24	3	2	*
SP-40-072120 20G0250-03	07/21/20 13:18	07/24/20 12:36	07/24/20 13:56	3	28	07/24/20 18:24	3	28	
SP-32-072120 20G0250-04	07/21/20 13:25	07/24/20 12:36	07/24/20 13:56	3	28	07/24/20 19:25	3	28	
SP-32-072120 20G0250-04	07/21/20 13:25	07/24/20 12:36	07/24/20 13:56	3	2	07/24/20 19:25	3	2	*
SP-26-072220 20G0250-05	07/22/20 09:37	07/24/20 12:36	07/24/20 13:56	2	28	07/27/20 13:52	5	28	
SP-26-072220 20G0250-05	07/22/20 09:37	07/24/20 12:36	07/24/20 13:56	2	2	07/27/20 13:52	5	2	*
SP-26-072220 20G0250-05RE1	07/22/20 09:37	07/24/20 12:36	07/24/20 13:56	2	28	07/27/20 16:33	5	28	
SP-126-072220 20G0250-06	07/22/20 09:42	07/24/20 12:36	07/24/20 13:56	2	2	07/24/20 19:45	2	2	*
SP-126-072220 20G0250-06	07/22/20 09:42	07/24/20 12:36	07/24/20 13:56	2	28	07/24/20 19:45	2	28	
SP-126-072220 20G0250-06RE1	07/22/20 09:42	07/24/20 12:36	07/24/20 13:56	2	28	07/24/20 21:44	3	28	
Field-Blank-072220 20G0250-07	07/22/20 10:55	07/24/20 12:36	07/24/20 13:56	2	2	07/24/20 20:25	2	2	*
Field-Blank-072220 20G0250-07	07/22/20 10:55	07/24/20 12:36	07/24/20 13:56	2	28	07/24/20 20:25	2	28	
SW-TP3-East1-072220 20G0250-08	07/22/20 13:45	07/24/20 12:36	07/24/20 13:56	2	2	07/24/20 16:24	2	2	*
SW-TP3-East1-072220 20G0250-08	07/22/20 13:45	07/24/20 12:36	07/24/20 13:56	2	28	07/24/20 16:24	2	28	
SW-TP3-East2-072220 20G0250-09	07/22/20 15:00	07/24/20 12:36	07/24/20 13:56	1	2	07/24/20 20:45	2	2	*
SW-TP3-East2-072220 20G0250-09	07/22/20 15:00	07/24/20 12:36	07/24/20 13:56	1	28	07/24/20 20:45	2	28	
SW-TP3-East2-072220 20G0250-09RE1	07/22/20 15:00	07/24/20 12:36	07/24/20 13:56	1	28	07/24/20 22:24	2	28	
Duplicate BIG0559-DUP1	07/22/20 13:45	07/24/20 12:36	07/24/20 13:56	2	28	07/24/20 16:44	2	28	

HOLDING TIME SUMMARY

Analysis: EPA 300.0

Laboratory: Analytical Resources, Inc. SDG: 20G0250

Client: Floyd - Snider Project: Rio Tinto Holden Mine Reclamation/Remediation

Sample Name	Date Collected	Date Received	Date Prepared	Days to Prep	Max Days to Prep	Date Analyzed	Days to Analysis	Max Days to Analysis	Q
Duplicate BIG0559-DUP1	07/22/20 13:45	07/24/20 12:36	07/24/20 13:56	2	2	07/24/20 16:44	2	2	*
Matrix Spike BIG0559-MS1	07/22/20 13:45	07/24/20 12:36	07/24/20 13:56	2	28	07/24/20 17:04	2	28	
Matrix Spike BIG0559-MS1	07/22/20 13:45	07/24/20 12:36	07/24/20 13:56	2	2	07/24/20 17:04	2	2	*
Matrix Spike BIG0559-MS5	07/22/20 13:45	07/24/20 12:36	07/24/20 13:56	2	28	07/28/20 16:41	6	28	
Matrix Spike Dup BIG0559-MSD1	07/22/20 13:45	07/24/20 12:36	07/24/20 13:56	2	28	07/24/20 17:24	2	28	
Matrix Spike Dup BIG0559-MSD1	07/22/20 13:45	07/24/20 12:36	07/24/20 13:56	2	2	07/24/20 17:24	2	2	*
Matrix Spike Dup BIG0559-MSD5	07/22/20 13:45	07/24/20 12:36	07/24/20 13:56	2	28	07/28/20 17:01	6	28	

* Indicates hold time exceedance.

METHOD DETECTION AND REPORTING LIMITS

EPA 300.0

Laboratory: Analytical Resources, Inc.
SDG: 20G0250
Client: Floyd - Snider
Project: Rio Tinto Holden Mine Reclamation/Rem
Matrix: Water
Instrument: IC930

Analyte	MDL	RL	Units
Chloride	0.100	0.100	mg/L
Nitrate-N	0.100	0.100	mg/L
Sulfate	0.100	0.100	mg/L

Form I
INORGANIC ANALYSIS DATA SHEET
SM 2320 B-97

SP-30-072020

Laboratory:	Analytical Resources, Inc.				
Client:	Floyd - Snider				
Project:	Rio Tinto Holden Mine Reclamation/Remediation				
Matrix:	Water	Laboratory ID:	20G0250-01 A	SDG:	20G0250
Sampled:	07/20/20 17:50	Prepared:	07/27/20 09:44	File ID:	
% Solids:	0.00	Preparation:	No Prep Wet Chem	Analyzed:	07/27/20 10:14
Batch:	BIG0574	Sequence:	SIG0365	Initial/Final:	100 mL / 100 mL
Instrument:	Accumet AB150			Calibration:	UNASSIGNED

CAS NO.	Analyte	Concentration (mg/L CaCO3)	Dilution Factor	MDL	MRL	Q
	Alkalinity, Bicarbonate	8.33	1	1.00	1.00	
	Alkalinity, Carbonate	<1.00	1	1.00	1.00	U
	Alkalinity, Hydroxide	<1.00	1	1.00	1.00	U
	Alkalinity, Total	8.33	1	1.00	1.00	

Form I
INORGANIC ANALYSIS DATA SHEET
SM 2320 B-97

SP-34-072120

Laboratory:	Analytical Resources, Inc.				
Client:	Floyd - Snider				
Project:	Rio Tinto Holden Mine Reclamation/Remediation				
Matrix:	Water	Laboratory ID:	20G0250-02 A	SDG:	20G0250
Sampled:	07/21/20 12:20	Prepared:	07/27/20 09:44	File ID:	
% Solids:	0.00	Preparation:	No Prep Wet Chem	Analyzed:	07/27/20 10:14
Batch:	BIG0574	Sequence:	SIG0365	Initial/Final:	100 mL / 100 mL
Instrument:	Accumet AB150			Calibration:	UNASSIGNED

CAS NO.	Analyte	Concentration (mg/L CaCO3)	Dilution Factor	MDL	MRL	Q
	Alkalinity, Bicarbonate	9.25	1	1.00	1.00	
	Alkalinity, Carbonate	<1.00	1	1.00	1.00	U
	Alkalinity, Hydroxide	<1.00	1	1.00	1.00	U
	Alkalinity, Total	9.25	1	1.00	1.00	

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INORGANIC ANALYSIS DATA SHEET
SM 2320 B-97

SP-40-072120

Laboratory:	Analytical Resources, Inc.				
Client:	Floyd - Snider				
Project:	Rio Tinto Holden Mine Reclamation/Remediation				
Matrix:	Water	Laboratory ID:	20G0250-03 A	SDG:	20G0250
Sampled:	07/21/20 13:18	Prepared:	07/27/20 09:44	File ID:	
% Solids:	0.00	Preparation:	No Prep Wet Chem	Analyzed:	07/27/20 10:14
Batch:	BIG0574	Sequence:	SIG0365	Initial/Final:	100 mL / 100 mL
Instrument:	Accumet AB150			Calibration:	UNASSIGNED

CAS NO.	Analyte	Concentration (mg/L CaCO3)	Dilution Factor	MDL	MRL	Q
	Alkalinity, Bicarbonate	9.77	1	1.00	1.00	
	Alkalinity, Carbonate	<1.00	1	1.00	1.00	U
	Alkalinity, Hydroxide	<1.00	1	1.00	1.00	U
	Alkalinity, Total	9.77	1	1.00	1.00	

Form I
INORGANIC ANALYSIS DATA SHEET
SM 2320 B-97

SP-32-072120

Laboratory:	Analytical Resources, Inc.				
Client:	Floyd - Snider				
Project:	Rio Tinto Holden Mine Reclamation/Remediation				
Matrix:	Water	Laboratory ID:	20G0250-04 A	SDG:	20G0250
Sampled:	07/21/20 13:25	Prepared:	07/27/20 09:44	File ID:	
% Solids:	0.00	Preparation:	No Prep Wet Chem	Analyzed:	07/27/20 10:14
Batch:	BIG0574	Sequence:	SIG0365	Initial/Final:	100 mL / 100 mL
Instrument:	Accumet AB150			Calibration:	UNASSIGNED

CAS NO.	Analyte	Concentration (mg/L CaCO3)	Dilution Factor	MDL	MRL	Q
	Alkalinity, Bicarbonate	9.56	1	1.00	1.00	
	Alkalinity, Carbonate	<1.00	1	1.00	1.00	U
	Alkalinity, Hydroxide	<1.00	1	1.00	1.00	U
	Alkalinity, Total	9.56	1	1.00	1.00	

Form I
INORGANIC ANALYSIS DATA SHEET
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SP-26-072220

Laboratory:	Analytical Resources, Inc.				
Client:	Floyd - Snider				
Project:	Rio Tinto Holden Mine Reclamation/Remediation				
Matrix:	Water	Laboratory ID:	20G0250-05 A	SDG:	20G0250
Sampled:	07/22/20 09:37	Prepared:	07/27/20 09:44	File ID:	
% Solids:	0.00	Preparation:	No Prep Wet Chem	Analyzed:	07/27/20 10:14
Batch:	BIG0574	Sequence:	SIG0365	Initial/Final:	100 mL / 100 mL
Instrument:	Accumet AB150			Calibration:	UNASSIGNED

CAS NO.	Analyte	Concentration (mg/L CaCO3)	Dilution Factor	MDL	MRL	Q
	Alkalinity, Bicarbonate	11.7	1	1.00	1.00	
	Alkalinity, Carbonate	<1.00	1	1.00	1.00	U
	Alkalinity, Hydroxide	<1.00	1	1.00	1.00	U
	Alkalinity, Total	11.7	1	1.00	1.00	

Form I
INORGANIC ANALYSIS DATA SHEET
SM 2320 B-97

SP-126-072220

Laboratory:	Analytical Resources, Inc.				
Client:	Floyd - Snider				
Project:	Rio Tinto Holden Mine Reclamation/Remediation				
Matrix:	Water	Laboratory ID:	20G0250-06 A	SDG:	20G0250
Sampled:	07/22/20 09:42	Prepared:	07/27/20 09:44	File ID:	
% Solids:	0.00	Preparation:	No Prep Wet Chem	Analyzed:	07/27/20 10:14
Batch:	BIG0574	Sequence:	SIG0365	Initial/Final:	100 mL / 100 mL
Instrument:	Accumet AB150			Calibration:	UNASSIGNED

CAS NO.	Analyte	Concentration (mg/L CaCO3)	Dilution Factor	MDL	MRL	Q
	Alkalinity, Bicarbonate	13.8	1	1.00	1.00	
	Alkalinity, Carbonate	<1.00	1	1.00	1.00	U
	Alkalinity, Hydroxide	<1.00	1	1.00	1.00	U
	Alkalinity, Total	13.8	1	1.00	1.00	

Form I
INORGANIC ANALYSIS DATA SHEET
SM 2320 B-97

Field-Blank-072220

Laboratory:	Analytical Resources, Inc.				
Client:	Floyd - Snider				
Project:	Rio Tinto Holden Mine Reclamation/Remediation				
Matrix:	Water	Laboratory ID:	20G0250-07 A	SDG:	20G0250
Sampled:	07/22/20 10:55	Prepared:	07/27/20 09:44	File ID:	
% Solids:	0.00	Preparation:	No Prep Wet Chem	Analyzed:	07/27/20 10:14
Batch:	BIG0574	Sequence:	SIG0365	Initial/Final:	100 mL / 100 mL
Instrument:	Accumet AB150			Calibration:	UNASSIGNED

CAS NO.	Analyte	Concentration (mg/L CaCO3)	Dilution Factor	MDL	MRL	Q
	Alkalinity, Bicarbonate	<1.00	1	1.00	1.00	U
	Alkalinity, Carbonate	<1.00	1	1.00	1.00	U
	Alkalinity, Hydroxide	<1.00	1	1.00	1.00	U
	Alkalinity, Total	<1.00	1	1.00	1.00	U

Form I
INORGANIC ANALYSIS DATA SHEET
SM 2320 B-97

SW-TP3-East1-072220

Laboratory:	Analytical Resources, Inc.				
Client:	Floyd - Snider				
Project:	Rio Tinto Holden Mine Reclamation/Remediation				
Matrix:	Water	Laboratory ID:	20G0250-08 F	SDG:	20G0250
Sampled:	07/22/20 13:45	Prepared:	07/27/20 09:44	File ID:	
% Solids:	0.00	Preparation:	No Prep Wet Chem	Analyzed:	07/27/20 10:14
Batch:	BIG0574	Sequence:	SIG0365	Initial/Final:	100 mL / 100 mL
Instrument:	Accumet AB150			Calibration:	UNASSIGNED

CAS NO.	Analyte	Concentration (mg/L CaCO3)	Dilution Factor	MDL	MRL	Q
	Alkalinity, Bicarbonate	25.1	1	1.00	1.00	
	Alkalinity, Carbonate	<1.00	1	1.00	1.00	U
	Alkalinity, Hydroxide	<1.00	1	1.00	1.00	U
	Alkalinity, Total	25.1	1	1.00	1.00	

Form I
INORGANIC ANALYSIS DATA SHEET
SM 2320 B-97

SW-TP3-East2-072220

Laboratory:	Analytical Resources, Inc.				
Client:	Floyd - Snider				
Project:	Rio Tinto Holden Mine Reclamation/Remediation				
Matrix:	Water	Laboratory ID:	20G0250-09 C	SDG:	20G0250
Sampled:	07/22/20 15:00	Prepared:	07/27/20 09:44	File ID:	
% Solids:	0.00	Preparation:	No Prep Wet Chem	Analyzed:	07/27/20 10:14
Batch:	BIG0574	Sequence:	SIG0365	Initial/Final:	100 mL / 100 mL
Instrument:	Accumet AB150			Calibration:	UNASSIGNED

CAS NO.	Analyte	Concentration (mg/L CaCO3)	Dilution Factor	MDL	MRL	Q
	Alkalinity, Bicarbonate	<1.00	1	1.00	1.00	U
	Alkalinity, Carbonate	<1.00	1	1.00	1.00	U
	Alkalinity, Hydroxide	<1.00	1	1.00	1.00	U
	Alkalinity, Total	<1.00	1	1.00	1.00	U

Analytical Resources, Incorporated
Analytical Chemists and Consultants

PREPARATION BATCH SUMMARY

SM 2320 B-97

Laboratory: Analytical Resources, Inc.
SDG: 20G0250
Client: Floyd - Snider
Project: Rio Tinto Holden Mine Reclamation/Remediation
Batch: BIG0574
Batch Matrix: Water
Preparation: No Prep Wet Chem

SAMPLE NAME	LAB SAMPLE ID	LAB FILE ID	DATE PREPARED	OBSERVATIONS
SP-30-072020	20G0250-01		07/27/20 09:44	
SP-34-072120	20G0250-02		07/27/20 09:44	
SP-40-072120	20G0250-03		07/27/20 09:44	
SP-32-072120	20G0250-04		07/27/20 09:44	
SP-26-072220	20G0250-05		07/27/20 09:44	
SP-126-072220	20G0250-06		07/27/20 09:44	
Field-Blank-072220	20G0250-07		07/27/20 09:44	
SW-TP3-East1-072220	20G0250-08		07/27/20 09:44	
SW-TP3-East2-072220	20G0250-09		07/27/20 09:44	
Blank	BIG0574-BLK1		07/27/20 09:44	
SW-TP3-East1-072220	BIG0574-DUP1		07/27/20 09:44	
MRL Check	BIG0574-MRL1		07/27/20 09:44	
Reference	BIG0574-SRM1		07/27/20 09:44	

Analytical Resources, Incorporated
Analytical Chemists and Consultants

Form I

METHOD BLANK DATA SHEET

SM 2320 B-97

TotalAnalytes

Blank

Laboratory: Analytical Resources, Inc.
SDG: 20G0250
Client: Floyd - Snider
Project: Rio Tinto Holden Mine Reclamation/I
Batch: BIG0574
Laboratory ID: BIG0574-BLK1
Prepared: 07/27/20 09:44
Matrix: Water
Preparation: No Prep Wet Chem
Analyzed: 07/27/20 10:14
Sequence: SIG0365
Calibration: N/A
Instrument: Accumet AB150

CAS NO.	Analyte	Concentration (mg/L CaCO3)	Dilution Factor	MDL	MRL	Q
	Alkalinity, Total	ND	1	1.00	1.00	U

SW-TP3-East1-072220

DUPLICATES

SM 2320 B-97

Laboratory: Analytical Resources, Inc.
SDG: 20G0250
Client: Floyd - Snider
Project: Rio Tinto Holden Mine Reclamation/Remediation
Matrix: Water
Laboratory ID: BIG0574-DUP1
Batch: BIG0574
Lab Source ID: 20G0250-08
Preparation: No Prep Wet Chem
Initial/Final: 100 mL / 100 mL
Source Sample Name: SW-TP3-East1-072220
% Solids:

ANALYTE	CONTROL LIMIT	SAMPLE CONCENTRATION (mg/L CaCO3)	C	DUPLICATE CONCENTRATION (mg/L CaCO3)	C	RPD %	Q
Alkalinity, Total	20	25.1		24.2		3.76	

*: Values outside of QC limits
L: Analyte concentration is <=5 times the reporting limit and the replicate control limit defaults to Dup = +/- RL instead of 20% RPD

Analytical Resources, Incorporated
Analytical Chemists and Consultants

ANALYSIS BATCH (SEQUENCE) SUMMARY

SM 2320 B-97

Laboratory: Analytical Resources, Inc.
SDG: 20G0250
Client: Floyd - Snider
Project: Rio Tinto Holden Mine Reclamation/Remediation
Sequence: SIG0365
Instrument: Accumet AB150
Calibration: UNASSIGNED

Sample Name	Lab Sample ID	Lab File ID	Matrix	Analysis Date/Time
	SIG0365-ICV1		NA	07/27/20 10:14
Blank	BIG0574-BLK1		Water	07/27/20 10:14
MRL Check	BIG0574-MRL1		Water	07/27/20 10:14
Reference	BIG0574-SRM1		Water	07/27/20 10:14
SP-30-072020	20G0250-01		Water	07/27/20 10:14
SP-34-072120	20G0250-02		Water	07/27/20 10:14
SP-40-072120	20G0250-03		Water	07/27/20 10:14
SP-32-072120	20G0250-04		Water	07/27/20 10:14
Calibration Check	SIG0365-CCV1		NA	07/27/20 10:14
SP-26-072220	20G0250-05		Water	07/27/20 10:14
SP-126-072220	20G0250-06		Water	07/27/20 10:14
Field-Blank-072220	20G0250-07		Water	07/27/20 10:14
SW-TP3-East1-072220	20G0250-08		Water	07/27/20 10:14
SW-TP3-East1-072220	BIG0574-DUP1		Water	07/27/20 10:14
SW-TP3-East1-072220	BIG0574-DUP1		Water	07/27/20 10:14
SW-TP3-East1-072220	BIG0574-DUP1		Water	07/27/20 10:14
SW-TP3-East1-072220	BIG0574-DUP1		Water	07/27/20 10:14
SW-TP3-East2-072220	20G0250-09		Water	07/27/20 10:14
Calibration Check	SIG0365-CCV2		NA	07/27/20 10:14

INITIAL AND CONTINUING CALIBRATION CHECK

SM 2320 B-97

Laboratory: Analytical Resources, Inc.
SDG: 20G0250
Client: Floyd - Snider
Project: Rio Tinto Holden Mine Reclamation/Remediation
Instrument ID: Accumet AB150
Calibration: UNASSIGNED
Control Limt: +/- 10.00%
Sequence: SIG0365

Lab Sample ID	Analyte	True	Found	%R	Units	Method
SIG0365-CCV1	Alkalinity, Total	117.94	116	98.5	mg/L CaCO3	SM 2320 B-97
SIG0365-CCV2	Alkalinity, Total	117.94	116	98.4	mg/L CaCO3	SM 2320 B-97
SIG0365-ICV1	Alkalinity, Total	117.94	116	98.6	mg/L CaCO3	SM 2320 B-97

* Values outside of QC limits

Analytical Resources, Incorporated
Analytical Chemists and Consultants

STANDARD REFERENCE MATERIAL RECOVERY

SM 2320 B-97

Laboratory: Analytical Resources, Inc.
SDG: 20G0250
Client: Floyd - Snider
Project: Rio Tinto Holden Mine Reclamation/Remed
Matrix: Water
Laboratory ID: BIG0574-SRM1
Batch: BIG0574
Initial/Final: 50 mL / 50 mL
Preparation: No Prep Wet Chem
Analyzed: 07/27/2020 10:14
Standard ID: H012037 **Description:** Minerals - ERA Reference Mater
Expires: 06/09/2021

ANALYTE	TRUE (mg/L	FOUND (mg/L	MDL	MRL	Q	SRM % REC.	QC LIMITS REC.
Alkalinity, Total	106.00	103	1.00	1.00		97.2	90.57 - 107.55

* Values outside of QC limits

HOLDING TIME SUMMARY

Analysis: SM 2320 B-97

Laboratory: Analytical Resources, Inc. SDG: 20G0250

Client: Floyd - Snider Project: Rio Tinto Holden Mine Reclamation/Remediation

Sample Name	Date Collected	Date Received	Date Prepared	Days to Prep	Max Days to Prep	Date Analyzed	Days to Analysis	Max Days to Analysis	Q
SP-30-072020 20G0250-01	07/20/20 17:50	07/24/20 12:36	07/27/20 09:44	6	14	07/27/20 10:14	7	14	
SP-30-072020 20G0250-01	07/20/20 17:50	07/24/20 12:36	07/27/20 09:44	6	14	07/27/20 10:14			
SP-34-072120 20G0250-02	07/21/20 12:20	07/24/20 12:36	07/27/20 09:44	5	14	07/27/20 10:14			
SP-34-072120 20G0250-02	07/21/20 12:20	07/24/20 12:36	07/27/20 09:44	5	14	07/27/20 10:14	6	14	
SP-40-072120 20G0250-03	07/21/20 13:18	07/24/20 12:36	07/27/20 09:44	5	14	07/27/20 10:14	6	14	
SP-40-072120 20G0250-03	07/21/20 13:18	07/24/20 12:36	07/27/20 09:44	5	14	07/27/20 10:14			
SP-32-072120 20G0250-04	07/21/20 13:25	07/24/20 12:36	07/27/20 09:44	5	14	07/27/20 10:14	6	14	
SP-32-072120 20G0250-04	07/21/20 13:25	07/24/20 12:36	07/27/20 09:44	5	14	07/27/20 10:14			
SP-26-072220 20G0250-05	07/22/20 09:37	07/24/20 12:36	07/27/20 09:44	5	14	07/27/20 10:14			
SP-26-072220 20G0250-05	07/22/20 09:37	07/24/20 12:36	07/27/20 09:44	5	14	07/27/20 10:14	5	14	
SP-126-072220 20G0250-06	07/22/20 09:42	07/24/20 12:36	07/27/20 09:44	5	14	07/27/20 10:14	5	14	
SP-126-072220 20G0250-06	07/22/20 09:42	07/24/20 12:36	07/27/20 09:44	5	14	07/27/20 10:14			
Field-Blank-072220 20G0250-07	07/22/20 10:55	07/24/20 12:36	07/27/20 09:44	4	14	07/27/20 10:14			
Field-Blank-072220 20G0250-07	07/22/20 10:55	07/24/20 12:36	07/27/20 09:44	4	14	07/27/20 10:14	5	14	
SW-TP3-East1-072220 20G0250-08	07/22/20 13:45	07/24/20 12:36	07/27/20 09:44	4	14	07/27/20 10:14			
SW-TP3-East1-072220 20G0250-08	07/22/20 13:45	07/24/20 12:36	07/27/20 09:44	4	14	07/27/20 10:14	5	14	
SW-TP3-East2-072220 20G0250-09	07/22/20 15:00	07/24/20 12:36	07/27/20 09:44	4	14	07/27/20 10:14	5	14	
SW-TP3-East2-072220 20G0250-09	07/22/20 15:00	07/24/20 12:36	07/27/20 09:44	4	14	07/27/20 10:14			
Duplicate BIG0574-DUP1	07/22/20 13:45	07/24/20 12:36	07/27/20 09:44	4	14	07/27/20 10:14	5	14	
Duplicate BIG0574-DUP1	07/22/20 13:45	07/24/20 12:36	07/27/20 09:44	4	14	07/27/20 10:14			

* Indicates hold time exceedance.

METHOD DETECTION AND REPORTING LIMITS

SM 2320 B-97

Laboratory: Analytical Resources, Inc.
SDG: 20G0250
Client: Floyd - Snider
Project: Rio Tinto Holden Mine Reclamation/Rem
Matrix: Water
Instrument: Accumet AB150

Analyte	MDL	RL	Units
Alkalinity, Bicarbonate	1.00	1.00	mg/L CaCO3
Alkalinity, Carbonate	1.00	1.00	mg/L CaCO3
Alkalinity, Hydroxide	1.00	1.00	mg/L CaCO3
Alkalinity, Total	1.00	1.00	mg/L CaCO3

Form I
INORGANIC ANALYSIS DATA SHEET
SM 2540 C-97

Dissolved Analytes

SW-TP3-East1-072220

Laboratory:	Analytical Resources, Inc.				
Client:	Floyd - Snider				
Project:	Rio Tinto Holden Mine Reclamation/Remediation				
Matrix:	Water	Laboratory ID:	20G0250-08 A	SDG:	20G0250
Sampled:	07/22/20 13:45	Prepared:	07/28/20 15:11	File ID:	
% Solids:	0.00	Preparation:	No Prep Wet Chem	Analyzed:	07/28/20 15:13
Batch:	BIG0623	Sequence:		Initial/Final:	200 mL / 200 mL
Instrument:	BAL2			Calibration:	

CAS NO.	Analyte	Concentration (mg/L)	Dilution Factor	MDL	MRL	Q
	Dissolved Solids	49	1	5	5	

Form I
INORGANIC ANALYSIS DATA SHEET
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Dissolved Analytes

SW-TP3-East2-072220

Laboratory:	Analytical Resources, Inc.				
Client:	Floyd - Snider				
Project:	Rio Tinto Holden Mine Reclamation/Remediation				
Matrix:	Water	Laboratory ID:	20G0250-09 B	SDG:	20G0250
Sampled:	07/22/20 15:00	Prepared:	07/28/20 15:11	File ID:	
% Solids:	0.00	Preparation:	No Prep Wet Chem	Analyzed:	07/28/20 15:13
Batch:	BIG0623	Sequence:		Initial/Final:	200 mL / 200 mL
Instrument:	BAL2			Calibration:	

CAS NO.	Analyte	Concentration (mg/L)	Dilution Factor	MDL	MRL	Q
	Dissolved Solids	186	1	5	5	

PREPARATION BATCH SUMMARY

SM 2540 C-97

Laboratory: Analytical Resources, Inc.
SDG: 20G0250
Client: Floyd - Snider
Project: Rio Tinto Holden Mine Reclamation/Remediation
Batch: BIG0623
Batch Matrix: Water
Preparation: No Prep Wet Chem

SAMPLE NAME	LAB SAMPLE ID	LAB FILE ID	DATE PREPARED	OBSERVATIONS
SW-TP3-East1-072220	20G0250-08		07/28/20 15:11	
SW-TP3-East2-072220	20G0250-09		07/28/20 15:11	
Blank	BIG0623-BLK1		07/28/20 15:11	
LCS	BIG0623-BS1		07/28/20 15:11	
LCS Dup	BIG0623-BSD1		07/28/20 15:11	
SW-TP3-East1-072220	BIG0623-DUP1		07/28/20 15:11	
MRL Check	BIG0623-MRL1		07/28/20 15:11	

Form I

METHOD BLANK DATA SHEET

SM 2540 C-97

DissolvedAnalytes

Blank

Laboratory: Analytical Resources, Inc.
SDG: 20G0250
Client: Floyd - Snider
Project: Rio Tinto Holden Mine Reclamation/I
Batch: BIG0623
Laboratory ID: BIG0623-BLK1
Prepared: 07/28/20 15:11
Matrix: Water
Preparation: No Prep Wet Chem
Analyzed: 07/28/20 15:13
Sequence:
Calibration:
Instrument: BAL2

CAS NO.	Analyte	Concentration (mg/L)	Dilution Factor	MDL	MRL	Q
	Dissolved Solids	ND	1	5	5	U

LCS / LCS DUPLICATE RECOVERY

SM 2540 C-97

Laboratory:	Analytical Resources, Inc.	SDG:	20G0250
Client:	Floyd - Snider	Project:	Rio Tinto Holden Mine Reclamation/Remediation
Matrix:	Water	Analyzed:	07/28/20 15:13
Batch:	BIG0623	Laboratory ID:	BIG0623-BS1
Preparation:	No Prep Wet Chem	Sequence Name:	LCS
Initial/Final:	100 mL / 200 mL		

COMPOUND	SPIKE ADDED (mg/L)	LCS CONCENTRATION (mg/L)	Q	LCS % REC. #	QC LIMITS REC.
Dissolved Solids	500	499		99.8	90 - 110

* Indicates values outside of QC limits

COMPOUND	SPIKE ADDED (mg/L)	LCSD CONCENTRATION (mg/L)	Q	LCSD % REC. #	% RPD #	QC LIMITS RPD	QC LIMITS REC.
Dissolved Solids	500	479		95.8	4.09	20	90 - 110

* Indicates values outside of QC limits

SW-TP3-East1-072220

DUPLICATES

SM 2540 C-97

Laboratory: Analytical Resources, Inc.
SDG: 20G0250
Client: Floyd - Snider
Project: Rio Tinto Holden Mine Reclamation/Remediation
Matrix: Water
Laboratory ID: BIG0623-DUP1
Batch: BIG0623
Lab Source ID: 20G0250-08
Preparation: No Prep Wet Chem
Initial/Final: 200 mL / 200 mL
Source Sample Name: SW-TP3-East1-072220
% Solids:

ANALYTE	CONTROL LIMIT	SAMPLE CONCENTRATION (mg/L)	C	DUPLICATE CONCENTRATION (mg/L)	C	RPD %	Q
Dissolved Solids	20	49		52		6.00	

*: Values outside of QC limits
L: Analyte concentration is <=5 times the reporting limit and the replicate control limit defaults to Dup = +/- RL instead of 20% RPD

HOLDING TIME SUMMARY

Analysis: SM 2540 C-97

Laboratory: Analytical Resources, Inc. SDG: 20G0250

Client: Floyd - Snider Project: Rio Tinto Holden Mine Reclamation/Remediation

Sample Name	Date Collected	Date Received	Date Prepared	Days to Prep	Max Days to Prep	Date Analyzed	Days to Analysis	Max Days to Analysis	Q
SW-TP3-East1-072220 20G0250-08	07/22/20 13:45	07/24/20 12:36	07/28/20 15:11	6	7	07/28/20 15:13	6	7	
SW-TP3-East2-072220 20G0250-09	07/22/20 15:00	07/24/20 12:36	07/28/20 15:11	6	7	07/28/20 15:13	6	7	
Duplicate BIG0623-DUP1	07/22/20 13:45	07/24/20 12:36	07/28/20 15:11	6	7	07/28/20 15:13	6	7	

* Indicates hold time exceedance.

METHOD DETECTION AND REPORTING LIMITS

SM 2540 C-97

Laboratory: Analytical Resources, Inc.
SDG: 20G0250
Client: Floyd - Snider
Project: Rio Tinto Holden Mine Reclamation/Rem
Matrix: Water
Instrument:

Analyte	MDL	RL	Units
Dissolved Solids	5	5	mg/L

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INORGANIC ANALYSIS DATA SHEET
SM 2540 D-97

SW-TP3-East1-072220

Laboratory:	Analytical Resources, Inc.				
Client:	Floyd - Snider				
Project:	Rio Tinto Holden Mine Reclamation/Remediation				
Matrix:	Water	Laboratory ID:	20G0250-08 B	SDG:	20G0250
Sampled:	07/22/20 13:45	Prepared:	07/26/20 06:56	File ID:	
% Solids:	0.00	Preparation:	No Prep Wet Chem	Analyzed:	07/26/20 06:56
Batch:	BIG0563	Sequence:		Initial/Final:	805 mL / 1000 mL
Instrument:	BAL2			Calibration:	

CAS NO.	Analyte	Concentration (mg/L)	Dilution Factor	MDL	MRL	Q
	Suspended Solids	4	1	1	1	

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INORGANIC ANALYSIS DATA SHEET
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SW-TP3-East2-072220

Laboratory:	Analytical Resources, Inc.				
Client:	Floyd - Snider				
Project:	Rio Tinto Holden Mine Reclamation/Remediation				
Matrix:	Water	Laboratory ID:	20G0250-09 A	SDG:	20G0250
Sampled:	07/22/20 15:00	Prepared:	07/26/20 06:56	File ID:	
% Solids:	0.00	Preparation:	No Prep Wet Chem	Analyzed:	07/26/20 06:56
Batch:	BIG0563	Sequence:		Initial/Final:	910 mL / 1000 mL
Instrument:	BAL2			Calibration:	

CAS NO.	Analyte	Concentration (mg/L)	Dilution Factor	MDL	MRL	Q
	Suspended Solids	3	1	1	1	

Analytical Resources, Incorporated
Analytical Chemists and Consultants

PREPARATION BATCH SUMMARY

SM 2540 D-97

Laboratory: Analytical Resources, Inc.
SDG: 20G0250
Client: Floyd - Snider
Project: Rio Tinto Holden Mine Reclamation/Remediation
Batch: BIG0563
Batch Matrix: Water
Preparation: No Prep Wet Chem

SAMPLE NAME	LAB SAMPLE ID	LAB FILE ID	DATE PREPARED	OBSERVATIONS
SW-TP3-East1-072220	20G0250-08		07/26/20 06:56	
SW-TP3-East2-072220	20G0250-09		07/26/20 06:56	
Blank	BIG0563-BLK1		07/26/20 06:56	
LCS	BIG0563-BS1		07/26/20 06:56	
LCS Dup	BIG0563-BSD1		07/26/20 06:56	
SW-TP3-East1-072220	BIG0563-DUP1		07/26/20 06:56	

Form I

METHOD BLANK DATA SHEET

SM 2540 D-97

TotalAnalytes

Blank

Laboratory: Analytical Resources, Inc.
SDG: 20G0250
Client: Floyd - Snider
Project: Rio Tinto Holden Mine Reclamation/I
Batch: BIG0563
Laboratory ID: BIG0563-BLK1
Prepared: 07/26/20 06:56
Matrix: Water
Preparation: No Prep Wet Chem
Analyzed: 07/26/20 06:56
Sequence:
Calibration:
Instrument: BAL2

CAS NO.	Analyte	Concentration (mg/L)	Dilution Factor	MDL	MRL	Q
	Suspended Solids	ND	1	1	1	U

LCS / LCS DUPLICATE RECOVERY

SM 2540 D-97

Laboratory:	Analytical Resources, Inc.	SDG:	20G0250
Client:	Floyd - Snider	Project:	Rio Tinto Holden Mine Reclamation/Remediation
Matrix:	Water	Analyzed:	07/26/20 06:56
Batch:	BIG0563	Laboratory ID:	BIG0563-BS1
Preparation:	No Prep Wet Chem	Sequence Name:	LCS
Initial/Final:	1000 mL / 1000 mL		

COMPOUND	SPIKE ADDED (mg/L)	LCS CONCENTRATION (mg/L)	Q	LCS % REC. #	QC LIMITS REC.
Suspended Solids	50.00	50		99.0	90 - 110

* Indicates values outside of QC limits

COMPOUND	SPIKE ADDED (mg/L)	LCSD CONCENTRATION (mg/L)	Q	LCSD % REC. #	% RPD #	QC LIMITS	
						RPD	REC.
Suspended Solids	50.00	49		98.4	0.608	20	90 - 110

* Indicates values outside of QC limits

SW-TP3-East1-072220

DUPLICATES

SM 2540 D-97

Laboratory: Analytical Resources, Inc.
SDG: 20G0250

Client: Floyd - Snider
Project: Rio Tinto Holden Mine Reclamation/Remediation

Matrix: Water
Laboratory ID: BIG0563-DUP1

Batch: BIG0563
Lab Source ID: 20G0250-08

Preparation: No Prep Wet Chem
Initial/Final: 810 mL / 1000 mL

Source Sample Name: SW-TP3-East1-072220
% Solids:

ANALYTE	CONTROL LIMIT	SAMPLE CONCENTRATION (mg/L)	C	DUPLICATE CONCENTRATION (mg/L)	C	RPD %	Q
Suspended Solids	20	4		4		7.59	

*: Values outside of QC limits
L: Analyte concentration is <=5 times the reporting limit and the replicate control limit defaults to Dup = +/- RL instead of 20% RPD

HOLDING TIME SUMMARY

Analysis: SM 2540 D-97

Laboratory: Analytical Resources, Inc. SDG: 20G0250

Client: Floyd - Snider Project: Rio Tinto Holden Mine Reclamation/Remediation

Sample Name	Date Collected	Date Received	Date Prepared	Days to Prep	Max Days to Prep	Date Analyzed	Days to Analysis	Max Days to Analysis	Q
SW-TP3-East1-072220 20G0250-08	07/22/20 13:45	07/24/20 12:36	07/26/20 06:56	3	7	07/26/20 06:56	4	7	
SW-TP3-East2-072220 20G0250-09	07/22/20 15:00	07/24/20 12:36	07/26/20 06:56	3	7	07/26/20 06:56	4	7	
Duplicate BIG0563-DUP1	07/22/20 13:45	07/24/20 12:36	07/26/20 06:56	3	7	07/26/20 06:56	4	7	

* Indicates hold time exceedance.

METHOD DETECTION AND REPORTING LIMITS

SM 2540 D-97

Laboratory: Analytical Resources, Inc.
SDG: 20G0250
Client: Floyd - Snider
Project: Rio Tinto Holden Mine Reclamation/Rem
Matrix: Water
Instrument:

Analyte	MDL	RL	Units
Suspended Solids	1	1	mg/L

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Dissolved Analytes

SP-30-072020

Laboratory:	Analytical Resources, Inc.				
Client:	Floyd - Snider				
Project:	Rio Tinto Holden Mine Reclamation/Remediation				
Matrix:	Water	Laboratory ID:	20G0250-01 C	SDG:	20G0250
Sampled:	07/20/20 17:50	Prepared:	07/27/20 11:00	File ID:	ShimadzuData_07302020@0934-066
% Solids:	0.00	Preparation:	No Prep Wet Chem	Analyzed:	07/29/20 12:23
Batch:	BIG0584	Sequence:	SIG0420	Initial/Final:	20 mL / 20 mL
Instrument:	TOC-LCSH			Calibration:	DG00086

CAS NO.	Analyte	Concentration (mg/L)	Dilution Factor	MDL	MRL	Q
	Dissolved Organic Carbon, Dissolved	0.50	1	0.50	0.50	

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Dissolved Analytes

SP-34-072120

Laboratory:	Analytical Resources, Inc.				
Client:	Floyd - Snider				
Project:	Rio Tinto Holden Mine Reclamation/Remediation				
Matrix:	Water	Laboratory ID:	20G0250-02 C	SDG:	20G0250
Sampled:	07/21/20 12:20	Prepared:	07/27/20 11:00	File ID:	ShimadzuData_07302020@0934-067
% Solids:	0.00	Preparation:	No Prep Wet Chem	Analyzed:	07/29/20 12:40
Batch:	BIG0584	Sequence:	SIG0420	Initial/Final:	20 mL / 20 mL
Instrument:	TOC-LCSH			Calibration:	DG00086

CAS NO.	Analyte	Concentration (mg/L)	Dilution Factor	MDL	MRL	Q
	Dissolved Organic Carbon, Dissolved	<0.50	1	0.50	0.50	U

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Dissolved Analytes

SP-40-072120

Laboratory:	Analytical Resources, Inc.				
Client:	Floyd - Snider				
Project:	Rio Tinto Holden Mine Reclamation/Remediation				
Matrix:	Water	Laboratory ID:	20G0250-03 C	SDG:	20G0250
Sampled:	07/21/20 13:18	Prepared:	07/27/20 11:00	File ID:	ShimadzuData_07302020@0934-068
% Solids:	0.00	Preparation:	No Prep Wet Chem	Analyzed:	07/29/20 13:02
Batch:	BIG0584	Sequence:	SIG0420	Initial/Final:	20 mL / 20 mL
Instrument:	TOC-LCSH			Calibration:	DG00086

CAS NO.	Analyte	Concentration (mg/L)	Dilution Factor	MDL	MRL	Q
	Dissolved Organic Carbon, Dissolved	<0.50	1	0.50	0.50	U

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Dissolved Analytes

SP-32-072120

Laboratory:	Analytical Resources, Inc.				
Client:	Floyd - Snider				
Project:	Rio Tinto Holden Mine Reclamation/Remediation				
Matrix:	Water	Laboratory ID:	20G0250-04 C	SDG:	20G0250
Sampled:	07/21/20 13:25	Prepared:	07/27/20 11:00	File ID:	ShimadzuData_07302020@0934-069
% Solids:	0.00	Preparation:	No Prep Wet Chem	Analyzed:	07/29/20 13:23
Batch:	BIG0584	Sequence:	SIG0420	Initial/Final:	20 mL / 20 mL
Instrument:	TOC-LCSH			Calibration:	DG00086

CAS NO.	Analyte	Concentration (mg/L)	Dilution Factor	MDL	MRL	Q
	Dissolved Organic Carbon, Dissolved	<0.50	1	0.50	0.50	U

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Dissolved Analytes

SP-26-072220

Laboratory:	Analytical Resources, Inc.				
Client:	Floyd - Snider				
Project:	Rio Tinto Holden Mine Reclamation/Remediation				
Matrix:	Water	Laboratory ID:	20G0250-05 C	SDG:	20G0250
Sampled:	07/22/20 09:37	Prepared:	07/27/20 11:00	File ID:	ShimadzuData_07302020@0934-072
% Solids:	0.00	Preparation:	No Prep Wet Chem	Analyzed:	07/29/20 14:27
Batch:	BIG0584	Sequence:	SIG0420	Initial/Final:	20 mL / 20 mL
Instrument:	TOC-LCSH			Calibration:	DG00086

CAS NO.	Analyte	Concentration (mg/L)	Dilution Factor	MDL	MRL	Q
	Dissolved Organic Carbon, Dissolved	<0.50	1	0.50	0.50	U

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Dissolved Analytes

SP-126-072220

Laboratory:	Analytical Resources, Inc.				
Client:	Floyd - Snider				
Project:	Rio Tinto Holden Mine Reclamation/Remediation				
Matrix:	Water	Laboratory ID:	20G0250-06 C	SDG:	20G0250
Sampled:	07/22/20 09:42	Prepared:	07/27/20 11:00	File ID:	ShimadzuData_07302020@0934-073
% Solids:	0.00	Preparation:	No Prep Wet Chem	Analyzed:	07/29/20 14:53
Batch:	BIG0584	Sequence:	SIG0420	Initial/Final:	20 mL / 20 mL
Instrument:	TOC-LCSH			Calibration:	DG00086

CAS NO.	Analyte	Concentration (mg/L)	Dilution Factor	MDL	MRL	Q
	Dissolved Organic Carbon, Dissolved	<0.50	1	0.50	0.50	U

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INORGANIC ANALYSIS DATA SHEET
SM 5310 B-00

Dissolved Analytes

Field-Blank-072220

Laboratory:	Analytical Resources, Inc.				
Client:	Floyd - Snider				
Project:	Rio Tinto Holden Mine Reclamation/Remediation				
Matrix:	Water	Laboratory ID:	20G0250-07 C	SDG:	20G0250
Sampled:	07/22/20 10:55	Prepared:	07/27/20 11:00	File ID:	ShimadzuData_07302020@0934-074
% Solids:	0.00	Preparation:	No Prep Wet Chem	Analyzed:	07/29/20 15:14
Batch:	BIG0584	Sequence:	SIG0420	Initial/Final:	20 mL / 20 mL
Instrument:	TOC-LCSH			Calibration:	DG00086

CAS NO.	Analyte	Concentration (mg/L)	Dilution Factor	MDL	MRL	Q
	Dissolved Organic Carbon, Dissolved	<0.50	1	0.50	0.50	U

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INORGANIC ANALYSIS DATA SHEET
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Dissolved Analytes

SW-TP3-East1-072220

Laboratory:	Analytical Resources, Inc.				
Client:	Floyd - Snider				
Project:	Rio Tinto Holden Mine Reclamation/Remediation				
Matrix:	Water	Laboratory ID:	20G0250-08 I	SDG:	20G0250
Sampled:	07/22/20 13:45	Prepared:	07/27/20 11:00	File ID:	ShimadzuData_07302020@0934-075
% Solids:	0.00	Preparation:	No Prep Wet Chem	Analyzed:	07/29/20 15:36
Batch:	BIG0584	Sequence:	SIG0420	Initial/Final:	20 mL / 20 mL
Instrument:	TOC-LCSH			Calibration:	DG00086

CAS NO.	Analyte	Concentration (mg/L)	Dilution Factor	MDL	MRL	Q
	Dissolved Organic Carbon, Dissolved	3.32	1	0.50	0.50	

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INORGANIC ANALYSIS DATA SHEET
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SW-TP3-East1-072220

Laboratory:	Analytical Resources, Inc.				
Client:	Floyd - Snider				
Project:	Rio Tinto Holden Mine Reclamation/Remediation				
Matrix:	Water	Laboratory ID:	20G0250-08RE1 G	SDG:	20G0250
Sampled:	07/22/20 13:45	Prepared:	07/27/20 10:56	File ID:	ShimadzuData_07312020@0911-016
% Solids:	0.00	Preparation:	No Prep Wet Chem	Analyzed:	07/30/20 21:07
Batch:	BIG0582	Sequence:	SIG0433	Initial/Final:	20 mL / 20 mL
Instrument:	TOC-LCSH			Calibration:	DG00092

CAS NO.	Analyte	Concentration (mg/L)	Dilution Factor	MDL	MRL	Q
	Total Organic Carbon	3.25	1	0.50	0.50	

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SM 5310 B-00

Dissolved Analytes

SW-TP3-East2-072220

Laboratory:	Analytical Resources, Inc.				
Client:	Floyd - Snider				
Project:	Rio Tinto Holden Mine Reclamation/Remediation				
Matrix:	Water	Laboratory ID:	20G0250-09 E	SDG:	20G0250
Sampled:	07/22/20 15:00	Prepared:	07/27/20 11:00	File ID:	ShimadzuData_07302020@0934-079
% Solids:	0.00	Preparation:	No Prep Wet Chem	Analyzed:	07/29/20 17:04
Batch:	BIG0584	Sequence:	SIG0420	Initial/Final:	20 mL / 20 mL
Instrument:	TOC-LCSH			Calibration:	DG00086

CAS NO.	Analyte	Concentration (mg/L)	Dilution Factor	MDL	MRL	Q
	Dissolved Organic Carbon, Dissolved	0.70	1	0.50	0.50	

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SW-TP3-East2-072220

Laboratory:	Analytical Resources, Inc.				
Client:	Floyd - Snider				
Project:	Rio Tinto Holden Mine Reclamation/Remediation				
Matrix:	Water	Laboratory ID:	20G0250-09RE1 D	SDG:	20G0250
Sampled:	07/22/20 15:00	Prepared:	07/27/20 10:56	File ID:	ShimadzuData_07312020@0911-020
% Solids:	0.00	Preparation:	No Prep Wet Chem	Analyzed:	07/30/20 22:39
Batch:	BIG0582	Sequence:	SIG0433	Initial/Final:	20 mL / 20 mL
Instrument:	TOC-LCSH			Calibration:	DG00092

CAS NO.	Analyte	Concentration (mg/L)	Dilution Factor	MDL	MRL	Q
	Total Organic Carbon	0.79	1	0.50	0.50	

PREPARATION BATCH SUMMARY

SM 5310 B-00

Laboratory: Analytical Resources, Inc. SDG: 20G0250

Client: Floyd - Snider Project: Rio Tinto Holden Mine Reclamation/Remediation

Batch: BIG0582 Batch Matrix: Water Preparation: No Prep Wet Chem

SAMPLE NAME	LAB SAMPLE ID	LAB FILE ID	DATE PREPARED	OBSERVATIONS
SW-TP3-East1-072220	20G0250-08RE1	dzuData_07312020@091	07/27/20 10:56	Added 7/31/2020 by BF
SW-TP3-East2-072220	20G0250-09RE1	dzuData_07312020@091	07/27/20 10:56	Added 7/31/2020 by BF
Blank	BIG0582-BLK2	dzuData_07312020@091	07/27/20 10:56	Added 7/31/2020 by BF
LCS	BIG0582-BS2	dzuData_07312020@091	07/27/20 10:56	Added 7/31/2020 by BF
SW-TP3-East1-072220	BIG0582-DUP2	dzuData_07312020@091	07/27/20 10:56	Added 7/31/2020 by BF
MRL Check	BIG0582-MRL2	dzuData_07312020@091	07/27/20 10:56	Added 7/31/2020 by BF
SW-TP3-East1-072220	BIG0582-MS2	dzuData_07312020@091	07/27/20 10:56	Added 7/31/2020 by BF
SW-TP3-East1-072220	BIG0582-MSD2	dzuData_07312020@091	07/27/20 10:56	Added 7/31/2020 by BF

Analytical Resources, Incorporated
Analytical Chemists and Consultants

PREPARATION BATCH SUMMARY

SM 5310 B-00

Laboratory: Analytical Resources, Inc. SDG: 20G0250

Client: Floyd - Snider Project: Rio Tinto Holden Mine Reclamation/Remediation

Batch: BIG0584 Batch Matrix: Water Preparation: No Prep Wet Chem

SAMPLE NAME	LAB SAMPLE ID	LAB FILE ID	DATE PREPARED	OBSERVATIONS
SP-30-072020	20G0250-01	dzuData_07302020@093	07/27/20 11:00	
SP-34-072120	20G0250-02	dzuData_07302020@093	07/27/20 11:00	
SP-40-072120	20G0250-03	dzuData_07302020@093	07/27/20 11:00	
SP-32-072120	20G0250-04	dzuData_07302020@093	07/27/20 11:00	
SP-26-072220	20G0250-05	dzuData_07302020@093	07/27/20 11:00	
SP-126-072220	20G0250-06	dzuData_07302020@093	07/27/20 11:00	
Field-Blank-072220	20G0250-07	dzuData_07302020@093	07/27/20 11:00	
SW-TP3-East1-072220	20G0250-08	dzuData_07302020@093	07/27/20 11:00	
SW-TP3-East2-072220	20G0250-09	dzuData_07302020@093	07/27/20 11:00	
Blank	BIG0584-BLK1	dzuData_07302020@093	07/27/20 11:00	
LCS	BIG0584-BS1	dzuData_07302020@093	07/27/20 11:00	
SW-TP3-East1-072220	BIG0584-DUP1	dzuData_07302020@093	07/27/20 11:00	
MRL Check	BIG0584-MRL1	dzuData_07302020@093	07/27/20 11:00	
SW-TP3-East1-072220	BIG0584-MS1	dzuData_07302020@093	07/27/20 11:00	
SW-TP3-East1-072220	BIG0584-MSD1	dzuData_07302020@093	07/27/20 11:00	

Analytical Resources, Incorporated
Analytical Chemists and Consultants

Form I

METHOD BLANK DATA SHEET

SM 5310 B-00

TotalAnalytes

Blank

Laboratory: Analytical Resources, Inc.
SDG: 20G0250
Client: Floyd - Snider
Project: Rio Tinto Holden Mine Reclamation/I
Batch: BIG0582
Laboratory ID: BIG0582-BLK2
Prepared: 07/27/20 10:56
Matrix: Water
Preparation: No Prep Wet Chem
Analyzed: 07/30/20 20:31
Sequence: SIG0433
Calibration: DG00092
Instrument: TOC-LCSH

CAS NO.	Analyte	Concentration (mg/L)	Dilution Factor	MDL	MRL	Q
	Total Organic Carbon	ND	1	0.50	0.50	U

Form I

METHOD BLANK DATA SHEET

SM 5310 B-00

DissolvedAnalytes

Blank

Laboratory: Analytical Resources, Inc.
SDG: 20G0250
Client: Floyd - Snider
Project: Rio Tinto Holden Mine Reclamation/I
Batch: BIG0584
Laboratory ID: BIG0584-BLK1
Prepared: 07/27/20 11:00
Matrix: Water
Preparation: No Prep Wet Chem
Analyzed: 07/29/20 11:39
Sequence: SIG0420
Calibration: DG00086
Instrument: TOC-LCSH

CAS NO.	Analyte	Concentration (mg/L)	Dilution Factor	MDL	MRL	Q
	Dissolved Organic Carbon	ND	1	0.50	0.50	U

LCS / LCS DUPLICATE RECOVERY

SM 5310 B-00

Laboratory:	Analytical Resources, Inc.	SDG:	20G0250
Client:	Floyd - Snider	Project:	Rio Tinto Holden Mine Reclamation/Remediation
Matrix:	Water	Analyzed:	07/30/20 20:49
Batch:	BIG0582	Laboratory ID:	BIG0582-BS2
Preparation:	No Prep Wet Chem	Sequence Name:	LCS
Initial/Final:	20 mL / 20 mL		

COMPOUND	SPIKE ADDED (mg/L)	LCS CONCENTRATION (mg/L)	Q	LCS % REC. #	QC LIMITS REC.
Total Organic Carbon	20.00	18.56		92.8	90 - 110

* Indicates values outside of QC limits

LCS / LCS DUPLICATE RECOVERY

SM 5310 B-00

Laboratory:	Analytical Resources, Inc.	SDG:	20G0250
Client:	Floyd - Snider	Project:	Rio Tinto Holden Mine Reclamation/Remediation
Matrix:	Water	Analyzed:	07/29/20 11:57
Batch:	BIG0584	Laboratory ID:	BIG0584-BS1
Preparation:	No Prep Wet Chem	Sequence Name:	LCS
Initial/Final:	20 mL / 20 mL		

COMPOUND	SPIKE ADDED (mg/L)	LCS CONCENTRATION (mg/L)	Q	LCS % REC. #	QC LIMITS REC.
Dissolved Organic Carbon	20.00	21.64		108	90 - 110

* Indicates values outside of QC limits

SW-TP3-East1-072220

DUPLICATES

SM 5310 B-00

Laboratory: Analytical Resources, Inc.
SDG: 20G0250
Client: Floyd - Snider
Project: Rio Tinto Holden Mine Reclamation/Remediation
Matrix: Water
Laboratory ID: BIG0582-DUP2
Batch: BIG0582
Lab Source ID: 20G0250-08RE1
Preparation: No Prep Wet Chem
Initial/Final: 20 mL / 20 mL
Source Sample Name: SW-TP3-East1-072220
% Solids:

ANALYTE	CONTROL LIMIT	SAMPLE CONCENTRATION (mg/L)	C	DUPLICATE CONCENTRATION (mg/L)	C	RPD %	Q
Total Organic Carbon	20	3.25		2.84		13.4	

*: Values outside of QC limits
L: Analyte concentration is <=5 times the reporting limit and the replicate control limit defaults to Dup = +/- RL instead of 20% RPD

SW-TP3-East1-072220

DUPLICATES

SM 5310 B-00

Laboratory: Analytical Resources, Inc.
SDG: 20G0250
Client: Floyd - Snider
Project: Rio Tinto Holden Mine Reclamation/Remediation
Matrix: Water
Laboratory ID: BIG0584-DUP1
Batch: BIG0584
Lab Source ID: 20G0250-08
Preparation: No Prep Wet Chem
Initial/Final: 20 mL / 20 mL
Source Sample Name: SW-TP3-East1-072220
% Solids:

ANALYTE	CONTROL LIMIT	SAMPLE CONCENTRATION (mg/L)	C	DUPLICATE CONCENTRATION (mg/L)	C	RPD %	Q
Dissolved Organic Carbon	20	3.32		3.13		6.11	

*: Values outside of QC limits
L: Analyte concentration is <=5 times the reporting limit and the replicate control limit defaults to Dup = +/- RL instead of 20% RPD

MS / MS DUPLICATE RECOVERY
SM 5310 B-00

Laboratory:	Analytical Resources, Inc.	SDG:	20G0250
Client:	Floyd - Snider	Project:	Rio Tinto Holden Mine Reclamation/Remediation
Matrix:	Water	Analyzed:	07/30/20 21:55
Batch:	BIG0582	Laboratory ID:	BIG0582-MS2
Preparation:	No Prep Wet Chem	Sequence Name:	Matrix Spike
Initial/Final:	20 mL / 20 mL	Source Sample:	SW-TP3-East1-072220

COMPOUND	SPIKE ADDED (mg/L)	SAMPLE CONCENTRATION (mg/L)	Q	MS CONCENTRATION (mg/L)	Q	MS % REC. #	QC LIMITS REC.
Total Organic Carbon	20.00	3.25		23.10		99.2	75 - 125

* Values outside of QC limits

MS / MS DUPLICATE RECOVERY
SM 5310 B-00

Laboratory:	Analytical Resources, Inc.	SDG:	20G0250
Client:	Floyd - Snider	Project:	Rio Tinto Holden Mine Reclamation/Remediation
Matrix:	Water	Analyzed:	07/30/20 22:21
Batch:	BIG0582	Laboratory ID:	BIG0582-MSD2
Preparation:	No Prep Wet Chem	Sequence Name:	Matrix Spike Dup
Initial/Final:	20 mL / 20 mL	Source Sample:	SW-TP3-East1-072220

COMPOUND	SPIKE ADDED (mg/L)	MSD CONCENTRATION (mg/L)	Q	MSD % REC. #	% RPD #	QC LIMITS RPD	QC LIMITS REC.
Total Organic Carbon	20.00	23.50		101	1.72	20	75 - 125

* Values outside of QC limits

MS / MS DUPLICATE RECOVERY
SM 5310 B-00

Laboratory:	Analytical Resources, Inc.	SDG:	20G0250
Client:	Floyd - Snider	Project:	Rio Tinto Holden Mine Reclamation/Remediation
Matrix:	Water	Analyzed:	07/29/20 16:20
Batch:	BIG0584	Laboratory ID:	BIG0584-MS1
Preparation:	No Prep Wet Chem	Sequence Name:	Matrix Spike
Initial/Final:	20 mL / 20 mL	Source Sample:	SW-TP3-East1-072220

COMPOUND	SPIKE ADDED (mg/L)	SAMPLE CONCENTRATION (mg/L)	Q	MS CONCENTRATION (mg/L)	Q	MS % REC. #	QC LIMITS REC.
Dissolved Organic Carbon	20.00	3.32		20.51		85.9	75 - 125

* Values outside of QC limits

SW-TP3-East1-072220

MS / MS DUPLICATE RECOVERY
SM 5310 B-00

Laboratory:	Analytical Resources, Inc.	SDG:	20G0250
Client:	Floyd - Snider	Project:	Rio Tinto Holden Mine Reclamation/Remediation
Matrix:	Water	Analyzed:	07/29/20 16:38
Batch:	BIG0584	Laboratory ID:	BIG0584-MSD1
Preparation:	No Prep Wet Chem	Sequence Name:	Matrix Spike Dup
Initial/Final:	20 mL / 20 mL	Source Sample:	SW-TP3-East1-072220

COMPOUND	SPIKE ADDED (mg/L)	MSD CONCENTRATION (mg/L)	Q	MSD % REC. #	% RPD #	QC LIMITS RPD	QC LIMITS REC.
Dissolved Organic Carbon	20.00	20.42		85.5	0.440	20	75 - 125

* Values outside of QC limits

ANALYSIS BATCH (SEQUENCE) SUMMARY

SM 5310 B-00

Laboratory: Analytical Resources, Inc.
SDG: 20G0250
Client: Floyd - Snider
Project: Rio Tinto Holden Mine Reclamation/Remediation
Sequence: SIG0420
Instrument: TOC-LCSH
Calibration: DG00086

Sample Name	Lab Sample ID	Lab File ID	Matrix	Analysis Date/Time
1	SIG0420-CAL1	dzuData_07302020@093	NA	07/28/20 11:53
10	SIG0420-CAL2	dzuData_07302020@093	NA	07/28/20 12:10
5	SIG0420-CAL3	dzuData_07302020@093	NA	07/28/20 12:29
2	SIG0420-CAL4	dzuData_07302020@093	NA	07/28/20 12:57
1	SIG0420-CAL5	dzuData_07302020@093	NA	07/28/20 13:18
5	SIG0420-CAL6	dzuData_07302020@093	NA	07/28/20 13:45
2	SIG0420-CAL7	dzuData_07302020@093	NA	07/28/20 14:08
1	SIG0420-CAL8	dzuData_07302020@093	NA	07/28/20 14:31
1	SIG0420-ICV1	dzuData_07302020@093	NA	07/28/20 14:51
1	SIG0420-ICB1	dzuData_07302020@093	NA	07/28/20 15:09
1	SIG0420-IFA1	dzuData_07302020@093	NA	07/28/20 15:34
1	SIG0420-CCV2	dzuData_07302020@093	NA	07/29/20 00:06
1	SIG0420-CCB2	dzuData_07302020@093	NA	07/29/20 00:28
1	SIG0420-CCV3	dzuData_07302020@093	NA	07/29/20 04:41
1	SIG0420-CCB3	dzuData_07302020@093	NA	07/29/20 05:15
1	SIG0420-CCV4	dzuData_07302020@093	NA	07/29/20 09:19
1	SIG0420-CCB4	dzuData_07302020@093	NA	07/29/20 09:44
MRL Check	BIG0584-MRL1	dzuData_07302020@093	Water	07/29/20 11:22
Blank	BIG0584-BLK1	dzuData_07302020@093	Water	07/29/20 11:39
LCS	BIG0584-BS1	dzuData_07302020@093	Water	07/29/20 11:57
SP-30-072020	20G0250-01	dzuData_07302020@093	Water	07/29/20 12:23
SP-34-072120	20G0250-02	dzuData_07302020@093	Water	07/29/20 12:40
SP-40-072120	20G0250-03	dzuData_07302020@093	Water	07/29/20 13:02
SP-32-072120	20G0250-04	dzuData_07302020@093	Water	07/29/20 13:23
1	SIG0420-CCV5	dzuData_07302020@093	NA	07/29/20 13:41
1	SIG0420-CCB5	dzuData_07302020@093	NA	07/29/20 14:10
SP-26-072220	20G0250-05	dzuData_07302020@093	Water	07/29/20 14:27
SP-126-072220	20G0250-06	dzuData_07302020@093	Water	07/29/20 14:53
Field-Blank-072220	20G0250-07	dzuData_07302020@093	Water	07/29/20 15:14
SW-TP3-East1-072220	20G0250-08	dzuData_07302020@093	Water	07/29/20 15:36

Analytical Resources, Incorporated
Analytical Chemists and Consultants

ANALYSIS BATCH (SEQUENCE) SUMMARY

SM 5310 B-00

Laboratory: Analytical Resources, Inc.
SDG: 20G0250
Client: Floyd - Snider
Project: Rio Tinto Holden Mine Reclamation/Remediation
Sequence: SIG0420
Instrument: TOC-LCSH
Calibration: DG00086

Sample Name	Lab Sample ID	Lab File ID	Matrix	Analysis Date/Time
SW-TP3-East1-072220	BIG0584-DUP1	dzuData_07302020@093	Water	07/29/20 15:54
SW-TP3-East1-072220	BIG0584-DUP1	dzuData_07302020@093	Water	07/29/20 15:54
SW-TP3-East1-072220	BIG0584-MS1	dzuData_07302020@093	Water	07/29/20 16:20
SW-TP3-East1-072220	BIG0584-MS1	dzuData_07302020@093	Water	07/29/20 16:20
SW-TP3-East1-072220	BIG0584-MSD1	dzuData_07302020@093	Water	07/29/20 16:38
SW-TP3-East1-072220	BIG0584-MSD1	dzuData_07302020@093	Water	07/29/20 16:38
SW-TP3-East2-072220	20G0250-09	dzuData_07302020@093	Water	07/29/20 17:04
1	SIG0420-CCV6	dzuData_07302020@093	NA	07/29/20 17:49
1	SIG0420-CCB6	dzuData_07302020@093	NA	07/29/20 18:13

ANALYSIS BATCH (SEQUENCE) SUMMARY

SM 5310 B-00

Laboratory: Analytical Resources, Inc.
SDG: 20G0250
Client: Floyd - Snider
Project: Rio Tinto Holden Mine Reclamation/Remediation
Sequence: SIG0433
Instrument: TOC-LCSH
Calibration: DG00092

Sample Name	Lab Sample ID	Lab File ID	Matrix	Analysis Date/Time
1	SIG0433-CAL1	adzuData_07312020@091	NA	07/30/20 16:15
10	SIG0433-CAL2	adzuData_07312020@091	NA	07/30/20 16:33
5	SIG0433-CAL3	adzuData_07312020@091	NA	07/30/20 17:01
2	SIG0433-CAL4	adzuData_07312020@091	NA	07/30/20 17:18
1	SIG0433-CAL5	adzuData_07312020@091	NA	07/30/20 17:35
5	SIG0433-CAL6	adzuData_07312020@091	NA	07/30/20 17:54
2	SIG0433-CAL7	adzuData_07312020@091	NA	07/30/20 18:25
1	SIG0433-CAL8	adzuData_07312020@091	NA	07/30/20 18:47
1	SIG0433-ICV1	adzuData_07312020@091	NA	07/30/20 19:06
1	SIG0433-ICB1	adzuData_07312020@091	NA	07/30/20 19:31
1	SIG0433-IFA1	adzuData_07312020@091	NA	07/30/20 19:49
MRL Check	BIG0582-MRL2	adzuData_07312020@091	Water	07/30/20 20:06
Blank	BIG0582-BLK2	adzuData_07312020@091	Water	07/30/20 20:31
LCS	BIG0582-BS2	adzuData_07312020@091	Water	07/30/20 20:49
SW-TP3-East1-072220	20G0250-08RE1	adzuData_07312020@091	Water	07/30/20 21:07
SW-TP3-East1-072220	BIG0582-DUP2	adzuData_07312020@091	Water	07/30/20 21:26
SW-TP3-East1-072220	BIG0582-MS2	adzuData_07312020@091	Water	07/30/20 21:55
SW-TP3-East1-072220	BIG0582-MSD2	adzuData_07312020@091	Water	07/30/20 22:21
SW-TP3-East2-072220	20G0250-09RE1	adzuData_07312020@091	Water	07/30/20 22:39
1	SIG0433-CCV1	adzuData_07312020@091	NA	07/30/20 23:30
1	SIG0433-CCB1	adzuData_07312020@091	NA	07/30/20 23:55
1	SIG0433-CCV2	adzuData_07312020@091	NA	07/31/20 04:11
1	SIG0433-CCB2	adzuData_07312020@091	NA	07/31/20 04:36
1	SIG0433-CCV3	adzuData_07312020@091	NA	07/31/20 07:02
1	SIG0433-CCB3	adzuData_07312020@091	NA	07/31/20 07:23

INITIAL CALIBRATION DATA

SM 5310 B-00

Laboratory: Analytical Resources, Inc.
SDG: 20G0250
Client: Floyd - Snider
Project: Rio Tinto Holden Mine Reclamation/Remediat
Calibration: DG00086
Instrument: TOC-LCSH
Calibration Date: 07/28/2020 11:45

Compound	Level 01		Level 02		Level 03		Level 04		Level 05		Level 06	
		RF		RF		RF		RF		RF		RF
Dissolved Organic Carbon, Dissolved	0	0	0.50002	9.173633	1	9.156	2.5001	8.49166	5.0002	8.209671	10	7.732
Total Organic Carbon	0	0	0.50002	9.173633	1	9.156	2.5001	8.49166	5.0002	8.209671	10	7.732

INITIAL CALIBRATION DATA

SM 5310 B-00

Laboratory:	Analytical Resources, Inc.	SDG:	20G0250
Client:	Floyd - Snider	Project:	Rio Tinto Holden Mine Reclamation/Remediat
Calibration:	DG00086	Instrument:	TOC-LCSH
Calibration Date:	07/28/2020 11:45		

Compound	Level 07		Level 08		Level 09		Level 10		Level 11		Level 12	
		RF		RF		RF		RF		RF		RF
Dissolved Organic Carbon, Dissolved	25.001	8.391665	50.002	8.25367								
Total Organic Carbon	25.001	8.391665	50.002	8.25367								

INITIAL CALIBRATION DATA

SM 5310 B-00

Laboratory:	Analytical Resources, Inc.	SDG:	20G0250
Client:	Floyd - Snider	Project:	Rio Tinto Holden Mine Reclamation/Remediat
Calibration:	DG00086	Instrument:	TOC-LCSH
Calibration Date:	07/28/2020 11:45		

COMPOUND	Mean RF	RF RSD	Linear COD	Quad COD	COD Limit	Q
Dissolved Organic Carbon, Dissolved	7.426037	40.9	0.9997			
Total Organic Carbon	7.426037	40.9	0.9997			

INITIAL CALIBRATION DATA

SM 5310 B-00

Laboratory:	Analytical Resources, Inc.	SDG:	20G0250
Client:	Floyd - Snider	Project:	Rio Tinto Holden Mine Reclamation/Remediat
Calibration:	DG00092	Instrument:	TOC-LCSH
Calibration Date:	07/30/2020 11:08		

Compound	Level 01		Level 02		Level 03		Level 04		Level 05		Level 06	
		RF		RF		RF		RF		RF		RF
Total Organic Carbon	0.4999	9.04981	0.9998	9.369874	2.4995	9.341868	4.999	9.111822	9.998	8.712743	24.995	9.117824

INITIAL CALIBRATION DATA

SM 5310 B-00

Laboratory:	Analytical Resources, Inc.	SDG:	20G0250
Client:	Floyd - Snider	Project:	Rio Tinto Holden Mine Reclamation/Remediat
Calibration:	DG00092	Instrument:	TOC-LCSH
Calibration Date:	07/30/2020 11:08		

Compound	Level 07		Level 08		Level 09		Level 10		Level 11		Level 12	
		RF		RF		RF		RF		RF		RF
Total Organic Carbon	49.99	9.579916										

INITIAL CALIBRATION DATA

SM 5310 B-00

Laboratory:	Analytical Resources, Inc.	SDG:	20G0250
Client:	Floyd - Snider	Project:	Rio Tinto Holden Mine Reclamation/Remediat
Calibration:	DG00092	Instrument:	TOC-LCSH
Calibration Date:	07/30/2020 11:08		

COMPOUND	Mean RF	RF RSD	Linear COD	Quad COD	COD Limit	Q
Total Organic Carbon	9.183408	3.0	0.9993			

INSTRUMENT BLANKS
SM 5310 B-00

Laboratory: Analytical Resources, Inc.
SDG: 20G0250
Client: Floyd - Snider
Project: Rio Tinto Holden Mine Reclamation/R
Instrument ID: TOC-LCSH
Calibration: DG00086
Sequence: SIG0420
Date Analyzed: 07/28/20 15:09

Lab Sample ID	Analyte	Found	MDL	MRL	Units	C
SIG0420-ICB1	Total Organic Carbon	0.33	0.5	0.50	mg/L	
SIG0420-ICB1	Dissolved Organic Carbon (dissolve	0.33	0.5	0.50	mg/L	
SIG0420-CCB2	Total Organic Carbon	0.25	0.5	0.50	mg/L	
SIG0420-CCB2	Dissolved Organic Carbon (dissolve	0.25	0.5	0.50	mg/L	
SIG0420-CCB3	Total Organic Carbon	0.23	0.5	0.50	mg/L	
SIG0420-CCB3	Dissolved Organic Carbon (dissolve	0.23	0.5	0.50	mg/L	
SIG0420-CCB4	Total Organic Carbon	0.21	0.5	0.50	mg/L	
SIG0420-CCB4	Dissolved Organic Carbon (dissolve	0.21	0.5	0.50	mg/L	
SIG0420-CCB5	Total Organic Carbon	0.21	0.5	0.50	mg/L	
SIG0420-CCB5	Dissolved Organic Carbon (dissolve	0.21	0.5	0.50	mg/L	
SIG0420-CCB6	Total Organic Carbon	0.21	0.5	0.50	mg/L	
SIG0420-CCB6	Dissolved Organic Carbon (dissolve	0.21	0.5	0.50	mg/L	

INSTRUMENT BLANKS
SM 5310 B-00

Laboratory: Analytical Resources, Inc.
SDG: 20G0250
Client: Floyd - Snider
Project: Rio Tinto Holden Mine Reclamation/R
Instrument ID: TOC-LCSH
Calibration: DG00092
Sequence: SIG0433
Date Analyzed: 07/30/20 19:31

Lab Sample ID	Analyte	Found	MDL	MRL	Units	C
SIG0433-ICB1	Total Organic Carbon	0.39	0.5	0.50	mg/L	
SIG0433-CCB1	Total Organic Carbon	0.46	0.5	0.50	mg/L	
SIG0433-CCB2	Total Organic Carbon	0.36	0.5	0.50	mg/L	
SIG0433-CCB3	Total Organic Carbon	0.40	0.5	0.50	mg/L	

INITIAL AND CONTINUING CALIBRATION CHECK

SM 5310 B-00

Laboratory: Analytical Resources, Inc.
SDG: 20G0250
Client: Floyd - Snider
Project: Rio Tinto Holden Mine Reclamation/Remediation
Instrument ID: TOC-LCSH
Calibration: DG00086
Control Limt: +/- 10.00%
Sequence: SIG0420

Lab Sample ID	Analyte	True	Found	%R	Units	Method
SIG0420-ICV1	Dissolved Organic Carbon	20.000	21.89	109	mg/L	SM 5310 B-00
	Total Organic Carbon	20.000	21.89	109	mg/L	SM 5310 B-00
SIG0420-CCV2	Dissolved Organic Carbon	20.000	20.96	105	mg/L	SM 5310 B-00
	Total Organic Carbon	20.000	20.96	105	mg/L	SM 5310 B-00
SIG0420-CCV3	Dissolved Organic Carbon	20.000	21.28	106	mg/L	SM 5310 B-00
	Total Organic Carbon	20.000	21.28	106	mg/L	SM 5310 B-00
SIG0420-CCV4	Dissolved Organic Carbon	20.000	21.27	106	mg/L	SM 5310 B-00
	Total Organic Carbon	20.000	21.27	106	mg/L	SM 5310 B-00
SIG0420-CCV5	Dissolved Organic Carbon	20.000	21.08	105	mg/L	SM 5310 B-00
	Total Organic Carbon	20.000	21.08	105	mg/L	SM 5310 B-00
SIG0420-CCV6	Dissolved Organic Carbon	20.000	21.51	108	mg/L	SM 5310 B-00
	Total Organic Carbon	20.000	21.51	108	mg/L	SM 5310 B-00

* Values outside of QC limits

INITIAL AND CONTINUING CALIBRATION CHECK

SM 5310 B-00

Laboratory: Analytical Resources, Inc.
SDG: 20G0250
Client: Floyd - Snider
Project: Rio Tinto Holden Mine Reclamation/Remediation
Instrument ID: TOC-LCSH
Calibration: DG00092
Control Limt: +/- 10.00%
Sequence: SIG0433

Lab Sample ID	Analyte	True	Found	%R	Units	Method
SIG0433-ICV1	Total Organic Carbon	20.000	19.17	95.9	mg/L	SM 5310 B-00
SIG0433-CCV1	Total Organic Carbon	20.000	18.94	94.7	mg/L	SM 5310 B-00
SIG0433-CCV2	Total Organic Carbon	20.000	18.81	94.1	mg/L	SM 5310 B-00
SIG0433-CCV3	Total Organic Carbon	20.000	18.72	93.6	mg/L	SM 5310 B-00

* Values outside of QC limits

HOLDING TIME SUMMARY

Analysis: SM 5310 B-00

Laboratory: Analytical Resources, Inc. SDG: 20G0250

Client: Floyd - Snider Project: Rio Tinto Holden Mine Reclamation/Remediation

Sample Name	Date Collected	Date Received	Date Prepared	Days to Prep	Max Days to Prep	Date Analyzed	Days to Analysis	Max Days to Analysis	Q
SP-30-072020 20G0250-01	07/20/20 17:50	07/24/20 12:36	07/27/20 11:00	6	28	07/29/20 12:23	9	28	
SP-34-072120 20G0250-02	07/21/20 12:20	07/24/20 12:36	07/27/20 11:00	5	28	07/29/20 12:40	8	28	
SP-40-072120 20G0250-03	07/21/20 13:18	07/24/20 12:36	07/27/20 11:00	5	28	07/29/20 13:02	8	28	
SP-32-072120 20G0250-04	07/21/20 13:25	07/24/20 12:36	07/27/20 11:00	5	28	07/29/20 13:23	8	28	
SP-26-072220 20G0250-05	07/22/20 09:37	07/24/20 12:36	07/27/20 11:00	5	28	07/29/20 14:27	7	28	
SP-126-072220 20G0250-06	07/22/20 09:42	07/24/20 12:36	07/27/20 11:00	5	28	07/29/20 14:53	7	28	
Field-Blank-072220 20G0250-07	07/22/20 10:55	07/24/20 12:36	07/27/20 11:00	5	28	07/29/20 15:14	7	28	
SW-TP3-East1-072220 20G0250-08	07/22/20 13:45	07/24/20 12:36	07/27/20 11:00	4	28	07/29/20 15:36	7	28	
SW-TP3-East1-072220 20G0250-08RE1	07/22/20 13:45	07/24/20 12:36	07/27/20 10:56	4	28	07/30/20 21:07	8	28	
SW-TP3-East2-072220 20G0250-09	07/22/20 15:00	07/24/20 12:36	07/27/20 11:00	4	28	07/29/20 17:04	7	28	
SW-TP3-East2-072220 20G0250-09RE1	07/22/20 15:00	07/24/20 12:36	07/27/20 10:56	4	28	07/30/20 22:39	8	28	
Duplicate BIG0582-DUP2	07/22/20 13:45	07/24/20 12:36	07/27/20 10:56	4	28	07/30/20 21:26	8	28	
Matrix Spike BIG0582-MS2	07/22/20 13:45	07/24/20 12:36	07/27/20 10:56	4	28	07/30/20 21:55	8	28	
Matrix Spike Dup BIG0582-MSD2	07/22/20 13:45	07/24/20 12:36	07/27/20 10:56	4	28	07/30/20 22:21	8	28	
Duplicate BIG0584-DUP1	07/22/20 13:45	07/24/20 12:36	07/27/20 11:00	4	28	07/29/20 15:54	7	28	
Matrix Spike BIG0584-MS1	07/22/20 13:45	07/24/20 12:36	07/27/20 11:00	4	28	07/29/20 16:20	7	28	
Matrix Spike Dup BIG0584-MSD1	07/22/20 13:45	07/24/20 12:36	07/27/20 11:00	4	28	07/29/20 16:38	7	28	

* Indicates hold time exceedance.

METHOD DETECTION AND REPORTING LIMITS

SM 5310 B-00

Laboratory: Analytical Resources, Inc.
SDG: 20G0250
Client: Floyd - Snider
Project: Rio Tinto Holden Mine Reclamation/Rem
Matrix: Water
Instrument: TOC-LCSH

Analyte	MDL	RL	Units
Dissolved Organic Carbon (dissolved)	0.50	0.50	mg/L
Total Organic Carbon	0.50	0.50	mg/L

Form I
INORGANIC ANALYSIS DATA SHEET
SM 2340 B-97

Total Metals

SP-30-072020

Laboratory:	Analytical Resources, Inc.				
Client:	Floyd - Snider				
Project:	Rio Tinto Holden Mine Reclamation/Remediation				
Matrix:	Water	Laboratory ID:	20G0250-01	SDG:	20G0250
Sampled:	07/20/20 17:50	Prepared:	07/30/20 08:11	File ID:	
% Solids:	0.00	Preparation:	[CALC]	Analyzed:	07/31/20 16:23
Batch:	[CALC]	Sequence:		Initial/Final:	1 / 1
Instrument:	[CALC]			Calibration:	

CAS NO.	Analyte	Concentration (mg/L CaCO3)	Dilution Factor	MDL	MRL	Q
	Hardness	10.3	1	0.00602	0.207	

Form I
INORGANIC ANALYSIS DATA SHEET
SM 2340 B-97

Total Metals

SP-34-072120

Laboratory:	Analytical Resources, Inc.				
Client:	Floyd - Snider				
Project:	Rio Tinto Holden Mine Reclamation/Remediation				
Matrix:	Water	Laboratory ID:	20G0250-02	SDG:	20G0250
Sampled:	07/21/20 12:20	Prepared:	07/30/20 08:11	File ID:	
% Solids:	0.00	Preparation:	[CALC]	Analyzed:	07/31/20 16:28
Batch:	[CALC]	Sequence:		Initial/Final:	1 / 1
Instrument:	[CALC]			Calibration:	

CAS NO.	Analyte	Concentration (mg/L CaCO3)	Dilution Factor	MDL	MRL	Q
	Hardness	11.3	1	0.00602	0.207	

Form I
INORGANIC ANALYSIS DATA SHEET
SM 2340 B-97

Total Metals

SP-40-072120

Laboratory:	Analytical Resources, Inc.				
Client:	Floyd - Snider				
Project:	Rio Tinto Holden Mine Reclamation/Remediation				
Matrix:	Water	Laboratory ID:	20G0250-03	SDG:	20G0250
Sampled:	07/21/20 13:18	Prepared:	07/30/20 08:11	File ID:	
% Solids:	0.00	Preparation:	[CALC]	Analyzed:	07/31/20 16:32
Batch:	[CALC]	Sequence:		Initial/Final:	1 / 1
Instrument:	[CALC]			Calibration:	

CAS NO.	Analyte	Concentration (mg/L CaCO3)	Dilution Factor	MDL	MRL	Q
	Hardness	15.8	1	0.00602	0.207	

Form I
INORGANIC ANALYSIS DATA SHEET
SM 2340 B-97

Total Metals

SP-32-072120

Laboratory:	Analytical Resources, Inc.				
Client:	Floyd - Snider				
Project:	Rio Tinto Holden Mine Reclamation/Remediation				
Matrix:	Water	Laboratory ID:	20G0250-04	SDG:	20G0250
Sampled:	07/21/20 13:25	Prepared:	07/30/20 08:11	File ID:	
% Solids:	0.00	Preparation:	[CALC]	Analyzed:	07/31/20 16:37
Batch:	[CALC]	Sequence:		Initial/Final:	1 / 1
Instrument:	[CALC]			Calibration:	

CAS NO.	Analyte	Concentration (mg/L CaCO3)	Dilution Factor	MDL	MRL	Q
	Hardness	16.0	1	0.00602	0.207	

Form I
INORGANIC ANALYSIS DATA SHEET
SM 2340 B-97

Total Metals

SP-26-072220

Laboratory:	Analytical Resources, Inc.				
Client:	Floyd - Snider				
Project:	Rio Tinto Holden Mine Reclamation/Remediation				
Matrix:	Water	Laboratory ID:	20G0250-05	SDG:	20G0250
Sampled:	07/22/20 09:37	Prepared:	07/30/20 08:11	File ID:	
% Solids:	0.00	Preparation:	[CALC]	Analyzed:	07/31/20 16:41
Batch:	[CALC]	Sequence:		Initial/Final:	1 / 1
Instrument:	[CALC]			Calibration:	

CAS NO.	Analyte	Concentration (mg/L CaCO3)	Dilution Factor	MDL	MRL	Q
	Hardness	29.6	1	0.00602	0.207	

Form I
INORGANIC ANALYSIS DATA SHEET
SM 2340 B-97

Total Metals

SP-126-072220

Laboratory:	Analytical Resources, Inc.				
Client:	Floyd - Snider				
Project:	Rio Tinto Holden Mine Reclamation/Remediation				
Matrix:	Water	Laboratory ID:	20G0250-06	SDG:	20G0250
Sampled:	07/22/20 09:42	Prepared:	07/30/20 08:11	File ID:	
% Solids:	0.00	Preparation:	[CALC]	Analyzed:	07/31/20 16:46
Batch:	[CALC]	Sequence:		Initial/Final:	1 / 1
Instrument:	[CALC]			Calibration:	

CAS NO.	Analyte	Concentration (mg/L CaCO3)	Dilution Factor	MDL	MRL	Q
	Hardness	30.1	1	0.00602	0.207	

Form I
INORGANIC ANALYSIS DATA SHEET
SM 2340 B-97

Total Metals

Field-Blank-072220

Laboratory:	Analytical Resources, Inc.				
Client:	Floyd - Snider				
Project:	Rio Tinto Holden Mine Reclamation/Remediation				
Matrix:	Water	Laboratory ID:	20G0250-07	SDG:	20G0250
Sampled:	07/22/20 10:55	Prepared:	07/30/20 08:11	File ID:	
% Solids:	0.00	Preparation:	[CALC]	Analyzed:	07/31/20 16:19
Batch:	[CALC]	Sequence:		Initial/Final:	1 / 1
Instrument:	[CALC]			Calibration:	

CAS NO.	Analyte	Concentration (mg/L CaCO3)	Dilution Factor	MDL	MRL	Q
	Hardness	<0.207	1	0.00602	0.207	U

Form I
INORGANIC ANALYSIS DATA SHEET
SM 2340 B-97

Total Metals

SW-TP3-East1-072220

Laboratory:	Analytical Resources, Inc.				
Client:	Floyd - Snider				
Project:	Rio Tinto Holden Mine Reclamation/Remediation				
Matrix:	Water	Laboratory ID:	20G0250-08	SDG:	20G0250
Sampled:	07/22/20 13:45	Prepared:	07/30/20 08:11	File ID:	
% Solids:	0.00	Preparation:	[CALC]	Analyzed:	07/31/20 15:35
Batch:	[CALC]	Sequence:		Initial/Final:	1 / 1
Instrument:	[CALC]			Calibration:	

CAS NO.	Analyte	Concentration (mg/L CaCO3)	Dilution Factor	MDL	MRL	Q
	Hardness	27.4	1	0.00602	0.207	

Form I
INORGANIC ANALYSIS DATA SHEET
SM 2340 B-97

Total Metals

SW-TP3-East2-072220

Laboratory:	Analytical Resources, Inc.				
Client:	Floyd - Snider				
Project:	Rio Tinto Holden Mine Reclamation/Remediation				
Matrix:	Water	Laboratory ID:	20G0250-09	SDG:	20G0250
Sampled:	07/22/20 15:00	Prepared:	07/30/20 08:11	File ID:	
% Solids:	0.00	Preparation:	[CALC]	Analyzed:	07/31/20 16:51
Batch:	[CALC]	Sequence:		Initial/Final:	1 / 1
Instrument:	[CALC]			Calibration:	

CAS NO.	Analyte	Concentration (mg/L CaCO3)	Dilution Factor	MDL	MRL	Q
	Hardness	83.5	5	0.0301	1.04	

HOLDING TIME SUMMARY

Analysis: SM 2340 B-97

Laboratory: Analytical Resources, Inc. SDG: 20G0250

Client: Floyd - Snider Project: Rio Tinto Holden Mine Reclamation/Remediation

Sample Name	Date Collected	Date Received	Date Prepared	Days to Prep	Max Days to Prep	Date Analyzed	Days to Analysis	Max Days to Analysis	Q
SP-30-072020 20G0250-01	07/20/20 17:50	07/24/20 12:36	07/30/20 08:11	9	180	07/31/20 16:23			
SP-34-072120 20G0250-02	07/21/20 12:20	07/24/20 12:36	07/30/20 08:11	8	180	07/31/20 16:28			
SP-40-072120 20G0250-03	07/21/20 13:18	07/24/20 12:36	07/30/20 08:11	8	180	07/31/20 16:32			
SP-32-072120 20G0250-04	07/21/20 13:25	07/24/20 12:36	07/30/20 08:11	8	180	07/31/20 16:37			
SP-26-072220 20G0250-05	07/22/20 09:37	07/24/20 12:36	07/30/20 08:11	7	180	07/31/20 16:41			
SP-126-072220 20G0250-06	07/22/20 09:42	07/24/20 12:36	07/30/20 08:11	7	180	07/31/20 16:46			
Field-Blank-072220 20G0250-07	07/22/20 10:55	07/24/20 12:36	07/30/20 08:11	7	180	07/31/20 16:19			
SW-TP3-East1-072220 20G0250-08	07/22/20 13:45	07/24/20 12:36	07/30/20 08:11	7	180	07/31/20 15:35			
SW-TP3-East2-072220 20G0250-09	07/22/20 15:00	07/24/20 12:36	07/30/20 08:11	7	180	07/31/20 16:51			

* Indicates hold time exceedance.

Holden Mine Site

Performance Standards Verification
2020 Annual Compliance Assessment Report

Appendix B
Summer and Fall 2020 Laboratory Reports

Attachment B.2
Fall 2020 Laboratory Reports

DRAFT

Analytical Resources, Incorporated
Analytical Chemists and Consultants

22 October 2020

Amanda McKay
Floyd - Snider
601 Union Street Two Union Square, Suite 600
Seattle, WA 98101-2341

RE: Rio Tinto Holden Mine Reclamation/Remediation

Please find enclosed sample receipt documentation and analytical results for samples from the project referenced above.

Sample analyses were performed according to ARI's Quality Assurance Plan and any provided project specific Quality Assurance Plan. Each analytical section of this report has been approved and reviewed by an analytical peer, the appropriate Laboratory Supervisor or qualified substitute, and a technical reviewer.

Should you have any questions or problems, please feel free to contact us at your convenience.

Associated Work Order(s)	Associated SDG ID(s)
20I0445	N/A

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed in the enclose Narrative. ARI, an accredited laboratory, certifies that the report results for which ARI is accredited meets all the requirements of the accrediting body. A list of certified analyses, accreditations, and expiration dates is included in this report.

Release of the data contained in this hardcopy data package has been authorized by the Laboratory Manager or his/her designee, as verified by the following signature.

Analytical Resources, Inc.



The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in it entirety.

ACCREDITED IN ACCORDANCE WITH nelac
Cert# 100006

PJLA Testing
Accreditation # 66169

4611 S. 134th Place, Suite 100 • Tukwila, WA 98168 • Ph: (206) 695-6200 • Fax: (206) 695-6202

Chain of Custody Record & Laboratory Analysis Request

ARI Assigned Number: 20I0445	Turn-around Requested: Standard	Date: 9/22/20	
ARI Client Company: Floyd Snider	Phone: 206-292-2078	Page: 1 of 11	
Client Contact: Amanda McKay or Pamela Osterhout		No. of Coolers: 26	Cooler Temps: See COC
Client Project Name: RT-Holden			
Client Project #: RT-Holden Task 5.4	Samplers: G.C., K.H., E.M., T.S., B.B., P.O., G.W., N.W.		

Analytical Resources, Incorporated
Analytical Chemists and Consultants
4611 South 134th Place, Suite 100
Tukwila, WA 98168
206-695-6200 206-695-6201 (fax)

Sample ID	Date	Time	Matrix	No. Containers	Total Metals Cations	Diss. Metals (FF)	Alkalinity (A2320)	TSS /TDS (SM2540D/C)	TOC (A5310B)	DOC (FF)	Anions (300.0)	Hardness (Calculate)	Notes/Comments
DS-5-092220	9/22/20	1125	GW	7	X	X	X	X	X	X	X	X	
Filter-Blank-092220	↓	1300	W	2		X				X			Run low level Cd
Field Blank-GW-092220		1315	W	7	X	X	X	X	X	X	X	X	Run low level Cd
NRC-3DR-GW-092220		1400	GW	6	X		X	X	X	X	X	X	
NRC-3IR-GW-092220		1400	GW	6	X		X	X	X	X	X	X	
NRC-3SR-GW-092220		1505	GW	6	X		X	X	X	X	X	X	
SG-7R-WP-092220		1605	GW	7	X	X	X	X	X	X	X	X	
SG-7-SW-092220	↓	1612	W	6	X		X	X	X	X	X	X	
SG-18-WP-36-092420	9/24/20	1500	GW	7 ~~8~~	X	X	X	X	X	X	X	X	
SG-18-WP-092420	↓	1400	GW	6 ~~7~~ 5C	X		X	X	X	X	X	X	

Comments/Special Instructions
- ~Metals by E6020A include Al, Cd, Cu, Fe, Pb, Zn, Mn, Ca, K, Mg, Na
- ~Anions: Chloride, sulfate and nitrate
- ~DOC and dissolved metals field filtered (FF) at 0.45 micron.
- ~If Cadmium is non-detect, run low-level analysis to PQL of 0.02 ug/L
- ~Alkalinity: report total, carbonate, bicarbonate and hydroxide.

	Relinquished by:	Received by:	Relinquished by:	Received by:
(Signature)				
Printed Name:	Gaha Cisneros	Jacobsen		
Company:	Floyd Snider	ARI		
Date & Time:	9/22/2 1310	09/28/20 1310		

Limits of Liability: *ARI will perform all requested services in accordance with appropriate methodology following ARI Standard Operating Procedures and the ARI Quality Assurance Program. This program meets standards for the industry. The total liability of ARI, its officers, agents, employees, or successors, arising out of or in connection with the requested services, shall not exceed the Invoiced amount for said services. The acceptance by the client of a proposal for services by ARI release ARI from any liability in excess thereof, not withstanding any provision to the contrary in any contract, purchase order or co-signed agreement between ARI and the Client.*

Sample Retention Policy: Unless specified by workorder or contract, all water/soil samples submitted to ARI will be discarded or returned, no sooner than 90 days after receipt or 60 days after submission of hardcopy data, whichever is longer. Sediment samples submitted under PSDDA/PSEP/SMS protocol will be stored frozen for up to one year and then discarded.

Chain of Custody Record & Laboratory Analysis Request

ARI Assigned Number: 20I0445	Turn-around Requested: Standard
ARI Client Company: Floyd Snider	Phone: 206-292-2078
Client Contact: Amanda McKay or Pamela Osterhout	
Client Project Name: RT-Holden	
Client Project #: RT-Holden Task 5.4	Samplers: G.C., K.H., E.M., T.S., B.B., P.O., G.W., N.W.

Date: 9/27/20
Page: 2 of 11
No. of Coolers: 2 Cooler Temps: See COC

Analytical Resources, Incorporated
Analytical Chemists and Consultants
4611 South 134th Place, Suite 100
Tukwila, WA 98168
206-695-6200 206-695-6201 (fax)

Sample ID	Date	Time	Matrix	No. Containers	Total Metals Cations	Diss. Metals (FF)	Alkalinity (A2320)	TSS /TDS (SM2540D/C)	TOC (A5310B)	DOC (FF)	Anions (300.0)	Hardness (Calculate)	Notes/Comments
DS-4S-GW-092320	9/23/20	1627	GW	6	X		X	X	X	X	X	X	
DS-4D-GW-092320	"	1520	GW	6	X		X	X	X	X	X	X	
DS-4I-GW-092320	"	1500	GW	12	X		X	X	X	X	X	X	MS/MSD
DS-3D-GW-092320	"	1330	GW	6	X		X	X	X	X	X	X	
DS-3S-GW-092320	"	1355	GW	6	X		X	X	X	X	X	X	
DS-18S-GW-092320	"	1515	GW	6	X		X	X	X	X	X	X	
DS-17S-GW-092320	"	1230	GW	6	X		X	X	X	X	X	X	
DS-17I-GW-092320	"	1400	GW	6	X		X	X	X	X	X	X	
DS-15S-GW-092320	"	0840	GW	6	X		X	X	X	X	X	X	
DS-16S-GW-092320	"	1100	GW	6	X		X	X	X	X	X	X	

Comments/Special Instructions
- Metals by E6020A include Al, Cd, Cu, Fe, Pb, Zn, Mn, Ca, K, Mg, Na
- Anions: Chloride, sulfate and nitrate
- DOC and dissolved metals field filtered (FF) at 0.45 micron.
- If Cadmium is non-detect, run low-level analysis to PQL of 0.02 ug/L
- Alkalinity: report total, carbonate, bicarbonate and hydroxide.

	Relinquished by:	Received by:	Relinquished by:	Received by:
(Signature)				
Printed Name:	Gabe Cisneros	Jacobsen		
Company:	Floyd|Snider	ARI		
Date & Time:	9/28/20 1310	09/28/20 1310		

Limits of Liability: *ARI will perform all requested services in accordance with appropriate methodology following ARI Standard Operating Procedures and the ARI Quality Assurance Program. This program meets standards for the industry. The total liability of ARI, its officers, agents, employees, or successors, arising out of or in connection with the requested services, shall not exceed the Invoiced amount for said services. The acceptance by the client of a proposal for services by ARI release ARI from any liability in excess thereof, not withstanding any provision to the contrary in any contract, purchase order or co-signed agreement between ARI and the Client.*

Sample Retention Policy: Unless specified by workorder or contract, all water/soil samples submitted to ARI will be discarded or returned, no sooner than 90 days after receipt or 60 days after submission of hardcopy data, whichever is longer. Sediment samples submitted under PSDDA/PSEP/SMS protocol will be stored frozen for up to one year and then discarded.

Chain of Custody Record & Laboratory Analysis Request

ARI Assigned Number: 20I0445	Turn-around Requested: Standard	Date: 9/27/20	
ARI Client Company: Floyd Snider	Phone: 206-292-2078	Page: 3 of 11	
Client Contact: Amanda McKay or Pamela Osterhout		No. of Coolers: 26	Cooler Temps: See CRF
Client Project Name: RT-Holden			
Client Project #: RT-Holden Task 5.4	Samplers: G.C., K.H., E.M., T.S., B.B., P.O., G.W., N.W.		

Analytical Resources, Incorporated
Analytical Chemists and Consultants
4611 South 134th Place, Suite 100
Tukwila, WA 98168
206-695-6200 206-695-6201 (fax)

Sample ID	Date	Time	Matrix	No. Containers	Total Metals Cations	Diss. Metals (FF)	Alkalinity (A2320)	TSS /TDS (SM2540D/C)	TOC (A5310B)	DOC (FF)	Anions (300.0)	Hardness (Calculate)	Notes/Comments
DS-9S-GW-092320	9/23	0925	GW	6	X		X	X	X	X	X	X	
DS-9I-GW-092320		0950	GW	6	X		X	X	X	X	X	X	
DS-9D-GW-092320		1035	GW	6	X		X	X	X	X	X	X	
DS-18D-GW-092320		1600	GW	6	X		X	X	X	X	X	X	
DS-18I-GW-092320		1330	GW	6	X		X	X	X	X	X	X	
DS-16D-GW-092320		1215	GW	6	X		X	X	X	X	X	X	
DS-15I-GW-092320		0830	GW	6	X		X	X	X	X	X	X	
DS-16I-GW-092320		1050	GW	6	X		X	X	X	X	X	X	
DS-16I DD-GW-092320		1050	GW	6	X		X	X	X	X	X	X	
RC-5A-SW-092320	"	1500	W	6	X		X	X	X	X	X	X	

Comments/Special Instructions
- ~Metals by E6020A include Al, Cd, Cu, Fe, Pb, Zn, Mn, Ca, K, Mg, Na
- ~Anions: Chloride, sulfate and nitrate
- ~DOC and dissolved metals field filtered (FF) at 0.45 micron.
- ~If Cadmium is non-detect, run low-level analysis to PQL of 0.02 ug/L
- ~Alkalinity: report total, carbonate, bicarbonate and hydroxide.

	Relinquished by:	Received by:	Relinquished by:	Received by:
(Signature)				
Printed Name:	Gabe Cisneros	Jessica Walter		
Company:	Floyd Snider	AR		
Date & Time:	9/28/20 1310	09/28/2020 1310		

Limits of Liability: *ARI will perform all requested services in accordance with appropriate methodology following ARI Standard Operating Procedures and the ARI Quality Assurance Program. This program meets standards for the industry. The total liability of ARI, its officers, agents, employees, or successors, arising out of or in connection with the requested services, shall not exceed the Invoiced amount for said services. The acceptance by the client of a proposal for services by ARI release ARI from any liability in excess thereof, not withstanding any provision to the contrary in any contract, purchase order or co-signed agreement between ARI and the Client.*

Sample Retention Policy: Unless specified by workorder or contract, all water/soil samples submitted to ARI will be discarded or returned, no sooner than 90 days after receipt or 60 days after submission of hardcopy data, whichever is longer. Sediment samples submitted under PSDDA/PSEP/SMS protocol will be stored frozen for up to one year and then discarded.

Chain of Custody Record & Laboratory Analysis Request

ARI Assigned Number: 2070445	Turn-around Requested: Standard	Date: 9/27/20	
ARI Client Company: Floyd Snider	Phone: 206-292-2078	Page: 3 of 11	
Client Contact: Amanda McKay or Pamela Osterhout		No. of Coolers: 26	Cooler Temps: See CRF
Client Project Name: RT-Holden			
Client Project #: RT-Holden Task 5.4	Samplers: G.C., K.H., E.M., T.S., B.B., P.O., G.W., N.W.		

Analytical Resources, Incorporated
Analytical Chemists and Consultants
4611 South 134th Place, Suite 100
Tukwila, WA 98168
206-695-6200 206-695-6201 (fax)

Sample ID	Date	Time	Matrix	No. Containers	Total Metals Cations	Diss. Metals (FF)	Alkalinity (A2320)	TSS /TDS (SM2540D/C)	TOC (A5310B)	DOC (FF)	Anions (300.0)	Hardness (Calculate)	Notes/Comments
					Analysis Requested								
SG-11-WP-092320	9/23	1430	GW	6	X		X	X	X	X	X	X	
SG-11-PW-12-092320		1512	GW	6	X		X	X	X	X	X	X	
SG-11-WP-36-092320		1612	GW	6	X		X	X	X	X	X	X	
SG-11-PW-6-092320		1409	GW	6	X		X	X	X	X	X	X	
SG-18-PW-6-092420	9/24	1559	GW	6	X		X	X	X	X	X	X	
SG-18-PW-12-092420		1501	GW	6	X		X	X	X	X	X	X	
MW-3-GW-092420		1440	GW	12	X		X	X	X	X	X	X	MS MSD
MW-2-GW-092420		1500	GW	6	X		X	X	X	X	X	X	
MW-102-GW-092420		1510	GW	6	X		X	X	X	X	X	X	
MW-1-GW-092420		1610	GW	6	X		X	X	X	X	X	X	

Comments/Special Instructions
~Metals by E6020A include Al, Cd, Cu, Fe, Pb, Zn, Mn, Ca, K, Mg, Na
~Anions: Chloride, sulfate and nitrate
~DOC and dissolved metals field filtered (FF) at 0.45 micron.
~If Cadmium is non-detect, run low-level analysis to PQL of 0.02 ug/L
~Alkalinity: report total, carbonate, bicarbonate and hydroxide.

Relinquished by: (Signature)	Received by: (Signature)	Relinquished by: (Signature)	Received by: (Signature)
Printed Name: Gabe Cisneros	Printed Name: Jamie Walter	Printed Name:	Printed Name:
Company: Floyd Snider	Company: ARI	Company:	Company:
Date & Time: 9/28/20 1310	Date & Time: 09/28/2020 1310	Date & Time:	Date & Time:

Limits of Liability: *ARI will perform all requested services in accordance with appropriate methodology following ARI Standard Operating Procedures and the ARI Quality Assurance Program. This program meets standards for the industry. The total liability of ARI, its officers, agents, employees, or successors, arising out of or in connection with the requested services, shall not exceed the Invoiced amount for said services. The acceptance by the client of a proposal for services by ARI release ARI from any liability in excess thereof, not withstanding any provision to the contrary in any contract, purchase order or co-signed agreement between ARI and the Client.*

Sample Retention Policy: Unless specified by workorder or contract, all water/soil samples submitted to ARI will be discarded or returned, no sooner than 90 days after receipt or 60 days after submission of hardcopy data, whichever is longer. Sediment samples submitted under PSDDA/PSEP/SMS protocol will be stored frozen for up to one year and then discarded.

Chain of Custody Record & Laboratory Analysis Request

ARI Assigned Number: 20I0445	Turn-around Requested: Standard	Date: 9/27/20	
ARI Client Company: Floyd Snider	Phone: 206-292-2078	Page: 5 of 11	
Client Contact: Amanda McKay or Pamela Osterhout		No. of Coolers: 2	Cooler Temps: See CRF
Client Project Name: RT-Holden			
Client Project #: RT-Holden Task 5.4	Samplers: G.C., K.H., E.M., T.S., B.B., P.O., G.W., N.W.		

Analytical Resources, Incorporated
Analytical Chemists and Consultants
4611 South 134th Place, Suite 100
Tukwila, WA 98168
206-695-6200 206-695-6201 (fax)

Sample ID	Date	Time	Matrix	No. Containers	Total Metals Cations	Diss. Metals (FF)	Alkalinity (A2320)	TSS /TDS (SM2540D/C)	TOC (A5310B)	DOC (FF)	Anions (300.0)	Hardness (Calculate)	Notes/Comments
TP3-12D-GW-092420	9/24	1450	GW	6	X		X	X	X	X	X	X	
HV-3-GW-092420	9/24	1630	GW	6	X		X	X	X	X	X	X	
SG-10-PW-6-092520	9/25	0919	GW	6	X		X	X	X	X	X	X	
SG-10-PW-12-092520	9/25	1017	GW	6	X		X	X	X	X	X	X	
SG-10-WP-36-092520		1030	GW	6	X		X	X	X	X	X	X	
SG-10-WP-092520		0930	GW	6	X		X	X	X	X	X	X	
SG-17-PW-6-092520		1119	GW	6	X		X	X	X	X	X	X	
SG-17-PW-12-092520		1219	GW	6	X		X	X	X	X	X	X	
SG-17-WP-092520		1200	GW	6	X		X	X	X	X	X	X	
SG-17-WP-36-092520	↓	1348	GW	1	X							X	added per Pamela O's email 09/28/20 TF

Comments/Special Instructions

-Metals by E6020A include Al, Cd, Cu, Fe, Pb, Zn, Mn, Ca, K, Mg, Na
-Anions: Chloride, sulfate and nitrate
-DOC and dissolved metals field filtered (FF) at 0.45 micron.
-If Cadmium is non-detect, run low-level analysis to PQL of 0.02 ug/L
-Alkalinity: report total, carbonate, bicarbonate and hydroxide.

	Relinquished by:	Received by:	Relinquished by:	Received by:
(Signature)				
Printed Name:	Gabriel Cisneros	Jacob Smith		
Company:	Floyd Snider	ARI		
Date & Time:	9/28/20 1310	9/28/2020 0800		

Limits of Liability: *ARI will perform all requested services in accordance with appropriate methodology following ARI Standard Operating Procedures and the ARI Quality Assurance Program. This program meets standards for the industry. The total liability of ARI, its officers, agents, employees, or successors, arising out of or in connection with the requested services, shall not exceed the invoiced amount for said services. The acceptance by the client of a proposal for services by ARI release ARI from any liability in excess thereof, not withstanding any provision to the contrary in any contract, purchase order or co-signed agreement between ARI and the Client.*

Sample Retention Policy: Unless specified by workorder or contract, all water/soil samples submitted to ARI will be discarded or returned, no sooner than 90 days after receipt or 60 days after submission of hardcopy data, whichever is longer. Sediment samples submitted under PSDDA/PSEP/SMS protocol will be stored frozen for up to one year and then discarded.

Chain of Custody Record & Laboratory Analysis Request

ARI Assigned Number: 20I0445	Turn-around Requested: Standard	Date: 9/27/11	
ARI Client Company: Floyd Snider	Phone: 206-292-2078	Page: 6 of 11	
Client Contact: Amanda McKay or Pamela Osterhout		No. of Coolers: 26	Cooler Temps: See CR F
Client Project Name: RT-Holden			
Client Project #: RT-Holden Task 5.4	Samplers: G.C., K.H., E.M., T.S., B.B., P.O., G.W., N.W.		

Analytical Resources, Incorporated
Analytical Chemists and Consultants
4611 South 134th Place, Suite 100
Tukwila, WA 98168
206-695-6200 206-695-6201 (fax)

Sample ID	Date	Time	Matrix	No. Containers	Analysis Requested: Total Metals Cations	Diss. Metals (FF)	Alkalinity (A2320)	TSS /TDS (SM2540D/C)	TOC (A5310B)	DOC (FF)	Anions (300.0)	Hardness (Calculate)	Notes/Comments
TP2-12D-GW-092520	9/25	1230	GW	6	X		X	X	X	X	X	X	
TP2-13D-GW-092520		0900	GW	6	X		X	X	X	X	X	X	
FieldBlank1-GW-092520		0820	W	6	X		X	X	X	X	X	X	Run Low level Cd
TP2-15-GW-092520		1230	GW	6	X		X	X	X	X	X	X	
TP3-13-GW-092520		0915	GW	6	X		X	X	X	X	X	X	
DS-12D-GW-092520		1355	GW	6	X		X	X	X	X	X	X	
DS-13I-GW-092520		1225	GW	6	X		X	X	X	X	X	X	
DS-113I-GW-092520		1235	GW	6	X		X	X	X	X	X	X	
DS-12I-GW-092520		1350	GW	6	X		X	X	X	X	X	X	
DS-13S-GW-092520	↓	1035	GW	12	X		X	X	X	X	X	X	MS/MSD

Comments/Special Instructions

-Metals by E6020A include Al, Cd, Cu, Fe, Pb, Zn, Mn, Ca, K, Mg, Na
-Anions: Chloride, sulfate and nitrate
-DOC and dissolved metals field filtered (FF) at 0.45 micron.
-If Cadmium is non-detect, run low-level analysis to PQL of 0.02 ug/L
-Alkalinity: report total, carbonate, bicarbonate and hydroxide.

	Relinquished by:	Received by:	Relinquished by:	Received by:
(Signature)				
Printed Name:	Gabe Cisneros	Sandra Hale		
Company:	Floyd Snider	ARI		
Date & Time:	9/28/20 1310	09/28/2020 1310		

Limits of Liability: *ARI will perform all requested services in accordance with appropriate methodology following ARI Standard Operating Procedures and the ARI Quality Assurance Program. This program meets standards for the industry. The total liability of ARI, its officers, agents, employees, or successors, arising out of or in connection with the requested services, shall not exceed the invoiced amount for said services. The acceptance by the client of a proposal for services by ARI release ARI from any liability in excess thereof, not withstanding any provision to the contrary in any contract, purchase order or co-signed agreement between ARI and the Client.*

Sample Retention Policy: Unless specified by workorder or contract, all water/soil samples submitted to ARI will be discarded or returned, no sooner than 90 days after receipt or 60 days after submission of hardcopy data, whichever is longer. Sediment samples submitted under PSDDA/PSEP/SMS protocol will be stored frozen for up to one year and then discarded.

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
DS-5-092220	20I0445-01	Water	22-Sep-2020 11:25	28-Sep-2020 13:10
DS-5-092220	20I0445-02	Water	22-Sep-2020 11:25	28-Sep-2020 13:10
Filter-Blank-092220	20I0445-03	Water	22-Sep-2020 13:00	28-Sep-2020 13:10
Field Blank-GW-092220	20I0445-04	Water	22-Sep-2020 13:15	28-Sep-2020 13:10
Field Blank-GW-092220	20I0445-05	Water	22-Sep-2020 13:15	28-Sep-2020 13:10
NRC-3DR-GW-092220	20I0445-06	Water	22-Sep-2020 14:00	28-Sep-2020 13:10
NRC-3IR-GW-092220	20I0445-07	Water	22-Sep-2020 14:00	28-Sep-2020 13:10
NRC-3SR-GW-092220	20I0445-08	Water	22-Sep-2020 15:05	28-Sep-2020 13:10
SG-7R-WP-092220	20I0445-09	Water	22-Sep-2020 16:05	28-Sep-2020 13:10
SG-7R-WP-092220	20I0445-10	Water	22-Sep-2020 16:05	28-Sep-2020 13:10
SG-7-SW-092220	20I0445-11	Water	22-Sep-2020 16:12	28-Sep-2020 13:10
SG-18-WP-36-092420	20I0445-12	Water	24-Sep-2020 15:00	28-Sep-2020 13:10
SG-18-WP-36-092420	20I0445-13	Water	24-Sep-2020 15:00	28-Sep-2020 13:10
SG-18-WP-092420	20I0445-14	Water	24-Sep-2020 14:00	28-Sep-2020 13:10
DS-4S-GW-092320	20I0445-15	Water	23-Sep-2020 16:27	28-Sep-2020 13:10
DS-4D-GW-092320	20I0445-16	Water	23-Sep-2020 15:20	28-Sep-2020 13:10
DS-4I-GW-092320	20I0445-17	Water	23-Sep-2020 15:00	28-Sep-2020 13:10
DS-3D-GW-092320	20I0445-18	Water	23-Sep-2020 13:30	28-Sep-2020 13:10
DS-3S-GW-092320	20I0445-19	Water	23-Sep-2020 13:55	28-Sep-2020 13:10
DS-18S-GW-092320	20I0445-20	Water	23-Sep-2020 15:15	28-Sep-2020 13:10
DS-17S-GW-092320	20I0445-21	Water	23-Sep-2020 12:30	28-Sep-2020 13:10
DS-17I-GW-092320	20I0445-22	Water	23-Sep-2020 14:00	28-Sep-2020 13:10
DS-15S-GW-092320	20I0445-23	Water	23-Sep-2020 08:40	28-Sep-2020 13:10
DS-16S-GW-092320	20I0445-24	Water	23-Sep-2020 11:00	28-Sep-2020 13:10
DS-9S-GW-092320	20I0445-25	Water	23-Sep-2020 09:25	28-Sep-2020 13:10
DS-9I-GW-092320	20I0445-26	Water	23-Sep-2020 09:50	28-Sep-2020 13:10
DS-9D-GW-092320	20I0445-27	Water	23-Sep-2020 10:35	28-Sep-2020 13:10
DS-18D-GW-092320	20I0445-28	Water	23-Sep-2020 16:00	28-Sep-2020 13:10
DS-18I-GW-092320	20I0445-29	Water	23-Sep-2020 13:30	28-Sep-2020 13:10
DS-16D-GW-092320	20I0445-30	Water	23-Sep-2020 12:15	28-Sep-2020 13:10
DS-15I-GW-092320	20I0445-31	Water	23-Sep-2020 08:30	28-Sep-2020 13:10
DS-16I-GW-092320	20I0445-32	Water	23-Sep-2020 10:50	28-Sep-2020 13:10
DS-16I-100-GW-092320	20I0445-33	Water	23-Sep-2020 10:50	28-Sep-2020 13:10
RC-5A-SW-092320	20I0445-34	Water	23-Sep-2020 15:00	28-Sep-2020 13:10
SG-11-WP-092320	20I0445-35	Water	23-Sep-2020 14:30	28-Sep-2020 13:10
SG-11-PW-12-092320	20I0445-36	Water	23-Sep-2020 15:12	28-Sep-2020 13:10
SG-11-WP-36-092320	20I0445-37	Water	23-Sep-2020 16:12	28-Sep-2020 13:10
SG-11-PW-6-092320	20I0445-38	Water	23-Sep-2020 14:09	28-Sep-2020 13:10
SG-18-PW-6-092420	20I0445-39	Water	24-Sep-2020 15:59	28-Sep-2020 13:10

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Floyd - Snider	Project:	Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number:	RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager:	Amanda McKay	22-Oct-2020 19:59

SG-18-PW-12-092420	20I0445-40	Water	24-Sep-2020 15:01	28-Sep-2020 13:10
MW-3-GW-092420	20I0445-41	Water	24-Sep-2020 14:40	28-Sep-2020 13:10
MW-2-GW-092420	20I0445-42	Water	24-Sep-2020 15:00	28-Sep-2020 13:10
MW-102-GW-092420	20I0445-43	Water	24-Sep-2020 15:10	28-Sep-2020 13:10
MW-1-GW-092420	20I0445-44	Water	24-Sep-2020 16:10	28-Sep-2020 13:10
TP3-12D-GW-092420	20I0445-45	Water	24-Sep-2020 14:50	28-Sep-2020 13:10
HV-3-GW-092420	20I0445-46	Water	24-Sep-2020 16:30	28-Sep-2020 13:10
SG-10-PW-6-092520	20I0445-47	Water	25-Sep-2020 09:19	28-Sep-2020 13:10
SG-10-PW-12-092520	20I0445-48	Water	25-Sep-2020 10:17	28-Sep-2020 13:10
SG-10-WP-36-092520	20I0445-49	Water	25-Sep-2020 10:30	28-Sep-2020 13:10
SG-10-WP-092520	20I0445-50	Water	25-Sep-2020 09:30	28-Sep-2020 13:10
SG-17-PW-6-092520	20I0445-51	Water	25-Sep-2020 11:19	28-Sep-2020 13:10
SG-17-PW-12-092520	20I0445-52	Water	25-Sep-2020 12:19	28-Sep-2020 13:10
SG-17-WP-092520	20I0445-53	Water	25-Sep-2020 12:00	28-Sep-2020 13:10
SG-17-WP-36-092520	20I0445-54	Water	25-Sep-2020 13:48	28-Sep-2020 13:10
TP2-12D-GW-092520	20I0445-55	Water	25-Sep-2020 12:30	28-Sep-2020 13:10
TP2-13D-GW-092520	20I0445-56	Water	25-Sep-2020 09:00	28-Sep-2020 13:10
Field Blank1-GW-092520	20I0445-57	Water	25-Sep-2020 08:20	28-Sep-2020 13:10
TP2-15-GW-092520	20I0445-58	Water	25-Sep-2020 12:30	28-Sep-2020 13:10
TP3-13-GW-092520	20I0445-59	Water	25-Sep-2020 09:15	28-Sep-2020 13:10
DS-12D-GW-092520	20I0445-60	Water	25-Sep-2020 13:55	28-Sep-2020 13:10
DS-13I-GW-092520	20I0445-61	Water	25-Sep-2020 12:25	28-Sep-2020 13:10
DS-113I-GW-092520	20I0445-62	Water	25-Sep-2020 12:35	28-Sep-2020 13:10
DS-12I-GW-092520	20I0445-63	Water	25-Sep-2020 13:50	28-Sep-2020 13:10
DS-13S-GW-092520	20I0445-64	Water	25-Sep-2020 10:35	28-Sep-2020 13:10

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

Work Order Case Narrative

Sample receipt

Samples as listed on the preceding page were received 9/28/20 under ARI work order 20I0445. For details regarding sample receipt, please refer to the Cooler Receipt Form.

Total and Dissolved Metals - EPA Method 6020A

The sample(s) were digested and analyzed within the recommended holding times.

Initial and continuing calibrations were within method requirements.

The method blank(s) were clean at the reporting limits.

The blank spike (BS/LCS) percent recoveries were within control limits.

The matrix spike (MS) percent recoveries and the duplicate (DUP) relative percent difference (RPD) were within advisory control limits with the exception of analytes flagged on the associated forms.

Wet Chemistry

The sample(s) were prepared and analyzed within the recommended holding times exception of analytes flagged with a "H" qualifer on the associated forms and arrived at the lab outside of the holding time.

Initial and continuing calibrations were within method requirements.

The method blank(s) were clean at the reporting limits.

The blank spike (BS/LCS) percent recoveries were within control limits.

The reference material (SRM) percent recoveries were within control limits.

The matrix spike (MS) percent recoveries and the duplicate (DUP) relative percent difference (RPD) were within advisory control limits.

WORK ORDER

20I0445

Client: Floyd - Snider | Project Manager: Kelly Bottem

Project: Rio Tinto Holden Mine Reclamation/Remediation | Project Number: RT-Holden

Preservation Confirmation

Container ID	Container Type	pH	
20I0445-01 A	Large OJ, 1000 mL		
20I0445-01 B	Large OJ, 1000 mL		
20I0445-01 C	Small OJ, 500 mL		
20I0445-01 D	Glass NM, Amber, 250 mL, 9N H2SO4	<2	Pass (P)
20I0445-01 E	Glass NM, Amber, 250 mL, 9N H2SO4	<2	P
20I0445-01 F	HDPE NM, 500 mL, 1:1 HNO3	<2	P
20I0445-02 A	HDPE NM, 500 mL, 1:1 HNO3 (FF)	<2	P
20I0445-03 A	HDPE NM, 500 mL, 1:1 HNO3 (FF)	<2	P
20I0445-03 B	Glass NM, Amber, 250 mL, 9N H2SO4	<2	P
20I0445-04 A	Large OJ, 1000 mL		
20I0445-04 B	Large OJ, 1000 mL		
20I0445-04 C	Small OJ, 500 mL		
20I0445-04 D	Glass NM, Amber, 250 mL, 9N H2SO4	<2	P
20I0445-04 E	Glass NM, Amber, 250 mL, 9N H2SO4	<2	P
20I0445-04 F	HDPE NM, 500 mL, 1:1 HNO3	<2	P
20I0445-05 A	HDPE NM, 500 mL, 1:1 HNO3 (FF)	<2	P
20I0445-06 A	Large OJ, 1000 mL		
20I0445-06 B	Large OJ, 1000 mL		
20I0445-06 C	Small OJ, 500 mL		
20I0445-06 D	Glass NM, Amber, 250 mL, 9N H2SO4	<2	P
20I0445-06 E	Glass NM, Amber, 250 mL, 9N H2SO4	<2	P
20I0445-06 F	HDPE NM, 500 mL, 1:1 HNO3	<2	P
20I0445-07 A	Large OJ, 1000 mL		
20I0445-07 B	Large OJ, 1000 mL		
20I0445-07 C	Small OJ, 500 mL		
20I0445-07 D	Glass NM, Amber, 250 mL, 9N H2SO4	<2	P
20I0445-07 E	Glass NM, Amber, 250 mL, 9N H2SO4	<2	P
20I0445-07 F	HDPE NM, 500 mL, 1:1 HNO3	<2	P
20I0445-08 A	Large OJ, 1000 mL		
20I0445-08 B	Large OJ, 1000 mL		
20I0445-08 C	Small OJ, 500 mL		
20I0445-08 D	Glass NM, Amber, 250 mL, 9N H2SO4	<2	P
20I0445-08 E	Glass NM, Amber, 250 mL, 9N H2SO4	<2	P
20I0445-08 F	HDPE NM, 500 mL, 1:1 HNO3	<2	P
20I0445-09 A	Large OJ, 1000 mL		

Reviewed By

Date

WORK ORDER

20I0445

Client: Floyd - Snider | Project Manager: Kelly Bottem

Project: Rio Tinto Holden Mine Reclamation/Remediation | Project Number: RT-Holden

2010445-09 B	Large OJ, 1000 mL		
2010445-09 C	Small OJ, 500 mL		
2010445-09 D	Glass NM, Amber, 250 mL, 9N H2SO4	<2	Pass (P)
2010445-09 E	Glass NM, Amber, 250 mL, 9N H2SO4	<2	P
2010445-09 F	HDPE NM, 500 mL, 1:1 HNO3	<2	P
2010445-10 A	HDPE NM, 500 mL, 1:1 HNO3 (FF)	<2	P
2010445-11 A	Large OJ, 1000 mL		
2010445-11 B	Large OJ, 1000 mL		
2010445-11 C	Small OJ, 500 mL		
2010445-11 D	Glass NM, Amber, 250 mL, 9N H2SO4	<2	P
2010445-11 E	Glass NM, Amber, 250 mL, 9N H2SO4	<2	P
2010445-11 F	HDPE NM, 500 mL, 1:1 HNO3	<2	P
2010445-12 A	Large OJ, 1000 mL		
2010445-12 B	Large OJ, 1000 mL		
2010445-12 C	Small OJ, 500 mL		
2010445-12 D	Glass NM, Amber, 250 mL, 9N H2SO4	<2	P
2010445-12 E	Glass NM, Amber, 250 mL, 9N H2SO4	<2	P
2010445-12 F	HDPE NM, 500 mL, 1:1 HNO3	<2	P
2010445-13 A	HDPE NM, 500 mL, 1:1 HNO3 (FF)	<2	P
2010445-14 A	Large OJ, 1000 mL		
2010445-14 B	Large OJ, 1000 mL		
2010445-14 C	Small OJ, 500 mL		
2010445-14 D	Glass NM, Amber, 250 mL, 9N H2SO4	<2	P
2010445-14 E	Glass NM, Amber, 250 mL, 9N H2SO4	<2	P
2010445-14 F	HDPE NM, 500 mL, 1:1 HNO3	<2	P
2010445-15 A	Large OJ, 1000 mL		
2010445-15 B	Large OJ, 1000 mL		
2010445-15 C	Small OJ, 500 mL		
2010445-15 D	Glass NM, Amber, 250 mL, 9N H2SO4	<2	P
2010445-15 E	Glass NM, Amber, 250 mL, 9N H2SO4	<2	P
2010445-15 F	HDPE NM, 500 mL, 1:1 HNO3	<2	P
2010445-16 A	Large OJ, 1000 mL		
2010445-16 B	Large OJ, 1000 mL		
2010445-16 C	Small OJ, 500 mL		
2010445-16 D	Glass NM, Amber, 250 mL, 9N H2SO4	<2	P
2010445-16 E	Glass NM, Amber, 250 mL, 9N H2SO4	<2	P
2010445-16 F	HDPE NM, 500 mL, 1:1 HNO3	<2	P

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Project Manager: Kelly Bottem

Project: Rio Tinto Holden Mine Reclamation/Remediation

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20I0445-17 A	Large OJ, 1000 mL		
20I0445-17 B	Large OJ, 1000 mL		
20I0445-17 C	Large OJ, 1000 mL		
20I0445-17 D	Large OJ, 1000 mL		
20I0445-17 E	Small OJ, 500 mL		
20I0445-17 F	Small OJ, 500 mL		
20I0445-17 G	Glass NM, Amber, 250 mL, 9N H2SO4	<2	Pass (PJ)
20I0445-17 H	Glass NM, Amber, 250 mL, 9N H2SO4	<2	P
20I0445-17 I	Glass NM, Amber, 250 mL, 9N H2SO4	<2	P
20I0445-17 J	Glass NM, Amber, 250 mL, 9N H2SO4	<2	P
20I0445-17 K	HDPE NM, 500 mL, 1:1 HNO3	<2	P
20I0445-17 L	HDPE NM, 500 mL, 1:1 HNO3	<2	P
20I0445-18 A	Large OJ, 1000 mL		
20I0445-18 B	Large OJ, 1000 mL		
20I0445-18 C	Small OJ, 500 mL		
20I0445-18 D	Glass NM, Amber, 250 mL, 9N H2SO4	<2	P
20I0445-18 E	Glass NM, Amber, 250 mL, 9N H2SO4	<2	P
20I0445-18 F	HDPE NM, 500 mL, 1:1 HNO3	<2	P
20I0445-19 A	Large OJ, 1000 mL		
20I0445-19 B	Large OJ, 1000 mL		
20I0445-19 C	Small OJ, 500 mL		
20I0445-19 D	Glass NM, Amber, 250 mL, 9N H2SO4	<2	P
20I0445-19 E	Glass NM, Amber, 250 mL, 9N H2SO4	<2	P
20I0445-19 F	HDPE NM, 500 mL, 1:1 HNO3	<2	P
20I0445-20 A	Large OJ, 1000 mL		
20I0445-20 B	Large OJ, 1000 mL		
20I0445-20 C	Small OJ, 500 mL		
20I0445-20 D	Glass NM, Amber, 250 mL, 9N H2SO4	<2	P
20I0445-20 E	Glass NM, Amber, 250 mL, 9N H2SO4	<2	P
20I0445-20 F	HDPE NM, 500 mL, 1:1 HNO3	<2	P
20I0445-21 A	Large OJ, 1000 mL		
20I0445-21 B	Large OJ, 1000 mL		
20I0445-21 C	Small OJ, 500 mL		
20I0445-21 D	Glass NM, Amber, 250 mL, 9N H2SO4	<2	P
20I0445-21 E	Glass NM, Amber, 250 mL, 9N H2SO4	<2	P
20I0445-21 F	HDPE NM, 500 mL, 1:1 HNO3	<2	P
20I0445-22 A	Large OJ, 1000 mL		

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2010445-22 B	Large OJ, 1000 mL		
2010445-22 C	Small OJ, 500 mL		
2010445-22 D	Glass NM, Amber, 250 mL, 9N H2SO4	<2	Pass (P)
2010445-22 E	Glass NM, Amber, 250 mL, 9N H2SO4	<2	P
2010445-22 F	HDPE NM, 500 mL, 1:1 HNO3	<2	P
2010445-23 A	Large OJ, 1000 mL		
2010445-23 B	Large OJ, 1000 mL		
2010445-23 C	Small OJ, 500 mL		
2010445-23 D	Glass NM, Amber, 250 mL, 9N H2SO4	<2	P
2010445-23 E	Glass NM, Amber, 250 mL, 9N H2SO4	<2	P
2010445-23 F	HDPE NM, 500 mL, 1:1 HNO3	<2	P
2010445-24 A	Large OJ, 1000 mL		
2010445-24 B	Large OJ, 1000 mL		
2010445-24 C	Small OJ, 500 mL		
2010445-24 D	Glass NM, Amber, 250 mL, 9N H2SO4	<2	P
2010445-24 E	Glass NM, Amber, 250 mL, 9N H2SO4	<2	P
2010445-24 F	HDPE NM, 500 mL, 1:1 HNO3	<2	P
2010445-25 A	Large OJ, 1000 mL		
2010445-25 B	Large OJ, 1000 mL		
2010445-25 C	Small OJ, 500 mL		
2010445-25 D	Glass NM, Amber, 250 mL, 9N H2SO4	<2	P
2010445-25 E	Glass NM, Amber, 250 mL, 9N H2SO4	<2	P
2010445-25 F	HDPE NM, 500 mL, 1:1 HNO3	<2	P
2010445-26 A	Large OJ, 1000 mL		
2010445-26 B	Large OJ, 1000 mL		
2010445-26 C	Small OJ, 500 mL		
2010445-26 D	Glass NM, Amber, 250 mL, 9N H2SO4	<2	P
2010445-26 E	Glass NM, Amber, 250 mL, 9N H2SO4	<2	P
2010445-26 F	HDPE NM, 500 mL, 1:1 HNO3	<2	P
2010445-27 A	Large OJ, 1000 mL		
2010445-27 B	Large OJ, 1000 mL		
2010445-27 C	Small OJ, 500 mL		
2010445-27 D	Glass NM, Amber, 250 mL, 9N H2SO4	<2	P
2010445-27 E	Glass NM, Amber, 250 mL, 9N H2SO4	<2	P
2010445-27 F	HDPE NM, 500 mL, 1:1 HNO3	<2	P
2010445-28 A	Large OJ, 1000 mL		
2010445-28 B	Large OJ, 1000 mL		

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20I0445-28 C	Small OJ, 500 mL		
20I0445-28 D	Glass NM, Amber, 250 mL, 9N H2SO4	<2	Pass (P)
20I0445-28 E	Glass NM, Amber, 250 mL, 9N H2SO4	<2	P
20I0445-28 F	HDPE NM, 500 mL, 1:1 HNO3	<2	P
20I0445-29 A	Large OJ, 1000 mL		
20I0445-29 B	Large OJ, 1000 mL		
20I0445-29 C	Small OJ, 500 mL		
20I0445-29 D	Glass NM, Amber, 250 mL, 9N H2SO4	<2	P
20I0445-29 E	Glass NM, Amber, 250 mL, 9N H2SO4	<2	P
20I0445-29 F	HDPE NM, 500 mL, 1:1 HNO3	<2	P
20I0445-30 A	Large OJ, 1000 mL		
20I0445-30 B	Large OJ, 1000 mL		
20I0445-30 C	Small OJ, 500 mL		
20I0445-30 D	Glass NM, Amber, 250 mL, 9N H2SO4	<2	P
20I0445-30 E	Glass NM, Amber, 250 mL, 9N H2SO4	<2	P
20I0445-30 F	HDPE NM, 500 mL, 1:1 HNO3	<2	P
20I0445-31 A	Large OJ, 1000 mL		
20I0445-31 B	Large OJ, 1000 mL		
20I0445-31 C	Small OJ, 500 mL		
20I0445-31 D	Glass NM, Amber, 250 mL, 9N H2SO4	<2	P
20I0445-31 E	Glass NM, Amber, 250 mL, 9N H2SO4	<2	P
20I0445-31 F	HDPE NM, 500 mL, 1:1 HNO3	<2	P
20I0445-32 A	Large OJ, 1000 mL		
20I0445-32 B	Large OJ, 1000 mL		
20I0445-32 C	Small OJ, 500 mL		
20I0445-32 D	Glass NM, Amber, 250 mL, 9N H2SO4	<2	P
20I0445-32 E	Glass NM, Amber, 250 mL, 9N H2SO4	<2	P
20I0445-32 F	HDPE NM, 500 mL, 1:1 HNO3	<2	P
20I0445-33 A	Large OJ, 1000 mL		
20I0445-33 B	Large OJ, 1000 mL		
20I0445-33 C	Small OJ, 500 mL		
20I0445-33 D	Glass NM, Amber, 250 mL, 9N H2SO4	<2	P
20I0445-33 E	Glass NM, Amber, 250 mL, 9N H2SO4	<2	P
20I0445-33 F	HDPE NM, 500 mL, 1:1 HNO3	<2	P
20I0445-34 A	Large OJ, 1000 mL		
20I0445-34 B	Large OJ, 1000 mL		
20I0445-34 C	Small OJ, 500 mL		

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2010445-34 D	Glass NM, Amber, 250 mL, 9N H2SO4	<2	Pull (P)
2010445-34 E	Glass NM, Amber, 250 mL, 9N H2SO4	<2	P
2010445-34 F	HDPE NM, 500 mL, 1:1 HNO3	<2	P
2010445-35 A	Large OJ, 1000 mL		
2010445-35 B	Large OJ, 1000 mL		
2010445-35 C	Small OJ, 500 mL		
2010445-35 D	Glass NM, Amber, 250 mL, 9N H2SO4	<2	P
2010445-35 E	Glass NM, Amber, 250 mL, 9N H2SO4	<2	P
2010445-35 F	HDPE NM, 500 mL, 1:1 HNO3	<2	P
2010445-36 A	Large OJ, 1000 mL		
2010445-36 B	Large OJ, 1000 mL		
2010445-36 C	Small OJ, 500 mL		
2010445-36 D	Glass NM, Amber, 250 mL, 9N H2SO4	<2	P
2010445-36 E	Glass NM, Amber, 250 mL, 9N H2SO4	<2	P
2010445-36 F	HDPE NM, 500 mL, 1:1 HNO3	<2	P
2010445-37 A	Large OJ, 1000 mL		
2010445-37 B	Large OJ, 1000 mL		
2010445-37 C	Small OJ, 500 mL		
2010445-37 D	Glass NM, Amber, 250 mL, 9N H2SO4	<2	P
2010445-37 E	Glass NM, Amber, 250 mL, 9N H2SO4	<2	P
2010445-37 F	HDPE NM, 500 mL, 1:1 HNO3	<2	P
2010445-38 A	Large OJ, 1000 mL		
2010445-38 B	Large OJ, 1000 mL		
2010445-38 C	Small OJ, 500 mL		
2010445-38 D	Glass NM, Amber, 250 mL, 9N H2SO4	<2	P
2010445-38 E	Glass NM, Amber, 250 mL, 9N H2SO4	<2	P
2010445-38 F	HDPE NM, 500 mL, 1:1 HNO3	<2	P
2010445-39 A	Large OJ, 1000 mL		
2010445-39 B	Large OJ, 1000 mL		
2010445-39 C	Small OJ, 500 mL		
2010445-39 D	Glass NM, Amber, 250 mL, 9N H2SO4	<2	P
2010445-39 E	Glass NM, Amber, 250 mL, 9N H2SO4	<2	P
2010445-39 F	HDPE NM, 500 mL, 1:1 HNO3	<2	P
2010445-40 A	Large OJ, 1000 mL		
2010445-40 B	Large OJ, 1000 mL		
2010445-40 C	Small OJ, 500 mL		
2010445-40 D	Glass NM, Amber, 250 mL, 9N H2SO4	<2	P

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20I0445-40 E	Glass NM, Amber, 250 mL, 9N H2SO4	<2	Rush(P)
20I0445-40 F	HDPE NM, 500 mL, 1:1 HNO3	<2	P
20I0445-41 A	Large OJ, 1000 mL		
20I0445-41 B	Large OJ, 1000 mL		
20I0445-41 C	Large OJ, 1000 mL		
20I0445-41 D	Large OJ, 1000 mL		
20I0445-41 E	Small OJ, 500 mL		
20I0445-41 F	Small OJ, 500 mL		
20I0445-41 G	Glass NM, Amber, 250 mL, 9N H2SO4	<2	P
20I0445-41 H	Glass NM, Amber, 250 mL, 9N H2SO4	<2	P
20I0445-41 I	Glass NM, Amber, 250 mL, 9N H2SO4	<2	P
20I0445-41 J	Glass NM, Amber, 250 mL, 9N H2SO4	<2	P
20I0445-41 K	HDPE NM, 500 mL, 1:1 HNO3	<2	P
20I0445-41 L	HDPE NM, 500 mL, 1:1 HNO3	<2	P
20I0445-42 A	Large OJ, 1000 mL		
20I0445-42 B	Large OJ, 1000 mL		
20I0445-42 C	Small OJ, 500 mL		
20I0445-42 D	Glass NM, Amber, 250 mL, 9N H2SO4	<2	P
20I0445-42 E	Glass NM, Amber, 250 mL, 9N H2SO4	<2	P
20I0445-42 F	HDPE NM, 500 mL, 1:1 HNO3	<2	P
20I0445-43 A	Large OJ, 1000 mL		
20I0445-43 B	Large OJ, 1000 mL		
20I0445-43 C	Small OJ, 500 mL		
20I0445-43 D	Glass NM, Amber, 250 mL, 9N H2SO4	<2	P
20I0445-43 E	Glass NM, Amber, 250 mL, 9N H2SO4	<2	P
20I0445-43 F	HDPE NM, 500 mL, 1:1 HNO3	<2	P
20I0445-44 A	Large OJ, 1000 mL		
20I0445-44 B	Large OJ, 1000 mL		
20I0445-44 C	Small OJ, 500 mL		
20I0445-44 D	Glass NM, Amber, 250 mL, 9N H2SO4	<2	P
20I0445-44 E	Glass NM, Amber, 250 mL, 9N H2SO4	<2	P
20I0445-44 F	HDPE NM, 500 mL, 1:1 HNO3	<2	P
20I0445-45 A	Large OJ, 1000 mL		
20I0445-45 B	Large OJ, 1000 mL		
20I0445-45 C	Small OJ, 500 mL		
20I0445-45 D	Glass NM, Amber, 250 mL, 9N H2SO4	<2	P
20I0445-45 E	Glass NM, Amber, 250 mL, 9N H2SO4	<2	P

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2010445-45 F	HDPE NM, 500 mL, 1:1 HNO3	<2	Rec(P)
2010445-46 A	Large OJ, 1000 mL		
2010445-46 B	Large OJ, 1000 mL		
2010445-46 C	Small OJ, 500 mL		
2010445-46 D	Glass NM, Amber, 250 mL, 9N H2SO4	<2	P
2010445-46 E	Glass NM, Amber, 250 mL, 9N H2SO4	<2	P
2010445-46 F	HDPE NM, 500 mL, 1:1 HNO3	<2	P
2010445-47 A	Large OJ, 1000 mL		
2010445-47 B	Large OJ, 1000 mL		
2010445-47 C	Small OJ, 500 mL		
2010445-47 D	Glass NM, Amber, 250 mL, 9N H2SO4	<2	P
2010445-47 E	Glass NM, Amber, 250 mL, 9N H2SO4	<2	P
2010445-47 F	HDPE NM, 500 mL, 1:1 HNO3	<2	P
2010445-48 A	Large OJ, 1000 mL		
2010445-48 B	Large OJ, 1000 mL		
2010445-48 C	Small OJ, 500 mL		
2010445-48 D	Glass NM, Amber, 250 mL, 9N H2SO4	<2	P
2010445-48 E	Glass NM, Amber, 250 mL, 9N H2SO4	<2	P
2010445-48 F	HDPE NM, 500 mL, 1:1 HNO3	<2	P
2010445-49 A	Large OJ, 1000 mL		
2010445-49 B	Large OJ, 1000 mL		
2010445-49 C	Small OJ, 500 mL		
2010445-49 D	Glass NM, Amber, 250 mL, 9N H2SO4	<2	P
2010445-49 E	Glass NM, Amber, 250 mL, 9N H2SO4	<2	P
2010445-49 F	HDPE NM, 500 mL, 1:1 HNO3	<2	P
2010445-50 A	Large OJ, 1000 mL		
2010445-50 B	Large OJ, 1000 mL		
2010445-50 C	Small OJ, 500 mL		
2010445-50 D	Glass NM, Amber, 250 mL, 9N H2SO4	<2	P
2010445-50 E	Glass NM, Amber, 250 mL, 9N H2SO4	<2	P
2010445-50 F	HDPE NM, 500 mL, 1:1 HNO3	<2	P
2010445-51 A	Large OJ, 1000 mL		
2010445-51 B	Large OJ, 1000 mL		
2010445-51 C	Small OJ, 500 mL		
2010445-51 D	Glass NM, Amber, 250 mL, 9N H2SO4	<2	P
2010445-51 E	Glass NM, Amber, 250 mL, 9N H2SO4	<2	P
2010445-51 F	HDPE NM, 500 mL, 1:1 HNO3	<2	P

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20I0445-52 A	Large OJ, 1000 mL		
20I0445-52 B	Large OJ, 1000 mL		
20I0445-52 C	Small OJ, 500 mL		
20I0445-52 D	Glass NM, Amber, 250 mL, 9N H2SO4	<2	Pass (P)
20I0445-52 E	Glass NM, Amber, 250 mL, 9N H2SO4	<2	P
20I0445-52 F	HDPE NM, 500 mL, 1:1 HNO3	<2	P
20I0445-53 A	Large OJ, 1000 mL		
20I0445-53 B	Large OJ, 1000 mL		
20I0445-53 C	Small OJ, 500 mL		
20I0445-53 D	Glass NM, Amber, 250 mL, 9N H2SO4	<2	P
20I0445-53 E	Glass NM, Amber, 250 mL, 9N H2SO4	<2	P
20I0445-53 F	HDPE NM, 500 mL, 1:1 HNO3	<2	P
20I0445-54 A	HDPE NM, 500 mL, 1:1 HNO3	<2	P
20I0445-55 A	Large OJ, 1000 mL		
20I0445-55 B	Large OJ, 1000 mL		
20I0445-55 C	Small OJ, 500 mL		
20I0445-55 D	Glass NM, Amber, 250 mL, 9N H2SO4	<2	P
20I0445-55 E	Glass NM, Amber, 250 mL, 9N H2SO4	<2	P
20I0445-55 F	HDPE NM, 500 mL, 1:1 HNO3	<2	P
20I0445-56 A	Large OJ, 1000 mL		
20I0445-56 B	Large OJ, 1000 mL		
20I0445-56 C	Small OJ, 500 mL		
20I0445-56 D	Glass NM, Amber, 250 mL, 9N H2SO4	<2	P
20I0445-56 E	Glass NM, Amber, 250 mL, 9N H2SO4	<2	P
20I0445-56 F	HDPE NM, 500 mL, 1:1 HNO3	<2	P
20I0445-57 A	Large OJ, 1000 mL		
20I0445-57 B	Large OJ, 1000 mL		
20I0445-57 C	Small OJ, 500 mL		
20I0445-57 D	Glass NM, Amber, 250 mL, 9N H2SO4	<2	P
20I0445-57 E	Glass NM, Amber, 250 mL, 9N H2SO4	<2	P
20I0445-57 F	HDPE NM, 500 mL, 1:1 HNO3	<2	P
20I0445-58 A	Large OJ, 1000 mL		
20I0445-58 B	Large OJ, 1000 mL		
20I0445-58 C	Small OJ, 500 mL		
20I0445-58 D	Glass NM, Amber, 250 mL, 9N H2SO4	<2	P
20I0445-58 E	Glass NM, Amber, 250 mL, 9N H2SO4	<2	P
20I0445-58 F	HDPE NM, 500 mL, 1:1 HNO3	<2	P

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20I0445-59 A	Large OJ, 1000 mL		
20I0445-59 B	Large OJ, 1000 mL		
20I0445-59 C	Small OJ, 500 mL		
20I0445-59 D	Glass NM, Amber, 250 mL, 9N H2SO4	<2	Pass (P)
20I0445-59 E	Glass NM, Amber, 250 mL, 9N H2SO4	<2	P
20I0445-59 F	HDPE NM, 500 mL, 1:1 HNO3	<2	P
20I0445-60 A	Large OJ, 1000 mL		
20I0445-60 B	Large OJ, 1000 mL		
20I0445-60 C	Small OJ, 500 mL		
20I0445-60 D	Glass NM, Amber, 250 mL, 9N H2SO4	<2	P
20I0445-60 E	Glass NM, Amber, 250 mL, 9N H2SO4	<2	P
20I0445-60 F	HDPE NM, 500 mL, 1:1 HNO3	<2	P
20I0445-61 A	Large OJ, 1000 mL		
20I0445-61 B	Large OJ, 1000 mL		
20I0445-61 C	Small OJ, 500 mL		
20I0445-61 D	Glass NM, Amber, 250 mL, 9N H2SO4	<2	P
20I0445-61 E	Glass NM, Amber, 250 mL, 9N H2SO4	<2	P
20I0445-61 F	HDPE NM, 500 mL, 1:1 HNO3	<2	P
20I0445-62 A	Large OJ, 1000 mL		
20I0445-62 B	Large OJ, 1000 mL		
20I0445-62 C	Small OJ, 500 mL		
20I0445-62 D	Glass NM, Amber, 250 mL, 9N H2SO4	<2	P
20I0445-62 E	Glass NM, Amber, 250 mL, 9N H2SO4	<2	P
20I0445-62 F	HDPE NM, 500 mL, 1:1 HNO3	<2	P
20I0445-63 A	Large OJ, 1000 mL		
20I0445-63 B	Large OJ, 1000 mL		
20I0445-63 C	Small OJ, 500 mL		
20I0445-63 D	Glass NM, Amber, 250 mL, 9N H2SO4	<2	P
20I0445-63 E	Glass NM, Amber, 250 mL, 9N H2SO4	<2	P
20I0445-63 F	HDPE NM, 500 mL, 1:1 HNO3	<2	P
20I0445-64 A	Large OJ, 1000 mL		
20I0445-64 B	Large OJ, 1000 mL		
20I0445-64 C	Large OJ, 1000 mL		
20I0445-64 D	Large OJ, 1000 mL		
20I0445-64 E	Small OJ, 500 mL		
20I0445-64 F	Small OJ, 500 mL		
20I0445-64 G	Glass NM, Amber, 250 mL, 9N H2SO4	<2	P

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Client: Floyd - Snider		**Project Manager:** Kelly Bottem	
Project: Rio Tinto Holden Mine Reclamation/Remediation		**Project Number:** RT-Holden	
20I0445-64 H	Glass NM, Amber, 250 mL, 9N H2SO4	<2	Pass (P)
20I0445-64 I	Glass NM, Amber, 250 mL, 9N H2SO4	<2	P
20I0445-64 J	Glass NM, Amber, 250 mL, 9N H2SO4	<2	P
20I0445-64 K	HDPE NM, 500 mL, 1:1 HNO3	<2	P
20I0445-64 L	HDPE NM, 500 mL, 1:1 HNO3	<2	P

Preservation Confirmed By

09/28/2020
Date

Reviewed By

Date

Analytical Resources, Incorporated
Analytical Chemists and Consultants

Cooler Receipt Form

ARI Client: Floyd-Snider

Project Name: RT-Holden

COC No(s): _____ (NA)

Delivered by: Fed-Ex UPS Courier Hand Delivered Other: _____

Assigned ARI Job No: 20I0445

Tracking No: _____ (NA)

Preliminary Examination Phase:

Were intact, properly signed and dated custody seals attached to the outside of the cooler? (YES) NO

Were custody papers included with the cooler? (YES) NO

Were custody papers properly filled out (ink, signed, etc.) (YES) NO

Temperature of Cooler(s) (°C) (recommended 2.0-6.0 °C for chemistry)

Time 1310 See Separate document

If cooler temperature is out of compliance fill out form 00070F

Temp Gun ID#: D00506

Cooler Accepted by: JG Date: 09/28/2020 Time: 1310

Complete custody forms and attach all shipping documents

Log-In Phase:

Was a temperature blank included in the cooler? YES (NO)

What kind of packing material was used? (Bubble Wrap) Wet Ice Gel Packs Baggies Foam Block Paper Other: _____

Was sufficient ice used (if appropriate)? NA (YES) NO

How were bottles sealed in plastic bags? Individually (Grouped) Not

Did all bottles arrive in good condition (unbroken)? (YES) NO

Were all bottle labels complete and legible? (YES) NO

Did the number of containers listed on COC match with the number of containers received? (YES) NO

Did all bottle labels and tags agree with custody papers? (YES) NO

Were all bottles used correct for the requested analyses? (YES) NO

Do any of the analyses (bottles) require preservation? (attach preservation sheet, excluding VOCs) ... NA (YES) NO

Were all VOC vials free of air bubbles? (NA) YES NO

Was sufficient amount of sample sent in each bottle? (YES) NO

Date VOC Trip Blank was made at ARI... (NA) _____

Were the sample(s) split by ARI? (NA) YES Date/Time: _____ Equipment: _____ Split by: _____

Samples Logged by: JG Date: 09/28/2020 Time: 1511 Labels checked by: JG

***** Notify Project Manager of discrepancies or concerns *****

Sample ID on Bottle	Sample ID on COC	Sample ID on Bottle	Sample ID on COC

Additional Notes, Discrepancies, & Resolutions:

By: Date:

Analytical Resources, Incorporated
Analytical Chemists and Consultants

Cooler Temperature Compliance Form

ARI Work Order: 20I0445

Cooler#: 13 Temperature(°C): 6.9°C

Sample ID	Bottle Count	Bottle Type
DS-13S-GW-092520	6	All containers
SG-11-HP-36-092320	6	All containers
DS-18I-GW-092320	6	All containers
DS-9S-GW-092320	6	All containers
DS-4I-GW-092320	6	2-Large OJ, 1-Small OJ, 1-500mL HDPE, 2-250mL AG

Cooler#: _____ Temperature(°C): _____

Sample ID	Bottle Count	Bottle Type

Cooler#: _____ Temperature(°C): _____

Sample ID	Bottle Count	Bottle Type

Cooler#: _____ Temperature(°C): _____

Sample ID	Bottle Count	Bottle Type

Completed by: _____ Date: 09/28/2020 Time: 1310

Holden Mine cooler Temps

1 - 2.1
2 - 1.7
3 - 3.3
4 - 3.1
5 - 3.9
6 - 3.3
7 - 3.2
8 - 2.0
9 - 3.2
10 - 5.2
11 - 4.3
12 - 0.6
13 - 6.9
14 - 2.3
15 - 1.1
16 - 1.8
17 - 3.7
18 - 5.1
19 - 5.4
20 - 2.2
21 - 1.5
22 - 4.1
23 - 2.9
24 - 4.7
25 - 4.5
26 - 3.0

Analytical Resources, Incorporated
Analytical Chemists and Consultants

Cooler Temperature Compliance Form

ARI Work Order: ____________________

Cooler#: ____________ **Temperature(°C):** ________

Sample ID	Bottle Count	Bottle Type

Cooler#: ____________ **Temperature(°C):** ________

Sample ID	Bottle Count	Bottle Type

Cooler#: ____________ **Temperature(°C):** ________

Sample ID	Bottle Count	Bottle Type

Cooler#: ____________ **Temperature(°C):** ________

Sample ID	Bottle Count	Bottle Type

Completed by:______________________________ Date:______________ Time:______________

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-5-092220

20I0445-01 (Water)

Metals and Metallic Compounds

Method: EPA 6020A — Sampled: 09/22/2020 11:25

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/19/2020 17:41

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0445-01 F 01

Preparation Batch: BIJ0288 — Sample Size: 25 mL

Prepared: 10/08/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Aluminum	7429-90-5	1	2.37	20.0	227	ug/L	
Calcium	7440-70-2	1	1.91	50.0	6140	ug/L	
Iron	7439-89-6	1	6.27	20.0	194	ug/L	
Lead	7439-92-1	1	0.0680	0.100	0.165	ug/L	
Magnesium	7439-95-4	1	0.307	20.0	701	ug/L	
Manganese	7439-96-5	1	0.0850	0.500	6.21	ug/L	
Potassium	7440-09-7	1	1.41	20.0	589	ug/L	
Sodium	7440-23-5	1	7.18	100	775	ug/L	

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-5-092220

20I0445-01 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/22/2020 11:25

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/12/2020 20:51

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0445-01 F 01

Preparation Batch: BIJ0288 — Sample Size: 25 mL

Prepared: 10/08/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Copper	7440-50-8	1	0.340	0.500	0.703	ug/L	
Zinc	7440-66-6	1	0.820	4.00	4.61	ug/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-5-092220

20I0445-01 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/22/2020 11:25

Instrument: IC930 Analyst: KOTT — Analyzed: 09/30/2020 01:41

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-01 B

Preparation Batch: BII0841 — Sample Size: 10 mL

Prepared: 09/29/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Chloride	16887-00-6	1	0.100	0.100	0.317	mg/L	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Nitrate-N	14797-55-8	1	0.100	0.100	ND	mg/L	H, U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Sulfate	14808-79-8	1	0.100	0.100	7.26	mg/L	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-5-092220

20I0445-01 (Water)

Wet Chemistry

Method: SM 2320 B-97 — Sampled: 09/22/2020 11:25
Instrument: Accumet AB150 Analyst: UW — Analyzed: 09/29/2020 10:57

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-01 C
Preparation Batch: BII0843 — Sample Size: 100 mL
Prepared: 09/29/2020 — Final Volume: 100 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Bicarbonate		1	1.00	1.00	11.4	mg/L CaCO3	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Carbonate		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Hydroxide		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Total		1	1.00	1.00	11.4	mg/L CaCO3	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-5-092220

20I0445-01 (Water)

Wet Chemistry

Method: SM 2540 C-97 — Sampled: 09/22/2020 11:25

Instrument: BAL2 Analyst: KLE — Analyzed: 09/29/2020 13:16

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-01

Preparation Batch: BII0853 — Sample Size: 200 mL

Prepared: 09/29/2020 — Final Volume: 200 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Solids		1	5	5	45	mg/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-5-092220

20I0445-01 (Water)

Wet Chemistry

Method: SM 2540 D-97 — Sampled: 09/22/2020 11:25

Instrument: BAL2 Analyst: KLE — Analyzed: 09/29/2020 09:00

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-01

Preparation Batch: BII0833 — Sample Size: 500 mL

Prepared: 09/29/2020 — Final Volume: 1000 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Suspended Solids		1	2	2	31	mg/L	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-5-092220

20I0445-01 (Water)

Wet Chemistry

Method: SM 5310 B-00 — Sampled: 09/22/2020 11:25
Instrument: TOC-LCSH Analyst: WCW — Analyzed: 10/05/2020 21:13

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-01 E
Preparation Batch: BIJ0113 — Sample Size: 20 mL
Prepared: 10/05/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Organic Carbon, Dissolved		1	0.50	0.50	ND	mg/L	U

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-01 D
Preparation Batch: BIJ0269 — Sample Size: 20 mL
Prepared: 10/08/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Organic Carbon		1	0.50	0.50	0.55	mg/L	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-5-092220

20I0445-01 (Water)

Calculation

Method: SM 2340 B-97 — Sampled: 09/22/2020 11:25

Instrument: [CALC] Analyst: MCB — Analyzed: 10/12/2020 20:51

Sample Preparation: Preparation Method: [CALC] — Extract ID: 20I0445-01

Preparation Batch: [CALC]

Prepared: 10/08/2020 Final Volume: 1

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness		1	0.207	18.2	mg/L CaCO3	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-5-092220

20I0445-01RE1 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/22/2020 11:25

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/15/2020 23:37

Sample Preparation: Preparation Method: RHN EPA 600/4-79-020 4.1.4 HNO3 matrix 5x — Extract ID: 20I0445-01RE1 F 02

Preparation Batch: BIJ0436 — Sample Size: 100 mL

Prepared: 10/14/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Cadmium	7440-43-9	1	0.00600	0.0200	0.0304	ug/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-5-092220

20I0445-02 (Water)

Metals and Metallic Compounds (dissolved)

Method: EPA 6020A — Sampled: 09/22/2020 11:25

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/17/2020 17:37

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0445-02 A 01

Preparation Batch: BIJ0290 — Sample Size: 25 mL

Prepared: 10/08/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Aluminum, Dissolved	7429-90-5	1	2.37	20.0	4.54	ug/L	J
Calcium, Dissolved	7440-70-2	1	1.91	50.0	5950	ug/L	
Iron, Dissolved	7439-89-6	1	6.27	20.0	8.99	ug/L	J
Lead, Dissolved	7439-92-1	1	0.0680	0.100	ND	ug/L	U
Magnesium, Dissolved	7439-95-4	1	0.307	20.0	632	ug/L	
Manganese, Dissolved	7439-96-5	1	0.0850	0.500	0.186	ug/L	J
Potassium, Dissolved	7440-09-7	1	1.41	20.0	540	ug/L	
Sodium, Dissolved	7440-23-5	1	7.18	100	771	ug/L	

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-5-092220

20I0445-02 (Water)

Metals and Metallic Compounds (dissolved)

Method: EPA 6020A UCT-KED — Sampled: 09/22/2020 11:25

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/12/2020 20:42

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0445-02 A 01

Preparation Batch: BIJ0290 — Sample Size: 25 mL

Prepared: 10/08/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Copper, Dissolved	7440-50-8	1	0.340	0.500	ND	ug/L	U
Zinc, Dissolved	7440-66-6	1	0.820	4.00	3.78	ug/L	J

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-5-092220

20I0445-02RE1 (Water)

Metals and Metallic Compounds (dissolved)

Method: EPA 6020A UCT-KED — Sampled: 09/22/2020 11:25

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/15/2020 23:42

Sample Preparation: Preparation Method: RHN EPA 600/4-79-020 4.1.4 HNO3 matrix 5x — Extract ID: 20I0445-02RE1 A 02

Preparation Batch: BIJ0439 — Sample Size: 100 mL

Prepared: 10/14/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Cadmium, Dissolved	7440-43-9	1	0.00600	0.0200	0.0226	ug/L	

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

Filter-Blank-092220

20I0445-03 (Water)

Metals and Metallic Compounds (dissolved)

Method: EPA 6020A — Sampled: 09/22/2020 13:00

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/17/2020 13:58

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0445-03 A 01

Preparation Batch: BIJ0290 — Sample Size: 25 mL

Prepared: 10/08/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Aluminum, Dissolved	7429-90-5	1	2.37	20.0	ND	ug/L	U
Calcium, Dissolved	7440-70-2	1	1.91	50.0	21.8	ug/L	J
Iron, Dissolved	7439-89-6	1	6.27	20.0	7.07	ug/L	J
Lead, Dissolved	7439-92-1	1	0.0680	0.100	ND	ug/L	U
Magnesium, Dissolved	7439-95-4	1	0.307	20.0	2.57	ug/L	J
Manganese, Dissolved	7439-96-5	1	0.0850	0.500	ND	ug/L	U
Potassium, Dissolved	7440-09-7	1	1.41	20.0	18.2	ug/L	J
Sodium, Dissolved	7440-23-5	1	7.18	100	19.7	ug/L	J

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

Filter-Blank-092220

20I0445-03 (Water)

Metals and Metallic Compounds (dissolved)

Method: EPA 6020A UCT-KED — Sampled: 09/22/2020 13:00

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/12/2020 19:00

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0445-03 A 01

Preparation Batch: BIJ0290 — Sample Size: 25 mL

Prepared: 10/08/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Copper, Dissolved	7440-50-8	1	0.340	0.500	ND	ug/L	U
Zinc, Dissolved	7440-66-6	1	0.820	4.00	ND	ug/L	U

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

Filter-Blank-092220

20I0445-03 (Water)

Wet Chemistry

Method: SM 5310 B-00 — Sampled: 09/22/2020 13:00

Instrument: TOC-LCSH Analyst: WCW — Analyzed: 10/05/2020 21:35

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-03 B

Preparation Batch: BIJ0113 — Sample Size: 20 mL

Prepared: 10/05/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Organic Carbon, Dissolved		1	0.50	0.50	ND	mg/L	U

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

Filter-Blank-092220

20I0445-03RE1 (Water)

Metals and Metallic Compounds (dissolved)

Method: EPA 6020A UCT-KED — Sampled: 09/22/2020 13:00
Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/15/2020 22:31

Sample Preparation: Preparation Method: RHN EPA 600/4-79-020 4.1.4 HNO3 matrix 5x — Extract ID: 20I0445-03RE1 A 02
Preparation Batch: BIJ0439 — Sample Size: 100 mL
Prepared: 10/14/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Cadmium, Dissolved	7440-43-9	1	0.00600	0.0200	ND	ug/L	U

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

Field Blank-GW-092220

20I0445-04 (Water)

Metals and Metallic Compounds

Method: EPA 6020A — Sampled: 09/22/2020 13:15
Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/17/2020 14:00

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0445-04 F 01
Preparation Batch: BIJ0288 — Sample Size: 25 mL
Prepared: 10/08/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Aluminum	7429-90-5	1	2.37	20.0	ND	ug/L	U
Calcium	7440-70-2	1	1.91	50.0	3.21	ug/L	J
Iron	7439-89-6	1	6.27	20.0	7.08	ug/L	J
Lead	7439-92-1	1	0.0680	0.100	ND	ug/L	U
Magnesium	7439-95-4	1	0.307	20.0	0.388	ug/L	J
Manganese	7439-96-5	1	0.0850	0.500	ND	ug/L	U
Potassium	7440-09-7	1	1.41	20.0	9.53	ug/L	J
Sodium	7440-23-5	1	7.18	100	8.64	ug/L	J

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

Field Blank-GW-092220

20I0445-04 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/22/2020 13:15
Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/12/2020 19:04

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0445-04 F 01
Preparation Batch: BIJ0288 — Sample Size: 25 mL
Prepared: 10/08/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Copper	7440-50-8	1	0.340	0.500	ND	ug/L	U
Zinc	7440-66-6	1	0.820	4.00	0.944	ug/L	J

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

Field Blank-GW-092220

20I0445-04 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/22/2020 13:15
Instrument: IC930 Analyst: KOTT — Analyzed: 09/30/2020 02:01

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-04 F
Preparation Batch: BII0841 — Sample Size: 10 mL
Prepared: 09/29/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Chloride	16887-00-6	1	0.100	0.100	ND	mg/L	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Nitrate-N	14797-55-8	1	0.100	0.100	ND	mg/L	H, U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Sulfate	14808-79-8	1	0.100	0.100	ND	mg/L	U

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

Field Blank-GW-092220

20I0445-04 (Water)

Wet Chemistry

Method: SM 2320 B-97 — Sampled: 09/22/2020 13:15
Instrument: Accumet AB150 Analyst: UW — Analyzed: 09/29/2020 10:57

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-04 C
Preparation Batch: BII0843 — Sample Size: 100 mL
Prepared: 09/29/2020 — Final Volume: 100 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Bicarbonate		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Carbonate		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Hydroxide		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Total		1	1.00	1.00	ND	mg/L CaCO3	U

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

Field Blank-GW-092220

20I0445-04 (Water)

Wet Chemistry

Method: SM 2540 C-97 — Sampled: 09/22/2020 13:15
Instrument: BAL2 Analyst: KLE — Analyzed: 09/29/2020 13:16

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-04
Preparation Batch: BII0853 — Sample Size: 200 mL
Prepared: 09/29/2020 — Final Volume: 200 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Solids		1	5	5	7	mg/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

Field Blank-GW-092220

20I0445-04 (Water)

Wet Chemistry

Method: SM 2540 D-97 — Sampled: 09/22/2020 13:15
Instrument: BAL2 Analyst: KLE — Analyzed: 09/29/2020 09:00

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-04
Preparation Batch: BII0833 — Sample Size: 950 mL
Prepared: 09/29/2020 — Final Volume: 1000 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Suspended Solids		1	1	1	ND	mg/L	U

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

Field Blank-GW-092220

20I0445-04 (Water)

Wet Chemistry

Method: SM 5310 B-00 — Sampled: 09/22/2020 13:15
Instrument: TOC-LCSH Analyst: WCW — Analyzed: 10/05/2020 21:52

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-04 E
Preparation Batch: BIJ0113 — Sample Size: 20 mL
Prepared: 10/05/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Organic Carbon, Dissolved		1	0.50	0.50	ND	mg/L	U

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-04 D
Preparation Batch: BIJ0269 — Sample Size: 20 mL
Prepared: 10/08/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Organic Carbon		1	0.50	0.50	ND	mg/L	U

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

Field Blank-GW-092220

20I0445-04 (Water)

Calculation

Method: SM 2340 B-97 — Sampled: 09/22/2020 13:15
Instrument: [CALC] Analyst: MCB — Analyzed: 10/12/2020 19:04

Sample Preparation: Preparation Method: [CALC]
Preparation Batch: [CALC]
Prepared: 10/08/2020 Final Volume: 1 — Extract ID: 20I0445-04

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness		1	0.207	ND	mg/L CaCO3	U

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

Field Blank-GW-092220

20I0445-04RE1 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/22/2020 13:15
Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/15/2020 22:35

Sample Preparation: Preparation Method: RHN EPA 600/4-79-020 4.1.4 HNO3 matrix 5x — Extract ID: 20I0445-04RE1 F 02
Preparation Batch: BIJ0436 — Sample Size: 100 mL
Prepared: 10/14/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Cadmium	7440-43-9	1	0.00600	0.0200	ND	ug/L	U

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

Field Blank-GW-092220

20I0445-05 (Water)

Metals and Metallic Compounds (dissolved)

Method: EPA 6020A — Sampled: 09/22/2020 13:15
Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/17/2020 14:02

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0445-05 A 01
Preparation Batch: BIJ0290 — Sample Size: 25 mL
Prepared: 10/08/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Aluminum, Dissolved	7429-90-5	1	2.37	20.0	ND	ug/L	U
Calcium, Dissolved	7440-70-2	1	1.91	50.0	ND	ug/L	U
Iron, Dissolved	7439-89-6	1	6.27	20.0	7.66	ug/L	J
Lead, Dissolved	7439-92-1	1	0.0680	0.100	ND	ug/L	U
Magnesium, Dissolved	7439-95-4	1	0.307	20.0	0.635	ug/L	J
Manganese, Dissolved	7439-96-5	1	0.0850	0.500	ND	ug/L	U
Potassium, Dissolved	7440-09-7	1	1.41	20.0	9.59	ug/L	J
Sodium, Dissolved	7440-23-5	1	7.18	100	ND	ug/L	U

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Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

Field Blank-GW-092220

20I0445-05 (Water)

Metals and Metallic Compounds (dissolved)

Method: EPA 6020A UCT-KED — Sampled: 09/22/2020 13:15
Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/12/2020 19:08

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0445-05 A 01
Preparation Batch: BIJ0290 — Sample Size: 25 mL
Prepared: 10/08/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Copper, Dissolved	7440-50-8	1	0.340	0.500	ND	ug/L	U
Zinc, Dissolved	7440-66-6	1	0.820	4.00	ND	ug/L	U

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

Field Blank-GW-092220

20I0445-05RE1 (Water)

Metals and Metallic Compounds (dissolved)

Method: EPA 6020A UCT-KED — Sampled: 09/22/2020 13:15
Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/15/2020 22:40

Sample Preparation: Preparation Method: RHN EPA 600/4-79-020 4.1.4 HNO3 matrix 5x — Extract ID: 20I0445-05RE1 A 02
Preparation Batch: BIJ0439 — Sample Size: 100 mL
Prepared: 10/14/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Cadmium, Dissolved	7440-43-9	1	0.00600	0.0200	ND	ug/L	U

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

NRC-3DR-GW-092220

20I0445-06 (Water)

Metals and Metallic Compounds

Method: EPA 6020A — Sampled: 09/22/2020 14:00

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/19/2020 16:40

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0445-06 F 01

Preparation Batch: BIJ0288 — Sample Size: 25 mL

Prepared: 10/08/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Aluminum	7429-90-5	2	4.73	40.0	51.4	ug/L	D
Iron	7439-89-6	2	12.5	40.0	55.0	ug/L	D
Lead	7439-92-1	1	0.0680	0.100	ND	ug/L	U
Magnesium	7439-95-4	1	0.307	20.0	10100	ug/L	
Manganese	7439-96-5	5	0.425	2.50	3.76	ug/L	D
Potassium	7440-09-7	2	2.81	40.0	4250	ug/L	D
Sodium	7440-23-5	5	35.9	500	4900	ug/L	D

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

NRC-3DR-GW-092220

20I0445-06 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/22/2020 14:00

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/12/2020 20:46

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0445-06 F 01

Preparation Batch: BIJ0288 — Sample Size: 25 mL

Prepared: 10/08/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Copper	7440-50-8	1	0.340	0.500	0.429	ug/L	J
Zinc	7440-66-6	1	0.820	4.00	2.52	ug/L	J

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

NRC-3DR-GW-092220

20I0445-06 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/22/2020 14:00
Instrument: IC930 Analyst: KOTT — Analyzed: 09/30/2020 02:21

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-06 F
Preparation Batch: BII0841 — Sample Size: 10 mL
Prepared: 09/29/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Chloride	16887-00-6	1	0.100	0.100	0.725	mg/L	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Nitrate-N	14797-55-8	1	0.100	0.100	ND	mg/L	H, U

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

NRC-3DR-GW-092220

20I0445-06 (Water)

Wet Chemistry

Method: SM 2320 B-97 — Sampled: 09/22/2020 14:00

Instrument: Accumet AB150 Analyst: UW — Analyzed: 09/29/2020 10:57

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-06 C

Preparation Batch: BII0843 — Sample Size: 100 mL

Prepared: 09/29/2020 — Final Volume: 100 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Bicarbonate		1	1.00	1.00	33.5	mg/L CaCO3	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Carbonate		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Hydroxide		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Total		1	1.00	1.00	33.5	mg/L CaCO3	

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

NRC-3DR-GW-092220

20I0445-06 (Water)

Wet Chemistry

Method: SM 2540 C-97 — Sampled: 09/22/2020 14:00

Instrument: BAL2 Analyst: KLE — Analyzed: 09/29/2020 13:16

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-06

Preparation Batch: BII0853 — Sample Size: 200 mL

Prepared: 09/29/2020 — Final Volume: 200 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Solids		1	5	5	359	mg/L	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

NRC-3DR-GW-092220

20I0445-06 (Water)

Wet Chemistry

Method: SM 2540 D-97 — Sampled: 09/22/2020 14:00

Instrument: BAL2 Analyst: KLE — Analyzed: 09/29/2020 09:00

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-06

Preparation Batch: BII0833 — Sample Size: 955 mL

Prepared: 09/29/2020 — Final Volume: 1000 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Suspended Solids		1	1	1	2	mg/L	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

NRC-3DR-GW-092220

20I0445-06 (Water)

Wet Chemistry

Method: SM 5310 B-00 — Sampled: 09/22/2020 14:00

Instrument: TOC-LCSH Analyst: WCW — Analyzed: 10/05/2020 22:17

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-06 E

Preparation Batch: BIJ0113 — Sample Size: 20 mL

Prepared: 10/05/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Organic Carbon, Dissolved		1	0.50	0.50	ND	mg/L	U

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-06 D

Preparation Batch: BIJ0269 — Sample Size: 20 mL

Prepared: 10/08/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Organic Carbon		1	0.50	0.50	ND	mg/L	U

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

NRC-3DR-GW-092220

20I0445-06 (Water)

Calculation

Method: SM 2340 B-97 — Sampled: 09/22/2020 14:00

Instrument: [CALC] Analyst: MCB — Analyzed: 10/19/2020 16:40

Sample Preparation: Preparation Method: [CALC]
Preparation Batch: [CALC]
Prepared: 10/08/2020 Final Volume: 1 — Extract ID: 20I0445-06

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness		2	0.332	213	mg/L CaCO3	

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

NRC-3DR-GW-092220

20I0445-06RE1 (Water)

Metals and Metallic Compounds

Method: EPA 6020A — Sampled: 09/22/2020 14:00

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/19/2020 18:16

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0445-06RE1 F 01

Preparation Batch: BIJ0288 — Sample Size: 25 mL

Prepared: 10/08/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Calcium	7440-70-2	10	19.1	500	70800	ug/L	D

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

NRC-3DR-GW-092220

20I0445-06RE1 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/22/2020 14:00

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/15/2020 23:46

Sample Preparation: Preparation Method: RHN EPA 600/4-79-020 4.1.4 HNO3 matrix 5x — Extract ID: 20I0445-06RE1 F 02

Preparation Batch: BIJ0436 — Sample Size: 100 mL

Prepared: 10/14/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Cadmium	7440-43-9	1	0.00600	0.0200	0.0324	ug/L	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

NRC-3DR-GW-092220

20I0445-06RE1 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/22/2020 14:00

Instrument: IC930 Analyst: KOTT — Analyzed: 09/30/2020 10:19

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-06RE1 F

Preparation Batch: BII0841 — Sample Size: 10 mL

Prepared: 09/29/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Sulfate	14808-79-8	38	3.80	3.80	181	mg/L	D

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

NRC-3DR-GW-092220

20I0445-06RE1 (Water)

Calculation

Method: SM 2340 B-97 — Sampled: 09/22/2020 14:00

Instrument: [CALC] Analyst: MCB — Analyzed: 10/19/2020 18:16

Sample Preparation: Preparation Method: [CALC] — Extract ID: 20I0445-06RE1

Preparation Batch: [CALC]

Prepared: 10/08/2020 Final Volume: 1

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness		10	1.25	177	mg/L CaCO3	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

NRC-3IR-GW-092220

20I0445-07 (Water)

Metals and Metallic Compounds

Method: EPA 6020A — Sampled: 09/22/2020 14:00

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/17/2020 17:31

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0445-07 F 01

Preparation Batch: BIJ0288 — Sample Size: 25 mL

Prepared: 10/08/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Aluminum	7429-90-5	5	11.8	100	2930	ug/L	D
Calcium	7440-70-2	5	9.53	250	46100	ug/L	D
Iron	7439-89-6	5	31.4	100	13100	ug/L	D
Lead	7439-92-1	1	0.0680	0.100	ND	ug/L	U
Magnesium	7439-95-4	1	0.307	20.0	6550	ug/L	
Manganese	7439-96-5	5	0.425	2.50	471	ug/L	D
Potassium	7440-09-7	5	7.03	100	6780	ug/L	D
Sodium	7440-23-5	5	35.9	500	3130	ug/L	D

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

NRC-3IR-GW-092220

20I0445-07 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/22/2020 14:00

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/12/2020 21:29

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0445-07 F 01

Preparation Batch: BIJ0288 — Sample Size: 25 mL

Prepared: 10/08/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Cadmium	7440-43-9	1	0.0300	0.100	2.14	ug/L	
Copper	7440-50-8	1	0.340	0.500	18.8	ug/L	
Zinc	7440-66-6	5	4.70	20.0	307	ug/L	D

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

NRC-3IR-GW-092220

20I0445-07 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/22/2020 14:00

Instrument: IC930 Analyst: KOTT — Analyzed: 09/30/2020 02:41

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-07 F

Preparation Batch: BII0841 — Sample Size: 10 mL

Prepared: 09/29/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Chloride	16887-00-6	1	0.100	0.100	0.448	mg/L	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Nitrate-N	14797-55-8	1	0.100	0.100	ND	mg/L	H, U

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

NRC-3IR-GW-092220

20I0445-07 (Water)

Wet Chemistry

Method: SM 2320 B-97 — Sampled: 09/22/2020 14:00

Instrument: Accumet AB150 Analyst: UW — Analyzed: 09/29/2020 10:57

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-07 C

Preparation Batch: BII0843 — Sample Size: 100 mL

Prepared: 09/29/2020 — Final Volume: 100 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Bicarbonate		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Carbonate		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Hydroxide		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Total		1	1.00	1.00	ND	mg/L CaCO3	U

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

NRC-3IR-GW-092220

20I0445-07 (Water)

Wet Chemistry

Method: SM 2540 C-97 — Sampled: 09/22/2020 14:00

Instrument: BAL2 Analyst: KLE — Analyzed: 09/29/2020 13:16

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-07

Preparation Batch: BII0853 — Sample Size: 200 mL

Prepared: 09/29/2020 — Final Volume: 200 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Solids		1	5	5	334	mg/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

NRC-3IR-GW-092220

20I0445-07 (Water)

Wet Chemistry

Method: SM 2540 D-97 — Sampled: 09/22/2020 14:00

Instrument: BAL2 Analyst: KLE — Analyzed: 09/29/2020 09:00

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-07

Preparation Batch: BII0833 — Sample Size: 870 mL

Prepared: 09/29/2020 — Final Volume: 1000 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Suspended Solids		1	1	1	ND	mg/L	U

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

NRC-3IR-GW-092220

20I0445-07 (Water)

Wet Chemistry

Method: SM 5310 B-00 — Sampled: 09/22/2020 14:00

Instrument: TOC-LCSH Analyst: WCW — Analyzed: 10/05/2020 22:34

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-07 E

Preparation Batch: BIJ0113 — Sample Size: 20 mL

Prepared: 10/05/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Organic Carbon, Dissolved		1	0.50	0.50	ND	mg/L	U

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-07 D

Preparation Batch: BIJ0269 — Sample Size: 20 mL

Prepared: 10/08/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Organic Carbon		1	0.50	0.50	ND	mg/L	U

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

NRC-3IR-GW-092220

20I0445-07 (Water)

Calculation

Method: SM 2340 B-97 — Sampled: 09/22/2020 14:00

Instrument: [CALC] Analyst: MCB — Analyzed: 10/19/2020 18:24

Sample Preparation: Preparation Method: [CALC] — Extract ID: 20I0445-07

Preparation Batch: [CALC]

Prepared: 10/08/2020 Final Volume: 1

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness		5	0.707	142	mg/L CaCO3	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

NRC-3IR-GW-092220

20I0445-07RE1 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/22/2020 14:00

Instrument: IC930 Analyst: KOTT — Analyzed: 09/30/2020 10:39

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-07RE1 F

Preparation Batch: BII0841 — Sample Size: 10 mL

Prepared: 09/29/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Sulfate	14808-79-8	39	3.90	3.90	189	mg/L	D

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

NRC-3SR-GW-092220

20I0445-08 (Water)

Metals and Metallic Compounds

Method: EPA 6020A — Sampled: 09/22/2020 15:05

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/17/2020 17:39

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0445-08 F 01

Preparation Batch: BIJ0288 — Sample Size: 25 mL

Prepared: 10/08/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Aluminum	7429-90-5	1	2.37	20.0	622	ug/L	
Calcium	7440-70-2	1	1.91	50.0	5040	ug/L	
Iron	7439-89-6	1	6.27	20.0	366	ug/L	
Lead	7439-92-1	1	0.0680	0.100	ND	ug/L	U
Magnesium	7439-95-4	1	0.307	20.0	659	ug/L	
Manganese	7439-96-5	1	0.0850	0.500	109	ug/L	
Potassium	7440-09-7	1	1.41	20.0	563	ug/L	
Sodium	7440-23-5	1	7.18	100	778	ug/L	

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

NRC-3SR-GW-092220

20I0445-08 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/22/2020 15:05

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/12/2020 21:34

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0445-08 F 01

Preparation Batch: BIJ0288 — Sample Size: 25 mL

Prepared: 10/08/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Cadmium	7440-43-9	1	0.0300	0.100	0.118	ug/L	
Copper	7440-50-8	1	0.340	0.500	1.70	ug/L	
Zinc	7440-66-6	1	0.820	4.00	23.3	ug/L	

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

NRC-3SR-GW-092220

20I0445-08 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/22/2020 15:05
Instrument: IC930 Analyst: KOTT — Analyzed: 09/30/2020 03:01

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-08 F
Preparation Batch: BII0841 — Sample Size: 10 mL
Prepared: 09/29/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Chloride	16887-00-6	1	0.100	0.100	0.309	mg/L	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Nitrate-N	14797-55-8	1	0.100	0.100	ND	mg/L	H, U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Sulfate	14808-79-8	1	0.100	0.100	6.74	mg/L	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

NRC-3SR-GW-092220

20I0445-08 (Water)

Wet Chemistry

Method: SM 2320 B-97 — Sampled: 09/22/2020 15:05
Instrument: Accumet AB150 Analyst: UW — Analyzed: 09/29/2020 10:57

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-08 C
Preparation Batch: BII0843 — Sample Size: 100 mL
Prepared: 09/29/2020 — Final Volume: 100 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Bicarbonate		1	1.00	1.00	10.1	mg/L CaCO3	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Carbonate		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Hydroxide		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Total		1	1.00	1.00	10.1	mg/L CaCO3	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

NRC-3SR-GW-092220

20I0445-08 (Water)

Wet Chemistry

Method: SM 2540 C-97 — Sampled: 09/22/2020 15:05

Instrument: BAL2 Analyst: KLE — Analyzed: 09/29/2020 13:16

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-08

Preparation Batch: BII0853 — Sample Size: 200 mL

Prepared: 09/29/2020 — Final Volume: 200 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Solids		1	5	5	25	mg/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

NRC-3SR-GW-092220

20I0445-08 (Water)

Wet Chemistry

Method: SM 2540 D-97 — Sampled: 09/22/2020 15:05

Instrument: BAL2 Analyst: KLE — Analyzed: 09/29/2020 09:00

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-08

Preparation Batch: BII0833 — Sample Size: 930 mL

Prepared: 09/29/2020 — Final Volume: 1000 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Suspended Solids		1	1	1	17	mg/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

NRC-3SR-GW-092220

20I0445-08 (Water)

Wet Chemistry

Method: SM 5310 B-00 — Sampled: 09/22/2020 15:05

Instrument: TOC-LCSH Analyst: WCW — Analyzed: 10/05/2020 22:51

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-08 E

Preparation Batch: BIJ0113 — Sample Size: 20 mL

Prepared: 10/05/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Organic Carbon, Dissolved		1	0.50	0.50	ND	mg/L	U

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-08 D

Preparation Batch: BIJ0269 — Sample Size: 20 mL

Prepared: 10/08/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Organic Carbon		1	0.50	0.50	ND	mg/L	U

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

NRC-3SR-GW-092220

20I0445-08 (Water)

Calculation

Method: SM 2340 B-97 — Sampled: 09/22/2020 15:05

Instrument: [CALC] Analyst: MCB — Analyzed: 10/12/2020 21:34

Sample Preparation: Preparation Method: [CALC]
Preparation Batch: [CALC]
Prepared: 10/08/2020 Final Volume: 1 — Extract ID: 20I0445-08

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness		1	0.207	15.3	mg/L CaCO3	

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-7R-WP-092220

20I0445-09 (Water)

Metals and Metallic Compounds

Method: EPA 6020A — Sampled: 09/22/2020 16:05

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/17/2020 17:41

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0445-09 F 01

Preparation Batch: BIJ0288 — Sample Size: 25 mL

Prepared: 10/08/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Aluminum	7429-90-5	1	2.37	20.0	533	ug/L	
Calcium	7440-70-2	1	1.91	50.0	5130	ug/L	
Iron	7439-89-6	1	6.27	20.0	147	ug/L	
Lead	7439-92-1	1	0.0680	0.100	ND	ug/L	U
Magnesium	7439-95-4	1	0.307	20.0	557	ug/L	
Manganese	7439-96-5	1	0.0850	0.500	6.96	ug/L	
Potassium	7440-09-7	1	1.41	20.0	525	ug/L	
Sodium	7440-23-5	1	7.18	100	695	ug/L	

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-7R-WP-092220

20I0445-09 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/22/2020 16:05

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/12/2020 21:38

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0445-09 F 01

Preparation Batch: BIJ0288 — Sample Size: 25 mL

Prepared: 10/08/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Copper	7440-50-8	1	0.340	0.500	1.37	ug/L	
Zinc	7440-66-6	1	0.820	4.00	3.36	ug/L	J

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-7R-WP-092220

20I0445-09 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/22/2020 16:05

Instrument: IC930 Analyst: KOTT — Analyzed: 09/30/2020 03:21

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-09 F

Preparation Batch: BII0841 — Sample Size: 10 mL

Prepared: 09/29/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Chloride	16887-00-6	1	0.100	0.100	0.325	mg/L	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Nitrate-N	14797-55-8	1	0.100	0.100	ND	mg/L	H, U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Sulfate	14808-79-8	1	0.100	0.100	5.16	mg/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-7R-WP-092220

20I0445-09 (Water)

Wet Chemistry

Method: SM 2320 B-97 — Sampled: 09/22/2020 16:05

Instrument: Accumet AB150 Analyst: UW — Analyzed: 09/29/2020 10:57

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-09 C

Preparation Batch: BII0843 — Sample Size: 100 mL

Prepared: 09/29/2020 — Final Volume: 100 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Bicarbonate		1	1.00	1.00	10.5	mg/L CaCO3	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Carbonate		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Hydroxide		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Total		1	1.00	1.00	10.5	mg/L CaCO3	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-7R-WP-092220

20I0445-09 (Water)

Wet Chemistry

Method: SM 2540 C-97 — Sampled: 09/22/2020 16:05

Instrument: BAL2 Analyst: KLE — Analyzed: 09/29/2020 13:16

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-09

Preparation Batch: BII0853 — Sample Size: 200 mL

Prepared: 09/29/2020 — Final Volume: 200 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Solids		1	5	5	36	mg/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-7R-WP-092220

20I0445-09 (Water)

Wet Chemistry

Method: SM 2540 D-97 — Sampled: 09/22/2020 16:05

Instrument: BAL2 Analyst: KLE — Analyzed: 09/29/2020 10:38

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-09

Preparation Batch: BII0839 — Sample Size: 950 mL

Prepared: 09/29/2020 — Final Volume: 1000 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Suspended Solids		1	1	1	45	mg/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-7R-WP-092220

20I0445-09 (Water)

Wet Chemistry

Method: SM 5310 B-00 — Sampled: 09/22/2020 16:05

Instrument: TOC-LCSH Analyst: WCW — Analyzed: 10/05/2020 23:51

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-09 E

Preparation Batch: BIJ0113 — Sample Size: 20 mL

Prepared: 10/05/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Organic Carbon, Dissolved		1	0.50	0.50	ND	mg/L	U

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-09 D

Preparation Batch: BIJ0269 — Sample Size: 20 mL

Prepared: 10/08/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Organic Carbon		1	0.50	0.50	ND	mg/L	U

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-7R-WP-092220

20I0445-09 (Water)

Calculation

Method: SM 2340 B-97 — Sampled: 09/22/2020 16:05

Instrument: [CALC] Analyst: MCB — Analyzed: 10/12/2020 21:38

Sample Preparation: Preparation Method: [CALC]
Preparation Batch: [CALC]
Prepared: 10/08/2020 Final Volume: 1 — Extract ID: 20I0445-09

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness		1	0.207	15.1	mg/L CaCO3	

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-7R-WP-092220

20I0445-09RE1 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/22/2020 16:05

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/16/2020 00:25

Sample Preparation: Preparation Method: RHN EPA 600/4-79-020 4.1.4 HNO3 matrix 5x — Extract ID: 20I0445-09RE1 F 02

Preparation Batch: BIJ0436 — Sample Size: 100 mL

Prepared: 10/14/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Cadmium	7440-43-9	1	0.00600	0.0200	0.0246	ug/L	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-7R-WP-092220

20I0445-10 (Water)

Metals and Metallic Compounds (dissolved)

Method: EPA 6020A — Sampled: 09/22/2020 16:05

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/17/2020 17:43

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0445-10 A 01

Preparation Batch: BIJ0290 — Sample Size: 25 mL

Prepared: 10/08/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Aluminum, Dissolved	7429-90-5	1	2.37	20.0	196	ug/L	
Calcium, Dissolved	7440-70-2	1	1.91	50.0	5020	ug/L	
Iron, Dissolved	7439-89-6	1	6.27	20.0	60.7	ug/L	
Lead, Dissolved	7439-92-1	1	0.0680	0.100	ND	ug/L	U
Magnesium, Dissolved	7439-95-4	1	0.307	20.0	534	ug/L	
Manganese, Dissolved	7439-96-5	1	0.0850	0.500	2.38	ug/L	
Potassium, Dissolved	7440-09-7	1	1.41	20.0	514	ug/L	
Sodium, Dissolved	7440-23-5	1	7.18	100	709	ug/L	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-7R-WP-092220

20I0445-10 (Water)

Metals and Metallic Compounds (dissolved)

Method: EPA 6020A UCT-KED — Sampled: 09/22/2020 16:05

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/12/2020 21:42

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0445-10 A 01

Preparation Batch: BIJ0290 — Sample Size: 25 mL

Prepared: 10/08/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Copper, Dissolved	7440-50-8	1	0.340	0.500	0.749	ug/L	
Zinc, Dissolved	7440-66-6	1	0.820	4.00	2.42	ug/L	J

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-7R-WP-092220

20I0445-10RE1 (Water)

Metals and Metallic Compounds (dissolved)

Method: EPA 6020A UCT-KED — Sampled: 09/22/2020 16:05

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/16/2020 00:29

Sample Preparation: Preparation Method: RHN EPA 600/4-79-020 4.1.4 HNO3 matrix 5x — Extract ID: 20I0445-10RE1 A 02

Preparation Batch: BIJ0439 — Sample Size: 100 mL

Prepared: 10/14/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Cadmium, Dissolved	7440-43-9	1	0.00600	0.0200	0.0184	ug/L	J

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-7-SW-092220

20I0445-11 (Water)

Metals and Metallic Compounds

Method: EPA 6020A — Sampled: 09/22/2020 16:12

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/17/2020 17:45

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0445-11 F 01

Preparation Batch: BIJ0288 — Sample Size: 25 mL

Prepared: 10/08/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Aluminum	7429-90-5	1	2.37	20.0	21.1	ug/L	
Calcium	7440-70-2	1	1.91	50.0	5590	ug/L	
Iron	7439-89-6	1	6.27	20.0	68.8	ug/L	
Lead	7439-92-1	1	0.0680	0.100	ND	ug/L	U
Magnesium	7439-95-4	1	0.307	20.0	565	ug/L	
Manganese	7439-96-5	1	0.0850	0.500	3.34	ug/L	
Potassium	7440-09-7	1	1.41	20.0	494	ug/L	
Sodium	7440-23-5	1	7.18	100	729	ug/L	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-7-SW-092220

20I0445-11 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/22/2020 16:12

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/12/2020 21:46

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0445-11 F 01

Preparation Batch: BIJ0288 — Sample Size: 25 mL

Prepared: 10/08/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Copper	7440-50-8	1	0.340	0.500	0.614	ug/L	
Zinc	7440-66-6	1	0.820	4.00	5.63	ug/L	

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-7-SW-092220

20I0445-11 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/22/2020 16:12

Instrument: IC930 Analyst: KOTT — Analyzed: 09/30/2020 04:41

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-11 F

Preparation Batch: BII0841 — Sample Size: 10 mL

Prepared: 09/29/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Chloride	16887-00-6	1	0.100	0.100	0.335	mg/L	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Nitrate-N	14797-55-8	1	0.100	0.100	ND	mg/L	H, U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Sulfate	14808-79-8	1	0.100	0.100	5.47	mg/L	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-7-SW-092220

20I0445-11 (Water)

Wet Chemistry

Method: SM 2320 B-97 — Sampled: 09/22/2020 16:12

Instrument: Accumet AB150 Analyst: UW — Analyzed: 09/29/2020 10:57

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-11 C

Preparation Batch: BII0843 — Sample Size: 100 mL

Prepared: 09/29/2020 — Final Volume: 100 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Bicarbonate		1	1.00	1.00	12.7	mg/L CaCO3	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Carbonate		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Hydroxide		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Total		1	1.00	1.00	12.7	mg/L CaCO3	

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-7-SW-092220

20I0445-11 (Water)

Wet Chemistry

Method: SM 2540 C-97 — Sampled: 09/22/2020 16:12

Instrument: BAL2 Analyst: KLE — Analyzed: 09/29/2020 13:16

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-11

Preparation Batch: BII0853 — Sample Size: 200 mL

Prepared: 09/29/2020 — Final Volume: 200 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Solids		1	5	5	31	mg/L	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-7-SW-092220

20I0445-11 (Water)

Wet Chemistry

Method: SM 2540 D-97 — Sampled: 09/22/2020 16:12

Instrument: BAL2 Analyst: KLE — Analyzed: 09/29/2020 09:00

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-11

Preparation Batch: BII0833 — Sample Size: 935 mL

Prepared: 09/29/2020 — Final Volume: 1000 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Suspended Solids		1	1	1	ND	mg/L	U

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-7-SW-092220

20I0445-11 (Water)

Wet Chemistry

Method: SM 5310 B-00 — Sampled: 09/22/2020 16:12

Instrument: TOC-LCSH Analyst: WCW — Analyzed: 10/06/2020 00:09

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-11 E

Preparation Batch: BIJ0113 — Sample Size: 20 mL

Prepared: 10/05/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Organic Carbon, Dissolved		1	0.50	0.50	ND	mg/L	U

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-11 D

Preparation Batch: BIJ0269 — Sample Size: 20 mL

Prepared: 10/08/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Organic Carbon		1	0.50	0.50	ND	mg/L	U

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-7-SW-092220

20I0445-11 (Water)

Calculation

Method: SM 2340 B-97 — Sampled: 09/22/2020 16:12

Instrument: [CALC] Analyst: MCB — Analyzed: 10/12/2020 21:46

Sample Preparation: Preparation Method: [CALC] — Extract ID: 20I0445-11

Preparation Batch: [CALC]

Prepared: 10/08/2020 Final Volume: 1

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness		1	0.207	16.3	mg/L CaCO3	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-7-SW-092220

20I0445-11RE1 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/22/2020 16:12

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/16/2020 00:34

Sample Preparation: Preparation Method: RHN EPA 600/4-79-020 4.1.4 HNO3 matrix 5x — Extract ID: 20I0445-11RE1 F 02

Preparation Batch: BIJ0436 — Sample Size: 100 mL

Prepared: 10/14/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Cadmium	7440-43-9	1	0.00600	0.0200	0.0390	ug/L	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-18-WP-36-092420

20I0445-12 (Water)

Metals and Metallic Compounds

Method: EPA 6020A — Sampled: 09/24/2020 15:00

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/19/2020 16:04

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0445-12 F 01

Preparation Batch: BIJ0288 — Sample Size: 25 mL

Prepared: 10/08/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Aluminum	7429-90-5	1	2.37	20.0	308	ug/L	
Calcium	7440-70-2	1	1.91	50.0	10700	ug/L	
Iron	7439-89-6	1	6.27	20.0	258	ug/L	
Lead	7439-92-1	1	0.0680	0.100	0.100	ug/L	
Magnesium	7439-95-4	1	0.307	20.0	1220	ug/L	
Manganese	7439-96-5	1	0.0850	0.500	149	ug/L	
Potassium	7440-09-7	1	1.41	20.0	808	ug/L	
Sodium	7440-23-5	1	7.18	100	1040	ug/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-18-WP-36-092420

20I0445-12 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/24/2020 15:00

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/12/2020 21:51

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0445-12 F 01

Preparation Batch: BIJ0288 — Sample Size: 25 mL

Prepared: 10/08/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Cadmium	7440-43-9	1	0.0300	0.100	0.480	ug/L	
Copper	7440-50-8	1	0.340	0.500	2.68	ug/L	
Zinc	7440-66-6	1	0.820	4.00	13.9	ug/L	

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-18-WP-36-092420

20I0445-12 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/24/2020 15:00

Instrument: IC930 Analyst: KOTT — Analyzed: 09/30/2020 05:01

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-12 F

Preparation Batch: BII0841 — Sample Size: 10 mL

Prepared: 09/29/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Chloride	16887-00-6	1	0.100	0.100	0.128	mg/L	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Nitrate-N	14797-55-8	1	0.100	0.100	0.116	mg/L	H

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-18-WP-36-092420

20I0445-12 (Water)

Wet Chemistry

Method: SM 2320 B-97 — Sampled: 09/24/2020 15:00

Instrument: Accumet AB150 Analyst: UW — Analyzed: 09/29/2020 10:57

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-12 C

Preparation Batch: BII0843 — Sample Size: 100 mL

Prepared: 09/29/2020 — Final Volume: 100 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Bicarbonate		1	1.00	1.00	20.5	mg/L CaCO3	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Carbonate		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Hydroxide		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Total		1	1.00	1.00	20.5	mg/L CaCO3	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-18-WP-36-092420

20I0445-12 (Water)

Wet Chemistry

Method: SM 2540 C-97 — Sampled: 09/24/2020 15:00

Instrument: BAL2 Analyst: KLE — Analyzed: 09/29/2020 13:16

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-12

Preparation Batch: BII0853 — Sample Size: 200 mL

Prepared: 09/29/2020 — Final Volume: 200 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Solids		1	5	5	58	mg/L	

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-18-WP-36-092420

20I0445-12 (Water)

Wet Chemistry

Method: SM 2540 D-97 — Sampled: 09/24/2020 15:00

Instrument: BAL2 Analyst: KLE — Analyzed: 09/29/2020 09:00

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-12

Preparation Batch: BII0833 — Sample Size: 920 mL

Prepared: 09/29/2020 — Final Volume: 1000 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Suspended Solids		1	1	1	12	mg/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-18-WP-36-092420

20I0445-12 (Water)

Wet Chemistry

Method: SM 5310 B-00 — Sampled: 09/24/2020 15:00

Instrument: TOC-LCSH Analyst: WCW — Analyzed: 10/06/2020 00:26

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-12 E

Preparation Batch: BIJ0113 — Sample Size: 20 mL

Prepared: 10/05/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Organic Carbon, Dissolved		1	0.50	0.50	0.75	mg/L	

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-12 D

Preparation Batch: BIJ0269 — Sample Size: 20 mL

Prepared: 10/08/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Organic Carbon		1	0.50	0.50	0.55	mg/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-18-WP-36-092420

20I0445-12 (Water)

Calculation

Method: SM 2340 B-97 — Sampled: 09/24/2020 15:00

Instrument: [CALC] Analyst: MCB — Analyzed: 10/12/2020 21:51

Sample Preparation: Preparation Method: [CALC] — Extract ID: 20I0445-12

Preparation Batch: [CALC]

Prepared: 10/08/2020 Final Volume: 1

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness		1	0.207	31.8	mg/L CaCO3	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-18-WP-36-092420

20I0445-12RE1 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/24/2020 15:00

Instrument: IC930 Analyst: KOTT — Analyzed: 09/30/2020 10:59

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-12RE1 F

Preparation Batch: BII0841 — Sample Size: 10 mL

Prepared: 09/29/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Sulfate	14808-79-8	3	0.300	0.300	15.1	mg/L	D

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-18-WP-36-092420

20I0445-13 (Water)

Metals and Metallic Compounds (dissolved)

Method: EPA 6020A — Sampled: 09/24/2020 15:00

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/19/2020 16:06

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0445-13 A 01

Preparation Batch: BIJ0290 — Sample Size: 25 mL

Prepared: 10/08/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Aluminum, Dissolved	7429-90-5	1	2.37	20.0	275	ug/L	
Calcium, Dissolved	7440-70-2	1	1.91	50.0	11100	ug/L	
Iron, Dissolved	7439-89-6	1	6.27	20.0	237	ug/L	
Lead, Dissolved	7439-92-1	1	0.0680	0.100	0.0920	ug/L	J
Magnesium, Dissolved	7439-95-4	1	0.307	20.0	1250	ug/L	
Manganese, Dissolved	7439-96-5	1	0.0850	0.500	133	ug/L	
Potassium, Dissolved	7440-09-7	1	1.41	20.0	818	ug/L	
Sodium, Dissolved	7440-23-5	1	7.18	100	1040	ug/L	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-18-WP-36-092420

20I0445-13 (Water)

Metals and Metallic Compounds (dissolved)

Method: EPA 6020A UCT-KED — Sampled: 09/24/2020 15:00

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/12/2020 21:55

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0445-13 A 01

Preparation Batch: BIJ0290 — Sample Size: 25 mL

Prepared: 10/08/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Cadmium, Dissolved	7440-43-9	1	0.0300	0.100	0.374	ug/L	
Copper, Dissolved	7440-50-8	1	0.340	0.500	2.62	ug/L	
Zinc, Dissolved	7440-66-6	1	0.820	4.00	12.3	ug/L	

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-18-WP-092420

20I0445-14 (Water)

Metals and Metallic Compounds

Method: EPA 6020A — Sampled: 09/24/2020 14:00

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/19/2020 14:38

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0445-14 F 01

Preparation Batch: BIJ0242 — Sample Size: 25 mL

Prepared: 10/07/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Aluminum	7429-90-5	1	2.37	20.0	23.2	ug/L	
Calcium	7440-70-2	1	1.91	50.0	9580	ug/L	
Iron	7439-89-6	1	6.27	20.0	28.5	ug/L	
Lead	7439-92-1	1	0.0680	0.100	ND	ug/L	U
Magnesium	7439-95-4	1	0.307	20.0	1030	ug/L	
Manganese	7439-96-5	1	0.0850	0.500	6.07	ug/L	
Potassium	7440-09-7	1	1.41	20.0	735	ug/L	
Sodium	7440-23-5	1	7.18	100	982	ug/L	

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-18-WP-092420

20I0445-14 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/24/2020 14:00

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/09/2020 03:21

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0445-14 F 01

Preparation Batch: BIJ0242 — Sample Size: 25 mL

Prepared: 10/07/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Copper	7440-50-8	1	0.340	0.500	0.823	ug/L	
Zinc	7440-66-6	1	0.820	4.00	5.37	ug/L	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-18-WP-092420

20I0445-14 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/24/2020 14:00

Instrument: IC930 Analyst: KOTT — Analyzed: 09/30/2020 05:21

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-14 F

Preparation Batch: BII0841 — Sample Size: 10 mL

Prepared: 09/29/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Chloride	16887-00-6	1	0.100	0.100	0.112	mg/L	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Nitrate-N	14797-55-8	1	0.100	0.100	ND	mg/L	H, U

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-18-WP-092420

20I0445-14 (Water)

Wet Chemistry

Method: SM 2320 B-97 — Sampled: 09/24/2020 14:00

Instrument: Accumet AB150 Analyst: UW — Analyzed: 09/29/2020 10:57

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-14 C

Preparation Batch: BII0843 — Sample Size: 100 mL

Prepared: 09/29/2020 — Final Volume: 100 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Bicarbonate		1	1.00	1.00	21.1	mg/L CaCO3	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Carbonate		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Hydroxide		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Total		1	1.00	1.00	21.1	mg/L CaCO3	

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-18-WP-092420

20I0445-14 (Water)

Wet Chemistry

Method: SM 2540 C-97 — Sampled: 09/24/2020 14:00

Instrument: BAL2 Analyst: KLE — Analyzed: 09/29/2020 13:16

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-14

Preparation Batch: BII0853 — Sample Size: 200 mL

Prepared: 09/29/2020 — Final Volume: 200 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Solids		1	5	5	50	mg/L	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-18-WP-092420

20I0445-14 (Water)

Wet Chemistry

Method: SM 2540 D-97 — Sampled: 09/24/2020 14:00

Instrument: BAL2 Analyst: KLE — Analyzed: 09/29/2020 09:00

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-14

Preparation Batch: BII0833 — Sample Size: 955 mL

Prepared: 09/29/2020 — Final Volume: 1000 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Suspended Solids		1	1	1	11	mg/L	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-18-WP-092420

20I0445-14 (Water)

Wet Chemistry

Method: SM 5310 B-00 — Sampled: 09/24/2020 14:00

Instrument: TOC-LCSH Analyst: WCW — Analyzed: 10/06/2020 00:48

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-14 E

Preparation Batch: BIJ0113 — Sample Size: 20 mL

Prepared: 10/05/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Organic Carbon, Dissolved		1	0.50	0.50	0.66	mg/L	

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-14 D

Preparation Batch: BIJ0269 — Sample Size: 20 mL

Prepared: 10/08/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Organic Carbon		1	0.50	0.50	ND	mg/L	U

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-18-WP-092420

20I0445-14 (Water)

Calculation

Method: SM 2340 B-97 — Sampled: 09/24/2020 14:00

Instrument: [CALC] Analyst: MCB — Analyzed: 10/19/2020 14:38

Sample Preparation: Preparation Method: [CALC] — Extract ID: 20I0445-14

Preparation Batch: [CALC]

Prepared: 10/07/2020 Final Volume: 1

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness		1	0.207	28.2	mg/L CaCO3	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-18-WP-092420

20I0445-14RE1 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/24/2020 14:00

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/16/2020 00:38

Sample Preparation: Preparation Method: RHN EPA 600/4-79-020 4.1.4 HNO3 matrix 5x — Extract ID: 20I0445-14RE1 F 02

Preparation Batch: BIJ0345 — Sample Size: 100 mL

Prepared: 10/12/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Cadmium	7440-43-9	1	0.00600	0.0200	0.0516	ug/L	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-18-WP-092420

20I0445-14RE1 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/24/2020 14:00

Instrument: IC930 Analyst: KOTT — Analyzed: 09/30/2020 11:19

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-14RE1 F

Preparation Batch: BII0841 — Sample Size: 10 mL

Prepared: 09/29/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Sulfate	14808-79-8	2	0.200	0.200	11.8	mg/L	D

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-4S-GW-092320

20I0445-15 (Water)

Metals and Metallic Compounds

Method: EPA 6020A — Sampled: 09/23/2020 16:27

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/19/2020 15:30

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0445-15 F 01

Preparation Batch: BIJ0242 — Sample Size: 25 mL

Prepared: 10/07/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Aluminum	7429-90-5	1	2.37	20.0	4.19	ug/L	J
Calcium	7440-70-2	1	1.91	50.0	5170	ug/L	
Iron	7439-89-6	1	6.27	20.0	6.72	ug/L	J
Lead	7439-92-1	1	0.0680	0.100	ND	ug/L	U
Magnesium	7439-95-4	1	0.307	20.0	563	ug/L	
Manganese	7439-96-5	1	0.0850	0.500	0.132	ug/L	J
Potassium	7440-09-7	1	1.41	20.0	550	ug/L	
Sodium	7440-23-5	1	7.18	100	764	ug/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-4S-GW-092320

20I0445-15 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/23/2020 16:27

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/09/2020 03:25

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0445-15 F 01

Preparation Batch: BIJ0242 — Sample Size: 25 mL

Prepared: 10/07/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Cadmium	7440-43-9	1	0.0300	0.100	0.115	ug/L	
Copper	7440-50-8	1	0.340	0.500	ND	ug/L	U
Zinc	7440-66-6	1	0.820	4.00	11.2	ug/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-4S-GW-092320

20I0445-15 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/23/2020 16:27

Instrument: IC930 Analyst: KOTT — Analyzed: 09/30/2020 05:41

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-15 F

Preparation Batch: BII0841 — Sample Size: 10 mL

Prepared: 09/29/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Chloride	16887-00-6	1	0.100	0.100	0.305	mg/L	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Nitrate-N	14797-55-8	1	0.100	0.100	ND	mg/L	H, U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Sulfate	14808-79-8	1	0.100	0.100	5.46	mg/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-4S-GW-092320

20I0445-15 (Water)

Wet Chemistry

Method: SM 2320 B-97 — Sampled: 09/23/2020 16:27

Instrument: Accumet AB150 Analyst: UW — Analyzed: 09/29/2020 10:57

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-15 C

Preparation Batch: BII0843 — Sample Size: 100 mL

Prepared: 09/29/2020 — Final Volume: 100 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Bicarbonate		1	1.00	1.00	12.1	mg/L CaCO3	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Carbonate		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Hydroxide		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Total		1	1.00	1.00	12.1	mg/L CaCO3	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-4S-GW-092320

20I0445-15 (Water)

Wet Chemistry

Method: SM 2540 C-97 — Sampled: 09/23/2020 16:27

Instrument: BAL2 Analyst: KLE — Analyzed: 09/29/2020 13:16

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-15

Preparation Batch: BII0853 — Sample Size: 200 mL

Prepared: 09/29/2020 — Final Volume: 200 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Solids		1	5	5	34	mg/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-4S-GW-092320

20I0445-15 (Water)

Wet Chemistry

Method: SM 2540 D-97 — Sampled: 09/23/2020 16:27

Instrument: BAL2 Analyst: KLE — Analyzed: 09/29/2020 09:00

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-15

Preparation Batch: BII0833 — Sample Size: 930 mL

Prepared: 09/29/2020 — Final Volume: 1000 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Suspended Solids		1	1	1	ND	mg/L	U

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-4S-GW-092320

20I0445-15 (Water)

Wet Chemistry

Method: SM 5310 B-00 — Sampled: 09/23/2020 16:27

Instrument: TOC-LCSH Analyst: WCW — Analyzed: 10/06/2020 01:05

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-15 E

Preparation Batch: BIJ0113 — Sample Size: 20 mL

Prepared: 10/05/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Organic Carbon, Dissolved		1	0.50	0.50	ND	mg/L	U

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-15 D

Preparation Batch: BIJ0269 — Sample Size: 20 mL

Prepared: 10/08/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Organic Carbon		1	0.50	0.50	ND	mg/L	U

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-4S-GW-092320

20I0445-15 (Water)

Calculation

Method: SM 2340 B-97 — Sampled: 09/23/2020 16:27

Instrument: [CALC] Analyst: MCB — Analyzed: 10/19/2020 15:30

Sample Preparation: Preparation Method: [CALC] — Extract ID: 20I0445-15

Preparation Batch: [CALC]

Prepared: 10/07/2020 Final Volume: 1

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness		1	0.207	15.2	mg/L CaCO3	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-4D-GW-092320

20I0445-16 (Water)

Metals and Metallic Compounds

Method: EPA 6020A — Sampled: 09/23/2020 15:20

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/19/2020 15:32

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0445-16 F 01

Preparation Batch: BIJ0242 — Sample Size: 25 mL

Prepared: 10/07/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Aluminum	7429-90-5	1	2.37	20.0	66.8	ug/L	
Calcium	7440-70-2	1	1.91	50.0	8610	ug/L	
Iron	7439-89-6	1	6.27	20.0	8.06	ug/L	J
Lead	7439-92-1	1	0.0680	0.100	ND	ug/L	U
Magnesium	7439-95-4	1	0.307	20.0	1230	ug/L	
Manganese	7439-96-5	1	0.0850	0.500	68.5	ug/L	
Potassium	7440-09-7	1	1.41	20.0	1050	ug/L	
Sodium	7440-23-5	1	7.18	100	1160	ug/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-4D-GW-092320

20I0445-16 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/23/2020 15:20

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/09/2020 03:28

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0445-16 F 01

Preparation Batch: BIJ0242 — Sample Size: 25 mL

Prepared: 10/07/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Cadmium	7440-43-9	1	0.0300	0.100	0.249	ug/L	
Copper	7440-50-8	1	0.340	0.500	ND	ug/L	U
Zinc	7440-66-6	1	0.820	4.00	24.5	ug/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-4D-GW-092320

20I0445-16 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/23/2020 15:20

Instrument: IC930 Analyst: KOTT — Analyzed: 09/30/2020 06:01

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-16 B

Preparation Batch: BII0841 — Sample Size: 10 mL

Prepared: 09/29/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Chloride	16887-00-6	1	0.100	0.100	0.280	mg/L	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Nitrate-N	14797-55-8	1	0.100	0.100	ND	mg/L	H, U

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-4D-GW-092320

20I0445-16 (Water)

Wet Chemistry

Method: SM 2320 B-97 — Sampled: 09/23/2020 15:20

Instrument: Accumet AB150 Analyst: UW — Analyzed: 09/29/2020 10:57

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-16 C

Preparation Batch: BII0843 — Sample Size: 100 mL

Prepared: 09/29/2020 — Final Volume: 100 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Bicarbonate		1	1.00	1.00	6.15	mg/L CaCO3	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Carbonate		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Hydroxide		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Total		1	1.00	1.00	6.15	mg/L CaCO3	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-4D-GW-092320

20I0445-16 (Water)

Wet Chemistry

Method: SM 2540 C-97 — Sampled: 09/23/2020 15:20

Instrument: BAL2 Analyst: KLE — Analyzed: 09/29/2020 13:16

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-16

Preparation Batch: BII0853 — Sample Size: 200 mL

Prepared: 09/29/2020 — Final Volume: 200 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Solids		1	5	5	59	mg/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-4D-GW-092320

20I0445-16 (Water)

Wet Chemistry

Method: SM 2540 D-97 — Sampled: 09/23/2020 15:20

Instrument: BAL2 Analyst: KLE — Analyzed: 09/29/2020 09:00

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-16

Preparation Batch: BII0833 — Sample Size: 920 mL

Prepared: 09/29/2020 — Final Volume: 1000 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Suspended Solids		1	1	1	ND	mg/L	U

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-4D-GW-092320

20I0445-16 (Water)

Wet Chemistry

Method: SM 5310 B-00 — Sampled: 09/23/2020 15:20

Instrument: TOC-LCSH Analyst: WCW — Analyzed: 10/06/2020 01:22

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-16 E

Preparation Batch: BIJ0113 — Sample Size: 20 mL

Prepared: 10/05/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Organic Carbon, Dissolved		1	0.50	0.50	ND	mg/L	U

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-16 D

Preparation Batch: BIJ0269 — Sample Size: 20 mL

Prepared: 10/08/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Organic Carbon		1	0.50	0.50	ND	mg/L	U

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-4D-GW-092320

20I0445-16 (Water)

Calculation

Method: SM 2340 B-97 — Sampled: 09/23/2020 15:20

Instrument: [CALC] Analyst: MCB — Analyzed: 10/19/2020 15:32

Sample Preparation: Preparation Method: [CALC]
Preparation Batch: [CALC]
Prepared: 10/07/2020 Final Volume: 1 — Extract ID: 20I0445-16

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness		1	0.207	26.6	mg/L CaCO3	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-4D-GW-092320

20I0445-16RE1 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/23/2020 15:20

Instrument: IC930 Analyst: KOTT — Analyzed: 09/30/2020 11:39

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-16RE1 B

Preparation Batch: BII0841 — Sample Size: 10 mL

Prepared: 09/29/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Sulfate	14808-79-8	5	0.500	0.500	22.6	mg/L	D

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-4I-GW-092320

20I0445-17 (Water)

Metals and Metallic Compounds

Method: EPA 6020A — Sampled: 09/23/2020 15:00

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/19/2020 17:33

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0445-17 L 01

Preparation Batch: BIJ0242 — Sample Size: 25 mL

Prepared: 10/07/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Aluminum	7429-90-5	5	11.8	100	6100	ug/L	D
Calcium	7440-70-2	5	9.53	250	64700	ug/L	D
Iron	7439-89-6	5	31.4	100	23200	ug/L	D
Lead	7439-92-1	1	0.0680	0.100	0.0990	ug/L	J
Magnesium	7439-95-4	5	1.53	100	10200	ug/L	D
Manganese	7439-96-5	5	0.425	2.50	1030	ug/L	D
Potassium	7440-09-7	5	7.03	100	8450	ug/L	D
Sodium	7440-23-5	5	35.9	500	4130	ug/L	D

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-4I-GW-092320

20I0445-17 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/23/2020 15:00

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/09/2020 03:32

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0445-17 L 01

Preparation Batch: BIJ0242 — Sample Size: 25 mL

Prepared: 10/07/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Cadmium	7440-43-9	1	0.0300	0.100	2.50	ug/L	
Copper	7440-50-8	1	0.340	0.500	35.0	ug/L	
Zinc	7440-66-6	5	4.70	20.0	422	ug/L	D

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-4I-GW-092320

20I0445-17 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/23/2020 15:00

Instrument: IC930 Analyst: KOTT — Analyzed: 09/30/2020 20:55

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-17 L

Preparation Batch: BII0857 — Sample Size: 10 mL

Prepared: 09/29/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Chloride	16887-00-6	1	0.100	0.100	0.410	mg/L	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Nitrate-N	14797-55-8	1	0.100	0.100	ND	mg/L	H, U

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-4I-GW-092320

20I0445-17 (Water)

Wet Chemistry

Method: SM 2320 B-97 — Sampled: 09/23/2020 15:00

Instrument: Accumet AB150 Analyst: UW — Analyzed: 09/29/2020 10:57

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-17 F

Preparation Batch: BII0843 — Sample Size: 100 mL

Prepared: 09/29/2020 — Final Volume: 100 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Bicarbonate		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Carbonate		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Hydroxide		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Total		1	1.00	1.00	ND	mg/L CaCO3	U

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-4I-GW-092320

20I0445-17 (Water)

Wet Chemistry

Method: SM 2540 C-97 — Sampled: 09/23/2020 15:00

Instrument: BAL2 Analyst: KLE — Analyzed: 09/29/2020 13:16

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-17

Preparation Batch: BII0853 — Sample Size: 100 mL

Prepared: 09/29/2020 — Final Volume: 200 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Solids		1	10	10	507	mg/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-4I-GW-092320

20I0445-17 (Water)

Wet Chemistry

Method: SM 2540 D-97 — Sampled: 09/23/2020 15:00

Instrument: BAL2 Analyst: KLE — Analyzed: 09/29/2020 09:00

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-17

Preparation Batch: BII0833 — Sample Size: 940 mL

Prepared: 09/29/2020 — Final Volume: 1000 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Suspended Solids		1	1	1	3	mg/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-4I-GW-092320

20I0445-17 (Water)

Wet Chemistry

Method: SM 5310 B-00 — Sampled: 09/23/2020 15:00
Instrument: TOC-LCSH Analyst: WCW — Analyzed: 10/06/2020 01:44

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-17 J
Preparation Batch: BIJ0113 — Sample Size: 20 mL
Prepared: 10/05/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Organic Carbon, Dissolved		1	0.50	0.50	ND	mg/L	U

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-17 G
Preparation Batch: BIJ0269 — Sample Size: 20 mL
Prepared: 10/08/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Organic Carbon		1	0.50	0.50	ND	mg/L	U

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-4I-GW-092320

20I0445-17 (Water)

Calculation

Method: SM 2340 B-97 — Sampled: 09/23/2020 15:00

Instrument: [CALC] Analyst: MCB — Analyzed: 10/12/2020 13:16

Sample Preparation: Preparation Method: [CALC] — Extract ID: 20I0445-17

Preparation Batch: [CALC]

Prepared: 10/07/2020 Final Volume: 1

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness		5	1.04	203	mg/L CaCO3	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-4I-GW-092320

20I0445-17RE1 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/23/2020 15:00

Instrument: IC930 Analyst: KOTT — Analyzed: 10/02/2020 05:58

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-17RE1 L

Preparation Batch: BII0857 — Sample Size: 10 mL

Prepared: 09/29/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Sulfate	14808-79-8	57	5.70	5.70	280	mg/L	D

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-3D-GW-092320

20I0445-18 (Water)

Metals and Metallic Compounds

Method: EPA 6020A — Sampled: 09/23/2020 13:30

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/19/2020 15:34

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0445-18 F 01

Preparation Batch: BIJ0242 — Sample Size: 25 mL

Prepared: 10/07/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Aluminum	7429-90-5	1	2.37	20.0	21.9	ug/L	
Calcium	7440-70-2	1	1.91	50.0	5690	ug/L	
Iron	7439-89-6	1	6.27	20.0	7.62	ug/L	J
Lead	7439-92-1	1	0.0680	0.100	ND	ug/L	U
Magnesium	7439-95-4	1	0.307	20.0	733	ug/L	
Manganese	7439-96-5	1	0.0850	0.500	16.3	ug/L	
Potassium	7440-09-7	1	1.41	20.0	745	ug/L	
Sodium	7440-23-5	1	7.18	100	983	ug/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-3D-GW-092320

20I0445-18 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/23/2020 13:30

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/09/2020 04:06

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0445-18 F 01

Preparation Batch: BIJ0242 — Sample Size: 25 mL

Prepared: 10/07/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Cadmium	7440-43-9	1	0.0300	0.100	0.160	ug/L	
Copper	7440-50-8	1	0.340	0.500	ND	ug/L	U
Zinc	7440-66-6	1	0.820	4.00	13.5	ug/L	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-3D-GW-092320

20I0445-18 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/23/2020 13:30

Instrument: IC930 Analyst: KOTT — Analyzed: 09/30/2020 22:15

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-18 F

Preparation Batch: BII0857 — Sample Size: 10 mL

Prepared: 09/29/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Chloride	16887-00-6	1	0.100	0.100	0.295	mg/L	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Nitrate-N	14797-55-8	1	0.100	0.100	ND	mg/L	H, U

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-3D-GW-092320

20I0445-18 (Water)

Wet Chemistry

Method: SM 2320 B-97 — Sampled: 09/23/2020 13:30

Instrument: Accumet AB150 Analyst: UW — Analyzed: 09/29/2020 10:57

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-18 C

Preparation Batch: BII0843 — Sample Size: 100 mL

Prepared: 09/29/2020 — Final Volume: 100 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Bicarbonate		1	1.00	1.00	7.96	mg/L CaCO3	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Carbonate		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Hydroxide		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Total		1	1.00	1.00	7.96	mg/L CaCO3	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-3D-GW-092320

20I0445-18 (Water)

Wet Chemistry

Method: SM 2540 C-97 — Sampled: 09/23/2020 13:30

Instrument: BAL2 Analyst: KLE — Analyzed: 09/29/2020 13:16

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-18

Preparation Batch: BII0853 — Sample Size: 200 mL

Prepared: 09/29/2020 — Final Volume: 200 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Solids		1	5	5	43	mg/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-3D-GW-092320

20I0445-18 (Water)

Wet Chemistry

Method: SM 2540 D-97 — Sampled: 09/23/2020 13:30

Instrument: BAL2 Analyst: KLE — Analyzed: 09/29/2020 09:00

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-18

Preparation Batch: BII0833 — Sample Size: 950 mL

Prepared: 09/29/2020 — Final Volume: 1000 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Suspended Solids		1	1	1	ND	mg/L	U

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-3D-GW-092320

20I0445-18 (Water)

Wet Chemistry

Method: SM 5310 B-00 — Sampled: 09/23/2020 13:30

Instrument: TOC-LCSH Analyst: WCW — Analyzed: 10/06/2020 03:44

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-18 E

Preparation Batch: BIJ0113 — Sample Size: 20 mL

Prepared: 10/05/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Organic Carbon, Dissolved		1	0.50	0.50	ND	mg/L	U

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-18 D

Preparation Batch: BIJ0269 — Sample Size: 20 mL

Prepared: 10/08/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Organic Carbon		1	0.50	0.50	ND	mg/L	U

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-3D-GW-092320

20I0445-18 (Water)

Calculation

Method: SM 2340 B-97 — Sampled: 09/23/2020 13:30

Instrument: [CALC] Analyst: MCB — Analyzed: 10/19/2020 15:34

Sample Preparation: Preparation Method: [CALC] — Extract ID: 20I0445-18

Preparation Batch: [CALC]

Prepared: 10/07/2020 Final Volume: 1

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness		1	0.207	17.2	mg/L CaCO3	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-3D-GW-092320

20I0445-18RE1 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/23/2020 13:30

Instrument: IC930 Analyst: KOTT — Analyzed: 10/02/2020 07:17

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-18RE1 F

Preparation Batch: BII0857 — Sample Size: 10 mL

Prepared: 09/29/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Sulfate	14808-79-8	2	0.200	0.200	12.2	mg/L	D

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-3S-GW-092320

20I0445-19 (Water)

Metals and Metallic Compounds

Method: EPA 6020A — Sampled: 09/23/2020 13:55

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/19/2020 15:36

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0445-19 F 01

Preparation Batch: BIJ0242 — Sample Size: 25 mL

Prepared: 10/07/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Aluminum	7429-90-5	1	2.37	20.0	5.16	ug/L	J
Calcium	7440-70-2	1	1.91	50.0	4990	ug/L	
Iron	7439-89-6	1	6.27	20.0	ND	ug/L	U
Lead	7439-92-1	1	0.0680	0.100	ND	ug/L	U
Magnesium	7439-95-4	1	0.307	20.0	533	ug/L	
Manganese	7439-96-5	1	0.0850	0.500	0.350	ug/L	J
Potassium	7440-09-7	1	1.41	20.0	591	ug/L	
Sodium	7440-23-5	1	7.18	100	835	ug/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-3S-GW-092320

20I0445-19 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/23/2020 13:55

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/09/2020 04:09

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0445-19 F 01

Preparation Batch: BIJ0242 — Sample Size: 25 mL

Prepared: 10/07/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Copper	7440-50-8	1	0.340	0.500	ND	ug/L	U
Zinc	7440-66-6	1	0.820	4.00	10.3	ug/L	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-3S-GW-092320

20I0445-19 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/23/2020 13:55

Instrument: IC930 Analyst: KOTT — Analyzed: 09/30/2020 23:16

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-19 F

Preparation Batch: BII0857 — Sample Size: 10 mL

Prepared: 09/29/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Chloride	16887-00-6	1	0.100	0.100	0.302	mg/L	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Nitrate-N	14797-55-8	1	0.100	0.100	ND	mg/L	H, U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Sulfate	14808-79-8	1	0.100	0.100	5.49	mg/L	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-3S-GW-092320

20I0445-19 (Water)

Wet Chemistry

Method: SM 2320 B-97 — Sampled: 09/23/2020 13:55

Instrument: Accumet AB150 Analyst: UW — Analyzed: 09/29/2020 10:57

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-19 C

Preparation Batch: BII0843 — Sample Size: 100 mL

Prepared: 09/29/2020 — Final Volume: 100 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Bicarbonate		1	1.00	1.00	10.7	mg/L CaCO3	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Carbonate		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Hydroxide		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Total		1	1.00	1.00	10.7	mg/L CaCO3	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-3S-GW-092320

20I0445-19 (Water)

Wet Chemistry

Method: SM 2540 C-97 — Sampled: 09/23/2020 13:55

Instrument: BAL2 Analyst: KLE — Analyzed: 09/29/2020 13:16

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-19

Preparation Batch: BII0853 — Sample Size: 200 mL

Prepared: 09/29/2020 — Final Volume: 200 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Solids		1	5	5	28	mg/L	

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-3S-GW-092320

20I0445-19 (Water)

Wet Chemistry

Method: SM 2540 D-97 — Sampled: 09/23/2020 13:55

Instrument: BAL2 Analyst: KLE — Analyzed: 09/29/2020 09:00

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-19

Preparation Batch: BII0833 — Sample Size: 940 mL

Prepared: 09/29/2020 — Final Volume: 1000 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Suspended Solids		1	1	1	ND	mg/L	U

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-3S-GW-092320

20I0445-19 (Water)

Wet Chemistry

Method: SM 5310 B-00 — Sampled: 09/23/2020 13:55

Instrument: TOC-LCSH Analyst: WCW — Analyzed: 10/06/2020 04:05

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-19 E

Preparation Batch: BIJ0113 — Sample Size: 20 mL

Prepared: 10/05/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Organic Carbon, Dissolved		1	0.50	0.50	ND	mg/L	U

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-19 D

Preparation Batch: BIJ0269 — Sample Size: 20 mL

Prepared: 10/08/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Organic Carbon		1	0.50	0.50	ND	mg/L	U

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-3S-GW-092320

20I0445-19 (Water)

Calculation

Method: SM 2340 B-97 — Sampled: 09/23/2020 13:55

Instrument: [CALC] Analyst: MCB — Analyzed: 10/19/2020 15:36

Sample Preparation: Preparation Method: [CALC] — Extract ID: 20I0445-19

Preparation Batch: [CALC]

Prepared: 10/07/2020 Final Volume: 1

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness		1	0.207	14.7	mg/L CaCO3	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-3S-GW-092320

20I0445-19RE1 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/23/2020 13:55

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/16/2020 00:43

Sample Preparation: Preparation Method: RHN EPA 600/4-79-020 4.1.4 HNO3 matrix 5x — Extract ID: 20I0445-19RE1 F 02

Preparation Batch: BIJ0345 — Sample Size: 100 mL

Prepared: 10/12/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Cadmium	7440-43-9	1	0.00600	0.0200	0.0934	ug/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-18S-GW-092320

20I0445-20 (Water)

Metals and Metallic Compounds

Method: EPA 6020A — Sampled: 09/23/2020 15:15

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/19/2020 15:38

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0445-20 F 01

Preparation Batch: BIJ0242 — Sample Size: 25 mL

Prepared: 10/07/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Aluminum	7429-90-5	1	2.37	20.0	47.9	ug/L	
Calcium	7440-70-2	1	1.91	50.0	4070	ug/L	
Iron	7439-89-6	1	6.27	20.0	45.9	ug/L	
Lead	7439-92-1	1	0.0680	0.100	ND	ug/L	U
Magnesium	7439-95-4	1	0.307	20.0	512	ug/L	
Manganese	7439-96-5	1	0.0850	0.500	3.64	ug/L	
Potassium	7440-09-7	1	1.41	20.0	643	ug/L	
Sodium	7440-23-5	1	7.18	100	761	ug/L	

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-18S-GW-092320

20I0445-20 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/23/2020 15:15

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/09/2020 04:13

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0445-20 F 01

Preparation Batch: BIJ0242 — Sample Size: 25 mL

Prepared: 10/07/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Copper	7440-50-8	1	0.340	0.500	0.471	ug/L	J
Zinc	7440-66-6	1	0.820	4.00	2.14	ug/L	J

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-18S-GW-092320

20I0445-20 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/23/2020 15:15

Instrument: IC930 Analyst: KOTT — Analyzed: 09/30/2020 23:36

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-20 F

Preparation Batch: BII0857 — Sample Size: 10 mL

Prepared: 09/29/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Chloride	16887-00-6	1	0.100	0.100	0.307	mg/L	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Nitrate-N	14797-55-8	1	0.100	0.100	ND	mg/L	H, U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Sulfate	14808-79-8	1	0.100	0.100	9.12	mg/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-18S-GW-092320

20I0445-20 (Water)

Wet Chemistry

Method: SM 2320 B-97 — Sampled: 09/23/2020 15:15

Instrument: Accumet AB150 Analyst: UW — Analyzed: 09/29/2020 10:57

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-20 C

Preparation Batch: BII0843 — Sample Size: 100 mL

Prepared: 09/29/2020 — Final Volume: 100 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Bicarbonate		1	1.00	1.00	5.04	mg/L CaCO3	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Carbonate		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Hydroxide		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Total		1	1.00	1.00	5.04	mg/L CaCO3	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-18S-GW-092320

20I0445-20 (Water)

Wet Chemistry

Method: SM 2540 C-97 — Sampled: 09/23/2020 15:15

Instrument: BAL2 Analyst: KLE — Analyzed: 09/29/2020 13:16

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-20

Preparation Batch: BII0853 — Sample Size: 200 mL

Prepared: 09/29/2020 — Final Volume: 200 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Solids		1	5	5	33	mg/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-18S-GW-092320

20I0445-20 (Water)

Wet Chemistry

Method: SM 2540 D-97 — Sampled: 09/23/2020 15:15

Instrument: BAL2 Analyst: KLE — Analyzed: 09/29/2020 09:00

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-20

Preparation Batch: BII0833 — Sample Size: 945 mL

Prepared: 09/29/2020 — Final Volume: 1000 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Suspended Solids		1	1	1	3	mg/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-18S-GW-092320

20I0445-20 (Water)

Wet Chemistry

Method: SM 5310 B-00 — Sampled: 09/23/2020 15:15

Instrument: TOC-LCSH Analyst: WCW — Analyzed: 10/06/2020 04:34

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-20 E

Preparation Batch: BIJ0113 — Sample Size: 20 mL

Prepared: 10/05/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Organic Carbon, Dissolved		1	0.50	0.50	ND	mg/L	U

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-20 D

Preparation Batch: BIJ0269 — Sample Size: 20 mL

Prepared: 10/08/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Organic Carbon		1	0.50	0.50	ND	mg/L	U

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-18S-GW-092320

20I0445-20 (Water)

Calculation

Method: SM 2340 B-97 — Sampled: 09/23/2020 15:15

Instrument: [CALC] Analyst: MCB — Analyzed: 10/19/2020 15:38

Sample Preparation: Preparation Method: [CALC] — Extract ID: 20I0445-20

Preparation Batch: [CALC]

Prepared: 10/07/2020 Final Volume: 1

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness		1	0.207	12.3	mg/L CaCO3	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-18S-GW-092320

20I0445-20RE1 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/23/2020 15:15

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/16/2020 00:48

Sample Preparation: Preparation Method: RHN EPA 600/4-79-020 4.1.4 HNO3 matrix 5x — Extract ID: 20I0445-20RE1 F 02

Preparation Batch: BIJ0345 — Sample Size: 100 mL

Prepared: 10/12/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Cadmium	7440-43-9	1	0.00600	0.0200	0.0306	ug/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-17S-GW-092320

20I0445-21 (Water)

Metals and Metallic Compounds

Method: EPA 6020A — Sampled: 09/23/2020 12:30

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/19/2020 15:40

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0445-21 F 01

Preparation Batch: BIJ0242 — Sample Size: 25 mL

Prepared: 10/07/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Aluminum	7429-90-5	1	2.37	20.0	388	ug/L	
Calcium	7440-70-2	1	1.91	50.0	4560	ug/L	
Iron	7439-89-6	1	6.27	20.0	12.0	ug/L	J
Lead	7439-92-1	1	0.0680	0.100	ND	ug/L	U
Magnesium	7439-95-4	1	0.307	20.0	555	ug/L	
Manganese	7439-96-5	1	0.0850	0.500	24.4	ug/L	
Potassium	7440-09-7	1	1.41	20.0	673	ug/L	
Sodium	7440-23-5	1	7.18	100	793	ug/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-17S-GW-092320

20I0445-21 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/23/2020 12:30

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/09/2020 04:16

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0445-21 F 01

Preparation Batch: BIJ0242 — Sample Size: 25 mL

Prepared: 10/07/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Cadmium	7440-43-9	1	0.0300	0.100	0.457	ug/L	
Copper	7440-50-8	1	0.340	0.500	9.13	ug/L	
Zinc	7440-66-6	1	0.940	4.00	55.4	ug/L	

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-17S-GW-092320

20I0445-21 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/23/2020 12:30

Instrument: IC930 Analyst: KOTT — Analyzed: 09/30/2020 23:56

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-21 F

Preparation Batch: BII0857 — Sample Size: 10 mL

Prepared: 09/29/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Chloride	16887-00-6	1	0.100	0.100	0.309	mg/L	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Nitrate-N	14797-55-8	1	0.100	0.100	ND	mg/L	H, U

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-17S-GW-092320

20I0445-21 (Water)

Wet Chemistry

Method: SM 2320 B-97 — Sampled: 09/23/2020 12:30

Instrument: Accumet AB150 Analyst: UW — Analyzed: 09/29/2020 10:57

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-21 C

Preparation Batch: BII0843 — Sample Size: 100 mL

Prepared: 09/29/2020 — Final Volume: 100 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Bicarbonate		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Carbonate		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Hydroxide		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Total		1	1.00	1.00	ND	mg/L CaCO3	U

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-17S-GW-092320

20I0445-21 (Water)

Wet Chemistry

Method: SM 2540 C-97 — Sampled: 09/23/2020 12:30

Instrument: BAL2 Analyst: KLE — Analyzed: 09/29/2020 13:16

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-21

Preparation Batch: BII0853 — Sample Size: 200 mL

Prepared: 09/29/2020 — Final Volume: 200 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Solids		1	5	5	46	mg/L	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-17S-GW-092320

20I0445-21 (Water)

Wet Chemistry

Method: SM 2540 D-97 — Sampled: 09/23/2020 12:30

Instrument: BAL2 Analyst: KLE — Analyzed: 09/29/2020 09:00

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-21

Preparation Batch: BII0833 — Sample Size: 960 mL

Prepared: 09/29/2020 — Final Volume: 1000 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Suspended Solids		1	1	1	ND	mg/L	U

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-17S-GW-092320

20I0445-21 (Water)

Wet Chemistry

Method: SM 5310 B-00 — Sampled: 09/23/2020 12:30

Instrument: TOC-LCSH Analyst: WCW — Analyzed: 10/06/2020 04:55

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-21 E

Preparation Batch: BIJ0113 — Sample Size: 20 mL

Prepared: 10/05/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Organic Carbon, Dissolved		1	0.50	0.50	ND	mg/L	U

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-21 D

Preparation Batch: BIJ0269 — Sample Size: 20 mL

Prepared: 10/08/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Organic Carbon		1	0.50	0.50	ND	mg/L	U

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-17S-GW-092320

20I0445-21 (Water)

Calculation

Method: SM 2340 B-97 — Sampled: 09/23/2020 12:30

Instrument: [CALC] Analyst: MCB — Analyzed: 10/19/2020 15:40

Sample Preparation: Preparation Method: [CALC] — Extract ID: 20I0445-21

Preparation Batch: [CALC]

Prepared: 10/07/2020 Final Volume: 1

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness		1	0.207	13.7	mg/L CaCO3	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-17S-GW-092320

20I0445-21RE1 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/23/2020 12:30

Instrument: IC930 Analyst: KOTT — Analyzed: 10/02/2020 07:37

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-21RE1 F

Preparation Batch: BII0857 — Sample Size: 10 mL

Prepared: 09/29/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Sulfate	14808-79-8	4	0.400	0.400	18.5	mg/L	D

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-17I-GW-092320

20I0445-22 (Water)

Metals and Metallic Compounds

Method: EPA 6020A — Sampled: 09/23/2020 14:00

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/19/2020 15:42

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0445-22 F 01

Preparation Batch: BIJ0242 — Sample Size: 25 mL

Prepared: 10/07/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Aluminum	7429-90-5	1	2.37	20.0	1300	ug/L	
Calcium	7440-70-2	1	1.91	50.0	9780	ug/L	
Iron	7439-89-6	1	6.27	20.0	12.9	ug/L	J
Lead	7439-92-1	1	0.0680	0.100	ND	ug/L	U
Magnesium	7439-95-4	1	0.307	20.0	1530	ug/L	
Manganese	7439-96-5	1	0.0850	0.500	49.8	ug/L	
Potassium	7440-09-7	1	1.41	20.0	1220	ug/L	
Sodium	7440-23-5	1	7.18	100	1350	ug/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-17I-GW-092320

20I0445-22 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/23/2020 14:00

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/09/2020 04:20

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0445-22 F 01

Preparation Batch: BIJ0242 — Sample Size: 25 mL

Prepared: 10/07/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Cadmium	7440-43-9	1	0.0300	0.100	1.82	ug/L	
Copper	7440-50-8	1	0.340	0.500	21.6	ug/L	
Zinc	7440-66-6	1	0.940	4.00	197	ug/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-17I-GW-092320

20I0445-22 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/23/2020 14:00

Instrument: IC930 Analyst: KOTT — Analyzed: 10/01/2020 00:16

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-22 F

Preparation Batch: BII0857 — Sample Size: 10 mL

Prepared: 09/29/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Chloride	16887-00-6	1	0.100	0.100	0.277	mg/L	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Nitrate-N	14797-55-8	1	0.100	0.100	0.110	mg/L	H

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-17I-GW-092320

20I0445-22 (Water)

Wet Chemistry

Method: SM 2320 B-97 — Sampled: 09/23/2020 14:00

Instrument: Accumet AB150 Analyst: UW — Analyzed: 09/29/2020 10:57

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-22 C

Preparation Batch: BII0843 — Sample Size: 100 mL

Prepared: 09/29/2020 — Final Volume: 100 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Bicarbonate		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Carbonate		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Hydroxide		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Total		1	1.00	1.00	ND	mg/L CaCO3	U

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-17I-GW-092320

20I0445-22 (Water)

Wet Chemistry

Method: SM 2540 C-97 — Sampled: 09/23/2020 14:00

Instrument: BAL2 Analyst: KLE — Analyzed: 09/29/2020 13:16

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-22

Preparation Batch: BII0853 — Sample Size: 200 mL

Prepared: 09/29/2020 — Final Volume: 200 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Solids		1	5	5	89	mg/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-17I-GW-092320

20I0445-22 (Water)

Wet Chemistry

Method: SM 2540 D-97 — Sampled: 09/23/2020 14:00

Instrument: BAL2 Analyst: KLE — Analyzed: 09/29/2020 09:00

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-22

Preparation Batch: BII0833 — Sample Size: 950 mL

Prepared: 09/29/2020 — Final Volume: 1000 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Suspended Solids		1	1	1	ND	mg/L	U

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-17I-GW-092320

20I0445-22 (Water)

Wet Chemistry

Method: SM 5310 B-00 — Sampled: 09/23/2020 14:00

Instrument: TOC-LCSH Analyst: WCW — Analyzed: 10/06/2020 05:16

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-22 E

Preparation Batch: BIJ0113 — Sample Size: 20 mL

Prepared: 10/05/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Organic Carbon, Dissolved		1	0.50	0.50	ND	mg/L	U

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-22 D

Preparation Batch: BIJ0269 — Sample Size: 20 mL

Prepared: 10/08/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Organic Carbon		1	0.50	0.50	ND	mg/L	U

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-17I-GW-092320

20I0445-22 (Water)

Calculation

Method: SM 2340 B-97 — Sampled: 09/23/2020 14:00

Instrument: [CALC] Analyst: MCB — Analyzed: 10/19/2020 15:42

Sample Preparation: Preparation Method: [CALC] — Extract ID: 20I0445-22

Preparation Batch: [CALC]

Prepared: 10/07/2020 Final Volume: 1

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness		1	0.207	30.7	mg/L CaCO3	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-17I-GW-092320

20I0445-22RE1 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/23/2020 14:00

Instrument: IC930 Analyst: KOTT — Analyzed: 10/02/2020 07:57

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-22RE1 F

Preparation Batch: BII0857 — Sample Size: 10 mL

Prepared: 09/29/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Sulfate	14808-79-8	9	0.900	0.900	40.6	mg/L	D

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-15S-GW-092320

20I0445-23 (Water)

Metals and Metallic Compounds

Method: EPA 6020A — Sampled: 09/23/2020 08:40

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/19/2020 16:19

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0445-23 F 01

Preparation Batch: BIJ0242 — Sample Size: 25 mL

Prepared: 10/07/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Aluminum	7429-90-5	5	11.8	100	30.5	ug/L	J, D
Calcium	7440-70-2	5	9.53	250	121000	ug/L	D
Iron	7439-89-6	5	31.4	100	39500	ug/L	D
Lead	7439-92-1	1	0.0680	0.100	ND	ug/L	U
Magnesium	7439-95-4	5	1.53	100	14800	ug/L	D
Manganese	7439-96-5	5	0.425	2.50	552	ug/L	D
Potassium	7440-09-7	5	7.03	100	15500	ug/L	D
Sodium	7440-23-5	5	35.9	500	5000	ug/L	D

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-15S-GW-092320

20I0445-23 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/23/2020 08:40

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/09/2020 04:23

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0445-23 F 01

Preparation Batch: BIJ0242 — Sample Size: 25 mL

Prepared: 10/07/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Cadmium	7440-43-9	1	0.0300	0.100	0.154	ug/L	
Copper	7440-50-8	1	0.340	0.500	0.603	ug/L	
Zinc	7440-66-6	1	0.820	4.00	43.3	ug/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-15S-GW-092320

20I0445-23 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/23/2020 08:40

Instrument: IC930 Analyst: KOTT — Analyzed: 10/01/2020 00:36

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-23 F

Preparation Batch: BII0857 — Sample Size: 10 mL

Prepared: 09/29/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Chloride	16887-00-6	1	0.100	0.100	0.334	mg/L	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Nitrate-N	14797-55-8	1	0.100	0.100	ND	mg/L	H, U

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-15S-GW-092320

20I0445-23 (Water)

Wet Chemistry

Method: SM 2320 B-97 — Sampled: 09/23/2020 08:40

Instrument: Accumet AB150 Analyst: UW — Analyzed: 09/29/2020 10:57

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-23 C

Preparation Batch: BII0843 — Sample Size: 100 mL

Prepared: 09/29/2020 — Final Volume: 100 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Bicarbonate		1	1.00	1.00	32.7	mg/L CaCO3	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Carbonate		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Hydroxide		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Total		1	1.00	1.00	32.7	mg/L CaCO3	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-15S-GW-092320

20I0445-23 (Water)

Wet Chemistry

Method: SM 2540 C-97 — Sampled: 09/23/2020 08:40

Instrument: BAL2 Analyst: KLE — Analyzed: 09/29/2020 13:16

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-23

Preparation Batch: BII0853 — Sample Size: 100 mL

Prepared: 09/29/2020 — Final Volume: 200 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Solids		1	10	10	662	mg/L	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-15S-GW-092320

20I0445-23 (Water)

Wet Chemistry

Method: SM 2540 D-97 — Sampled: 09/23/2020 08:40

Instrument: BAL2 Analyst: KLE — Analyzed: 09/29/2020 11:50

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-23

Preparation Batch: BII0846 — Sample Size: 950 mL

Prepared: 09/29/2020 — Final Volume: 1000 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Suspended Solids		1	1	1	17	mg/L	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-15S-GW-092320

20I0445-23 (Water)

Wet Chemistry

Method: SM 5310 B-00 — Sampled: 09/23/2020 08:40

Instrument: TOC-LCSH Analyst: WCW — Analyzed: 10/06/2020 05:37

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-23 E

Preparation Batch: BIJ0113 — Sample Size: 20 mL

Prepared: 10/05/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Organic Carbon, Dissolved		1	0.50	0.50	0.88	mg/L	

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-23 D

Preparation Batch: BIJ0269 — Sample Size: 20 mL

Prepared: 10/08/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Organic Carbon		1	0.50	0.50	0.84	mg/L	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-15S-GW-092320

20I0445-23 (Water)

Calculation

Method: SM 2340 B-97 — Sampled: 09/23/2020 08:40

Instrument: [CALC] Analyst: MCB — Analyzed: 10/19/2020 16:19

Sample Preparation: Preparation Method: [CALC] — Extract ID: 20I0445-23

Preparation Batch: [CALC]

Prepared: 10/07/2020 Final Volume: 1

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness		5	1.04	363	mg/L CaCO3	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-15S-GW-092320

20I0445-23RE1 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/23/2020 08:40

Instrument: IC930 Analyst: KOTT — Analyzed: 10/02/2020 09:17

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-23RE1 F

Preparation Batch: BII0857 — Sample Size: 10 mL

Prepared: 09/29/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Sulfate	14808-79-8	77	7.70	7.70	366	mg/L	D

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-16S-GW-092320

20I0445-24 (Water)

Metals and Metallic Compounds

Method: EPA 6020A — Sampled: 09/23/2020 11:00

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/19/2020 15:44

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0445-24 F 01

Preparation Batch: BIJ0242 — Sample Size: 25 mL

Prepared: 10/07/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Aluminum	7429-90-5	1	2.37	20.0	15.9	ug/L	J
Calcium	7440-70-2	1	1.91	50.0	5570	ug/L	
Iron	7439-89-6	1	6.27	20.0	205	ug/L	
Lead	7439-92-1	1	0.0680	0.100	ND	ug/L	U
Magnesium	7439-95-4	1	0.307	20.0	686	ug/L	
Manganese	7439-96-5	1	0.0850	0.500	24.3	ug/L	
Potassium	7440-09-7	1	1.41	20.0	732	ug/L	
Sodium	7440-23-5	1	7.18	100	920	ug/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-16S-GW-092320

20I0445-24 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/23/2020 11:00

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/09/2020 04:27

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0445-24 F 01

Preparation Batch: BIJ0242 — Sample Size: 25 mL

Prepared: 10/07/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Cadmium	7440-43-9	1	0.0300	0.100	0.312	ug/L	
Copper	7440-50-8	1	0.340	0.500	0.771	ug/L	
Zinc	7440-66-6	1	0.820	4.00	20.3	ug/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-16S-GW-092320

20I0445-24 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/23/2020 11:00

Instrument: IC930 Analyst: KOTT — Analyzed: 10/01/2020 00:56

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-24 F

Preparation Batch: BII0857 — Sample Size: 10 mL

Prepared: 09/29/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Chloride	16887-00-6	1	0.100	0.100	0.317	mg/L	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Nitrate-N	14797-55-8	1	0.100	0.100	ND	mg/L	H, U

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-16S-GW-092320

20I0445-24 (Water)

Wet Chemistry

Method: SM 2320 B-97 — Sampled: 09/23/2020 11:00

Instrument: Accumet AB150 Analyst: UW — Analyzed: 09/29/2020 10:57

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-24 C

Preparation Batch: BII0843 — Sample Size: 100 mL

Prepared: 09/29/2020 — Final Volume: 100 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Bicarbonate		1	1.00	1.00	9.07	mg/L CaCO3	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Carbonate		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Hydroxide		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Total		1	1.00	1.00	9.07	mg/L CaCO3	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-16S-GW-092320

20I0445-24 (Water)

Wet Chemistry

Method: SM 2540 C-97 — Sampled: 09/23/2020 11:00

Instrument: BAL2 Analyst: KLE — Analyzed: 09/29/2020 13:16

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-24

Preparation Batch: BII0853 — Sample Size: 100 mL

Prepared: 09/29/2020 — Final Volume: 200 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Solids		1	10	10	73	mg/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-16S-GW-092320

20I0445-24 (Water)

Wet Chemistry

Method: SM 2540 D-97 — Sampled: 09/23/2020 11:00

Instrument: BAL2 Analyst: KLE — Analyzed: 09/29/2020 09:00

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-24

Preparation Batch: BII0833 — Sample Size: 955 mL

Prepared: 09/29/2020 — Final Volume: 1000 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Suspended Solids		1	1	1	ND	mg/L	U

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-16S-GW-092320

20I0445-24 (Water)

Wet Chemistry

Method: SM 5310 B-00 — Sampled: 09/23/2020 11:00

Instrument: TOC-LCSH Analyst: WCW — Analyzed: 10/06/2020 05:55

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-24 E

Preparation Batch: BIJ0113 — Sample Size: 20 mL

Prepared: 10/05/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Organic Carbon, Dissolved		1	0.50	0.50	ND	mg/L	U

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-24 D

Preparation Batch: BIJ0269 — Sample Size: 20 mL

Prepared: 10/08/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Organic Carbon		1	0.50	0.50	ND	mg/L	U

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-16S-GW-092320

20I0445-24 (Water)

Calculation

Method: SM 2340 B-97 — Sampled: 09/23/2020 11:00

Instrument: [CALC] Analyst: MCB — Analyzed: 10/19/2020 15:44

Sample Preparation: Preparation Method: [CALC] — Extract ID: 20I0445-24

Preparation Batch: [CALC]

Prepared: 10/07/2020 Final Volume: 1

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness		1	0.207	16.7	mg/L CaCO3	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-16S-GW-092320

20I0445-24RE1 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/23/2020 11:00

Instrument: IC930 Analyst: KOTT — Analyzed: 10/02/2020 09:36

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-24RE1 F

Preparation Batch: BII0857 — Sample Size: 10 mL

Prepared: 09/29/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Sulfate	14808-79-8	2	0.200	0.200	10.2	mg/L	D

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-9S-GW-092320

20I0445-25 (Water)

Metals and Metallic Compounds

Method: EPA 6020A — Sampled: 09/23/2020 09:25

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/19/2020 15:47

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0445-25 F 01

Preparation Batch: BIJ0242 — Sample Size: 25 mL

Prepared: 10/07/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Aluminum	7429-90-5	1	2.37	20.0	11.3	ug/L	J
Calcium	7440-70-2	1	1.91	50.0	6320	ug/L	
Iron	7439-89-6	1	6.27	20.0	ND	ug/L	U
Lead	7439-92-1	1	0.0680	0.100	ND	ug/L	U
Magnesium	7439-95-4	1	0.307	20.0	818	ug/L	
Manganese	7439-96-5	1	0.0850	0.500	1.03	ug/L	
Potassium	7440-09-7	1	1.41	20.0	856	ug/L	
Sodium	7440-23-5	1	7.18	100	975	ug/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-9S-GW-092320

20I0445-25 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/23/2020 09:25

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/09/2020 04:31

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0445-25 F 01

Preparation Batch: BIJ0242 — Sample Size: 25 mL

Prepared: 10/07/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Cadmium	7440-43-9	1	0.0300	0.100	0.133	ug/L	
Copper	7440-50-8	1	0.340	0.500	ND	ug/L	U
Zinc	7440-66-6	1	0.820	4.00	10.2	ug/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-9S-GW-092320

20I0445-25 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/23/2020 09:25

Instrument: IC930 Analyst: KOTT — Analyzed: 10/01/2020 01:16

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-25 F

Preparation Batch: BII0857 — Sample Size: 10 mL

Prepared: 09/29/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Chloride	16887-00-6	1	0.100	0.100	0.276	mg/L	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Nitrate-N	14797-55-8	1	0.100	0.100	ND	mg/L	H, U

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-9S-GW-092320

20I0445-25 (Water)

Wet Chemistry

Method: SM 2320 B-97 — Sampled: 09/23/2020 09:25

Instrument: Accumet AB150 Analyst: UW — Analyzed: 09/29/2020 10:57

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-25 C

Preparation Batch: BII0843 — Sample Size: 100 mL

Prepared: 09/29/2020 — Final Volume: 100 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Bicarbonate		1	1.00	1.00	6.95	mg/L CaCO3	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Carbonate		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Hydroxide		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Total		1	1.00	1.00	6.95	mg/L CaCO3	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-9S-GW-092320

20I0445-25 (Water)

Wet Chemistry

Method: SM 2540 C-97 — Sampled: 09/23/2020 09:25

Instrument: BAL2 Analyst: KLE — Analyzed: 09/29/2020 13:16

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-25

Preparation Batch: BII0853 — Sample Size: 200 mL

Prepared: 09/29/2020 — Final Volume: 200 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Solids		1	5	5	40	mg/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-9S-GW-092320

20I0445-25 (Water)

Wet Chemistry

Method: SM 2540 D-97 — Sampled: 09/23/2020 09:25

Instrument: BAL2 Analyst: KLE — Analyzed: 09/29/2020 09:00

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-25

Preparation Batch: BII0833 — Sample Size: 940 mL

Prepared: 09/29/2020 — Final Volume: 1000 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Suspended Solids		1	1	1	ND	mg/L	U

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-9S-GW-092320

20I0445-25 (Water)

Wet Chemistry

Method: SM 5310 B-00 — Sampled: 09/23/2020 09:25

Instrument: TOC-LCSH Analyst: WCW — Analyzed: 10/06/2020 07:57

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-25 E

Preparation Batch: BIJ0114 — Sample Size: 20 mL

Prepared: 10/05/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Organic Carbon, Dissolved		1	0.50	0.50	ND	mg/L	U

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-25 D

Preparation Batch: BIJ0276 — Sample Size: 20 mL

Prepared: 10/08/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Organic Carbon		1	0.50	0.50	ND	mg/L	U

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-9S-GW-092320

20I0445-25 (Water)

Calculation

Method: SM 2340 B-97 — Sampled: 09/23/2020 09:25

Instrument: [CALC] Analyst: MCB — Analyzed: 10/19/2020 15:47

Sample Preparation: Preparation Method: [CALC] — Extract ID: 20I0445-25

Preparation Batch: [CALC]

Prepared: 10/07/2020 Final Volume: 1

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness		1	0.207	19.1	mg/L CaCO3	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-9S-GW-092320

20I0445-25RE1 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/23/2020 09:25

Instrument: IC930 Analyst: KOTT — Analyzed: 10/02/2020 09:56

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-25RE1 F

Preparation Batch: BII0857 — Sample Size: 10 mL

Prepared: 09/29/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Sulfate	14808-79-8	3	0.300	0.300	14.8	mg/L	D

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-9I-GW-092320

20I0445-26 (Water)

Metals and Metallic Compounds

Method: EPA 6020A — Sampled: 09/23/2020 09:50

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/19/2020 18:26

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0445-26 F 01

Preparation Batch: BIJ0242 — Sample Size: 25 mL

Prepared: 10/07/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Aluminum	7429-90-5	20	47.3	400	6020	ug/L	D
Calcium	7440-70-2	5	9.53	250	70300	ug/L	D
Iron	7439-89-6	20	125	400	20400	ug/L	D
Lead	7439-92-1	1	0.0680	0.100	0.117	ug/L	
Magnesium	7439-95-4	5	1.53	100	11000	ug/L	D
Manganese	7439-96-5	20	1.70	10.0	1540	ug/L	D
Potassium	7440-09-7	20	28.1	400	8330	ug/L	D
Sodium	7440-23-5	20	144	2000	4400	ug/L	D

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-9I-GW-092320

20I0445-26 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/23/2020 09:50

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/09/2020 04:35

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0445-26 F 01

Preparation Batch: BIJ0242 — Sample Size: 25 mL

Prepared: 10/07/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Cadmium	7440-43-9	1	0.0300	0.100	2.77	ug/L	
Copper	7440-50-8	1	0.340	0.500	25.9	ug/L	
Zinc	7440-66-6	5	4.70	20.0	433	ug/L	D

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-9I-GW-092320

20I0445-26 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/23/2020 09:50

Instrument: IC930 Analyst: KOTT — Analyzed: 10/01/2020 01:36

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-26 F

Preparation Batch: BII0857 — Sample Size: 10 mL

Prepared: 09/29/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Chloride	16887-00-6	1	0.100	0.100	0.411	mg/L	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Nitrate-N	14797-55-8	1	0.100	0.100	ND	mg/L	H, U

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-9I-GW-092320

20I0445-26 (Water)

Wet Chemistry

Method: SM 2320 B-97 — Sampled: 09/23/2020 09:50

Instrument: Accumet AB150 Analyst: UW — Analyzed: 09/29/2020 14:32

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-26 C

Preparation Batch: BII0859 — Sample Size: 100 mL

Prepared: 09/29/2020 — Final Volume: 100 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Bicarbonate		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Carbonate		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Hydroxide		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Total		1	1.00	1.00	ND	mg/L CaCO3	U

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-9I-GW-092320

20I0445-26 (Water)

Wet Chemistry

Method: SM 2540 C-97 — Sampled: 09/23/2020 09:50

Instrument: BAL2 Analyst: KLE — Analyzed: 09/29/2020 15:23

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-26

Preparation Batch: BII0860 — Sample Size: 100 mL

Prepared: 09/29/2020 — Final Volume: 200 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Solids		1	10	10	559	mg/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-9I-GW-092320

20I0445-26 (Water)

Wet Chemistry

Method: SM 2540 D-97 — Sampled: 09/23/2020 09:50

Instrument: BAL2 Analyst: KLE — Analyzed: 09/29/2020 09:00

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-26

Preparation Batch: BII0833 — Sample Size: 895 mL

Prepared: 09/29/2020 — Final Volume: 1000 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Suspended Solids		1	1	1	ND	mg/L	U

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-9I-GW-092320

20I0445-26 (Water)

Wet Chemistry

Method: SM 5310 B-00 — Sampled: 09/23/2020 09:50

Instrument: TOC-LCSH Analyst: WCW — Analyzed: 10/06/2020 08:26

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-26 E

Preparation Batch: BIJ0114 — Sample Size: 20 mL

Prepared: 10/05/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Organic Carbon, Dissolved		1	0.50	0.50	ND	mg/L	U

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-26 D

Preparation Batch: BIJ0276 — Sample Size: 20 mL

Prepared: 10/08/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Organic Carbon		1	0.50	0.50	ND	mg/L	U

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-9I-GW-092320

20I0445-26 (Water)

Calculation

Method: SM 2340 B-97 — Sampled: 09/23/2020 09:50

Instrument: [CALC] Analyst: MCB — Analyzed: 10/12/2020 19:50

Sample Preparation: Preparation Method: [CALC] — Extract ID: 20I0445-26

Preparation Batch: [CALC]

Prepared: 10/07/2020 Final Volume: 1

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness		5	1.04	221	mg/L CaCO3	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-9I-GW-092320

20I0445-26RE2 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/23/2020 09:50

Instrument: IC930 Analyst: KOTT — Analyzed: 10/05/2020 16:37

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-26RE2 F

Preparation Batch: BII0857 — Sample Size: 10 mL

Prepared: 09/29/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Sulfate	14808-79-8	61	6.10	6.10	290	mg/L	D

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-9D-GW-092320

20I0445-27 (Water)

Metals and Metallic Compounds

Method: EPA 6020A — Sampled: 09/23/2020 10:35

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/19/2020 16:43

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0445-27 F 01

Preparation Batch: BIJ0242 — Sample Size: 25 mL

Prepared: 10/07/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Aluminum	7429-90-5	1	2.37	20.0	3.06	ug/L	J
Iron	7439-89-6	1	6.27	20.0	15.3	ug/L	J
Lead	7439-92-1	1	0.0680	0.100	ND	ug/L	U
Magnesium	7439-95-4	1	0.307	20.0	7400	ug/L	
Manganese	7439-96-5	1	0.0850	0.500	6.12	ug/L	
Potassium	7440-09-7	1	1.41	20.0	2030	ug/L	
Sodium	7440-23-5	1	7.18	100	3180	ug/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-9D-GW-092320

20I0445-27 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/23/2020 10:35

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/09/2020 04:56

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0445-27 F 01

Preparation Batch: BIJ0242 — Sample Size: 25 mL

Prepared: 10/07/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Copper	7440-50-8	1	0.340	0.500	ND	ug/L	U
Zinc	7440-66-6	1	0.820	4.00	6.02	ug/L	

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-9D-GW-092320

20I0445-27 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/23/2020 10:35

Instrument: IC930 Analyst: KOTT — Analyzed: 10/01/2020 01:56

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-27 F

Preparation Batch: BII0857 — Sample Size: 10 mL

Prepared: 09/29/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Chloride	16887-00-6	1	0.100	0.100	0.429	mg/L	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Nitrate-N	14797-55-8	1	0.100	0.100	0.116	mg/L	H

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-9D-GW-092320

20I0445-27 (Water)

Wet Chemistry

Method: SM 2320 B-97 — Sampled: 09/23/2020 10:35

Instrument: Accumet AB150 Analyst: UW — Analyzed: 09/29/2020 14:32

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-27 C

Preparation Batch: BII0859 — Sample Size: 100 mL

Prepared: 09/29/2020 — Final Volume: 100 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Bicarbonate		1	1.00	1.00	33.8	mg/L CaCO3	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Carbonate		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Hydroxide		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Total		1	1.00	1.00	33.8	mg/L CaCO3	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-9D-GW-092320

20I0445-27 (Water)

Wet Chemistry

Method: SM 2540 C-97 — Sampled: 09/23/2020 10:35

Instrument: BAL2 Analyst: KLE — Analyzed: 09/29/2020 15:23

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-27

Preparation Batch: BII0860 — Sample Size: 200 mL

Prepared: 09/29/2020 — Final Volume: 200 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Solids		1	5	5	269	mg/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-9D-GW-092320

20I0445-27 (Water)

Wet Chemistry

Method: SM 2540 D-97 — Sampled: 09/23/2020 10:35

Instrument: BAL2 Analyst: KLE — Analyzed: 09/29/2020 10:38

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-27

Preparation Batch: BII0839 — Sample Size: 895 mL

Prepared: 09/29/2020 — Final Volume: 1000 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Suspended Solids		1	1	1	ND	mg/L	U

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-9D-GW-092320

20I0445-27 (Water)

Wet Chemistry

Method: SM 5310 B-00 — Sampled: 09/23/2020 10:35

Instrument: TOC-LCSH Analyst: WCW — Analyzed: 10/06/2020 08:47

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-27 E

Preparation Batch: BIJ0114 — Sample Size: 20 mL

Prepared: 10/05/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Organic Carbon, Dissolved		1	0.50	0.50	ND	mg/L	U

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-27 D

Preparation Batch: BIJ0276 — Sample Size: 20 mL

Prepared: 10/08/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Organic Carbon		1	0.50	0.50	ND	mg/L	U

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-9D-GW-092320

20I0445-27 (Water)

Calculation

Method: SM 2340 B-97 — Sampled: 09/23/2020 10:35

Instrument: [CALC] Analyst: MCB — Analyzed: 10/19/2020 16:43

Sample Preparation: Preparation Method: [CALC] — Extract ID: 20I0445-27

Preparation Batch: [CALC]

Prepared: 10/07/2020 Final Volume: 1

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness		1	0.207	150	mg/L CaCO3	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-9D-GW-092320

20I0445-27RE1 (Water)

Metals and Metallic Compounds

Method: EPA 6020A — Sampled: 09/23/2020 10:35

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/19/2020 18:10

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0445-27RE1 F 01

Preparation Batch: BIJ0242 — Sample Size: 25 mL

Prepared: 10/07/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Calcium	7440-70-2	5	9.53	250	50600	ug/L	D

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-9D-GW-092320

20I0445-27RE1 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/23/2020 10:35

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/16/2020 01:26

Sample Preparation: Preparation Method: RHN EPA 600/4-79-020 4.1.4 HNO3 matrix 5x — Extract ID: 20I0445-27RE1 F 02

Preparation Batch: BIJ0345 — Sample Size: 100 mL

Prepared: 10/12/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Cadmium	7440-43-9	1	0.00600	0.0200	0.0678	ug/L	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-9D-GW-092320

20I0445-27RE1 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/23/2020 10:35

Instrument: IC930 Analyst: KOTT — Analyzed: 10/02/2020 10:21

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-27RE1 F

Preparation Batch: BII0857 — Sample Size: 10 mL

Prepared: 09/29/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Sulfate	14808-79-8	26	2.60	2.60	122	mg/L	D

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-9D-GW-092320

20I0445-27RE1 (Water)

Calculation

Method: SM 2340 B-97 — Sampled: 09/23/2020 10:35

Instrument: [CALC] Analyst: MCB — Analyzed: 10/19/2020 18:10

Sample Preparation: Preparation Method: [CALC] — Extract ID: 20I0445-27RE1

Preparation Batch: [CALC]

Prepared: 10/07/2020 Final Volume: 1

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness		5	0.624	126	mg/L CaCO3	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-18D-GW-092320

20I0445-28 (Water)

Metals and Metallic Compounds

Method: EPA 6020A — Sampled: 09/23/2020 16:00

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/19/2020 16:14

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0445-28 F 01

Preparation Batch: BIJ0242 — Sample Size: 25 mL

Prepared: 10/07/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Aluminum	7429-90-5	2	4.73	40.0	5.71	ug/L	J, D
Calcium	7440-70-2	2	3.81	100	50100	ug/L	D
Iron	7439-89-6	2	12.5	40.0	70.1	ug/L	D
Lead	7439-92-1	1	0.0680	0.100	ND	ug/L	U
Magnesium	7439-95-4	2	0.614	40.0	7340	ug/L	D
Manganese	7439-96-5	10	0.850	5.00	870	ug/L	D
Potassium	7440-09-7	2	2.81	40.0	4310	ug/L	D
Sodium	7440-23-5	10	71.8	1000	4760	ug/L	D

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-18D-GW-092320

20I0445-28 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/23/2020 16:00

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/09/2020 05:00

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0445-28 F 01

Preparation Batch: BIJ0242 — Sample Size: 25 mL

Prepared: 10/07/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Copper	7440-50-8	1	0.340	0.500	ND	ug/L	U
Zinc	7440-66-6	1	0.820	4.00	1.11	ug/L	J

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-18D-GW-092320

20I0445-28 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/23/2020 16:00

Instrument: IC930 Analyst: KOTT — Analyzed: 10/01/2020 02:16

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-28 F

Preparation Batch: BII0857 — Sample Size: 10 mL

Prepared: 09/29/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Chloride	16887-00-6	1	0.100	0.100	0.948	mg/L	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Nitrate-N	14797-55-8	1	0.100	0.100	ND	mg/L	H, U

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-18D-GW-092320

20I0445-28 (Water)

Wet Chemistry

Method: SM 2320 B-97 — Sampled: 09/23/2020 16:00

Instrument: Accumet AB150 Analyst: UW — Analyzed: 09/29/2020 14:32

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-28 C

Preparation Batch: BII0859 — Sample Size: 100 mL

Prepared: 09/29/2020 — Final Volume: 100 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Bicarbonate		1	1.00	1.00	30.1	mg/L CaCO3	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Carbonate		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Hydroxide		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Total		1	1.00	1.00	30.1	mg/L CaCO3	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-18D-GW-092320

20I0445-28 (Water)

Wet Chemistry

Method: SM 2540 C-97 — Sampled: 09/23/2020 16:00

Instrument: BAL2 Analyst: KLE — Analyzed: 09/29/2020 15:23

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-28

Preparation Batch: BII0860 — Sample Size: 200 mL

Prepared: 09/29/2020 — Final Volume: 200 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Solids		1	5	5	271	mg/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-18D-GW-092320

20I0445-28 (Water)

Wet Chemistry

Method: SM 2540 D-97 — Sampled: 09/23/2020 16:00

Instrument: BAL2 Analyst: KLE — Analyzed: 09/29/2020 10:38

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-28

Preparation Batch: BII0839 — Sample Size: 950 mL

Prepared: 09/29/2020 — Final Volume: 1000 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Suspended Solids		1	1	1	ND	mg/L	U

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-18D-GW-092320

20I0445-28 (Water)

Wet Chemistry

Method: SM 5310 B-00 — Sampled: 09/23/2020 16:00

Instrument: TOC-LCSH Analyst: WCW — Analyzed: 10/06/2020 09:08

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-28 E

Preparation Batch: BIJ0114 — Sample Size: 20 mL

Prepared: 10/05/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Organic Carbon, Dissolved		1	0.50	0.50	ND	mg/L	U

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-28 D

Preparation Batch: BIJ0276 — Sample Size: 20 mL

Prepared: 10/08/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Organic Carbon		1	0.50	0.50	ND	mg/L	U

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-18D-GW-092320

20I0445-28 (Water)

Calculation

Method: SM 2340 B-97 — Sampled: 09/23/2020 16:00

Instrument: [CALC] Analyst: MCB — Analyzed: 10/19/2020 16:14

Sample Preparation: Preparation Method: [CALC] — Extract ID: 20I0445-28

Preparation Batch: [CALC]

Prepared: 10/07/2020 Final Volume: 1

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness		2	0.414	155	mg/L CaCO3	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-18D-GW-092320

20I0445-28RE1 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/23/2020 16:00

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/16/2020 01:30

Sample Preparation: Preparation Method: RHN EPA 600/4-79-020 4.1.4 HNO3 matrix 5x — Extract ID: 20I0445-28RE1 F 02

Preparation Batch: BIJ0345 — Sample Size: 100 mL

Prepared: 10/12/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Cadmium	7440-43-9	1	0.00600	0.0200	0.0252	ug/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-18D-GW-092320

20I0445-28RE1 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/23/2020 16:00

Instrument: IC930 Analyst: KOTT — Analyzed: 10/02/2020 10:41

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-28RE1 F

Preparation Batch: BII0857 — Sample Size: 10 mL

Prepared: 09/29/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Sulfate	14808-79-8	27	2.70	2.70	130	mg/L	D

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-18I-GW-092320

20I0445-29 (Water)

Metals and Metallic Compounds

Method: EPA 6020A — Sampled: 09/23/2020 13:30

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/19/2020 16:08

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0445-29 F 01

Preparation Batch: BIJ0242 — Sample Size: 25 mL

Prepared: 10/07/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Aluminum	7429-90-5	1	2.37	20.0	1920	ug/L	
Calcium	7440-70-2	1	1.91	50.0	8770	ug/L	
Iron	7439-89-6	1	6.27	20.0	21.5	ug/L	
Lead	7439-92-1	1	0.0680	0.100	ND	ug/L	U
Magnesium	7439-95-4	1	0.307	20.0	1150	ug/L	
Manganese	7439-96-5	1	0.0850	0.500	55.2	ug/L	
Potassium	7440-09-7	1	1.41	20.0	1100	ug/L	
Sodium	7440-23-5	1	7.18	100	1390	ug/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-18I-GW-092320

20I0445-29 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/23/2020 13:30

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/09/2020 05:03

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0445-29 F 01

Preparation Batch: BIJ0242 — Sample Size: 25 mL

Prepared: 10/07/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Cadmium	7440-43-9	1	0.0300	0.100	0.632	ug/L	
Copper	7440-50-8	1	0.340	0.500	23.3	ug/L	
Zinc	7440-66-6	1	0.940	4.00	84.2	ug/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-18I-GW-092320

20I0445-29 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/23/2020 13:30

Instrument: IC930 Analyst: KOTT — Analyzed: 10/01/2020 03:16

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-29 F

Preparation Batch: BII0857 — Sample Size: 10 mL

Prepared: 09/29/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Chloride	16887-00-6	1	0.100	0.100	0.241	mg/L	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Nitrate-N	14797-55-8	1	0.100	0.100	ND	mg/L	H, U

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-18I-GW-092320

20I0445-29 (Water)

Wet Chemistry

Method: SM 2320 B-97 — Sampled: 09/23/2020 13:30

Instrument: Accumet AB150 Analyst: UW — Analyzed: 09/29/2020 14:32

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-29 C

Preparation Batch: BII0859 — Sample Size: 100 mL

Prepared: 09/29/2020 — Final Volume: 100 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Bicarbonate		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Carbonate		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Hydroxide		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Total		1	1.00	1.00	ND	mg/L CaCO3	U

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-18I-GW-092320

20I0445-29 (Water)

Wet Chemistry

Method: SM 2540 C-97 — Sampled: 09/23/2020 13:30

Instrument: BAL2 Analyst: KLE — Analyzed: 09/29/2020 15:23

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-29

Preparation Batch: BII0860 — Sample Size: 200 mL

Prepared: 09/29/2020 — Final Volume: 200 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Solids		1	5	5	102	mg/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-18I-GW-092320

20I0445-29 (Water)

Wet Chemistry

Method: SM 2540 D-97 — Sampled: 09/23/2020 13:30

Instrument: BAL2 Analyst: KLE — Analyzed: 09/29/2020 10:38

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-29

Preparation Batch: BII0839 — Sample Size: 940 mL

Prepared: 09/29/2020 — Final Volume: 1000 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Suspended Solids		1	1	1	ND	mg/L	U

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-18I-GW-092320

20I0445-29 (Water)

Wet Chemistry

Method: SM 5310 B-00 — Sampled: 09/23/2020 13:30

Instrument: TOC-LCSH Analyst: WCW — Analyzed: 10/06/2020 09:26

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-29 E

Preparation Batch: BIJ0114 — Sample Size: 20 mL

Prepared: 10/05/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Organic Carbon, Dissolved		1	0.50	0.50	ND	mg/L	U

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-29 D

Preparation Batch: BIJ0276 — Sample Size: 20 mL

Prepared: 10/08/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Organic Carbon		1	0.50	0.50	ND	mg/L	U

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-18I-GW-092320

20I0445-29 (Water)

Calculation

Method: SM 2340 B-97 — Sampled: 09/23/2020 13:30

Instrument: [CALC] Analyst: MCB — Analyzed: 10/19/2020 16:08

Sample Preparation: Preparation Method: [CALC] — Extract ID: 20I0445-29

Preparation Batch: [CALC]

Prepared: 10/07/2020 Final Volume: 1

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness		1	0.207	26.6	mg/L CaCO3	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-18I-GW-092320

20I0445-29RE1 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/23/2020 13:30

Instrument: IC930 Analyst: KOTT — Analyzed: 10/02/2020 11:01

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-29RE1 F

Preparation Batch: BII0857 — Sample Size: 10 mL

Prepared: 09/29/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Sulfate	14808-79-8	9	0.900	0.900	41.2	mg/L	D

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-16D-GW-092320

20I0445-30 (Water)

Metals and Metallic Compounds

Method: EPA 6020A — Sampled: 09/23/2020 12:15

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/19/2020 16:46

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0445-30 F 01

Preparation Batch: BIJ0242 — Sample Size: 25 mL

Prepared: 10/07/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Aluminum	7429-90-5	1	2.37	20.0	11.0	ug/L	J
Iron	7439-89-6	1	6.27	20.0	37.1	ug/L	
Lead	7439-92-1	1	0.0680	0.100	ND	ug/L	U
Magnesium	7439-95-4	1	0.307	20.0	6140	ug/L	
Manganese	7439-96-5	1	0.0850	0.500	65.5	ug/L	
Potassium	7440-09-7	1	1.41	20.0	1990	ug/L	
Sodium	7440-23-5	1	7.18	100	5510	ug/L	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-16D-GW-092320

20I0445-30 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/23/2020 12:15

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/09/2020 05:07

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0445-30 F 01

Preparation Batch: BIJ0242 — Sample Size: 25 mL

Prepared: 10/07/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Copper	7440-50-8	1	0.340	0.500	ND	ug/L	U
Zinc	7440-66-6	1	0.820	4.00	1.64	ug/L	J

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-16D-GW-092320

20I0445-30 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/23/2020 12:15

Instrument: IC930 Analyst: KOTT — Analyzed: 10/01/2020 03:36

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-30 F

Preparation Batch: BII0857 — Sample Size: 10 mL

Prepared: 09/29/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Chloride	16887-00-6	1	0.100	0.100	0.645	mg/L	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Nitrate-N	14797-55-8	1	0.100	0.100	0.234	mg/L	H

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-16D-GW-092320

20I0445-30 (Water)

Wet Chemistry

Method: SM 2320 B-97 — Sampled: 09/23/2020 12:15

Instrument: Accumet AB150 Analyst: UW — Analyzed: 09/29/2020 14:32

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-30 C

Preparation Batch: BII0859 — Sample Size: 100 mL

Prepared: 09/29/2020 — Final Volume: 100 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Bicarbonate		1	1.00	1.00	149	mg/L CaCO3	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Carbonate		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Hydroxide		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Total		1	1.00	1.00	149	mg/L CaCO3	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-16D-GW-092320

20I0445-30 (Water)

Wet Chemistry

Method: SM 2540 C-97 — Sampled: 09/23/2020 12:15

Instrument: BAL2 Analyst: KLE — Analyzed: 09/29/2020 15:23

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-30

Preparation Batch: BII0860 — Sample Size: 200 mL

Prepared: 09/29/2020 — Final Volume: 200 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Solids		1	5	5	195	mg/L	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-16D-GW-092320

20I0445-30 (Water)

Wet Chemistry

Method: SM 2540 D-97 — Sampled: 09/23/2020 12:15

Instrument: BAL2 Analyst: KLE — Analyzed: 09/29/2020 10:38

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-30

Preparation Batch: BII0839 — Sample Size: 935 mL

Prepared: 09/29/2020 — Final Volume: 1000 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Suspended Solids		1	1	1	ND	mg/L	U

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Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-16D-GW-092320

20I0445-30 (Water)

Wet Chemistry

Method: SM 5310 B-00 — Sampled: 09/23/2020 12:15

Instrument: TOC-LCSH Analyst: WCW — Analyzed: 10/06/2020 09:43

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-30 E

Preparation Batch: BIJ0114 — Sample Size: 20 mL

Prepared: 10/05/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Organic Carbon, Dissolved		1	0.50	0.50	ND	mg/L	U

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-30 D

Preparation Batch: BIJ0276 — Sample Size: 20 mL

Prepared: 10/08/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Organic Carbon		1	0.50	0.50	ND	mg/L	U

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-16D-GW-092320

20I0445-30 (Water)

Calculation

Method: SM 2340 B-97 — Sampled: 09/23/2020 12:15

Instrument: [CALC] Analyst: MCB — Analyzed: 10/19/2020 16:46

Sample Preparation: Preparation Method: [CALC] — Extract ID: 20I0445-30

Preparation Batch: [CALC]

Prepared: 10/07/2020 Final Volume: 1

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness		1	0.207	141	mg/L CaCO3	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-16D-GW-092320

20I0445-30RE1 (Water)

Metals and Metallic Compounds

Method: EPA 6020A — Sampled: 09/23/2020 12:15

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/19/2020 18:12

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0445-30RE1 F 01

Preparation Batch: BIJ0242 — Sample Size: 25 mL

Prepared: 10/07/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Calcium	7440-70-2	5	9.53	250	49000	ug/L	D

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-16D-GW-092320

20I0445-30RE1 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/23/2020 12:15

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/16/2020 01:35

Sample Preparation: Preparation Method: RHN EPA 600/4-79-020 4.1.4 HNO3 matrix 5x — Extract ID: 20I0445-30RE1 F 02

Preparation Batch: BIJ0345 — Sample Size: 100 mL

Prepared: 10/12/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Cadmium	7440-43-9	1	0.00600	0.0200	ND	ug/L	U

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-16D-GW-092320

20I0445-30RE1 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/23/2020 12:15

Instrument: IC930 Analyst: KOTT — Analyzed: 10/02/2020 11:21

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-30RE1 F

Preparation Batch: BII0857 — Sample Size: 10 mL

Prepared: 09/29/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Sulfate	14808-79-8	3	0.300	0.300	13.1	mg/L	D

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-16D-GW-092320

20I0445-30RE1 (Water)

Calculation

Method: SM 2340 B-97 — Sampled: 09/23/2020 12:15

Instrument: [CALC] Analyst: MCB — Analyzed: 10/19/2020 18:12

Sample Preparation: Preparation Method: [CALC] — Extract ID: 20I0445-30RE1

Preparation Batch: [CALC]

Prepared: 10/07/2020 Final Volume: 1

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness		5	0.624	122	mg/L CaCO3	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-15I-GW-092320

20I0445-31 (Water)

Metals and Metallic Compounds

Method: EPA 6020A — Sampled: 09/23/2020 08:30

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/19/2020 16:49

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0445-31 F 01

Preparation Batch: BIJ0242 — Sample Size: 25 mL

Prepared: 10/07/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Aluminum	7429-90-5	1	2.37	20.0	3.42	ug/L	J
Iron	7439-89-6	1	6.27	20.0	ND	ug/L	U
Lead	7439-92-1	1	0.0680	0.100	ND	ug/L	U
Magnesium	7439-95-4	1	0.307	20.0	5240	ug/L	
Manganese	7439-96-5	1	0.0850	0.500	25.5	ug/L	
Potassium	7440-09-7	1	1.41	20.0	3930	ug/L	
Sodium	7440-23-5	1	7.18	100	3940	ug/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-15I-GW-092320

20I0445-31 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/23/2020 08:30

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/09/2020 05:10

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0445-31 F 01

Preparation Batch: BIJ0242 — Sample Size: 25 mL

Prepared: 10/07/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Cadmium	7440-43-9	1	0.0300	0.100	0.169	ug/L	
Copper	7440-50-8	1	0.340	0.500	ND	ug/L	U
Zinc	7440-66-6	1	0.820	4.00	2.39	ug/L	J

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-15I-GW-092320

20I0445-31 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/23/2020 08:30

Instrument: IC930 Analyst: KOTT — Analyzed: 10/01/2020 03:56

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-31 F

Preparation Batch: BII0857 — Sample Size: 10 mL

Prepared: 09/29/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Chloride	16887-00-6	1	0.100	0.100	0.841	mg/L	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Nitrate-N	14797-55-8	1	0.100	0.100	0.428	mg/L	H

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-15I-GW-092320

20I0445-31 (Water)

Wet Chemistry

Method: SM 2320 B-97 — Sampled: 09/23/2020 08:30

Instrument: Accumet AB150 Analyst: UW — Analyzed: 09/29/2020 14:32

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-31 C

Preparation Batch: BII0859 — Sample Size: 100 mL

Prepared: 09/29/2020 — Final Volume: 100 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Bicarbonate		1	1.00	1.00	74.8	mg/L CaCO3	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Carbonate		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Hydroxide		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Total		1	1.00	1.00	74.8	mg/L CaCO3	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-15I-GW-092320

20I0445-31 (Water)

Wet Chemistry

Method: SM 2540 C-97 — Sampled: 09/23/2020 08:30

Instrument: BAL2 Analyst: KLE — Analyzed: 09/29/2020 15:23

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-31

Preparation Batch: BII0860 — Sample Size: 200 mL

Prepared: 09/29/2020 — Final Volume: 200 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Solids		1	5	5	247	mg/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-15I-GW-092320

20I0445-31 (Water)

Wet Chemistry

Method: SM 2540 D-97 — Sampled: 09/23/2020 08:30

Instrument: BAL2 Analyst: KLE — Analyzed: 09/29/2020 10:38

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-31

Preparation Batch: BII0839 — Sample Size: 900 mL

Prepared: 09/29/2020 — Final Volume: 1000 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Suspended Solids		1	1	1	ND	mg/L	U

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-15I-GW-092320

20I0445-31 (Water)

Wet Chemistry

Method: SM 5310 B-00 — Sampled: 09/23/2020 08:30

Instrument: TOC-LCSH Analyst: WCW — Analyzed: 10/06/2020 10:12

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-31 E

Preparation Batch: BIJ0114 — Sample Size: 20 mL

Prepared: 10/05/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Organic Carbon, Dissolved		1	0.50	0.50	ND	mg/L	U

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-31 D

Preparation Batch: BIJ0276 — Sample Size: 20 mL

Prepared: 10/08/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Organic Carbon		1	0.50	0.50	ND	mg/L	U

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-15I-GW-092320

20I0445-31 (Water)

Calculation

Method: SM 2340 B-97 — Sampled: 09/23/2020 08:30

Instrument: [CALC] Analyst: MCB — Analyzed: 10/19/2020 16:49

Sample Preparation: Preparation Method: [CALC] — Extract ID: 20I0445-31

Preparation Batch: [CALC]

Prepared: 10/07/2020 Final Volume: 1

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness		1	0.207	143	mg/L CaCO3	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-15I-GW-092320

20I0445-31RE1 (Water)

Metals and Metallic Compounds

Method: EPA 6020A — Sampled: 09/23/2020 08:30

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/19/2020 18:14

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0445-31RE1 F 01

Preparation Batch: BIJ0242 — Sample Size: 25 mL

Prepared: 10/07/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Calcium	7440-70-2	5	9.53	250	51800	ug/L	D

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-15I-GW-092320

20I0445-31RE1 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/23/2020 08:30

Instrument: IC930 Analyst: KOTT — Analyzed: 10/02/2020 15:41

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-31RE1 F

Preparation Batch: BII0857 — Sample Size: 10 mL

Prepared: 09/29/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Sulfate	14808-79-8	18	1.80	1.80	81.3	mg/L	D

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-15I-GW-092320

20I0445-31RE1 (Water)

Calculation

Method: SM 2340 B-97 — Sampled: 09/23/2020 08:30

Instrument: [CALC] Analyst: MCB — Analyzed: 10/19/2020 18:14

Sample Preparation: Preparation Method: [CALC] — Extract ID: 20I0445-31RE1

Preparation Batch: [CALC]

Prepared: 10/07/2020 Final Volume: 1

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness		5	0.624	129	mg/L CaCO3	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-16I-GW-092320

20I0445-32 (Water)

Metals and Metallic Compounds

Method: EPA 6020A — Sampled: 09/23/2020 10:50

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/19/2020 16:10

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0445-32 F 01

Preparation Batch: BIJ0242 — Sample Size: 25 mL

Prepared: 10/07/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Aluminum	7429-90-5	1	2.37	20.0	13.1	ug/L	J
Calcium	7440-70-2	1	1.91	50.0	7530	ug/L	
Iron	7439-89-6	1	6.27	20.0	18.2	ug/L	J
Lead	7439-92-1	1	0.0680	0.100	ND	ug/L	U
Magnesium	7439-95-4	1	0.307	20.0	1290	ug/L	
Manganese	7439-96-5	1	0.0850	0.500	8.27	ug/L	
Potassium	7440-09-7	1	1.41	20.0	826	ug/L	
Sodium	7440-23-5	1	7.18	100	1370	ug/L	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-16I-GW-092320

20I0445-32 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/23/2020 10:50

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/09/2020 05:14

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0445-32 F 01

Preparation Batch: BIJ0242 — Sample Size: 25 mL

Prepared: 10/07/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Cadmium	7440-43-9	1	0.0300	0.100	0.358	ug/L	
Copper	7440-50-8	1	0.340	0.500	1.17	ug/L	
Zinc	7440-66-6	1	0.820	4.00	53.0	ug/L	

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-16I-GW-092320

20I0445-32 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/23/2020 10:50

Instrument: IC930 Analyst: KOTT — Analyzed: 10/01/2020 04:16

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-32 F

Preparation Batch: BII0857 — Sample Size: 10 mL

Prepared: 09/29/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Chloride	16887-00-6	1	0.100	0.100	0.257	mg/L	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Nitrate-N	14797-55-8	1	0.100	0.100	0.115	mg/L	H

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-16I-GW-092320

20I0445-32 (Water)

Wet Chemistry

Method: SM 2320 B-97 — Sampled: 09/23/2020 10:50

Instrument: Accumet AB150 Analyst: UW — Analyzed: 09/29/2020 14:32

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-32 C

Preparation Batch: BII0859 — Sample Size: 100 mL

Prepared: 09/29/2020 — Final Volume: 100 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Bicarbonate		1	1.00	1.00	9.47	mg/L CaCO3	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Carbonate		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Hydroxide		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Total		1	1.00	1.00	9.47	mg/L CaCO3	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-16I-GW-092320

20I0445-32 (Water)

Wet Chemistry

Method: SM 2540 C-97 — Sampled: 09/23/2020 10:50

Instrument: BAL2 Analyst: KLE — Analyzed: 09/29/2020 15:23

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-32

Preparation Batch: BII0860 — Sample Size: 200 mL

Prepared: 09/29/2020 — Final Volume: 200 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Solids		1	5	5	64	mg/L	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-16I-GW-092320

20I0445-32 (Water)

Wet Chemistry

Method: SM 2540 D-97 — Sampled: 09/23/2020 10:50

Instrument: BAL2 Analyst: KLE — Analyzed: 09/29/2020 10:38

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-32

Preparation Batch: BII0839 — Sample Size: 950 mL

Prepared: 09/29/2020 — Final Volume: 1000 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Suspended Solids		1	1	1	ND	mg/L	U

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-16I-GW-092320

20I0445-32 (Water)

Wet Chemistry

Method: SM 5310 B-00 — Sampled: 09/23/2020 10:50

Instrument: TOC-LCSH Analyst: WCW — Analyzed: 10/06/2020 10:37

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-32 E

Preparation Batch: BIJ0114 — Sample Size: 20 mL

Prepared: 10/05/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Organic Carbon, Dissolved		1	0.50	0.50	ND	mg/L	U

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-32 D

Preparation Batch: BIJ0276 — Sample Size: 20 mL

Prepared: 10/08/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Organic Carbon		1	0.50	0.50	ND	mg/L	U

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-16I-GW-092320

20I0445-32 (Water)

Calculation

Method: SM 2340 B-97 — Sampled: 09/23/2020 10:50

Instrument: [CALC] Analyst: MCB — Analyzed: 10/19/2020 16:10

Sample Preparation: Preparation Method: [CALC] — Extract ID: 20I0445-32

Preparation Batch: [CALC]

Prepared: 10/07/2020 Final Volume: 1

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness		1	0.207	24.1	mg/L CaCO3	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-16I-GW-092320

20I0445-32RE1 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/23/2020 10:50

Instrument: IC930 Analyst: KOTT — Analyzed: 10/02/2020 16:01

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-32RE1 F

Preparation Batch: BII0857 — Sample Size: 10 mL

Prepared: 09/29/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Sulfate	14808-79-8	4	0.400	0.400	18.0	mg/L	D

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-16I-100-GW-092320

20I0445-33 (Water)

Metals and Metallic Compounds

Method: EPA 6020A — Sampled: 09/23/2020 10:50

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/19/2020 16:11

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0445-33 F 01

Preparation Batch: BIJ0195 — Sample Size: 25 mL

Prepared: 10/06/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Aluminum	7429-90-5	1	2.37	20.0	11.3	ug/L	J
Calcium	7440-70-2	1	1.91	50.0	7840	ug/L	
Iron	7439-89-6	1	6.27	20.0	12.6	ug/L	J
Lead	7439-92-1	1	0.0680	0.100	ND	ug/L	U
Magnesium	7439-95-4	1	0.307	20.0	1270	ug/L	
Manganese	7439-96-5	1	0.0850	0.500	8.95	ug/L	
Potassium	7440-09-7	1	1.41	20.0	811	ug/L	
Sodium	7440-23-5	1	7.18	100	1280	ug/L	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-16I-100-GW-092320

20I0445-33 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/23/2020 10:50

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/08/2020 21:24

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0445-33 F 01

Preparation Batch: BIJ0195 — Sample Size: 25 mL

Prepared: 10/06/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Cadmium	7440-43-9	1	0.0300	0.100	0.444	ug/L	
Copper	7440-50-8	1	0.340	0.500	1.25	ug/L	
Zinc	7440-66-6	1	0.820	4.00	55.1	ug/L	

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-16I-100-GW-092320

20I0445-33 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/23/2020 10:50

Instrument: IC930 Analyst: KOTT — Analyzed: 10/01/2020 04:36

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-33 F

Preparation Batch: BII0857 — Sample Size: 10 mL

Prepared: 09/29/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Chloride	16887-00-6	1	0.100	0.100	0.257	mg/L	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Nitrate-N	14797-55-8	1	0.100	0.100	0.115	mg/L	H

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-16I-100-GW-092320

20I0445-33 (Water)

Wet Chemistry

Method: SM 2320 B-97 — Sampled: 09/23/2020 10:50

Instrument: Accumet AB150 Analyst: UW — Analyzed: 09/29/2020 14:32

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-33 C

Preparation Batch: BII0859 — Sample Size: 100 mL

Prepared: 09/29/2020 — Final Volume: 100 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Bicarbonate		1	1.00	1.00	10.7	mg/L CaCO3	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Carbonate		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Hydroxide		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Total		1	1.00	1.00	10.7	mg/L CaCO3	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-16I-100-GW-092320

20I0445-33 (Water)

Wet Chemistry

Method: SM 2540 C-97 — Sampled: 09/23/2020 10:50

Instrument: BAL2 Analyst: KLE — Analyzed: 09/29/2020 15:23

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-33

Preparation Batch: BII0860 — Sample Size: 200 mL

Prepared: 09/29/2020 — Final Volume: 200 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Solids		1	5	5	61	mg/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-16I-100-GW-092320

20I0445-33 (Water)

Wet Chemistry

Method: SM 2540 D-97 — Sampled: 09/23/2020 10:50

Instrument: BAL2 Analyst: KLE — Analyzed: 09/29/2020 10:38

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-33

Preparation Batch: BII0839 — Sample Size: 940 mL

Prepared: 09/29/2020 — Final Volume: 1000 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Suspended Solids		1	1	1	ND	mg/L	U

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-16I-100-GW-092320

20I0445-33 (Water)

Wet Chemistry

Method: SM 5310 B-00 — Sampled: 09/23/2020 10:50

Instrument: TOC-LCSH Analyst: WCW — Analyzed: 10/06/2020 10:54

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-33 E

Preparation Batch: BIJ0114 — Sample Size: 20 mL

Prepared: 10/05/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Organic Carbon, Dissolved		1	0.50	0.50	ND	mg/L	U

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-33 D

Preparation Batch: BIJ0276 — Sample Size: 20 mL

Prepared: 10/08/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Organic Carbon		1	0.50	0.50	ND	mg/L	U

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-16I-100-GW-092320

20I0445-33 (Water)

Calculation

Method: SM 2340 B-97 — Sampled: 09/23/2020 10:50

Instrument: [CALC] Analyst: MCB — Analyzed: 10/19/2020 16:11

Sample Preparation: Preparation Method: [CALC] — Extract ID: 20I0445-33

Preparation Batch: [CALC]

Prepared: 10/06/2020 Final Volume: 1

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness		1	0.207	24.8	mg/L CaCO3	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-16I-100-GW-092320

20I0445-33RE1 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/23/2020 10:50

Instrument: IC930 Analyst: KOTT — Analyzed: 10/02/2020 16:21

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-33RE1 F

Preparation Batch: BII0857 — Sample Size: 10 mL

Prepared: 09/29/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Sulfate	14808-79-8	4	0.400	0.400	17.8	mg/L	D

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

RC-5A-SW-092320

20I0445-34 (Water)

Metals and Metallic Compounds

Method: EPA 6020A — Sampled: 09/23/2020 15:00

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/19/2020 14:21

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0445-34 F 01

Preparation Batch: BIJ0195 — Sample Size: 25 mL

Prepared: 10/06/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Aluminum	7429-90-5	1	2.37	20.0	48.9	ug/L	
Calcium	7440-70-2	1	1.91	50.0	9110	ug/L	
Iron	7439-89-6	1	6.27	20.0	104	ug/L	
Lead	7439-92-1	1	0.0680	0.100	ND	ug/L	U
Magnesium	7439-95-4	1	0.307	20.0	827	ug/L	
Manganese	7439-96-5	1	0.0850	0.500	27.6	ug/L	
Potassium	7440-09-7	1	1.41	20.0	678	ug/L	
Sodium	7440-23-5	1	7.18	100	926	ug/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

RC-5A-SW-092320

20I0445-34 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/23/2020 15:00

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/08/2020 21:28

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0445-34 F 01

Preparation Batch: BIJ0195 — Sample Size: 25 mL

Prepared: 10/06/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Copper	7440-50-8	1	0.340	0.500	0.933	ug/L	
Zinc	7440-66-6	1	0.820	4.00	9.65	ug/L	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

RC-5A-SW-092320

20I0445-34 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/23/2020 15:00
Instrument: IC930 Analyst: KOTT — Analyzed: 10/01/2020 04:56

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-34 F
Preparation Batch: BII0857 — Sample Size: 10 mL
Prepared: 09/29/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Chloride	16887-00-6	1	0.100	0.100	0.312	mg/L	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Nitrate-N	14797-55-8	1	0.100	0.100	ND	mg/L	H, U

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

RC-5A-SW-092320

20I0445-34 (Water)

Wet Chemistry

Method: SM 2320 B-97 — Sampled: 09/23/2020 15:00
Instrument: Accumet AB150 Analyst: UW — Analyzed: 09/29/2020 14:32

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-34 C
Preparation Batch: BII0859 — Sample Size: 100 mL
Prepared: 09/29/2020 — Final Volume: 100 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Bicarbonate		1	1.00	1.00	12.9	mg/L CaCO3	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Carbonate		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Hydroxide		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Total		1	1.00	1.00	12.9	mg/L CaCO3	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

RC-5A-SW-092320

20I0445-34 (Water)

Wet Chemistry

Method: SM 2540 C-97 — Sampled: 09/23/2020 15:00

Instrument: BAL2 Analyst: KLE — Analyzed: 09/29/2020 15:23

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-34

Preparation Batch: BII0860 — Sample Size: 200 mL

Prepared: 09/29/2020 — Final Volume: 200 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Solids		1	5	5	58	mg/L	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

RC-5A-SW-092320

20I0445-34 (Water)

Wet Chemistry

Method: SM 2540 D-97 — Sampled: 09/23/2020 15:00

Instrument: BAL2 Analyst: KLE — Analyzed: 09/29/2020 10:38

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-34

Preparation Batch: BII0839 — Sample Size: 910 mL

Prepared: 09/29/2020 — Final Volume: 1000 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Suspended Solids		1	1	1	ND	mg/L	U

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

RC-5A-SW-092320

20I0445-34 (Water)

Wet Chemistry

Method: SM 5310 B-00 — Sampled: 09/23/2020 15:00
Instrument: TOC-LCSH Analyst: WCW — Analyzed: 10/06/2020 11:16

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-34 E
Preparation Batch: BIJ0114 — Sample Size: 20 mL
Prepared: 10/05/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Organic Carbon, Dissolved		1	0.50	0.50	0.81	mg/L	

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-34 D
Preparation Batch: BIJ0276 — Sample Size: 20 mL
Prepared: 10/08/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Organic Carbon		1	0.50	0.50	0.60	mg/L	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

RC-5A-SW-092320

20I0445-34 (Water)

Calculation

Method: SM 2340 B-97 — Sampled: 09/23/2020 15:00

Instrument: [CALC] Analyst: MCB — Analyzed: 10/19/2020 14:21

Sample Preparation: Preparation Method: [CALC] — Extract ID: 20I0445-34

Preparation Batch: [CALC]

Prepared: 10/06/2020 Final Volume: 1

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness		1	0.207	26.2	mg/L CaCO3	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

RC-5A-SW-092320

20I0445-34RE1 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/23/2020 15:00

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/16/2020 01:39

Sample Preparation: Preparation Method: RHN EPA 600/4-79-020 4.1.4 HNO3 matrix 5x — Extract ID: 20I0445-34RE1 F 02

Preparation Batch: BIJ0345 — Sample Size: 100 mL

Prepared: 10/12/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Cadmium	7440-43-9	1	0.00600	0.0200	0.0602	ug/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

RC-5A-SW-092320

20I0445-34RE1 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/23/2020 15:00

Instrument: IC930 Analyst: KOTT — Analyzed: 10/02/2020 16:41

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-34RE1 F

Preparation Batch: BII0857 — Sample Size: 10 mL

Prepared: 09/29/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Sulfate	14808-79-8	3	0.300	0.300	14.0	mg/L	D

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-11-WP-092320

20I0445-35 (Water)

Metals and Metallic Compounds

Method: EPA 6020A — Sampled: 09/23/2020 14:30

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/19/2020 14:55

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0445-35 F 01

Preparation Batch: BIJ0195 — Sample Size: 25 mL

Prepared: 10/06/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Aluminum	7429-90-5	2	4.73	40.0	49.3	ug/L	D
Calcium	7440-70-2	2	3.81	100	35100	ug/L	D
Iron	7439-89-6	2	12.5	40.0	1210	ug/L	D
Lead	7439-92-1	1	0.0680	0.100	ND	ug/L	U
Magnesium	7439-95-4	2	0.614	40.0	5280	ug/L	D
Manganese	7439-96-5	1	0.0850	0.500	14.1	ug/L	
Potassium	7440-09-7	2	2.81	40.0	2460	ug/L	D
Sodium	7440-23-5	2	14.4	200	3430	ug/L	D

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-11-WP-092320

20I0445-35 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/23/2020 14:30

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/08/2020 21:33

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0445-35 F 01

Preparation Batch: BIJ0195 — Sample Size: 25 mL

Prepared: 10/06/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Cadmium	7440-43-9	1	0.0300	0.100	0.281	ug/L	
Copper	7440-50-8	1	0.340	0.500	0.670	ug/L	
Zinc	7440-66-6	1	0.820	4.00	17.3	ug/L	

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-11-WP-092320

20I0445-35 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/23/2020 14:30

Instrument: IC930 Analyst: KOTT — Analyzed: 10/01/2020 05:16

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-35 F

Preparation Batch: BII0857 — Sample Size: 10 mL

Prepared: 09/29/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Chloride	16887-00-6	1	0.100	0.100	0.607	mg/L	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Nitrate-N	14797-55-8	1	0.100	0.100	0.196	mg/L	H

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-11-WP-092320

20I0445-35 (Water)

Wet Chemistry

Method: SM 2320 B-97 — Sampled: 09/23/2020 14:30

Instrument: Accumet AB150 Analyst: UW — Analyzed: 09/29/2020 14:32

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-35 C

Preparation Batch: BII0859 — Sample Size: 100 mL

Prepared: 09/29/2020 — Final Volume: 100 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Bicarbonate		1	1.00	1.00	20.7	mg/L CaCO3	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Carbonate		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Hydroxide		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Total		1	1.00	1.00	20.7	mg/L CaCO3	

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-11-WP-092320

20I0445-35 (Water)

Wet Chemistry

Method: SM 2540 C-97 — Sampled: 09/23/2020 14:30

Instrument: BAL2 Analyst: KLE — Analyzed: 09/29/2020 15:23

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-35

Preparation Batch: BII0860 — Sample Size: 200 mL

Prepared: 09/29/2020 — Final Volume: 200 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Solids		1	5	5	185	mg/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-11-WP-092320

20I0445-35 (Water)

Wet Chemistry

Method: SM 2540 D-97 — Sampled: 09/23/2020 14:30

Instrument: BAL2 Analyst: KLE — Analyzed: 09/29/2020 10:38

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-35

Preparation Batch: BII0839 — Sample Size: 820 mL

Prepared: 09/29/2020 — Final Volume: 1000 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Suspended Solids		1	1	1	3	mg/L	

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-11-WP-092320

20I0445-35 (Water)

Wet Chemistry

Method: SM 5310 B-00 — Sampled: 09/23/2020 14:30

Instrument: TOC-LCSH Analyst: WCW — Analyzed: 10/06/2020 12:21

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-35 E

Preparation Batch: BIJ0114 — Sample Size: 20 mL

Prepared: 10/05/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Organic Carbon, Dissolved		1	0.50	0.50	1.42	mg/L	

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-35 D

Preparation Batch: BIJ0276 — Sample Size: 20 mL

Prepared: 10/08/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Organic Carbon		1	0.50	0.50	0.99	mg/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-11-WP-092320

20I0445-35 (Water)

Calculation

Method: SM 2340 B-97 — Sampled: 09/23/2020 14:30

Instrument: [CALC] Analyst: MCB — Analyzed: 10/19/2020 14:55

Sample Preparation: Preparation Method: [CALC] — Extract ID: 20I0445-35

Preparation Batch: [CALC]

Prepared: 10/06/2020 Final Volume: 1

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness		2	0.414	109	mg/L CaCO3	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-11-WP-092320

20I0445-35RE1 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/23/2020 14:30

Instrument: IC930 Analyst: KOTT — Analyzed: 10/02/2020 17:40

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-35RE1 F

Preparation Batch: BII0857 — Sample Size: 10 mL

Prepared: 09/29/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Sulfate	14808-79-8	19	1.90	1.90	88.2	mg/L	D

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-11-PW-12-092320

20I0445-36 (Water)

Metals and Metallic Compounds

Method: EPA 6020A — Sampled: 09/23/2020 15:12

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/19/2020 14:23

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0445-36 F 01

Preparation Batch: BIJ0195 — Sample Size: 25 mL

Prepared: 10/06/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Aluminum	7429-90-5	1	2.37	20.0	12.4	ug/L	J
Calcium	7440-70-2	1	1.91	50.0	19600	ug/L	
Iron	7439-89-6	1	6.27	20.0	87.4	ug/L	
Lead	7439-92-1	1	0.0680	0.100	0.990	ug/L	
Magnesium	7439-95-4	1	0.307	20.0	2610	ug/L	
Manganese	7439-96-5	1	0.0850	0.500	8.19	ug/L	
Potassium	7440-09-7	1	1.41	20.0	1270	ug/L	
Sodium	7440-23-5	1	7.18	100	1960	ug/L	

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-11-PW-12-092320

20I0445-36 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/23/2020 15:12

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/08/2020 21:37

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0445-36 F 01

Preparation Batch: BIJ0195 — Sample Size: 25 mL

Prepared: 10/06/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Copper	7440-50-8	1	0.340	0.500	1.41	ug/L	
Zinc	7440-66-6	1	0.820	4.00	7.58	ug/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-11-PW-12-092320

20I0445-36 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/23/2020 15:12

Instrument: IC930 Analyst: KOTT — Analyzed: 10/01/2020 05:36

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-36 C

Preparation Batch: BII0857 — Sample Size: 10 mL

Prepared: 09/29/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Chloride	16887-00-6	1	0.100	0.100	0.593	mg/L	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Nitrate-N	14797-55-8	1	0.100	0.100	0.116	mg/L	H

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-11-PW-12-092320

20I0445-36 (Water)

Wet Chemistry

Method: SM 2320 B-97 — Sampled: 09/23/2020 15:12

Instrument: Accumet AB150 Analyst: UW — Analyzed: 09/29/2020 14:32

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-36 C

Preparation Batch: BII0859 — Sample Size: 100 mL

Prepared: 09/29/2020 — Final Volume: 100 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Bicarbonate		1	1.00	1.00	17.3	mg/L CaCO3	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Carbonate		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Hydroxide		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Total		1	1.00	1.00	17.3	mg/L CaCO3	

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-11-PW-12-092320

20I0445-36 (Water)

Wet Chemistry

Method: SM 2540 C-97 — Sampled: 09/23/2020 15:12

Instrument: BAL2 Analyst: KLE — Analyzed: 09/29/2020 15:23

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-36

Preparation Batch: BII0860 — Sample Size: 200 mL

Prepared: 09/29/2020 — Final Volume: 200 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Solids		1	5	5	106	mg/L	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-11-PW-12-092320

20I0445-36 (Water)

Wet Chemistry

Method: SM 2540 D-97 — Sampled: 09/23/2020 15:12

Instrument: BAL2 Analyst: KLE — Analyzed: 09/29/2020 10:38

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-36

Preparation Batch: BII0839 — Sample Size: 940 mL

Prepared: 09/29/2020 — Final Volume: 1000 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Suspended Solids		1	1	1	ND	mg/L	U

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-11-PW-12-092320

20I0445-36 (Water)

Wet Chemistry

Method: SM 5310 B-00 — Sampled: 09/23/2020 15:12

Instrument: TOC-LCSH Analyst: WCW — Analyzed: 10/06/2020 12:46

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-36 E

Preparation Batch: BIJ0114 — Sample Size: 20 mL

Prepared: 10/05/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Organic Carbon, Dissolved		1	0.50	0.50	0.64	mg/L	

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-36 D

Preparation Batch: BIJ0276 — Sample Size: 20 mL

Prepared: 10/08/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Organic Carbon		1	0.50	0.50	0.80	mg/L	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-11-PW-12-092320

20I0445-36 (Water)

Calculation

Method: SM 2340 B-97 — Sampled: 09/23/2020 15:12

Instrument: [CALC] Analyst: MCB — Analyzed: 10/19/2020 14:23

Sample Preparation: Preparation Method: [CALC] — Extract ID: 20I0445-36

Preparation Batch: [CALC]

Prepared: 10/06/2020 Final Volume: 1

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness		1	0.207	59.6	mg/L CaCO3	

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-11-PW-12-092320

20I0445-36RE1 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/23/2020 15:12

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/16/2020 01:44

Sample Preparation: Preparation Method: RHN EPA 600/4-79-020 4.1.4 HNO3 matrix 5x — Extract ID: 20I0445-36RE1 F 02

Preparation Batch: BIJ0345 — Sample Size: 100 mL

Prepared: 10/12/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Cadmium	7440-43-9	1	0.00600	0.0200	0.0434	ug/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-11-PW-12-092320

20I0445-36RE1 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/23/2020 15:12

Instrument: IC930 Analyst: KOTT — Analyzed: 10/02/2020 18:00

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-36RE1 B

Preparation Batch: BII0857 — Sample Size: 10 mL

Prepared: 09/29/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Sulfate	14808-79-8	9	0.900	0.900	44.2	mg/L	D

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-11-WP-36-092320

20I0445-37 (Water)

Metals and Metallic Compounds

Method: EPA 6020A — Sampled: 09/23/2020 16:12

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/19/2020 14:57

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0445-37 F 01

Preparation Batch: BIJ0195 — Sample Size: 25 mL

Prepared: 10/06/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Aluminum	7429-90-5	2	4.73	40.0	338	ug/L	D
Calcium	7440-70-2	2	3.81	100	32000	ug/L	D
Iron	7439-89-6	2	12.5	40.0	484	ug/L	D
Lead	7439-92-1	1	0.0680	0.100	0.225	ug/L	
Magnesium	7439-95-4	2	0.614	40.0	4870	ug/L	D
Manganese	7439-96-5	1	0.0850	0.500	20.2	ug/L	
Potassium	7440-09-7	2	2.81	40.0	2090	ug/L	D
Sodium	7440-23-5	2	14.4	200	3410	ug/L	D

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-11-WP-36-092320

20I0445-37 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/23/2020 16:12

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/08/2020 22:17

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0445-37 F 01

Preparation Batch: BIJ0195 — Sample Size: 25 mL

Prepared: 10/06/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Copper	7440-50-8	1	0.340	0.500	1.21	ug/L	
Zinc	7440-66-6	1	0.820	4.00	8.10	ug/L	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-11-WP-36-092320

20I0445-37 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/23/2020 16:12

Instrument: IC930 Analyst: KOTT — Analyzed: 10/01/2020 07:57

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-37 F

Preparation Batch: BII0886 — Sample Size: 10 mL

Prepared: 09/30/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Chloride	16887-00-6	1	0.100	0.100	0.634	mg/L	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Nitrate-N	14797-55-8	1	0.100	0.100	0.182	mg/L	H

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-11-WP-36-092320

20I0445-37 (Water)

Wet Chemistry

Method: SM 2320 B-97 — Sampled: 09/23/2020 16:12
Instrument: Accumet AB150 Analyst: UW — Analyzed: 09/29/2020 14:32

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-37 C
Preparation Batch: BII0859 — Sample Size: 100 mL
Prepared: 09/29/2020 — Final Volume: 100 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Bicarbonate		1	1.00	1.00	24.2	mg/L CaCO3	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Carbonate		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Hydroxide		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Total		1	1.00	1.00	24.2	mg/L CaCO3	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-11-WP-36-092320

20I0445-37 (Water)

Wet Chemistry

Method: SM 2540 C-97 — Sampled: 09/23/2020 16:12

Instrument: BAL2 Analyst: KLE — Analyzed: 09/29/2020 15:23

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-37

Preparation Batch: BII0860 — Sample Size: 200 mL

Prepared: 09/29/2020 — Final Volume: 200 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Solids		1	5	5	172	mg/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-11-WP-36-092320

20I0445-37 (Water)

Wet Chemistry

Method: SM 2540 D-97 — Sampled: 09/23/2020 16:12

Instrument: BAL2 Analyst: KLE — Analyzed: 09/29/2020 10:38

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-37

Preparation Batch: BII0839 — Sample Size: 950 mL

Prepared: 09/29/2020 — Final Volume: 1000 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Suspended Solids		1	1	1	21	mg/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-11-WP-36-092320

20I0445-37 (Water)

Wet Chemistry

Method: SM 5310 B-00 — Sampled: 09/23/2020 16:12
Instrument: TOC-LCSH Analyst: WCW — Analyzed: 10/06/2020 13:04

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-37 E
Preparation Batch: BIJ0114 — Sample Size: 20 mL
Prepared: 10/05/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Organic Carbon, Dissolved		1	0.50	0.50	2.13	mg/L	

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-37 D
Preparation Batch: BIJ0276 — Sample Size: 20 mL
Prepared: 10/08/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Organic Carbon		1	0.50	0.50	2.34	mg/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-11-WP-36-092320

20I0445-37 (Water)

Calculation

Method: SM 2340 B-97 — Sampled: 09/23/2020 16:12

Instrument: [CALC] Analyst: MCB — Analyzed: 10/19/2020 14:57

Sample Preparation: Preparation Method: [CALC] — Extract ID: 20I0445-37

Preparation Batch: [CALC]

Prepared: 10/06/2020 Final Volume: 1

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness		2	0.414	100	mg/L CaCO3	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-11-WP-36-092320

20I0445-37RE1 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/23/2020 16:12

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/16/2020 01:49

Sample Preparation: Preparation Method: RHN EPA 600/4-79-020 4.1.4 HNO3 matrix 5x — Extract ID: 20I0445-37RE1 F 02

Preparation Batch: BIJ0345 — Sample Size: 100 mL

Prepared: 10/12/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Cadmium	7440-43-9	1	0.00600	0.0200	0.0502	ug/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-11-WP-36-092320

20I0445-37RE1 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/23/2020 16:12

Instrument: IC930 Analyst: KOTT — Analyzed: 10/02/2020 18:20

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-37RE1 F

Preparation Batch: BII0886 — Sample Size: 10 mL

Prepared: 09/30/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Sulfate	14808-79-8	16	1.60	1.60	76.4	mg/L	D

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-11-PW-6-092320

20I0445-38 (Water)

Metals and Metallic Compounds

Method: EPA 6020A — Sampled: 09/23/2020 14:09

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/19/2020 14:25

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0445-38 F 01

Preparation Batch: BIJ0195 — Sample Size: 25 mL

Prepared: 10/06/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Aluminum	7429-90-5	1	2.37	20.0	19.8	ug/L	J
Calcium	7440-70-2	1	1.91	50.0	12900	ug/L	
Iron	7439-89-6	1	6.27	20.0	49.4	ug/L	
Lead	7439-92-1	1	0.0680	0.100	0.150	ug/L	
Magnesium	7439-95-4	1	0.307	20.0	1470	ug/L	
Manganese	7439-96-5	1	0.0850	0.500	10.9	ug/L	
Potassium	7440-09-7	1	1.41	20.0	925	ug/L	
Sodium	7440-23-5	1	7.18	100	1410	ug/L	

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-11-PW-6-092320

20I0445-38 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/23/2020 14:09

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/08/2020 22:21

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0445-38 F 01

Preparation Batch: BIJ0195 — Sample Size: 25 mL

Prepared: 10/06/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Copper	7440-50-8	1	0.340	0.500	3.74	ug/L	
Zinc	7440-66-6	1	0.820	4.00	12.2	ug/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-11-PW-6-092320

20I0445-38 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/23/2020 14:09

Instrument: IC930 Analyst: KOTT — Analyzed: 10/01/2020 08:17

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-38 F

Preparation Batch: BII0886 — Sample Size: 10 mL

Prepared: 09/30/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Chloride	16887-00-6	1	0.100	0.100	0.404	mg/L	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Nitrate-N	14797-55-8	1	0.100	0.100	ND	mg/L	H, U

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-11-PW-6-092320

20I0445-38 (Water)

Wet Chemistry

Method: SM 2320 B-97 — Sampled: 09/23/2020 14:09

Instrument: Accumet AB150 Analyst: UW — Analyzed: 09/29/2020 14:32

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-38 C

Preparation Batch: BII0859 — Sample Size: 100 mL

Prepared: 09/29/2020 — Final Volume: 100 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Bicarbonate		1	1.00	1.00	15.3	mg/L CaCO3	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Carbonate		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Hydroxide		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Total		1	1.00	1.00	15.3	mg/L CaCO3	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-11-PW-6-092320

20I0445-38 (Water)

Wet Chemistry

Method: SM 2540 C-97 — Sampled: 09/23/2020 14:09

Instrument: BAL2 Analyst: KLE — Analyzed: 09/29/2020 15:23

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-38

Preparation Batch: BII0860 — Sample Size: 200 mL

Prepared: 09/29/2020 — Final Volume: 200 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Solids		1	5	5	68	mg/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-11-PW-6-092320

20I0445-38 (Water)

Wet Chemistry

Method: SM 2540 D-97 — Sampled: 09/23/2020 14:09

Instrument: BAL2 Analyst: KLE — Analyzed: 09/29/2020 10:38

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-38

Preparation Batch: BII0839 — Sample Size: 950 mL

Prepared: 09/29/2020 — Final Volume: 1000 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Suspended Solids		1	1	1	2	mg/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-11-PW-6-092320

20I0445-38 (Water)

Wet Chemistry

Method: SM 5310 B-00 — Sampled: 09/23/2020 14:09

Instrument: TOC-LCSH Analyst: WCW — Analyzed: 10/06/2020 13:22

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-38 E

Preparation Batch: BIJ0114 — Sample Size: 20 mL

Prepared: 10/05/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Organic Carbon, Dissolved		1	0.50	0.50	0.53	mg/L	

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-38 D

Preparation Batch: BIJ0276 — Sample Size: 20 mL

Prepared: 10/08/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Organic Carbon		1	0.50	0.50	0.70	mg/L	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-11-PW-6-092320

20I0445-38 (Water)

Calculation

Method: SM 2340 B-97 — Sampled: 09/23/2020 14:09

Instrument: [CALC] Analyst: MCB — Analyzed: 10/19/2020 14:25

Sample Preparation: Preparation Method: [CALC] — Extract ID: 20I0445-38

Preparation Batch: [CALC]

Prepared: 10/06/2020 Final Volume: 1

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness		1	0.207	38.2	mg/L CaCO3	

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-11-PW-6-092320

20I0445-38RE1 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/23/2020 14:09

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/16/2020 02:27

Sample Preparation: Preparation Method: RHN EPA 600/4-79-020 4.1.4 HNO3 matrix 5x — Extract ID: 20I0445-38RE1 F 02

Preparation Batch: BIJ0345 — Sample Size: 100 mL

Prepared: 10/12/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Cadmium	7440-43-9	1	0.00600	0.0200	0.0448	ug/L	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-11-PW-6-092320

20I0445-38RE1 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/23/2020 14:09

Instrument: IC930 Analyst: KOTT — Analyzed: 10/02/2020 18:40

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-38RE1 F

Preparation Batch: BII0886 — Sample Size: 10 mL

Prepared: 09/30/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Sulfate	14808-79-8	5	0.500	0.500	24.3	mg/L	D

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-18-PW-6-092420

20I0445-39 (Water)

Metals and Metallic Compounds

Method: EPA 6020A — Sampled: 09/24/2020 15:59

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/19/2020 14:26

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0445-39 F 01

Preparation Batch: BIJ0195 Sample Size: 25 mL

Prepared: 10/06/2020 Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Aluminum	7429-90-5	1	2.37	20.0	8.21	ug/L	J
Calcium	7440-70-2	1	1.91	50.0	14400	ug/L	
Iron	7439-89-6	1	6.27	20.0	ND	ug/L	U
Lead	7439-92-1	1	0.0680	0.100	ND	ug/L	U
Magnesium	7439-95-4	1	0.307	20.0	1800	ug/L	
Manganese	7439-96-5	1	0.0850	0.500	0.717	ug/L	
Potassium	7440-09-7	1	1.41	20.0	1060	ug/L	
Sodium	7440-23-5	1	7.18	100	1350	ug/L	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-18-PW-6-092420

20I0445-39 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/24/2020 15:59

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/08/2020 22:25

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0445-39 F 01

Preparation Batch: BIJ0195 — Sample Size: 25 mL

Prepared: 10/06/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Copper	7440-50-8	1	0.340	0.500	0.361	ug/L	J
Zinc	7440-66-6	1	0.820	4.00	6.29	ug/L	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-18-PW-6-092420

20I0445-39 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/24/2020 15:59

Instrument: IC930 Analyst: KOTT — Analyzed: 10/01/2020 08:37

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-39 F

Preparation Batch: BII0886 — Sample Size: 10 mL

Prepared: 09/30/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Chloride	16887-00-6	1	0.100	0.100	0.201	mg/L	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Nitrate-N	14797-55-8	1	0.100	0.100	0.126	mg/L	H

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-18-PW-6-092420

20I0445-39 (Water)

Wet Chemistry

Method: SM 2320 B-97 — Sampled: 09/24/2020 15:59

Instrument: Accumet AB150 Analyst: UW — Analyzed: 09/29/2020 14:32

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-39 C

Preparation Batch: BII0859 — Sample Size: 100 mL

Prepared: 09/29/2020 — Final Volume: 100 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Bicarbonate		1	1.00	1.00	17.3	mg/L CaCO3	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Carbonate		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Hydroxide		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Total		1	1.00	1.00	17.3	mg/L CaCO3	

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-18-PW-6-092420

20I0445-39 (Water)

Wet Chemistry

Method: SM 2540 C-97 — Sampled: 09/24/2020 15:59

Instrument: BAL2 Analyst: KLE — Analyzed: 09/29/2020 15:23

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-39

Preparation Batch: BII0860 — Sample Size: 200 mL

Prepared: 09/29/2020 — Final Volume: 200 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Solids		1	5	5	81	mg/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-18-PW-6-092420

20I0445-39 (Water)

Wet Chemistry

Method: SM 2540 D-97 — Sampled: 09/24/2020 15:59

Instrument: BAL2 Analyst: KLE — Analyzed: 09/29/2020 10:38

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-39

Preparation Batch: BII0839 — Sample Size: 960 mL

Prepared: 09/29/2020 — Final Volume: 1000 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Suspended Solids		1	1	1	2	mg/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-18-PW-6-092420

20I0445-39 (Water)

Wet Chemistry

Method: SM 5310 B-00 — Sampled: 09/24/2020 15:59

Instrument: TOC-LCSH Analyst: WCW — Analyzed: 10/06/2020 13:40

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-39 E

Preparation Batch: BIJ0114 — Sample Size: 20 mL

Prepared: 10/05/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Organic Carbon, Dissolved		1	0.50	0.50	0.58	mg/L	

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-39 D

Preparation Batch: BIJ0276 — Sample Size: 20 mL

Prepared: 10/08/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Organic Carbon		1	0.50	0.50	ND	mg/L	U

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-18-PW-6-092420

20I0445-39 (Water)

Calculation

Method: SM 2340 B-97 — Sampled: 09/24/2020 15:59

Instrument: [CALC] Analyst: MCB — Analyzed: 10/19/2020 14:26

Sample Preparation: Preparation Method: [CALC] — Extract ID: 20I0445-39

Preparation Batch: [CALC]

Prepared: 10/06/2020 Final Volume: 1

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness		1	0.207	43.4	mg/L CaCO3	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-18-PW-6-092420

20I0445-39RE1 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/24/2020 15:59

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/16/2020 02:32

Sample Preparation: Preparation Method: RHN EPA 600/4-79-020 4.1.4 HNO3 matrix 5x — Extract ID: 20I0445-39RE1 F 02

Preparation Batch: BIJ0345 — Sample Size: 100 mL

Prepared: 10/12/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Cadmium	7440-43-9	1	0.00600	0.0200	0.0630	ug/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-18-PW-6-092420

20I0445-39RE1 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/24/2020 15:59

Instrument: IC930 Analyst: KOTT — Analyzed: 10/02/2020 18:59

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-39RE1 F

Preparation Batch: BII0886 — Sample Size: 10 mL

Prepared: 09/30/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Sulfate	14808-79-8	6	0.600	0.600	27.8	mg/L	D

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-18-PW-12-092420

20I0445-40 (Water)

Metals and Metallic Compounds

Method: EPA 6020A — Sampled: 09/24/2020 15:01

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/19/2020 14:28

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0445-40 F 01

Preparation Batch: BIJ0242 — Sample Size: 25 mL

Prepared: 10/07/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Aluminum	7429-90-5	1	2.37	20.0	19.5	ug/L	J
Calcium	7440-70-2	1	1.91	50.0	15900	ug/L	
Iron	7439-89-6	1	6.27	20.0	40.7	ug/L	
Lead	7439-92-1	1	0.0680	0.100	ND	ug/L	U
Magnesium	7439-95-4	1	0.307	20.0	2130	ug/L	
Manganese	7439-96-5	1	0.0850	0.500	1.92	ug/L	
Potassium	7440-09-7	1	1.41	20.0	1300	ug/L	
Sodium	7440-23-5	1	7.18	100	1500	ug/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-18-PW-12-092420

20I0445-40 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/24/2020 15:01

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/09/2020 05:18

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0445-40 F 01

Preparation Batch: BIJ0242 — Sample Size: 25 mL

Prepared: 10/07/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Copper	7440-50-8	1	0.340	0.500	0.461	ug/L	J
Zinc	7440-66-6	1	0.820	4.00	9.02	ug/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-18-PW-12-092420

20I0445-40 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/24/2020 15:01

Instrument: IC930 Analyst: KOTT — Analyzed: 10/01/2020 08:57

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-40 F

Preparation Batch: BII0886 — Sample Size: 10 mL

Prepared: 09/30/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Chloride	16887-00-6	1	0.100	0.100	0.254	mg/L	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Nitrate-N	14797-55-8	1	0.100	0.100	0.122	mg/L	H

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-18-PW-12-092420

20I0445-40 (Water)

Wet Chemistry

Method: SM 2320 B-97 — Sampled: 09/24/2020 15:01

Instrument: Accumet AB150 Analyst: UW — Analyzed: 09/29/2020 14:32

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-40 C

Preparation Batch: BII0859 — Sample Size: 100 mL

Prepared: 09/29/2020 — Final Volume: 100 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Bicarbonate		1	1.00	1.00	14.6	mg/L CaCO3	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Carbonate		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Hydroxide		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Total		1	1.00	1.00	14.6	mg/L CaCO3	

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-18-PW-12-092420

20I0445-40 (Water)

Wet Chemistry

Method: SM 2540 C-97 — Sampled: 09/24/2020 15:01

Instrument: BAL2 Analyst: KLE — Analyzed: 09/29/2020 15:23

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-40

Preparation Batch: BII0860 — Sample Size: 200 mL

Prepared: 09/29/2020 — Final Volume: 200 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Solids		1	5	5	92	mg/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-18-PW-12-092420

20I0445-40 (Water)

Wet Chemistry

Method: SM 2540 D-97 — Sampled: 09/24/2020 15:01

Instrument: BAL2 Analyst: KLE — Analyzed: 09/29/2020 10:38

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-40

Preparation Batch: BII0839 — Sample Size: 955 mL

Prepared: 09/29/2020 — Final Volume: 1000 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Suspended Solids		1	1	1	ND	mg/L	U

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-18-PW-12-092420

20I0445-40 (Water)

Wet Chemistry

Method: SM 5310 B-00 — Sampled: 09/24/2020 15:01

Instrument: TOC-LCSH Analyst: WCW — Analyzed: 10/06/2020 14:01

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-40 E

Preparation Batch: BIJ0114 — Sample Size: 20 mL

Prepared: 10/05/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Organic Carbon, Dissolved		1	0.50	0.50	0.53	mg/L	

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-40 D

Preparation Batch: BIJ0276 — Sample Size: 20 mL

Prepared: 10/08/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Organic Carbon		1	0.50	0.50	ND	mg/L	U

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-18-PW-12-092420

20I0445-40 (Water)

Calculation

Method: SM 2340 B-97 — Sampled: 09/24/2020 15:01

Instrument: [CALC] Analyst: MCB — Analyzed: 10/19/2020 14:28

Sample Preparation: Preparation Method: [CALC] — Extract ID: 20I0445-40

Preparation Batch: [CALC]

Prepared: 10/07/2020 Final Volume: 1

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness		1	0.207	48.6	mg/L CaCO3	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-18-PW-12-092420

20I0445-40RE1 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/24/2020 15:01

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/16/2020 02:36

Sample Preparation: Preparation Method: RHN EPA 600/4-79-020 4.1.4 HNO3 matrix 5x — Extract ID: 20I0445-40RE1 F 02

Preparation Batch: BIJ0345 — Sample Size: 100 mL

Prepared: 10/12/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Cadmium	7440-43-9	1	0.00600	0.0200	0.0886	ug/L	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-18-PW-12-092420

20I0445-40RE1 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/24/2020 15:01

Instrument: IC930 Analyst: KOTT — Analyzed: 10/02/2020 19:19

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-40RE1 F

Preparation Batch: BII0886 — Sample Size: 10 mL

Prepared: 09/30/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Sulfate	14808-79-8	7	0.700	0.700	35.6	mg/L	D

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

MW-3-GW-092420

20I0445-41 (Water)

Metals and Metallic Compounds

Method: EPA 6020A — Sampled: 09/24/2020 14:40

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/17/2020 14:25

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0445-41 L 01

Preparation Batch: BIJ0195 — Sample Size: 25 mL

Prepared: 10/06/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Aluminum	7429-90-5	1	2.37	20.0	13.0	ug/L	J
Calcium	7440-70-2	1	1.91	50.0	6090	ug/L	
Iron	7439-89-6	1	6.27	20.0	8.62	ug/L	J
Lead	7439-92-1	1	0.0680	0.100	ND	ug/L	U
Magnesium	7439-95-4	1	0.307	20.0	640	ug/L	
Manganese	7439-96-5	1	0.0850	0.500	0.810	ug/L	
Potassium	7440-09-7	1	1.41	20.0	748	ug/L	
Sodium	7440-23-5	1	7.18	100	1010	ug/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

MW-3-GW-092420

20I0445-41 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/24/2020 14:40

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/08/2020 22:38

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0445-41 L 01

Preparation Batch: BIJ0195 — Sample Size: 25 mL

Prepared: 10/06/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Cadmium	7440-43-9	1	0.0300	0.100	0.956	ug/L	
Copper	7440-50-8	1	0.340	0.500	14.5	ug/L	
Zinc	7440-66-6	1	0.940	4.00	136	ug/L	

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

MW-3-GW-092420

20I0445-41 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/24/2020 14:40

Instrument: IC930 Analyst: KOTT — Analyzed: 10/01/2020 09:37

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-41 L

Preparation Batch: BII0886 — Sample Size: 10 mL

Prepared: 09/30/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Chloride	16887-00-6	1	0.100	0.100	0.408	mg/L	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Nitrate-N	14797-55-8	1	0.100	0.100	ND	mg/L	H, U

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

MW-3-GW-092420

20I0445-41 (Water)

Wet Chemistry

Method: SM 2320 B-97 — Sampled: 09/24/2020 14:40

Instrument: Accumet AB150 Analyst: UW — Analyzed: 09/29/2020 14:32

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-41 E

Preparation Batch: BII0859 — Sample Size: 100 mL

Prepared: 09/29/2020 — Final Volume: 100 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Bicarbonate		1	1.00	1.00	7.15	mg/L CaCO3	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Carbonate		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Hydroxide		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Total		1	1.00	1.00	7.15	mg/L CaCO3	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

MW-3-GW-092420

20I0445-41 (Water)

Wet Chemistry

Method: SM 2540 C-97 — Sampled: 09/24/2020 14:40

Instrument: BAL2 Analyst: KLE — Analyzed: 09/29/2020 15:23

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-41

Preparation Batch: BII0860 — Sample Size: 200 mL

Prepared: 09/29/2020 — Final Volume: 200 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Solids		1	5	5	56	mg/L	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

MW-3-GW-092420

20I0445-41 (Water)

Wet Chemistry

Method: SM 2540 D-97 — Sampled: 09/24/2020 14:40

Instrument: BAL2 Analyst: KLE — Analyzed: 09/29/2020 10:38

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-41

Preparation Batch: BII0839 — Sample Size: 900 mL

Prepared: 09/29/2020 — Final Volume: 1000 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Suspended Solids		1	1	1	ND	mg/L	U

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

MW-3-GW-092420

20I0445-41 (Water)

Wet Chemistry

Method: SM 5310 B-00 — Sampled: 09/24/2020 14:40

Instrument: TOC-LCSH Analyst: WCW — Analyzed: 10/06/2020 14:22

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-41 H

Preparation Batch: BIJ0114 — Sample Size: 20 mL

Prepared: 10/05/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Organic Carbon, Dissolved		1	0.50	0.50	ND	mg/L	U

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-41 G

Preparation Batch: BIJ0276 — Sample Size: 20 mL

Prepared: 10/08/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Organic Carbon		1	0.50	0.50	ND	mg/L	U

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

MW-3-GW-092420

20I0445-41 (Water)

Calculation

Method: SM 2340 B-97 — Sampled: 09/24/2020 14:40

Instrument: [CALC] Analyst: MCB — Analyzed: 10/17/2020 14:25

Sample Preparation: Preparation Method: [CALC]; Preparation Batch: [CALC]; Prepared: 10/06/2020; Final Volume: 1 — Extract ID: 20I0445-41

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness		1	0.207	17.9	mg/L CaCO3	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

MW-3-GW-092420

20I0445-41RE1 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/24/2020 14:40

Instrument: IC930 Analyst: KOTT — Analyzed: 10/02/2020 19:39

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-41RE1 L

Preparation Batch: BII0886 — Sample Size: 10 mL

Prepared: 09/30/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Sulfate	14808-79-8	3	0.300	0.300	12.9	mg/L	D

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

MW-2-GW-092420

20I0445-42 (Water)

Metals and Metallic Compounds

Method: EPA 6020A — Sampled: 09/24/2020 15:00

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/19/2020 14:30

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0445-42 F 01

Preparation Batch: BIJ0195 — Sample Size: 25 mL

Prepared: 10/06/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Aluminum	7429-90-5	1	2.37	20.0	4.81	ug/L	J
Calcium	7440-70-2	1	1.91	50.0	5940	ug/L	
Iron	7439-89-6	1	6.27	20.0	6.42	ug/L	J
Lead	7439-92-1	1	0.0680	0.100	ND	ug/L	U
Magnesium	7439-95-4	1	0.307	20.0	544	ug/L	
Manganese	7439-96-5	1	0.0850	0.500	0.135	ug/L	J
Potassium	7440-09-7	1	1.41	20.0	542	ug/L	
Sodium	7440-23-5	1	7.18	100	831	ug/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

MW-2-GW-092420

20I0445-42 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/24/2020 15:00

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/08/2020 22:29

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0445-42 F 01

Preparation Batch: BIJ0195 — Sample Size: 25 mL

Prepared: 10/06/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Cadmium	7440-43-9	1	0.0300	0.100	0.560	ug/L	
Copper	7440-50-8	1	0.340	0.500	7.65	ug/L	
Zinc	7440-66-6	1	0.940	4.00	70.0	ug/L	

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

MW-2-GW-092420

20I0445-42 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/24/2020 15:00

Instrument: IC930 Analyst: KOTT — Analyzed: 10/01/2020 12:16

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-42 F

Preparation Batch: BII0886 — Sample Size: 10 mL

Prepared: 09/30/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Chloride	16887-00-6	1	0.100	0.100	0.330	mg/L	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Nitrate-N	14797-55-8	1	0.100	0.100	0.104	mg/L	H

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Sulfate	14808-79-8	1	0.100	0.100	6.19	mg/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

MW-2-GW-092420

20I0445-42 (Water)

Wet Chemistry

Method: SM 2320 B-97 — Sampled: 09/24/2020 15:00
Instrument: Accumet AB150 Analyst: UW — Analyzed: 09/29/2020 14:32

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-42 C
Preparation Batch: BII0859 — Sample Size: 100 mL
Prepared: 09/29/2020 — Final Volume: 100 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Bicarbonate		1	1.00	1.00	12.3	mg/L CaCO3	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Carbonate		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Hydroxide		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Total		1	1.00	1.00	12.3	mg/L CaCO3	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

MW-2-GW-092420

20I0445-42 (Water)

Wet Chemistry

Method: SM 2540 C-97 — Sampled: 09/24/2020 15:00

Instrument: BAL2 Analyst: KLE — Analyzed: 09/29/2020 15:23

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-42

Preparation Batch: BII0860 — Sample Size: 200 mL

Prepared: 09/29/2020 — Final Volume: 200 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Solids		1	5	5	34	mg/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

MW-2-GW-092420

20I0445-42 (Water)

Wet Chemistry

Method: SM 2540 D-97 — Sampled: 09/24/2020 15:00

Instrument: BAL2 Analyst: KLE — Analyzed: 09/29/2020 10:38

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-42

Preparation Batch: BII0839 — Sample Size: 840 mL

Prepared: 09/29/2020 — Final Volume: 1000 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Suspended Solids		1	1	1	ND	mg/L	U

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

MW-2-GW-092420

20I0445-42 (Water)

Wet Chemistry

Method: SM 5310 B-00 — Sampled: 09/24/2020 15:00
Instrument: TOC-LCSH Analyst: WCW — Analyzed: 10/06/2020 16:22

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-42 E
Preparation Batch: BIJ0114 — Sample Size: 20 mL
Prepared: 10/05/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Organic Carbon, Dissolved		1	0.50	0.50	ND	mg/L	U

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-42 D
Preparation Batch: BIJ0276 — Sample Size: 20 mL
Prepared: 10/08/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Organic Carbon		1	0.50	0.50	ND	mg/L	U

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

MW-2-GW-092420

20I0445-42 (Water)

Calculation

Method: SM 2340 B-97 — Sampled: 09/24/2020 15:00

Instrument: [CALC] Analyst: MCB — Analyzed: 10/19/2020 14:30

Sample Preparation: Preparation Method: [CALC] — Extract ID: 20I0445-42

Preparation Batch: [CALC]

Prepared: 10/06/2020 Final Volume: 1

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness		1	0.207	17.1	mg/L CaCO3	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

MW-102-GW-092420

20I0445-43 (Water)

Metals and Metallic Compounds

Method: EPA 6020A — Sampled: 09/24/2020 15:10

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/19/2020 14:32

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0445-43 F 01

Preparation Batch: BIJ0195 — Sample Size: 25 mL

Prepared: 10/06/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Aluminum	7429-90-5	1	2.37	20.0	18.8	ug/L	J
Calcium	7440-70-2	1	1.91	50.0	6110	ug/L	
Iron	7439-89-6	1	6.27	20.0	32.2	ug/L	
Lead	7439-92-1	1	0.0680	0.100	ND	ug/L	U
Magnesium	7439-95-4	1	0.307	20.0	565	ug/L	
Manganese	7439-96-5	1	0.0850	0.500	0.565	ug/L	
Potassium	7440-09-7	1	1.41	20.0	554	ug/L	
Sodium	7440-23-5	1	7.18	100	903	ug/L	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

MW-102-GW-092420

20I0445-43 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/24/2020 15:10

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/08/2020 22:34

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0445-43 F 01

Preparation Batch: BIJ0195 — Sample Size: 25 mL

Prepared: 10/06/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Cadmium	7440-43-9	1	0.0300	0.100	0.549	ug/L	
Copper	7440-50-8	1	0.340	0.500	7.87	ug/L	
Zinc	7440-66-6	1	0.940	4.00	74.7	ug/L	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

MW-102-GW-092420

20I0445-43 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/24/2020 15:10

Instrument: IC930 Analyst: KOTT — Analyzed: 10/01/2020 12:37

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-43 F

Preparation Batch: BII0886 — Sample Size: 10 mL

Prepared: 09/30/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Chloride	16887-00-6	1	0.100	0.100	0.330	mg/L	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Nitrate-N	14797-55-8	1	0.100	0.100	0.105	mg/L	H

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Sulfate	14808-79-8	1	0.100	0.100	6.18	mg/L	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

MW-102-GW-092420

20I0445-43 (Water)

Wet Chemistry

Method: SM 2320 B-97 — Sampled: 09/24/2020 15:10
Instrument: Accumet AB150 Analyst: UW — Analyzed: 09/29/2020 14:32

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-43 C
Preparation Batch: BII0859 — Sample Size: 100 mL
Prepared: 09/29/2020 — Final Volume: 100 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Bicarbonate		1	1.00	1.00	13.1	mg/L CaCO3	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Carbonate		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Hydroxide		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Total		1	1.00	1.00	13.1	mg/L CaCO3	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

MW-102-GW-092420

20I0445-43 (Water)

Wet Chemistry

Method: SM 2540 C-97 — Sampled: 09/24/2020 15:10

Instrument: BAL2 Analyst: KLE — Analyzed: 09/29/2020 15:23

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-43

Preparation Batch: BII0860 — Sample Size: 200 mL

Prepared: 09/29/2020 — Final Volume: 200 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Solids		1	5	5	31	mg/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

MW-102-GW-092420

20I0445-43 (Water)

Wet Chemistry

Method: SM 2540 D-97 — Sampled: 09/24/2020 15:10

Instrument: BAL2 Analyst: KLE — Analyzed: 09/29/2020 09:00

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-43

Preparation Batch: BII0833 — Sample Size: 920 mL

Prepared: 09/29/2020 — Final Volume: 1000 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Suspended Solids		1	1	1	ND	mg/L	U

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

MW-102-GW-092420

20I0445-43 (Water)

Wet Chemistry

Method: SM 5310 B-00 — Sampled: 09/24/2020 15:10

Instrument: TOC-LCSH Analyst: WCW — Analyzed: 10/06/2020 16:43

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-43 E

Preparation Batch: BIJ0114 — Sample Size: 20 mL

Prepared: 10/05/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Organic Carbon, Dissolved		1	0.50	0.50	ND	mg/L	U

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-43 D

Preparation Batch: BIJ0276 — Sample Size: 20 mL

Prepared: 10/08/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Organic Carbon		1	0.50	0.50	ND	mg/L	U

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

MW-102-GW-092420

20I0445-43 (Water)

Calculation

Method: SM 2340 B-97 — Sampled: 09/24/2020 15:10

Instrument: [CALC] Analyst: MCB — Analyzed: 10/19/2020 14:32

Sample Preparation: Preparation Method: [CALC] — Extract ID: 20I0445-43

Preparation Batch: [CALC]

Prepared: 10/06/2020 Final Volume: 1

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness		1	0.207	17.6	mg/L CaCO3	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

MW-1-GW-092420

20I0445-44 (Water)

Metals and Metallic Compounds

Method: EPA 6020A — Sampled: 09/24/2020 16:10

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/19/2020 18:41

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0445-44 F 01

Preparation Batch: BIJ0195 — Sample Size: 25 mL

Prepared: 10/06/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Aluminum	7429-90-5	1	2.37	20.0	8.76	ug/L	J
Calcium	7440-70-2	1	1.91	50.0	7150	ug/L	
Iron	7439-89-6	1	6.27	20.0	ND	ug/L	U
Lead	7439-92-1	1	0.0680	0.100	ND	ug/L	U
Magnesium	7439-95-4	1	0.307	20.0	626	ug/L	
Manganese	7439-96-5	1	0.0850	0.500	0.274	ug/L	J
Potassium	7440-09-7	1	1.41	20.0	549	ug/L	
Sodium	7440-23-5	1	7.18	100	913	ug/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

MW-1-GW-092420

20I0445-44 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/24/2020 16:10

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/08/2020 23:17

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0445-44 F 01

Preparation Batch: BIJ0195 — Sample Size: 25 mL

Prepared: 10/06/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Cadmium	7440-43-9	1	0.0300	0.100	0.446	ug/L	
Copper	7440-50-8	1	0.340	0.500	0.968	ug/L	
Zinc	7440-66-6	1	0.940	4.00	74.0	ug/L	

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

MW-1-GW-092420

20I0445-44 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/24/2020 16:10

Instrument: IC930 Analyst: KOTT — Analyzed: 10/01/2020 12:57

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-44 F

Preparation Batch: BII0886 — Sample Size: 10 mL

Prepared: 09/30/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Chloride	16887-00-6	1	0.100	0.100	0.368	mg/L	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Nitrate-N	14797-55-8	1	0.100	0.100	ND	mg/L	H, U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Sulfate	14808-79-8	1	0.100	0.100	8.47	mg/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

MW-1-GW-092420

20I0445-44 (Water)

Wet Chemistry

Method: SM 2320 B-97 — Sampled: 09/24/2020 16:10

Instrument: Accumet AB150 Analyst: UW — Analyzed: 09/29/2020 14:32

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-44 C

Preparation Batch: BII0859 — Sample Size: 100 mL

Prepared: 09/29/2020 — Final Volume: 100 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Bicarbonate		1	1.00	1.00	13.3	mg/L CaCO3	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Carbonate		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Hydroxide		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Total		1	1.00	1.00	13.3	mg/L CaCO3	

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

MW-1-GW-092420

20I0445-44 (Water)

Wet Chemistry

Method: SM 2540 C-97 — Sampled: 09/24/2020 16:10

Instrument: BAL2 Analyst: KLE — Analyzed: 09/29/2020 15:23

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-44

Preparation Batch: BII0860 — Sample Size: 200 mL

Prepared: 09/29/2020 — Final Volume: 200 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Solids		1	5	5	36	mg/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

MW-1-GW-092420

20I0445-44 (Water)

Wet Chemistry

Method: SM 2540 D-97 — Sampled: 09/24/2020 16:10

Instrument: BAL2 Analyst: KLE — Analyzed: 09/29/2020 10:38

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-44

Preparation Batch: BII0839 — Sample Size: 910 mL

Prepared: 09/29/2020 — Final Volume: 1000 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Suspended Solids		1	1	1	ND	mg/L	U

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

MW-1-GW-092420

20I0445-44 (Water)

Wet Chemistry

Method: SM 5310 B-00 — Sampled: 09/24/2020 16:10

Instrument: TOC-LCSH Analyst: WCW — Analyzed: 10/06/2020 17:04

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-44 E

Preparation Batch: BIJ0114 — Sample Size: 20 mL

Prepared: 10/05/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Organic Carbon, Dissolved		1	0.50	0.50	ND	mg/L	U

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-44 D

Preparation Batch: BIJ0276 — Sample Size: 20 mL

Prepared: 10/08/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Organic Carbon		1	0.50	0.50	ND	mg/L	U

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

MW-1-GW-092420

20I0445-44 (Water)

Calculation

Method: SM 2340 B-97 — Sampled: 09/24/2020 16:10

Instrument: [CALC] Analyst: MCB — Analyzed: 10/19/2020 18:41

Sample Preparation: Preparation Method: [CALC] — Extract ID: 20I0445-44

Preparation Batch: [CALC]

Prepared: 10/06/2020 Final Volume: 1

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness		1	0.207	20.4	mg/L CaCO3	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

TP3-12D-GW-092420

20I0445-45 (Water)

Metals and Metallic Compounds

Method: EPA 6020A — Sampled: 09/24/2020 14:50

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/17/2020 17:33

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0445-45 F 01

Preparation Batch: BIJ0195 — Sample Size: 25 mL

Prepared: 10/06/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Aluminum	7429-90-5	5	11.8	100	873	ug/L	D
Calcium	7440-70-2	5	9.53	250	74500	ug/L	D
Iron	7439-89-6	1	6.27	20.0	12.3	ug/L	J
Lead	7439-92-1	1	0.0680	0.100	ND	ug/L	U
Magnesium	7439-95-4	5	1.53	100	8580	ug/L	D
Manganese	7439-96-5	5	0.425	2.50	816	ug/L	D
Potassium	7440-09-7	1	1.41	20.0	5250	ug/L	
Sodium	7440-23-5	5	35.9	500	3430	ug/L	D

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

TP3-12D-GW-092420

20I0445-45 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/24/2020 14:50

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/08/2020 23:22

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0445-45 F 01

Preparation Batch: BIJ0195 — Sample Size: 25 mL

Prepared: 10/06/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Cadmium	7440-43-9	1	0.0300	0.100	5.49	ug/L	
Copper	7440-50-8	1	0.340	0.500	70.9	ug/L	
Zinc	7440-66-6	5	4.70	20.0	761	ug/L	D

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

TP3-12D-GW-092420

20I0445-45 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/24/2020 14:50

Instrument: IC930 Analyst: KOTT — Analyzed: 10/01/2020 13:17

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-45 F

Preparation Batch: BII0886 — Sample Size: 10 mL

Prepared: 09/30/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Chloride	16887-00-6	1	0.100	0.100	0.227	mg/L	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Nitrate-N	14797-55-8	1	0.100	0.100	ND	mg/L	H, U

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

TP3-12D-GW-092420

20I0445-45 (Water)

Wet Chemistry

Method: SM 2320 B-97 — Sampled: 09/24/2020 14:50

Instrument: Accumet AB150 Analyst: UW — Analyzed: 09/29/2020 14:32

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-45 C

Preparation Batch: BII0859 — Sample Size: 100 mL

Prepared: 09/29/2020 — Final Volume: 100 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Bicarbonate		1	1.00	1.00	5.04	mg/L CaCO3	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Carbonate		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Hydroxide		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Total		1	1.00	1.00	5.04	mg/L CaCO3	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

TP3-12D-GW-092420

20I0445-45 (Water)

Wet Chemistry

Method: SM 2540 C-97 — Sampled: 09/24/2020 14:50

Instrument: BAL2 Analyst: KLE — Analyzed: 09/29/2020 15:23

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-45

Preparation Batch: BII0860 — Sample Size: 100 mL

Prepared: 09/29/2020 — Final Volume: 200 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Solids		1	10	10	382	mg/L	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

TP3-12D-GW-092420

20I0445-45 (Water)

Wet Chemistry

Method: SM 2540 D-97 — Sampled: 09/24/2020 14:50

Instrument: BAL2 Analyst: KLE — Analyzed: 09/29/2020 10:38

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-45

Preparation Batch: BII0839 — Sample Size: 910 mL

Prepared: 09/29/2020 — Final Volume: 1000 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Suspended Solids		1	1	1	ND	mg/L	U

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

TP3-12D-GW-092420

20I0445-45 (Water)

Wet Chemistry

Method: SM 5310 B-00 — Sampled: 09/24/2020 14:50

Instrument: TOC-LCSH Analyst: WCW — Analyzed: 10/06/2020 18:27

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-45 E

Preparation Batch: BIJ0116 — Sample Size: 20 mL

Prepared: 10/05/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Organic Carbon, Dissolved		1	0.50	0.50	0.70	mg/L	

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-45 D

Preparation Batch: BIJ0289 — Sample Size: 20 mL

Prepared: 10/08/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Organic Carbon		1	0.50	0.50	0.62	mg/L	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

TP3-12D-GW-092420

20I0445-45 (Water)

Calculation

Method: SM 2340 B-97 — Sampled: 09/24/2020 14:50

Instrument: [CALC] Analyst: MCB — Analyzed: 10/12/2020 13:12

Sample Preparation: Preparation Method: [CALC]
Preparation Batch: [CALC]
Prepared: 10/06/2020 Final Volume: 1 — Extract ID: 20I0445-45

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness		5	1.04	221	mg/L CaCO3	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

TP3-12D-GW-092420

20I0445-45RE1 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/24/2020 14:50

Instrument: IC930 Analyst: KOTT — Analyzed: 10/02/2020 21:58

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-45RE1 F

Preparation Batch: BII0886 — Sample Size: 10 mL

Prepared: 09/30/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Sulfate	14808-79-8	45	4.50	4.50	213	mg/L	D

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

HV-3-GW-092420

20I0445-46 (Water)

Metals and Metallic Compounds

Method: EPA 6020A — Sampled: 09/24/2020 16:30

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/19/2020 18:43

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0445-46 F 01

Preparation Batch: BIJ0195 — Sample Size: 25 mL

Prepared: 10/06/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Aluminum	7429-90-5	1	2.37	20.0	4.42	ug/L	J
Calcium	7440-70-2	1	1.91	50.0	12900	ug/L	
Iron	7439-89-6	1	6.27	20.0	10.8	ug/L	J
Lead	7439-92-1	1	0.0680	0.100	ND	ug/L	U
Magnesium	7439-95-4	1	0.307	20.0	1640	ug/L	
Manganese	7439-96-5	1	0.0850	0.500	0.190	ug/L	J
Potassium	7440-09-7	1	1.41	20.0	837	ug/L	
Sodium	7440-23-5	1	7.18	100	1330	ug/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

HV-3-GW-092420

20I0445-46 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/24/2020 16:30

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/08/2020 23:26

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0445-46 F 01

Preparation Batch: BIJ0195 — Sample Size: 25 mL

Prepared: 10/06/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Copper	7440-50-8	1	0.340	0.500	ND	ug/L	U
Zinc	7440-66-6	1	0.820	4.00	1.06	ug/L	J

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

HV-3-GW-092420

20I0445-46 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/24/2020 16:30

Instrument: IC930 Analyst: KOTT — Analyzed: 10/01/2020 13:37

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-46 F

Preparation Batch: BII0886 — Sample Size: 10 mL

Prepared: 09/30/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Chloride	16887-00-6	1	0.100	0.100	0.121	mg/L	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Nitrate-N	14797-55-8	1	0.100	0.100	0.167	mg/L	H

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Sulfate	14808-79-8	1	0.100	0.100	4.85	mg/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

HV-3-GW-092420

20I0445-46 (Water)

Wet Chemistry

Method: SM 2320 B-97 — Sampled: 09/24/2020 16:30

Instrument: Accumet AB150 Analyst: UW — Analyzed: 09/30/2020 09:33

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-46 C

Preparation Batch: BII0880 — Sample Size: 100 mL

Prepared: 09/30/2020 — Final Volume: 100 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Bicarbonate		1	1.00	1.00	39.3	mg/L CaCO3	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Carbonate		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Hydroxide		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Total		1	1.00	1.00	39.3	mg/L CaCO3	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

HV-3-GW-092420

20I0445-46 (Water)

Wet Chemistry

Method: SM 2540 C-97 — Sampled: 09/24/2020 16:30

Instrument: BAL2 Analyst: KLE — Analyzed: 09/29/2020 16:14

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-46

Preparation Batch: BII0865 — Sample Size: 200 mL

Prepared: 09/29/2020 — Final Volume: 200 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Solids		1	5	5	47	mg/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

HV-3-GW-092420

20I0445-46 (Water)

Wet Chemistry

Method: SM 2540 D-97 — Sampled: 09/24/2020 16:30

Instrument: BAL2 Analyst: KLE — Analyzed: 09/29/2020 10:38

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-46

Preparation Batch: BII0839 — Sample Size: 920 mL

Prepared: 09/29/2020 — Final Volume: 1000 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Suspended Solids		1	1	1	ND	mg/L	U

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

HV-3-GW-092420

20I0445-46 (Water)

Wet Chemistry

Method: SM 5310 B-00 — Sampled: 09/24/2020 16:30

Instrument: TOC-LCSH Analyst: WCW — Analyzed: 10/06/2020 18:44

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-46 E

Preparation Batch: BIJ0116 — Sample Size: 20 mL

Prepared: 10/05/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Organic Carbon, Dissolved		1	0.50	0.50	ND	mg/L	U

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-46 D

Preparation Batch: BIJ0289 — Sample Size: 20 mL

Prepared: 10/08/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Organic Carbon		1	0.50	0.50	ND	mg/L	U

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

HV-3-GW-092420

20I0445-46 (Water)

Calculation

Method: SM 2340 B-97 — Sampled: 09/24/2020 16:30

Instrument: [CALC] Analyst: MCB — Analyzed: 10/19/2020 18:43

Sample Preparation: Preparation Method: [CALC] — Extract ID: 20I0445-46

Preparation Batch: [CALC]

Prepared: 10/06/2020 Final Volume: 1

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness		1	0.207	39.1	mg/L CaCO3	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

HV-3-GW-092420

20I0445-46RE1 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/24/2020 16:30

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/16/2020 02:41

Sample Preparation: Preparation Method: RHN EPA 600/4-79-020 4.1.4 HNO3 matrix 5x — Extract ID: 20I0445-46RE1 F 02

Preparation Batch: BIJ0345 — Sample Size: 100 mL

Prepared: 10/12/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Cadmium	7440-43-9	1	0.00600	0.0200	0.00800	ug/L	J

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-10-PW-6-092520

20I0445-47 (Water)

Metals and Metallic Compounds

Method: EPA 6020A — Sampled: 09/25/2020 09:19

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/17/2020 15:29

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0445-47 F 01

Preparation Batch: BIJ0195 — Sample Size: 25 mL

Prepared: 10/06/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Aluminum	7429-90-5	20	47.3	400	5370	ug/L	D
Calcium	7440-70-2	5	9.53	250	54200	ug/L	D
Iron	7439-89-6	2	12.5	40.0	28.6	ug/L	J, D
Lead	7439-92-1	1	0.0680	0.100	0.148	ug/L	
Magnesium	7439-95-4	5	1.53	100	8060	ug/L	D
Manganese	7439-96-5	20	1.70	10.0	2690	ug/L	D
Potassium	7440-09-7	20	28.1	400	6230	ug/L	D
Sodium	7440-23-5	20	144	2000	3710	ug/L	D

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-10-PW-6-092520

20I0445-47 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/25/2020 09:19

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/08/2020 23:30

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0445-47 F 01

Preparation Batch: BIJ0195 — Sample Size: 25 mL

Prepared: 10/06/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Cadmium	7440-43-9	1	0.0300	0.100	4.27	ug/L	
Copper	7440-50-8	1	0.340	0.500	36.5	ug/L	
Zinc	7440-66-6	5	4.70	20.0	414	ug/L	D

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-10-PW-6-092520

20I0445-47 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/25/2020 09:19

Instrument: IC930 Analyst: KOTT — Analyzed: 10/01/2020 13:57

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-47 F

Preparation Batch: BII0886 — Sample Size: 10 mL

Prepared: 09/30/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Chloride	16887-00-6	1	0.100	0.100	0.375	mg/L	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Nitrate-N	14797-55-8	1	0.100	0.100	ND	mg/L	H, U

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-10-PW-6-092520

20I0445-47 (Water)

Wet Chemistry

Method: SM 2320 B-97 — Sampled: 09/25/2020 09:19

Instrument: Accumet AB150 Analyst: UW — Analyzed: 09/30/2020 09:33

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-47 C

Preparation Batch: BII0880 — Sample Size: 100 mL

Prepared: 09/30/2020 — Final Volume: 100 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Bicarbonate		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Carbonate		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Hydroxide		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Total		1	1.00	1.00	ND	mg/L CaCO3	U

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-10-PW-6-092520

20I0445-47 (Water)

Wet Chemistry

Method: SM 2540 C-97 — Sampled: 09/25/2020 09:19

Instrument: BAL2 Analyst: KLE — Analyzed: 09/29/2020 16:14

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-47

Preparation Batch: BII0865 — Sample Size: 200 mL

Prepared: 09/29/2020 — Final Volume: 200 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Solids		1	5	5	354	mg/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-10-PW-6-092520

20I0445-47 (Water)

Wet Chemistry

Method: SM 2540 D-97 — Sampled: 09/25/2020 09:19

Instrument: BAL2 Analyst: KLE — Analyzed: 09/29/2020 11:50

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-47

Preparation Batch: BII0846 — Sample Size: 960 mL

Prepared: 09/29/2020 — Final Volume: 1000 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Suspended Solids		1	1	1	ND	mg/L	U

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-10-PW-6-092520

20I0445-47 (Water)

Wet Chemistry

Method: SM 5310 B-00 — Sampled: 09/25/2020 09:19

Instrument: TOC-LCSH Analyst: WCW — Analyzed: 10/06/2020 19:06

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-47 E

Preparation Batch: BIJ0116 — Sample Size: 20 mL

Prepared: 10/05/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Organic Carbon, Dissolved		1	0.50	0.50	0.55	mg/L	

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-47 D

Preparation Batch: BIJ0289 — Sample Size: 20 mL

Prepared: 10/08/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Organic Carbon		1	0.50	0.50	ND	mg/L	U

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-10-PW-6-092520

20I0445-47 (Water)

Calculation

Method: SM 2340 B-97 — Sampled: 09/25/2020 09:19

Instrument: [CALC] Analyst: MCB — Analyzed: 10/12/2020 19:54

Sample Preparation: Preparation Method: [CALC] — Extract ID: 20I0445-47

Preparation Batch: [CALC]

Prepared: 10/06/2020 Final Volume: 1

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness		5	1.04	168	mg/L CaCO3	

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-10-PW-6-092520

20I0445-47RE1 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/25/2020 09:19

Instrument: IC930 Analyst: KOTT — Analyzed: 10/02/2020 22:18

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-47RE1 F

Preparation Batch: BII0886 — Sample Size: 10 mL

Prepared: 09/30/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Sulfate	14808-79-8	44	4.40	4.40	206	mg/L	D

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-10-PW-12-092520

20I0445-48 (Water)

Metals and Metallic Compounds

Method: EPA 6020A — Sampled: 09/25/2020 10:17

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/17/2020 15:31

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0445-48 F 01

Preparation Batch: BIJ0195 — Sample Size: 25 mL

Prepared: 10/06/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Aluminum	7429-90-5	20	47.3	400	5400	ug/L	D
Calcium	7440-70-2	5	9.53	250	57600	ug/L	D
Iron	7439-89-6	2	12.5	40.0	ND	ug/L	U
Lead	7439-92-1	1	0.0680	0.100	0.100	ug/L	
Magnesium	7439-95-4	5	1.53	100	8440	ug/L	D
Manganese	7439-96-5	20	1.70	10.0	3660	ug/L	D
Potassium	7440-09-7	20	28.1	400	6210	ug/L	D
Sodium	7440-23-5	20	144	2000	3830	ug/L	D

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-10-PW-12-092520

20I0445-48 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/25/2020 10:17

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/08/2020 23:34

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0445-48 F 01

Preparation Batch: BIJ0195 — Sample Size: 25 mL

Prepared: 10/06/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Cadmium	7440-43-9	1	0.0400	0.100	4.86	ug/L	
Copper	7440-50-8	1	0.340	0.500	30.1	ug/L	
Zinc	7440-66-6	5	4.70	20.0	437	ug/L	D

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-10-PW-12-092520

20I0445-48 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/25/2020 10:17

Instrument: IC930 Analyst: KOTT — Analyzed: 10/01/2020 14:17

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-48 E

Preparation Batch: BII0886 — Sample Size: 10 mL

Prepared: 09/30/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Chloride	16887-00-6	1	0.100	0.100	0.379	mg/L	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Nitrate-N	14797-55-8	1	0.100	0.100	ND	mg/L	H, U

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-10-PW-12-092520

20I0445-48 (Water)

Wet Chemistry

Method: SM 2320 B-97 — Sampled: 09/25/2020 10:17

Instrument: Accumet AB150 Analyst: UW — Analyzed: 09/30/2020 09:33

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-48 C

Preparation Batch: BII0880 — Sample Size: 100 mL

Prepared: 09/30/2020 — Final Volume: 100 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Bicarbonate		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Carbonate		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Hydroxide		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Total		1	1.00	1.00	ND	mg/L CaCO3	U

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-10-PW-12-092520

20I0445-48 (Water)

Wet Chemistry

Method: SM 2540 C-97 — Sampled: 09/25/2020 10:17

Instrument: BAL2 Analyst: KLE — Analyzed: 09/29/2020 16:14

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-48

Preparation Batch: BII0865 — Sample Size: 200 mL

Prepared: 09/29/2020 — Final Volume: 200 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Solids		1	5	5	357	mg/L	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-10-PW-12-092520

20I0445-48 (Water)

Wet Chemistry

Method: SM 2540 D-97 — Sampled: 09/25/2020 10:17

Instrument: BAL2 Analyst: KLE — Analyzed: 09/29/2020 11:50

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-48

Preparation Batch: BII0846 — Sample Size: 940 mL

Prepared: 09/29/2020 — Final Volume: 1000 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Suspended Solids		1	1	1	ND	mg/L	U

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-10-PW-12-092520

20I0445-48 (Water)

Wet Chemistry

Method: SM 5310 B-00 — Sampled: 09/25/2020 10:17

Instrument: TOC-LCSH Analyst: WCW — Analyzed: 10/06/2020 19:23

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-48 E

Preparation Batch: BIJ0116 — Sample Size: 20 mL

Prepared: 10/05/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Organic Carbon, Dissolved		1	0.50	0.50	0.62	mg/L	

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-48 D

Preparation Batch: BIJ0289 — Sample Size: 20 mL

Prepared: 10/08/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Organic Carbon		1	0.50	0.50	0.54	mg/L	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-10-PW-12-092520

20I0445-48 (Water)

Calculation

Method: SM 2340 B-97 — Sampled: 09/25/2020 10:17

Instrument: [CALC] Analyst: MCB — Analyzed: 10/12/2020 19:59

Sample Preparation: Preparation Method: [CALC] — Extract ID: 20I0445-48

Preparation Batch: [CALC]

Prepared: 10/06/2020 Final Volume: 1

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness		5	1.04	178	mg/L CaCO3	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-10-PW-12-092520

20I0445-48RE1 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/25/2020 10:17

Instrument: IC930 Analyst: KOTT — Analyzed: 10/02/2020 23:38

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-48RE1 F

Preparation Batch: BII0886 — Sample Size: 10 mL

Prepared: 09/30/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Sulfate	14808-79-8	45	4.50	4.50	204	mg/L	D

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-10-WP-36-092520

20I0445-49 (Water)

Metals and Metallic Compounds

Method: EPA 6020A — Sampled: 09/25/2020 10:30

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/17/2020 15:33

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0445-49 F 01

Preparation Batch: BIJ0195 — Sample Size: 25 mL

Prepared: 10/06/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Aluminum	7429-90-5	20	47.3	400	6390	ug/L	D
Calcium	7440-70-2	5	9.53	250	67400	ug/L	D
Iron	7439-89-6	20	125	400	5410	ug/L	D
Lead	7439-92-1	1	0.0680	0.100	0.0760	ug/L	J
Magnesium	7439-95-4	5	1.53	100	10300	ug/L	D
Manganese	7439-96-5	20	1.70	10.0	3870	ug/L	D
Potassium	7440-09-7	20	28.1	400	7970	ug/L	D
Sodium	7440-23-5	20	144	2000	4480	ug/L	D

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-10-WP-36-092520

20I0445-49 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/25/2020 10:30

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/08/2020 23:39

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0445-49 F 01

Preparation Batch: BIJ0195 — Sample Size: 25 mL

Prepared: 10/06/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Cadmium	7440-43-9	1	0.0400	0.100	5.17	ug/L	
Copper	7440-50-8	1	0.340	0.500	15.5	ug/L	
Zinc	7440-66-6	5	4.70	20.0	457	ug/L	D

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-10-WP-36-092520

20I0445-49 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/25/2020 10:30

Instrument: IC930 Analyst: KOTT — Analyzed: 10/01/2020 14:37

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-49 F

Preparation Batch: BII0886 — Sample Size: 10 mL

Prepared: 09/30/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Chloride	16887-00-6	1	0.100	0.100	0.405	mg/L	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Nitrate-N	14797-55-8	1	0.100	0.100	ND	mg/L	H, U

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-10-WP-36-092520

20I0445-49 (Water)

Wet Chemistry

Method: SM 2320 B-97 — Sampled: 09/25/2020 10:30

Instrument: Accumet AB150 Analyst: UW — Analyzed: 09/30/2020 09:33

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-49 C

Preparation Batch: BII0880 — Sample Size: 100 mL

Prepared: 09/30/2020 — Final Volume: 100 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Bicarbonate		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Carbonate		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Hydroxide		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Total		1	1.00	1.00	ND	mg/L CaCO3	U

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-10-WP-36-092520

20I0445-49 (Water)

Wet Chemistry

Method: SM 2540 C-97 — Sampled: 09/25/2020 10:30

Instrument: BAL2 Analyst: KLE — Analyzed: 09/29/2020 16:14

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-49

Preparation Batch: BII0865 — Sample Size: 100 mL

Prepared: 09/29/2020 — Final Volume: 200 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Solids		1	10	10	451	mg/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-10-WP-36-092520

20I0445-49 (Water)

Wet Chemistry

Method: SM 2540 D-97 — Sampled: 09/25/2020 10:30

Instrument: BAL2 Analyst: KLE — Analyzed: 09/29/2020 11:50

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-49

Preparation Batch: BII0846 — Sample Size: 945 mL

Prepared: 09/29/2020 — Final Volume: 1000 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Suspended Solids		1	1	1	2	mg/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-10-WP-36-092520

20I0445-49 (Water)

Wet Chemistry

Method: SM 5310 B-00 — Sampled: 09/25/2020 10:30
Instrument: TOC-LCSH Analyst: WCW — Analyzed: 10/07/2020 12:29

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-49 E
Preparation Batch: BIJ0116 — Sample Size: 20 mL
Prepared: 10/05/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Organic Carbon, Dissolved		1	0.50	0.50	0.69	mg/L	

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-49 D
Preparation Batch: BIJ0289 — Sample Size: 20 mL
Prepared: 10/08/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Organic Carbon		1	0.50	0.50	ND	mg/L	U

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-10-WP-36-092520

20I0445-49 (Water)

Calculation

Method: SM 2340 B-97 — Sampled: 09/25/2020 10:30

Instrument: [CALC] Analyst: MCB — Analyzed: 10/12/2020 20:03

Sample Preparation: Preparation Method: [CALC] — Extract ID: 20I0445-49

Preparation Batch: [CALC]

Prepared: 10/06/2020 Final Volume: 1

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness		5	1.04	211	mg/L CaCO3	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-10-WP-36-092520

20I0445-49RE1 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/25/2020 10:30

Instrument: IC930 Analyst: KOTT — Analyzed: 10/02/2020 23:57

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-49RE1 E

Preparation Batch: BII0886 — Sample Size: 10 mL

Prepared: 09/30/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Sulfate	14808-79-8	56	5.60	5.60	262	mg/L	D

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-10-WP-092520

20I0445-50 (Water)

Metals and Metallic Compounds

Method: EPA 6020A — Sampled: 09/25/2020 09:30

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/17/2020 15:35

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0445-50 F 01

Preparation Batch: BIJ0195 — Sample Size: 25 mL

Prepared: 10/06/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Aluminum	7429-90-5	20	47.3	400	3420	ug/L	D
Calcium	7440-70-2	5	9.53	250	44500	ug/L	D
Iron	7439-89-6	2	12.5	40.0	ND	ug/L	U
Lead	7439-92-1	1	0.0680	0.100	0.121	ug/L	
Magnesium	7439-95-4	5	1.53	100	6550	ug/L	D
Manganese	7439-96-5	20	1.70	10.0	2370	ug/L	D
Potassium	7440-09-7	20	28.1	400	5000	ug/L	D
Sodium	7440-23-5	20	144	2000	3190	ug/L	D

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-10-WP-092520

20I0445-50 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/25/2020 09:30

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/08/2020 23:43

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0445-50 F 01

Preparation Batch: BIJ0195 — Sample Size: 25 mL

Prepared: 10/06/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Cadmium	7440-43-9	1	0.0300	0.100	4.08	ug/L	
Copper	7440-50-8	1	0.340	0.500	25.0	ug/L	
Zinc	7440-66-6	5	4.70	20.0	332	ug/L	D

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-10-WP-092520

20I0445-50 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/25/2020 09:30

Instrument: IC930 Analyst: KOTT — Analyzed: 10/01/2020 15:57

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-50 F

Preparation Batch: BII0886 — Sample Size: 10 mL

Prepared: 09/30/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Chloride	16887-00-6	1	0.100	0.100	0.350	mg/L	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Nitrate-N	14797-55-8	1	0.100	0.100	ND	mg/L	H, U

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-10-WP-092520

20I0445-50 (Water)

Wet Chemistry

Method: SM 2320 B-97 — Sampled: 09/25/2020 09:30

Instrument: Accumet AB150 Analyst: UW — Analyzed: 09/30/2020 09:33

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-50 C

Preparation Batch: BII0880 — Sample Size: 100 mL

Prepared: 09/30/2020 — Final Volume: 100 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Bicarbonate		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Carbonate		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Hydroxide		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Total		1	1.00	1.00	ND	mg/L CaCO3	U

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-10-WP-092520

20I0445-50 (Water)

Wet Chemistry

Method: SM 2540 C-97 — Sampled: 09/25/2020 09:30

Instrument: BAL2 Analyst: KLE — Analyzed: 09/29/2020 16:14

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-50

Preparation Batch: BII0865 — Sample Size: 200 mL

Prepared: 09/29/2020 — Final Volume: 200 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Solids		1	5	5	275	mg/L	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-10-WP-092520

20I0445-50 (Water)

Wet Chemistry

Method: SM 2540 D-97 — Sampled: 09/25/2020 09:30

Instrument: BAL2 Analyst: KLE — Analyzed: 09/29/2020 11:50

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-50

Preparation Batch: BII0846 — Sample Size: 920 mL

Prepared: 09/29/2020 — Final Volume: 1000 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Suspended Solids		1	1	1	ND	mg/L	U

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-10-WP-092520

20I0445-50 (Water)

Wet Chemistry

Method: SM 5310 B-00 — Sampled: 09/25/2020 09:30
Instrument: TOC-LCSH Analyst: WCW — Analyzed: 10/07/2020 12:58

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-50 E
Preparation Batch: BIJ0116 — Sample Size: 20 mL
Prepared: 10/05/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Organic Carbon, Dissolved		1	0.50	0.50	0.52	mg/L	

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-50 D
Preparation Batch: BIJ0289 — Sample Size: 20 mL
Prepared: 10/08/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Organic Carbon		1	0.50	0.50	ND	mg/L	U

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-10-WP-092520

20I0445-50 (Water)

Calculation

Method: SM 2340 B-97 — Sampled: 09/25/2020 09:30

Instrument: [CALC] Analyst: MCB — Analyzed: 10/12/2020 20:07

Sample Preparation: Preparation Method: [CALC] — Extract ID: 20I0445-50

Preparation Batch: [CALC]

Prepared: 10/06/2020 Final Volume: 1

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness		5	1.04	138	mg/L CaCO3	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-10-WP-092520

20I0445-50RE1 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/25/2020 09:30

Instrument: IC930 Analyst: KOTT — Analyzed: 10/03/2020 00:17

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-50RE1 E

Preparation Batch: BII0886 — Sample Size: 10 mL

Prepared: 09/30/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Sulfate	14808-79-8	33	3.30	3.30	160	mg/L	D

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-17-PW-6-092520

20I0445-51 (Water)

Metals and Metallic Compounds

Method: EPA 6020A — Sampled: 09/25/2020 11:19

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/19/2020 18:45

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0445-51 F 01

Preparation Batch: BIJ0195 — Sample Size: 25 mL

Prepared: 10/06/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Aluminum	7429-90-5	1	2.37	20.0	53.4	ug/L	
Calcium	7440-70-2	1	1.91	50.0	5380	ug/L	
Iron	7439-89-6	1	6.27	20.0	84.7	ug/L	
Lead	7439-92-1	1	0.0680	0.100	ND	ug/L	U
Magnesium	7439-95-4	1	0.307	20.0	515	ug/L	
Manganese	7439-96-5	1	0.0850	0.500	3.79	ug/L	
Potassium	7440-09-7	1	1.41	20.0	700	ug/L	
Sodium	7440-23-5	1	7.18	100	694	ug/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-17-PW-6-092520

20I0445-51 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/25/2020 11:19

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/08/2020 23:48

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0445-51 F 01

Preparation Batch: BIJ0195 — Sample Size: 25 mL

Prepared: 10/06/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Copper	7440-50-8	1	0.340	0.500	2.46	ug/L	
Zinc	7440-66-6	1	0.820	4.00	10.8	ug/L	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-17-PW-6-092520

20I0445-51 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/25/2020 11:19

Instrument: IC930 Analyst: KOTT — Analyzed: 10/01/2020 16:17

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-51 F

Preparation Batch: BII0886 — Sample Size: 10 mL

Prepared: 09/30/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Chloride	16887-00-6	1	0.100	0.100	0.298	mg/L	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Nitrate-N	14797-55-8	1	0.100	0.100	ND	mg/L	H, U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Sulfate	14808-79-8	1	0.100	0.100	8.55	mg/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-17-PW-6-092520

20I0445-51 (Water)

Wet Chemistry

Method: SM 2320 B-97 — Sampled: 09/25/2020 11:19

Instrument: Accumet AB150 Analyst: UW — Analyzed: 09/30/2020 09:33

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-51 C

Preparation Batch: BII0880 — Sample Size: 100 mL

Prepared: 09/30/2020 — Final Volume: 100 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Bicarbonate		1	1.00	1.00	9.08	mg/L CaCO3	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Carbonate		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Hydroxide		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Total		1	1.00	1.00	9.08	mg/L CaCO3	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-17-PW-6-092520

20I0445-51 (Water)

Wet Chemistry

Method: SM 2540 C-97 — Sampled: 09/25/2020 11:19

Instrument: BAL2 Analyst: KLE — Analyzed: 09/29/2020 16:14

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-51

Preparation Batch: BII0865 — Sample Size: 200 mL

Prepared: 09/29/2020 — Final Volume: 200 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Solids		1	5	5	22	mg/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-17-PW-6-092520

20I0445-51 (Water)

Wet Chemistry

Method: SM 2540 D-97 — Sampled: 09/25/2020 11:19

Instrument: BAL2 Analyst: KLE — Analyzed: 09/29/2020 11:50

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-51

Preparation Batch: BII0846 — Sample Size: 960 mL

Prepared: 09/29/2020 — Final Volume: 1000 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Suspended Solids		1	1	1	2	mg/L	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-17-PW-6-092520

20I0445-51 (Water)

Wet Chemistry

Method: SM 5310 B-00 — Sampled: 09/25/2020 11:19

Instrument: TOC-LCSH Analyst: WCW — Analyzed: 10/07/2020 13:16

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-51 E

Preparation Batch: BIJ0116 — Sample Size: 20 mL

Prepared: 10/05/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Organic Carbon, Dissolved		1	0.50	0.50	0.88	mg/L	

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-51 D

Preparation Batch: BIJ0289 — Sample Size: 20 mL

Prepared: 10/08/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Organic Carbon		1	0.50	0.50	0.88	mg/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-17-PW-6-092520

20I0445-51 (Water)

Calculation

Method: SM 2340 B-97 — Sampled: 09/25/2020 11:19

Instrument: [CALC] Analyst: MCB — Analyzed: 10/19/2020 18:45

Sample Preparation: Preparation Method: [CALC] — Extract ID: 20I0445-51

Preparation Batch: [CALC]

Prepared: 10/06/2020 Final Volume: 1

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness		1	0.207	15.5	mg/L CaCO3	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-17-PW-6-092520

20I0445-51RE1 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/25/2020 11:19

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/16/2020 02:46

Sample Preparation: Preparation Method: RHN EPA 600/4-79-020 4.1.4 HNO3 matrix 5x — Extract ID: 20I0445-51RE1 F 02

Preparation Batch: BIJ0345 — Sample Size: 100 mL

Prepared: 10/12/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Cadmium	7440-43-9	1	0.00600	0.0200	0.0658	ug/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-17-PW-12-092520

20I0445-52 (Water)

Metals and Metallic Compounds

Method: EPA 6020A — Sampled: 09/25/2020 12:19

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/19/2020 18:47

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0445-52 F 01

Preparation Batch: BIJ0195 — Sample Size: 25 mL

Prepared: 10/06/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Aluminum	7429-90-5	1	2.37	20.0	31.9	ug/L	
Calcium	7440-70-2	1	1.91	50.0	6280	ug/L	
Iron	7439-89-6	1	6.27	20.0	54.8	ug/L	
Lead	7439-92-1	1	0.0680	0.100	ND	ug/L	U
Magnesium	7439-95-4	1	0.307	20.0	526	ug/L	
Manganese	7439-96-5	1	0.0850	0.500	1.24	ug/L	
Potassium	7440-09-7	1	1.41	20.0	550	ug/L	
Sodium	7440-23-5	1	7.18	100	669	ug/L	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-17-PW-12-092520

20I0445-52 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/25/2020 12:19

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/08/2020 23:52

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0445-52 F 01

Preparation Batch: BIJ0195 — Sample Size: 25 mL

Prepared: 10/06/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Copper	7440-50-8	1	0.340	0.500	1.30	ug/L	
Zinc	7440-66-6	1	0.820	4.00	5.27	ug/L	

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-17-PW-12-092520

20I0445-52 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/25/2020 12:19

Instrument: IC930 Analyst: KOTT — Analyzed: 10/01/2020 16:37

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-52 F

Preparation Batch: BII0886 — Sample Size: 10 mL

Prepared: 09/30/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Chloride	16887-00-6	1	0.100	0.100	0.299	mg/L	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Nitrate-N	14797-55-8	1	0.100	0.100	ND	mg/L	H, U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Sulfate	14808-79-8	1	0.100	0.100	8.48	mg/L	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-17-PW-12-092520

20I0445-52 (Water)

Wet Chemistry

Method: SM 2320 B-97 — Sampled: 09/25/2020 12:19

Instrument: Accumet AB150 Analyst: UW — Analyzed: 09/30/2020 09:33

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-52 C

Preparation Batch: BII0880 — Sample Size: 100 mL

Prepared: 09/30/2020 — Final Volume: 100 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Bicarbonate		1	1.00	1.00	10.7	mg/L CaCO3	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Carbonate		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Hydroxide		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Total		1	1.00	1.00	10.7	mg/L CaCO3	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-17-PW-12-092520

20I0445-52 (Water)

Wet Chemistry

Method: SM 2540 C-97 — Sampled: 09/25/2020 12:19

Instrument: BAL2 Analyst: KLE — Analyzed: 09/29/2020 16:14

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-52

Preparation Batch: BII0865 — Sample Size: 200 mL

Prepared: 09/29/2020 — Final Volume: 200 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Solids		1	5	5	23	mg/L	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-17-PW-12-092520

20I0445-52 (Water)

Wet Chemistry

Method: SM 2540 D-97 — Sampled: 09/25/2020 12:19

Instrument: BAL2 Analyst: KLE — Analyzed: 09/29/2020 11:50

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-52

Preparation Batch: BII0846 — Sample Size: 950 mL

Prepared: 09/29/2020 — Final Volume: 1000 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Suspended Solids		1	1	1	2	mg/L	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-17-PW-12-092520

20I0445-52 (Water)

Wet Chemistry

Method: SM 5310 B-00 — Sampled: 09/25/2020 12:19

Instrument: TOC-LCSH Analyst: WCW — Analyzed: 10/07/2020 13:33

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-52 E

Preparation Batch: BIJ0116 — Sample Size: 20 mL

Prepared: 10/05/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Organic Carbon, Dissolved		1	0.50	0.50	0.73	mg/L	

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-52 D

Preparation Batch: BIJ0289 — Sample Size: 20 mL

Prepared: 10/08/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Organic Carbon		1	0.50	0.50	0.66	mg/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-17-PW-12-092520

20I0445-52 (Water)

Calculation

Method: SM 2340 B-97 — Sampled: 09/25/2020 12:19

Instrument: [CALC] Analyst: MCB — Analyzed: 10/19/2020 18:47

Sample Preparation: Preparation Method: [CALC] — Extract ID: 20I0445-52

Preparation Batch: [CALC]

Prepared: 10/06/2020 Final Volume: 1

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness		1	0.207	17.8	mg/L CaCO3	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-17-PW-12-092520

20I0445-52RE1 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/25/2020 12:19

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/16/2020 02:50

Sample Preparation: Preparation Method: RHN EPA 600/4-79-020 4.1.4 HNO3 matrix 5x — Extract ID: 20I0445-52RE1 F 02

Preparation Batch: BIJ0345 — Sample Size: 100 mL

Prepared: 10/12/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Cadmium	7440-43-9	1	0.00600	0.0200	0.0320	ug/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-17-WP-092520

20I0445-53 (Water)

Metals and Metallic Compounds

Method: EPA 6020A — Sampled: 09/25/2020 12:00

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/19/2020 16:21

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0445-53 F 01

Preparation Batch: BIJ0193 — Sample Size: 25 mL

Prepared: 10/06/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Aluminum	7429-90-5	2	4.73	40.0	160	ug/L	D
Calcium	7440-70-2	2	3.81	100	36500	ug/L	D
Iron	7439-89-6	2	12.5	40.0	ND	ug/L	U
Lead	7439-92-1	1	0.0680	0.100	ND	ug/L	U
Magnesium	7439-95-4	2	0.614	40.0	5320	ug/L	D
Manganese	7439-96-5	2	0.170	1.00	288	ug/L	D
Potassium	7440-09-7	2	2.81	40.0	3150	ug/L	D
Sodium	7440-23-5	2	14.4	200	2740	ug/L	D

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-17-WP-092520

20I0445-53 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/25/2020 12:00

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/09/2020 00:21

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0445-53 F 01

Preparation Batch: BIJ0193 — Sample Size: 25 mL

Prepared: 10/06/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Cadmium	7440-43-9	1	0.0300	0.100	1.08	ug/L	
Copper	7440-50-8	1	0.340	0.500	1.26	ug/L	
Zinc	7440-66-6	1	0.820	4.00	82.7	ug/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-17-WP-092520

20I0445-53 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/25/2020 12:00

Instrument: IC930 Analyst: KOTT — Analyzed: 10/01/2020 16:57

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-53 F

Preparation Batch: BII0886 — Sample Size: 10 mL

Prepared: 09/30/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Chloride	16887-00-6	1	0.100	0.100	0.402	mg/L	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Nitrate-N	14797-55-8	1	0.100	0.100	ND	mg/L	H, U

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-17-WP-092520

20I0445-53 (Water)

Wet Chemistry

Method: SM 2320 B-97 — Sampled: 09/25/2020 12:00

Instrument: Accumet AB150 Analyst: UW — Analyzed: 09/30/2020 09:33

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-53 C

Preparation Batch: BII0880 — Sample Size: 100 mL

Prepared: 09/30/2020 — Final Volume: 100 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Bicarbonate		1	1.00	1.00	5.82	mg/L CaCO3	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Carbonate		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Hydroxide		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Total		1	1.00	1.00	5.82	mg/L CaCO3	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-17-WP-092520

20I0445-53 (Water)

Wet Chemistry

Method: SM 2540 C-97 — Sampled: 09/25/2020 12:00

Instrument: BAL2 Analyst: KLE — Analyzed: 09/29/2020 16:14

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-53

Preparation Batch: BII0865 — Sample Size: 200 mL

Prepared: 09/29/2020 — Final Volume: 200 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Solids		1	5	5	196	mg/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-17-WP-092520

20I0445-53 (Water)

Wet Chemistry

Method: SM 2540 D-97 — Sampled: 09/25/2020 12:00

Instrument: BAL2 Analyst: KLE — Analyzed: 09/29/2020 11:50

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-53

Preparation Batch: BII0846 — Sample Size: 930 mL

Prepared: 09/29/2020 — Final Volume: 1000 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Suspended Solids		1	1	1	ND	mg/L	U

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-17-WP-092520

20I0445-53 (Water)

Wet Chemistry

Method: SM 5310 B-00 — Sampled: 09/25/2020 12:00

Instrument: TOC-LCSH Analyst: WCW — Analyzed: 10/07/2020 13:51

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-53 E

Preparation Batch: BIJ0116 — Sample Size: 20 mL

Prepared: 10/05/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Organic Carbon, Dissolved		1	0.50	0.50	ND	mg/L	U

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-53 D

Preparation Batch: BIJ0289 — Sample Size: 20 mL

Prepared: 10/08/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Organic Carbon		1	0.50	0.50	ND	mg/L	U

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-17-WP-092520

20I0445-53 (Water)

Calculation

Method: SM 2340 B-97 — Sampled: 09/25/2020 12:00

Instrument: [CALC] Analyst: MCB — Analyzed: 10/19/2020 16:21

Sample Preparation: Preparation Method: [CALC] — Extract ID: 20I0445-53

Preparation Batch: [CALC]

Prepared: 10/06/2020 Final Volume: 1

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness		2	0.414	113	mg/L CaCO3	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-17-WP-092520

20I0445-53RE1 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/25/2020 12:00

Instrument: IC930 Analyst: KOTT — Analyzed: 10/03/2020 00:37

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-53RE1 E

Preparation Batch: BII0886 — Sample Size: 10 mL

Prepared: 09/30/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Sulfate	14808-79-8	24	2.40	2.40	113	mg/L	D

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-17-WP-36-092520

20I0445-54 (Water)

Metals and Metallic Compounds

Method: EPA 6020A — Sampled: 09/25/2020 13:48

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/19/2020 14:34

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0445-54 A 01

Preparation Batch: BIJ0193 — Sample Size: 25 mL

Prepared: 10/06/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Aluminum	7429-90-5	1	2.37	20.0	70.1	ug/L	
Calcium	7440-70-2	1	1.91	50.0	7540	ug/L	
Iron	7439-89-6	1	6.27	20.0	171	ug/L	
Lead	7439-92-1	1	0.0680	0.100	0.122	ug/L	
Magnesium	7439-95-4	1	0.307	20.0	630	ug/L	
Manganese	7439-96-5	1	0.0850	0.500	137	ug/L	
Potassium	7440-09-7	1	1.41	20.0	647	ug/L	
Sodium	7440-23-5	1	7.18	100	761	ug/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-17-WP-36-092520

20I0445-54 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/25/2020 13:48

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/09/2020 00:25

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0445-54 A 01

Preparation Batch: BIJ0193 — Sample Size: 25 mL

Prepared: 10/06/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Cadmium	7440-43-9	1	0.0300	0.100	0.237	ug/L	
Copper	7440-50-8	1	0.340	0.500	3.94	ug/L	
Zinc	7440-66-6	1	0.820	4.00	16.3	ug/L	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

SG-17-WP-36-092520

20I0445-54 (Water)

Calculation

Method: SM 2340 B-97 — Sampled: 09/25/2020 13:48

Instrument: [CALC] Analyst: MCB — Analyzed: 10/19/2020 14:34

Sample Preparation: Preparation Method: [CALC] — Extract ID: 20I0445-54

Preparation Batch: [CALC]

Prepared: 10/06/2020 Final Volume: 1

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness		1	0.207	21.4	mg/L CaCO3	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

TP2-12D-GW-092520

20I0445-55 (Water)

Metals and Metallic Compounds

Method: EPA 6020A — Sampled: 09/25/2020 12:30

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/17/2020 17:35

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0445-55 F 01

Preparation Batch: BIJ0193 — Sample Size: 25 mL

Prepared: 10/06/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Aluminum	7429-90-5	5	11.8	100	895	ug/L	D
Calcium	7440-70-2	10	19.1	500	102000	ug/L	D
Iron	7439-89-6	5	31.4	100	6690	ug/L	D
Lead	7439-92-1	1	0.0680	0.100	ND	ug/L	U
Magnesium	7439-95-4	5	1.53	100	6240	ug/L	D
Manganese	7439-96-5	5	0.425	2.50	419	ug/L	D
Potassium	7440-09-7	10	14.1	200	8660	ug/L	D
Sodium	7440-23-5	5	35.9	500	3290	ug/L	D

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

TP2-12D-GW-092520

20I0445-55 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/25/2020 12:30

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/09/2020 00:30

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0445-55 F 01

Preparation Batch: BIJ0193 — Sample Size: 25 mL

Prepared: 10/06/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Cadmium	7440-43-9	1	0.0300	0.100	1.91	ug/L	
Copper	7440-50-8	1	0.340	0.500	15.4	ug/L	
Zinc	7440-66-6	1	0.940	4.00	137	ug/L	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

TP2-12D-GW-092520

20I0445-55 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/25/2020 12:30

Instrument: IC930 Analyst: KOTT — Analyzed: 10/01/2020 17:17

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-55 F

Preparation Batch: BII0886 — Sample Size: 10 mL

Prepared: 09/30/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Chloride	16887-00-6	1	0.100	0.100	0.281	mg/L	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Nitrate-N	14797-55-8	1	0.100	0.100	ND	mg/L	H, U

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

TP2-12D-GW-092520

20I0445-55 (Water)

Wet Chemistry

Method: SM 2320 B-97 — Sampled: 09/25/2020 12:30

Instrument: Accumet AB150 Analyst: UW — Analyzed: 09/30/2020 09:33

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-55 C

Preparation Batch: BII0880 — Sample Size: 100 mL

Prepared: 09/30/2020 — Final Volume: 100 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Bicarbonate		1	1.00	1.00	1.33	mg/L CaCO3	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Carbonate		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Hydroxide		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Total		1	1.00	1.00	1.33	mg/L CaCO3	

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

TP2-12D-GW-092520

20I0445-55 (Water)

Wet Chemistry

Method: SM 2540 C-97 — Sampled: 09/25/2020 12:30

Instrument: BAL2 Analyst: KLE — Analyzed: 09/29/2020 16:14

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-55

Preparation Batch: BII0865 — Sample Size: 100 mL

Prepared: 09/29/2020 — Final Volume: 200 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Solids		1	10	10	484	mg/L	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

TP2-12D-GW-092520

20I0445-55 (Water)

Wet Chemistry

Method: SM 2540 D-97 — Sampled: 09/25/2020 12:30

Instrument: BAL2 Analyst: KLE — Analyzed: 09/29/2020 11:50

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-55

Preparation Batch: BII0846 — Sample Size: 960 mL

Prepared: 09/29/2020 — Final Volume: 1000 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Suspended Solids		1	1	1	ND	mg/L	U

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

TP2-12D-GW-092520

20I0445-55 (Water)

Wet Chemistry

Method: SM 5310 B-00 — Sampled: 09/25/2020 12:30

Instrument: TOC-LCSH Analyst: WCW — Analyzed: 10/07/2020 14:16

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-55 E

Preparation Batch: BIJ0116 — Sample Size: 20 mL

Prepared: 10/05/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Organic Carbon, Dissolved		1	0.50	0.50	0.55	mg/L	

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-55 D

Preparation Batch: BIJ0289 — Sample Size: 20 mL

Prepared: 10/08/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Organic Carbon		1	0.50	0.50	0.50	mg/L	

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Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

TP2-12D-GW-092520

20I0445-55 (Water)

Calculation

Method: SM 2340 B-97 — Sampled: 09/25/2020 12:30

Instrument: [CALC] Analyst: MCB — Analyzed: 10/19/2020 18:22

Sample Preparation: Preparation Method: [CALC] — Extract ID: 20I0445-55

Preparation Batch: [CALC]

Prepared: 10/06/2020 Final Volume: 1

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness		10	1.66	281	mg/L CaCO3	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

TP2-12D-GW-092520

20I0445-55RE1 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/25/2020 12:30

Instrument: IC930 Analyst: KOTT — Analyzed: 10/03/2020 00:57

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-55RE1 E

Preparation Batch: BII0886 — Sample Size: 10 mL

Prepared: 09/30/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Sulfate	14808-79-8	60	6.00	6.00	281	mg/L	D

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

TP2-13D-GW-092520

20I0445-56 (Water)

Metals and Metallic Compounds

Method: EPA 6020A — Sampled: 09/25/2020 09:00

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/19/2020 18:18

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0445-56 F 01

Preparation Batch: BIJ0193 — Sample Size: 25 mL

Prepared: 10/06/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Aluminum	7429-90-5	10	23.7	200	ND	ug/L	U
Calcium	7440-70-2	10	19.1	500	157000	ug/L	D
Iron	7439-89-6	1	6.27	20.0	2810	ug/L	
Lead	7439-92-1	1	0.0680	0.100	ND	ug/L	U
Magnesium	7439-95-4	1	0.307	20.0	14600	ug/L	
Manganese	7439-96-5	1	0.0850	0.500	232	ug/L	
Potassium	7440-09-7	10	14.1	200	18400	ug/L	D
Sodium	7440-23-5	1	7.18	100	4390	ug/L	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

TP2-13D-GW-092520

20I0445-56 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/25/2020 09:00

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/09/2020 00:34

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0445-56 F 01

Preparation Batch: BIJ0193 — Sample Size: 25 mL

Prepared: 10/06/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Copper	7440-50-8	1	0.340	0.500	ND	ug/L	U
Zinc	7440-66-6	1	0.820	4.00	1.61	ug/L	J

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

TP2-13D-GW-092520

20I0445-56 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/25/2020 09:00

Instrument: IC930 Analyst: KOTT — Analyzed: 10/01/2020 17:37

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-56 F

Preparation Batch: BII0886 — Sample Size: 10 mL

Prepared: 09/30/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Chloride	16887-00-6	1	0.100	0.100	0.198	mg/L	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Nitrate-N	14797-55-8	1	0.100	0.100	ND	mg/L	H, U

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

TP2-13D-GW-092520

20I0445-56 (Water)

Wet Chemistry

Method: SM 2320 B-97 — Sampled: 09/25/2020 09:00

Instrument: Accumet AB150 Analyst: UW — Analyzed: 09/30/2020 09:33

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-56 C

Preparation Batch: BII0880 — Sample Size: 100 mL

Prepared: 09/30/2020 — Final Volume: 100 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Bicarbonate		1	1.00	1.00	78.6	mg/L CaCO3	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Carbonate		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Hydroxide		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Total		1	1.00	1.00	78.6	mg/L CaCO3	

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

TP2-13D-GW-092520

20I0445-56 (Water)

Wet Chemistry

Method: SM 2540 C-97 — Sampled: 09/25/2020 09:00

Instrument: BAL2 Analyst: KLE — Analyzed: 09/29/2020 16:14

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-56

Preparation Batch: BII0865 — Sample Size: 100 mL

Prepared: 09/29/2020 — Final Volume: 200 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Solids		1	10	10	683	mg/L	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

TP2-13D-GW-092520

20I0445-56 (Water)

Wet Chemistry

Method: SM 2540 D-97 — Sampled: 09/25/2020 09:00

Instrument: BAL2 Analyst: KLE — Analyzed: 09/29/2020 11:50

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-56

Preparation Batch: BII0846 — Sample Size: 950 mL

Prepared: 09/29/2020 — Final Volume: 1000 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Suspended Solids		1	1	1	4	mg/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

TP2-13D-GW-092520

20I0445-56 (Water)

Wet Chemistry

Method: SM 5310 B-00 — Sampled: 09/25/2020 09:00

Instrument: TOC-LCSH Analyst: WCW — Analyzed: 10/07/2020 14:37

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-56 E

Preparation Batch: BIJ0116 — Sample Size: 20 mL

Prepared: 10/05/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Organic Carbon, Dissolved		1	0.50	0.50	0.67	mg/L	

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-56 D

Preparation Batch: BIJ0289 — Sample Size: 20 mL

Prepared: 10/08/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Organic Carbon		1	0.50	0.50	0.65	mg/L	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

TP2-13D-GW-092520

20I0445-56 (Water)

Calculation

Method: SM 2340 B-97 — Sampled: 09/25/2020 09:00

Instrument: [CALC] Analyst: MCB — Analyzed: 10/19/2020 18:18

Sample Preparation: Preparation Method: [CALC] — Extract ID: 20I0445-56

Preparation Batch: [CALC]

Prepared: 10/06/2020 Final Volume: 1

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness		10	1.33	453	mg/L CaCO3	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

TP2-13D-GW-092520

20I0445-56RE1 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/25/2020 09:00

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/16/2020 21:06

Sample Preparation: Preparation Method: RHN EPA 600/4-79-020 4.1.4 HNO3 matrix 5x — Extract ID: 20I0445-56RE1 F 02

Preparation Batch: BIJ0345 — Sample Size: 100 mL

Prepared: 10/12/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Cadmium	7440-43-9	2	0.0120	0.0400	ND	ug/L	U

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

TP2-13D-GW-092520

20I0445-56RE1 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/25/2020 09:00

Instrument: IC930 Analyst: KOTT — Analyzed: 10/03/2020 02:16

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-56RE1 F

Preparation Batch: BII0886 — Sample Size: 10 mL

Prepared: 09/30/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Chloride	16887-00-6	78	7.80	7.80	ND	mg/L	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Sulfate	14808-79-8	78	7.80	7.80	378	mg/L	D

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

Field Blank1-GW-092520

20I0445-57 (Water)

Metals and Metallic Compounds

Method: EPA 6020A — Sampled: 09/25/2020 08:20
Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/17/2020 14:23

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0445-57 F 01
Preparation Batch: BIJ0193 — Sample Size: 25 mL
Prepared: 10/06/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Aluminum	7429-90-5	1	2.37	20.0	2.82	ug/L	J
Calcium	7440-70-2	1	1.91	50.0	29.6	ug/L	J
Iron	7439-89-6	1	6.27	20.0	8.16	ug/L	J
Lead	7439-92-1	1	0.0680	0.100	ND	ug/L	U
Magnesium	7439-95-4	1	0.307	20.0	3.18	ug/L	J
Manganese	7439-96-5	1	0.0850	0.500	0.130	ug/L	J
Potassium	7440-09-7	1	1.41	20.0	12.2	ug/L	J
Sodium	7440-23-5	1	7.18	100	ND	ug/L	U

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

Field Blank1-GW-092520

20I0445-57 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/25/2020 08:20
Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/09/2020 00:17

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0445-57 F 01
Preparation Batch: BIJ0193 — Sample Size: 25 mL
Prepared: 10/06/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Copper	7440-50-8	1	0.340	0.500	ND	ug/L	U
Zinc	7440-66-6	1	0.820	4.00	2.03	ug/L	J

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

Field Blank1-GW-092520

20I0445-57 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/25/2020 08:20
Instrument: IC930 Analyst: KOTT — Analyzed: 10/01/2020 17:57

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-57 F
Preparation Batch: BII0886 — Sample Size: 10 mL
Prepared: 09/30/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Chloride	16887-00-6	1	0.100	0.100	ND	mg/L	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Nitrate-N	14797-55-8	1	0.100	0.100	ND	mg/L	H, U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Sulfate	14808-79-8	1	0.100	0.100	ND	mg/L	U

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

Field Blank1-GW-092520

20I0445-57 (Water)

Wet Chemistry

Method: SM 2320 B-97 — Sampled: 09/25/2020 08:20
Instrument: Accumet AB150 Analyst: UW — Analyzed: 09/30/2020 09:33

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-57 C
Preparation Batch: BII0880 — Sample Size: 100 mL
Prepared: 09/30/2020 — Final Volume: 100 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Bicarbonate		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Carbonate		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Hydroxide		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Total		1	1.00	1.00	ND	mg/L CaCO3	U

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

Field Blank1-GW-092520

20I0445-57 (Water)

Wet Chemistry

Method: SM 2540 C-97 — Sampled: 09/25/2020 08:20
Instrument: BAL2 Analyst: KLE — Analyzed: 09/29/2020 16:14

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-57
Preparation Batch: BII0865 — Sample Size: 200 mL
Prepared: 09/29/2020 — Final Volume: 200 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Solids		1	5	5	ND	mg/L	U

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

Field Blank1-GW-092520

20I0445-57 (Water)

Wet Chemistry

Method: SM 2540 D-97 — Sampled: 09/25/2020 08:20
Instrument: BAL2 Analyst: KLE — Analyzed: 09/29/2020 11:50

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-57
Preparation Batch: BII0846 — Sample Size: 945 mL
Prepared: 09/29/2020 — Final Volume: 1000 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Suspended Solids		1	1	1	ND	mg/L	U

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

Field Blank1-GW-092520

20I0445-57 (Water)

Wet Chemistry

Method: SM 5310 B-00 — Sampled: 09/25/2020 08:20
Instrument: TOC-LCSH Analyst: WCW — Analyzed: 10/07/2020 14:58

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-57 E
Preparation Batch: BIJ0116 — Sample Size: 20 mL
Prepared: 10/05/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Organic Carbon, Dissolved		1	0.50	0.50	ND	mg/L	U

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-57 D
Preparation Batch: BIJ0289 — Sample Size: 20 mL
Prepared: 10/08/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Organic Carbon		1	0.50	0.50	ND	mg/L	U

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

Field Blank1-GW-092520

20I0445-57 (Water)

Calculation

Method: SM 2340 B-97 — Sampled: 09/25/2020 08:20
Instrument: [CALC] Analyst: MCB — Analyzed: 10/17/2020 14:23

Sample Preparation: Preparation Method: [CALC]
Preparation Batch: [CALC]
Prepared: 10/06/2020 Final Volume: 1 — Extract ID: 20I0445-57

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness		1	0.207	ND	mg/L CaCO3	U

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Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

Field Blank1-GW-092520

20I0445-57RE1 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/25/2020 08:20
Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/15/2020 22:45

Sample Preparation: Preparation Method: RHN EPA 600/4-79-020 4.1.4 HNO3 matrix 5x — Extract ID: 20I0445-57RE1 F 02
Preparation Batch: BIJ0345 — Sample Size: 100 mL
Prepared: 10/12/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Cadmium	7440-43-9	1	0.00600	0.0200	ND	ug/L	U

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Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

TP2-15-GW-092520

20I0445-58 (Water)

Metals and Metallic Compounds

Method: EPA 6020A — Sampled: 09/25/2020 12:30

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/19/2020 18:20

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0445-58 F 01

Preparation Batch: BIJ0193 — Sample Size: 25 mL

Prepared: 10/06/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Aluminum	7429-90-5	10	23.7	200	ND	ug/L	U
Calcium	7440-70-2	10	19.1	500	115000	ug/L	D
Iron	7439-89-6	1	6.27	20.0	1280	ug/L	
Lead	7439-92-1	1	0.0680	0.100	ND	ug/L	U
Magnesium	7439-95-4	1	0.307	20.0	8930	ug/L	
Manganese	7439-96-5	1	0.0850	0.500	143	ug/L	
Potassium	7440-09-7	10	14.1	200	14200	ug/L	D
Sodium	7440-23-5	1	7.18	100	3340	ug/L	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

TP2-15-GW-092520

20I0445-58 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/25/2020 12:30

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/09/2020 00:38

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0445-58 F 01

Preparation Batch: BIJ0193 — Sample Size: 25 mL

Prepared: 10/06/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Copper	7440-50-8	1	0.340	0.500	ND	ug/L	U
Zinc	7440-66-6	1	0.820	4.00	2.47	ug/L	J

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

TP2-15-GW-092520

20I0445-58 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/25/2020 12:30

Instrument: IC930 Analyst: KOTT — Analyzed: 10/01/2020 21:37

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-58 B

Preparation Batch: BIJ0025 — Sample Size: 10 mL

Prepared: 10/01/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Chloride	16887-00-6	1	0.100	0.100	0.202	mg/L	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Nitrate-N	14797-55-8	1	0.100	0.100	ND	mg/L	H, U

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Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

TP2-15-GW-092520

20I0445-58 (Water)

Wet Chemistry

Method: SM 2320 B-97 — Sampled: 09/25/2020 12:30

Instrument: Accumet AB150 Analyst: UW — Analyzed: 09/30/2020 09:33

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-58 C

Preparation Batch: BII0880 — Sample Size: 100 mL

Prepared: 09/30/2020 — Final Volume: 100 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Bicarbonate		1	1.00	1.00	78.5	mg/L CaCO3	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Carbonate		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Hydroxide		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Total		1	1.00	1.00	78.5	mg/L CaCO3	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

TP2-15-GW-092520

20I0445-58 (Water)

Wet Chemistry

Method: SM 2540 C-97 — Sampled: 09/25/2020 12:30

Instrument: BAL2 Analyst: KLE — Analyzed: 09/29/2020 16:14

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-58

Preparation Batch: BII0865 — Sample Size: 100 mL

Prepared: 09/29/2020 — Final Volume: 200 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Solids		1	10	10	486	mg/L	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

TP2-15-GW-092520

20I0445-58 (Water)

Wet Chemistry

Method: SM 2540 D-97 — Sampled: 09/25/2020 12:30

Instrument: BAL2 Analyst: KLE — Analyzed: 09/29/2020 11:50

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-58

Preparation Batch: BII0846 — Sample Size: 935 mL

Prepared: 09/29/2020 — Final Volume: 1000 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Suspended Solids		1	1	1	2	mg/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

TP2-15-GW-092520

20I0445-58 (Water)

Wet Chemistry

Method: SM 5310 B-00 — Sampled: 09/25/2020 12:30

Instrument: TOC-LCSH Analyst: WCW — Analyzed: 10/07/2020 15:24

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-58 E

Preparation Batch: BIJ0116 — Sample Size: 20 mL

Prepared: 10/05/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Organic Carbon, Dissolved		1	0.50	0.50	0.84	mg/L	

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-58 D

Preparation Batch: BIJ0289 — Sample Size: 20 mL

Prepared: 10/08/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Organic Carbon		1	0.50	0.50	0.74	mg/L	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

TP2-15-GW-092520

20I0445-58 (Water)

Calculation

Method: SM 2340 B-97 — Sampled: 09/25/2020 12:30

Instrument: [CALC] Analyst: MCB — Analyzed: 10/19/2020 18:20

Sample Preparation: Preparation Method: [CALC]
Preparation Batch: [CALC]
Prepared: 10/06/2020 Final Volume: 1 — Extract ID: 20I0445-58

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness		10	1.33	325	mg/L CaCO3	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

TP2-15-GW-092520

20I0445-58RE1 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/25/2020 12:30

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/16/2020 21:12

Sample Preparation: Preparation Method: RHN EPA 600/4-79-020 4.1.4 HNO3 matrix 5x — Extract ID: 20I0445-58RE1 F 02

Preparation Batch: BIJ0345 — Sample Size: 100 mL

Prepared: 10/12/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Cadmium	7440-43-9	2	0.0120	0.0400	ND	ug/L	U

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

TP2-15-GW-092520

20I0445-58RE1 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/25/2020 12:30

Instrument: IC930 Analyst: KOTT — Analyzed: 10/03/2020 02:36

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-58RE1 B

Preparation Batch: BIJ0025 — Sample Size: 10 mL

Prepared: 10/01/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Chloride	16887-00-6	53	5.30	5.30	ND	mg/L	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Sulfate	14808-79-8	53	5.30	5.30	258	mg/L	D

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

TP3-13-GW-092520

20I0445-59 (Water)

Metals and Metallic Compounds

Method: EPA 6020A — Sampled: 09/25/2020 09:15

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/17/2020 15:37

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0445-59 F 01

Preparation Batch: BIJ0193 — Sample Size: 25 mL

Prepared: 10/06/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Aluminum	7429-90-5	20	47.3	400	7500	ug/L	D
Calcium	7440-70-2	20	38.1	1000	230000	ug/L	D
Iron	7439-89-6	20	125	400	239000	ug/L	D
Lead	7439-92-1	1	0.0680	0.100	0.195	ug/L	
Magnesium	7439-95-4	5	1.53	100	39200	ug/L	D
Manganese	7439-96-5	20	1.70	10.0	3060	ug/L	D
Potassium	7440-09-7	20	28.1	400	18900	ug/L	D
Sodium	7440-23-5	20	144	2000	9120	ug/L	D

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

TP3-13-GW-092520

20I0445-59 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/25/2020 09:15

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/09/2020 00:42

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0445-59 F 01

Preparation Batch: BIJ0193 — Sample Size: 25 mL

Prepared: 10/06/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Cadmium	7440-43-9	1	0.0300	0.100	3.12	ug/L	
Copper	7440-50-8	1	0.340	0.500	38.6	ug/L	
Zinc	7440-66-6	5	4.70	20.0	562	ug/L	D

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

TP3-13-GW-092520

20I0445-59 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/25/2020 09:15

Instrument: IC930 Analyst: KOTT — Analyzed: 10/01/2020 21:57

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-59 B

Preparation Batch: BIJ0025 — Sample Size: 10 mL

Prepared: 10/01/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Chloride	16887-00-6	1	0.100	0.100	0.383	mg/L	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Nitrate-N	14797-55-8	1	0.100	0.100	ND	mg/L	H, U

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

TP3-13-GW-092520

20I0445-59 (Water)

Wet Chemistry

Method: SM 2320 B-97 — Sampled: 09/25/2020 09:15

Instrument: Accumet AB150 Analyst: UW — Analyzed: 09/30/2020 09:33

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-59 C

Preparation Batch: BII0880 — Sample Size: 100 mL

Prepared: 09/30/2020 — Final Volume: 100 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Bicarbonate		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Carbonate		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Hydroxide		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Total		1	1.00	1.00	ND	mg/L CaCO3	U

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

TP3-13-GW-092520

20I0445-59 (Water)

Wet Chemistry

Method: SM 2540 C-97 — Sampled: 09/25/2020 09:15

Instrument: BAL2 Analyst: KLE — Analyzed: 09/29/2020 16:14

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-59

Preparation Batch: BII0865 — Sample Size: 75 mL

Prepared: 09/29/2020 — Final Volume: 200 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Solids		1	13	13	1980	mg/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

TP3-13-GW-092520

20I0445-59 (Water)

Wet Chemistry

Method: SM 2540 D-97 — Sampled: 09/25/2020 09:15

Instrument: BAL2 Analyst: KLE — Analyzed: 09/29/2020 11:50

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-59

Preparation Batch: BII0846 — Sample Size: 910 mL

Prepared: 09/29/2020 — Final Volume: 1000 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Suspended Solids		1	1	1	ND	mg/L	U

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

TP3-13-GW-092520

20I0445-59 (Water)

Wet Chemistry

Method: SM 5310 B-00 — Sampled: 09/25/2020 09:15

Instrument: TOC-LCSH Analyst: WCW — Analyzed: 10/07/2020 16:20

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-59 E

Preparation Batch: BIJ0116 — Sample Size: 20 mL

Prepared: 10/05/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Organic Carbon, Dissolved		1	0.50	0.50	0.83	mg/L	

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-59 D

Preparation Batch: BIJ0289 — Sample Size: 20 mL

Prepared: 10/08/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Organic Carbon		1	0.50	0.50	0.80	mg/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

TP3-13-GW-092520

20I0445-59 (Water)

Calculation

Method: SM 2340 B-97 — Sampled: 09/25/2020 09:15

Instrument: [CALC] Analyst: MCB — Analyzed: 10/17/2020 15:37

Sample Preparation: Preparation Method: [CALC] — Extract ID: 20I0445-59

Preparation Batch: [CALC]

Prepared: 10/06/2020 Final Volume: 1

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness		20	2.91	737	mg/L CaCO3	

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

TP3-13-GW-092520

20I0445-59RE1 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/25/2020 09:15

Instrument: IC930 Analyst: KOTT — Analyzed: 10/03/2020 02:56

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-59RE1 B

Preparation Batch: BIJ0025 — Sample Size: 10 mL

Prepared: 10/01/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Chloride	16887-00-6	100	10.0	10.0	ND	mg/L	U

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

TP3-13-GW-092520

20I0445-59RE2 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/25/2020 09:15

Instrument: IC930 Analyst: KOTT — Analyzed: 10/07/2020 03:31

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-59RE2 E

Preparation Batch: BIJ0025 — Sample Size: 10 mL

Prepared: 10/01/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Sulfate	14808-79-8	200	20.0	20.0	1260	mg/L	D

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-12D-GW-092520

20I0445-60 (Water)

Metals and Metallic Compounds

Method: EPA 6020A — Sampled: 09/25/2020 13:55

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/19/2020 19:12

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0445-60 F 01

Preparation Batch: BIJ0193 — Sample Size: 25 mL

Prepared: 10/06/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Aluminum	7429-90-5	5	11.8	100	ND	ug/L	U
Calcium	7440-70-2	5	9.53	250	52100	ug/L	D
Iron	7439-89-6	1	6.27	20.0	54.7	ug/L	
Lead	7439-92-1	1	0.0680	0.100	ND	ug/L	U
Magnesium	7439-95-4	1	0.307	20.0	6210	ug/L	
Manganese	7439-96-5	1	0.0850	0.500	214	ug/L	
Potassium	7440-09-7	5	7.03	100	3360	ug/L	D
Sodium	7440-23-5	1	7.18	100	2700	ug/L	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-12D-GW-092520

20I0445-60 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/25/2020 13:55

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/09/2020 00:47

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0445-60 F 01

Preparation Batch: BIJ0193 — Sample Size: 25 mL

Prepared: 10/06/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Cadmium	7440-43-9	1	0.0300	0.100	1.46	ug/L	
Copper	7440-50-8	1	0.340	0.500	ND	ug/L	U
Zinc	7440-66-6	1	0.820	4.00	3.79	ug/L	J

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-12D-GW-092520

20I0445-60 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/25/2020 13:55

Instrument: IC930 Analyst: KOTT — Analyzed: 10/01/2020 22:17

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-60 C

Preparation Batch: BIJ0025 — Sample Size: 10 mL

Prepared: 10/01/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Chloride	16887-00-6	1	0.100	0.100	0.211	mg/L	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Nitrate-N	14797-55-8	1	0.100	0.100	ND	mg/L	H, U

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-12D-GW-092520

20I0445-60 (Water)

Wet Chemistry

Method: SM 2320 B-97 — Sampled: 09/25/2020 13:55

Instrument: Accumet AB150 Analyst: UW — Analyzed: 09/30/2020 09:33

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-60 C

Preparation Batch: BII0880 — Sample Size: 100 mL

Prepared: 09/30/2020 — Final Volume: 100 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Bicarbonate		1	1.00	1.00	12.8	mg/L CaCO3	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Carbonate		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Hydroxide		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Total		1	1.00	1.00	12.8	mg/L CaCO3	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-12D-GW-092520

20I0445-60 (Water)

Wet Chemistry

Method: SM 2540 C-97 — Sampled: 09/25/2020 13:55

Instrument: BAL2 Analyst: KLE — Analyzed: 09/29/2020 16:14

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-60

Preparation Batch: BII0865 — Sample Size: 200 mL

Prepared: 09/29/2020 — Final Volume: 200 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Solids		1	5	5	284	mg/L	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-12D-GW-092520

20I0445-60 (Water)

Wet Chemistry

Method: SM 2540 D-97 — Sampled: 09/25/2020 13:55

Instrument: BAL2 Analyst: KLE — Analyzed: 09/29/2020 11:50

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-60

Preparation Batch: BII0846 — Sample Size: 950 mL

Prepared: 09/29/2020 — Final Volume: 1000 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Suspended Solids		1	1	1	ND	mg/L	U

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-12D-GW-092520

20I0445-60 (Water)

Wet Chemistry

Method: SM 5310 B-00 — Sampled: 09/25/2020 13:55

Instrument: TOC-LCSH Analyst: WCW — Analyzed: 10/07/2020 16:42

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-60 E

Preparation Batch: BIJ0116 — Sample Size: 20 mL

Prepared: 10/05/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Organic Carbon, Dissolved		1	0.50	0.50	0.52	mg/L	

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-60 D

Preparation Batch: BIJ0289 — Sample Size: 20 mL

Prepared: 10/08/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Organic Carbon		1	0.50	0.50	ND	mg/L	U

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-12D-GW-092520

20I0445-60 (Water)

Calculation

Method: SM 2340 B-97 — Sampled: 09/25/2020 13:55

Instrument: [CALC] Analyst: MCB — Analyzed: 10/19/2020 19:12

Sample Preparation: Preparation Method: [CALC] — Extract ID: 20I0445-60

Preparation Batch: [CALC]

Prepared: 10/06/2020 Final Volume: 1

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness		5	0.707	156	mg/L CaCO3	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-12D-GW-092520

20I0445-60RE1 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/25/2020 13:55

Instrument: IC930 Analyst: KOTT — Analyzed: 10/03/2020 03:16

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-60RE1 C

Preparation Batch: BIJ0025 — Sample Size: 10 mL

Prepared: 10/01/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Chloride	16887-00-6	31	3.10	3.10	ND	mg/L	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Sulfate	14808-79-8	31	3.10	3.10	152	mg/L	D

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-13I-GW-092520

20I0445-61 (Water)

Metals and Metallic Compounds

Method: EPA 6020A — Sampled: 09/25/2020 12:25

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/17/2020 15:39

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0445-61 F 01

Preparation Batch: BIJ0193 — Sample Size: 25 mL

Prepared: 10/06/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Aluminum	7429-90-5	20	47.3	400	3710	ug/L	D
Calcium	7440-70-2	5	9.53	250	59600	ug/L	D
Iron	7439-89-6	20	125	400	9290	ug/L	D
Lead	7439-92-1	1	0.0680	0.100	ND	ug/L	U
Magnesium	7439-95-4	5	1.53	100	9500	ug/L	D
Manganese	7439-96-5	20	1.70	10.0	1620	ug/L	D
Potassium	7440-09-7	20	28.1	400	5280	ug/L	D
Sodium	7440-23-5	20	144	2000	3860	ug/L	D

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-13I-GW-092520

20I0445-61 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/25/2020 12:25

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/09/2020 00:52

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0445-61 F 01

Preparation Batch: BIJ0193 — Sample Size: 25 mL

Prepared: 10/06/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Cadmium	7440-43-9	1	0.0300	0.100	3.56	ug/L	
Copper	7440-50-8	1	0.340	0.500	40.2	ug/L	
Zinc	7440-66-6	5	4.70	20.0	455	ug/L	D

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-13I-GW-092520

20I0445-61 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/25/2020 12:25

Instrument: IC930 Analyst: KOTT — Analyzed: 10/01/2020 22:37

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-61 E

Preparation Batch: BIJ0025 — Sample Size: 10 mL

Prepared: 10/01/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Chloride	16887-00-6	1	0.100	0.100	0.278	mg/L	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Nitrate-N	14797-55-8	1	0.100	0.100	ND	mg/L	H, U

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-13I-GW-092520

20I0445-61 (Water)

Wet Chemistry

Method: SM 2320 B-97 — Sampled: 09/25/2020 12:25

Instrument: Accumet AB150 Analyst: UW — Analyzed: 09/30/2020 09:33

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-61 C

Preparation Batch: BII0880 — Sample Size: 100 mL

Prepared: 09/30/2020 — Final Volume: 100 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Bicarbonate		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Carbonate		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Hydroxide		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Total		1	1.00	1.00	ND	mg/L CaCO3	U

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-13I-GW-092520

20I0445-61 (Water)

Wet Chemistry

Method: SM 2540 C-97 — Sampled: 09/25/2020 12:25

Instrument: BAL2 Analyst: KLE — Analyzed: 09/29/2020 16:14

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-61

Preparation Batch: BII0865 — Sample Size: 200 mL

Prepared: 09/29/2020 — Final Volume: 200 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Solids		1	5	5	391	mg/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-13I-GW-092520

20I0445-61 (Water)

Wet Chemistry

Method: SM 2540 D-97 — Sampled: 09/25/2020 12:25

Instrument: BAL2 Analyst: KLE — Analyzed: 09/29/2020 11:50

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-61

Preparation Batch: BII0846 — Sample Size: 720 mL

Prepared: 09/29/2020 — Final Volume: 1000 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Suspended Solids		1	1	1	ND	mg/L	U

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-13I-GW-092520

20I0445-61 (Water)

Wet Chemistry

Method: SM 5310 B-00 — Sampled: 09/25/2020 12:25

Instrument: TOC-LCSH Analyst: WCW — Analyzed: 10/07/2020 17:03

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-61 E

Preparation Batch: BIJ0116 — Sample Size: 20 mL

Prepared: 10/05/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Organic Carbon, Dissolved		1	0.50	0.50	0.56	mg/L	

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-61 D

Preparation Batch: BIJ0289 — Sample Size: 20 mL

Prepared: 10/08/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Organic Carbon		1	0.50	0.50	0.53	mg/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-13I-GW-092520

20I0445-61 (Water)

Calculation

Method: SM 2340 B-97 — Sampled: 09/25/2020 12:25

Instrument: [CALC] Analyst: MCB — Analyzed: 10/12/2020 20:34

Sample Preparation: Preparation Method: [CALC] — Extract ID: 20I0445-61

Preparation Batch: [CALC]

Prepared: 10/06/2020 Final Volume: 1

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness		5	1.04	188	mg/L CaCO3	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-13I-GW-092520

20I0445-61RE1 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/25/2020 12:25

Instrument: IC930 Analyst: KOTT — Analyzed: 10/03/2020 03:36

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-61RE1 E

Preparation Batch: BIJ0025 — Sample Size: 10 mL

Prepared: 10/01/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Chloride	16887-00-6	46	4.60	4.60	ND	mg/L	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Sulfate	14808-79-8	46	4.60	4.60	215	mg/L	D

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-113I-GW-092520

20I0445-62 (Water)

Metals and Metallic Compounds

Method: EPA 6020A — Sampled: 09/25/2020 12:35

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/17/2020 15:40

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0445-62 F 01

Preparation Batch: BIJ0193 — Sample Size: 25 mL

Prepared: 10/06/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Aluminum	7429-90-5	20	47.3	400	3620	ug/L	D
Calcium	7440-70-2	5	9.53	250	58800	ug/L	D
Iron	7439-89-6	20	125	400	8940	ug/L	D
Lead	7439-92-1	1	0.0680	0.100	ND	ug/L	U
Magnesium	7439-95-4	5	1.53	100	9400	ug/L	D
Manganese	7439-96-5	20	1.70	10.0	1600	ug/L	D
Potassium	7440-09-7	20	28.1	400	5060	ug/L	D
Sodium	7440-23-5	20	144	2000	3800	ug/L	D

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-113I-GW-092520

20I0445-62 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/25/2020 12:35

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/09/2020 01:28

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0445-62 F 01

Preparation Batch: BIJ0193 — Sample Size: 25 mL

Prepared: 10/06/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Cadmium	7440-43-9	1	0.0300	0.100	3.53	ug/L	
Copper	7440-50-8	1	0.340	0.500	40.3	ug/L	
Zinc	7440-66-6	5	4.70	20.0	450	ug/L	D

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-113I-GW-092520

20I0445-62 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/25/2020 12:35

Instrument: IC930 Analyst: KOTT — Analyzed: 10/01/2020 22:57

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-62 C

Preparation Batch: BIJ0025 — Sample Size: 10 mL

Prepared: 10/01/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Chloride	16887-00-6	1	0.100	0.100	0.278	mg/L	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Nitrate-N	14797-55-8	1	0.100	0.100	ND	mg/L	H, U

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-113I-GW-092520

20I0445-62 (Water)

Wet Chemistry

Method: SM 2320 B-97 — Sampled: 09/25/2020 12:35

Instrument: Accumet AB150 Analyst: UW — Analyzed: 09/30/2020 09:33

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-62 C

Preparation Batch: BII0880 — Sample Size: 100 mL

Prepared: 09/30/2020 — Final Volume: 100 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Bicarbonate		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Carbonate		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Hydroxide		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Total		1	1.00	1.00	ND	mg/L CaCO3	U

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-113I-GW-092520

20I0445-62 (Water)

Wet Chemistry

Method: SM 2540 C-97 — Sampled: 09/25/2020 12:35

Instrument: BAL2 Analyst: KLE — Analyzed: 09/29/2020 16:14

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-62

Preparation Batch: BII0865 — Sample Size: 200 mL

Prepared: 09/29/2020 — Final Volume: 200 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Solids		1	5	5	378	mg/L	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-113I-GW-092520

20I0445-62 (Water)

Wet Chemistry

Method: SM 2540 D-97 — Sampled: 09/25/2020 12:35

Instrument: BAL2 Analyst: KLE — Analyzed: 09/29/2020 11:50

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-62

Preparation Batch: BII0846 — Sample Size: 930 mL

Prepared: 09/29/2020 — Final Volume: 1000 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Suspended Solids		1	1	1	ND	mg/L	U

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-113I-GW-092520

20I0445-62 (Water)

Wet Chemistry

Method: SM 5310 B-00 — Sampled: 09/25/2020 12:35

Instrument: TOC-LCSH Analyst: WCW — Analyzed: 10/07/2020 17:20

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-62 E

Preparation Batch: BIJ0116 — Sample Size: 20 mL

Prepared: 10/05/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Organic Carbon, Dissolved		1	0.50	0.50	0.55	mg/L	

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-62 D

Preparation Batch: BIJ0289 — Sample Size: 20 mL

Prepared: 10/08/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Organic Carbon		1	0.50	0.50	0.52	mg/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-113I-GW-092520

20I0445-62 (Water)

Calculation

Method: SM 2340 B-97 — Sampled: 09/25/2020 12:35

Instrument: [CALC] Analyst: MCB — Analyzed: 10/12/2020 20:38

Sample Preparation: Preparation Method: [CALC] — Extract ID: 20I0445-62

Preparation Batch: [CALC]

Prepared: 10/06/2020 Final Volume: 1

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness		5	1.04	186	mg/L CaCO3	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-113I-GW-092520

20I0445-62RE1 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/25/2020 12:35

Instrument: IC930 Analyst: KOTT — Analyzed: 10/03/2020 03:55

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-62RE1 C

Preparation Batch: BIJ0025 — Sample Size: 10 mL

Prepared: 10/01/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Chloride	16887-00-6	46	4.60	4.60	ND	mg/L	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Sulfate	14808-79-8	46	4.60	4.60	216	mg/L	D

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-12I-GW-092520

20I0445-63 (Water)

Metals and Metallic Compounds

Method: EPA 6020A — Sampled: 09/25/2020 13:50

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/19/2020 16:17

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0445-63 F 01

Preparation Batch: BIJ0195 — Sample Size: 25 mL

Prepared: 10/06/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Aluminum	7429-90-5	5	11.8	100	246	ug/L	D
Calcium	7440-70-2	5	9.53	250	62800	ug/L	D
Iron	7439-89-6	5	31.4	100	148	ug/L	D
Lead	7439-92-1	1	0.0680	0.100	ND	ug/L	U
Magnesium	7439-95-4	5	1.53	100	8200	ug/L	D
Manganese	7439-96-5	10	0.850	5.00	1510	ug/L	D
Potassium	7440-09-7	5	7.03	100	4730	ug/L	D
Sodium	7440-23-5	10	71.8	1000	3530	ug/L	D

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-12I-GW-092520

20I0445-63 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/25/2020 13:50

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/09/2020 01:31

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0445-63 F 01

Preparation Batch: BIJ0195 — Sample Size: 25 mL

Prepared: 10/06/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Cadmium	7440-43-9	1	0.0300	0.100	3.75	ug/L	
Copper	7440-50-8	1	0.340	0.500	1.38	ug/L	
Zinc	7440-66-6	1	0.820	4.00	44.7	ug/L	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-12I-GW-092520

20I0445-63 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/25/2020 13:50

Instrument: IC930 Analyst: KOTT — Analyzed: 10/01/2020 23:17

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-63 C

Preparation Batch: BIJ0025 — Sample Size: 10 mL

Prepared: 10/01/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Chloride	16887-00-6	1	0.100	0.100	0.226	mg/L	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Nitrate-N	14797-55-8	1	0.100	0.100	ND	mg/L	H, U

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-12I-GW-092520

20I0445-63 (Water)

Wet Chemistry

Method: SM 2320 B-97 — Sampled: 09/25/2020 13:50

Instrument: Accumet AB150 Analyst: UW — Analyzed: 09/30/2020 09:33

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-63 C

Preparation Batch: BII0880 — Sample Size: 100 mL

Prepared: 09/30/2020 — Final Volume: 100 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Bicarbonate		1	1.00	1.00	3.88	mg/L CaCO3	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Carbonate		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Hydroxide		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Total		1	1.00	1.00	3.88	mg/L CaCO3	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-12I-GW-092520

20I0445-63 (Water)

Wet Chemistry

Method: SM 2540 C-97 — Sampled: 09/25/2020 13:50

Instrument: BAL2 Analyst: KLE — Analyzed: 09/29/2020 16:14

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-63

Preparation Batch: BII0865 — Sample Size: 200 mL

Prepared: 09/29/2020 — Final Volume: 200 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Solids		1	5	5	318	mg/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-12I-GW-092520

20I0445-63 (Water)

Wet Chemistry

Method: SM 2540 D-97 — Sampled: 09/25/2020 13:50

Instrument: BAL2 Analyst: KLE — Analyzed: 09/29/2020 11:50

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-63

Preparation Batch: BII0846 — Sample Size: 920 mL

Prepared: 09/29/2020 — Final Volume: 1000 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Suspended Solids		1	1	1	ND	mg/L	U

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-12I-GW-092520

20I0445-63 (Water)

Wet Chemistry

Method: SM 5310 B-00 — Sampled: 09/25/2020 13:50

Instrument: TOC-LCSH Analyst: WCW — Analyzed: 10/07/2020 17:42

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-63 E

Preparation Batch: BIJ0116 — Sample Size: 20 mL

Prepared: 10/05/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Organic Carbon, Dissolved		1	0.50	0.50	ND	mg/L	U

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-63 D

Preparation Batch: BIJ0289 — Sample Size: 20 mL

Prepared: 10/08/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Organic Carbon		1	0.50	0.50	ND	mg/L	U

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-12I-GW-092520

20I0445-63 (Water)

Calculation

Method: SM 2340 B-97 — Sampled: 09/25/2020 13:50

Instrument: [CALC] Analyst: MCB — Analyzed: 10/19/2020 16:17

Sample Preparation: Preparation Method: [CALC] — Extract ID: 20I0445-63

Preparation Batch: [CALC]

Prepared: 10/06/2020 Final Volume: 1

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness		5	1.04	191	mg/L CaCO3	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-12I-GW-092520

20I0445-63RE1 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/25/2020 13:50

Instrument: IC930 Analyst: KOTT — Analyzed: 10/03/2020 04:15

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-63RE1 C

Preparation Batch: BIJ0025 — Sample Size: 10 mL

Prepared: 10/01/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Chloride	16887-00-6	39	3.90	3.90	ND	mg/L	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Sulfate	14808-79-8	39	3.90	3.90	182	mg/L	D

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-13S-GW-092520

20I0445-64 (Water)

Metals and Metallic Compounds

Method: EPA 6020A — Sampled: 09/25/2020 10:35

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/17/2020 15:55

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0445-64 L 01

Preparation Batch: BIJ0193 — Sample Size: 25 mL

Prepared: 10/06/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Aluminum	7429-90-5	2	4.73	40.0	6080	ug/L	D
Calcium	7440-70-2	2	3.81	100	24500	ug/L	D
Iron	7439-89-6	2	12.5	40.0	3330	ug/L	D
Lead	7439-92-1	1	0.0680	0.100	0.119	ug/L	
Magnesium	7439-95-4	2	0.614	40.0	2850	ug/L	D
Manganese	7439-96-5	2	0.170	1.00	290	ug/L	D
Potassium	7440-09-7	2	2.81	40.0	3510	ug/L	D
Sodium	7440-23-5	2	14.4	200	1960	ug/L	D

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-13S-GW-092520

20I0445-64 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/25/2020 10:35

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/09/2020 01:35

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0445-64 L 01

Preparation Batch: BIJ0193 — Sample Size: 25 mL

Prepared: 10/06/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Cadmium	7440-43-9	1	0.0300	0.100	1.82	ug/L	
Copper	7440-50-8	1	0.340	0.500	44.8	ug/L	
Zinc	7440-66-6	2	1.88	8.00	351	ug/L	D

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-13S-GW-092520

20I0445-64 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/25/2020 10:35

Instrument: IC930 Analyst: KOTT — Analyzed: 10/02/2020 00:37

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-64 C

Preparation Batch: BIJ0025 — Sample Size: 10 mL

Prepared: 10/01/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Chloride	16887-00-6	1	0.100	0.100	0.259	mg/L	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Nitrate-N	14797-55-8	1	0.100	0.100	ND	mg/L	H, U

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-13S-GW-092520

20I0445-64 (Water)

Wet Chemistry

Method: SM 2320 B-97 — Sampled: 09/25/2020 10:35

Instrument: Accumet AB150 Analyst: UW — Analyzed: 09/30/2020 09:33

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-64 E

Preparation Batch: BII0880 — Sample Size: 100 mL

Prepared: 09/30/2020 — Final Volume: 100 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Bicarbonate		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Carbonate		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Hydroxide		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Total		1	1.00	1.00	ND	mg/L CaCO3	U

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-13S-GW-092520

20I0445-64 (Water)

Wet Chemistry

Method: SM 2540 C-97 — Sampled: 09/25/2020 10:35

Instrument: BAL2 Analyst: KLE — Analyzed: 09/29/2020 16:14

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-64

Preparation Batch: BII0865 — Sample Size: 200 mL

Prepared: 09/29/2020 — Final Volume: 200 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Solids		1	5	5	202	mg/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-13S-GW-092520

20I0445-64 (Water)

Wet Chemistry

Method: SM 2540 D-97 — Sampled: 09/25/2020 10:35

Instrument: BAL2 Analyst: KLE — Analyzed: 09/29/2020 11:50

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-64

Preparation Batch: BII0846 — Sample Size: 910 mL

Prepared: 09/29/2020 — Final Volume: 1000 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Suspended Solids		1	1	1	ND	mg/L	U

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-13S-GW-092520

20I0445-64 (Water)

Wet Chemistry

Method: SM 5310 B-00 — Sampled: 09/25/2020 10:35

Instrument: TOC-LCSH Analyst: WCW — Analyzed: 10/07/2020 17:59

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-64 J

Preparation Batch: BIJ0116 — Sample Size: 20 mL

Prepared: 10/05/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Organic Carbon, Dissolved		1	0.50	0.50	ND	mg/L	U

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-64 G

Preparation Batch: BIJ0289 — Sample Size: 20 mL

Prepared: 10/08/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Organic Carbon		1	0.50	0.50	ND	mg/L	U

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-13S-GW-092520

20I0445-64 (Water)

Calculation

Method: SM 2340 B-97 — Sampled: 09/25/2020 10:35

Instrument: [CALC] Analyst: MCB — Analyzed: 10/12/2020 13:38

Sample Preparation: Preparation Method: [CALC] — Extract ID: 20I0445-64

Preparation Batch: [CALC]

Prepared: 10/06/2020 Final Volume: 1

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness		2	0.414	72.9	mg/L CaCO3	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

DS-13S-GW-092520

20I0445-64RE1 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/25/2020 10:35

Instrument: IC930 Analyst: KOTT — Analyzed: 10/03/2020 04:35

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0445-64RE1 A

Preparation Batch: BIJ0025 — Sample Size: 10 mL

Prepared: 10/01/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Sulfate	14808-79-8	26	2.60	2.60	121	mg/L	D

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

Metals and Metallic Compounds - Quality Control

Batch BIJ0193 - REN EPA 600/4-79-020 4.1.4 HNO3 matrix

Instrument: ICPMS1 Analyst: MCB

QC Sample/Analyte	Isotope	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BIJ0193-BLK1)					Prepared: 06-Oct-2020 Analyzed: 08-Oct-2020 18:55							
Lead	208	ND	0.0680	0.100	ug/L							U
Manganese	55	0.127	0.0850	0.500	ug/L							J
Cadmium	111	ND	0.0300	0.100	ug/L							U
Cadmium	114	ND	0.0400	0.100	ug/L							U
Copper	63	ND	0.340	0.500	ug/L							U
Copper	65	ND	0.350	0.500	ug/L							U
Zinc	66	1.09	0.820	4.00	ug/L							J
Zinc	67	ND	0.940	4.00	ug/L							U
Blank (BIJ0193-BLK2)					Prepared: 06-Oct-2020 Analyzed: 17-Oct-2020 14:14							
Aluminum	27	2.75	2.37	20.0	ug/L							J
Calcium	44	3.69	1.91	50.0	ug/L							J
Iron	54	6.42	6.27	20.0	ug/L							J
Iron	57	ND	1.40	20.0	ug/L							U
Magnesium	24	0.572	0.307	20.0	ug/L							J
Potassium	39	10.1	1.41	20.0	ug/L							J
Sodium	23	ND	7.18	100	ug/L							U
LCS (BIJ0193-BS1)					Prepared: 06-Oct-2020 Analyzed: 08-Oct-2020 18:59							
Lead	208	26.5	0.0680	0.100	ug/L	25.0		106	80-120			
Manganese	55	28.8	0.0850	0.500	ug/L	25.0		115	80-120			
Cadmium	111	26.7	0.0300	0.100	ug/L	25.0		107	80-120			
Cadmium	114	26.2	0.0400	0.100	ug/L	25.0		105	80-120			
Copper	63	25.5	0.340	0.500	ug/L	25.0		102	80-120			
Copper	65	25.0	0.350	0.500	ug/L	25.0		100	80-120			
Zinc	66	84.8	0.820	4.00	ug/L	80.0		106	80-120			
Zinc	67	79.8	0.940	4.00	ug/L	80.0		99.7	80-120			
LCS (BIJ0193-BS2)					Prepared: 06-Oct-2020 Analyzed: 17-Oct-2020 14:16							
Aluminum	27	4770	2.37	20.0	ug/L	5000		95.4	80-120			
Calcium	44	4650	1.91	50.0	ug/L	5000		93.1	80-120			
Iron	54	4800	6.27	20.0	ug/L	5000		96.1	80-120			
Iron	57	4760	1.40	20.0	ug/L	5000		95.2	80-120			
Magnesium	24	4740	0.307	20.0	ug/L	5000		94.7	80-120			
Potassium	39	4840	1.41	20.0	ug/L	5000		96.7	80-120			
Sodium	23	4820	7.18	100	ug/L	5000		96.4	80-120			

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

Metals and Metallic Compounds - Quality Control

Batch BIJ0193 - REN EPA 600/4-79-020 4.1.4 HNO3 matrix

Instrument: ICPMS1 Analyst: MCB

QC Sample/Analyte	Isotope	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
LCS (BIJ0193-BS2)						Prepared: 06-Oct-2020 Analyzed: 17-Oct-2020 14:16						
Duplicate (BIJ0193-DUP1)			Source: 20I0445-64			Prepared: 06-Oct-2020 Analyzed: 09-Oct-2020 01:38						
Lead	208	0.123	0.0680	0.100	ug/L		0.119			3.31	20	
Cadmium	111	1.87	0.0300	0.100	ug/L		1.82			2.55	20	
Copper	63	45.6	0.340	0.500	ug/L		44.8			1.70	20	
Duplicate (BIJ0193-DUP3)			Source: 20I0445-64			Prepared: 06-Oct-2020 Analyzed: 12-Oct-2020 13:43						
Calcium	44	24700	3.81	100	ug/L		24500			0.95	20	D
Magnesium	24	2920	0.614	40.0	ug/L		2850			2.42	20	D
Zinc	67	344	1.88	8.00	ug/L		351			1.96	20	D
Duplicate (BIJ0193-DUP5)			Source: 20I0445-64			Prepared: 06-Oct-2020 Analyzed: 17-Oct-2020 15:57						
Aluminum	27	5860	4.73	40.0	ug/L		6080			3.72	20	D
Iron	54	3250	12.5	40.0	ug/L		3330			2.54	20	D
Manganese	55	285	0.170	1.00	ug/L		290			1.87	20	D
Potassium	39	3430	2.81	40.0	ug/L		3510			2.41	20	D
Sodium	23	1900	14.4	200	ug/L		1960			3.29	20	D
Matrix Spike (BIJ0193-MS1)			Source: 20I0445-64			Prepared: 06-Oct-2020 Analyzed: 09-Oct-2020 01:42						
Lead	208	26.7	0.0680	0.100	ug/L	25.0	0.119	106	75-125			
Cadmium	111	27.6	0.0300	0.100	ug/L	25.0	1.82	103	75-125			
Copper	63	72.1	0.340	0.500	ug/L	25.0	44.8	109	75-125			
Recovery limits for target analytes in MS/MSD QC samples are advisory only.												
Matrix Spike (BIJ0193-MS3)			Source: 20I0445-64			Prepared: 06-Oct-2020 Analyzed: 12-Oct-2020 13:49						
Calcium	44	29600	3.81	100	ug/L	5000	24500	103	75-125			D
Magnesium	24	7800	0.614	40.0	ug/L	5000	2850	99.0	75-125			D
Zinc	67	420	1.88	8.00	ug/L	80.0	351	86.4	75-125			D
Recovery limits for target analytes in MS/MSD QC samples are advisory only.												
Matrix Spike (BIJ0193-MS5)			Source: 20I0445-64			Prepared: 06-Oct-2020 Analyzed: 17-Oct-2020 15:59						
Aluminum	27	10500	4.73	40.0	ug/L	5000	6080	87.7	75-125			D
Iron	54	7910	12.5	40.0	ug/L	5000	3330	91.7	75-125			D
Manganese	55	322	0.170	1.00	ug/L	25.0	290	127	75-125			HC, D
Potassium	39	8010	2.81	40.0	ug/L	5000	3510	90.0	75-125			D
Sodium	23	6410	14.4	200	ug/L	5000	1960	88.9	75-125			D

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

Metals and Metallic Compounds - Quality Control

Batch BIJ0193 - REN EPA 600/4-79-020 4.1.4 HNO3 matrix

Instrument: ICPMS1 Analyst: MCB

QC Sample/Analyte	Isotope	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Matrix Spike (BIJ0193-MS5)			**Source: 20I0445-64**			Prepared: 06-Oct-2020		Analyzed: 17-Oct-2020 15:59				
Recovery limits for target analytes in MS/MSD QC samples are advisory only.												
Matrix Spike Dup (BIJ0193-MSD1)			**Source: 20I0445-64**			Prepared: 06-Oct-2020		Analyzed: 09-Oct-2020 01:47				
Lead	208	26.7	0.0680	0.100	ug/L	25.0	0.119	106	75-125	0.06	20	
Cadmium	111	28.1	0.0300	0.100	ug/L	25.0	1.82	105	75-125	1.59	20	
Copper	63	69.9	0.340	0.500	ug/L	25.0	44.8	100	75-125	3.16	20	
Recovery limits for target analytes in MS/MSD QC samples are advisory only.												
Matrix Spike Dup (BIJ0193-MSD3)			**Source: 20I0445-64**			Prepared: 06-Oct-2020		Analyzed: 12-Oct-2020 13:55				
Calcium	44	29600	3.81	100	ug/L	5000	24500	103	75-125	0.05	20	D
Magnesium	24	7740	0.614	40.0	ug/L	5000	2850	97.8	75-125	0.78	20	D
Zinc	67	427	1.88	8.00	ug/L	80.0	351	95.8	75-125	1.77	20	D
Recovery limits for target analytes in MS/MSD QC samples are advisory only.												
Matrix Spike Dup (BIJ0193-MSD5)			**Source: 20I0445-64**			Prepared: 06-Oct-2020		Analyzed: 17-Oct-2020 16:01				
Aluminum	27	9880	4.73	40.0	ug/L	5000	6080	76.0	75-125	5.76	20	D
Iron	54	7620	12.5	40.0	ug/L	5000	3330	85.7	75-125	3.84	20	D
Manganese	55	306	0.170	1.00	ug/L	25.0	290	65.0	75-125	4.97	20	HC, D
Potassium	39	7730	2.81	40.0	ug/L	5000	3510	84.4	75-125	3.51	20	D
Sodium	23	6070	14.4	200	ug/L	5000	1960	82.2	75-125	5.36	20	D
Recovery limits for target analytes in MS/MSD QC samples are advisory only.												

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

Metals and Metallic Compounds - Quality Control

Batch BIJ0195 - REN EPA 600/4-79-020 4.1.4 HNO3 matrix

Instrument: ICPMS1 Analyst: MCB

QC Sample/Analyte	Isotope	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BIJ0195-BLK1)					Prepared: 06-Oct-2020 Analyzed: 08-Oct-2020 19:56							
Lead	208	ND	0.0680	0.100	ug/L							U
Manganese	55	0.121	0.0850	0.500	ug/L							J
Cadmium	111	ND	0.0300	0.100	ug/L							U
Cadmium	114	ND	0.0400	0.100	ug/L							U
Copper	63	ND	0.340	0.500	ug/L							U
Copper	65	ND	0.350	0.500	ug/L							U
Zinc	66	1.15	0.820	4.00	ug/L							J
Zinc	67	1.04	0.940	4.00	ug/L							J
Blank (BIJ0195-BLK2)					Prepared: 06-Oct-2020 Analyzed: 17-Oct-2020 14:18							
Aluminum	27	ND	2.37	20.0	ug/L							U
Calcium	44	6.56	1.91	50.0	ug/L							J
Iron	54	ND	6.27	20.0	ug/L							U
Iron	57	ND	1.40	20.0	ug/L							U
Magnesium	24	1.46	0.307	20.0	ug/L							J
Potassium	39	11.7	1.41	20.0	ug/L							J
Sodium	23	ND	7.18	100	ug/L							U
LCS (BIJ0195-BS1)					Prepared: 06-Oct-2020 Analyzed: 08-Oct-2020 20:00							
Lead	208	26.1	0.0680	0.100	ug/L	25.0		104	80-120			
Manganese	55	28.4	0.0850	0.500	ug/L	25.0		113	80-120			
Cadmium	111	25.7	0.0300	0.100	ug/L	25.0		103	80-120			
Cadmium	114	25.4	0.0400	0.100	ug/L	25.0		102	80-120			
Copper	63	24.8	0.340	0.500	ug/L	25.0		99.2	80-120			
Copper	65	24.9	0.350	0.500	ug/L	25.0		99.6	80-120			
Zinc	66	82.9	0.820	4.00	ug/L	80.0		104	80-120			
Zinc	67	78.4	0.940	4.00	ug/L	80.0		98.0	80-120			
LCS (BIJ0195-BS2)					Prepared: 06-Oct-2020 Analyzed: 17-Oct-2020 14:20							
Aluminum	27	4610	2.37	20.0	ug/L	5000		92.2	80-120			
Calcium	44	4690	1.91	50.0	ug/L	5000		93.7	80-120			
Iron	54	4730	6.27	20.0	ug/L	5000		94.6	80-120			
Iron	57	4630	1.40	20.0	ug/L	5000		92.6	80-120			
Magnesium	24	4720	0.307	20.0	ug/L	5000		94.4	80-120			
Potassium	39	4580	1.41	20.0	ug/L	5000		91.6	80-120			
Sodium	23	4750	7.18	100	ug/L	5000		95.1	80-120			

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

Metals and Metallic Compounds - Quality Control

Batch BIJ0195 - REN EPA 600/4-79-020 4.1.4 HNO3 matrix

Instrument: ICPMS1 Analyst: MCB

QC Sample/Analyte	Isotope	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
LCS (BIJ0195-BS2)						Prepared: 06-Oct-2020 Analyzed: 17-Oct-2020 14:20						
Duplicate (BIJ0195-DUP1)			**Source: 20I0445-41**			Prepared: 06-Oct-2020 Analyzed: 08-Oct-2020 22:43						
Lead	208	ND	0.0680	0.100	ug/L		ND					U
Cadmium	111	0.969	0.0300	0.100	ug/L		0.956			1.35	20	
Copper	63	15.1	0.340	0.500	ug/L		14.5			4.00	20	
Zinc	67	141	0.940	4.00	ug/L		136			3.01	20	
Duplicate (BIJ0195-DUP2)			**Source: 20I0445-41**			Prepared: 06-Oct-2020 Analyzed: 17-Oct-2020 14:29						
Aluminum	27	12.1	2.37	20.0	ug/L		13.0			7.02	20	J
Calcium	44	6180	1.91	50.0	ug/L		6090			1.39	20	
Iron	54	ND	6.27	20.0	ug/L		8.62					U
Magnesium	24	656	0.307	20.0	ug/L		640			2.41	20	
Manganese	55	1.03	0.0850	0.500	ug/L		0.810			23.40	20	L
Potassium	39	752	1.41	20.0	ug/L		748			0.53	20	
Sodium	23	959	7.18	100	ug/L		1010			5.61	20	
Matrix Spike (BIJ0195-MS1)			**Source: 20I0445-41**			Prepared: 06-Oct-2020 Analyzed: 08-Oct-2020 22:47						
Lead	208	26.6	0.0680	0.100	ug/L	25.0	ND	107	75-125			
Cadmium	111	26.7	0.0300	0.100	ug/L	25.0	0.956	103	75-125			
Copper	63	40.2	0.340	0.500	ug/L	25.0	14.5	103	75-125			
Zinc	67	210	0.940	4.00	ug/L	80.0	136	92.5	75-125			

Recovery limits for target analytes in MS/MSD QC samples are advisory only.

Matrix Spike (BIJ0195-MS2)			**Source: 20I0445-41**			Prepared: 06-Oct-2020 Analyzed: 17-Oct-2020 14:31						
Aluminum	27	4650	2.37	20.0	ug/L	5000	13.0	92.7	75-125			
Calcium	44	10800	1.91	50.0	ug/L	5000	6090	94.0	75-125			
Iron	54	4690	6.27	20.0	ug/L	5000	8.62	93.7	75-125			
Magnesium	24	5320	0.307	20.0	ug/L	5000	640	93.6	75-125			
Manganese	55	25.9	0.0850	0.500	ug/L	25.0	0.810	100	75-125			
Potassium	39	5290	1.41	20.0	ug/L	5000	748	90.9	75-125			
Sodium	23	5620	7.18	100	ug/L	5000	1010	92.1	75-125			

Recovery limits for target analytes in MS/MSD QC samples are advisory only.

Matrix Spike Dup (BIJ0195-MSD1)			**Source: 20I0445-41**			Prepared: 06-Oct-2020 Analyzed: 08-Oct-2020 22:53						
Lead	208	26.6	0.0680	0.100	ug/L	25.0	ND	107	75-125	0.03	20	
Cadmium	111	26.6	0.0300	0.100	ug/L	25.0	0.956	103	75-125	0.38	20	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

Metals and Metallic Compounds - Quality Control

Batch BIJ0195 - REN EPA 600/4-79-020 4.1.4 HNO3 matrix

Instrument: ICPMS1 Analyst: MCB

QC Sample/Analyte	Isotope	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Matrix Spike Dup (BIJ0195-MSD1)			**Source: 20I0445-41**			Prepared: 06-Oct-2020		Analyzed: 08-Oct-2020 22:53				
Copper	63	40.2	0.340	0.500	ug/L	25.0	14.5	103	75-125	0.05	20	
Zinc	67	210	0.940	4.00	ug/L	80.0	136	91.5	75-125	0.40	20	

Recovery limits for target analytes in MS/MSD QC samples are advisory only.

Matrix Spike Dup (BIJ0195-MSD2)			**Source: 20I0445-41**			Prepared: 06-Oct-2020		Analyzed: 17-Oct-2020 14:33				
Aluminum	27	4450	2.37	20.0	ug/L	5000	13.0	88.7	75-125	4.42	20	
Calcium	44	10700	1.91	50.0	ug/L	5000	6090	91.1	75-125	1.31	20	
Iron	54	4590	6.27	20.0	ug/L	5000	8.62	91.7	75-125	2.12	20	
Magnesium	24	5170	0.307	20.0	ug/L	5000	640	90.7	75-125	2.78	20	
Manganese	55	25.6	0.0850	0.500	ug/L	25.0	0.810	99.0	75-125	1.35	20	
Potassium	39	5240	1.41	20.0	ug/L	5000	748	89.8	75-125	1.05	20	
Sodium	23	5570	7.18	100	ug/L	5000	1010	91.1	75-125	0.89	20	

Recovery limits for target analytes in MS/MSD QC samples are advisory only.

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

Metals and Metallic Compounds - Quality Control

Batch BIJ0242 - REN EPA 600/4-79-020 4.1.4 HNO3 matrix

Instrument: ICPMS1 Analyst: MCB

QC Sample/Analyte	Isotope	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BIJ0242-BLK1)					Prepared: 07-Oct-2020 Analyzed: 09-Oct-2020 03:14							
Lead	208	ND	0.0680	0.100	ug/L							U
Manganese	55	ND	0.0850	0.500	ug/L							U
Cadmium	111	ND	0.0300	0.100	ug/L							U
Cadmium	114	ND	0.0400	0.100	ug/L							U
Copper	63	ND	0.340	0.500	ug/L							U
Copper	65	ND	0.350	0.500	ug/L							U
Zinc	66	ND	0.820	4.00	ug/L							U
Zinc	67	ND	0.940	4.00	ug/L							U
Blank (BIJ0242-BLK2)					Prepared: 07-Oct-2020 Analyzed: 17-Oct-2020 15:25							
Aluminum	27	ND	2.37	20.0	ug/L							U
Calcium	44	2.94	1.91	50.0	ug/L							J
Iron	54	ND	6.27	20.0	ug/L							U
Iron	57	ND	1.40	20.0	ug/L							U
Magnesium	24	0.404	0.307	20.0	ug/L							J
Potassium	39	9.72	1.41	20.0	ug/L							J
Sodium	23	ND	7.18	100	ug/L							U
LCS (BIJ0242-BS1)					Prepared: 07-Oct-2020 Analyzed: 09-Oct-2020 03:18							
Lead	208	26.9	0.0680	0.100	ug/L	25.0		108	80-120			
Manganese	55	28.2	0.0850	0.500	ug/L	25.0		113	80-120			
Cadmium	111	25.8	0.0300	0.100	ug/L	25.0		103	80-120			
Cadmium	114	26.2	0.0400	0.100	ug/L	25.0		105	80-120			
Copper	63	26.5	0.340	0.500	ug/L	25.0		106	80-120			
Copper	65	26.5	0.350	0.500	ug/L	25.0		106	80-120			
Zinc	66	83.7	0.820	4.00	ug/L	80.0		105	80-120			
Zinc	67	78.5	0.940	4.00	ug/L	80.0		98.1	80-120			
LCS (BIJ0242-BS2)					Prepared: 07-Oct-2020 Analyzed: 17-Oct-2020 15:27							
Aluminum	27	4660	2.37	20.0	ug/L	5000		93.1	80-120			
Calcium	44	4700	1.91	50.0	ug/L	5000		93.9	80-120			
Iron	54	4680	6.27	20.0	ug/L	5000		93.7	80-120			
Iron	57	4770	1.40	20.0	ug/L	5000		95.4	80-120			
Magnesium	24	4640	0.307	20.0	ug/L	5000		92.8	80-120			
Potassium	39	4690	1.41	20.0	ug/L	5000		93.7	80-120			
Sodium	23	4640	7.18	100	ug/L	5000		92.9	80-120			

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

Metals and Metallic Compounds - Quality Control

Batch BIJ0242 - REN EPA 600/4-79-020 4.1.4 HNO3 matrix

Instrument: ICPMS1 Analyst: MCB

QC Sample/Analyte	Isotope	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
LCS (BIJ0242-BS2)						Prepared: 07-Oct-2020 Analyzed: 17-Oct-2020 15:27						
Duplicate (BIJ0242-DUP1)			**Source: 20I0445-17**			Prepared: 07-Oct-2020 Analyzed: 09-Oct-2020 03:35						
Lead	208	0.107	0.0680	0.100	ug/L		0.0990			7.77	20	
Cadmium	111	2.59	0.0300	0.100	ug/L		2.50			3.50	20	
Copper	63	35.7	0.340	0.500	ug/L		35.0			2.20	20	
Duplicate (BIJ0242-DUP2)			**Source: 20I0445-17**			Prepared: 07-Oct-2020 Analyzed: 12-Oct-2020 13:21						
Calcium	44	64600	9.53	250	ug/L		64700			0.10	20	D
Magnesium	24	10100	1.53	100	ug/L		10200			0.84	20	D
Zinc	67	424	4.70	20.0	ug/L		422			0.60	20	D
Duplicate (BIJ0242-DUP3)			**Source: 20I0445-17**			Prepared: 07-Oct-2020 Analyzed: 17-Oct-2020 16:40						
Iron	54	23300	31.4	100	ug/L		23200			0.54	20	D
Manganese	55	1060	0.425	2.50	ug/L		1030			2.91	20	D
Sodium	23	4160	35.9	500	ug/L		4130			0.81	20	D
Duplicate (BIJ0242-DUP4)			**Source: 20I0445-17**			Prepared: 07-Oct-2020 Analyzed: 19-Oct-2020 17:35						
Aluminum	27	6030	11.8	100	ug/L		6100			1.17	20	D
Potassium	39	8110	7.03	100	ug/L		8450			4.14	20	D
Matrix Spike (BIJ0242-MS1)			**Source: 20I0445-17**			Prepared: 07-Oct-2020 Analyzed: 09-Oct-2020 03:39						
Lead	208	25.0	0.0680	0.100	ug/L	25.0	0.0990	99.6	75-125			
Cadmium	111	27.3	0.0300	0.100	ug/L	25.0	2.50	99.2	75-125			
Copper	63	61.3	0.340	0.500	ug/L	25.0	35.0	106	75-125			
Recovery limits for target analytes in MS/MSD QC samples are advisory only.												
Matrix Spike (BIJ0242-MS2)			**Source: 20I0445-17**			Prepared: 07-Oct-2020 Analyzed: 12-Oct-2020 13:25						
Calcium	44	70900	9.53	250	ug/L	5000	64700	125	75-125			D
Magnesium	24	15200	1.53	100	ug/L	5000	10200	102	75-125			D
Zinc	67	499	4.70	20.0	ug/L	80.0	422	97.3	75-125			D
Recovery limits for target analytes in MS/MSD QC samples are advisory only.												
Matrix Spike (BIJ0242-MS3)			**Source: 20I0445-17**			Prepared: 07-Oct-2020 Analyzed: 17-Oct-2020 16:42						
Iron	54	28600	31.4	100	ug/L	5000	23200	108	75-125			D
Manganese	55	1080	0.425	2.50	ug/L	25.0	1030	189	75-125			HC, D
Sodium	23	8840	35.9	500	ug/L	5000	4130	94.3	75-125			D

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

Metals and Metallic Compounds - Quality Control

Batch BIJ0242 - REN EPA 600/4-79-020 4.1.4 HNO3 matrix

Instrument: ICPMS1 Analyst: MCB

QC Sample/Analyte	Isotope	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Recovery limits for target analytes in MS/MSD QC samples are advisory only.												
Matrix Spike (BIJ0242-MS4)		**Source: 20I0445-17**				Prepared: 07-Oct-2020		Analyzed: 19-Oct-2020 17:36				
Aluminum	27	10700	11.8	100	ug/L	5000	6100	92.1	75-125			D
Potassium	39	12700	7.03	100	ug/L	5000	8450	85.0	75-125			D
Recovery limits for target analytes in MS/MSD QC samples are advisory only.												
Matrix Spike Dup (BIJ0242-MSD1)		**Source: 20I0445-17**				Prepared: 07-Oct-2020		Analyzed: 09-Oct-2020 03:44				
Lead	208	25.3	0.0680	0.100	ug/L	25.0	0.0990	101	75-125	1.17	20	
Cadmium	111	27.4	0.0300	0.100	ug/L	25.0	2.50	99.7	75-125	0.45	20	
Copper	63	61.3	0.340	0.500	ug/L	25.0	35.0	106	75-125	0.01	20	
Recovery limits for target analytes in MS/MSD QC samples are advisory only.												
Matrix Spike Dup (BIJ0242-MSD2)		**Source: 20I0445-17**				Prepared: 07-Oct-2020		Analyzed: 12-Oct-2020 13:31				
Calcium	44	68600	9.53	250	ug/L	5000	64700	78.9	75-125	3.32	20	D
Magnesium	24	15100	1.53	100	ug/L	5000	10200	98.3	75-125	1.07	20	D
Zinc	67	493	4.70	20.0	ug/L	80.0	422	88.5	75-125	1.41	20	D
Recovery limits for target analytes in MS/MSD QC samples are advisory only.												
Matrix Spike Dup (BIJ0242-MSD3)		**Source: 20I0445-17**				Prepared: 07-Oct-2020		Analyzed: 17-Oct-2020 16:44				
Iron	54	27800	31.4	100	ug/L	5000	23200	92.1	75-125	2.83	20	D
Manganese	55	1070	0.425	2.50	ug/L	25.0	1030	161	75-125	0.64	20	HC, D
Sodium	23	8800	35.9	500	ug/L	5000	4130	93.5	75-125	0.43	20	D
Recovery limits for target analytes in MS/MSD QC samples are advisory only.												
Matrix Spike Dup (BIJ0242-MSD4)		**Source: 20I0445-17**				Prepared: 07-Oct-2020		Analyzed: 19-Oct-2020 17:38				
Aluminum	27	10700	11.8	100	ug/L	5000	6100	91.4	75-125	0.32	20	D
Potassium	39	12900	7.03	100	ug/L	5000	8450	89.6	75-125	1.78	20	D
Recovery limits for target analytes in MS/MSD QC samples are advisory only.												

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

Metals and Metallic Compounds - Quality Control

Batch BIJ0288 - REN EPA 600/4-79-020 4.1.4 HNO3 matrix

Instrument: ICPMS1 Analyst: MCB

QC Sample/Analyte	Isotope	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BIJ0288-BLK1)					Prepared: 08-Oct-2020 Analyzed: 12-Oct-2020 18:35							
Calcium	44	3.28	1.91	50.0	ug/L							J
Lead	208	ND	0.0680	0.100	ug/L							U
Magnesium	24	ND	0.307	20.0	ug/L							U
Cadmium	111	ND	0.0300	0.100	ug/L							U
Cadmium	114	ND	0.0400	0.100	ug/L							U
Copper	63	ND	0.340	0.500	ug/L							U
Copper	65	ND	0.350	0.500	ug/L							U
Zinc	66	ND	0.820	4.00	ug/L							U
Zinc	67	ND	0.940	4.00	ug/L							U
Blank (BIJ0288-BLK2)					Prepared: 08-Oct-2020 Analyzed: 13-Oct-2020 13:53							
Lead	208	ND	0.0680	0.100	ug/L							U
Blank (BIJ0288-BLK3)					Prepared: 08-Oct-2020 Analyzed: 17-Oct-2020 14:48							
Aluminum	27	ND	2.37	20.0	ug/L							U
Iron	54	ND	6.27	20.0	ug/L							U
Iron	57	ND	1.40	20.0	ug/L							U
Manganese	55	ND	0.0850	0.500	ug/L							U
Potassium	39	10.1	1.41	20.0	ug/L							J
Sodium	23	ND	7.18	100	ug/L							U
LCS (BIJ0288-BS1)					Prepared: 08-Oct-2020 Analyzed: 12-Oct-2020 18:39							
Calcium	44	4740	1.91	50.0	ug/L	5000		94.8	80-120			
Lead	208	25.5	0.0680	0.100	ug/L	25.0		102	80-120			
Magnesium	24	4990	0.307	20.0	ug/L	5000		99.7	80-120			
Cadmium	111	24.4	0.0300	0.100	ug/L	25.0		97.6	80-120			
Cadmium	114	24.3	0.0400	0.100	ug/L	25.0		97.1	80-120			
Copper	63	24.2	0.340	0.500	ug/L	25.0		97.0	80-120			
Copper	65	24.5	0.350	0.500	ug/L	25.0		97.9	80-120			
Zinc	66	80.0	0.820	4.00	ug/L	80.0		100	80-120			
Zinc	67	77.9	0.940	4.00	ug/L	80.0		97.4	80-120			
LCS (BIJ0288-BS3)					Prepared: 08-Oct-2020 Analyzed: 17-Oct-2020 14:50							
Aluminum	27	4660	2.37	20.0	ug/L	5000		93.1	80-120			
Iron	54	4690	6.27	20.0	ug/L	5000		93.9	80-120			
Iron	57	4650	1.40	20.0	ug/L	5000		93.0	80-120			

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

Metals and Metallic Compounds - Quality Control

Batch BIJ0288 - REN EPA 600/4-79-020 4.1.4 HNO3 matrix

Instrument: ICPMS1 Analyst: MCB

QC Sample/Analyte	Isotope	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
LCS (BIJ0288-BS3)						Prepared: 08-Oct-2020 Analyzed: 17-Oct-2020 14:50						
Manganese	55	24.1	0.0850	0.500	ug/L	25.0		96.3	80-120			
Potassium	39	4530	1.41	20.0	ug/L	5000		90.7	80-120			
Sodium	23	4660	7.18	100	ug/L	5000		93.1	80-120			
Duplicate (BIJ0288-DUP1)			**Source: 20I0445-01**			Prepared: 08-Oct-2020 Analyzed: 12-Oct-2020 20:55						
Calcium	44	6180	1.91	50.0	ug/L		6140			0.66	20	
Lead	208	0.210	0.0680	0.100	ug/L		0.165			24.00	20	L
Magnesium	24	730	0.307	20.0	ug/L		701			4.11	20	
Cadmium	111	0.0370	0.0300	0.100	ug/L		ND					J
Copper	63	0.876	0.340	0.500	ug/L		0.703			21.90	20	L
Zinc	66	4.69	0.820	4.00	ug/L		4.61			1.91	20	
Duplicate (BIJ0288-DUP2)			**Source: 20I0445-01**			Prepared: 08-Oct-2020 Analyzed: 17-Oct-2020 16:28						
Iron	54	285	6.27	20.0	ug/L		194			38.00	20	*
Manganese	55	7.07	0.0850	0.500	ug/L		6.21			12.90	20	
Sodium	23	780	7.18	100	ug/L		775			0.60	20	
Duplicate (BIJ0288-DUP3)			**Source: 20I0445-01**			Prepared: 08-Oct-2020 Analyzed: 19-Oct-2020 17:45						
Aluminum	27	308	2.37	20.0	ug/L		227			30.30	20	*
Potassium	39	581	1.41	20.0	ug/L		589			1.40	20	
Matrix Spike (BIJ0288-MS1)			**Source: 20I0445-01**			Prepared: 08-Oct-2020 Analyzed: 12-Oct-2020 21:00						
Calcium	44	11000	1.91	50.0	ug/L	5000	6140	97.1	75-125			
Lead	208	24.9	0.0680	0.100	ug/L	25.0	0.165	99.1	75-125			
Magnesium	24	5630	0.307	20.0	ug/L	5000	701	98.6	75-125			
Cadmium	111	23.6	0.0300	0.100	ug/L	25.0	ND	94.4	75-125			
Copper	63	24.8	0.340	0.500	ug/L	25.0	0.703	96.2	75-125			
Zinc	66	82.8	0.820	4.00	ug/L	80.0	4.61	97.7	75-125			

Recovery limits for target analytes in MS/MSD QC samples are advisory only.

Matrix Spike (BIJ0288-MS2)			**Source: 20I0445-01**			Prepared: 08-Oct-2020 Analyzed: 17-Oct-2020 16:30						
Iron	54	4780	6.27	20.0	ug/L	5000	194	91.7	75-125			
Manganese	55	31.1	0.0850	0.500	ug/L	25.0	6.21	99.7	75-125			
Sodium	23	5290	7.18	100	ug/L	5000	775	90.3	75-125			

Recovery limits for target analytes in MS/MSD QC samples are advisory only.

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

Metals and Metallic Compounds - Quality Control

Batch BIJ0288 - REN EPA 600/4-79-020 4.1.4 HNO3 matrix

Instrument: ICPMS1 Analyst: MCB

QC Sample/Analyte	Isotope	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Matrix Spike (BIJ0288-MS3)			**Source: 20I0445-01**			Prepared: 08-Oct-2020		Analyzed: 19-Oct-2020 17:47				
Aluminum	27	4870	2.37	20.0	ug/L	5000	227	92.8	75-125			
Potassium	39	5220	1.41	20.0	ug/L	5000	589	92.6	75-125			
Recovery limits for target analytes in MS/MSD QC samples are advisory only.												
Matrix Spike Dup (BIJ0288-MSD1)			**Source: 20I0445-01**			Prepared: 08-Oct-2020		Analyzed: 12-Oct-2020 21:05				
Calcium	44	11100	1.91	50.0	ug/L	5000	6140	99.2	75-125	0.95	20	
Lead	208	25.4	0.0680	0.100	ug/L	25.0	0.165	101	75-125	1.92	20	
Magnesium	24	5680	0.307	20.0	ug/L	5000	701	99.5	75-125	0.81	20	
Cadmium	111	24.1	0.0300	0.100	ug/L	25.0	ND	96.6	75-125	2.23	20	
Copper	63	25.4	0.340	0.500	ug/L	25.0	0.703	98.8	75-125	2.56	20	
Zinc	66	82.5	0.820	4.00	ug/L	80.0	4.61	97.3	75-125	0.33	20	
Recovery limits for target analytes in MS/MSD QC samples are advisory only.												
Matrix Spike Dup (BIJ0288-MSD2)			**Source: 20I0445-01**			Prepared: 08-Oct-2020		Analyzed: 17-Oct-2020 16:33				
Iron	54	4800	6.27	20.0	ug/L	5000	194	92.2	75-125	0.52	20	
Manganese	55	31.7	0.0850	0.500	ug/L	25.0	6.21	102	75-125	1.83	20	
Sodium	23	5300	7.18	100	ug/L	5000	775	90.5	75-125	0.14	20	
Recovery limits for target analytes in MS/MSD QC samples are advisory only.												
Matrix Spike Dup (BIJ0288-MSD3)			**Source: 20I0445-01**			Prepared: 08-Oct-2020		Analyzed: 19-Oct-2020 17:49				
Aluminum	27	4920	2.37	20.0	ug/L	5000	227	93.8	75-125	1.08	20	
Potassium	39	5340	1.41	20.0	ug/L	5000	589	94.9	75-125	2.22	20	
Recovery limits for target analytes in MS/MSD QC samples are advisory only.												

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

Metals and Metallic Compounds - Quality Control

Batch BIJ0345 - RHN EPA 600/4-79-020 4.1.4 HNO3 matrix 5x

Instrument: ICPMS1 Analyst: MCB

QC Sample/Analyte	Isotope	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BIJ0345-BLK1)					Prepared: 12-Oct-2020 Analyzed: 15-Oct-2020 22:08							
Cadmium	111	ND	0.00600	0.0200	ug/L							U
Cadmium	114	ND	0.00800	0.0200	ug/L							U
LCS (BIJ0345-BS1)					Prepared: 12-Oct-2020 Analyzed: 15-Oct-2020 22:13							
Cadmium	111	5.03	0.00600	0.0200	ug/L	5.00		101	80-120			
Cadmium	114	4.88	0.00800	0.0200	ug/L	5.00		97.7	80-120			
LCS Dup (BIJ0345-BSD1)					Prepared: 12-Oct-2020 Analyzed: 15-Oct-2020 22:17							
Cadmium	111	5.05	0.00600	0.0200	ug/L	5.00		101	80-120	0.50	20	
Cadmium	114	5.10	0.00800	0.0200	ug/L	5.00		102	80-120	4.33	20	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

Metals and Metallic Compounds - Quality Control

Batch BIJ0436 - RHN EPA 600/4-79-020 4.1.4 HNO3 matrix 5x

Instrument: ICPMS1 Analyst: MCB

QC Sample/Analyte	Isotope	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BIJ0436-BLK1)					Prepared: 14-Oct-2020 Analyzed: 16-Oct-2020 00:11							
Cadmium	111	ND	0.00600	0.0200	ug/L							U
Cadmium	114	ND	0.00800	0.0200	ug/L							U
LCS (BIJ0436-BS1)					Prepared: 14-Oct-2020 Analyzed: 16-Oct-2020 00:16							
Cadmium	111	5.08	0.00600	0.0200	ug/L	5.00		102	80-120			
Cadmium	114	5.06	0.00800	0.0200	ug/L	5.00		101	80-120			
LCS Dup (BIJ0436-BSD1)					Prepared: 14-Oct-2020 Analyzed: 16-Oct-2020 00:20							
Cadmium	111	4.87	0.00600	0.0200	ug/L	5.00		97.3	80-120	4.39	20	
Cadmium	114	4.98	0.00800	0.0200	ug/L	5.00		99.6	80-120	1.66	20	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

Metals and Metallic Compounds (dissolved) - Quality Control

Batch BIJ0290 - REN EPA 600/4-79-020 4.1.4 HNO3 matrix

Instrument: ICPMS1 Analyst: MCB

QC Sample/Analyte	Isotope	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BIJ0290-BLK1)					Prepared: 08-Oct-2020 Analyzed: 12-Oct-2020 18:43							
Calcium, Dissolved	44	2.95	1.91	50.0	ug/L							J
Magnesium, Dissolved	24	0.943	0.307	20.0	ug/L							J
Cadmium, Dissolved	111	ND	0.0300	0.100	ug/L							U
Cadmium, Dissolved	114	ND	0.0400	0.100	ug/L							U
Copper, Dissolved	63	ND	0.340	0.500	ug/L							U
Copper, Dissolved	65	ND	0.350	0.500	ug/L							U
Zinc, Dissolved	66	1.40	0.820	4.00	ug/L							J
Zinc, Dissolved	67	1.10	0.940	4.00	ug/L							J
Blank (BIJ0290-BLK3)					Prepared: 08-Oct-2020 Analyzed: 17-Oct-2020 14:52							
Aluminum, Dissolved	27	14.1	2.37	20.0	ug/L							J
Iron, Dissolved	54	ND	6.27	20.0	ug/L							U
Iron, Dissolved	57	ND	1.40	20.0	ug/L							U
Manganese, Dissolved	55	0.115	0.0850	0.500	ug/L							J
Potassium, Dissolved	39	12.0	1.41	20.0	ug/L							J
Sodium, Dissolved	23	ND	7.18	100	ug/L							U
LCS (BIJ0290-BS1)					Prepared: 08-Oct-2020 Analyzed: 12-Oct-2020 18:47							
Calcium, Dissolved	44	4850	1.91	50.0	ug/L	5000		97.1	80-120			
Lead, Dissolved	208	25.9	0.0680	0.100	ug/L	25.0		104	80-120			
Magnesium, Dissolved	24	5030	0.307	20.0	ug/L	5000		101	80-120			
Cadmium, Dissolved	111	24.8	0.0300	0.100	ug/L	25.0		99.3	80-120			
Cadmium, Dissolved	114	24.7	0.0400	0.100	ug/L	25.0		98.7	80-120			
Copper, Dissolved	63	24.5	0.340	0.500	ug/L	25.0		98.1	80-120			
Copper, Dissolved	65	24.6	0.350	0.500	ug/L	25.0		98.6	80-120			
Zinc, Dissolved	66	80.9	0.820	4.00	ug/L	80.0		101	80-120			
Zinc, Dissolved	67	76.7	0.940	4.00	ug/L	80.0		95.9	80-120			
LCS (BIJ0290-BS3)					Prepared: 08-Oct-2020 Analyzed: 17-Oct-2020 14:54							
Aluminum, Dissolved	27	4570	2.37	20.0	ug/L	5000		91.4	80-120			
Iron, Dissolved	54	4670	6.27	20.0	ug/L	5000		93.4	80-120			
Iron, Dissolved	57	4700	1.40	20.0	ug/L	5000		94.0	80-120			
Manganese, Dissolved	55	25.0	0.0850	0.500	ug/L	25.0		99.9	80-120			
Potassium, Dissolved	39	4660	1.41	20.0	ug/L	5000		93.2	80-120			
Sodium, Dissolved	23	4660	7.18	100	ug/L	5000		93.2	80-120			

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

Metals and Metallic Compounds (dissolved) - Quality Control

Batch BIJ0439 - RHN EPA 600/4-79-020 4.1.4 HNO3 matrix 5x

Instrument: ICPMS1 Analyst: MCB

QC Sample/Analyte	Isotope	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BIJ0439-BLK1)					Prepared: 14-Oct-2020 Analyzed: 16-Oct-2020 01:13							
Cadmium, Dissolved	111	ND	0.00600	0.0200	ug/L							U
Cadmium, Dissolved	114	ND	0.00800	0.0200	ug/L							U
LCS (BIJ0439-BS1)					Prepared: 14-Oct-2020 Analyzed: 16-Oct-2020 01:17							
Cadmium, Dissolved	111	4.61	0.00600	0.0200	ug/L	5.00		92.2	80-120			
Cadmium, Dissolved	114	4.60	0.00800	0.0200	ug/L	5.00		92.0	80-120			
LCS Dup (BIJ0439-BSD1)					Prepared: 14-Oct-2020 Analyzed: 16-Oct-2020 01:21							
Cadmium, Dissolved	111	4.49	0.00600	0.0200	ug/L	5.00		89.9	80-120	2.55	20	
Cadmium, Dissolved	114	4.51	0.00800	0.0200	ug/L	5.00		90.2	80-120	1.96	20	

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Floyd - Snider	Project:	Rio Tinto Holden Mine Reclamation/Remediation
601 Union Street Two Union Square, Suite 600	Project Number:	RT-Holden
Seattle WA, 98101-2341	Project Manager:	Amanda McKay

Reported:
22-Oct-2020 19:59

Wet Chemistry - Quality Control

Batch BII0833 - No Prep Wet Chem

Instrument: BAL2 Analyst: KLE

QC Sample/Analyte	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BII0833-BLK1)				Prepared: 29-Sep-2020 Analyzed: 29-Sep-2020 09:00							
Suspended Solids	ND	1	1	mg/L							U
LCS (BII0833-BS1)				Prepared: 29-Sep-2020 Analyzed: 29-Sep-2020 09:00							
Suspended Solids	49	1	1	mg/L	50.00		97.0	90-110			
Duplicate (BII0833-DUP1)		**Source: 20I0445-17**		Prepared: 29-Sep-2020 Analyzed: 29-Sep-2020 09:00							
Suspended Solids	2	1	1	mg/L		3			63.80	20	L

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

Wet Chemistry - Quality Control

Batch BII0839 - No Prep Wet Chem

Instrument: BAL2 Analyst: KLE

QC Sample/Analyte	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BII0839-BLK1)				Prepared: 29-Sep-2020 Analyzed: 29-Sep-2020 10:38							
Suspended Solids	ND	1	1	mg/L							U
LCS (BII0839-BS1)				Prepared: 29-Sep-2020 Analyzed: 29-Sep-2020 10:38							
Suspended Solids	49	1	1	mg/L	50.00		98.6	90-110			
Duplicate (BII0839-DUP1)		**Source: 20I0445-41**		Prepared: 29-Sep-2020 Analyzed: 29-Sep-2020 10:38							
Suspended Solids	ND	1	1	mg/L		ND					U

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

Wet Chemistry - Quality Control

Batch BII0841 - No Prep Wet Chem

Instrument: IC930 Analyst: KOTT

QC Sample/Analyte	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BII0841-BLK1)				Prepared: 29-Sep-2020 Analyzed: 29-Sep-2020 20:00							
Chloride	ND	0.100	0.100	mg/L							U
Nitrate-N	ND	0.100	0.100	mg/L							U
Sulfate	ND	0.100	0.100	mg/L							U
LCS (BII0841-BS1)				Prepared: 29-Sep-2020 Analyzed: 29-Sep-2020 20:20							
Chloride	4.80	0.100	0.100	mg/L	5.00		96.0	90-110			
Nitrate-N	4.93	0.100	0.100	mg/L	5.00		98.6	90-110			
Sulfate	5.22	0.100	0.100	mg/L	5.00		104	90-110			

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

Wet Chemistry - Quality Control

Batch BII0843 - No Prep Wet Chem

Instrument: Accumet AB150 Analyst: UW

QC Sample/Analyte	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BII0843-BLK1)					Prepared: 29-Sep-2020 Analyzed: 29-Sep-2020 10:57						
Alkalinity, Total	ND	1.00	1.00	mg/L CaCO3							U
Duplicate (BII0843-DUP1)			**Source: 20I0445-17**		Prepared: 29-Sep-2020 Analyzed: 29-Sep-2020 10:57						
Alkalinity, Total	ND	1.00	1.00	mg/L CaCO3		ND					U
Reference (BII0843-SRM1)					Prepared: 29-Sep-2020 Analyzed: 29-Sep-2020 10:57						
Alkalinity, Total	105	1.00	1.00	mg/L CaCO3	106		98.7	90.57-107.55			

Floyd - Snider	Project:	Rio Tinto Holden Mine Reclamation/Remediation
601 Union Street Two Union Square, Suite 600	Project Number:	RT-Holden
Seattle WA, 98101-2341	Project Manager:	Amanda McKay

Reported:
22-Oct-2020 19:59

Wet Chemistry - Quality Control

Batch BII0846 - No Prep Wet Chem

Instrument: BAL2 Analyst: KLE

QC Sample/Analyte	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BII0846-BLK1)					Prepared: 29-Sep-2020 Analyzed: 29-Sep-2020 11:50						
Suspended Solids	ND	1	1	mg/L							U
LCS (BII0846-BS1)					Prepared: 29-Sep-2020 Analyzed: 29-Sep-2020 11:50						
Suspended Solids	50	1	1	mg/L	50.00		100	90-110			
Duplicate (BII0846-DUP1)		**Source: 20I0445-64**			Prepared: 29-Sep-2020 Analyzed: 29-Sep-2020 11:50						
Suspended Solids	ND	1	1	mg/L		ND					U

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

Wet Chemistry - Quality Control

Batch BII0853 - No Prep Wet Chem

Instrument: BAL2 Analyst: KLE

QC Sample/Analyte	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BII0853-BLK1)				Prepared: 29-Sep-2020 Analyzed: 29-Sep-2020 13:16							
Dissolved Solids	ND	5	5	mg/L							U
LCS (BII0853-BS1)				Prepared: 29-Sep-2020 Analyzed: 29-Sep-2020 13:16							
Dissolved Solids	503	10	10	mg/L	500		101	90-110			
Duplicate (BII0853-DUP1)		**Source: 20I0445-17**		Prepared: 29-Sep-2020 Analyzed: 29-Sep-2020 13:16							
Dissolved Solids	511	10	10	mg/L		507			0.79	20	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

Wet Chemistry - Quality Control

Batch BII0857 - No Prep Wet Chem

Instrument: IC930 Analyst: KOTT

QC Sample/Analyte	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BII0857-BLK1)				Prepared: 29-Sep-2020 Analyzed: 30-Sep-2020 20:15							
Chloride	ND	0.100	0.100	mg/L							U
Nitrate-N	ND	0.100	0.100	mg/L							U
Sulfate	ND	0.100	0.100	mg/L							U
LCS (BII0857-BS1)				Prepared: 29-Sep-2020 Analyzed: 30-Sep-2020 20:35							
Chloride	4.87	0.100	0.100	mg/L	5.00		97.3	90-110			
Nitrate-N	4.98	0.100	0.100	mg/L	5.00		99.5	90-110			
Sulfate	5.24	0.100	0.100	mg/L	5.00		105	90-110			
Duplicate (BII0857-DUP1)		**Source: 20I0445-17**		Prepared: 29-Sep-2020 Analyzed: 30-Sep-2020 21:15							
Chloride	0.409	0.100	0.100	mg/L		0.410			0.24	20	
Nitrate-N	ND	0.100	0.100	mg/L		ND					H, U
Duplicate (BII0857-DUP2)		**Source: 20I0445-17**		Prepared: 29-Sep-2020 Analyzed: 02-Oct-2020 06:18							
Sulfate	279	5.80	5.80	mg/L		290			3.86	20	D
Matrix Spike (BII0857-MS1)		**Source: 20I0445-17**		Prepared: 29-Sep-2020 Analyzed: 30-Sep-2020 21:35							
Chloride	2.33	0.100	0.100	mg/L	2.00	0.410	96.0	75-125			
Nitrate-N	1.99	0.100	0.100	mg/L	2.00	ND	99.7	75-125			H

Recovery limits for target analytes in MS/MSD QC samples are advisory only.

Matrix Spike Dup (BII0857-MSD1)		**Source: 20I0445-17**		Prepared: 29-Sep-2020 Analyzed: 30-Sep-2020 21:55							
Chloride	2.33	0.100	0.100	mg/L	2.00	0.410	96.1	75-125	0.09	20	
Nitrate-N	2.00	0.100	0.100	mg/L	2.00	ND	99.8	75-125	0.05	20	H

Recovery limits for target analytes in MS/MSD QC samples are advisory only.

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

Wet Chemistry - Quality Control

Batch BII0859 - No Prep Wet Chem

Instrument: Accumet AB150 Analyst: UW

QC Sample/Analyte	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BII0859-BLK1)					Prepared: 29-Sep-2020 Analyzed: 29-Sep-2020 14:32						
Alkalinity, Total	ND	1.00	1.00	mg/L CaCO3							U
Duplicate (BII0859-DUP1)		**Source: 20I0445-41**			Prepared: 29-Sep-2020 Analyzed: 29-Sep-2020 14:32						
Alkalinity, Total	7.05	1.00	1.00	mg/L CaCO3		7.15			1.42	20	
Reference (BII0859-SRM1)					Prepared: 29-Sep-2020 Analyzed: 29-Sep-2020 14:32						
Alkalinity, Total	105	1.00	1.00	mg/L CaCO3	106		98.7	90.57-107.55			

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Floyd - Snider	Project:	Rio Tinto Holden Mine Reclamation/Remediation
601 Union Street Two Union Square, Suite 600	Project Number:	RT-Holden
Seattle WA, 98101-2341	Project Manager:	Amanda McKay

Reported:
22-Oct-2020 19:59

Wet Chemistry - Quality Control

Batch BII0860 - No Prep Wet Chem

Instrument: BAL2 Analyst: KLE

QC Sample/Analyte	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BII0860-BLK1)				Prepared: 29-Sep-2020 Analyzed: 29-Sep-2020 15:23							
Dissolved Solids	ND	5	5	mg/L							U
LCS (BII0860-BS1)				Prepared: 29-Sep-2020 Analyzed: 29-Sep-2020 15:23							
Dissolved Solids	537	10	10	mg/L	500		107	90-110			
Duplicate (BII0860-DUP1)		**Source: 20I0445-41**		Prepared: 29-Sep-2020 Analyzed: 29-Sep-2020 15:23							
Dissolved Solids	59	5	5	mg/L		56			4.37	20	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

Wet Chemistry - Quality Control

Batch BII0865 - No Prep Wet Chem

Instrument: BAL2 Analyst: KLE

QC Sample/Analyte	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BII0865-BLK1)				Prepared: 29-Sep-2020 Analyzed: 29-Sep-2020 16:14							
Dissolved Solids	ND	5	5	mg/L							U
LCS (BII0865-BS1)				Prepared: 29-Sep-2020 Analyzed: 29-Sep-2020 16:14							
Dissolved Solids	504	10	10	mg/L	500		101	90-110			
Duplicate (BII0865-DUP1)		**Source: 20I0445-64**		Prepared: 29-Sep-2020 Analyzed: 29-Sep-2020 16:14							
Dissolved Solids	201	5	5	mg/L		202			0.50	20	

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Floyd - Snider	Project:	Rio Tinto Holden Mine Reclamation/Remediation
601 Union Street Two Union Square, Suite 600	Project Number:	RT-Holden
Seattle WA, 98101-2341	Project Manager:	Amanda McKay

Reported:
22-Oct-2020 19:59

Wet Chemistry - Quality Control

Batch BII0880 - No Prep Wet Chem

Instrument: Accumet AB150 Analyst: UW

QC Sample/Analyte	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BII0880-BLK1)					Prepared: 30-Sep-2020 Analyzed: 30-Sep-2020 09:33						
Alkalinity, Total	ND	1.00	1.00	mg/L CaCO3							U
Duplicate (BII0880-DUP1)			**Source: 20I0445-64**		Prepared: 30-Sep-2020 Analyzed: 30-Sep-2020 09:33						
Alkalinity, Total	ND	1.00	1.00	mg/L CaCO3		ND					U
Reference (BII0880-SRM1)					Prepared: 30-Sep-2020 Analyzed: 30-Sep-2020 09:33						
Alkalinity, Total	105	1.00	1.00	mg/L CaCO3	106		98.8	90.57-107.55			

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

Wet Chemistry - Quality Control

Batch BII0886 - No Prep Wet Chem

Instrument: IC930 Analyst: KOTT

QC Sample/Analyte	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BII0886-BLK1)				Prepared: 30-Sep-2020 Analyzed: 01-Oct-2020 06:16							
Chloride	ND	0.100	0.100	mg/L							U
Nitrate-N	ND	0.100	0.100	mg/L							U
Sulfate	ND	0.100	0.100	mg/L							U
LCS (BII0886-BS1)				Prepared: 30-Sep-2020 Analyzed: 01-Oct-2020 09:17							
Chloride	4.87	0.100	0.100	mg/L	5.00		97.4	90-110			
Nitrate-N	4.98	0.100	0.100	mg/L	5.00		99.7	90-110			
Sulfate	5.28	0.100	0.100	mg/L	5.00		106	90-110			
Duplicate (BII0886-DUP1)		**Source: 20I0445-41**		Prepared: 30-Sep-2020 Analyzed: 01-Oct-2020 09:57							
Chloride	0.410	0.100	0.100	mg/L		0.408			0.49	20	
Nitrate-N	ND	0.100	0.100	mg/L		ND					H, U
Duplicate (BII0886-DUP2)		**Source: 20I0445-41**		Prepared: 30-Sep-2020 Analyzed: 02-Oct-2020 19:59							
Sulfate	12.9	0.300	0.300	mg/L		13.8			6.59	20	D
Matrix Spike (BII0886-MS1)		**Source: 20I0445-41**		Prepared: 30-Sep-2020 Analyzed: 01-Oct-2020 10:17							
Chloride	2.33	0.100	0.100	mg/L	2.00	0.408	96.0	75-125			
Nitrate-N	2.06	0.100	0.100	mg/L	2.00	ND	103	75-125			H

Recovery limits for target analytes in MS/MSD QC samples are advisory only.

Matrix Spike (BII0886-MS2)		**Source: 20I0445-41**		Prepared: 30-Sep-2020 Analyzed: 02-Oct-2020 20:18							
Sulfate	15.3	0.300	0.300	mg/L	2.00	13.8	78.2	75-125			D

Recovery limits for target analytes in MS/MSD QC samples are advisory only.

Matrix Spike Dup (BII0886-MSD1)		**Source: 20I0445-41**		Prepared: 30-Sep-2020 Analyzed: 01-Oct-2020 10:37							
Chloride	2.33	0.100	0.100	mg/L	2.00	0.408	96.1	75-125	0.09	20	
Nitrate-N	2.06	0.100	0.100	mg/L	2.00	ND	103	75-125	0.00		H

Recovery limits for target analytes in MS/MSD QC samples are advisory only.

Matrix Spike Dup (BII0886-MSD2)		**Source: 20I0445-41**		Prepared: 30-Sep-2020 Analyzed: 02-Oct-2020 20:38							
Sulfate	15.4	0.300	0.300	mg/L	2.00	13.8	82.4	75-125	0.55	20	D

Recovery limits for target analytes in MS/MSD QC samples are advisory only.

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

Wet Chemistry - Quality Control

Batch BIJ0025 - No Prep Wet Chem

Instrument: IC930 Analyst: KOTT

QC Sample/Analyte	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BIJ0025-BLK1)				Prepared: 01-Oct-2020 Analyzed: 02-Oct-2020 22:58							
Chloride	ND	0.100	0.100	mg/L							U
Nitrate-N	ND	0.100	0.100	mg/L							U
Sulfate	ND	0.100	0.100	mg/L							U
LCS (BIJ0025-BS1)				Prepared: 01-Oct-2020 Analyzed: 02-Oct-2020 23:18							
Chloride	4.87	0.100	0.100	mg/L	5.00		97.4	90-110			
Nitrate-N	4.98	0.100	0.100	mg/L	5.00		99.7	90-110			
Sulfate	5.09	0.100	0.100	mg/L	5.00		102	90-110			
Duplicate (BIJ0025-DUP1)		**Source: 20I0445-64**		Prepared: 01-Oct-2020 Analyzed: 02-Oct-2020 00:57							
Chloride	0.260	0.100	0.100	mg/L		0.259			0.39	20	
Nitrate-N	ND	0.100	0.100	mg/L		ND					H, U
Duplicate (BIJ0025-DUP3)		**Source: 20I0445-64RE1**		Prepared: 01-Oct-2020 Analyzed: 03-Oct-2020 04:55							
Sulfate	124	2.60	2.60	mg/L		121			2.73	20	D
Matrix Spike (BIJ0025-MS1)		**Source: 20I0445-64**		Prepared: 01-Oct-2020 Analyzed: 02-Oct-2020 01:17							
Chloride	2.19	0.100	0.100	mg/L	2.00	0.259	96.4	75-125			
Nitrate-N	2.01	0.100	0.100	mg/L	2.00	ND	100	75-125			H

Recovery limits for target analytes in MS/MSD QC samples are advisory only.

Matrix Spike (BIJ0025-MS7)		**Source: 20I0445-64RE1**		Prepared: 01-Oct-2020 Analyzed: 05-Oct-2020 20:37							
Sulfate	253	6.00	6.00	mg/L	150	121	88.2	75-125			D

Recovery limits for target analytes in MS/MSD QC samples are advisory only.

Matrix Spike Dup (BIJ0025-MSD1)		**Source: 20I0445-64**		Prepared: 01-Oct-2020 Analyzed: 02-Oct-2020 01:37							
Chloride	2.19	0.100	0.100	mg/L	2.00	0.259	96.5	75-125	0.05	20	
Nitrate-N	2.01	0.100	0.100	mg/L	2.00	ND	100	75-125	0.00		H

Recovery limits for target analytes in MS/MSD QC samples are advisory only.

Matrix Spike Dup (BIJ0025-MSD7)		**Source: 20I0445-64RE1**		Prepared: 01-Oct-2020 Analyzed: 05-Oct-2020 20:57							
Sulfate	256	6.00	6.00	mg/L	150	121	90.4	75-125	1.29	20	D

Recovery limits for target analytes in MS/MSD QC samples are advisory only.

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

Wet Chemistry - Quality Control

Batch BIJ0113 - No Prep Wet Chem

Instrument: TOC-LCSH Analyst: WCW

QC Sample/Analyte	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BIJ0113-BLK1)				Prepared: 05-Oct-2020 Analyzed: 05-Oct-2020 20:22							
Dissolved Organic Carbon, Dissolved	ND	0.50	0.50	mg/L							U
LCS (BIJ0113-BS1)				Prepared: 05-Oct-2020 Analyzed: 05-Oct-2020 20:48							
Dissolved Organic Carbon, Dissolved	19.66	0.50	0.50	mg/L	20.00		98.3	90-110			
Duplicate (BIJ0113-DUP1)		**Source: 20I0445-17**		Prepared: 05-Oct-2020 Analyzed: 06-Oct-2020 02:01							
Dissolved Organic Carbon, Dissolved	ND	0.50	0.50	mg/L		ND					U
Matrix Spike (BIJ0113-MS1)		**Source: 20I0445-17**		Prepared: 05-Oct-2020 Analyzed: 06-Oct-2020 02:19							
Dissolved Organic Carbon, Dissolved	19.63	0.50	0.50	mg/L	20.00	ND	98.2	75-125			

Recovery limits for target analytes in MS/MSD QC samples are advisory only.

Matrix Spike Dup (BIJ0113-MSD1)		**Source: 20I0445-17**		Prepared: 05-Oct-2020 Analyzed: 06-Oct-2020 02:38							
Dissolved Organic Carbon, Dissolved	20.03	0.50	0.50	mg/L	20.00	ND	100	75-125	2.02	20	

Recovery limits for target analytes in MS/MSD QC samples are advisory only.

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

Wet Chemistry - Quality Control

Batch BIJ0114 - No Prep Wet Chem

Instrument: TOC-LCSH Analyst: WCW

QC Sample/Analyte	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BIJ0114-BLK1)				Prepared: 05-Oct-2020 Analyzed: 06-Oct-2020 06:34							
Dissolved Organic Carbon, Dissolved	ND	0.50	0.50	mg/L							U
LCS (BIJ0114-BS1)				Prepared: 05-Oct-2020 Analyzed: 06-Oct-2020 06:56							
Dissolved Organic Carbon, Dissolved	19.52	0.50	0.50	mg/L	20.00		97.6	90-110			
Duplicate (BIJ0114-DUP1)		**Source: 20I0445-41**		Prepared: 05-Oct-2020 Analyzed: 06-Oct-2020 14:39							
Dissolved Organic Carbon, Dissolved	ND	0.50	0.50	mg/L		ND					U
Matrix Spike (BIJ0114-MS1)		**Source: 20I0445-41**		Prepared: 05-Oct-2020 Analyzed: 06-Oct-2020 15:02							
Dissolved Organic Carbon, Dissolved	19.50	0.50	0.50	mg/L	20.00	ND	97.5	75-125			

Recovery limits for target analytes in MS/MSD QC samples are advisory only.

Matrix Spike Dup (BIJ0114-MSD1)		**Source: 20I0445-41**		Prepared: 05-Oct-2020 Analyzed: 06-Oct-2020 15:20							
Dissolved Organic Carbon, Dissolved	19.88	0.50	0.50	mg/L	20.00	ND	99.4	75-125	1.93	20	

Recovery limits for target analytes in MS/MSD QC samples are advisory only.

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

Wet Chemistry - Quality Control

Batch BIJ0116 - No Prep Wet Chem

Instrument: TOC-LCSH Analyst: WCW

QC Sample/Analyte	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BIJ0116-BLK1)				Prepared: 05-Oct-2020 Analyzed: 06-Oct-2020 17:43							
Dissolved Organic Carbon, Dissolved	ND	0.50	0.50	mg/L							U
LCS (BIJ0116-BS1)				Prepared: 05-Oct-2020 Analyzed: 06-Oct-2020 18:09							
Dissolved Organic Carbon, Dissolved	19.55	0.50	0.50	mg/L	20.00		97.8	90-110			
Duplicate (BIJ0116-DUP1)		**Source: 20I0445-64**		Prepared: 05-Oct-2020 Analyzed: 07-Oct-2020 18:20							
Dissolved Organic Carbon, Dissolved	ND	0.50	0.50	mg/L		ND					U
Matrix Spike (BIJ0116-MS1)		**Source: 20I0445-64**		Prepared: 05-Oct-2020 Analyzed: 07-Oct-2020 18:43							
Dissolved Organic Carbon, Dissolved	19.48	0.50	0.50	mg/L	20.00	ND	97.4	75-125			

Recovery limits for target analytes in MS/MSD QC samples are advisory only.

Matrix Spike Dup (BIJ0116-MSD1)		**Source: 20I0445-64**		Prepared: 05-Oct-2020 Analyzed: 07-Oct-2020 19:01							
Dissolved Organic Carbon, Dissolved	20.60	0.50	0.50	mg/L	20.00	ND	103	75-125	5.59	20	

Recovery limits for target analytes in MS/MSD QC samples are advisory only.

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

Wet Chemistry - Quality Control

Batch BIJ0269 - No Prep Wet Chem

Instrument: TOC-LCSH Analyst: WCW

QC Sample/Analyte	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BIJ0269-BLK1)					Prepared: 08-Oct-2020 Analyzed: 09-Oct-2020 02:35						
Total Organic Carbon	ND	0.50	0.50	mg/L							U
LCS (BIJ0269-BS1)					Prepared: 08-Oct-2020 Analyzed: 09-Oct-2020 02:53						
Total Organic Carbon	19.62	0.50	0.50	mg/L	20.00		98.1	90-110			
Duplicate (BIJ0269-DUP1)		**Source: 20I0445-17**			Prepared: 08-Oct-2020 Analyzed: 09-Oct-2020 09:09						
Total Organic Carbon	ND	0.50	0.50	mg/L		ND					U
Matrix Spike (BIJ0269-MS1)		**Source: 20I0445-17**			Prepared: 08-Oct-2020 Analyzed: 09-Oct-2020 09:28						
Total Organic Carbon	20.00	0.50	0.50	mg/L	20.00	ND	100	75-125			

Recovery limits for target analytes in MS/MSD QC samples are advisory only.

Matrix Spike Dup (BIJ0269-MSD1)		**Source: 20I0445-17**			Prepared: 08-Oct-2020 Analyzed: 09-Oct-2020 09:47						
Total Organic Carbon	20.04	0.50	0.50	mg/L	20.00	ND	100	75-125	0.20	20	

Recovery limits for target analytes in MS/MSD QC samples are advisory only.

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

Wet Chemistry - Quality Control

Batch BIJ0276 - No Prep Wet Chem

Instrument: TOC-LCSH Analyst: WCW

QC Sample/Analyte	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BIJ0276-BLK1)					Prepared: 08-Oct-2020 Analyzed: 09-Oct-2020 13:38						
Total Organic Carbon	ND	0.50	0.50	mg/L							U
LCS (BIJ0276-BS1)					Prepared: 08-Oct-2020 Analyzed: 09-Oct-2020 13:56						
Total Organic Carbon	19.58	0.50	0.50	mg/L	20.00		97.9	90-110			
Duplicate (BIJ0276-DUP1)		**Source: 20I0445-41**			Prepared: 08-Oct-2020 Analyzed: 09-Oct-2020 23:16						
Total Organic Carbon	ND	0.50	0.50	mg/L		ND					U
Matrix Spike (BIJ0276-MS1)		**Source: 20I0445-41**			Prepared: 08-Oct-2020 Analyzed: 09-Oct-2020 23:38						
Total Organic Carbon	20.00	0.50	0.50	mg/L	20.00	ND	100	75-125			

Recovery limits for target analytes in MS/MSD QC samples are advisory only.

Matrix Spike Dup (BIJ0276-MSD1)		**Source: 20I0445-41**			Prepared: 08-Oct-2020 Analyzed: 09-Oct-2020 23:57						
Total Organic Carbon	20.26	0.50	0.50	mg/L	20.00	ND	101	75-125	1.29	20	

Recovery limits for target analytes in MS/MSD QC samples are advisory only.

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

Wet Chemistry - Quality Control

Batch BIJ0289 - No Prep Wet Chem

Instrument: TOC-LCSH Analyst: WCW

QC Sample/Analyte	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BIJ0289-BLK1)				Prepared: 08-Oct-2020 Analyzed: 10-Oct-2020 02:23							
Total Organic Carbon	ND	0.50	0.50	mg/L							U
LCS (BIJ0289-BS1)				Prepared: 08-Oct-2020 Analyzed: 10-Oct-2020 02:42							
Total Organic Carbon	19.79	0.50	0.50	mg/L	20.00		99.0	90-110			
Duplicate (BIJ0289-DUP1)		**Source: 20I0445-64**		Prepared: 08-Oct-2020 Analyzed: 10-Oct-2020 11:22							
Total Organic Carbon	ND	0.50	0.50	mg/L		ND					U
Matrix Spike (BIJ0289-MS1)		**Source: 20I0445-64**		Prepared: 08-Oct-2020 Analyzed: 10-Oct-2020 11:41							
Total Organic Carbon	19.60	0.50	0.50	mg/L	20.00	ND	98.0	75-125			
Recovery limits for target analytes in MS/MSD QC samples are advisory only.											
Matrix Spike Dup (BIJ0289-MSD1)		**Source: 20I0445-64**		Prepared: 08-Oct-2020 Analyzed: 10-Oct-2020 11:59							
Total Organic Carbon	19.81	0.50	0.50	mg/L	20.00	ND	99.1	75-125	1.07	20	
Recovery limits for target analytes in MS/MSD QC samples are advisory only.											

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

4611 S. 134th Place, Suite 100 • Tukwila, WA 98168 • Ph: (206) 695-6200 • Fax: (206) 695-6202

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

Certified Analyses included in this Report

Analyte	Certifications
EPA 300.0 in Water	
Chloride	DoD-ELAP,WADOE,NELAP
Chloride	DoD-ELAP,WADOE,WA-DW,NELAP
Chloride	DoD-ELAP,WADOE,WA-DW
Chloride	DoD-ELAP,WA-DW,NELAP
Nitrate-N	DoD-ELAP,WADOE,WA-DW,NELAP
Nitrate-N	DoD-ELAP,WADOE,WA-DW
Nitrate-N	DoD-ELAP,WA-DW,NELAP
Nitrate-N	DoD-ELAP,WADOE,NELAP
Sulfate	DoD-ELAP,WA-DW,NELAP
Sulfate	DoD-ELAP,WADOE,WA-DW
Sulfate	DoD-ELAP,WADOE,WA-DW,NELAP
Sulfate	DoD-ELAP,WADOE,NELAP
EPA 6020A in Water	
Aluminum-27	NELAP,WADOE,DoD-ELAP
Aluminum-27	NELAP,DoD-ELAP
Aluminum-27	NELAP,WADOE,DoD-ELAP
Aluminum-27	WADOE,DoD-ELAP
Calcium-44	NELAP,DoD-ELAP
Calcium-44	NELAP,DoD-ELAP,WADOE
Calcium-44	NELAP,DoD-ELAP,WADOE
Calcium-44	DoD-ELAP,WADOE
Iron-54	WADOE,DoD-ELAP
Iron-54	NELAP,DoD-ELAP
Iron-54	NELAP,WADOE,DoD-ELAP
Iron-54	NELAP,WADOE,DoD-ELAP
Iron-57	NELAP,WADOE,DoD-ELAP
Iron-57	NELAP,DoD-ELAP
Iron-57	WADOE,DoD-ELAP
Iron-57	NELAP,WADOE,DoD-ELAP
Potassium-39	NELAP,DoD-ELAP,WADOE
Potassium-39	DoD-ELAP,WADOE
Potassium-39	NELAP,DoD-ELAP,WADOE
Potassium-39	NELAP,DoD-ELAP
Magnesium-24	NELAP,DoD-ELAP,WADOE
Magnesium-24	NELAP,DoD-ELAP

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

Magnesium-24	NELAP,DoD-ELAP,WADOE
Magnesium-24	DoD-ELAP,WADOE
Manganese-55	NELAP,DoD-ELAP
Manganese-55	WADOE,DoD-ELAP
Manganese-55	NELAP,WADOE,DoD-ELAP
Manganese-55	NELAP,WADOE,DoD-ELAP
Sodium-23	NELAP,WADOE,DoD-ELAP
Sodium-23	WADOE,DoD-ELAP
Sodium-23	NELAP,DoD-ELAP
Sodium-23	NELAP,WADOE,DoD-ELAP
Lead-208	NELAP,DoD-ELAP,ADEC
Lead-208	WADOE,DoD-ELAP,ADEC
Lead-208	NELAP,WADOE,DoD-ELAP,ADEC
Lead-208	NELAP,WADOE,DoD-ELAP,ADEC
Aluminum-27	NELAP,WADOE,DoD-ELAP
Aluminum-27	NELAP,WADOE,DoD-ELAP
Aluminum-27	WADOE,DoD-ELAP
Aluminum-27	NELAP,DoD-ELAP
Calcium-44	DoD-ELAP,NELAP
Calcium-44	WA-DW,DoD-ELAP,NELAP
Calcium-44	WA-DW,DoD-ELAP,NELAP
Calcium-44	WA-DW,DoD-ELAP
Iron-54	NELAP,DoD-ELAP
Iron-54	NELAP,WADOE,DoD-ELAP
Iron-54	NELAP,WADOE,DoD-ELAP
Iron-54	WADOE,DoD-ELAP
Iron-57	NELAP,WADOE,DoD-ELAP
Iron-57	NELAP,DoD-ELAP
Iron-57	WADOE,DoD-ELAP
Iron-57	NELAP,WADOE,DoD-ELAP
Potassium-39	NELAP,DoD-ELAP
Potassium-39	NELAP,DoD-ELAP,WADOE
Potassium-39	DoD-ELAP,WADOE
Potassium-39	NELAP,DoD-ELAP,WADOE
Magnesium-24	NELAP,DoD-ELAP,WADOE
Magnesium-24	NELAP,DoD-ELAP,WADOE
Magnesium-24	NELAP,DoD-ELAP
Magnesium-24	DoD-ELAP,WADOE
Manganese-55	NELAP,WADOE,DoD-ELAP

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

Manganese-55	NELAP,DoD-ELAP
Manganese-55	NELAP,WADOE,DoD-ELAP
Manganese-55	WADOE,DoD-ELAP
Sodium-23	WADOE,DoD-ELAP,NELAP
Sodium-23	WADOE,DoD-ELAP,NELAP
Sodium-23	DoD-ELAP,NELAP
Sodium-23	WADOE,DoD-ELAP
Lead-208	NELAP,DoD-ELAP,ADEC
Lead-208	WADOE,DoD-ELAP,ADEC
Lead-208	NELAP,WADOE,DoD-ELAP,ADEC
Lead-208	NELAP,WADOE,DoD-ELAP,ADEC

EPA 6020A UCT-KED in Water

Cadmium-111	NELAP,DoD-ELAP,ADEC
Cadmium-111	NELAP,WADOE,DoD-ELAP,ADEC
Cadmium-111	WADOE,DoD-ELAP,ADEC
Cadmium-111	NELAP,WADOE,DoD-ELAP,ADEC
Cadmium-114	NELAP,WADOE,DoD-ELAP,ADEC
Cadmium-114	NELAP,WADOE,DoD-ELAP,ADEC
Cadmium-114	NELAP,DoD-ELAP,ADEC
Cadmium-114	WADOE,DoD-ELAP,ADEC
Copper-63	NELAP,WADOE,DoD-ELAP
Copper-63	WADOE,DoD-ELAP
Copper-63	NELAP,WADOE,DoD-ELAP
Copper-63	NELAP,DoD-ELAP
Copper-65	NELAP,WADOE,DoD-ELAP
Copper-65	NELAP,DoD-ELAP
Copper-65	NELAP,WADOE,DoD-ELAP
Copper-65	WADOE,DoD-ELAP
Zinc-66	WA-DW,DoD-ELAP
Zinc-66	WADOE,WA-DW,DoD-ELAP
Zinc-66	WADOE,DoD-ELAP
Zinc-66	WADOE,WA-DW,DoD-ELAP
Zinc-67	WADOE,WA-DW,DoD-ELAP
Zinc-67	WADOE,WA-DW,DoD-ELAP
Zinc-67	WA-DW,DoD-ELAP
Zinc-67	WADOE,DoD-ELAP
Cadmium-111	NELAP,WADOE,DoD-ELAP,ADEC
Cadmium-111	WADOE,DoD-ELAP,ADEC
Cadmium-111	NELAP,DoD-ELAP,ADEC

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

Cadmium-111	NELAP,WADOE,DoD-ELAP,ADEC
Cadmium-114	NELAP,WADOE,DoD-ELAP,ADEC
Cadmium-114	NELAP,WADOE,DoD-ELAP,ADEC
Cadmium-114	WADOE,DoD-ELAP,ADEC
Cadmium-114	NELAP,DoD-ELAP,ADEC
Copper-63	NELAP,WADOE,DoD-ELAP
Copper-63	WADOE,DoD-ELAP
Copper-63	NELAP,DoD-ELAP
Copper-63	NELAP,WADOE,DoD-ELAP
Copper-65	NELAP,WADOE,DoD-ELAP
Copper-65	WADOE,DoD-ELAP
Copper-65	NELAP,DoD-ELAP
Copper-65	NELAP,WADOE,DoD-ELAP
Zinc-66	NELAP,DoD-ELAP
Zinc-66	NELAP,WADOE,DoD-ELAP
Zinc-66	NELAP,WADOE,DoD-ELAP
Zinc-66	WADOE,DoD-ELAP
Zinc-67	NELAP,WADOE,DoD-ELAP
Zinc-67	WADOE,DoD-ELAP
Zinc-67	NELAP,DoD-ELAP
Zinc-67	NELAP,WADOE,DoD-ELAP

SM 2320 B-97 in Water

Alkalinity, Bicarbonate	NELAP,WADOE,WA-DW,DoD-ELAP
Alkalinity, Bicarbonate	WADOE,WA-DW,DoD-ELAP
Alkalinity, Bicarbonate	NELAP,WA-DW,DoD-ELAP
Alkalinity, Bicarbonate	NELAP,WADOE,DoD-ELAP
Alkalinity, Carbonate	WADOE,WA-DW,DoD-ELAP,NELAP
Alkalinity, Carbonate	WADOE,DoD-ELAP,NELAP
Alkalinity, Carbonate	WADOE,WA-DW,DoD-ELAP
Alkalinity, Carbonate	WA-DW,DoD-ELAP,NELAP
Alkalinity, Hydroxide	WADOE,WA-DW,DoD-ELAP,NELAP
Alkalinity, Hydroxide	WADOE,WA-DW,DoD-ELAP
Alkalinity, Hydroxide	WA-DW,DoD-ELAP,NELAP
Alkalinity, Hydroxide	WADOE,DoD-ELAP,NELAP
Alkalinity, Total	DoD-ELAP,WADOE,NELAP
Alkalinity, Total	DoD-ELAP,WADOE,WA-DW,NELAP
Alkalinity, Total	DoD-ELAP,WADOE,WA-DW
Alkalinity, Total	DoD-ELAP,WA-DW,NELAP

SM 2540 C-97 in Water

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

Dissolved Solids	DoD-ELAP,WADOE,WA-DW,NELAP
Dissolved Solids	DoD-ELAP,WA-DW,NELAP
Dissolved Solids	DoD-ELAP,WADOE,NELAP
Dissolved Solids	DoD-ELAP,WADOE,WA-DW
SM 2540 D-97 in Water	
Suspended Solids	DoD-ELAP,WADOE,NELAP
Suspended Solids	DoD-ELAP,WADOE,NELAP
Suspended Solids	DoD-ELAP,WADOE
Suspended Solids	DoD-ELAP,NELAP
SM 5310 B-00 in Water	
Dissolved Organic Carbon	WADOE,WA-DW,NELAP
Dissolved Organic Carbon	WADOE,NELAP
Dissolved Organic Carbon	WA-DW,NELAP
Dissolved Organic Carbon	WADOE,WA-DW
Total Organic Carbon	WA-DW,NELAP
Total Organic Carbon	WA-DW,WADOE
Total Organic Carbon	WA-DW,WADOE,NELAP
Total Organic Carbon	WADOE,NELAP

Code	Description	Number	Expires
ADEC	Alaska Dept of Environmental Conservation	17-015	01/31/2021
DoD-ELAP	DoD-Environmental Laboratory Accreditation Program	66169	01/01/2021

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	22-Oct-2020 19:59

Notes and Definitions

*	Flagged value is not within established control limits.
B	This analyte was detected in the method blank.
D	The reported value is from a dilution
H	Hold time violation - Hold time was exceeded.
HC	The natural concentration of the spiked analyte is so much greater than the concentration spiked that an accurate determination of spike recovery is not possible
J	Estimated concentration value detected below the reporting limit.
L	Analyte concentration is <=5 times the reporting limit and the replicate control limit defaults to +/- RL instead of 20% RPD
U	This analyte is not detected above the reporting limit (RL) or if noted, not detected above the limit of detection (LOD).
DET	Analyte DETECTED
ND	Analyte NOT DETECTED at or above the reporting limit
NR	Not Reported
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference
[2C]	Indicates this result was quantified on the second column on a dual column analysis.

Analytical Resources, Incorporated
Analytical Chemists and Consultants

16 November 2020

Amanda McKay
Floyd - Snider
601 Union Street Two Union Square, Suite 600
Seattle, WA 98101-2341

RE: Rio Tinto Holden Mine Reclamation/Remediation

Please find enclosed sample receipt documentation and analytical results for samples from the project referenced above.

Sample analyses were performed according to ARI's Quality Assurance Plan and any provided project specific Quality Assurance Plan. Each analytical section of this report has been approved and reviewed by an analytical peer, the appropriate Laboratory Supervisor or qualified substitute, and a technical reviewer.

Should you have any questions or problems, please feel free to contact us at your convenience.

Associated Work Order(s)	Associated SDG ID(s)
20I0446	N/A

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed in the enclose Narrative. ARI, an accredited laboratory, certifies that the report results for which ARI is accredited meets all the requirements of the accrediting body. A list of certified analyses, accreditations, and expiration dates is included in this report.

Release of the data contained in this hardcopy data package has been authorized by the Laboratory Manager or his/her designee, as verified by the following signature.

Analytical Resources, Inc.



The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

ACCREDITED IN ACCORDANCE WITH nelac
Cert# 100006-012

Chain of Custody Record & Laboratory Analysis Request

ARI Assigned Number: 20I0446	Turn-around Requested: Standard	Date: 9/27/1,	
ARI Client Company: Floyd Snider	Phone: 206-292-2078	Page: 7 of 11	
Client Contact: Amanda McKay or Pamela Osterhout		No. of Coolers: 26	Cooler Temps: See CRF
Client Project Name: RT-Holden			
Client Project #: RT-Holden Task 5.4	Samplers: G.C., K.H., E.M., T.S., B.B., P.O., G.W., N.W.		

Analytical Resources, Incorporated
Analytical Chemists and Consultants
4611 South 134th Place, Suite 100
Tukwila, WA 98168
206-695-6200 206-695-6201 (fax)

Sample ID	Date	Time	Matrix	No. Containers	Total Metals Cations	Diss. Metals (FF)	Alkalinity (A2320)	TSS /TDS (SM2540D/C)	TOC (A5310B)	DOC (FF)	Anions (300.0)	Hardness (Calculate)	Notes/Comments
DS-13D-GW-092520	9/25	1025	GW	6	X		X	X	X	X	X	X	
DS-12S-GW-092520		1245	GW	6	X		X	X	X	X	X	X	
~~GG~~DS-14-GW-092520		1400	GW	6	X		X	X	X	X	X	X	
TP3-14D-GW-092520		1445	GW	6	X		X	X	X	X	X	X	
SG-9-PW-6-092620	9/26	0829	GW	6	X		X	X	X	X	X	X	
SG-9-PW-12-092620		0921	GW	6	X		X	X	X	X	X	X	
SG-9-WP-36-092620		0922	GW	6	X		X	X	X	X	X	X	
SG-9-WP-092620		0832	GW	6	X		X	X	X	X	X	X	
SG-7-PW-6-092620		1033	GW	12	X		X	X	X	X	X	X	MS/MSD
SG-7-PW-12-092620		1032	GW	6	X		X	X	X	X	X	X	

Comments/Special Instructions

~Metals by E6020A include Al, Cd, Cu, Fe, Pb, Zn, Mn, Ca, K, Mg, Na
~Anions: Chloride, sulfate and nitrate
~DOC and dissolved metals field filtered (FF) at 0.45 micron.
~If Cadmium is non-detect, run low-level analysis to PQL of 0.02 ug/L
~Alkalinity: report total, carbonate, bicarbonate and hydroxide.

	Relinquished by:	Received by:	Relinquished by:	Received by:
(Signature)				
Printed Name:	Gabe Cisneros	Jacobi Walter		
Company:	Floyd|Snider	ARI		
Date & Time:	9/28/20 1310	09/28/2020 1310		

Limits of Liability: *ARI will perform all requested services in accordance with appropriate methodology following ARI Standard Operating Procedures and the ARI Quality Assurance Program. This program meets standards for the industry. The total liability of ARI, its officers, agents, employees, or successors, arising out of or in connection with the requested services, shall not exceed the Invoiced amount for said services. The acceptance by the client of a proposal for services by ARI release ARI from any liability in excess thereof, not withstanding any provision to the contrary in any contract, purchase order or co-signed agreement between ARI and the Client.*

Sample Retention Policy: Unless specified by workorder or contract, all water/soil samples submitted to ARI will be discarded or returned, no sooner than 90 days after receipt or 60 days after submission of hardcopy data, whichever is longer. Sediment samples submitted under PSDDA/PSEP/SMS protocol will be stored frozen for up to one year and then discarded.

Chain of Custody Record & Laboratory Analysis Request

ARI Assigned Number: 20I0446	Turn-around Requested: Standard	Date: 9/27/20	
ARI Client Company: Floyd Snider	Phone: 206-292-2078	Page: 8 of 11	
Client Contact: Amanda McKay or Pamela Osterhout		No. of Coolers: 26	Cooler Temps: See CRF
Client Project Name: RT-Holden			
Client Project #: RT-Holden Task 5.4	Samplers: G.C., K.H., E.M., T.S., B.B., P.O., G.W., N.W.		

Analytical Resources, Incorporated
Analytical Chemists and Consultants
4611 South 134th Place, Suite 100
Tukwila, WA 98168
206-695-6200 206-695-6201 (fax)

Sample ID	Date	Time	Matrix	No. Containers	Total Metals Cations	Diss. Metals (FF)	Alkalinity (A2320)	TSS /TDS (SM2540D/C)	TOC (A5310B)	DOC (FF)	Anions (300.0)	Hardness (Calculate)	Notes/Comments
SG-107-PW-12-092620	9/26	1042	GW	6	X		X	X	X	X	X	X	
SG-7-WP-36-092620		1143	GW	6	X		X	X	X	X	X	X	
RC-6-PW-6-092620		1259	GW	6	X		X	X	X	X	X	X	
RC-6-PW-12-092620		1349	GW	6	X		X	X	X	X	X	X	
RC-6-WP-36-092620		1302	GW	6	X		X	X	X	X	X	X	
RC-1-SW-092620		1432	SW	6	X		X	X	X	X	X	X	
SW-TP3-EAST1-SW-092620		1532	SW	6	X		X	X	X	X	X	X	
SW-TP3-EAST2-SW-092620		1531	SW	6	X		X	X	X	X	X	X	
RC-15E-SW-092620		1300	SW	6	X		X	X	X	X	X	X	
RC-10-SW-092620		1400	SW	6	X		X	X	X	X	X	X	

Comments/Special Instructions
- ~Metals by E6020A include Al, Cd, Cu, Fe, Pb, Zn, Mn, Ca, K, Mg, Na
- ~Anions: Chloride, sulfate and nitrate
- ~DOC and dissolved metals field filtered (FF) at 0.45 micron.
- ~If Cadmium is non-detect, run low-level analysis to PQL of 0.02 ug/L
- ~Alkalinity: report total, carbonate, bicarbonate and hydroxide.

	Relinquished by:	Received by:	Relinquished by:	Received by:
(Signature)				
Printed Name:	Gabe Cisneros	Jacobi Hafer		
Company:	Floyd Snider	ARI		
Date & Time:	9/28/20 1310	09/28/2020 1310		

Limits of Liability: *ARI will perform all requested services in accordance with appropriate methodology following ARI Standard Operating Procedures and the ARI Quality Assurance Program. This program meets standards for the industry. The total liability of ARI, its officers, agents, employees, or successors, arising out of or in connection with the requested services, shall not exceed the invoiced amount for said services. The acceptance by the client of a proposal for services by ARI release ARI from any liability in excess thereof, not withstanding any provision to the contrary in any contract, purchase order or co-signed agreement between ARI and the Client.*

Sample Retention Policy: Unless specified by workorder or contract, all water/soil samples submitted to ARI will be discarded or returned, no sooner than 90 days after receipt or 60 days after submission of hardcopy data, whichever is longer. Sediment samples submitted under PSDDA/PSEP/SMS protocol will be stored frozen for up to one year and then discarded.

Chain of Custody Record & Laboratory Analysis Request

ARI Assigned Number: 2010-46	Turn-around Requested: Standard	Date: 9/27/11	
ARI Client Company: Floyd Snider	Phone: 206-292-2078	Page: 9 of 11	
Client Contact: Amanda McKay or Pamela Osterhout		No. of Coolers: 76	Cooler Temps: See CRF
Client Project Name: RT-Holden			
Client Project #: RT-Holden Task 5.4	Samplers: G.C., K.H., E.M., T.S., B.B., P.O., G.W., N.W.		

Analytical Resources, Incorporated
Analytical Chemists and Consultants
4611 South 134th Place, Suite 100
Tukwila, WA 98168
206-695-6200 206-695-6201 (fax)

Sample ID	Date	Time	Matrix	No. Containers	Total Metals Cations	Diss. Metals (FF)	Alkalinity (A2320)	TSS /TDS (SM2540D/C)	TOC (A5310B)	DOC (FF)	Anions (300.0)	Hardness (Calculate)	Notes/Comments
SG-12R-SW-092620	9/26	1500	SW	6	X		X	X	X	X	X	X	
SG-13-SW-092620	9/26	1600	SW	6	X		X	X	X	X	X	X	
RC-4-SW-092620		1345	SW	12	X		X	X	X	X	X	X	MS/MSD
US-1I-GW-092620		1040	GW	6	X		X	X	X	X	X	X	
HBKG-2-GW-092620		1155	GW	6	X		X	X	X	X	X	X	
US-1D-GW-092620		0922	GW	6	X		X	X	X	X	X	X	
US-1S-GW-092620		0920	GW	6	X		X	X	X	X	X	X	
RC-7-SW-092620		1500	SW	6	X		X	X	X	X	X	X	
RC-107-SW-092620		1505	SW	6	X		X	X	X	X	X	X	
RC-16-SW-092620		1620	SW	6	X		X	X	X	X	X	X	

Comments/Special Instructions

-Metals by E6020A include Al, Cd, Cu, Fe, Pb, Zn, Mn, Ca, K, Mg, Na
-Anions: Chloride, sulfate and nitrate
-DOC and dissolved metals field filtered (FF) at 0.45 micron.
-If Cadmium is non-detect, run low-level analysis to PQL of 0.02 ug/L
-Alkalinity: report total, carbonate, bicarbonate and hydroxide.

	Relinquished by:	Received by:	Relinquished by:	Received by:
(Signature)				
Printed Name:	Grace Groves	Jessica Hall		
Company:	Floyd Snider	ARI		
Date & Time:	9/29/20 1310	09/30/20 1310		

Limits of Liability: *ARI will perform all requested services in accordance with appropriate methodology following ARI Standard Operating Procedures and the ARI Quality Assurance Program. This program meets standards for the industry. The total liability of ARI, its officers, agents, employees, or successors, arising out of or in connection with the requested services, shall not exceed the Invoiced amount for said services. The acceptance by the client of a proposal for services by ARI release ARI from any liability in excess thereof, not withstanding any provision to the contrary in any contract, purchase order or co-signed agreement between ARI and the Client.*

Sample Retention Policy: Unless specified by workorder or contract, all water/soil samples submitted to ARI will be discarded or returned, no sooner than 90 days after receipt or 60 days after submission of hardcopy data, whichever is longer. Sediment samples submitted under PSDDA/PSEP/SMS protocol will be stored frozen for up to one year and then discarded.

Chain of Custody Record & Laboratory Analysis Request

ARI Assigned Number: 20I044C	Turn-around Requested: Standard	Date: 9/27/11	
ARI Client Company: Floyd Snider	Phone: 206-292-2078	Page: 10 of 11	
Client Contact: Amanda McKay or Pamela Osterhout		No. of Coolers: 26	Cooler Temps: See COC
Client Project Name: RT-Holden			
Client Project #: RT-Holden Task 5.4	Samplers: G.C., K.H., E.M., T.S., B.B., P.O., G.W., N.W.		

Analytical Resources, Incorporated
Analytical Chemists and Consultants
4611 South 134th Place, Suite 100
Tukwila, WA 98168
206-695-6200 206-695-6201 (fax)

Sample ID	Date	Time	Matrix	No. Containers	Total Metals Cations	Diss. Metals (FF)	Alkalinity (A2320)	TSS /TDS (SM2540D/C)	TOC (A5310B)	DOC (FF)	Anions (300.0)	Hardness (Calculate)	Notes/Comments
DS-400-GW-092620	9/26	1000	GW	6	X		X	X	X	X	X	X	
SG-8-WP-GW-092620		0930	GW	6	X		X	X	X	X	X	X	
SG-8-PW-36-092620		1050	GW	6	X		X	X	X	X	X	X	
SG-8-PW-12-092620		0950	GW	6	X		X	X	X	X	X	X	
SG-8-PW-6-092620		0925	GW	6	X		X	X	X	X	X	X	
SG-8-SW-092620		0840	SW	6	X		X	X	X	X	X	X	
SG-11-SW-092720	9/27	0840	SW	6	X		X	X	X	X	X	X	
SG-10-SW-092720		0847	SW	6	X		X	X	X	X	X	X	
SG-9-SW-092720		0923	SW	6	X		X	X	X	X	X	X	
RC-6-SW-092720		1010	SW	6	X		X	X	X	X	X	X	

Comments/Special Instructions
- ~Metals by E6020A include Al, Cd, Cu, Fe, Pb, Zn, Mn, Ca, K, Mg, Na
- ~Anions: Chloride, sulfate and nitrate
- ~DOC and dissolved metals field filtered (FF) at 0.45 micron.
- ~If Cadmium is non-detect, run low-level analysis to PQL of 0.02 ug/L
- ~Alkalinity: report total, carbonate, bicarbonate and hydroxide.

	Relinquished by:	Received by:	Relinquished by:	Received by:
(Signature)				
Printed Name:	Gabe Cisneros	Jennifer Walter		
Company:	Floyd|Snider	ARI		
Date & Time:	9/28/20 1130	09/28/2011 1130		

Limits of Liability: *ARI will perform all requested services in accordance with appropriate methodology following ARI Standard Operating Procedures and the ARI Quality Assurance Program. This program meets standards for the industry. The total liability of ARI, its officers, agents, employees, or successors, arising out of or in connection with the requested services, shall not exceed the Invoiced amount for said services. The acceptance by the client of a proposal for services by ARI release ARI from any liability in excess thereof, not withstanding any provision to the contrary in any contract, purchase order or co-signed agreement between ARI and the Client.*

Sample Retention Policy: Unless specified by workorder or contract, all water/soil samples submitted to ARI will be discarded or returned, no sooner than 90 days after receipt or 60 days after submission of hardcopy data, whichever is longer. Sediment samples submitted under PSDDA/PSEP/SMS protocol will be stored frozen for up to one year and then discarded.

Chain of Custody Record & Laboratory Analysis Request

ARI Assigned Number: 20I0446	Turn-around Requested: Standard	Date: 9/27/20	
ARI Client Company: Floyd Snider	Phone: 206-292-2078	Page: 1 of 1	
Client Contact: Amanda McKay or Pamela Osterhout		No. of Coolers: 2	Cooler Temps: See COC
Client Project Name: RT-Holden			
Client Project #: RT-Holden Task 5.4	Samplers: G.C., K.H., E.M., T.S., B.B., P.O., G.W., N.W.		

Analytical Resources, Incorporated
Analytical Chemists and Consultants
4611 South 134th Place, Suite 100
Tukwila, WA 98168
206-695-6200 206-695-6201 (fax)

Sample ID	Date	Time	Matrix	No. Containers	Total Metals Cations	Diss. Metals (FF)	Alkalinity (A2320)	TSS /TDS (SM2540D/C)	TOC (A5310B)	DOC (FF)	Anions (300.0)	Hardness (Calculate)	Notes/Comments
					Analysis Requested								
RC-24-SW-092720	9/27	1115	SW	6	X		X	X	X	X	X	X	
SP-31-092720		0845	GW	8	X		X			X	X		MS/MSD
SP-131-092720		0900	GW	4	X		X			X	X		
SP-36-092720		1130	GW	4	X		X			X	X		
SP-40-092720		1350	GW	4	X		X			X	X		
SP-44-092720		1315	GW	4	X		X			X	X		
SP-45-092720		1010	GW	4	X		X			X	X		
SP-46-092720		1055	GW	4	X		X			X	X		
SP-47-092720		1300	GW	4	X		X			X	X		
~~SP-47-092720~~													

Comments/Special Instructions

~Metals by E6020A include Al, Cd, Cu, Fe, Pb, Zn, Mn, Ca, K, Mg, Na
~Anions: Chloride, sulfate and nitrate
~DOC and dissolved metals field filtered (FF) at 0.45 micron.
~If Cadmium is non-detect, run low-level analysis to PQL of 0.02 ug/L
~Alkalinity: report total, carbonate, bicarbonate and hydroxide.

Relinquished by: (Signature)		Received by: (Signature)	
Printed Name:	Gabe Cisneros	Printed Name:	Jacob Haltc
Company:	Floyd|Snider	Company:	ARI
Date & Time:	9/28/20 1310	Date & Time:	09/28/2020 1310

Relinquished by: (Signature)		Received by: (Signature)	
Printed Name:		Printed Name:	
Company:		Company:	
Date & Time:		Date & Time:	

Limits of Liability: *ARI will perform all requested services in accordance with appropriate methodology following ARI Standard Operating Procedures and the ARI Quality Assurance Program. This program meets standards for the industry. The total liability of ARI, its officers, agents, employees, or successors, arising out of or in connection with the requested services, shall not exceed the invoiced amount for said services. The acceptance by the client of a proposal for services by ARI release ARI from any liability in excess thereof, not withstanding any provision to the contrary in any contract, purchase order or co-signed agreement between ARI and the Client.*

Sample Retention Policy: Unless specified by workorder or contract, all water/soil samples submitted to ARI will be discarded or returned, no sooner than 90 days after receipt or 60 days after submission of hardcopy data, whichever is longer. Sediment samples submitted under PSDDA/PSEP/SMS protocol will be stored frozen for up to one year and then discarded.

Analytical Report

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
DS-13D-GW-092520	20I0446-01	Water	25-Sep-2020 10:25	28-Sep-2020 13:10
DS-12S-GW-092520	20I0446-02	Water	25-Sep-2020 12:45	28-Sep-2020 13:10
DS-14-GW-092520	20I0446-03	Water	25-Sep-2020 14:00	28-Sep-2020 13:10
TP3-14D-GW-092520	20I0446-04	Water	25-Sep-2020 14:45	28-Sep-2020 13:10
SG-9-PW-6-092620	20I0446-05	Water	25-Sep-2020 08:29	28-Sep-2020 13:10
SG-9-PW-12-092620	20I0446-06	Water	25-Sep-2020 09:21	28-Sep-2020 13:10
SG-9-WP-36-092620	20I0446-07	Water	25-Sep-2020 09:22	28-Sep-2020 13:10
SG-9-WP-092620	20I0446-08	Water	25-Sep-2020 08:32	28-Sep-2020 13:10
SG-7-PW-6-092620	20I0446-09	Water	25-Sep-2020 10:33	28-Sep-2020 13:10
SG-7-PW-12-092620	20I0446-10	Water	25-Sep-2020 10:32	28-Sep-2020 13:10
SG-107-PW-12-092620	20I0446-11	Water	26-Sep-2020 10:42	28-Sep-2020 13:10
SG-7-WP-36-092620	20I0446-12	Water	26-Sep-2020 11:43	28-Sep-2020 13:10
RC-6-PW-6-092620	20I0446-13	Water	26-Sep-2020 12:59	28-Sep-2020 13:10
RC-6-PW-12-092620	20I0446-14	Water	26-Sep-2020 13:49	28-Sep-2020 13:10
RC-6-WP-36-092620	20I0446-15	Water	26-Sep-2020 13:02	28-Sep-2020 13:10
RC-1-SW-092620	20I0446-16	Water	26-Sep-2020 14:32	28-Sep-2020 13:10
SW-TP3-East1-SW-092620	20I0446-17	Water	26-Sep-2020 15:32	28-Sep-2020 13:10
SW-TP3-East2-SW-092620	20I0446-18	Water	26-Sep-2020 15:31	28-Sep-2020 13:10
RC-15E-SW-092620	20I0446-19	Water	26-Sep-2020 13:00	28-Sep-2020 13:10
RC-10-SW-092620	20I0446-20	Water	26-Sep-2020 14:00	28-Sep-2020 13:10
SG-12R-SW-092620	20I0446-21	Water	26-Sep-2020 15:00	28-Sep-2020 13:10
SG-13-SW-092620	20I0446-22	Water	26-Sep-2020 16:00	28-Sep-2020 13:10
RC-4-SW-092620	20I0446-23	Water	26-Sep-2020 13:45	28-Sep-2020 13:10
US-1I-GW-092620	20I0446-24	Water	26-Sep-2020 10:40	28-Sep-2020 13:10
HBKG-2-GW-092620	20I0446-25	Water	26-Sep-2020 11:55	28-Sep-2020 13:10
US-1D-GW-092620	20I0446-26	Water	26-Sep-2020 09:22	28-Sep-2020 13:10
US-1S-GW-092620	20I0446-27	Water	26-Sep-2020 09:20	28-Sep-2020 13:10
RC-7-SW-092620	20I0446-28	Water	26-Sep-2020 15:00	28-Sep-2020 13:10
RC-107-SW-092620	20I0446-29	Water	26-Sep-2020 15:05	28-Sep-2020 13:10
RC-16-SW-092620	20I0446-30	Water	26-Sep-2020 16:20	28-Sep-2020 13:10
DS-4DD-SW-092620	20I0446-31	Water	26-Sep-2020 10:00	28-Sep-2020 13:10
SG-8-WP-GW-092620	20I0446-32	Water	26-Sep-2020 09:30	28-Sep-2020 13:10
SG-8-PW-36-092620	20I0446-33	Water	26-Sep-2020 10:50	28-Sep-2020 13:10
SG-8-PW-12-092620	20I0446-34	Water	26-Sep-2020 09:50	28-Sep-2020 13:10
SG-8-PW-6-092620	20I0446-35	Water	26-Sep-2020 09:25	28-Sep-2020 13:10
SG-8-SW-092620	20I0446-36	Water	26-Sep-2020 08:20	28-Sep-2020 13:10
SG-11-SW-092720	20I0446-37	Water	27-Sep-2020 08:40	28-Sep-2020 13:10
SG-10-SW-092720	20I0446-38	Water	27-Sep-2020 08:47	28-Sep-2020 13:10
SG-9-SW-092720	20I0446-39	Water	27-Sep-2020 09:23	28-Sep-2020 13:10

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

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Floyd - Snider	Project:	Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number:	RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager:	Amanda McKay	26-Oct-2020 12:46

RC-6-SW-092720	20I0446-40	Water	27-Sep-2020 10:10	28-Sep-2020 13:10
RC-24-SW-092720	20I0446-41	Water	27-Sep-2020 11:15	28-Sep-2020 13:10
SP-31-092720	20I0446-42	Water	27-Sep-2020 08:45	28-Sep-2020 13:10
SP-131-092720	20I0446-43	Water	27-Sep-2020 09:00	28-Sep-2020 13:10
SP-36-092720	20I0446-44	Water	27-Sep-2020 11:30	28-Sep-2020 13:10
SP-40-092720	20I0446-45	Water	27-Sep-2020 13:50	28-Sep-2020 13:10
SP-44-092720	20I0446-46	Water	27-Sep-2020 13:15	28-Sep-2020 13:10
SP-45-092720	20I0446-47	Water	27-Sep-2020 10:10	28-Sep-2020 13:10
SP-46-092720	20I0446-48	Water	27-Sep-2020 10:55	28-Sep-2020 13:10
SP-47-092720	20I0446-49	Water	27-Sep-2020 13:00	28-Sep-2020 13:10

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

Work Order Case Narrative

Sample receipt

Samples as listed on the preceding page were received 9/28/20 under ARI work order 20I0446. For details regarding sample receipt, please refer to the Cooler Receipt Form.

Total Metals - EPA Method 6020A

The sample(s) were digested and analyzed within the recommended holding times.

Initial and continuing calibrations were within method requirements.

The method blank(s) were clean at the reporting limits.

The blank spike (BS/LCS) percent recoveries were within control limits.

The matrix spike (MS) percent recoveries and the duplicate (DUP) relative percent difference (RPD) were within advisory control limits with the exception of analytes flagged on the associated forms.

Wet Chemistry

The sample(s) were prepared and analyzed within the recommended holding times with the exception of analytes flagged with a "H" qualifer on the associated forms and arrived at the lab outside of the holding time.

Initial and continuing calibrations were within method requirements.

The method blank(s) were clean at the reporting limits.

The blank spike (BS/LCS) percent recoveries were within control limits.

The reference material (SRM) percent recoveries were within control limits.

The matrix spike (MS) percent recoveries and the duplicate (DUP) relative percent difference (RPD) were within advisory control limits.

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

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WORK ORDER

20I0446

Client: Floyd - Snider | Project Manager: Kelly Bottem

Project: Rio Tinto Holden Mine Reclamation/Remediation | Project Number: RT-Holden

Preservation Confirmation

Container ID	Container Type	pH	
20I0446-01 A	Large OJ, 1000 mL		
20I0446-01 B	Large OJ, 1000 mL		
20I0446-01 C	HDPE NM, 500 mL, 1:1 HNO3	<2	Pass (P)
20I0446-01 D	Small OJ, 500 mL		
20I0446-01 E	Glass NM, Amber, 250 mL, 9N H2SO4	<2	(P)
20I0446-01 F	Glass NM, Amber, 250 mL, 9N H2SO4	<2	(P)
20I0446-02 A	Large OJ, 1000 mL		
20I0446-02 B	Large OJ, 1000 mL		
20I0446-02 C	HDPE NM, 500 mL, 1:1 HNO3	<2	(P)
20I0446-02 D	Small OJ, 500 mL		
20I0446-02 E	Glass NM, Amber, 250 mL, 9N H2SO4	<2	(P)
20I0446-02 F	Glass NM, Amber, 250 mL, 9N H2SO4	<2	(P)
20I0446-03 A	Large OJ, 1000 mL		
20I0446-03 B	Large OJ, 1000 mL		
20I0446-03 C	HDPE NM, 500 mL, 1:1 HNO3	<2	(P)
20I0446-03 D	Small OJ, 500 mL		
20I0446-03 E	Glass NM, Amber, 250 mL, 9N H2SO4	<2	(P)
20I0446-03 F	Glass NM, Amber, 250 mL, 9N H2SO4	<2	(P)
20I0446-04 A	Large OJ, 1000 mL		
20I0446-04 B	Large OJ, 1000 mL		
20I0446-04 C	HDPE NM, 500 mL, 1:1 HNO3	<2	(P)
20I0446-04 D	Small OJ, 500 mL		
20I0446-04 E	Glass NM, Amber, 250 mL, 9N H2SO4	<2	(P)
20I0446-04 F	Glass NM, Amber, 250 mL, 9N H2SO4	<2	(P)
20I0446-05 A	Large OJ, 1000 mL		
20I0446-05 B	Large OJ, 1000 mL		
20I0446-05 C	HDPE NM, 500 mL, 1:1 HNO3	<2	(P)
20I0446-05 D	Small OJ, 500 mL		
20I0446-05 E	Glass NM, Amber, 250 mL, 9N H2SO4	<2	(P)
20I0446-05 F	Glass NM, Amber, 250 mL, 9N H2SO4	<2	(P)
20I0446-06 A	Large OJ, 1000 mL		
20I0446-06 B	Large OJ, 1000 mL		
20I0446-06 C	HDPE NM, 500 mL, 1:1 HNO3	<2	(P)
20I0446-06 D	Small OJ, 500 mL		
20I0446-06 E	Glass NM, Amber, 250 mL, 9N H2SO4	<2	(P)

Reviewed By

Date

WORK ORDER

2010446

Client: Floyd - Snider | Project Manager: Kelly Bottem

Project: Rio Tinto Holden Mine Reclamation/Remediation | Project Number: RT-Holden

2010446-06 F	Glass NM, Amber, 250 mL, 9N H2SO4	<2 Pass (P)
2010446-07 A	Large OJ, 1000 mL	
2010446-07 B	Large OJ, 1000 mL	
2010446-07 C	HDPE NM, 500 mL, 1:1 HNO3	<2 (P)
2010446-07 D	Small OJ, 500 mL	
2010446-07 E	Glass NM, Amber, 250 mL, 9N H2SO4	<2 (P)
2010446-07 F	Glass NM, Amber, 250 mL, 9N H2SO4	<2 (P)
2010446-08 A	Large OJ, 1000 mL	
2010446-08 B	Large OJ, 1000 mL	
2010446-08 C	HDPE NM, 500 mL, 1:1 HNO3	<2 (P)
2010446-08 D	Small OJ, 500 mL	
2010446-08 E	Glass NM, Amber, 250 mL, 9N H2SO4	<2 (P)
2010446-08 F	Glass NM, Amber, 250 mL, 9N H2SO4	<2 (P)
2010446-09 A	Large OJ, 1000 mL	
2010446-09 B	Large OJ, 1000 mL	
2010446-09 C	HDPE NM, 500 mL, 1:1 HNO3	<2 (P)
2010446-09 D	Small OJ, 500 mL	
2010446-09 E	Glass NM, Amber, 250 mL, 9N H2SO4	<2 (P)
2010446-09 F	Glass NM, Amber, 250 mL, 9N H2SO4	<2 (P)
2010446-09 G	Large OJ, 1000 mL	
2010446-09 H	Large OJ, 1000 mL	
2010446-09 I	HDPE NM, 500 mL, 1:1 HNO3	<2 (P)
2010446-09 J	Small OJ, 500 mL	
2010446-09 K	Glass NM, Amber, 250 mL, 9N H2SO4	<2 (P)
2010446-09 L	Glass NM, Amber, 250 mL, 9N H2SO4	<2 (P)
2010446-10 A	Large OJ, 1000 mL	
2010446-10 B	Large OJ, 1000 mL	
2010446-10 C	HDPE NM, 500 mL, 1:1 HNO3	<2 (P)
2010446-10 D	Small OJ, 500 mL	
2010446-10 E	Glass NM, Amber, 250 mL, 9N H2SO4	<2 (P)
2010446-10 F	Glass NM, Amber, 250 mL, 9N H2SO4	<2 (P)
2010446-11 A	Large OJ, 1000 mL	
2010446-11 B	Large OJ, 1000 mL	
2010446-11 C	HDPE NM, 500 mL, 1:1 HNO3	<2 (P)
2010446-11 D	Small OJ, 500 mL	
2010446-11 E	Glass NM, Amber, 250 mL, 9N H2SO4	<2 (P)
2010446-11 F	Glass NM, Amber, 250 mL, 9N H2SO4	<2 (P)

Reviewed By

Date

WORK ORDER

20I0446

Client: Floyd - Snider | Project Manager: Kelly Bottem

Project: Rio Tinto Holden Mine Reclamation/Remediation | Project Number: RT-Holden

20I0446-12 A	Large OJ, 1000 mL		
20I0446-12 B	Large OJ, 1000 mL		
20I0446-12 C	HDPE NM, 500 mL, 1:1 HNO3	<2	Pass (P)
20I0446-12 D	Small OJ, 500 mL		
20I0446-12 E	Glass NM, Amber, 250 mL, 9N H2SO4	<2	(P)
20I0446-12 F	Glass NM, Amber, 250 mL, 9N H2SO4	<2	(P)
20I0446-13 A	Large OJ, 1000 mL		
20I0446-13 B	Large OJ, 1000 mL		
20I0446-13 C	HDPE NM, 500 mL, 1:1 HNO3	<2	(P)
20I0446-13 D	Small OJ, 500 mL		
20I0446-13 E	Glass NM, Amber, 250 mL, 9N H2SO4	<2	(P)
20I0446-13 F	Glass NM, Amber, 250 mL, 9N H2SO4	<2	(P)
20I0446-14 A	Large OJ, 1000 mL		
20I0446-14 B	Large OJ, 1000 mL		
20I0446-14 C	HDPE NM, 500 mL, 1:1 HNO3	<2	(P)
20I0446-14 D	Small OJ, 500 mL		
20I0446-14 E	Glass NM, Amber, 250 mL, 9N H2SO4	<2	(P)
20I0446-14 F	Glass NM, Amber, 250 mL, 9N H2SO4	<2	(P)
20I0446-15 A	Large OJ, 1000 mL		
20I0446-15 B	Large OJ, 1000 mL		
20I0446-15 C	HDPE NM, 500 mL, 1:1 HNO3	<2	(P)
20I0446-15 D	Small OJ, 500 mL		
20I0446-15 E	Glass NM, Amber, 250 mL, 9N H2SO4	<2	(P)
20I0446-15 F	Glass NM, Amber, 250 mL, 9N H2SO4	<2	(P)
20I0446-16 A	Large OJ, 1000 mL		
20I0446-16 B	Large OJ, 1000 mL		
20I0446-16 C	HDPE NM, 500 mL, 1:1 HNO3	<2	(P)
20I0446-16 D	Small OJ, 500 mL		
20I0446-16 E	Glass NM, Amber, 250 mL, 9N H2SO4	<2	(P)
20I0446-16 F	Glass NM, Amber, 250 mL, 9N H2SO4	<2	(P
20I0446-17 A	Large OJ, 1000 mL		
20I0446-17 B	Large OJ, 1000 mL		
20I0446-17 C	HDPE NM, 500 mL, 1:1 HNO3	<2	(P)
20I0446-17 D	Small OJ, 500 mL		
20I0446-17 E	Glass NM, Amber, 250 mL, 9N H2SO4	<2	(P)
20I0446-17 F	Glass NM, Amber, 250 mL, 9N H2SO4	<2	(P)
20I0446-18 A	Large OJ, 1000 mL		

Reviewed By

Date

WORK ORDER

20I0446

Client: Floyd - Snider	**Project Manager:** Kelly Bottem
Project: Rio Tinto Holden Mine Reclamation/Remediation	**Project Number:** RT-Holden

20I0446-18 B	Large OJ, 1000 mL		
20I0446-18 C	HDPE NM, 500 mL, 1:1 HNO3	<2	Pass (P)
20I0446-18 D	Small OJ, 500 mL		
20I0446-18 E	Glass NM, Amber, 250 mL, 9N H2SO4	<2	(P)
20I0446-18 F	Glass NM, Amber, 250 mL, 9N H2SO4	<2	(P)
20I0446-19 A	Large OJ, 1000 mL		
20I0446-19 B	Large OJ, 1000 mL		
20I0446-19 C	HDPE NM, 500 mL, 1:1 HNO3	<2	(P)
20I0446-19 D	Small OJ, 500 mL		
20I0446-19 E	Glass NM, Amber, 250 mL, 9N H2SO4	<2	(P)
20I0446-19 F	Glass NM, Amber, 250 mL, 9N H2SO4	<2	(P)
20I0446-20 A	Large OJ, 1000 mL		
20I0446-20 B	Large OJ, 1000 mL		
20I0446-20 C	HDPE NM, 500 mL, 1:1 HNO3	<2	(P)
20I0446-20 D	Small OJ, 500 mL		
20I0446-20 E	Glass NM, Amber, 250 mL, 9N H2SO4	<2	(P)
20I0446-20 F	Glass NM, Amber, 250 mL, 9N H2SO4	<2	(P)
20I0446-21 A	Large OJ, 1000 mL		
20I0446-21 B	Large OJ, 1000 mL		
20I0446-21 C	HDPE NM, 500 mL, 1:1 HNO3	<2	(P)
20I0446-21 D	Small OJ, 500 mL		
20I0446-21 E	Glass NM, Amber, 250 mL, 9N H2SO4	<2	(P)
20I0446-21 F	Glass NM, Amber, 250 mL, 9N H2SO4	<2	(P)
20I0446-22 A	Large OJ, 1000 mL		
20I0446-22 B	Large OJ, 1000 mL		
20I0446-22 C	HDPE NM, 500 mL, 1:1 HNO3	<2	(P)
20I0446-22 D	Small OJ, 500 mL		
20I0446-22 E	Glass NM, Amber, 250 mL, 9N H2SO4	<2	(P)
20I0446-22 F	Glass NM, Amber, 250 mL, 9N H2SO4	<2	(P)
20I0446-23 A	Large OJ, 1000 mL		
20I0446-23 B	Large OJ, 1000 mL		
20I0446-23 C	HDPE NM, 500 mL, 1:1 HNO3	<2	(P)
20I0446-23 D	Small OJ, 500 mL		
20I0446-23 E	Glass NM, Amber, 250 mL, 9N H2SO4	<2	(P)
20I0446-23 F	Glass NM, Amber, 250 mL, 9N H2SO4	<2	(P)
20I0446-23 G	Large OJ, 1000 mL		
20I0446-23 H	Large OJ, 1000 mL		

Reviewed By

Date

WORK ORDER

2010446

Client: Floyd - Snider | Project Manager: Kelly Bottem

Project: Rio Tinto Holden Mine Reclamation/Remediation | Project Number: RT-Holden

2010446-23 I	HDPE NM, 500 mL, 1:1 HNO3	<2	Pass (P)
2010446-23 J	Small OJ, 500 mL		
2010446-23 K	Glass NM, Amber, 250 mL, 9N H2SO4	<2	(P)
2010446-23 L	Glass NM, Amber, 250 mL, 9N H2SO4	<2	(P)
2010446-24 A	Large OJ, 1000 mL		
2010446-24 B	Large OJ, 1000 mL		
2010446-24 C	HDPE NM, 500 mL, 1:1 HNO3	<2	(P)
2010446-24 D	Small OJ, 500 mL		
2010446-24 E	Glass NM, Amber, 250 mL, 9N H2SO4	<2	(P)
2010446-24 F	Glass NM, Amber, 250 mL, 9N H2SO4	<2	(P)
2010446-25 A	Large OJ, 1000 mL		
2010446-25 B	Large OJ, 1000 mL		
2010446-25 C	HDPE NM, 500 mL, 1:1 HNO3	<2	(P)
2010446-25 D	Small OJ, 500 mL		
2010446-25 E	Glass NM, Amber, 250 mL, 9N H2SO4	<2	(P)
2010446-25 F	Glass NM, Amber, 250 mL, 9N H2SO4	<2	(P)
2010446-26 A	Large OJ, 1000 mL		
2010446-26 B	Large OJ, 1000 mL		
2010446-26 C	HDPE NM, 500 mL, 1:1 HNO3	<2	(P)
2010446-26 D	Small OJ, 500 mL		
2010446-26 E	Glass NM, Amber, 250 mL, 9N H2SO4	<2	(P)
2010446-26 F	Glass NM, Amber, 250 mL, 9N H2SO4	<2	(P)
2010446-27 A	Large OJ, 1000 mL		
2010446-27 B	Large OJ, 1000 mL		
2010446-27 C	HDPE NM, 500 mL, 1:1 HNO3	<2	(P)
2010446-27 D	Small OJ, 500 mL		
2010446-27 E	Glass NM, Amber, 250 mL, 9N H2SO4	<2	(P)
2010446-27 F	Glass NM, Amber, 250 mL, 9N H2SO4	<2	(P)
2010446-28 A	Large OJ, 1000 mL		
2010446-28 B	Large OJ, 1000 mL		
2010446-28 C	HDPE NM, 500 mL, 1:1 HNO3	<2	(P)
2010446-28 D	Small OJ, 500 mL		
2010446-28 E	Glass NM, Amber, 250 mL, 9N H2SO4	<2	(P)
2010446-28 F	Glass NM, Amber, 250 mL, 9N H2SO4	<2	(P)
2010446-29 A	Large OJ, 1000 mL		
2010446-29 B	Large OJ, 1000 mL		
2010446-29 C	HDPE NM, 500 mL, 1:1 HNO3	<2	(P)

Reviewed By

Date

WORK ORDER

20I0446

Client: Floyd - Snider | Project Manager: Kelly Bottem

Project: Rio Tinto Holden Mine Reclamation/Remediation | Project Number: RT-Holden

20I0446-29 D	Small OJ, 500 mL		
20I0446-29 E	Glass NM, Amber, 250 mL, 9N H2SO4	<2	Pass (P)
20I0446-29 F	Glass NM, Amber, 250 mL, 9N H2SO4	<2	(P)
20I0446-30 A	Large OJ, 1000 mL		
20I0446-30 B	Large OJ, 1000 mL		
20I0446-30 C	HDPE NM, 500 mL, 1:1 HNO3	<2	(P)
20I0446-30 D	Small OJ, 500 mL		
20I0446-30 E	Glass NM, Amber, 250 mL, 9N H2SO4	<2	(P)
20I0446-30 F	Glass NM, Amber, 250 mL, 9N H2SO4	<2	(P)
20I0446-31 A	Large OJ, 1000 mL		
20I0446-31 B	Large OJ, 1000 mL		
20I0446-31 C	HDPE NM, 500 mL, 1:1 HNO3	<2	(P)
20I0446-31 D	Small OJ, 500 mL		
20I0446-31 E	Glass NM, Amber, 250 mL, 9N H2SO4	<2	(P)
20I0446-31 F	Glass NM, Amber, 250 mL, 9N H2SO4	<2	(P)
20I0446-32 A	Large OJ, 1000 mL		
20I0446-32 B	Large OJ, 1000 mL		
20I0446-32 C	HDPE NM, 500 mL, 1:1 HNO3	<2	(P)
20I0446-32 D	Small OJ, 500 mL		
20I0446-32 E	Glass NM, Amber, 250 mL, 9N H2SO4	<2	(P)
20I0446-32 F	Glass NM, Amber, 250 mL, 9N H2SO4	<2	(P)
20I0446-33 A	Large OJ, 1000 mL		
20I0446-33 B	Large OJ, 1000 mL		
20I0446-33 C	HDPE NM, 500 mL, 1:1 HNO3	<2	(P)
20I0446-33 D	Small OJ, 500 mL		
20I0446-33 E	Glass NM, Amber, 250 mL, 9N H2SO4	<2	(P)
20I0446-33 F	Glass NM, Amber, 250 mL, 9N H2SO4	<2	(P)
20I0446-34 A	Large OJ, 1000 mL		
20I0446-34 B	Large OJ, 1000 mL		
20I0446-34 C	HDPE NM, 500 mL, 1:1 HNO3	<2	(P)
20I0446-34 D	Small OJ, 500 mL		
20I0446-34 E	Glass NM, Amber, 250 mL, 9N H2SO4	<2	(P)
20I0446-34 F	Glass NM, Amber, 250 mL, 9N H2SO4	<2	(P)
20I0446-35 A	Large OJ, 1000 mL		
20I0446-35 B	Large OJ, 1000 mL		
20I0446-35 C	HDPE NM, 500 mL, 1:1 HNO3	<2	(P)
20I0446-35 D	Small OJ, 500 mL		

Reviewed By

Date

WORK ORDER

20I0446

Client: Floyd - Snider | Project Manager: Kelly Bottem

Project: Rio Tinto Holden Mine Reclamation/Remediation | Project Number: RT-Holden

20I0446-35 E	Glass NM, Amber, 250 mL, 9N H2SO4	<2 Pass (P)
20I0446-35 F	Glass NM, Amber, 250 mL, 9N H2SO4	<2 (P)
20I0446-36 A	Large OJ, 1000 mL	
20I0446-36 B	Large OJ, 1000 mL	
20I0446-36 C	HDPE NM, 500 mL, 1:1 HNO3	<2 (P)
20I0446-36 D	Small OJ, 500 mL	
20I0446-36 E	Glass NM, Amber, 250 mL, 9N H2SO4	<2 (P)
20I0446-36 F	Glass NM, Amber, 250 mL, 9N H2SO4	<2 (P)
20I0446-37 A	Large OJ, 1000 mL	
20I0446-37 B	Large OJ, 1000 mL	
20I0446-37 C	HDPE NM, 500 mL, 1:1 HNO3	<2 (P)
20I0446-37 D	Small OJ, 500 mL	
20I0446-37 E	Glass NM, Amber, 250 mL, 9N H2SO4	<2 (P)
20I0446-37 F	Glass NM, Amber, 250 mL, 9N H2SO4	<2 (P)
20I0446-38 A	Large OJ, 1000 mL	
20I0446-38 B	Large OJ, 1000 mL	
20I0446-38 C	HDPE NM, 500 mL, 1:1 HNO3	<2 (P)
20I0446-38 D	Small OJ, 500 mL	
20I0446-38 E	Glass NM, Amber, 250 mL, 9N H2SO4	<2 (P)
20I0446-38 F	Glass NM, Amber, 250 mL, 9N H2SO4	<2 (P)
20I0446-39 A	Large OJ, 1000 mL	
20I0446-39 B	Large OJ, 1000 mL	
20I0446-39 C	HDPE NM, 500 mL, 1:1 HNO3	<2 (P)
20I0446-39 D	Small OJ, 500 mL	
20I0446-39 E	Glass NM, Amber, 250 mL, 9N H2SO4	<2 (P)
20I0446-39 F	Glass NM, Amber, 250 mL, 9N H2SO4	<2 (P)
20I0446-40 A	Large OJ, 1000 mL	
20I0446-40 B	Large OJ, 1000 mL	
20I0446-40 C	HDPE NM, 500 mL, 1:1 HNO3	<2 (P)
20I0446-40 D	Small OJ, 500 mL	
20I0446-40 E	Glass NM, Amber, 250 mL, 9N H2SO4	<2 (P)
20I0446-40 F	Glass NM, Amber, 250 mL, 9N H2SO4	<2 (P)
20I0446-41 A	Large OJ, 1000 mL	
20I0446-41 B	Large OJ, 1000 mL	
20I0446-41 C	HDPE NM, 500 mL, 1:1 HNO3	<2 (P)
20I0446-41 D	Small OJ, 500 mL	
20I0446-41 E	Glass NM, Amber, 250 mL, 9N H2SO4	<2 (P)

Reviewed By

Date

WORK ORDER

20I0446

Client: Floyd - Snider		Project Manager: Kelly Bottem	
Project: Rio Tinto Holden Mine Reclamation/Remediation		Project Number: RT-Holden	
20I0446-41 F	Glass NM, Amber, 250 mL, 9N H2SO4	<2	Pass (P)
20I0446-42 A	HDPE NM, 500 mL, 1:1 HNO3	<2 (P)	
20I0446-42 B	HDPE NM, 500 mL, 1:1 HNO3	<2	(P)
20I0446-42 C	Small OJ, 500 mL		
20I0446-42 D	Small OJ, 500 mL		
20I0446-42 E	Small OJ, 500 mL		
20I0446-42 F	Small OJ, 500 mL		
20I0446-42 G	Glass NM, Amber, 250 mL, 9N H2SO4	<2	(P)
20I0446-42 H	Glass NM, Amber, 250 mL, 9N H2SO4	<2	(P)
20I0446-43 A	HDPE NM, 500 mL, 1:1 HNO3	<2	(P)
20I0446-43 B	Small OJ, 500 mL		
20I0446-43 C	Small OJ, 500 mL		
20I0446-43 D	Glass NM, Amber, 250 mL, 9N H2SO4	<2	(P)
20I0446-44 A	HDPE NM, 500 mL, 1:1 HNO3	<2	(P)
20I0446-44 B	Small OJ, 500 mL		
20I0446-44 C	Small OJ, 500 mL		
20I0446-44 D	Glass NM, Amber, 250 mL, 9N H2SO4	<2	(P)
20I0446-45 A	HDPE NM, 500 mL, 1:1 HNO3 <2		
20I0446-45 B	Small OJ, 500 mL		
20I0446-45 C	Small OJ, 500 mL		
20I0446-45 D	Glass NM, Amber, 250 mL, 9N H2SO4	<2	(P)
20I0446-46 A	HDPE NM, 500 mL, 1:1 HNO3	<2	(P)
20I0446-46 B	Small OJ, 500 mL		
20I0446-46 C	Small OJ, 500 mL		
20I0446-46 D	Glass NM, Amber, 250 mL, 9N H2SO4	<2	(P)
20I0446-47 A	HDPE NM, 500 mL, 1:1 HNO3	<2	(P)
20I0446-47 B	Small OJ, 500 mL		
20I0446-47 C	Small OJ, 500 mL		
20I0446-47 D	Glass NM, Amber, 250 mL, 9N H2SO4	<2	(P)
20I0446-48 A	HDPE NM, 500 mL, 1:1 HNO3	<2	(P)
20I0446-48 B	Small OJ, 500 mL		
20I0446-48 C	Small OJ, 500 mL		
20I0446-48 D	Glass NM, Amber, 250 mL, 9N H2SO4	<2	(P)
20I0446-49 A	HDPE NM, 500 mL, 1:1 HNO3	<2	(P)
20I0446-49 B	Small OJ, 500 mL		
20I0446-49 C	Small OJ, 500 mL		
20I0446-49 D	Glass NM, Amber, 250 mL, 9N H2SO4	<2	(P)

Reviewed By

Date

WORK ORDER

20I0446

Client: Floyd - Snider

Project Manager: Kelly Bottem

Project: Rio Tinto Holden Mine Reclamation/Remediation

Project Number: RT-Holden

KP

Preservation Confirmed By

9/28/2020

Date

Reviewed By

Date

Analytical Resources, Incorporated
Analytical Chemists and Consultants

Cooler Receipt Form

ARI Client: Floyd-Snider

Project Name: RT - Holden

COC No(s): _____ (NA)

Delivered by: Fed-Ex UPS Courier Hand Delivered Other: _____

Assigned ARI Job No: 20I046

Tracking No: _____ (NA)

Preliminary Examination Phase:

Were intact, properly signed and dated custody seals attached to the outside of the cooler? (YES) NO

Were custody papers included with the cooler? (YES) NO

Were custody papers properly filled out (ink, signed, etc.) (YES) NO

Temperature of Cooler(s) (°C) (recommended 2.0-6.0 °C for chemistry)

Time 1310 See separate document

If cooler temperature is out of compliance fill out form 00070F

Temp Gun ID#: D00526

Cooler Accepted by: JB Date: 09/28/2020 Time: 1310

Complete custody forms and attach all shipping documents

Log-In Phase:

Was a temperature blank included in the cooler? YES (NO)

What kind of packing material was used? (Bubble Wrap) Wet Ice Gel Packs Baggies Foam Block Paper Other: _____

Was sufficient ice used (if appropriate)? NA (YES) NO

How were bottles sealed in plastic bags? Individually (Grouped) Not

Did all bottles arrive in good condition (unbroken)? (YES) NO

Were all bottle labels complete and legible? (YES) NO

Did the number of containers listed on COC match with the number of containers received? (YES) NO

Did all bottle labels and tags agree with custody papers? (YES) NO

Were all bottles used correct for the requested analyses? (YES) NO

Do any of the analyses (bottles) require preservation? (attach preservation sheet, excluding VOCs) NA (YES) NO

Were all VOC vials free of air bubbles? (NA) YES NO

Was sufficient amount of sample sent in each bottle? (YES) NO

Date VOC Trip Blank was made at ARI (NA) _____

Were the sample(s) split by ARI? (NA) YES Date/Time: _____ Equipment: _____ Split by: _____

Samples Logged by: KD Date: 9/28/20 Time: 1547 Labels checked by: KD

***** Notify Project Manager of discrepancies or concerns *****

Sample ID on Bottle	Sample ID on COC	Sample ID on Bottle	Sample ID on COC

Additional Notes, Discrepancies, & Resolutions:

By: Date:

Analytical Resources, Incorporated
Analytical Chemists and Consultants

Cooler Temperature Compliance Form

ARI Work Order: 20I0446

Cooler#: 13 Temperature(°C): 6.9°C

Sample ID	Bottle Count	Bottle Type
DS-13S-Gw-092520	6	All containers
SG-11-wP-36-092320	6	All containers
DS-18I-Gw-092320	6	All containers
DS-9S-Gw-092320	6	All containers
DS-4I-Gw-092320	6	2-Large OJ, 1-Small OJ, 1-500mL HDPE, 2-250mL AG-

Cooler#: Temperature(°C):

Sample ID	Bottle Count	Bottle Type

Cooler#: Temperature(°C):

Sample ID	Bottle Count	Bottle Type

Cooler#: Temperature(°C):

Sample ID	Bottle Count	Bottle Type

Completed by: JG Date: 09/28/2020 Time: 1310

Holden Mine cooler Temps 20I0446

1 - 2.1
2 - 1.7
3 - 3.3
4 - 3.1
5 - 3.9
6 - 3.3
7 - 3.2
8 - 2.0
9 - 3.2
10 - 5.2
11 - 4.3
12 - 0.6
13 - 6.9
14 - 2.3
15 - 1.1
16 - 1.8
17 - 3.7
18 - 5.1
19 - 5.4
20 - 2.2
21 - 1.5
22 - 4.1
23 - 2.9
24 - 4.7
25 - 4.5
26 - 3.0

Analytical Resources, Incorporated
Analytical Chemists and Consultants

Analytical Report

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

DS-13D-GW-092520

20I0446-01 (Water)

Metals and Metallic Compounds

Method: EPA 6020A — Sampled: 09/25/2020 10:25

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/06/2020 04:44

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0446-01 C 01

Preparation Batch: BIJ0096 — Sample Size: 25 mL

Prepared: 10/05/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Aluminum	7429-90-5	1	2.37	20.0	4.88	ug/L	J
Lead	7439-92-1	1	0.0680	0.100	ND	ug/L	U

Instrument: ICPMS2 Analyst: TCH — Analyzed: 10/09/2020 13:43

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0446-01 C 01

Preparation Batch: BIJ0096 — Sample Size: 25 mL

Prepared: 10/05/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Iron	7439-89-6	1	6.27	20.0	10.2	ug/L	J
Magnesium	7439-95-4	1	0.307	20.0	7950	ug/L	
Manganese	7439-96-5	1	0.0850	0.500	0.315	ug/L	J
Potassium	7440-09-7	1	1.41	20.0	2310	ug/L	
Sodium	7440-23-5	1	7.18	100	2960	ug/L	

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

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Analytical Resources, Incorporated
Analytical Chemists and Consultants

Analytical Report

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

DS-13D-GW-092520

20I0446-01 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/25/2020 10:25

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/06/2020 04:44

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0446-01 C 01

Preparation Batch: BIJ0096 — Sample Size: 25 mL

Prepared: 10/05/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Cadmium	7440-43-9	1	0.0300	0.100	0.206	ug/L	
Copper	7440-50-8	1	0.340	0.500	ND	ug/L	U
Zinc	7440-66-6	1	0.820	4.00	2.26	ug/L	J

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Analytical Chemists and Consultants

Analytical Report

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

DS-13D-GW-092520

20I0446-01 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/25/2020 10:25

Instrument: IC930 Analyst: KOTT — Analyzed: 09/29/2020 20:40

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-01 A

Preparation Batch: BII0841 — Sample Size: 10 mL

Prepared: 09/29/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Chloride	16887-00-6	1	0.100	0.100	0.246	mg/L	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Nitrate-N	14797-55-8	1	0.100	0.100	0.343	mg/L	H

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

DS-13D-GW-092520

20I0446-01 (Water)

Wet Chemistry

Method: SM 2320 B-97 — Sampled: 09/25/2020 10:25

Instrument: Accumet AB150 Analyst: UW — Analyzed: 09/30/2020 09:33

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-01 D

Preparation Batch: BII0880 — Sample Size: 100 mL

Prepared: 09/30/2020 — Final Volume: 100 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Bicarbonate		1	1.00	1.00	32.5	mg/L CaCO3	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Carbonate		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Hydroxide		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Total		1	1.00	1.00	32.5	mg/L CaCO3	

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Analytical Resources, Incorporated
Analytical Chemists and Consultants

Analytical Report

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

DS-13D-GW-092520

20I0446-01 (Water)

Wet Chemistry

Method: SM 2540 C-97 — Sampled: 09/25/2020 10:25

Instrument: BAL2 Analyst: KLE — Analyzed: 10/01/2020 08:00

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-01

Preparation Batch: BIJ0001 — Sample Size: 200 mL

Prepared: 10/01/2020 — Final Volume: 200 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Solids		1	5	5	250	mg/L	

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Analytical Report

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

DS-13D-GW-092520

20I0446-01 (Water)

Wet Chemistry

Method: SM 2540 D-97 — Sampled: 09/25/2020 10:25

Instrument: BAL2 Analyst: KLE — Analyzed: 09/30/2020 06:14

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-01

Preparation Batch: BII0867 — Sample Size: 950 mL

Prepared: 09/30/2020 — Final Volume: 1000 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Suspended Solids		1	1	1	ND	mg/L	U

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

DS-13D-GW-092520

20I0446-01 (Water)

Wet Chemistry

Method: SM 5310 B-00 — Sampled: 09/25/2020 10:25

Instrument: TOC-LCSH Analyst: WCW — Analyzed: 10/07/2020 21:15

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-01 F

Preparation Batch: BIJ0121 — Sample Size: 20 mL

Prepared: 10/05/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Organic Carbon, Dissolved		1	0.50	0.50	ND	mg/L	U

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-01 E

Preparation Batch: BIJ0296 — Sample Size: 20 mL

Prepared: 10/08/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Organic Carbon		1	0.50	0.50	ND	mg/L	U

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

DS-13D-GW-092520

20I0446-01 (Water)

Calculation

Method: SM 2340 B-97 — Sampled: 09/25/2020 10:25

Instrument: [CALC] Analyst: TCH — Analyzed: 10/09/2020 13:43

Sample Preparation: Preparation Method: [CALC] — Extract ID: 20I0446-01

Preparation Batch: [CALC]

Prepared: 10/05/2020 Final Volume: 1

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness		1	0.207	158	mg/L CaCO3	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

DS-13D-GW-092520

20I0446-01RE1 (Water)

Metals and Metallic Compounds

Method: EPA 6020A — Sampled: 09/25/2020 10:25

Instrument: ICPMS2 Analyst: TCH — Analyzed: 10/09/2020 14:35

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0446-01RE1 C 01

Preparation Batch: BIJ0096 — Sample Size: 25 mL

Prepared: 10/05/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Calcium	7440-70-2	10	19.1	500	53900	ug/L	D

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

DS-13D-GW-092520

20I0446-01RE1 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/25/2020 10:25

Instrument: IC930 Analyst: KOTT — Analyzed: 09/30/2020 06:41

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-01RE1 A

Preparation Batch: BII0841 — Sample Size: 10 mL

Prepared: 09/29/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Sulfate	14808-79-8	26	2.60	2.60	126	mg/L	D

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

DS-13D-GW-092520

20I0446-01RE1 (Water)

Calculation

Method: SM 2340 B-97 — Sampled: 09/25/2020 10:25

Instrument: [CALC] Analyst: TCH — Analyzed: 10/09/2020 14:35

Sample Preparation: Preparation Method: [CALC]; Preparation Batch: [CALC]; Prepared: 10/05/2020; Final Volume: 1 — Extract ID: 20I0446-01RE1

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness		10	1.25	135	mg/L CaCO3	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

DS-12S-GW-092520

20I0446-02 (Water)

Metals and Metallic Compounds

Method: EPA 6020A — Sampled: 09/25/2020 12:45

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/06/2020 04:49

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0446-02 C 01

Preparation Batch: BIJ0096 — Sample Size: 25 mL

Prepared: 10/05/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Aluminum	7429-90-5	1	2.37	20.0	2050	ug/L	
Lead	7439-92-1	1	0.0680	0.100	0.0760	ug/L	J

Instrument: ICPMS2 Analyst: TCH — Analyzed: 10/09/2020 14:17

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0446-02 C 01

Preparation Batch: BIJ0096 — Sample Size: 25 mL

Prepared: 10/05/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Calcium	7440-70-2	5	9.53	250	87800	ug/L	D
Iron	7439-89-6	5	31.4	100	16900	ug/L	D
Magnesium	7439-95-4	5	1.53	100	11800	ug/L	D
Potassium	7440-09-7	5	7.03	100	7870	ug/L	D
Sodium	7440-23-5	5	35.9	500	4840	ug/L	D

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

DS-12S-GW-092520

20I0446-02 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/25/2020 12:45

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/06/2020 04:49

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0446-02 C 01

Preparation Batch: BIJ0096 — Sample Size: 25 mL

Prepared: 10/05/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Cadmium	7440-43-9	1	0.0400	0.100	6.12	ug/L	
Copper	7440-50-8	1	0.340	0.500	45.0	ug/L	
Zinc	7440-66-6	5	4.70	20.0	648	ug/L	D

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

DS-12S-GW-092520

20I0446-02 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/25/2020 12:45

Instrument: IC930 Analyst: KOTT — Analyzed: 09/29/2020 21:00

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-02 A

Preparation Batch: BII0841 — Sample Size: 10 mL

Prepared: 09/29/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Chloride	16887-00-6	1	0.100	0.100	0.246	mg/L	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Nitrate-N	14797-55-8	1	0.100	0.100	ND	mg/L	H, U

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

DS-12S-GW-092520

20I0446-02 (Water)

Wet Chemistry

Method: SM 2320 B-97 — Sampled: 09/25/2020 12:45

Instrument: Accumet AB150 Analyst: UW — Analyzed: 09/30/2020 09:33

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-02 D

Preparation Batch: BII0880 — Sample Size: 100 mL

Prepared: 09/30/2020 — Final Volume: 100 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Bicarbonate		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Carbonate		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Hydroxide		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Total		1	1.00	1.00	ND	mg/L CaCO3	U

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

DS-12S-GW-092520

20I0446-02 (Water)

Wet Chemistry

Method: SM 2540 C-97 — Sampled: 09/25/2020 12:45

Instrument: BAL2 Analyst: KLE — Analyzed: 10/01/2020 08:00

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-02

Preparation Batch: BIJ0001 — Sample Size: 100 mL

Prepared: 10/01/2020 — Final Volume: 200 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Solids		1	10	10	487	mg/L	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

DS-12S-GW-092520

20I0446-02 (Water)

Wet Chemistry

Method: SM 2540 D-97 — Sampled: 09/25/2020 12:45

Instrument: BAL2 Analyst: KLE — Analyzed: 09/30/2020 06:14

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-02

Preparation Batch: BII0867 — Sample Size: 940 mL

Prepared: 09/30/2020 — Final Volume: 1000 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Suspended Solids		1	1	1	ND	mg/L	U

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

DS-12S-GW-092520

20I0446-02 (Water)

Wet Chemistry

Method: SM 5310 B-00 — Sampled: 09/25/2020 12:45

Instrument: TOC-LCSH Analyst: WCW — Analyzed: 10/07/2020 21:33

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-02 F

Preparation Batch: BIJ0121 — Sample Size: 20 mL

Prepared: 10/05/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Organic Carbon, Dissolved		1	0.50	0.50	0.64	mg/L	

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-02 E

Preparation Batch: BIJ0296 — Sample Size: 20 mL

Prepared: 10/08/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Organic Carbon		1	0.50	0.50	0.54	mg/L	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

DS-12S-GW-092520

20I0446-02 (Water)

Calculation

Method: SM 2340 B-97 — Sampled: 09/25/2020 12:45

Instrument: [CALC] Analyst: TCH — Analyzed: 10/09/2020 14:17

Sample Preparation: Preparation Method: [CALC] — Extract ID: 20I0446-02

Preparation Batch: [CALC]

Prepared: 10/05/2020 Final Volume: 1

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness		5	1.04	268	mg/L CaCO3	

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Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

DS-12S-GW-092520

20I0446-02RE1 (Water)

Metals and Metallic Compounds

Method: EPA 6020A — Sampled: 09/25/2020 12:45

Instrument: ICPMS2 Analyst: TCH — Analyzed: 10/09/2020 14:38

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0446-02RE1 C 01

Preparation Batch: BIJ0096 — Sample Size: 25 mL

Prepared: 10/05/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Manganese	7439-96-5	50	4.25	25.0	3080	ug/L	D

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Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

DS-12S-GW-092520

20I0446-02RE1 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/25/2020 12:45

Instrument: IC930 Analyst: KOTT — Analyzed: 09/30/2020 07:01

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-02RE1 A

Preparation Batch: BII0841 — Sample Size: 10 mL

Prepared: 09/29/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Sulfate	14808-79-8	58	5.80	5.80	276	mg/L	D

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

DS-14-GW-092520

20I0446-03 (Water)

Metals and Metallic Compounds

Method: EPA 6020A — Sampled: 09/25/2020 14:00

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/06/2020 04:53

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0446-03 C 01

Preparation Batch: BIJ0096 — Sample Size: 25 mL

Prepared: 10/05/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Aluminum	7429-90-5	1	2.37	20.0	50.5	ug/L	
Lead	7439-92-1	1	0.0680	0.100	ND	ug/L	U

Instrument: ICPMS2 Analyst: TCH — Analyzed: 10/09/2020 13:44

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0446-03 C 01

Preparation Batch: BIJ0096 — Sample Size: 25 mL

Prepared: 10/05/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Calcium	7440-70-2	1	1.91	50.0	8650	ug/L	
Iron	7439-89-6	1	6.27	20.0	132	ug/L	
Magnesium	7439-95-4	1	0.307	20.0	1190	ug/L	
Manganese	7439-96-5	1	0.0850	0.500	8.86	ug/L	
Potassium	7440-09-7	1	1.41	20.0	1320	ug/L	
Sodium	7440-23-5	1	7.18	100	1550	ug/L	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

DS-14-GW-092520

20I0446-03 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/25/2020 14:00

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/06/2020 04:53

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0446-03 C 01

Preparation Batch: BIJ0096 — Sample Size: 25 mL

Prepared: 10/05/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Cadmium	7440-43-9	1	0.0300	0.100	0.166	ug/L	
Copper	7440-50-8	1	0.340	0.500	0.520	ug/L	
Zinc	7440-66-6	1	0.820	4.00	20.5	ug/L	

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Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

DS-14-GW-092520

20I0446-03 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/25/2020 14:00

Instrument: IC930 Analyst: KOTT — Analyzed: 09/29/2020 21:20

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-03 A

Preparation Batch: BII0841 — Sample Size: 10 mL

Prepared: 09/29/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Chloride	16887-00-6	1	0.100	0.100	0.300	mg/L	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Nitrate-N	14797-55-8	1	0.100	0.100	ND	mg/L	H, U

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

DS-14-GW-092520

20I0446-03 (Water)

Wet Chemistry

Method: SM 2320 B-97 — Sampled: 09/25/2020 14:00

Instrument: Accumet AB150 Analyst: UW — Analyzed: 09/30/2020 13:46

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-03 D

Preparation Batch: BII0890 — Sample Size: 100 mL

Prepared: 09/30/2020 — Final Volume: 100 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Bicarbonate		1	1.00	1.00	4.28	mg/L CaCO3	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Carbonate		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Hydroxide		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Total		1	1.00	1.00	4.28	mg/L CaCO3	

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Analytical Report

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

DS-14-GW-092520

20I0446-03 (Water)

Wet Chemistry

Method: SM 2540 C-97 — Sampled: 09/25/2020 14:00

Instrument: BAL2 Analyst: KLE — Analyzed: 10/01/2020 08:00

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-03

Preparation Batch: BIJ0001 — Sample Size: 200 mL

Prepared: 10/01/2020 — Final Volume: 200 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Solids		1	5	5	57	mg/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

DS-14-GW-092520

20I0446-03 (Water)

Wet Chemistry

Method: SM 2540 D-97 — Sampled: 09/25/2020 14:00

Instrument: BAL2 Analyst: KLE — Analyzed: 09/30/2020 06:14

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-03

Preparation Batch: BII0867 — Sample Size: 970 mL

Prepared: 09/30/2020 — Final Volume: 1000 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Suspended Solids		1	1	1	14	mg/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

DS-14-GW-092520

20I0446-03 (Water)

Wet Chemistry

Method: SM 5310 B-00 — Sampled: 09/25/2020 14:00

Instrument: TOC-LCSH Analyst: WCW — Analyzed: 10/07/2020 22:01

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-03 F

Preparation Batch: BIJ0121 — Sample Size: 20 mL

Prepared: 10/05/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Organic Carbon, Dissolved		1	0.50	0.50	ND	mg/L	U

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-03 E

Preparation Batch: BIJ0296 — Sample Size: 20 mL

Prepared: 10/08/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Organic Carbon		1	0.50	0.50	ND	mg/L	U

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Analytical Report

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

DS-14-GW-092520

20I0446-03 (Water)

Calculation

Method: SM 2340 B-97 — Sampled: 09/25/2020 14:00

Instrument: [CALC] Analyst: TCH — Analyzed: 10/09/2020 13:44

Sample Preparation: Preparation Method: [CALC] — Extract ID: 20I0446-03

Preparation Batch: [CALC]

Prepared: 10/05/2020 Final Volume: 1

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness		1	0.207	26.5	mg/L CaCO3	

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Analytical Report

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

DS-14-GW-092520

20I0446-03RE1 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/25/2020 14:00

Instrument: IC930 Analyst: KOTT — Analyzed: 09/30/2020 07:21

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-03RE1 A

Preparation Batch: BII0841 — Sample Size: 10 mL

Prepared: 09/29/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Sulfate	14808-79-8	5	0.500	0.500	22.1	mg/L	D

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

TP3-14D-GW-092520

20I0446-04 (Water)

Metals and Metallic Compounds

Method: EPA 6020A — Sampled: 09/25/2020 14:45

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/06/2020 05:18

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0446-04 C 01

Preparation Batch: BIJ0096 — Sample Size: 25 mL

Prepared: 10/05/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Aluminum	7429-90-5	1	2.37	20.0	3430	ug/L	
Lead	7439-92-1	1	0.0680	0.100	ND	ug/L	U

Instrument: ICPMS2 Analyst: TCH — Analyzed: 10/09/2020 14:19

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0446-04 C 01

Preparation Batch: BIJ0096 — Sample Size: 25 mL

Prepared: 10/05/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Calcium	7440-70-2	5	9.53	250	70600	ug/L	D
Iron	7439-89-6	5	31.4	100	209	ug/L	D
Magnesium	7439-95-4	5	1.53	100	13400	ug/L	D
Potassium	7440-09-7	5	7.03	100	3270	ug/L	D
Sodium	7440-23-5	5	35.9	500	5660	ug/L	D

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

TP3-14D-GW-092520

20I0446-04 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/25/2020 14:45

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/06/2020 05:18

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0446-04 C 01

Preparation Batch: BIJ0096 — Sample Size: 25 mL

Prepared: 10/05/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Cadmium	7440-43-9	1	0.0300	0.100	7.69	ug/L	
Copper	7440-50-8	1	0.340	0.500	132	ug/L	
Zinc	7440-66-6	5	4.70	20.0	778	ug/L	D

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

TP3-14D-GW-092520

20I0446-04 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/25/2020 14:45

Instrument: IC930 Analyst: KOTT — Analyzed: 09/29/2020 21:40

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-04 A

Preparation Batch: BII0841 — Sample Size: 10 mL

Prepared: 09/29/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Chloride	16887-00-6	1	0.100	0.100	0.367	mg/L	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Nitrate-N	14797-55-8	1	0.100	0.100	ND	mg/L	H, U

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

TP3-14D-GW-092520

20I0446-04 (Water)

Wet Chemistry

Method: SM 2320 B-97 — Sampled: 09/25/2020 14:45

Instrument: Accumet AB150 Analyst: UW — Analyzed: 09/30/2020 13:46

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-04 D

Preparation Batch: BII0890 — Sample Size: 100 mL

Prepared: 09/30/2020 — Final Volume: 100 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Bicarbonate		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Carbonate		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Hydroxide		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Total		1	1.00	1.00	ND	mg/L CaCO3	U

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

TP3-14D-GW-092520

20I0446-04 (Water)

Wet Chemistry

Method: SM 2540 C-97 — Sampled: 09/25/2020 14:45

Instrument: BAL2 Analyst: KLE — Analyzed: 10/01/2020 08:00

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-04

Preparation Batch: BIJ0001 — Sample Size: 200 mL

Prepared: 10/01/2020 — Final Volume: 200 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Solids		1	5	5	393	mg/L	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

TP3-14D-GW-092520

20I0446-04 (Water)

Wet Chemistry

Method: SM 2540 D-97 — Sampled: 09/25/2020 14:45

Instrument: BAL2 Analyst: KLE — Analyzed: 09/30/2020 06:14

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-04

Preparation Batch: BII0867 — Sample Size: 900 mL

Prepared: 09/30/2020 — Final Volume: 1000 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Suspended Solids		1	1	1	ND	mg/L	U

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

TP3-14D-GW-092520

20I0446-04 (Water)

Wet Chemistry

Method: SM 5310 B-00 — Sampled: 09/25/2020 14:45

Instrument: TOC-LCSH Analyst: WCW — Analyzed: 10/07/2020 22:19

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-04 F

Preparation Batch: BIJ0121 — Sample Size: 20 mL

Prepared: 10/05/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Organic Carbon, Dissolved		1	0.50	0.50	0.94	mg/L	

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-04 E

Preparation Batch: BIJ0296 — Sample Size: 20 mL

Prepared: 10/08/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Organic Carbon		1	0.50	0.50	0.84	mg/L	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

TP3-14D-GW-092520

20I0446-04 (Water)

Calculation

Method: SM 2340 B-97 — Sampled: 09/25/2020 14:45

Instrument: [CALC] Analyst: TCH — Analyzed: 10/09/2020 14:19

Sample Preparation: Preparation Method: [CALC] — Extract ID: 20I0446-04

Preparation Batch: [CALC]

Prepared: 10/05/2020 Final Volume: 1

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness		5	1.04	231	mg/L CaCO3	

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Analytical Report

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

TP3-14D-GW-092520

20I0446-04RE1 (Water)

Metals and Metallic Compounds

Method: EPA 6020A — Sampled: 09/25/2020 14:45

Instrument: ICPMS2 Analyst: TCH — Analyzed: 10/09/2020 14:40

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0446-04RE1 C 01

Preparation Batch: BIJ0096 — Sample Size: 25 mL

Prepared: 10/05/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Manganese	7439-96-5	50	4.25	25.0	1740	ug/L	D

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

TP3-14D-GW-092520

20I0446-04RE1 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/25/2020 14:45

Instrument: IC930 Analyst: KOTT — Analyzed: 09/30/2020 07:40

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-04RE1 A

Preparation Batch: BII0841 — Sample Size: 10 mL

Prepared: 09/29/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Sulfate	14808-79-8	47	4.70	4.70	220	mg/L	D

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-9-PW-6-092620

20I0446-05 (Water)

Metals and Metallic Compounds

Method: EPA 6020A — Sampled: 09/25/2020 08:29
Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/06/2020 05:22

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0446-05 C 01
Preparation Batch: BIJ0096 — Sample Size: 25 mL
Prepared: 10/05/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Aluminum	7429-90-5	1	2.37	20.0	19.0	ug/L	J
Lead	7439-92-1	1	0.0680	0.100	ND	ug/L	U

Instrument: ICPMS2 Analyst: TCH — Analyzed: 10/09/2020 13:46

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0446-05 C 01
Preparation Batch: BIJ0096 — Sample Size: 25 mL
Prepared: 10/05/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Calcium	7440-70-2	1	1.91	50.0	7790	ug/L	
Iron	7439-89-6	1	6.27	20.0	35.1	ug/L	
Magnesium	7439-95-4	1	0.307	20.0	854	ug/L	
Manganese	7439-96-5	1	0.0850	0.500	2.51	ug/L	
Potassium	7440-09-7	1	1.41	20.0	757	ug/L	
Sodium	7440-23-5	1	7.18	100	957	ug/L	

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Analytical Report

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-9-PW-6-092620

20I0446-05 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/25/2020 08:29

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/06/2020 05:22

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0446-05 C 01

Preparation Batch: BIJ0096 — Sample Size: 25 mL

Prepared: 10/05/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Copper	7440-50-8	1	0.340	0.500	1.51	ug/L	
Zinc	7440-66-6	1	0.820	4.00	15.6	ug/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-9-PW-6-092620

20I0446-05 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/25/2020 08:29

Instrument: IC930 Analyst: KOTT — Analyzed: 09/29/2020 22:00

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-05 A

Preparation Batch: BII0841 — Sample Size: 10 mL

Prepared: 09/29/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Chloride	16887-00-6	1	0.100	0.100	0.287	mg/L	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Nitrate-N	14797-55-8	1	0.100	0.100	ND	mg/L	H, U

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-9-PW-6-092620

20I0446-05 (Water)

Wet Chemistry

Method: SM 2320 B-97 — Sampled: 09/25/2020 08:29

Instrument: Accumet AB150 Analyst: UW — Analyzed: 09/30/2020 13:46

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-05 D

Preparation Batch: BII0890 — Sample Size: 100 mL

Prepared: 09/30/2020 — Final Volume: 100 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Bicarbonate		1	1.00	1.00	7.35	mg/L CaCO3	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Carbonate		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Hydroxide		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Total		1	1.00	1.00	7.35	mg/L CaCO3	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-9-PW-6-092620

20I0446-05 (Water)

Wet Chemistry

Method: SM 2540 C-97 — Sampled: 09/25/2020 08:29

Instrument: BAL2 Analyst: KLE — Analyzed: 10/01/2020 08:00

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-05

Preparation Batch: BIJ0001 — Sample Size: 200 mL

Prepared: 10/01/2020 — Final Volume: 200 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Solids		1	5	5	33	mg/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-9-PW-6-092620

20I0446-05 (Water)

Wet Chemistry

Method: SM 2540 D-97 — Sampled: 09/25/2020 08:29

Instrument: BAL2 Analyst: KLE — Analyzed: 09/30/2020 06:14

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-05

Preparation Batch: BII0867 — Sample Size: 950 mL

Prepared: 09/30/2020 — Final Volume: 1000 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Suspended Solids		1	1	1	ND	mg/L	U

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-9-PW-6-092620

20I0446-05 (Water)

Wet Chemistry

Method: SM 5310 B-00 — Sampled: 09/25/2020 08:29
Instrument: TOC-LCSH Analyst: WCW — Analyzed: 10/07/2020 22:37

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-05 F
Preparation Batch: BIJ0121 — Sample Size: 20 mL
Prepared: 10/05/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Organic Carbon, Dissolved		1	0.50	0.50	0.78	mg/L	

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-05 E
Preparation Batch: BIJ0296 — Sample Size: 20 mL
Prepared: 10/08/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Organic Carbon		1	0.50	0.50	0.60	mg/L	

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Analytical Report

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-9-PW-6-092620

20I0446-05 (Water)

Calculation

Method: SM 2340 B-97 — Sampled: 09/25/2020 08:29

Instrument: [CALC] Analyst: TCH — Analyzed: 10/09/2020 13:46

Sample Preparation: Preparation Method: [CALC] — Extract ID: 20I0446-05

Preparation Batch: [CALC]

Prepared: 10/05/2020 Final Volume: 1

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness		1	0.207	23.0	mg/L CaCO3	

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Analytical Report

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-9-PW-6-092620

20I0446-05RE1 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/25/2020 08:29

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/09/2020 15:28

Sample Preparation: Preparation Method: RHN EPA 600/4-79-020 4.1.4 HNO3 matrix 5x — Extract ID: 20I0446-05RE1 C 02

Preparation Batch: BIJ0194 — Sample Size: 100 mL

Prepared: 10/08/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Cadmium	7440-43-9	1	0.00600	0.0200	0.0874	ug/L	

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Analytical Report

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-9-PW-6-092620

20I0446-05RE1 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/25/2020 08:29

Instrument: IC930 Analyst: KOTT — Analyzed: 09/30/2020 09:00

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-05RE1 A

Preparation Batch: BII0841 — Sample Size: 10 mL

Prepared: 09/29/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Sulfate	14808-79-8	3	0.300	0.300	14.8	mg/L	D

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-9-PW-12-092620

20I0446-06 (Water)

Metals and Metallic Compounds

Method: EPA 6020A — Sampled: 09/25/2020 09:21

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/06/2020 05:27

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0446-06 C 01

Preparation Batch: BIJ0096 — Sample Size: 25 mL

Prepared: 10/05/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Aluminum	7429-90-5	1	2.37	20.0	25.7	ug/L	
Lead	7439-92-1	1	0.0680	0.100	ND	ug/L	U

Instrument: ICPMS2 Analyst: TCH — Analyzed: 10/09/2020 13:48

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0446-06 C 01

Preparation Batch: BIJ0096 — Sample Size: 25 mL

Prepared: 10/05/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Calcium	7440-70-2	1	1.91	50.0	7850	ug/L	
Iron	7439-89-6	1	6.27	20.0	53.7	ug/L	
Magnesium	7439-95-4	1	0.307	20.0	737	ug/L	
Manganese	7439-96-5	1	0.0850	0.500	6.24	ug/L	
Potassium	7440-09-7	1	1.41	20.0	653	ug/L	
Sodium	7440-23-5	1	7.18	100	876	ug/L	

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Analytical Report

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-9-PW-12-092620

20I0446-06 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/25/2020 09:21

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/06/2020 05:27

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0446-06 C 01

Preparation Batch: BIJ0096 — Sample Size: 25 mL

Prepared: 10/05/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Copper	7440-50-8	1	0.340	0.500	1.53	ug/L	
Zinc	7440-66-6	1	0.820	4.00	7.04	ug/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-9-PW-12-092620

20I0446-06 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/25/2020 09:21

Instrument: IC930 Analyst: KOTT — Analyzed: 09/29/2020 22:20

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-06 A

Preparation Batch: BII0841 — Sample Size: 10 mL

Prepared: 09/29/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Chloride	16887-00-6	1	0.100	0.100	0.285	mg/L	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Nitrate-N	14797-55-8	1	0.100	0.100	ND	mg/L	H, U

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-9-PW-12-092620

20I0446-06 (Water)

Wet Chemistry

Method: SM 2320 B-97 — Sampled: 09/25/2020 09:21

Instrument: Accumet AB150 Analyst: UW — Analyzed: 09/30/2020 13:46

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-06 D

Preparation Batch: BII0890 — Sample Size: 100 mL

Prepared: 09/30/2020 — Final Volume: 100 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Bicarbonate		1	1.00	1.00	8.67	mg/L CaCO3	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Carbonate		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Hydroxide		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Total		1	1.00	1.00	8.67	mg/L CaCO3	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-9-PW-12-092620

20I0446-06 (Water)

Wet Chemistry

Method: SM 2540 C-97 — Sampled: 09/25/2020 09:21

Instrument: BAL2 Analyst: KLE — Analyzed: 10/01/2020 08:00

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-06

Preparation Batch: BIJ0001 — Sample Size: 200 mL

Prepared: 10/01/2020 — Final Volume: 200 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Solids		1	5	5	36	mg/L	

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Analytical Report

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-9-PW-12-092620

20I0446-06 (Water)

Wet Chemistry

Method: SM 2540 D-97 — Sampled: 09/25/2020 09:21

Instrument: BAL2 Analyst: KLE — Analyzed: 09/30/2020 06:14

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-06

Preparation Batch: BII0867 — Sample Size: 945 mL

Prepared: 09/30/2020 — Final Volume: 1000 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Suspended Solids		1	1	1	ND	mg/L	U

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-9-PW-12-092620

20I0446-06 (Water)

Wet Chemistry

Method: SM 5310 B-00 — Sampled: 09/25/2020 09:21
Instrument: TOC-LCSH Analyst: WCW — Analyzed: 10/07/2020 22:54

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-06 F
Preparation Batch: BIJ0121 — Sample Size: 20 mL
Prepared: 10/05/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Organic Carbon, Dissolved		1	0.50	0.50	0.80	mg/L	

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-06 E
Preparation Batch: BIJ0296 — Sample Size: 20 mL
Prepared: 10/08/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Organic Carbon		1	0.50	0.50	0.65	mg/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-9-PW-12-092620

20I0446-06 (Water)

Calculation

Method: SM 2340 B-97 — Sampled: 09/25/2020 09:21

Instrument: [CALC] Analyst: TCH — Analyzed: 10/09/2020 13:48

Sample Preparation: Preparation Method: [CALC]; Preparation Batch: [CALC]; Prepared: 10/05/2020; Final Volume: 1 — Extract ID: 20I0446-06

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness		1	0.207	22.6	mg/L CaCO3	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-9-PW-12-092620

20I0446-06RE1 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/25/2020 09:21

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/09/2020 15:32

Sample Preparation: Preparation Method: RHN EPA 600/4-79-020 4.1.4 HNO3 matrix 5x — Extract ID: 20I0446-06RE1 C 02

Preparation Batch: BIJ0194 — Sample Size: 100 mL

Prepared: 10/08/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Cadmium	7440-43-9	1	0.00600	0.0200	0.0406	ug/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-9-PW-12-092620

20I0446-06RE1 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/25/2020 09:21

Instrument: IC930 Analyst: KOTT — Analyzed: 09/30/2020 09:20

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-06RE1 A

Preparation Batch: BII0841 — Sample Size: 10 mL

Prepared: 09/29/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Sulfate	14808-79-8	2	0.200	0.200	12.5	mg/L	D

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-9-WP-36-092620

20I0446-07 (Water)

Metals and Metallic Compounds

Method: EPA 6020A — Sampled: 09/25/2020 09:22
Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/06/2020 05:31

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0446-07 C 01
Preparation Batch: BIJ0096 — Sample Size: 25 mL
Prepared: 10/05/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Aluminum	7429-90-5	1	2.37	20.0	13.7	ug/L	J
Lead	7439-92-1	1	0.0680	0.100	ND	ug/L	U

Instrument: ICPMS2 Analyst: TCH — Analyzed: 10/09/2020 13:49

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0446-07 C 01
Preparation Batch: BIJ0096 — Sample Size: 25 mL
Prepared: 10/05/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Calcium	7440-70-2	1	1.91	50.0	9400	ug/L	
Iron	7439-89-6	1	6.27	20.0	19.8	ug/L	J
Magnesium	7439-95-4	1	0.307	20.0	1040	ug/L	
Manganese	7439-96-5	1	0.0850	0.500	0.961	ug/L	
Potassium	7440-09-7	1	1.41	20.0	844	ug/L	
Sodium	7440-23-5	1	7.18	100	975	ug/L	

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Analytical Report

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-9-WP-36-092620

20I0446-07 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/25/2020 09:22

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/06/2020 05:31

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0446-07 C 01

Preparation Batch: BIJ0096 — Sample Size: 25 mL

Prepared: 10/05/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Copper	7440-50-8	1	0.340	0.500	1.36	ug/L	
Zinc	7440-66-6	1	0.820	4.00	12.4	ug/L	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-9-WP-36-092620

20I0446-07 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/25/2020 09:22

Instrument: IC930 Analyst: KOTT — Analyzed: 09/29/2020 22:40

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-07 A

Preparation Batch: BII0841 — Sample Size: 10 mL

Prepared: 09/29/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Chloride	16887-00-6	1	0.100	0.100	0.287	mg/L	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Nitrate-N	14797-55-8	1	0.100	0.100	ND	mg/L	H, U

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-9-WP-36-092620

20I0446-07 (Water)

Wet Chemistry

Method: SM 2320 B-97 — Sampled: 09/25/2020 09:22

Instrument: Accumet AB150 Analyst: UW — Analyzed: 09/30/2020 13:46

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-07 D

Preparation Batch: BII0890 — Sample Size: 100 mL

Prepared: 09/30/2020 — Final Volume: 100 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Bicarbonate		1	1.00	1.00	8.26	mg/L CaCO3	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Carbonate		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Hydroxide		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Total		1	1.00	1.00	8.26	mg/L CaCO3	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-9-WP-36-092620

20I0446-07 (Water)

Wet Chemistry

Method: SM 2540 C-97 — Sampled: 09/25/2020 09:22

Instrument: BAL2 Analyst: KLE — Analyzed: 10/01/2020 08:00

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-07

Preparation Batch: BIJ0001 — Sample Size: 200 mL

Prepared: 10/01/2020 — Final Volume: 200 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Solids		1	5	5	43	mg/L	

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Analytical Resources, Incorporated
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Analytical Report

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-9-WP-36-092620

20I0446-07 (Water)

Wet Chemistry

Method: SM 2540 D-97 — Sampled: 09/25/2020 09:22

Instrument: BAL2 Analyst: KLE — Analyzed: 09/30/2020 06:14

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-07

Preparation Batch: BII0867 — Sample Size: 940 mL

Prepared: 09/30/2020 — Final Volume: 1000 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Suspended Solids		1	1	1	ND	mg/L	U

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-9-WP-36-092620

20I0446-07 (Water)

Wet Chemistry

Method: SM 5310 B-00 — Sampled: 09/25/2020 09:22
Instrument: TOC-LCSH Analyst: WCW — Analyzed: 10/07/2020 23:12

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-07 F
Preparation Batch: BIJ0121 — Sample Size: 20 mL
Prepared: 10/05/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Organic Carbon, Dissolved		1	0.50	0.50	0.68	mg/L	

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-07 E
Preparation Batch: BIJ0296 — Sample Size: 20 mL
Prepared: 10/08/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Organic Carbon		1	0.50	0.50	ND	mg/L	U

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-9-WP-36-092620

20I0446-07 (Water)

Calculation

Method: SM 2340 B-97 — Sampled: 09/25/2020 09:22

Instrument: [CALC] Analyst: TCH — Analyzed: 10/09/2020 13:49

Sample Preparation: Preparation Method: [CALC] — Extract ID: 20I0446-07

Preparation Batch: [CALC]

Prepared: 10/05/2020 Final Volume: 1

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness		1	0.207	27.8	mg/L CaCO3	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-9-WP-36-092620

20I0446-07RE1 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/25/2020 09:22

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/09/2020 15:36

Sample Preparation: Preparation Method: RHN EPA 600/4-79-020 4.1.4 HNO3 matrix 5x — Extract ID: 20I0446-07RE1 C 02

Preparation Batch: BIJ0194 — Sample Size: 100 mL

Prepared: 10/08/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Cadmium	7440-43-9	1	0.00600	0.0200	0.110	ug/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-9-WP-36-092620

20I0446-07RE1 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/25/2020 09:22

Instrument: IC930 Analyst: KOTT — Analyzed: 09/30/2020 09:40

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-07RE1 A

Preparation Batch: BII0841 — Sample Size: 10 mL

Prepared: 09/29/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Sulfate	14808-79-8	4	0.400	0.400	17.8	mg/L	D

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-9-WP-092620

20I0446-08 (Water)

Metals and Metallic Compounds

Method: EPA 6020A — Sampled: 09/25/2020 08:32

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/06/2020 05:36

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0446-08 C 01

Preparation Batch: BIJ0096 — Sample Size: 25 mL

Prepared: 10/05/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Aluminum	7429-90-5	1	2.37	20.0	27.7	ug/L	
Lead	7439-92-1	1	0.0680	0.100	ND	ug/L	U

Instrument: ICPMS2 Analyst: TCH — Analyzed: 10/09/2020 13:51

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0446-08 C 01

Preparation Batch: BIJ0096 — Sample Size: 25 mL

Prepared: 10/05/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Calcium	7440-70-2	1	1.91	50.0	12100	ug/L	
Iron	7439-89-6	1	6.27	20.0	91.7	ug/L	
Magnesium	7439-95-4	1	0.307	20.0	1580	ug/L	
Manganese	7439-96-5	1	0.0850	0.500	2.62	ug/L	
Potassium	7440-09-7	1	1.41	20.0	1270	ug/L	
Sodium	7440-23-5	1	7.18	100	1280	ug/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-9-WP-092620

20I0446-08 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/25/2020 08:32

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/06/2020 05:36

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0446-08 C 01

Preparation Batch: BIJ0096 — Sample Size: 25 mL

Prepared: 10/05/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Cadmium	7440-43-9	1	0.0300	0.100	0.325	ug/L	
Copper	7440-50-8	1	0.340	0.500	2.84	ug/L	
Zinc	7440-66-6	1	0.820	4.00	31.2	ug/L	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-9-WP-092620

20I0446-08 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/25/2020 08:32

Instrument: IC930 Analyst: KOTT — Analyzed: 09/29/2020 23:00

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-08 A

Preparation Batch: BII0841 — Sample Size: 10 mL

Prepared: 09/29/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Chloride	16887-00-6	1	0.100	0.100	0.287	mg/L	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Nitrate-N	14797-55-8	1	0.100	0.100	ND	mg/L	H, U

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-9-WP-092620

20I0446-08 (Water)

Wet Chemistry

Method: SM 2320 B-97 — Sampled: 09/25/2020 08:32

Instrument: Accumet AB150 Analyst: UW — Analyzed: 09/30/2020 13:46

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-08 D

Preparation Batch: BII0890 — Sample Size: 100 mL

Prepared: 09/30/2020 — Final Volume: 100 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Bicarbonate		1	1.00	1.00	6.33	mg/L CaCO3	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Carbonate		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Hydroxide		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Total		1	1.00	1.00	6.33	mg/L CaCO3	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-9-WP-092620

20I0446-08 (Water)

Wet Chemistry

Method: SM 2540 C-97 — Sampled: 09/25/2020 08:32

Instrument: BAL2 Analyst: KLE — Analyzed: 10/01/2020 08:00

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-08

Preparation Batch: BIJ0001 — Sample Size: 200 mL

Prepared: 10/01/2020 — Final Volume: 200 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Solids		1	5	5	59	mg/L	

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Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-9-WP-092620

20I0446-08 (Water)

Wet Chemistry

Method: SM 2540 D-97 — Sampled: 09/25/2020 08:32

Instrument: BAL2 Analyst: KLE — Analyzed: 09/30/2020 06:14

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-08

Preparation Batch: BII0867 — Sample Size: 940 mL

Prepared: 09/30/2020 — Final Volume: 1000 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Suspended Solids		1	1	1	1	mg/L	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-9-WP-092620

20I0446-08 (Water)

Wet Chemistry

Method: SM 5310 B-00 — Sampled: 09/25/2020 08:32

Instrument: TOC-LCSH Analyst: WCW — Analyzed: 10/07/2020 23:29

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-08 F

Preparation Batch: BIJ0121 — Sample Size: 20 mL

Prepared: 10/05/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Organic Carbon, Dissolved		1	0.50	0.50	ND	mg/L	U

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-08 E

Preparation Batch: BIJ0296 — Sample Size: 20 mL

Prepared: 10/08/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Organic Carbon		1	0.50	0.50	ND	mg/L	U

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-9-WP-092620

20I0446-08 (Water)

Calculation

Method: SM 2340 B-97 — Sampled: 09/25/2020 08:32

Instrument: [CALC] Analyst: TCH — Analyzed: 10/09/2020 13:51

Sample Preparation: Preparation Method: [CALC]
Preparation Batch: [CALC]
Prepared: 10/05/2020 Final Volume: 1

Extract ID: 20I0446-08

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness		1	0.207	36.7	mg/L CaCO3	

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Analytical Report

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-9-WP-092620

20I0446-08RE1 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/25/2020 08:32

Instrument: IC930 Analyst: KOTT — Analyzed: 09/30/2020 10:00

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-08RE1 A

Preparation Batch: BII0841 — Sample Size: 10 mL

Prepared: 09/29/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Sulfate	14808-79-8	6	0.600	0.600	30.0	mg/L	D

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-7-PW-6-092620

20I0446-09 (Water)

Metals and Metallic Compounds

Method: EPA 6020A — Sampled: 09/25/2020 10:33
Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/06/2020 05:40

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0446-09 I 01
Preparation Batch: BIJ0096 — Sample Size: 25 mL
Prepared: 10/05/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Aluminum	7429-90-5	1	2.37	20.0	55.8	ug/L	
Calcium	7440-70-2	1	1.91	50.0	4310	ug/L	
Iron	7439-89-6	1	6.27	20.0	112	ug/L	
Lead	7439-92-1	1	0.0680	0.100	0.0930	ug/L	J
Magnesium	7439-95-4	1	0.307	20.0	441	ug/L	
Manganese	7439-96-5	1	0.0850	0.500	2.92	ug/L	
Potassium	7440-09-7	1	1.41	20.0	460	ug/L	
Sodium	7440-23-5	1	7.18	100	591	ug/L	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-7-PW-6-092620

20I0446-09 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/25/2020 10:33

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/06/2020 05:40

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0446-09 I 01

Preparation Batch: BIJ0096 — Sample Size: 25 mL

Prepared: 10/05/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Copper	7440-50-8	1	0.340	0.500	1.09	ug/L	
Zinc	7440-66-6	1	0.820	4.00	4.38	ug/L	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-7-PW-6-092620

20I0446-09 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/25/2020 10:33
Instrument: IC930 Analyst: KOTT — Analyzed: 09/30/2020 00:21

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-09 A
Preparation Batch: BII0841 — Sample Size: 10 mL
Prepared: 09/29/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Chloride	16887-00-6	1	0.100	0.100	0.277	mg/L	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Nitrate-N	14797-55-8	1	0.100	0.100	ND	mg/L	H, U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Sulfate	14808-79-8	1	0.100	0.100	4.10	mg/L	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-7-PW-6-092620

20I0446-09 (Water)

Wet Chemistry

Method: SM 2320 B-97 — Sampled: 09/25/2020 10:33
Instrument: Accumet AB150 Analyst: UW — Analyzed: 09/30/2020 13:46

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-09 D
Preparation Batch: BII0890 — Sample Size: 100 mL
Prepared: 09/30/2020 — Final Volume: 100 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Bicarbonate		1	1.00	1.00	10.0	mg/L CaCO3	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Carbonate		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Hydroxide		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Total		1	1.00	1.00	10.0	mg/L CaCO3	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-7-PW-6-092620

20I0446-09 (Water)

Wet Chemistry

Method: SM 2540 C-97 — Sampled: 09/25/2020 10:33

Instrument: BAL2 Analyst: KLE — Analyzed: 10/01/2020 08:00

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-09

Preparation Batch: BIJ0001 — Sample Size: 200 mL

Prepared: 10/01/2020 — Final Volume: 200 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Solids		1	5	5	24	mg/L	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-7-PW-6-092620

20I0446-09 (Water)

Wet Chemistry

Method: SM 2540 D-97 — Sampled: 09/25/2020 10:33

Instrument: BAL2 Analyst: KLE — Analyzed: 09/30/2020 06:14

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-09

Preparation Batch: BII0867 — Sample Size: 950 mL

Prepared: 09/30/2020 — Final Volume: 1000 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Suspended Solids		1	1	1	2	mg/L	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-7-PW-6-092620

20I0446-09 (Water)

Wet Chemistry

Method: SM 5310 B-00 — Sampled: 09/25/2020 10:33
Instrument: TOC-LCSH Analyst: WCW — Analyzed: 10/08/2020 00:41

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-09 F
Preparation Batch: BIJ0121 — Sample Size: 20 mL
Prepared: 10/05/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Organic Carbon, Dissolved		1	0.50	0.50	0.70	mg/L	

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-09 E
Preparation Batch: BIJ0296 — Sample Size: 20 mL
Prepared: 10/08/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Organic Carbon		1	0.50	0.50	0.66	mg/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-7-PW-6-092620

20I0446-09 (Water)

Calculation

Method: SM 2340 B-97 — Sampled: 09/25/2020 10:33

Instrument: [CALC] Analyst: MCB — Analyzed: 10/19/2020 13:44

Sample Preparation: Preparation Method: [CALC] — Extract ID: 20I0446-09

Preparation Batch: [CALC]

Prepared: 10/05/2020 Final Volume: 1

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness		1	0.207	12.6	mg/L CaCO3	

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Analytical Resources, Incorporated
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Analytical Report

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-7-PW-6-092620

20I0446-09RE1 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/25/2020 10:33

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/09/2020 15:40

Sample Preparation: Preparation Method: RHN EPA 600/4-79-020 4.1.4 HNO3 matrix 5x — Extract ID: 20I0446-09RE1 I 02

Preparation Batch: BIJ0194 — Sample Size: 100 mL

Prepared: 10/08/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Cadmium	7440-43-9	1	0.00600	0.0200	0.0288	ug/L	

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Analytical Report

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-7-PW-12-092620

20I0446-10 (Water)

Metals and Metallic Compounds

Method: EPA 6020A — Sampled: 09/25/2020 10:32

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/06/2020 06:19

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0446-10 C 01

Preparation Batch: BIJ0096 — Sample Size: 25 mL

Prepared: 10/05/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Aluminum	7429-90-5	1	2.37	20.0	6.13	ug/L	J
Lead	7439-92-1	1	0.0680	0.100	ND	ug/L	U

Instrument: ICPMS2 Analyst: TCH — Analyzed: 10/09/2020 13:53

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0446-10 C 01

Preparation Batch: BIJ0096 — Sample Size: 25 mL

Prepared: 10/05/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Calcium	7440-70-2	1	1.91	50.0	4700	ug/L	
Iron	7439-89-6	1	6.27	20.0	10.1	ug/L	J
Magnesium	7439-95-4	1	0.307	20.0	451	ug/L	
Manganese	7439-96-5	1	0.0850	0.500	0.0890	ug/L	J
Potassium	7440-09-7	1	1.41	20.0	422	ug/L	
Sodium	7440-23-5	1	7.18	100	730	ug/L	

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Analytical Report

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-7-PW-12-092620

20I0446-10 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/25/2020 10:32

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/06/2020 06:19

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0446-10 C 01

Preparation Batch: BIJ0096 — Sample Size: 25 mL

Prepared: 10/05/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Copper	7440-50-8	1	0.340	0.500	1.04	ug/L	
Zinc	7440-66-6	1	0.820	4.00	7.34	ug/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-7-PW-12-092620

20I0446-10 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/25/2020 10:32
Instrument: IC930 Analyst: KOTT — Analyzed: 09/29/2020 06:40

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-10 B
Preparation Batch: BII0820 — Sample Size: 10 mL
Prepared: 09/28/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Chloride	16887-00-6	1	0.100	0.100	0.278	mg/L	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Nitrate-N	14797-55-8	1	0.100	0.100	ND	mg/L	H, U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Sulfate	14808-79-8	1	0.100	0.100	4.02	mg/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-7-PW-12-092620

20I0446-10 (Water)

Wet Chemistry

Method: SM 2320 B-97 — Sampled: 09/25/2020 10:32

Instrument: Accumet AB150 Analyst: UW — Analyzed: 09/30/2020 13:46

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-10 D

Preparation Batch: BII0890 — Sample Size: 100 mL

Prepared: 09/30/2020 — Final Volume: 100 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Bicarbonate		1	1.00	1.00	9.39	mg/L CaCO3	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Carbonate		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Hydroxide		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Total		1	1.00	1.00	9.39	mg/L CaCO3	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-7-PW-12-092620

20I0446-10 (Water)

Wet Chemistry

Method: SM 2540 C-97 — Sampled: 09/25/2020 10:32

Instrument: BAL2 Analyst: KLE — Analyzed: 10/01/2020 08:00

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-10

Preparation Batch: BIJ0001 — Sample Size: 200 mL

Prepared: 10/01/2020 — Final Volume: 200 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Solids		1	5	5	12	mg/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-7-PW-12-092620

20I0446-10 (Water)

Wet Chemistry

Method: SM 2540 D-97 — Sampled: 09/25/2020 10:32

Instrument: BAL2 Analyst: KLE — Analyzed: 09/30/2020 06:14

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-10

Preparation Batch: BII0867 — Sample Size: 930 mL

Prepared: 09/30/2020 — Final Volume: 1000 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Suspended Solids		1	1	1	ND	mg/L	U

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-7-PW-12-092620

20I0446-10 (Water)

Wet Chemistry

Method: SM 5310 B-00 — Sampled: 09/25/2020 10:32
Instrument: TOC-LCSH Analyst: WCW — Analyzed: 10/08/2020 02:02

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-10 F
Preparation Batch: BIJ0121 — Sample Size: 20 mL
Prepared: 10/05/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Organic Carbon, Dissolved		1	0.50	0.50	0.71	mg/L	

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-10 E
Preparation Batch: BIJ0296 — Sample Size: 20 mL
Prepared: 10/08/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Organic Carbon		1	0.50	0.50	0.55	mg/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-7-PW-12-092620

20I0446-10 (Water)

Calculation

Method: SM 2340 B-97 — Sampled: 09/25/2020 10:32

Instrument: [CALC] Analyst: TCH — Analyzed: 10/09/2020 13:53

Sample Preparation: Preparation Method: [CALC]
Preparation Batch: [CALC]
Prepared: 10/05/2020 Final Volume: 1

Extract ID: 20I0446-10

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness		1	0.207	13.6	mg/L CaCO3	

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Analytical Report

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-7-PW-12-092620

20I0446-10RE1 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/25/2020 10:32

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/09/2020 15:44

Sample Preparation: Preparation Method: RHN EPA 600/4-79-020 4.1.4 HNO3 matrix 5x — Extract ID: 20I0446-10RE1 C 02

Preparation Batch: BIJ0194 — Sample Size: 100 mL

Prepared: 10/08/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Cadmium	7440-43-9	1	0.00600	0.0200	0.0404	ug/L	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-107-PW-12-092620

20I0446-11 (Water)

Metals and Metallic Compounds

Method: EPA 6020A — Sampled: 09/26/2020 10:42

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/06/2020 06:23

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0446-11 C 01

Preparation Batch: BIJ0096 — Sample Size: 25 mL

Prepared: 10/05/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Aluminum	7429-90-5	1	2.37	20.0	6.30	ug/L	J
Lead	7439-92-1	1	0.0680	0.100	ND	ug/L	U

Instrument: ICPMS2 Analyst: TCH — Analyzed: 10/09/2020 13:54

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0446-11 C 01

Preparation Batch: BIJ0096 — Sample Size: 25 mL

Prepared: 10/05/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Calcium	7440-70-2	1	1.91	50.0	4520	ug/L	
Iron	7439-89-6	1	6.27	20.0	11.0	ug/L	J
Magnesium	7439-95-4	1	0.307	20.0	445	ug/L	
Manganese	7439-96-5	1	0.0850	0.500	0.125	ug/L	J
Potassium	7440-09-7	1	1.41	20.0	417	ug/L	
Sodium	7440-23-5	1	7.18	100	736	ug/L	

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Analytical Report

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-107-PW-12-092620

20I0446-11 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/26/2020 10:42

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/06/2020 06:23

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0446-11 C 01

Preparation Batch: BIJ0096 — Sample Size: 25 mL

Prepared: 10/05/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Copper	7440-50-8	1	0.340	0.500	1.03	ug/L	
Zinc	7440-66-6	1	0.820	4.00	6.50	ug/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-107-PW-12-092620

20I0446-11 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/26/2020 10:42
Instrument: IC930 Analyst: KOTT — Analyzed: 09/29/2020 07:40

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-11 B
Preparation Batch: BII0820 — Sample Size: 10 mL
Prepared: 09/28/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Chloride	16887-00-6	1	0.100	0.100	0.276	mg/L	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Nitrate-N	14797-55-8	1	0.100	0.100	ND	mg/L	H, U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Sulfate	14808-79-8	1	0.100	0.100	4.02	mg/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-107-PW-12-092620

20I0446-11 (Water)

Wet Chemistry

Method: SM 2320 B-97 — Sampled: 09/26/2020 10:42

Instrument: Accumet AB150 Analyst: UW — Analyzed: 09/30/2020 13:46

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-11 D

Preparation Batch: BII0890 — Sample Size: 100 mL

Prepared: 09/30/2020 — Final Volume: 100 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Bicarbonate		1	1.00	1.00	9.18	mg/L CaCO3	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Carbonate		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Hydroxide		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Total		1	1.00	1.00	9.18	mg/L CaCO3	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-107-PW-12-092620

20I0446-11 (Water)

Wet Chemistry

Method: SM 2540 C-97 — Sampled: 09/26/2020 10:42

Instrument: BAL2 Analyst: KLE — Analyzed: 10/01/2020 08:00

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-11

Preparation Batch: BIJ0001 — Sample Size: 200 mL

Prepared: 10/01/2020 — Final Volume: 200 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Solids		1	5	5	14	mg/L	

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Analytical Report

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-107-PW-12-092620

20I0446-11 (Water)

Wet Chemistry

Method: SM 2540 D-97 — Sampled: 09/26/2020 10:42

Instrument: BAL2 Analyst: KLE — Analyzed: 09/30/2020 06:14

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-11

Preparation Batch: BII0867 — Sample Size: 945 mL

Prepared: 09/30/2020 — Final Volume: 1000 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Suspended Solids		1	1	1	ND	mg/L	U

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-107-PW-12-092620

20I0446-11 (Water)

Wet Chemistry

Method: SM 5310 B-00 — Sampled: 09/26/2020 10:42

Instrument: TOC-LCSH Analyst: WCW — Analyzed: 10/08/2020 02:20

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-11 F

Preparation Batch: BIJ0121 — Sample Size: 20 mL

Prepared: 10/05/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Organic Carbon, Dissolved		1	0.50	0.50	0.58	mg/L	

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-11 E

Preparation Batch: BIJ0296 — Sample Size: 20 mL

Prepared: 10/08/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Organic Carbon		1	0.50	0.50	0.55	mg/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-107-PW-12-092620

20I0446-11 (Water)

Calculation

Method: SM 2340 B-97 — Sampled: 09/26/2020 10:42

Instrument: [CALC] Analyst: TCH — Analyzed: 10/09/2020 13:54

Sample Preparation: Preparation Method: [CALC] — Extract ID: 20I0446-11

Preparation Batch: [CALC]

Prepared: 10/05/2020 Final Volume: 1

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness		1	0.207	13.1	mg/L CaCO3	

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Analytical Report

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-107-PW-12-092620

20I0446-11RE1 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/26/2020 10:42

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/09/2020 15:49

Sample Preparation: Preparation Method: RHN EPA 600/4-79-020 4.1.4 HNO3 matrix 5x — Extract ID: 20I0446-11RE1 C 02

Preparation Batch: BIJ0194 — Sample Size: 100 mL

Prepared: 10/08/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Cadmium	7440-43-9	1	0.00600	0.0200	0.0372	ug/L	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-7-WP-36-092620

20I0446-12 (Water)

Metals and Metallic Compounds

Method: EPA 6020A — Sampled: 09/26/2020 11:43

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/06/2020 06:28

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0446-12 C 01

Preparation Batch: BIJ0096 — Sample Size: 25 mL

Prepared: 10/05/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Aluminum	7429-90-5	1	2.37	20.0	17.7	ug/L	J
Lead	7439-92-1	1	0.0680	0.100	0.150	ug/L	

Instrument: ICPMS2 Analyst: TCH — Analyzed: 10/09/2020 14:04

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0446-12 C 01

Preparation Batch: BIJ0096 — Sample Size: 25 mL

Prepared: 10/05/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Calcium	7440-70-2	1	1.91	50.0	4640	ug/L	
Iron	7439-89-6	1	6.27	20.0	16.7	ug/L	J
Magnesium	7439-95-4	1	0.307	20.0	454	ug/L	
Manganese	7439-96-5	1	0.0850	0.500	0.292	ug/L	J
Potassium	7440-09-7	1	1.41	20.0	429	ug/L	
Sodium	7440-23-5	1	7.18	100	691	ug/L	

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Analytical Report

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-7-WP-36-092620

20I0446-12 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/26/2020 11:43

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/06/2020 06:28

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0446-12 C 01

Preparation Batch: BIJ0096 — Sample Size: 25 mL

Prepared: 10/05/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Copper	7440-50-8	1	0.340	0.500	1.53	ug/L	
Zinc	7440-66-6	1	0.820	4.00	9.74	ug/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-7-WP-36-092620

20I0446-12 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/26/2020 11:43

Instrument: IC930 Analyst: KOTT — Analyzed: 09/29/2020 08:01

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-12 B

Preparation Batch: BII0820 — Sample Size: 10 mL

Prepared: 09/28/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Chloride	16887-00-6	1	0.100	0.100	0.275	mg/L	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Nitrate-N	14797-55-8	1	0.100	0.100	ND	mg/L	H, U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Sulfate	14808-79-8	1	0.100	0.100	4.00	mg/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-7-WP-36-092620

20I0446-12 (Water)

Wet Chemistry

Method: SM 2320 B-97 — Sampled: 09/26/2020 11:43

Instrument: Accumet AB150 Analyst: UW — Analyzed: 09/30/2020 13:46

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-12 D

Preparation Batch: BII0890 — Sample Size: 100 mL

Prepared: 09/30/2020 — Final Volume: 100 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Bicarbonate		1	1.00	1.00	6.02	mg/L CaCO3	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Carbonate		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Hydroxide		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Total		1	1.00	1.00	6.02	mg/L CaCO3	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-7-WP-36-092620

20I0446-12 (Water)

Wet Chemistry

Method: SM 2540 C-97 — Sampled: 09/26/2020 11:43

Instrument: BAL2 Analyst: KLE — Analyzed: 10/01/2020 08:00

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-12

Preparation Batch: BIJ0001 — Sample Size: 200 mL

Prepared: 10/01/2020 — Final Volume: 200 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Solids		1	5	5	24	mg/L	

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Analytical Report

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-7-WP-36-092620

20I0446-12 (Water)

Wet Chemistry

Method: SM 2540 D-97 — Sampled: 09/26/2020 11:43

Instrument: BAL2 Analyst: KLE — Analyzed: 09/30/2020 06:14

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-12

Preparation Batch: BII0867 — Sample Size: 960 mL

Prepared: 09/30/2020 — Final Volume: 1000 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Suspended Solids		1	1	1	ND	mg/L	U

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-7-WP-36-092620

20I0446-12 (Water)

Wet Chemistry

Method: SM 5310 B-00 — Sampled: 09/26/2020 11:43

Instrument: TOC-LCSH Analyst: WCW — Analyzed: 10/08/2020 02:41

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-12 E

Preparation Batch: BIJ0121 — Sample Size: 20 mL

Prepared: 10/05/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Organic Carbon, Dissolved		1	0.50	0.50	0.75	mg/L	

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-12 F

Preparation Batch: BIJ0296 — Sample Size: 20 mL

Prepared: 10/08/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Organic Carbon		1	0.50	0.50	0.50	mg/L	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-7-WP-36-092620

20I0446-12 (Water)

Calculation

Method: SM 2340 B-97 — Sampled: 09/26/2020 11:43

Instrument: [CALC] Analyst: TCH — Analyzed: 10/09/2020 14:04

Sample Preparation: Preparation Method: [CALC] — Extract ID: 20I0446-12

Preparation Batch: [CALC]

Prepared: 10/05/2020 Final Volume: 1

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness		1	0.207	13.5	mg/L CaCO3	

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Analytical Report

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-7-WP-36-092620

20I0446-12RE1 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/26/2020 11:43

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/09/2020 15:54

Sample Preparation: Preparation Method: RHN EPA 600/4-79-020 4.1.4 HNO3 matrix 5x — Extract ID: 20I0446-12RE1 C 02

Preparation Batch: BIJ0194 — Sample Size: 100 mL

Prepared: 10/08/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Cadmium	7440-43-9	1	0.00600	0.0200	0.0138	ug/L	J

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Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

RC-6-PW-6-092620

20I0446-13 (Water)

Metals and Metallic Compounds

Method: EPA 6020A — Sampled: 09/26/2020 12:59

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/06/2020 06:32

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0446-13 C 01

Preparation Batch: BIJ0096 — Sample Size: 25 mL

Prepared: 10/05/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Aluminum	7429-90-5	1	2.37	20.0	8.72	ug/L	J
Lead	7439-92-1	1	0.0680	0.100	ND	ug/L	U

Instrument: ICPMS2 Analyst: TCH — Analyzed: 10/09/2020 14:44

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0446-13 C 01

Preparation Batch: BIJ0096 — Sample Size: 25 mL

Prepared: 10/05/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Calcium	7440-70-2	1	1.91	50.0	4510	ug/L	
Iron	7439-89-6	1	6.27	20.0	6.95	ug/L	J
Magnesium	7439-95-4	1	0.307	20.0	398	ug/L	
Manganese	7439-96-5	1	0.0850	0.500	0.140	ug/L	J
Potassium	7440-09-7	1	1.41	20.0	363	ug/L	
Sodium	7440-23-5	1	7.18	100	649	ug/L	

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Analytical Report

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

RC-6-PW-6-092620

20I0446-13 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/26/2020 12:59

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/06/2020 06:32

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0446-13 C 01

Preparation Batch: BIJ0096 — Sample Size: 25 mL

Prepared: 10/05/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Copper	7440-50-8	1	0.340	0.500	0.502	ug/L	
Zinc	7440-66-6	1	0.940	4.00	239	ug/L	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

RC-6-PW-6-092620

20I0446-13 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/26/2020 12:59

Instrument: IC930 Analyst: KOTT — Analyzed: 09/29/2020 08:21

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-13 B

Preparation Batch: BII0820 — Sample Size: 10 mL

Prepared: 09/28/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Chloride	16887-00-6	1	0.100	0.100	0.288	mg/L	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Nitrate-N	14797-55-8	1	0.100	0.100	ND	mg/L	H, U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Sulfate	14808-79-8	1	0.100	0.100	3.49	mg/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

RC-6-PW-6-092620

20I0446-13 (Water)

Wet Chemistry

Method: SM 2320 B-97 — Sampled: 09/26/2020 12:59

Instrument: Accumet AB150 Analyst: UW — Analyzed: 09/30/2020 13:46

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-13 D

Preparation Batch: BII0890 — Sample Size: 100 mL

Prepared: 09/30/2020 — Final Volume: 100 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Bicarbonate		1	1.00	1.00	10.1	mg/L CaCO3	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Carbonate		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Hydroxide		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Total		1	1.00	1.00	10.1	mg/L CaCO3	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

RC-6-PW-6-092620

20I0446-13 (Water)

Wet Chemistry

Method: SM 2540 C-97 — Sampled: 09/26/2020 12:59

Instrument: BAL2 Analyst: KLE — Analyzed: 10/01/2020 08:00

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-13

Preparation Batch: BIJ0001 — Sample Size: 200 mL

Prepared: 10/01/2020 — Final Volume: 200 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Solids		1	5	5	16	mg/L	

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Analytical Report

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

RC-6-PW-6-092620

20I0446-13 (Water)

Wet Chemistry

Method: SM 2540 D-97 — Sampled: 09/26/2020 12:59

Instrument: BAL2 Analyst: KLE — Analyzed: 09/30/2020 06:14

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-13

Preparation Batch: BII0867 — Sample Size: 940 mL

Prepared: 09/30/2020 — Final Volume: 1000 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Suspended Solids		1	1	1	ND	mg/L	U

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

RC-6-PW-6-092620

20I0446-13 (Water)

Wet Chemistry

Method: SM 5310 B-00 — Sampled: 09/26/2020 12:59

Instrument: TOC-LCSH Analyst: WCW — Analyzed: 10/08/2020 03:06

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-13 F

Preparation Batch: BIJ0121 — Sample Size: 20 mL

Prepared: 10/05/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Organic Carbon, Dissolved		1	0.50	0.50	0.76	mg/L	

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-13 E

Preparation Batch: BIJ0296 — Sample Size: 20 mL

Prepared: 10/08/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Organic Carbon		1	0.50	0.50	0.51	mg/L	

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Analytical Report

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

RC-6-PW-6-092620

20I0446-13 (Water)

Calculation

Method: SM 2340 B-97 — Sampled: 09/26/2020 12:59

Instrument: [CALC] Analyst: TCH — Analyzed: 10/09/2020 14:44

Sample Preparation: Preparation Method: [CALC]; Preparation Batch: [CALC]; Prepared: 10/05/2020; Final Volume: 1 — Extract ID: 20I0446-13

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness		1	0.207	12.9	mg/L CaCO3	

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Analytical Report

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

RC-6-PW-6-092620

20I0446-13RE1 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/26/2020 12:59

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/09/2020 16:15

Sample Preparation: Preparation Method: RHN EPA 600/4-79-020 4.1.4 HNO3 matrix 5x — Extract ID: 20I0446-13RE1 C 02

Preparation Batch: BIJ0194 — Sample Size: 100 mL

Prepared: 10/08/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Cadmium	7440-43-9	1	0.00600	0.0200	0.0186	ug/L	J

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

RC-6-PW-12-092620

20I0446-14 (Water)

Metals and Metallic Compounds

Method: EPA 6020A — Sampled: 09/26/2020 13:49

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/06/2020 06:37

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0446-14 C 01

Preparation Batch: BIJ0096 — Sample Size: 25 mL

Prepared: 10/05/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Aluminum	7429-90-5	1	2.37	20.0	8.30	ug/L	J
Lead	7439-92-1	1	0.0680	0.100	ND	ug/L	U

Instrument: ICPMS2 Analyst: TCH — Analyzed: 10/09/2020 14:06

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0446-14 C 01

Preparation Batch: BIJ0096 — Sample Size: 25 mL

Prepared: 10/05/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Calcium	7440-70-2	1	1.91	50.0	4580	ug/L	
Iron	7439-89-6	1	6.27	20.0	20.8	ug/L	
Magnesium	7439-95-4	1	0.307	20.0	412	ug/L	
Manganese	7439-96-5	1	0.0850	0.500	0.178	ug/L	J
Potassium	7440-09-7	1	1.41	20.0	398	ug/L	
Sodium	7440-23-5	1	7.18	100	700	ug/L	

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Analytical Resources, Incorporated
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Analytical Report

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

RC-6-PW-12-092620

20I0446-14 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/26/2020 13:49

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/06/2020 06:37

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0446-14 C 01

Preparation Batch: BIJ0096 — Sample Size: 25 mL

Prepared: 10/05/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Copper	7440-50-8	1	0.340	0.500	0.550	ug/L	
Zinc	7440-66-6	1	0.820	4.00	9.75	ug/L	

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

RC-6-PW-12-092620

20I0446-14 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/26/2020 13:49

Instrument: IC930 Analyst: KOTT — Analyzed: 09/29/2020 08:41

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-14 B

Preparation Batch: BII0820 — Sample Size: 10 mL

Prepared: 09/28/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Chloride	16887-00-6	1	0.100	0.100	0.289	mg/L	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Nitrate-N	14797-55-8	1	0.100	0.100	ND	mg/L	H, U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Sulfate	14808-79-8	1	0.100	0.100	3.52	mg/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

RC-6-PW-12-092620

20I0446-14 (Water)

Wet Chemistry

Method: SM 2320 B-97 — Sampled: 09/26/2020 13:49

Instrument: Accumet AB150 Analyst: UW — Analyzed: 09/30/2020 13:46

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-14 D

Preparation Batch: BII0890 — Sample Size: 100 mL

Prepared: 09/30/2020 — Final Volume: 100 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Bicarbonate		1	1.00	1.00	10.1	mg/L CaCO3	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Carbonate		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Hydroxide		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Total		1	1.00	1.00	10.1	mg/L CaCO3	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

RC-6-PW-12-092620

20I0446-14 (Water)

Wet Chemistry

Method: SM 2540 C-97 — Sampled: 09/26/2020 13:49

Instrument: BAL2 Analyst: KLE — Analyzed: 10/01/2020 08:00

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-14

Preparation Batch: BIJ0001 — Sample Size: 200 mL

Prepared: 10/01/2020 — Final Volume: 200 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Solids		1	5	5	15	mg/L	

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Analytical Report

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

RC-6-PW-12-092620

20I0446-14 (Water)

Wet Chemistry

Method: SM 2540 D-97 — Sampled: 09/26/2020 13:49

Instrument: BAL2 Analyst: KLE — Analyzed: 09/30/2020 06:14

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-14

Preparation Batch: BII0867 — Sample Size: 950 mL

Prepared: 09/30/2020 — Final Volume: 1000 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Suspended Solids		1	1	1	ND	mg/L	U

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

RC-6-PW-12-092620

20I0446-14 (Water)

Wet Chemistry

Method: SM 5310 B-00 — Sampled: 09/26/2020 13:49

Instrument: TOC-LCSH Analyst: WCW — Analyzed: 10/08/2020 03:24

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-14 E

Preparation Batch: BIJ0121 — Sample Size: 20 mL

Prepared: 10/05/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Organic Carbon, Dissolved		1	0.50	0.50	0.59	mg/L	

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-14 F

Preparation Batch: BIJ0296 — Sample Size: 20 mL

Prepared: 10/08/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Organic Carbon		1	0.50	0.50	0.72	mg/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

RC-6-PW-12-092620

20I0446-14 (Water)

Calculation

Method: SM 2340 B-97 — Sampled: 09/26/2020 13:49

Instrument: [CALC] Analyst: TCH — Analyzed: 10/09/2020 14:06

Sample Preparation: Preparation Method: [CALC] — Extract ID: 20I0446-14

Preparation Batch: [CALC]

Prepared: 10/05/2020 Final Volume: 1

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness		1	0.207	13.1	mg/L CaCO3	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

RC-6-PW-12-092620

20I0446-14RE1 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/26/2020 13:49

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/09/2020 16:19

Sample Preparation: Preparation Method: RHN EPA 600/4-79-020 4.1.4 HNO3 matrix 5x — Extract ID: 20I0446-14RE1 C 02

Preparation Batch: BIJ0194 — Sample Size: 100 mL

Prepared: 10/08/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Cadmium	7440-43-9	1	0.00600	0.0200	0.0114	ug/L	J

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

RC-6-WP-36-092620

20I0446-15 (Water)

Metals and Metallic Compounds

Method: EPA 6020A — Sampled: 09/26/2020 13:02

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/06/2020 06:41

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0446-15 C 01

Preparation Batch: BIJ0096 — Sample Size: 25 mL

Prepared: 10/05/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Aluminum	7429-90-5	1	2.37	20.0	7.56	ug/L	J
Lead	7439-92-1	1	0.0680	0.100	ND	ug/L	U

Instrument: ICPMS2 Analyst: TCH — Analyzed: 10/09/2020 14:07

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0446-15 C 01

Preparation Batch: BIJ0096 — Sample Size: 25 mL

Prepared: 10/05/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Calcium	7440-70-2	1	1.91	50.0	4710	ug/L	
Iron	7439-89-6	1	6.27	20.0	10.8	ug/L	J
Magnesium	7439-95-4	1	0.307	20.0	428	ug/L	
Manganese	7439-96-5	1	0.0850	0.500	0.202	ug/L	J
Potassium	7440-09-7	1	1.41	20.0	393	ug/L	
Sodium	7440-23-5	1	7.18	100	715	ug/L	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

RC-6-WP-36-092620

20I0446-15 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/26/2020 13:02

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/06/2020 06:41

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0446-15 C 01

Preparation Batch: BIJ0096 — Sample Size: 25 mL

Prepared: 10/05/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Copper	7440-50-8	1	0.340	0.500	0.363	ug/L	J
Zinc	7440-66-6	1	0.820	4.00	4.82	ug/L	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

RC-6-WP-36-092620

20I0446-15 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/26/2020 13:02

Instrument: IC930 Analyst: KOTT — Analyzed: 09/29/2020 09:01

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-15 B

Preparation Batch: BII0820 — Sample Size: 10 mL

Prepared: 09/28/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Chloride	16887-00-6	1	0.100	0.100	0.296	mg/L	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Nitrate-N	14797-55-8	1	0.100	0.100	ND	mg/L	H, U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Sulfate	14808-79-8	1	0.100	0.100	3.46	mg/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

RC-6-WP-36-092620

20I0446-15 (Water)

Wet Chemistry

Method: SM 2320 B-97 — Sampled: 09/26/2020 13:02

Instrument: Accumet AB150 Analyst: UW — Analyzed: 09/30/2020 13:46

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-15 D

Preparation Batch: BII0890 — Sample Size: 100 mL

Prepared: 09/30/2020 — Final Volume: 100 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Bicarbonate		1	1.00	1.00	9.90	mg/L CaCO3	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Carbonate		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Hydroxide		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Total		1	1.00	1.00	9.90	mg/L CaCO3	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

RC-6-WP-36-092620

20I0446-15 (Water)

Wet Chemistry

Method: SM 2540 C-97 — Sampled: 09/26/2020 13:02

Instrument: BAL2 Analyst: KLE — Analyzed: 10/01/2020 08:00

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-15

Preparation Batch: BIJ0001 — Sample Size: 200 mL

Prepared: 10/01/2020 — Final Volume: 200 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Solids		1	5	5	19	mg/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

RC-6-WP-36-092620

20I0446-15 (Water)

Wet Chemistry

Method: SM 2540 D-97 — Sampled: 09/26/2020 13:02

Instrument: BAL2 Analyst: KLE — Analyzed: 09/30/2020 06:14

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-15

Preparation Batch: BII0867 — Sample Size: 940 mL

Prepared: 09/30/2020 — Final Volume: 1000 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Suspended Solids		1	1	1	ND	mg/L	U

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

RC-6-WP-36-092620

20I0446-15 (Water)

Wet Chemistry

Method: SM 5310 B-00 — Sampled: 09/26/2020 13:02

Instrument: TOC-LCSH Analyst: WCW — Analyzed: 10/08/2020 03:42

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-15 F

Preparation Batch: BIJ0121 — Sample Size: 20 mL

Prepared: 10/05/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Organic Carbon, Dissolved		1	0.50	0.50	0.70	mg/L	

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-15 E

Preparation Batch: BIJ0296 — Sample Size: 20 mL

Prepared: 10/08/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Organic Carbon		1	0.50	0.50	0.51	mg/L	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

RC-6-WP-36-092620

20I0446-15 (Water)

Calculation

Method: SM 2340 B-97 — Sampled: 09/26/2020 13:02

Instrument: [CALC] Analyst: TCH — Analyzed: 10/09/2020 14:07

Sample Preparation: Preparation Method: [CALC] — Extract ID: 20I0446-15

Preparation Batch: [CALC]

Prepared: 10/05/2020 Final Volume: 1

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness		1	0.207	13.5	mg/L CaCO3	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

RC-6-WP-36-092620

20I0446-15RE1 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/26/2020 13:02

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/09/2020 16:23

Sample Preparation: Preparation Method: RHN EPA 600/4-79-020 4.1.4 HNO3 matrix 5x — Extract ID: 20I0446-15RE1 C 02

Preparation Batch: BIJ0194 — Sample Size: 100 mL

Prepared: 10/08/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Cadmium	7440-43-9	1	0.00600	0.0200	0.00940	ug/L	J

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

RC-1-SW-092620

20I0446-16 (Water)

Metals and Metallic Compounds

Method: EPA 6020A — Sampled: 09/26/2020 14:32

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/06/2020 06:45

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0446-16 C 01

Preparation Batch: BIJ0096 — Sample Size: 25 mL

Prepared: 10/05/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Aluminum	7429-90-5	1	2.37	20.0	82.4	ug/L	
Lead	7439-92-1	1	0.0680	0.100	0.120	ug/L	

Instrument: ICPMS2 Analyst: TCH — Analyzed: 10/09/2020 14:09

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0446-16 C 01

Preparation Batch: BIJ0096 — Sample Size: 25 mL

Prepared: 10/05/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Calcium	7440-70-2	1	1.91	50.0	4500	ug/L	
Iron	7439-89-6	1	6.27	20.0	162	ug/L	
Magnesium	7439-95-4	1	0.307	20.0	454	ug/L	
Manganese	7439-96-5	1	0.0850	0.500	3.66	ug/L	
Potassium	7440-09-7	1	1.41	20.0	480	ug/L	
Sodium	7440-23-5	1	7.18	100	705	ug/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

RC-1-SW-092620

20I0446-16 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/26/2020 14:32

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/06/2020 06:45

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0446-16 C 01

Preparation Batch: BIJ0096 — Sample Size: 25 mL

Prepared: 10/05/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Copper	7440-50-8	1	0.340	0.500	0.849	ug/L	
Zinc	7440-66-6	1	0.820	4.00	2.88	ug/L	J

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

RC-1-SW-092620

20I0446-16 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/26/2020 14:32

Instrument: IC930 Analyst: KOTT — Analyzed: 09/29/2020 09:21

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-16 B

Preparation Batch: BII0820 — Sample Size: 10 mL

Prepared: 09/28/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Chloride	16887-00-6	1	0.100	0.100	0.288	mg/L	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Nitrate-N	14797-55-8	1	0.100	0.100	ND	mg/L	H, U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Sulfate	14808-79-8	1	0.100	0.100	3.61	mg/L	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

RC-1-SW-092620

20I0446-16 (Water)

Wet Chemistry

Method: SM 2320 B-97 — Sampled: 09/26/2020 14:32

Instrument: Accumet AB150 Analyst: UW — Analyzed: 09/30/2020 13:46

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-16 D

Preparation Batch: BII0890 — Sample Size: 100 mL

Prepared: 09/30/2020 — Final Volume: 100 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Bicarbonate		1	1.00	1.00	9.69	mg/L CaCO3	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Carbonate		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Hydroxide		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Total		1	1.00	1.00	9.69	mg/L CaCO3	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

RC-1-SW-092620

20I0446-16 (Water)

Wet Chemistry

Method: SM 2540 C-97 — Sampled: 09/26/2020 14:32

Instrument: BAL2 Analyst: KLE — Analyzed: 10/01/2020 08:00

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-16

Preparation Batch: BIJ0001 — Sample Size: 200 mL

Prepared: 10/01/2020 — Final Volume: 200 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Solids		1	5	5	21	mg/L	

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Analytical Report

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

RC-1-SW-092620

20I0446-16 (Water)

Wet Chemistry

Method: SM 2540 D-97 — Sampled: 09/26/2020 14:32

Instrument: BAL2 Analyst: KLE — Analyzed: 09/30/2020 06:14

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-16

Preparation Batch: BII0867 — Sample Size: 920 mL

Prepared: 09/30/2020 — Final Volume: 1000 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Suspended Solids		1	1	1	ND	mg/L	U

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

RC-1-SW-092620

20I0446-16 (Water)

Wet Chemistry

Method: SM 5310 B-00 — Sampled: 09/26/2020 14:32

Instrument: TOC-LCSH Analyst: WCW — Analyzed: 10/08/2020 04:42

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-16 F

Preparation Batch: BIJ0121 — Sample Size: 20 mL

Prepared: 10/05/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Organic Carbon, Dissolved		1	0.50	0.50	0.88	mg/L	

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-16 E

Preparation Batch: BIJ0296 — Sample Size: 20 mL

Prepared: 10/08/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Organic Carbon		1	0.50	0.50	0.74	mg/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

RC-1-SW-092620

20I0446-16 (Water)

Calculation

Method: SM 2340 B-97 — Sampled: 09/26/2020 14:32

Instrument: [CALC] Analyst: TCH — Analyzed: 10/09/2020 14:09

Sample Preparation: Preparation Method: [CALC] — Extract ID: 20I0446-16

Preparation Batch: [CALC]

Prepared: 10/05/2020 Final Volume: 1

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness		1	0.207	13.1	mg/L CaCO3	

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Analytical Report

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

RC-1-SW-092620

20I0446-16RE1 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/26/2020 14:32

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/09/2020 16:27

Sample Preparation: Preparation Method: RHN EPA 600/4-79-020 4.1.4 HNO3 matrix 5x — Extract ID: 20I0446-16RE1 C 02

Preparation Batch: BIJ0194 — Sample Size: 100 mL

Prepared: 10/08/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Cadmium	7440-43-9	1	0.00600	0.0200	0.0172	ug/L	J

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SW-TP3-East1-SW-092620

20I0446-17 (Water)

Metals and Metallic Compounds

Method: EPA 6020A — Sampled: 09/26/2020 15:32

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/06/2020 06:50

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0446-17 C 01

Preparation Batch: BIJ0096 — Sample Size: 25 mL

Prepared: 10/05/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Aluminum	7429-90-5	1	2.37	20.0	35.5	ug/L	
Lead	7439-92-1	1	0.0680	0.100	0.0780	ug/L	J

Instrument: ICPMS2 Analyst: TCH — Analyzed: 10/09/2020 14:10

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0446-17 C 01

Preparation Batch: BIJ0096 — Sample Size: 25 mL

Prepared: 10/05/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Calcium	7440-70-2	1	1.91	50.0	10500	ug/L	
Iron	7439-89-6	1	6.27	20.0	73.5	ug/L	
Magnesium	7439-95-4	1	0.307	20.0	1510	ug/L	
Manganese	7439-96-5	1	0.0850	0.500	12.7	ug/L	
Potassium	7440-09-7	1	1.41	20.0	2530	ug/L	
Sodium	7440-23-5	1	7.18	100	1360	ug/L	

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Analytical Report

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SW-TP3-East1-SW-092620

20I0446-17 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/26/2020 15:32

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/06/2020 06:50

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0446-17 C 01

Preparation Batch: BIJ0096 — Sample Size: 25 mL

Prepared: 10/05/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Copper	7440-50-8	1	0.340	0.500	4.47	ug/L	
Zinc	7440-66-6	1	0.820	4.00	7.43	ug/L	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SW-TP3-East1-SW-092620

20I0446-17 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/26/2020 15:32

Instrument: IC930 Analyst: KOTT — Analyzed: 09/29/2020 09:41

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-17 B

Preparation Batch: BII0820 — Sample Size: 10 mL

Prepared: 09/28/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Chloride	16887-00-6	1	0.100	0.100	0.670	mg/L	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Nitrate-N	14797-55-8	1	0.100	0.100	ND	mg/L	H, U

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SW-TP3-East1-SW-092620

20I0446-17 (Water)

Wet Chemistry

Method: SM 2320 B-97 — Sampled: 09/26/2020 15:32

Instrument: Accumet AB150 Analyst: UW — Analyzed: 09/30/2020 13:46

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-17 D

Preparation Batch: BII0890 — Sample Size: 100 mL

Prepared: 09/30/2020 — Final Volume: 100 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Bicarbonate		1	1.00	1.00	20.5	mg/L CaCO3	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Carbonate		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Hydroxide		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Total		1	1.00	1.00	20.5	mg/L CaCO3	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SW-TP3-East1-SW-092620

20I0446-17 (Water)

Wet Chemistry

Method: SM 2540 C-97 — Sampled: 09/26/2020 15:32

Instrument: BAL2 Analyst: KLE — Analyzed: 10/01/2020 08:00

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-17

Preparation Batch: BIJ0001 — Sample Size: 200 mL

Prepared: 10/01/2020 — Final Volume: 200 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Solids		1	5	5	59	mg/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SW-TP3-East1-SW-092620

20I0446-17 (Water)

Wet Chemistry

Method: SM 2540 D-97 — Sampled: 09/26/2020 15:32

Instrument: BAL2 Analyst: KLE — Analyzed: 09/30/2020 06:14

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-17

Preparation Batch: BII0867 — Sample Size: 950 mL

Prepared: 09/30/2020 — Final Volume: 1000 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Suspended Solids		1	1	1	ND	mg/L	U

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SW-TP3-East1-SW-092620

20I0446-17 (Water)

Wet Chemistry

Method: SM 5310 B-00 — Sampled: 09/26/2020 15:32

Instrument: TOC-LCSH Analyst: WCW — Analyzed: 10/08/2020 05:08

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-17 F

Preparation Batch: BIJ0121 — Sample Size: 20 mL

Prepared: 10/05/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Organic Carbon, Dissolved		1	0.50	0.50	3.22	mg/L	

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-17 E

Preparation Batch: BIJ0296 — Sample Size: 20 mL

Prepared: 10/08/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Organic Carbon		1	0.50	0.50	3.24	mg/L	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SW-TP3-East1-SW-092620

20I0446-17 (Water)

Calculation

Method: SM 2340 B-97 — Sampled: 09/26/2020 15:32

Instrument: [CALC] Analyst: TCH — Analyzed: 10/09/2020 14:10

Sample Preparation: Preparation Method: [CALC] — Extract ID: 20I0446-17

Preparation Batch: [CALC]

Prepared: 10/05/2020 Final Volume: 1

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness		1	0.207	32.5	mg/L CaCO3	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SW-TP3-East1-SW-092620

20I0446-17RE1 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/26/2020 15:32

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/09/2020 16:31

Sample Preparation: Preparation Method: RHN EPA 600/4-79-020 4.1.4 HNO3 matrix 5x — Extract ID: 20I0446-17RE1 C 02

Preparation Batch: BIJ0194 — Sample Size: 100 mL

Prepared: 10/08/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Cadmium	7440-43-9	1	0.00600	0.0200	0.0398	ug/L	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SW-TP3-East1-SW-092620

20I0446-17RE1 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/26/2020 15:32

Instrument: IC930 Analyst: KOTT — Analyzed: 09/29/2020 18:21

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-17RE1 B

Preparation Batch: BII0820 — Sample Size: 10 mL

Prepared: 09/28/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Sulfate	14808-79-8	4	0.400	0.400	18.1	mg/L	D

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SW-TP3-East2-SW-092620

20I0446-18 (Water)

Metals and Metallic Compounds

Method: EPA 6020A — Sampled: 09/26/2020 15:31

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/06/2020 06:55

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0446-18 C 01

Preparation Batch: BIJ0096 — Sample Size: 25 mL

Prepared: 10/05/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Aluminum	7429-90-5	1	2.37	20.0	537	ug/L	
Lead	7439-92-1	1	0.0680	0.100	0.199	ug/L	

Instrument: ICPMS2 Analyst: TCH — Analyzed: 10/09/2020 14:12

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0446-18 C 01

Preparation Batch: BIJ0096 — Sample Size: 25 mL

Prepared: 10/05/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Iron	7439-89-6	1	6.27	20.0	6460	ug/L	
Magnesium	7439-95-4	1	0.307	20.0	4710	ug/L	
Potassium	7440-09-7	1	1.41	20.0	3110	ug/L	
Sodium	7440-23-5	1	7.18	100	2470	ug/L	

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Analytical Report

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SW-TP3-East2-SW-092620

20I0446-18 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/26/2020 15:31

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/06/2020 06:55

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0446-18 C 01

Preparation Batch: BIJ0096 — Sample Size: 25 mL

Prepared: 10/05/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Cadmium	7440-43-9	1	0.0300	0.100	0.460	ug/L	
Copper	7440-50-8	1	0.340	0.500	5.23	ug/L	
Zinc	7440-66-6	1	0.940	4.00	88.8	ug/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SW-TP3-East2-SW-092620

20I0446-18 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/26/2020 15:31

Instrument: IC930 Analyst: KOTT — Analyzed: 09/29/2020 10:01

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-18 B

Preparation Batch: BII0820 — Sample Size: 10 mL

Prepared: 09/28/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Chloride	16887-00-6	1	0.100	0.100	0.253	mg/L	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Nitrate-N	14797-55-8	1	0.100	0.100	ND	mg/L	H, U

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SW-TP3-East2-SW-092620

20I0446-18 (Water)

Wet Chemistry

Method: SM 2320 B-97 — Sampled: 09/26/2020 15:31

Instrument: Accumet AB150 Analyst: UW — Analyzed: 09/30/2020 13:46

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-18 D

Preparation Batch: BII0890 — Sample Size: 100 mL

Prepared: 09/30/2020 — Final Volume: 100 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Bicarbonate		1	1.00	1.00	7.04	mg/L CaCO3	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Carbonate		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Hydroxide		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Total		1	1.00	1.00	7.04	mg/L CaCO3	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SW-TP3-East2-SW-092620

20I0446-18 (Water)

Wet Chemistry

Method: SM 2540 C-97 — Sampled: 09/26/2020 15:31

Instrument: BAL2 Analyst: KLE — Analyzed: 10/01/2020 08:00

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-18

Preparation Batch: BIJ0001 — Sample Size: 200 mL

Prepared: 10/01/2020 — Final Volume: 200 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Solids		1	5	5	210	mg/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SW-TP3-East2-SW-092620

20I0446-18 (Water)

Wet Chemistry

Method: SM 2540 D-97 — Sampled: 09/26/2020 15:31

Instrument: BAL2 Analyst: KLE — Analyzed: 09/30/2020 06:14

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-18

Preparation Batch: BII0867 — Sample Size: 890 mL

Prepared: 09/30/2020 — Final Volume: 1000 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Suspended Solids		1	1	1	6	mg/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SW-TP3-East2-SW-092620

20I0446-18 (Water)

Wet Chemistry

Method: SM 5310 B-00 — Sampled: 09/26/2020 15:31

Instrument: TOC-LCSH Analyst: WCW — Analyzed: 10/08/2020 05:26

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-18 F

Preparation Batch: BIJ0121 — Sample Size: 20 mL

Prepared: 10/05/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Organic Carbon, Dissolved		1	0.50	0.50	1.07	mg/L	

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-18 E

Preparation Batch: BIJ0296 — Sample Size: 20 mL

Prepared: 10/08/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Organic Carbon		1	0.50	0.50	1.17	mg/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SW-TP3-East2-SW-092620

20I0446-18 (Water)

Calculation

Method: SM 2340 B-97 — Sampled: 09/26/2020 15:31

Instrument: [CALC] Analyst: TCH — Analyzed: 10/09/2020 14:12

Sample Preparation: Preparation Method: [CALC] — Extract ID: 20I0446-18

Preparation Batch: [CALC]

Prepared: 10/05/2020 Final Volume: 1

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness		1	0.207	105	mg/L CaCO3	

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Analytical Report

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SW-TP3-East2-SW-092620

20I0446-18RE1 (Water)

Metals and Metallic Compounds

Method: EPA 6020A — Sampled: 09/26/2020 15:31

Instrument: ICPMS2 Analyst: TCH — Analyzed: 10/09/2020 14:42

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0446-18RE1 C 01

Preparation Batch: BIJ0096 — Sample Size: 25 mL

Prepared: 10/05/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Calcium	7440-70-2	10	19.1	500	38200	ug/L	D
Manganese	7439-96-5	10	0.850	5.00	789	ug/L	D

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SW-TP3-East2-SW-092620

20I0446-18RE1 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/26/2020 15:31

Instrument: IC930 Analyst: KOTT — Analyzed: 09/29/2020 18:40

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-18RE1 B

Preparation Batch: BII0820 — Sample Size: 10 mL

Prepared: 09/28/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Sulfate	14808-79-8	23	2.30	2.30	110	mg/L	D

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SW-TP3-East2-SW-092620

20I0446-18RE1 (Water)

Calculation

Method: SM 2340 B-97 — Sampled: 09/26/2020 15:31

Instrument: [CALC] Analyst: TCH — Analyzed: 10/09/2020 14:42

Sample Preparation: Preparation Method: [CALC]
Preparation Batch: [CALC]
Prepared: 10/05/2020 Final Volume: 1

Extract ID: 20I0446-18RE1

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness		10	1.25	95.4	mg/L CaCO3	

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Analytical Report

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

RC-15E-SW-092620

20I0446-19 (Water)

Metals and Metallic Compounds

Method: EPA 6020A — Sampled: 09/26/2020 13:00

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/06/2020 07:20

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0446-19 C 01

Preparation Batch: BIJ0096 — Sample Size: 25 mL

Prepared: 10/05/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Aluminum	7429-90-5	1	2.37	20.0	61.5	ug/L	
Lead	7439-92-1	1	0.0680	0.100	0.0830	ug/L	J

Instrument: ICPMS2 Analyst: TCH — Analyzed: 10/09/2020 14:14

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0446-19 C 01

Preparation Batch: BIJ0096 — Sample Size: 25 mL

Prepared: 10/05/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Calcium	7440-70-2	1	1.91	50.0	6920	ug/L	
Iron	7439-89-6	1	6.27	20.0	123	ug/L	
Magnesium	7439-95-4	1	0.307	20.0	704	ug/L	
Manganese	7439-96-5	1	0.0850	0.500	9.01	ug/L	
Potassium	7440-09-7	1	1.41	20.0	595	ug/L	
Sodium	7440-23-5	1	7.18	100	860	ug/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

RC-15E-SW-092620

20I0446-19 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/26/2020 13:00

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/06/2020 07:20

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0446-19 C 01

Preparation Batch: BIJ0096 — Sample Size: 25 mL

Prepared: 10/05/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Copper	7440-50-8	1	0.340	0.500	1.04	ug/L	
Zinc	7440-66-6	1	0.820	4.00	5.25	ug/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

RC-15E-SW-092620

20I0446-19 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/26/2020 13:00

Instrument: IC930 Analyst: KOTT — Analyzed: 09/29/2020 10:21

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-19 B

Preparation Batch: BII0820 — Sample Size: 10 mL

Prepared: 09/28/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Chloride	16887-00-6	1	0.100	0.100	0.276	mg/L	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Nitrate-N	14797-55-8	1	0.100	0.100	ND	mg/L	H, U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Sulfate	14808-79-8	1	0.100	0.100	8.48	mg/L	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

RC-15E-SW-092620

20I0446-19 (Water)

Wet Chemistry

Method: SM 2320 B-97 — Sampled: 09/26/2020 13:00

Instrument: Accumet AB150 Analyst: UW — Analyzed: 09/30/2020 13:46

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-19 D

Preparation Batch: BII0890 — Sample Size: 100 mL

Prepared: 09/30/2020 — Final Volume: 100 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Bicarbonate		1	1.00	1.00	12.2	mg/L CaCO3	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Carbonate		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Hydroxide		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Total		1	1.00	1.00	12.2	mg/L CaCO3	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

RC-15E-SW-092620

20I0446-19 (Water)

Wet Chemistry

Method: SM 2540 C-97 — Sampled: 09/26/2020 13:00

Instrument: BAL2 Analyst: KLE — Analyzed: 10/01/2020 08:00

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-19

Preparation Batch: BIJ0001 — Sample Size: 200 mL

Prepared: 10/01/2020 — Final Volume: 200 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Solids		1	5	5	25	mg/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

RC-15E-SW-092620

20I0446-19 (Water)

Wet Chemistry

Method: SM 2540 D-97 — Sampled: 09/26/2020 13:00

Instrument: BAL2 Analyst: KLE — Analyzed: 09/30/2020 06:14

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-19

Preparation Batch: BII0867 — Sample Size: 940 mL

Prepared: 09/30/2020 — Final Volume: 1000 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Suspended Solids		1	1	1	ND	mg/L	U

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

RC-15E-SW-092620

20I0446-19 (Water)

Wet Chemistry

Method: SM 5310 B-00 — Sampled: 09/26/2020 13:00

Instrument: TOC-LCSH Analyst: WCW — Analyzed: 10/08/2020 05:47

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-19 F

Preparation Batch: BIJ0121 — Sample Size: 20 mL

Prepared: 10/05/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Organic Carbon, Dissolved		1	0.50	0.50	0.90	mg/L	

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-19 E

Preparation Batch: BIJ0296 — Sample Size: 20 mL

Prepared: 10/08/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Organic Carbon		1	0.50	0.50	0.72	mg/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

RC-15E-SW-092620

20I0446-19 (Water)

Calculation

Method: SM 2340 B-97 — Sampled: 09/26/2020 13:00

Instrument: [CALC] Analyst: TCH — Analyzed: 10/09/2020 14:14

Sample Preparation: Preparation Method: [CALC]; Preparation Batch: [CALC]; Prepared: 10/05/2020; Final Volume: 1 — Extract ID: 20I0446-19

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness		1	0.207	20.2	mg/L CaCO3	

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Analytical Report

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

RC-15E-SW-092620

20I0446-19RE1 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/26/2020 13:00

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/09/2020 16:35

Sample Preparation: Preparation Method: RHN EPA 600/4-79-020 4.1.4 HNO3 matrix 5x — Extract ID: 20I0446-19RE1 C 02

Preparation Batch: BIJ0194 — Sample Size: 100 mL

Prepared: 10/08/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Cadmium	7440-43-9	1	0.00600	0.0200	0.0368	ug/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

RC-10-SW-092620

20I0446-20 (Water)

Metals and Metallic Compounds

Method: EPA 6020A — Sampled: 09/26/2020 14:00
Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/06/2020 07:25

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0446-20 C 01
Preparation Batch: BIJ0096 — Sample Size: 25 mL
Prepared: 10/05/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Aluminum	7429-90-5	1	2.37	20.0	64.3	ug/L	
Lead	7439-92-1	1	0.0680	0.100	0.0910	ug/L	J

Instrument: ICPMS2 Analyst: TCH — Analyzed: 10/09/2020 14:15

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0446-20 C 01
Preparation Batch: BIJ0096 — Sample Size: 25 mL
Prepared: 10/05/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Calcium	7440-70-2	1	1.91	50.0	6890	ug/L	
Iron	7439-89-6	1	6.27	20.0	136	ug/L	
Magnesium	7439-95-4	1	0.307	20.0	695	ug/L	
Manganese	7439-96-5	1	0.0850	0.500	10.3	ug/L	
Potassium	7440-09-7	1	1.41	20.0	604	ug/L	
Sodium	7440-23-5	1	7.18	100	853	ug/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

RC-10-SW-092620

20I0446-20 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/26/2020 14:00

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/06/2020 07:25

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0446-20 C 01

Preparation Batch: BIJ0096 — Sample Size: 25 mL

Prepared: 10/05/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Copper	7440-50-8	1	0.340	0.500	1.02	ug/L	
Zinc	7440-66-6	1	0.820	4.00	5.41	ug/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

RC-10-SW-092620

20I0446-20 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/26/2020 14:00

Instrument: IC930 Analyst: KOTT — Analyzed: 09/29/2020 10:41

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-20 B

Preparation Batch: BII0820 — Sample Size: 10 mL

Prepared: 09/28/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Chloride	16887-00-6	1	0.100	0.100	0.276	mg/L	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Nitrate-N	14797-55-8	1	0.100	0.100	ND	mg/L	H, U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Sulfate	14808-79-8	1	0.100	0.100	8.65	mg/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

RC-10-SW-092620

20I0446-20 (Water)

Wet Chemistry

Method: SM 2320 B-97 — Sampled: 09/26/2020 14:00

Instrument: Accumet AB150 Analyst: UW — Analyzed: 09/30/2020 13:46

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-20 D

Preparation Batch: BII0890 — Sample Size: 100 mL

Prepared: 09/30/2020 — Final Volume: 100 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Bicarbonate		1	1.00	1.00	12.2	mg/L CaCO3	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Carbonate		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Hydroxide		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Total		1	1.00	1.00	12.2	mg/L CaCO3	

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Analytical Report

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

RC-10-SW-092620

20I0446-20 (Water)

Wet Chemistry

Method: SM 2540 C-97 — Sampled: 09/26/2020 14:00

Instrument: BAL2 Analyst: KLE — Analyzed: 10/01/2020 08:00

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-20

Preparation Batch: BIJ0001 — Sample Size: 200 mL

Prepared: 10/01/2020 — Final Volume: 200 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Solids		1	5	5	21	mg/L	

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Analytical Chemists and Consultants

Analytical Report

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

RC-10-SW-092620

20I0446-20 (Water)

Wet Chemistry

Method: SM 2540 D-97 — Sampled: 09/26/2020 14:00

Instrument: BAL2 Analyst: KLE — Analyzed: 09/30/2020 06:14

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-20

Preparation Batch: BII0867 — Sample Size: 940 mL

Prepared: 09/30/2020 — Final Volume: 1000 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Suspended Solids		1	1	1	1	mg/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

RC-10-SW-092620

20I0446-20 (Water)

Wet Chemistry

Method: SM 5310 B-00 — Sampled: 09/26/2020 14:00

Instrument: TOC-LCSH Analyst: WCW — Analyzed: 10/08/2020 06:05

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-20 F

Preparation Batch: BIJ0121 — Sample Size: 20 mL

Prepared: 10/05/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Organic Carbon, Dissolved		1	0.50	0.50	0.83	mg/L	

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-20 E

Preparation Batch: BIJ0296 — Sample Size: 20 mL

Prepared: 10/08/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Organic Carbon		1	0.50	0.50	0.69	mg/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

RC-10-SW-092620

20I0446-20 (Water)

Calculation

Method: SM 2340 B-97 — Sampled: 09/26/2020 14:00

Instrument: [CALC] Analyst: TCH — Analyzed: 10/09/2020 14:15

Sample Preparation: Preparation Method: [CALC] — Extract ID: 20I0446-20

Preparation Batch: [CALC]

Prepared: 10/05/2020 Final Volume: 1

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness		1	0.207	20.1	mg/L CaCO3	

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Analytical Report

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

RC-10-SW-092620

20I0446-20RE1 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/26/2020 14:00

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/09/2020 16:39

Sample Preparation: Preparation Method: RHN EPA 600/4-79-020 4.1.4 HNO3 matrix 5x — Extract ID: 20I0446-20RE1 C 02

Preparation Batch: BIJ0194 — Sample Size: 100 mL

Prepared: 10/08/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Cadmium	7440-43-9	1	0.00600	0.0200	0.0372	ug/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-12R-SW-092620

20I0446-21 (Water)

Metals and Metallic Compounds

Method: EPA 6020A — Sampled: 09/26/2020 15:00
Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/07/2020 00:38

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0446-21 C 01
Preparation Batch: BIJ0139 — Sample Size: 25 mL
Prepared: 10/06/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Aluminum	7429-90-5	1	2.37	20.0	78.1	ug/L	
Lead	7439-92-1	1	0.0680	0.100	0.100	ug/L	

Instrument: ICPMS2 Analyst: TCH — Analyzed: 10/09/2020 12:24

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0446-21 C 01
Preparation Batch: BIJ0139 — Sample Size: 25 mL
Prepared: 10/06/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Calcium	7440-70-2	1	1.91	50.0	6860	ug/L	
Iron	7439-89-6	1	6.27	20.0	164	ug/L	
Magnesium	7439-95-4	1	0.307	20.0	708	ug/L	
Manganese	7439-96-5	1	0.0850	0.500	13.7	ug/L	
Potassium	7440-09-7	1	1.41	20.0	606	ug/L	
Sodium	7440-23-5	1	7.18	100	862	ug/L	

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Analytical Report

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-12R-SW-092620

20I0446-21 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/26/2020 15:00

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/07/2020 00:38

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0446-21 C 01

Preparation Batch: BIJ0139 — Sample Size: 25 mL

Prepared: 10/06/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Copper	7440-50-8	1	0.340	0.500	1.06	ug/L	
Zinc	7440-66-6	1	0.820	4.00	7.10	ug/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-12R-SW-092620

20I0446-21 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/26/2020 15:00

Instrument: IC930 Analyst: KOTT — Analyzed: 09/29/2020 12:01

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-21 B

Preparation Batch: BII0820 — Sample Size: 10 mL

Prepared: 09/28/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Chloride	16887-00-6	1	0.100	0.100	0.276	mg/L	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Nitrate-N	14797-55-8	1	0.100	0.100	ND	mg/L	H, U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Sulfate	14808-79-8	1	0.100	0.100	9.30	mg/L	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-12R-SW-092620

20I0446-21 (Water)

Wet Chemistry

Method: SM 2320 B-97 — Sampled: 09/26/2020 15:00

Instrument: Accumet AB150 Analyst: UW — Analyzed: 09/30/2020 13:46

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-21 D

Preparation Batch: BII0890 — Sample Size: 100 mL

Prepared: 09/30/2020 — Final Volume: 100 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Bicarbonate		1	1.00	1.00	11.5	mg/L CaCO3	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Carbonate		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Hydroxide		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Total		1	1.00	1.00	11.5	mg/L CaCO3	

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Analytical Report

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-12R-SW-092620

20I0446-21 (Water)

Wet Chemistry

Method: SM 2540 C-97 — Sampled: 09/26/2020 15:00

Instrument: BAL2 Analyst: KLE — Analyzed: 10/01/2020 08:08

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-21

Preparation Batch: BIJ0002 — Sample Size: 200 mL

Prepared: 10/01/2020 — Final Volume: 200 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Solids		1	5	5	13	mg/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-12R-SW-092620

20I0446-21 (Water)

Wet Chemistry

Method: SM 2540 D-97 — Sampled: 09/26/2020 15:00

Instrument: BAL2 Analyst: KLE — Analyzed: 09/30/2020 06:58

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-21

Preparation Batch: BII0869 — Sample Size: 940 mL

Prepared: 09/30/2020 — Final Volume: 1000 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Suspended Solids		1	1	1	1	mg/L	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-12R-SW-092620

20I0446-21 (Water)

Wet Chemistry

Method: SM 5310 B-00 — Sampled: 09/26/2020 15:00

Instrument: TOC-LCSH Analyst: WCW — Analyzed: 10/08/2020 07:28

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-21 F

Preparation Batch: BIJ0123 — Sample Size: 20 mL

Prepared: 10/05/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Organic Carbon, Dissolved		1	0.50	0.50	0.72	mg/L	

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-21 E

Preparation Batch: BIJ0297 — Sample Size: 20 mL

Prepared: 10/08/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Organic Carbon		1	0.50	0.50	0.76	mg/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-12R-SW-092620

20I0446-21 (Water)

Calculation

Method: SM 2340 B-97 — Sampled: 09/26/2020 15:00

Instrument: [CALC] Analyst: TCH — Analyzed: 10/09/2020 12:24

Sample Preparation: Preparation Method: [CALC] — Extract ID: 20I0446-21

Preparation Batch: [CALC]

Prepared: 10/06/2020 Final Volume: 1

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness		1	0.207	20.0	mg/L CaCO3	

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Analytical Report

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-12R-SW-092620

20I0446-21RE1 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/26/2020 15:00

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/09/2020 16:43

Sample Preparation: Preparation Method: RHN EPA 600/4-79-020 4.1.4 HNO3 matrix 5x — Extract ID: 20I0446-21RE1 C 02

Preparation Batch: BIJ0194 — Sample Size: 100 mL

Prepared: 10/08/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Cadmium	7440-43-9	1	0.00600	0.0200	0.0378	ug/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-13-SW-092620

20I0446-22 (Water)

Metals and Metallic Compounds

Method: EPA 6020A — Sampled: 09/26/2020 16:00
Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/07/2020 00:42

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0446-22 C 01
Preparation Batch: BIJ0139 — Sample Size: 25 mL
Prepared: 10/06/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Aluminum	7429-90-5	1	2.37	20.0	81.4	ug/L	
Lead	7439-92-1	1	0.0680	0.100	0.106	ug/L	

Instrument: ICPMS2 Analyst: TCH — Analyzed: 10/09/2020 12:26

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0446-22 C 01
Preparation Batch: BIJ0139 — Sample Size: 25 mL
Prepared: 10/06/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Calcium	7440-70-2	1	1.91	50.0	6820	ug/L	
Iron	7439-89-6	1	6.27	20.0	159	ug/L	
Magnesium	7439-95-4	1	0.307	20.0	667	ug/L	
Manganese	7439-96-5	1	0.0850	0.500	13.9	ug/L	
Potassium	7440-09-7	1	1.41	20.0	601	ug/L	
Sodium	7440-23-5	1	7.18	100	823	ug/L	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-13-SW-092620

20I0446-22 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/26/2020 16:00

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/07/2020 00:42

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0446-22 C 01

Preparation Batch: BIJ0139 — Sample Size: 25 mL

Prepared: 10/06/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Copper	7440-50-8	1	0.340	0.500	1.18	ug/L	
Zinc	7440-66-6	1	0.820	4.00	7.02	ug/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-13-SW-092620

20I0446-22 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/26/2020 16:00
Instrument: IC930 Analyst: KOTT — Analyzed: 09/29/2020 12:21

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-22 B
Preparation Batch: BII0820 — Sample Size: 10 mL
Prepared: 09/28/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Chloride	16887-00-6	1	0.100	0.100	0.274	mg/L	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Nitrate-N	14797-55-8	1	0.100	0.100	ND	mg/L	H, U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Sulfate	14808-79-8	1	0.100	0.100	9.84	mg/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-13-SW-092620

20I0446-22 (Water)

Wet Chemistry

Method: SM 2320 B-97 — Sampled: 09/26/2020 16:00
Instrument: Accumet AB150 Analyst: UW — Analyzed: 09/30/2020 13:46

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-22 D
Preparation Batch: BII0890 — Sample Size: 100 mL
Prepared: 09/30/2020 — Final Volume: 100 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Bicarbonate		1	1.00	1.00	11.9	mg/L CaCO3	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Carbonate		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Hydroxide		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Total		1	1.00	1.00	11.9	mg/L CaCO3	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-13-SW-092620

20I0446-22 (Water)

Wet Chemistry

Method: SM 2540 C-97 — Sampled: 09/26/2020 16:00

Instrument: BAL2 Analyst: KLE — Analyzed: 10/01/2020 08:08

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-22

Preparation Batch: BIJ0002 — Sample Size: 200 mL

Prepared: 10/01/2020 — Final Volume: 200 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Solids		1	5	5	26	mg/L	

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Analytical Resources, Incorporated
Analytical Chemists and Consultants

Analytical Report

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-13-SW-092620

20I0446-22 (Water)

Wet Chemistry

Method: SM 2540 D-97 — Sampled: 09/26/2020 16:00

Instrument: BAL2 Analyst: KLE — Analyzed: 09/30/2020 06:58

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-22

Preparation Batch: BII0869 — Sample Size: 940 mL

Prepared: 09/30/2020 — Final Volume: 1000 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Suspended Solids		1	1	1	2	mg/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-13-SW-092620

20I0446-22 (Water)

Wet Chemistry

Method: SM 5310 B-00 — Sampled: 09/26/2020 16:00

Instrument: TOC-LCSH Analyst: WCW — Analyzed: 10/08/2020 07:49

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-22 F

Preparation Batch: BIJ0123 — Sample Size: 20 mL

Prepared: 10/05/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Organic Carbon, Dissolved		1	0.50	0.50	0.75	mg/L	

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-22 E

Preparation Batch: BIJ0297 — Sample Size: 20 mL

Prepared: 10/08/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Organic Carbon		1	0.50	0.50	0.73	mg/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-13-SW-092620

20I0446-22 (Water)

Calculation

Method: SM 2340 B-97 — Sampled: 09/26/2020 16:00

Instrument: [CALC] Analyst: TCH — Analyzed: 10/09/2020 12:26

Sample Preparation: Preparation Method: [CALC] — Extract ID: 20I0446-22

Preparation Batch: [CALC]

Prepared: 10/06/2020 Final Volume: 1

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness		1	0.207	19.8	mg/L CaCO3	

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Analytical Report

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-13-SW-092620

20I0446-22RE1 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/26/2020 16:00

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/09/2020 16:48

Sample Preparation: Preparation Method: RHN EPA 600/4-79-020 4.1.4 HNO3 matrix 5x — Extract ID: 20I0446-22RE1 C 02

Preparation Batch: BIJ0194 — Sample Size: 100 mL

Prepared: 10/08/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Cadmium	7440-43-9	1	0.00600	0.0200	0.0432	ug/L	

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Analytical Report

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

RC-4-SW-092620

20I0446-23 (Water)

Metals and Metallic Compounds

Method: EPA 6020A — Sampled: 09/26/2020 13:45

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/07/2020 01:37

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0446-23 I 01

Preparation Batch: BIJ0139 Sample Size: 25 mL

Prepared: 10/06/2020 Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Aluminum	7429-90-5	1	2.37	20.0	86.7	ug/L	
Lead	7439-92-1	1	0.0680	0.100	0.120	ug/L	

Instrument: ICPMS2 Analyst: TCH — Analyzed: 10/09/2020 12:57

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0446-23 I 01

Preparation Batch: BIJ0139 Sample Size: 25 mL

Prepared: 10/06/2020 Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Calcium	7440-70-2	1	1.91	50.0	4780	ug/L	
Iron	7439-89-6	1	6.27	20.0	170	ug/L	
Magnesium	7439-95-4	1	0.307	20.0	482	ug/L	
Manganese	7439-96-5	1	0.0850	0.500	4.45	ug/L	
Potassium	7440-09-7	1	1.41	20.0	500	ug/L	
Sodium	7440-23-5	1	7.18	100	745	ug/L	

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Analytical Report

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

RC-4-SW-092620

20I0446-23 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/26/2020 13:45

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/07/2020 01:37

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0446-23 I 01

Preparation Batch: BIJ0139 — Sample Size: 25 mL

Prepared: 10/06/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Copper	7440-50-8	1	0.340	0.500	1.04	ug/L	
Zinc	7440-66-6	1	0.820	4.00	2.88	ug/L	J

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

RC-4-SW-092620

20I0446-23 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/26/2020 13:45

Instrument: IC930 Analyst: KOTT — Analyzed: 09/29/2020 12:41

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-23 G

Preparation Batch: BII0820 — Sample Size: 10 mL

Prepared: 09/28/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Chloride	16887-00-6	1	0.100	0.100	0.299	mg/L	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Nitrate-N	14797-55-8	1	0.100	0.100	ND	mg/L	H, U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Sulfate	14808-79-8	1	0.100	0.100	3.89	mg/L	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

RC-4-SW-092620

20I0446-23 (Water)

Wet Chemistry

Method: SM 2320 B-97 — Sampled: 09/26/2020 13:45

Instrument: Accumet AB150 Analyst: UW — Analyzed: 10/01/2020 09:49

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-23 J

Preparation Batch: BIJ0014 — Sample Size: 100 mL

Prepared: 10/01/2020 — Final Volume: 100 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Bicarbonate		1	1.00	1.00	9.48	mg/L CaCO3	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Carbonate		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Hydroxide		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Total		1	1.00	1.00	9.48	mg/L CaCO3	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

RC-4-SW-092620

20I0446-23 (Water)

Wet Chemistry

Method: SM 2540 C-97 — Sampled: 09/26/2020 13:45

Instrument: BAL2 Analyst: KLE — Analyzed: 10/01/2020 08:08

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-23

Preparation Batch: BIJ0002 — Sample Size: 200 mL

Prepared: 10/01/2020 — Final Volume: 200 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Solids		1	5	5	9	mg/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

RC-4-SW-092620

20I0446-23 (Water)

Wet Chemistry

Method: SM 2540 D-97 — Sampled: 09/26/2020 13:45

Instrument: BAL2 Analyst: KLE — Analyzed: 09/30/2020 06:58

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-23

Preparation Batch: BII0869 — Sample Size: 910 mL

Prepared: 09/30/2020 — Final Volume: 1000 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Suspended Solids		1	1	1	1	mg/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

RC-4-SW-092620

20I0446-23 (Water)

Wet Chemistry

Method: SM 5310 B-00 — Sampled: 09/26/2020 13:45

Instrument: TOC-LCSH Analyst: WCW — Analyzed: 10/08/2020 08:53

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-23 F

Preparation Batch: BIJ0123 — Sample Size: 20 mL

Prepared: 10/05/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Organic Carbon, Dissolved		1	0.50	0.50	0.67	mg/L	

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-23 E

Preparation Batch: BIJ0297 — Sample Size: 20 mL

Prepared: 10/08/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Organic Carbon		1	0.50	0.50	0.69	mg/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

RC-4-SW-092620

20I0446-23 (Water)

Calculation

Method: SM 2340 B-97 — Sampled: 09/26/2020 13:45

Instrument: [CALC] Analyst: TCH — Analyzed: 10/09/2020 12:57

Sample Preparation: Preparation Method: [CALC] — Extract ID: 20I0446-23

Preparation Batch: [CALC]

Prepared: 10/06/2020 Final Volume: 1

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness		1	0.207	13.9	mg/L CaCO3	

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Analytical Report

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

RC-4-SW-092620

20I0446-23RE1 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/26/2020 13:45

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/09/2020 16:53

Sample Preparation: Preparation Method: RHN EPA 600/4-79-020 4.1.4 HNO3 matrix 5x — Extract ID: 20I0446-23RE1 I 02

Preparation Batch: BIJ0194 — Sample Size: 100 mL

Prepared: 10/08/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Cadmium	7440-43-9	1	0.00600	0.0200	0.0254	ug/L	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

US-1I-GW-092620

20I0446-24 (Water)

Metals and Metallic Compounds

Method: EPA 6020A — Sampled: 09/26/2020 10:40

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/07/2020 00:46

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0446-24 C 01

Preparation Batch: BIJ0139 — Sample Size: 25 mL

Prepared: 10/06/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Aluminum	7429-90-5	1	2.37	20.0	2.85	ug/L	J
Lead	7439-92-1	1	0.0680	0.100	ND	ug/L	U

Instrument: ICPMS2 Analyst: TCH — Analyzed: 10/09/2020 12:27

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0446-24 C 01

Preparation Batch: BIJ0139 — Sample Size: 25 mL

Prepared: 10/06/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Calcium	7440-70-2	1	1.91	50.0	14300	ug/L	
Iron	7439-89-6	1	6.27	20.0	ND	ug/L	U
Magnesium	7439-95-4	1	0.307	20.0	1400	ug/L	
Manganese	7439-96-5	1	0.0850	0.500	ND	ug/L	U
Potassium	7440-09-7	1	1.41	20.0	728	ug/L	
Sodium	7440-23-5	1	7.18	100	1510	ug/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

US-1I-GW-092620

20I0446-24 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/26/2020 10:40

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/07/2020 00:46

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0446-24 C 01

Preparation Batch: BIJ0139 — Sample Size: 25 mL

Prepared: 10/06/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Copper	7440-50-8	1	0.340	0.500	ND	ug/L	U
Zinc	7440-66-6	1	0.820	4.00	1.28	ug/L	J

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

US-1I-GW-092620

20I0446-24 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/26/2020 10:40
Instrument: IC930 Analyst: KOTT — Analyzed: 09/29/2020 14:01

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-24 B
Preparation Batch: BII0820 — Sample Size: 10 mL
Prepared: 09/28/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Chloride	16887-00-6	1	0.100	0.100	0.455	mg/L	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Nitrate-N	14797-55-8	1	0.100	0.100	0.143	mg/L	H

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Sulfate	14808-79-8	1	0.100	0.100	9.35	mg/L	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

US-1I-GW-092620

20I0446-24 (Water)

Wet Chemistry

Method: SM 2320 B-97 — Sampled: 09/26/2020 10:40

Instrument: Accumet AB150 Analyst: UW — Analyzed: 10/01/2020 09:49

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-24 D

Preparation Batch: BIJ0014 — Sample Size: 100 mL

Prepared: 10/01/2020 — Final Volume: 100 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Bicarbonate		1	1.00	1.00	35.9	mg/L CaCO3	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Carbonate		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Hydroxide		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Total		1	1.00	1.00	35.9	mg/L CaCO3	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

US-1I-GW-092620

20I0446-24 (Water)

Wet Chemistry

Method: SM 2540 C-97 — Sampled: 09/26/2020 10:40

Instrument: BAL2 Analyst: KLE — Analyzed: 10/01/2020 08:08

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-24

Preparation Batch: BIJ0002 — Sample Size: 200 mL

Prepared: 10/01/2020 — Final Volume: 200 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Solids		1	5	5	50	mg/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

US-1I-GW-092620

20I0446-24 (Water)

Wet Chemistry

Method: SM 2540 D-97 — Sampled: 09/26/2020 10:40

Instrument: BAL2 Analyst: KLE — Analyzed: 09/30/2020 06:58

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-24

Preparation Batch: BII0869 — Sample Size: 930 mL

Prepared: 09/30/2020 — Final Volume: 1000 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Suspended Solids		1	1	1	ND	mg/L	U

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

US-1I-GW-092620

20I0446-24 (Water)

Wet Chemistry

Method: SM 5310 B-00 — Sampled: 09/26/2020 10:40

Instrument: TOC-LCSH Analyst: WCW — Analyzed: 10/08/2020 10:17

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-24 F

Preparation Batch: BIJ0123 — Sample Size: 20 mL

Prepared: 10/05/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Organic Carbon, Dissolved		1	0.50	0.50	ND	mg/L	U

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-24 E

Preparation Batch: BIJ0297 — Sample Size: 20 mL

Prepared: 10/08/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Organic Carbon		1	0.50	0.50	ND	mg/L	U

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

US-1I-GW-092620

20I0446-24 (Water)

Calculation

Method: SM 2340 B-97 — Sampled: 09/26/2020 10:40

Instrument: [CALC] Analyst: TCH — Analyzed: 10/09/2020 12:27

Sample Preparation: Preparation Method: [CALC] — Extract ID: 20I0446-24

Preparation Batch: [CALC]

Prepared: 10/06/2020 Final Volume: 1

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness		1	0.207	41.4	mg/L CaCO3	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

US-1I-GW-092620

20I0446-24RE1 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/26/2020 10:40

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/09/2020 17:13

Sample Preparation: Preparation Method: RHN EPA 600/4-79-020 4.1.4 HNO3 matrix 5x — Extract ID: 20I0446-24RE1 C 02

Preparation Batch: BIJ0194 — Sample Size: 100 mL

Prepared: 10/08/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Cadmium	7440-43-9	1	0.00600	0.0200	0.0236	ug/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

HBKG-2-GW-092620

20I0446-25 (Water)

Metals and Metallic Compounds

Method: EPA 6020A — Sampled: 09/26/2020 11:55
Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/07/2020 00:51

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0446-25 C 01
Preparation Batch: BIJ0139 — Sample Size: 25 mL
Prepared: 10/06/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Aluminum	7429-90-5	1	2.37	20.0	ND	ug/L	U
Lead	7439-92-1	1	0.0680	0.100	ND	ug/L	U

Instrument: ICPMS2 Analyst: TCH — Analyzed: 10/09/2020 12:51

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0446-25 C 01
Preparation Batch: BIJ0139 — Sample Size: 25 mL
Prepared: 10/06/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Calcium	7440-70-2	1	1.91	50.0	11400	ug/L	
Iron	7439-89-6	1	6.27	20.0	6.92	ug/L	J
Magnesium	7439-95-4	1	0.307	20.0	1060	ug/L	
Manganese	7439-96-5	1	0.0850	0.500	0.394	ug/L	J
Potassium	7440-09-7	1	1.41	20.0	634	ug/L	
Sodium	7440-23-5	1	7.18	100	1240	ug/L	

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Analytical Report

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

HBKG-2-GW-092620

20I0446-25 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/26/2020 11:55

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/07/2020 00:51

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0446-25 C 01

Preparation Batch: BIJ0139 — Sample Size: 25 mL

Prepared: 10/06/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Copper	7440-50-8	1	0.340	0.500	ND	ug/L	U
Zinc	7440-66-6	1	0.820	4.00	1.11	ug/L	J

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

HBKG-2-GW-092620

20I0446-25 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/26/2020 11:55
Instrument: IC930 Analyst: KOTT — Analyzed: 09/29/2020 14:21

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-25 B
Preparation Batch: BII0820 — Sample Size: 10 mL
Prepared: 09/28/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Chloride	16887-00-6	1	0.100	0.100	0.317	mg/L	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Nitrate-N	14797-55-8	1	0.100	0.100	ND	mg/L	H, U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Sulfate	14808-79-8	1	0.100	0.100	5.94	mg/L	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

HBKG-2-GW-092620

20I0446-25 (Water)

Wet Chemistry

Method: SM 2320 B-97 — Sampled: 09/26/2020 11:55
Instrument: Accumet AB150 Analyst: UW — Analyzed: 10/01/2020 09:49

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-25 D
Preparation Batch: BIJ0014 — Sample Size: 100 mL
Prepared: 10/01/2020 — Final Volume: 100 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Bicarbonate		1	1.00	1.00	29.7	mg/L CaCO3	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Carbonate		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Hydroxide		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Total		1	1.00	1.00	29.7	mg/L CaCO3	

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Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

HBKG-2-GW-092620

20I0446-25 (Water)

Wet Chemistry

Method: SM 2540 C-97 — Sampled: 09/26/2020 11:55

Instrument: BAL2 Analyst: KLE — Analyzed: 10/01/2020 08:08

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-25

Preparation Batch: BIJ0002 — Sample Size: 200 mL

Prepared: 10/01/2020 — Final Volume: 200 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Solids		1	5	5	41	mg/L	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

HBKG-2-GW-092620

20I0446-25 (Water)

Wet Chemistry

Method: SM 2540 D-97 — Sampled: 09/26/2020 11:55

Instrument: BAL2 Analyst: KLE — Analyzed: 09/30/2020 06:58

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-25

Preparation Batch: BII0869 — Sample Size: 940 mL

Prepared: 09/30/2020 — Final Volume: 1000 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Suspended Solids		1	1	1	ND	mg/L	U

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

HBKG-2-GW-092620

20I0446-25 (Water)

Wet Chemistry

Method: SM 5310 B-00 — Sampled: 09/26/2020 11:55
Instrument: TOC-LCSH Analyst: WCW — Analyzed: 10/08/2020 10:42

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-25 F
Preparation Batch: BIJ0123 — Sample Size: 20 mL
Prepared: 10/05/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Organic Carbon, Dissolved		1	0.50	0.50	ND	mg/L	U

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-25 E
Preparation Batch: BIJ0297 — Sample Size: 20 mL
Prepared: 10/08/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Organic Carbon		1	0.50	0.50	ND	mg/L	U

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

HBKG-2-GW-092620

20I0446-25 (Water)

Calculation

Method: SM 2340 B-97 — Sampled: 09/26/2020 11:55

Instrument: [CALC] Analyst: TCH — Analyzed: 10/09/2020 12:51

Sample Preparation: Preparation Method: [CALC] — Extract ID: 20I0446-25

Preparation Batch: [CALC]

Prepared: 10/06/2020 Final Volume: 1

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness		1	0.207	32.7	mg/L CaCO3	

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Analytical Report

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Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

HBKG-2-GW-092620

20I0446-25RE1 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/26/2020 11:55

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/09/2020 17:17

Sample Preparation: Preparation Method: RHN EPA 600/4-79-020 4.1.4 HNO3 matrix 5x — Extract ID: 20I0446-25RE1 C 02

Preparation Batch: BIJ0194 — Sample Size: 100 mL

Prepared: 10/08/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Cadmium	7440-43-9	1	0.00600	0.0200	0.0124	ug/L	J

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US-1D-GW-092620

20I0446-26 (Water)

Metals and Metallic Compounds

Method: EPA 6020A — Sampled: 09/26/2020 09:22

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/07/2020 01:16

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0446-26 C 01

Preparation Batch: BIJ0139 — Sample Size: 25 mL

Prepared: 10/06/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Aluminum	7429-90-5	1	2.37	20.0	2.47	ug/L	J
Lead	7439-92-1	1	0.0680	0.100	ND	ug/L	U

Instrument: ICPMS2 Analyst: TCH — Analyzed: 10/09/2020 12:52

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0446-26 C 01

Preparation Batch: BIJ0139 — Sample Size: 25 mL

Prepared: 10/06/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Iron	7439-89-6	1	6.27	20.0	6.33	ug/L	J
Magnesium	7439-95-4	1	0.307	20.0	2500	ug/L	
Manganese	7439-96-5	1	0.0850	0.500	ND	ug/L	U
Potassium	7440-09-7	1	1.41	20.0	1350	ug/L	
Sodium	7440-23-5	1	7.18	100	4320	ug/L	

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Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

US-1D-GW-092620

20I0446-26 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/26/2020 09:22

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/07/2020 01:16

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0446-26 C 01

Preparation Batch: BIJ0139 — Sample Size: 25 mL

Prepared: 10/06/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Copper	7440-50-8	1	0.340	0.500	ND	ug/L	U
Zinc	7440-66-6	1	0.820	4.00	1.33	ug/L	J

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Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

US-1D-GW-092620

20I0446-26 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/26/2020 09:22

Instrument: IC930 Analyst: KOTT — Analyzed: 09/29/2020 14:41

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-26 B

Preparation Batch: BII0820 — Sample Size: 10 mL

Prepared: 09/28/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Chloride	16887-00-6	1	0.100	0.100	3.82	mg/L	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Nitrate-N	14797-55-8	1	0.100	0.100	0.310	mg/L	H

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

US-1D-GW-092620

20I0446-26 (Water)

Wet Chemistry

Method: SM 2320 B-97 — Sampled: 09/26/2020 09:22
Instrument: Accumet AB150 Analyst: UW — Analyzed: 10/01/2020 09:49

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-26 D
Preparation Batch: BIJ0014 — Sample Size: 100 mL
Prepared: 10/01/2020 — Final Volume: 100 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Bicarbonate		1	1.00	1.00	48.7	mg/L CaCO3	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Carbonate		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Hydroxide		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Total		1	1.00	1.00	48.7	mg/L CaCO3	

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US-1D-GW-092620

20I0446-26 (Water)

Wet Chemistry

Method: SM 2540 C-97 — Sampled: 09/26/2020 09:22

Instrument: BAL2 Analyst: KLE — Analyzed: 10/01/2020 08:08

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-26

Preparation Batch: BIJ0002 — Sample Size: 200 mL

Prepared: 10/01/2020 — Final Volume: 200 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Solids		1	5	5	112	mg/L	

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Analytical Report

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

US-1D-GW-092620

20I0446-26 (Water)

Wet Chemistry

Method: SM 2540 D-97 — Sampled: 09/26/2020 09:22

Instrument: BAL2 Analyst: KLE — Analyzed: 09/30/2020 06:58

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-26

Preparation Batch: BII0869 — Sample Size: 940 mL

Prepared: 09/30/2020 — Final Volume: 1000 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Suspended Solids		1	1	1	ND	mg/L	U

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

US-1D-GW-092620

20I0446-26 (Water)

Wet Chemistry

Method: SM 5310 B-00 — Sampled: 09/26/2020 09:22
Instrument: TOC-LCSH Analyst: WCW — Analyzed: 10/08/2020 11:00

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-26 F
Preparation Batch: BIJ0123 — Sample Size: 20 mL
Prepared: 10/05/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Organic Carbon, Dissolved		1	0.50	0.50	ND	mg/L	U

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-26 E
Preparation Batch: BIJ0297 — Sample Size: 20 mL
Prepared: 10/08/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Organic Carbon		1	0.50	0.50	ND	mg/L	U

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Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

US-1D-GW-092620

20I0446-26 (Water)

Calculation

Method: SM 2340 B-97 — Sampled: 09/26/2020 09:22

Instrument: [CALC] Analyst: TCH — Analyzed: 10/09/2020 12:52

Sample Preparation: Preparation Method: [CALC] — Extract ID: 20I0446-26

Preparation Batch: [CALC]

Prepared: 10/06/2020 Final Volume: 1

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness		1	0.207	80.2	mg/L CaCO3	

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Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

US-1D-GW-092620

20I0446-26RE1 (Water)

Metals and Metallic Compounds

Method: EPA 6020A — Sampled: 09/26/2020 09:22

Instrument: ICPMS2 Analyst: TCH — Analyzed: 10/09/2020 14:32

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0446-26RE1 C 01

Preparation Batch: BIJ0139 — Sample Size: 25 mL

Prepared: 10/06/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Calcium	7440-70-2	10	19.1	500	28600	ug/L	D

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Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

US-1D-GW-092620

20I0446-26RE1 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/26/2020 09:22

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/09/2020 17:21

Sample Preparation: Preparation Method: RHN EPA 600/4-79-020 4.1.4 HNO3 matrix 5x — Extract ID: 20I0446-26RE1 C 02

Preparation Batch: BIJ0194 — Sample Size: 100 mL

Prepared: 10/08/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Cadmium	7440-43-9	1	0.00600	0.0200	0.0330	ug/L	

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Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

US-1D-GW-092620

20I0446-26RE1 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/26/2020 09:22

Instrument: IC930 Analyst: KOTT — Analyzed: 09/30/2020 06:21

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-26RE1 B

Preparation Batch: BII0820 — Sample Size: 10 mL

Prepared: 09/28/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Sulfate	14808-79-8	7	0.700	0.700	34.6	mg/L	D

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

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20I0446-26RE1 (Water)

Calculation

Method: SM 2340 B-97 — Sampled: 09/26/2020 09:22

Instrument: [CALC] Analyst: TCH — Analyzed: 10/09/2020 14:32

Sample Preparation: Preparation Method: [CALC] — Extract ID: 20I0446-26RE1

Preparation Batch: [CALC]

Prepared: 10/06/2020 Final Volume: 1

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness		10	1.25	71.5	mg/L CaCO3	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

US-1S-GW-092620

20I0446-27 (Water)

Metals and Metallic Compounds

Method: EPA 6020A — Sampled: 09/26/2020 09:20
Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/07/2020 01:20

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0446-27 C 01
Preparation Batch: BIJ0139 — Sample Size: 25 mL
Prepared: 10/06/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Aluminum	7429-90-5	1	2.37	20.0	5.52	ug/L	J
Lead	7439-92-1	1	0.0680	0.100	ND	ug/L	U

Instrument: ICPMS2 Analyst: TCH — Analyzed: 10/09/2020 12:54

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0446-27 C 01
Preparation Batch: BIJ0139 — Sample Size: 25 mL
Prepared: 10/06/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Calcium	7440-70-2	1	1.91	50.0	13800	ug/L	
Iron	7439-89-6	1	6.27	20.0	ND	ug/L	U
Magnesium	7439-95-4	1	0.307	20.0	1290	ug/L	
Manganese	7439-96-5	1	0.0850	0.500	ND	ug/L	U
Potassium	7440-09-7	1	1.41	20.0	690	ug/L	
Sodium	7440-23-5	1	7.18	100	1390	ug/L	

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Analytical Report

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

US-1S-GW-092620

20I0446-27 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/26/2020 09:20

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/07/2020 01:20

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0446-27 C 01

Preparation Batch: BIJ0139 — Sample Size: 25 mL

Prepared: 10/06/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Copper	7440-50-8	1	0.340	0.500	ND	ug/L	U
Zinc	7440-66-6	1	0.820	4.00	1.07	ug/L	J

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

US-1S-GW-092620

20I0446-27 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/26/2020 09:20
Instrument: IC930 Analyst: KOTT — Analyzed: 09/29/2020 15:01

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-27 B
Preparation Batch: BII0820 — Sample Size: 10 mL
Prepared: 09/28/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Chloride	16887-00-6	1	0.100	0.100	0.308	mg/L	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Nitrate-N	14797-55-8	1	0.100	0.100	ND	mg/L	H, U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Sulfate	14808-79-8	1	0.100	0.100	7.70	mg/L	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

US-1S-GW-092620

20I0446-27 (Water)

Wet Chemistry

Method: SM 2320 B-97 — Sampled: 09/26/2020 09:20
Instrument: Accumet AB150 Analyst: UW — Analyzed: 10/01/2020 09:49

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-27 D
Preparation Batch: BIJ0014 — Sample Size: 100 mL
Prepared: 10/01/2020 — Final Volume: 100 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Bicarbonate		1	1.00	1.00	35.1	mg/L CaCO3	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Carbonate		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Hydroxide		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Total		1	1.00	1.00	35.1	mg/L CaCO3	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

US-1S-GW-092620

20I0446-27 (Water)

Wet Chemistry

Method: SM 2540 C-97 — Sampled: 09/26/2020 09:20

Instrument: BAL2 Analyst: KLE — Analyzed: 10/01/2020 08:08

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-27

Preparation Batch: BIJ0002 — Sample Size: 200 mL

Prepared: 10/01/2020 — Final Volume: 200 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Solids		1	5	5	49	mg/L	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

US-1S-GW-092620

20I0446-27 (Water)

Wet Chemistry

Method: SM 2540 D-97 — Sampled: 09/26/2020 09:20

Instrument: BAL2 Analyst: KLE — Analyzed: 09/30/2020 06:58

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-27

Preparation Batch: BII0869 — Sample Size: 925 mL

Prepared: 09/30/2020 — Final Volume: 1000 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Suspended Solids		1	1	1	ND	mg/L	U

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

US-1S-GW-092620

20I0446-27 (Water)

Wet Chemistry

Method: SM 5310 B-00 — Sampled: 09/26/2020 09:20
Instrument: TOC-LCSH Analyst: WCW — Analyzed: 10/08/2020 11:17

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-27 F
Preparation Batch: BIJ0123 — Sample Size: 20 mL
Prepared: 10/05/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Organic Carbon, Dissolved		1	0.50	0.50	ND	mg/L	U

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-27 E
Preparation Batch: BIJ0297 — Sample Size: 20 mL
Prepared: 10/08/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Organic Carbon		1	0.50	0.50	ND	mg/L	U

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

US-1S-GW-092620

20I0446-27 (Water)

Calculation

Method: SM 2340 B-97 — Sampled: 09/26/2020 09:20

Instrument: [CALC] Analyst: TCH — Analyzed: 10/09/2020 12:54

Sample Preparation: Preparation Method: [CALC] — Extract ID: 20I0446-27

Preparation Batch: [CALC]

Prepared: 10/06/2020 Final Volume: 1

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness		1	0.207	39.7	mg/L CaCO3	

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Analytical Report

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

US-1S-GW-092620

20I0446-27RE1 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/26/2020 09:20
Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/09/2020 17:25

Sample Preparation: Preparation Method: RHN EPA 600/4-79-020 4.1.4 HNO3 matrix 5x — Extract ID: 20I0446-27RE1 C 02
Preparation Batch: BIJ0284 — Sample Size: 100 mL
Prepared: 10/09/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Cadmium	7440-43-9	1	0.00600	0.0200	0.0290	ug/L	

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Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

RC-7-SW-092620

20I0446-28 (Water)

Metals and Metallic Compounds

Method: EPA 6020A — Sampled: 09/26/2020 15:00

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/07/2020 01:24

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0446-28 C 01

Preparation Batch: BIJ0139 — Sample Size: 25 mL

Prepared: 10/06/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Aluminum	7429-90-5	1	2.37	20.0	79.8	ug/L	
Lead	7439-92-1	1	0.0680	0.100	0.114	ug/L	

Instrument: ICPMS2 Analyst: TCH — Analyzed: 10/09/2020 12:55

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0446-28 C 01

Preparation Batch: BIJ0139 — Sample Size: 25 mL

Prepared: 10/06/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Calcium	7440-70-2	1	1.91	50.0	4680	ug/L	
Iron	7439-89-6	1	6.27	20.0	158	ug/L	
Magnesium	7439-95-4	1	0.307	20.0	492	ug/L	
Manganese	7439-96-5	1	0.0850	0.500	4.21	ug/L	
Potassium	7440-09-7	1	1.41	20.0	509	ug/L	
Sodium	7440-23-5	1	7.18	100	719	ug/L	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

RC-7-SW-092620

20I0446-28 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/26/2020 15:00

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/07/2020 01:24

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0446-28 C 01

Preparation Batch: BIJ0139 — Sample Size: 25 mL

Prepared: 10/06/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Copper	7440-50-8	1	0.340	0.500	0.998	ug/L	
Zinc	7440-66-6	1	0.820	4.00	5.10	ug/L	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

RC-7-SW-092620

20I0446-28 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/26/2020 15:00

Instrument: IC930 Analyst: KOTT — Analyzed: 09/29/2020 16:02

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-28 B

Preparation Batch: BII0820 — Sample Size: 10 mL

Prepared: 09/28/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Chloride	16887-00-6	1	0.100	0.100	0.287	mg/L	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Nitrate-N	14797-55-8	1	0.100	0.100	ND	mg/L	H, U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Sulfate	14808-79-8	1	0.100	0.100	4.10	mg/L	

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Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

RC-7-SW-092620

20I0446-28 (Water)

Wet Chemistry

Method: SM 2320 B-97 — Sampled: 09/26/2020 15:00

Instrument: Accumet AB150 Analyst: UW — Analyzed: 10/01/2020 09:49

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-28 D

Preparation Batch: BIJ0014 — Sample Size: 100 mL

Prepared: 10/01/2020 — Final Volume: 100 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Bicarbonate		1	1.00	1.00	9.88	mg/L CaCO3	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Carbonate		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Hydroxide		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Total		1	1.00	1.00	9.88	mg/L CaCO3	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

RC-7-SW-092620

20I0446-28 (Water)

Wet Chemistry

Method: SM 2540 C-97 — Sampled: 09/26/2020 15:00

Instrument: BAL2 Analyst: KLE — Analyzed: 10/01/2020 08:08

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-28

Preparation Batch: BIJ0002 — Sample Size: 200 mL

Prepared: 10/01/2020 — Final Volume: 200 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Solids		1	5	5	21	mg/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

RC-7-SW-092620

20I0446-28 (Water)

Wet Chemistry

Method: SM 2540 D-97 — Sampled: 09/26/2020 15:00

Instrument: BAL2 Analyst: KLE — Analyzed: 09/30/2020 06:58

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-28

Preparation Batch: BII0869 — Sample Size: 950 mL

Prepared: 09/30/2020 — Final Volume: 1000 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Suspended Solids		1	1	1	1	mg/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

RC-7-SW-092620

20I0446-28 (Water)

Wet Chemistry

Method: SM 5310 B-00 — Sampled: 09/26/2020 15:00

Instrument: TOC-LCSH Analyst: WCW — Analyzed: 10/08/2020 11:39

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-28 F

Preparation Batch: BIJ0123 — Sample Size: 20 mL

Prepared: 10/05/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Organic Carbon, Dissolved		1	0.50	0.50	0.70	mg/L	

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-28 E

Preparation Batch: BIJ0297 — Sample Size: 20 mL

Prepared: 10/08/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Organic Carbon		1	0.50	0.50	0.71	mg/L	

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Analytical Report

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

RC-7-SW-092620

20I0446-28 (Water)

Calculation

Method: SM 2340 B-97 — Sampled: 09/26/2020 15:00

Instrument: [CALC] Analyst: TCH — Analyzed: 10/09/2020 12:55

Sample Preparation: Preparation Method: [CALC] — Extract ID: 20I0446-28

Preparation Batch: [CALC]

Prepared: 10/06/2020 Final Volume: 1

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness		1	0.207	13.7	mg/L CaCO3	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

RC-7-SW-092620

20I0446-28RE1 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/26/2020 15:00

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/09/2020 17:29

Sample Preparation: Preparation Method: RHN EPA 600/4-79-020 4.1.4 HNO3 matrix 5x — Extract ID: 20I0446-28RE1 C 02

Preparation Batch: BIJ0284 — Sample Size: 100 mL

Prepared: 10/09/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Cadmium	7440-43-9	1	0.00600	0.0200	0.0278	ug/L	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

RC-107-SW-092620

20I0446-29 (Water)

Metals and Metallic Compounds

Method: EPA 6020A — Sampled: 09/26/2020 15:05

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/07/2020 01:29

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0446-29 C 01

Preparation Batch: BIJ0139 — Sample Size: 25 mL

Prepared: 10/06/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Aluminum	7429-90-5	1	2.37	20.0	84.3	ug/L	
Lead	7439-92-1	1	0.0680	0.100	0.108	ug/L	

Instrument: ICPMS2 Analyst: TCH — Analyzed: 10/09/2020 13:13

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0446-29 C 01

Preparation Batch: BIJ0139 — Sample Size: 25 mL

Prepared: 10/06/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Calcium	7440-70-2	1	1.91	50.0	4730	ug/L	
Iron	7439-89-6	1	6.27	20.0	162	ug/L	
Magnesium	7439-95-4	1	0.307	20.0	500	ug/L	
Manganese	7439-96-5	1	0.0850	0.500	4.27	ug/L	
Potassium	7440-09-7	1	1.41	20.0	507	ug/L	
Sodium	7440-23-5	1	7.18	100	751	ug/L	

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Analytical Report

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

RC-107-SW-092620

20I0446-29 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/26/2020 15:05

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/07/2020 01:29

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0446-29 C 01

Preparation Batch: BIJ0139 — Sample Size: 25 mL

Prepared: 10/06/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Copper	7440-50-8	1	0.340	0.500	1.02	ug/L	
Zinc	7440-66-6	1	0.820	4.00	5.02	ug/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

RC-107-SW-092620

20I0446-29 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/26/2020 15:05

Instrument: IC930 Analyst: KOTT — Analyzed: 09/29/2020 16:22

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-29 B

Preparation Batch: BII0820 — Sample Size: 10 mL

Prepared: 09/28/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Chloride	16887-00-6	1	0.100	0.100	0.277	mg/L	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Nitrate-N	14797-55-8	1	0.100	0.100	ND	mg/L	H, U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Sulfate	14808-79-8	1	0.100	0.100	4.09	mg/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

RC-107-SW-092620

20I0446-29 (Water)

Wet Chemistry

Method: SM 2320 B-97 — Sampled: 09/26/2020 15:05

Instrument: Accumet AB150 Analyst: UW — Analyzed: 10/01/2020 09:49

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-29 D

Preparation Batch: BIJ0014 — Sample Size: 100 mL

Prepared: 10/01/2020 — Final Volume: 100 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Bicarbonate		1	1.00	1.00	10.3	mg/L CaCO3	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Carbonate		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Hydroxide		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Total		1	1.00	1.00	10.3	mg/L CaCO3	

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Analytical Report

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

RC-107-SW-092620

20I0446-29 (Water)

Wet Chemistry

Method: SM 2540 C-97 — Sampled: 09/26/2020 15:05

Instrument: BAL2 Analyst: KLE — Analyzed: 10/01/2020 08:08

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-29

Preparation Batch: BIJ0002 — Sample Size: 200 mL

Prepared: 10/01/2020 — Final Volume: 200 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Solids		1	5	5	20	mg/L	

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Analytical Report

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

RC-107-SW-092620

20I0446-29 (Water)

Wet Chemistry

Method: SM 2540 D-97 — Sampled: 09/26/2020 15:05

Instrument: BAL2 Analyst: KLE — Analyzed: 09/30/2020 06:58

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-29

Preparation Batch: BII0869 — Sample Size: 940 mL

Prepared: 09/30/2020 — Final Volume: 1000 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Suspended Solids		1	1	1	1	mg/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

RC-107-SW-092620

20I0446-29 (Water)

Wet Chemistry

Method: SM 5310 B-00 — Sampled: 09/26/2020 15:05

Instrument: TOC-LCSH Analyst: WCW — Analyzed: 10/08/2020 12:04

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-29 F

Preparation Batch: BIJ0123 — Sample Size: 20 mL

Prepared: 10/05/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Organic Carbon, Dissolved		1	0.50	0.50	0.67	mg/L	

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-29 E

Preparation Batch: BIJ0297 — Sample Size: 20 mL

Prepared: 10/08/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Organic Carbon		1	0.50	0.50	0.69	mg/L	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

RC-107-SW-092620

20I0446-29 (Water)

Calculation

Method: SM 2340 B-97 — Sampled: 09/26/2020 15:05

Instrument: [CALC] Analyst: TCH — Analyzed: 10/09/2020 13:13

Sample Preparation: Preparation Method: [CALC]; Preparation Batch: [CALC]; Prepared: 10/06/2020; Final Volume: 1 — Extract ID: 20I0446-29

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness		1	0.207	13.9	mg/L CaCO3	

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Analytical Report

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

RC-107-SW-092620

20I0446-29RE1 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/26/2020 15:05

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/09/2020 17:33

Sample Preparation: Preparation Method: RHN EPA 600/4-79-020 4.1.4 HNO3 matrix 5x — Extract ID: 20I0446-29RE1 C 02

Preparation Batch: BIJ0284 — Sample Size: 100 mL

Prepared: 10/09/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Cadmium	7440-43-9	1	0.00600	0.0200	0.0288	ug/L	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

RC-16-SW-092620

20I0446-30 (Water)

Metals and Metallic Compounds

Method: EPA 6020A — Sampled: 09/26/2020 16:20
Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/07/2020 01:33

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0446-30 C 01
Preparation Batch: BIJ0139 — Sample Size: 25 mL
Prepared: 10/06/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Aluminum	7429-90-5	1	2.37	20.0	58.8	ug/L	
Lead	7439-92-1	1	0.0680	0.100	ND	ug/L	U

Instrument: ICPMS2 Analyst: TCH — Analyzed: 10/09/2020 13:15

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0446-30 C 01
Preparation Batch: BIJ0139 — Sample Size: 25 mL
Prepared: 10/06/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Calcium	7440-70-2	1	1.91	50.0	4310	ug/L	
Iron	7439-89-6	1	6.27	20.0	98.2	ug/L	
Magnesium	7439-95-4	1	0.307	20.0	518	ug/L	
Manganese	7439-96-5	1	0.0850	0.500	2.38	ug/L	
Potassium	7440-09-7	1	1.41	20.0	606	ug/L	
Sodium	7440-23-5	1	7.18	100	689	ug/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

RC-16-SW-092620

20I0446-30 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/26/2020 16:20

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/07/2020 01:33

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0446-30 C 01

Preparation Batch: BIJ0139 — Sample Size: 25 mL

Prepared: 10/06/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Copper	7440-50-8	1	0.340	0.500	0.649	ug/L	
Zinc	7440-66-6	1	0.820	4.00	2.35	ug/L	J

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

RC-16-SW-092620

20I0446-30 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/26/2020 16:20

Instrument: IC930 Analyst: KOTT — Analyzed: 09/29/2020 02:40

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-30 B

Preparation Batch: BII0818 — Sample Size: 10 mL

Prepared: 09/28/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Chloride	16887-00-6	1	0.100	0.100	0.156	mg/L	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Nitrate-N	14797-55-8	1	0.100	0.100	ND	mg/L	H, U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Sulfate	14808-79-8	1	0.100	0.100	3.60	mg/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

RC-16-SW-092620

20I0446-30 (Water)

Wet Chemistry

Method: SM 2320 B-97 — Sampled: 09/26/2020 16:20

Instrument: Accumet AB150 Analyst: UW — Analyzed: 10/01/2020 09:49

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-30 D

Preparation Batch: BIJ0014 — Sample Size: 100 mL

Prepared: 10/01/2020 — Final Volume: 100 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Bicarbonate		1	1.00	1.00	9.44	mg/L CaCO3	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Carbonate		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Hydroxide		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Total		1	1.00	1.00	9.44	mg/L CaCO3	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

RC-16-SW-092620

20I0446-30 (Water)

Wet Chemistry

Method: SM 2540 C-97 — Sampled: 09/26/2020 16:20

Instrument: BAL2 Analyst: KLE — Analyzed: 10/01/2020 08:08

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-30

Preparation Batch: BIJ0002 — Sample Size: 200 mL

Prepared: 10/01/2020 — Final Volume: 200 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Solids		1	5	5	20	mg/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

RC-16-SW-092620

20I0446-30 (Water)

Wet Chemistry

Method: SM 2540 D-97 — Sampled: 09/26/2020 16:20

Instrument: BAL2 Analyst: KLE — Analyzed: 09/30/2020 06:58

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-30

Preparation Batch: BII0869 — Sample Size: 945 mL

Prepared: 09/30/2020 — Final Volume: 1000 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Suspended Solids		1	1	1	2	mg/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

RC-16-SW-092620

20I0446-30 (Water)

Wet Chemistry

Method: SM 5310 B-00 — Sampled: 09/26/2020 16:20
Instrument: TOC-LCSH Analyst: WCW — Analyzed: 10/08/2020 15:42

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-30 F
Preparation Batch: BIJ0123 — Sample Size: 20 mL
Prepared: 10/05/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Organic Carbon, Dissolved		1	0.50	0.50	0.65	mg/L	

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-30 E
Preparation Batch: BIJ0297 — Sample Size: 20 mL
Prepared: 10/08/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Organic Carbon		1	0.50	0.50	0.58	mg/L	

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Analytical Report

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

RC-16-SW-092620

20I0446-30 (Water)

Calculation

Method: SM 2340 B-97 — Sampled: 09/26/2020 16:20

Instrument: [CALC] Analyst: TCH — Analyzed: 10/09/2020 13:15

Sample Preparation: Preparation Method: [CALC]
Preparation Batch: [CALC]
Prepared: 10/06/2020 Final Volume: 1

Extract ID: 20I0446-30

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness		1	0.207	12.9	mg/L CaCO3	

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Analytical Report

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

RC-16-SW-092620

20I0446-30RE1 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/26/2020 16:20

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/09/2020 17:37

Sample Preparation: Preparation Method: RHN EPA 600/4-79-020 4.1.4 HNO3 matrix 5x — Extract ID: 20I0446-30RE1 C 02

Preparation Batch: BIJ0284 — Sample Size: 100 mL

Prepared: 10/09/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Cadmium	7440-43-9	1	0.00600	0.0200	0.0156	ug/L	J

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

DS-4DD-SW-092620

20I0446-31 (Water)

Metals and Metallic Compounds

Method: EPA 6020A — Sampled: 09/26/2020 10:00

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/07/2020 02:16

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0446-31 C 01

Preparation Batch: BIJ0139 — Sample Size: 25 mL

Prepared: 10/06/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Aluminum	7429-90-5	1	2.37	20.0	16.3	ug/L	J
Lead	7439-92-1	1	0.0680	0.100	ND	ug/L	U

Instrument: ICPMS2 Analyst: TCH — Analyzed: 10/09/2020 13:16

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0446-31 C 01

Preparation Batch: BIJ0139 — Sample Size: 25 mL

Prepared: 10/06/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Iron	7439-89-6	1	6.27	20.0	14.5	ug/L	J
Magnesium	7439-95-4	1	0.307	20.0	8060	ug/L	
Manganese	7439-96-5	1	0.0850	0.500	0.346	ug/L	J
Potassium	7440-09-7	1	1.41	20.0	2260	ug/L	
Sodium	7440-23-5	1	7.18	100	3500	ug/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

DS-4DD-SW-092620

20I0446-31 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/26/2020 10:00

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/07/2020 02:16

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0446-31 C 01

Preparation Batch: BIJ0139 — Sample Size: 25 mL

Prepared: 10/06/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Cadmium	7440-43-9	1	0.0300	0.100	0.164	ug/L	
Copper	7440-50-8	1	0.340	0.500	0.369	ug/L	J
Zinc	7440-66-6	1	0.820	4.00	1.82	ug/L	J

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

DS-4DD-SW-092620

20I0446-31 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/26/2020 10:00

Instrument: IC930 Analyst: KOTT — Analyzed: 09/29/2020 03:40

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-31 B

Preparation Batch: BII0818 — Sample Size: 10 mL

Prepared: 09/28/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Chloride	16887-00-6	1	0.100	0.100	0.376	mg/L	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Nitrate-N	14797-55-8	1	0.100	0.100	0.232	mg/L	H

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

DS-4DD-SW-092620

20I0446-31 (Water)

Wet Chemistry

Method: SM 2320 B-97 — Sampled: 09/26/2020 10:00

Instrument: Accumet AB150 Analyst: UW — Analyzed: 10/01/2020 09:49

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-31 D

Preparation Batch: BIJ0014 — Sample Size: 100 mL

Prepared: 10/01/2020 — Final Volume: 100 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Bicarbonate		1	1.00	1.00	36.2	mg/L CaCO3	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Carbonate		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Hydroxide		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Total		1	1.00	1.00	36.2	mg/L CaCO3	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

DS-4DD-SW-092620

20I0446-31 (Water)

Wet Chemistry

Method: SM 2540 C-97 — Sampled: 09/26/2020 10:00

Instrument: BAL2 Analyst: KLE — Analyzed: 10/01/2020 08:08

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-31

Preparation Batch: BIJ0002 — Sample Size: 200 mL

Prepared: 10/01/2020 — Final Volume: 200 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Solids		1	5	5	262	mg/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

DS-4DD-SW-092620

20I0446-31 (Water)

Wet Chemistry

Method: SM 2540 D-97 — Sampled: 09/26/2020 10:00

Instrument: BAL2 Analyst: KLE — Analyzed: 09/30/2020 06:58

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-31

Preparation Batch: BII0869 — Sample Size: 925 mL

Prepared: 09/30/2020 — Final Volume: 1000 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Suspended Solids		1	1	1	ND	mg/L	U

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

DS-4DD-SW-092620

20I0446-31 (Water)

Wet Chemistry

Method: SM 5310 B-00 — Sampled: 09/26/2020 10:00

Instrument: TOC-LCSH Analyst: WCW — Analyzed: 10/08/2020 16:07

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-31 F

Preparation Batch: BIJ0123 — Sample Size: 20 mL

Prepared: 10/05/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Organic Carbon, Dissolved		1	0.50	0.50	ND	mg/L	U

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-31 E

Preparation Batch: BIJ0297 — Sample Size: 20 mL

Prepared: 10/08/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Organic Carbon		1	0.50	0.50	ND	mg/L	U

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

DS-4DD-SW-092620

20I0446-31 (Water)

Calculation

Method: SM 2340 B-97 — Sampled: 09/26/2020 10:00

Instrument: [CALC] Analyst: TCH — Analyzed: 10/09/2020 13:16

Sample Preparation: Preparation Method: [CALC] — Extract ID: 20I0446-31

Preparation Batch: [CALC]

Prepared: 10/06/2020 Final Volume: 1

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness		1	0.207	163	mg/L CaCO3	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

DS-4DD-SW-092620

20I0446-31RE1 (Water)

Metals and Metallic Compounds

Method: EPA 6020A — Sampled: 09/26/2020 10:00

Instrument: ICPMS2 Analyst: TCH — Analyzed: 10/09/2020 14:33

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0446-31RE1 C 01

Preparation Batch: BIJ0139 — Sample Size: 25 mL

Prepared: 10/06/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Calcium	7440-70-2	10	19.1	500	55400	ug/L	D

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

DS-4DD-SW-092620

20I0446-31RE1 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/26/2020 10:00

Instrument: IC930 Analyst: KOTT — Analyzed: 09/29/2020 18:01

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-31RE1 B

Preparation Batch: BII0818 — Sample Size: 10 mL

Prepared: 09/28/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Sulfate	14808-79-8	27	2.70	2.70	129	mg/L	D

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

DS-4DD-SW-092620

20I0446-31RE1 (Water)

Calculation

Method: SM 2340 B-97 — Sampled: 09/26/2020 10:00

Instrument: [CALC] Analyst: TCH — Analyzed: 10/09/2020 14:33

Sample Preparation: Preparation Method: [CALC] — Extract ID: 20I0446-31RE1

Preparation Batch: [CALC]

Prepared: 10/06/2020 Final Volume: 1

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness		10	1.25	138	mg/L CaCO3	

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Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-8-WP-GW-092620

20I0446-32 (Water)

Metals and Metallic Compounds

Method: EPA 6020A — Sampled: 09/26/2020 09:30
Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/07/2020 02:20

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0446-32 C 01
Preparation Batch: BIJ0139 — Sample Size: 25 mL
Prepared: 10/06/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Aluminum	7429-90-5	1	2.37	20.0	34.6	ug/L	
Lead	7439-92-1	1	0.0680	0.100	0.0760	ug/L	J

Instrument: ICPMS2 Analyst: TCH — Analyzed: 10/09/2020 13:18

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0446-32 C 01
Preparation Batch: BIJ0139 — Sample Size: 25 mL
Prepared: 10/06/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Calcium	7440-70-2	1	1.91	50.0	4880	ug/L	
Iron	7439-89-6	1	6.27	20.0	358	ug/L	
Magnesium	7439-95-4	1	0.307	20.0	571	ug/L	
Manganese	7439-96-5	1	0.0850	0.500	7.64	ug/L	
Potassium	7440-09-7	1	1.41	20.0	582	ug/L	
Sodium	7440-23-5	1	7.18	100	981	ug/L	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-8-WP-GW-092620

20I0446-32 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/26/2020 09:30

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/07/2020 02:20

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0446-32 C 01

Preparation Batch: BIJ0139 — Sample Size: 25 mL

Prepared: 10/06/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Copper	7440-50-8	1	0.340	0.500	0.351	ug/L	J
Zinc	7440-66-6	1	0.820	4.00	2.40	ug/L	J

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Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-8-WP-GW-092620

20I0446-32 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/26/2020 09:30
Instrument: IC930 Analyst: KOTT — Analyzed: 09/29/2020 04:00

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-32 B
Preparation Batch: BII0818 — Sample Size: 10 mL
Prepared: 09/28/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Chloride	16887-00-6	1	0.100	0.100	0.294	mg/L	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Nitrate-N	14797-55-8	1	0.100	0.100	ND	mg/L	H, U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Sulfate	14808-79-8	1	0.100	0.100	3.18	mg/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-8-WP-GW-092620

20I0446-32 (Water)

Wet Chemistry

Method: SM 2320 B-97 — Sampled: 09/26/2020 09:30
Instrument: Accumet AB150 Analyst: UW — Analyzed: 10/01/2020 09:49

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-32 D
Preparation Batch: BIJ0014 — Sample Size: 100 mL
Prepared: 10/01/2020 — Final Volume: 100 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Bicarbonate		1	1.00	1.00	12.5	mg/L CaCO3	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Carbonate		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Hydroxide		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Total		1	1.00	1.00	12.5	mg/L CaCO3	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-8-WP-GW-092620

20I0446-32 (Water)

Wet Chemistry

Method: SM 2540 C-97 — Sampled: 09/26/2020 09:30

Instrument: BAL2 Analyst: KLE — Analyzed: 10/01/2020 08:08

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-32

Preparation Batch: BIJ0002 — Sample Size: 200 mL

Prepared: 10/01/2020 — Final Volume: 200 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Solids		1	5	5	27	mg/L	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-8-WP-GW-092620

20I0446-32 (Water)

Wet Chemistry

Method: SM 2540 D-97 — Sampled: 09/26/2020 09:30

Instrument: BAL2 Analyst: KLE — Analyzed: 09/30/2020 06:58

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-32

Preparation Batch: BII0869 — Sample Size: 900 mL

Prepared: 09/30/2020 — Final Volume: 1000 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Suspended Solids		1	1	1	ND	mg/L	U

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-8-WP-GW-092620

20I0446-32 (Water)

Wet Chemistry

Method: SM 5310 B-00 — Sampled: 09/26/2020 09:30
Instrument: TOC-LCSH Analyst: WCW — Analyzed: 10/08/2020 16:25

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-32 F
Preparation Batch: BIJ0123 — Sample Size: 20 mL
Prepared: 10/05/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Organic Carbon, Dissolved		1	0.50	0.50	0.71	mg/L	

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-32 E
Preparation Batch: BIJ0297 — Sample Size: 20 mL
Prepared: 10/08/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Organic Carbon		1	0.50	0.50	0.66	mg/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-8-WP-GW-092620

20I0446-32 (Water)

Calculation

Method: SM 2340 B-97 — Sampled: 09/26/2020 09:30

Instrument: [CALC] Analyst: TCH — Analyzed: 10/09/2020 13:18

Sample Preparation: Preparation Method: [CALC] — Extract ID: 20I0446-32

Preparation Batch: [CALC]

Prepared: 10/06/2020 Final Volume: 1

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness		1	0.207	14.5	mg/L CaCO3	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-8-WP-GW-092620

20I0446-32RE1 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/26/2020 09:30

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/09/2020 17:41

Sample Preparation: Preparation Method: RHN EPA 600/4-79-020 4.1.4 HNO3 matrix 5x — Extract ID: 20I0446-32RE1 C 02

Preparation Batch: BIJ0284 — Sample Size: 100 mL

Prepared: 10/09/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Cadmium	7440-43-9	1	0.00600	0.0200	ND	ug/L	U

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-8-PW-36-092620

20I0446-33 (Water)

Metals and Metallic Compounds

Method: EPA 6020A — Sampled: 09/26/2020 10:50
Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/07/2020 02:24

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0446-33 C 01
Preparation Batch: BIJ0139 — Sample Size: 25 mL
Prepared: 10/06/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Aluminum	7429-90-5	1	2.37	20.0	41.0	ug/L	
Lead	7439-92-1	1	0.0680	0.100	0.935	ug/L	

Instrument: ICPMS2 Analyst: TCH — Analyzed: 10/09/2020 13:20

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0446-33 C 01
Preparation Batch: BIJ0139 — Sample Size: 25 mL
Prepared: 10/06/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Calcium	7440-70-2	1	1.91	50.0	5040	ug/L	
Iron	7439-89-6	1	6.27	20.0	93.3	ug/L	
Magnesium	7439-95-4	1	0.307	20.0	503	ug/L	
Manganese	7439-96-5	1	0.0850	0.500	1.91	ug/L	
Potassium	7440-09-7	1	1.41	20.0	474	ug/L	
Sodium	7440-23-5	1	7.18	100	720	ug/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-8-PW-36-092620

20I0446-33 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/26/2020 10:50

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/07/2020 02:24

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0446-33 C 01

Preparation Batch: BIJ0139 — Sample Size: 25 mL

Prepared: 10/06/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Copper	7440-50-8	1	0.340	0.500	8.00	ug/L	
Zinc	7440-66-6	1	0.820	4.00	16.0	ug/L	

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Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-8-PW-36-092620

20I0446-33 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/26/2020 10:50
Instrument: IC930 Analyst: KOTT — Analyzed: 09/29/2020 04:20

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-33 B
Preparation Batch: BII0818 — Sample Size: 10 mL
Prepared: 09/28/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Chloride	16887-00-6	1	0.100	0.100	0.282	mg/L	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Nitrate-N	14797-55-8	1	0.100	0.100	ND	mg/L	H, U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Sulfate	14808-79-8	1	0.100	0.100	4.15	mg/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-8-PW-36-092620

20I0446-33 (Water)

Wet Chemistry

Method: SM 2320 B-97 — Sampled: 09/26/2020 10:50

Instrument: Accumet AB150 Analyst: UW — Analyzed: 10/01/2020 09:49

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-33 D

Preparation Batch: BIJ0014 — Sample Size: 100 mL

Prepared: 10/01/2020 — Final Volume: 100 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Bicarbonate		1	1.00	1.00	10.2	mg/L CaCO3	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Carbonate		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Hydroxide		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Total		1	1.00	1.00	10.2	mg/L CaCO3	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-8-PW-36-092620

20I0446-33 (Water)

Wet Chemistry

Method: SM 2540 C-97 — Sampled: 09/26/2020 10:50

Instrument: BAL2 Analyst: KLE — Analyzed: 10/01/2020 08:08

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-33

Preparation Batch: BIJ0002 — Sample Size: 200 mL

Prepared: 10/01/2020 — Final Volume: 200 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Solids		1	5	5	20	mg/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-8-PW-36-092620

20I0446-33 (Water)

Wet Chemistry

Method: SM 2540 D-97 — Sampled: 09/26/2020 10:50

Instrument: BAL2 Analyst: KLE — Analyzed: 09/30/2020 06:58

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-33

Preparation Batch: BII0869 — Sample Size: 940 mL

Prepared: 09/30/2020 — Final Volume: 1000 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Suspended Solids		1	1	1	1	mg/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-8-PW-36-092620

20I0446-33 (Water)

Wet Chemistry

Method: SM 5310 B-00 — Sampled: 09/26/2020 10:50
Instrument: TOC-LCSH Analyst: WCW — Analyzed: 10/08/2020 16:46

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-33 F
Preparation Batch: BIJ0123 — Sample Size: 20 mL
Prepared: 10/05/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Organic Carbon, Dissolved		1	0.50	0.50	0.52	mg/L	

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-33 E
Preparation Batch: BIJ0297 — Sample Size: 20 mL
Prepared: 10/08/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Organic Carbon		1	0.50	0.50	0.53	mg/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-8-PW-36-092620

20I0446-33 (Water)

Calculation

Method: SM 2340 B-97 — Sampled: 09/26/2020 10:50

Instrument: [CALC] Analyst: TCH — Analyzed: 10/09/2020 13:20

Sample Preparation: Preparation Method: [CALC] — Extract ID: 20I0446-33

Preparation Batch: [CALC]

Prepared: 10/06/2020 Final Volume: 1

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness		1	0.207	14.7	mg/L CaCO3	

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Analytical Report

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-8-PW-36-092620

20I0446-33RE1 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/26/2020 10:50

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/09/2020 17:46

Sample Preparation: Preparation Method: RHN EPA 600/4-79-020 4.1.4 HNO3 matrix 5x — Extract ID: 20I0446-33RE1 C 02

Preparation Batch: BIJ0284 — Sample Size: 100 mL

Prepared: 10/09/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Cadmium	7440-43-9	1	0.00600	0.0200	0.0558	ug/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-8-PW-12-092620

20I0446-34 (Water)

Metals and Metallic Compounds

Method: EPA 6020A — Sampled: 09/26/2020 09:50
Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/07/2020 02:29

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0446-34 C 01
Preparation Batch: BIJ0139 — Sample Size: 25 mL
Prepared: 10/06/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Aluminum	7429-90-5	1	2.37	20.0	22.5	ug/L	
Lead	7439-92-1	1	0.0680	0.100	ND	ug/L	U

Instrument: ICPMS2 Analyst: TCH — Analyzed: 10/09/2020 13:21

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0446-34 C 01
Preparation Batch: BIJ0139 — Sample Size: 25 mL
Prepared: 10/06/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Calcium	7440-70-2	1	1.91	50.0	4630	ug/L	
Iron	7439-89-6	1	6.27	20.0	43.3	ug/L	
Magnesium	7439-95-4	1	0.307	20.0	457	ug/L	
Manganese	7439-96-5	1	0.0850	0.500	0.434	ug/L	J
Potassium	7440-09-7	1	1.41	20.0	482	ug/L	
Sodium	7440-23-5	1	7.18	100	699	ug/L	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-8-PW-12-092620

20I0446-34 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/26/2020 09:50

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/07/2020 02:29

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0446-34 C 01

Preparation Batch: BIJ0139 — Sample Size: 25 mL

Prepared: 10/06/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Copper	7440-50-8	1	0.340	0.500	1.42	ug/L	
Zinc	7440-66-6	1	0.820	4.00	4.57	ug/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-8-PW-12-092620

20I0446-34 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/26/2020 09:50

Instrument: IC930 Analyst: KOTT — Analyzed: 09/29/2020 04:40

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-34 B

Preparation Batch: BII0818 — Sample Size: 10 mL

Prepared: 09/28/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Chloride	16887-00-6	1	0.100	0.100	0.274	mg/L	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Nitrate-N	14797-55-8	1	0.100	0.100	ND	mg/L	H, U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Sulfate	14808-79-8	1	0.100	0.100	4.04	mg/L	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-8-PW-12-092620

20I0446-34 (Water)

Wet Chemistry

Method: SM 2320 B-97 — Sampled: 09/26/2020 09:50

Instrument: Accumet AB150 Analyst: UW — Analyzed: 10/01/2020 09:49

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-34 D

Preparation Batch: BIJ0014 — Sample Size: 100 mL

Prepared: 10/01/2020 — Final Volume: 100 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Bicarbonate		1	1.00	1.00	9.58	mg/L CaCO3	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Carbonate		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Hydroxide		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Total		1	1.00	1.00	9.58	mg/L CaCO3	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-8-PW-12-092620

20I0446-34 (Water)

Wet Chemistry

Method: SM 2540 C-97 — Sampled: 09/26/2020 09:50

Instrument: BAL2 Analyst: KLE — Analyzed: 10/01/2020 08:08

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-34

Preparation Batch: BIJ0002 — Sample Size: 200 mL

Prepared: 10/01/2020 — Final Volume: 200 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Solids		1	5	5	21	mg/L	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-8-PW-12-092620

20I0446-34 (Water)

Wet Chemistry

Method: SM 2540 D-97 — Sampled: 09/26/2020 09:50

Instrument: BAL2 Analyst: KLE — Analyzed: 09/30/2020 06:58

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-34

Preparation Batch: BII0869 — Sample Size: 940 mL

Prepared: 09/30/2020 — Final Volume: 1000 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Suspended Solids		1	1	1	ND	mg/L	U

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-8-PW-12-092620

20I0446-34 (Water)

Wet Chemistry

Method: SM 5310 B-00 — Sampled: 09/26/2020 09:50
Instrument: TOC-LCSH Analyst: WCW — Analyzed: 10/08/2020 17:04

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-34 F
Preparation Batch: BIJ0123 — Sample Size: 20 mL
Prepared: 10/05/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Organic Carbon, Dissolved		1	0.50	0.50	0.69	mg/L	

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-34 E
Preparation Batch: BIJ0297 — Sample Size: 20 mL
Prepared: 10/08/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Organic Carbon		1	0.50	0.50	0.64	mg/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-8-PW-12-092620

20I0446-34 (Water)

Calculation

Method: SM 2340 B-97 — Sampled: 09/26/2020 09:50

Instrument: [CALC] Analyst: TCH — Analyzed: 10/09/2020 13:21

Sample Preparation: Preparation Method: [CALC] — Extract ID: 20I0446-34

Preparation Batch: [CALC]

Prepared: 10/06/2020 Final Volume: 1

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness		1	0.207	13.4	mg/L CaCO3	

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Analytical Report

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-8-PW-12-092620

20I0446-34RE1 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/26/2020 09:50

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/09/2020 18:09

Sample Preparation: Preparation Method: RHN EPA 600/4-79-020 4.1.4 HNO3 matrix 5x — Extract ID: 20I0446-34RE1 C 02

Preparation Batch: BIJ0284 — Sample Size: 100 mL

Prepared: 10/09/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Cadmium	7440-43-9	1	0.00600	0.0200	0.0302	ug/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-8-PW-6-092620

20I0446-35 (Water)

Metals and Metallic Compounds

Method: EPA 6020A — Sampled: 09/26/2020 09:25
Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/07/2020 02:33

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0446-35 C 01
Preparation Batch: BIJ0139 — Sample Size: 25 mL
Prepared: 10/06/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Aluminum	7429-90-5	1	2.37	20.0	12.5	ug/L	J
Lead	7439-92-1	1	0.0680	0.100	ND	ug/L	U

Instrument: ICPMS2 Analyst: TCH — Analyzed: 10/09/2020 13:23

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0446-35 C 01
Preparation Batch: BIJ0139 — Sample Size: 25 mL
Prepared: 10/06/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Calcium	7440-70-2	1	1.91	50.0	4880	ug/L	
Iron	7439-89-6	1	6.27	20.0	24.9	ug/L	
Magnesium	7439-95-4	1	0.307	20.0	468	ug/L	
Manganese	7439-96-5	1	0.0850	0.500	0.230	ug/L	J
Potassium	7440-09-7	1	1.41	20.0	473	ug/L	
Sodium	7440-23-5	1	7.18	100	719	ug/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-8-PW-6-092620

20I0446-35 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/26/2020 09:25

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/07/2020 02:33

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0446-35 C 01

Preparation Batch: BIJ0139 — Sample Size: 25 mL

Prepared: 10/06/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Copper	7440-50-8	1	0.340	0.500	1.33	ug/L	
Zinc	7440-66-6	1	0.820	4.00	4.66	ug/L	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-8-PW-6-092620

20I0446-35 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/26/2020 09:25
Instrument: IC930 Analyst: KOTT — Analyzed: 09/29/2020 05:00

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-35 B
Preparation Batch: BII0818 — Sample Size: 10 mL
Prepared: 09/28/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Chloride	16887-00-6	1	0.100	0.100	0.274	mg/L	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Nitrate-N	14797-55-8	1	0.100	0.100	ND	mg/L	H, U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Sulfate	14808-79-8	1	0.100	0.100	4.03	mg/L	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-8-PW-6-092620

20I0446-35 (Water)

Wet Chemistry

Method: SM 2320 B-97 — Sampled: 09/26/2020 09:25

Instrument: Accumet AB150 Analyst: UW — Analyzed: 10/01/2020 09:49

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-35 D

Preparation Batch: BIJ0014 — Sample Size: 100 mL

Prepared: 10/01/2020 — Final Volume: 100 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Bicarbonate		1	1.00	1.00	9.68	mg/L CaCO3	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Carbonate		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Hydroxide		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Total		1	1.00	1.00	9.68	mg/L CaCO3	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-8-PW-6-092620

20I0446-35 (Water)

Wet Chemistry

Method: SM 2540 C-97 — Sampled: 09/26/2020 09:25

Instrument: BAL2 Analyst: KLE — Analyzed: 10/01/2020 08:08

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-35

Preparation Batch: BIJ0002 — Sample Size: 200 mL

Prepared: 10/01/2020 — Final Volume: 200 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Solids		1	5	5	23	mg/L	

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Analytical Report

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-8-PW-6-092620

20I0446-35 (Water)

Wet Chemistry

Method: SM 2540 D-97 — Sampled: 09/26/2020 09:25

Instrument: BAL2 Analyst: KLE — Analyzed: 09/30/2020 06:58

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-35

Preparation Batch: BII0869 — Sample Size: 920 mL

Prepared: 09/30/2020 — Final Volume: 1000 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Suspended Solids		1	1	1	ND	mg/L	U

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-8-PW-6-092620

20I0446-35 (Water)

Wet Chemistry

Method: SM 5310 B-00 — Sampled: 09/26/2020 09:25
Instrument: TOC-LCSH Analyst: WCW — Analyzed: 10/08/2020 17:25

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-35 F
Preparation Batch: BIJ0123 — Sample Size: 20 mL
Prepared: 10/05/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Organic Carbon, Dissolved		1	0.50	0.50	0.67	mg/L	

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-35 E
Preparation Batch: BIJ0297 — Sample Size: 20 mL
Prepared: 10/08/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Organic Carbon		1	0.50	0.50	0.61	mg/L	

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Analytical Report

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-8-PW-6-092620

20I0446-35 (Water)

Calculation

Method: SM 2340 B-97 — Sampled: 09/26/2020 09:25

Instrument: [CALC] Analyst: TCH — Analyzed: 10/09/2020 13:23

Sample Preparation: Preparation Method: [CALC] — Extract ID: 20I0446-35

Preparation Batch: [CALC]

Prepared: 10/06/2020 Final Volume: 1

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness		1	0.207	14.1	mg/L CaCO3	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-8-PW-6-092620

20I0446-35RE1 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/26/2020 09:25

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/09/2020 18:13

Sample Preparation: Preparation Method: RHN EPA 600/4-79-020 4.1.4 HNO3 matrix 5x — Extract ID: 20I0446-35RE1 C 02

Preparation Batch: BIJ0284 — Sample Size: 100 mL

Prepared: 10/09/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Cadmium	7440-43-9	1	0.00600	0.0200	0.0278	ug/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-8-SW-092620

20I0446-36 (Water)

Metals and Metallic Compounds

Method: EPA 6020A — Sampled: 09/26/2020 08:20

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/07/2020 02:37

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0446-36 C 01

Preparation Batch: BIJ0139 — Sample Size: 25 mL

Prepared: 10/06/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Aluminum	7429-90-5	1	2.37	20.0	90.4	ug/L	
Lead	7439-92-1	1	0.0680	0.100	0.117	ug/L	

Instrument: ICPMS2 Analyst: TCH — Analyzed: 10/09/2020 13:25

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0446-36 C 01

Preparation Batch: BIJ0139 — Sample Size: 25 mL

Prepared: 10/06/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Calcium	7440-70-2	1	1.91	50.0	4810	ug/L	
Iron	7439-89-6	1	6.27	20.0	178	ug/L	
Magnesium	7439-95-4	1	0.307	20.0	507	ug/L	
Manganese	7439-96-5	1	0.0850	0.500	4.85	ug/L	
Potassium	7440-09-7	1	1.41	20.0	523	ug/L	
Sodium	7440-23-5	1	7.18	100	719	ug/L	

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Analytical Report

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-8-SW-092620

20I0446-36 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/26/2020 08:20

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/07/2020 02:37

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0446-36 C 01

Preparation Batch: BIJ0139 — Sample Size: 25 mL

Prepared: 10/06/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Copper	7440-50-8	1	0.340	0.500	1.12	ug/L	
Zinc	7440-66-6	1	0.820	4.00	5.34	ug/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-8-SW-092620

20I0446-36 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/26/2020 08:20

Instrument: IC930 Analyst: KOTT — Analyzed: 09/29/2020 05:20

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-36 B

Preparation Batch: BII0818 — Sample Size: 10 mL

Prepared: 09/28/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Chloride	16887-00-6	1	0.100	0.100	0.273	mg/L	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Nitrate-N	14797-55-8	1	0.100	0.100	ND	mg/L	H, U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Sulfate	14808-79-8	1	0.100	0.100	4.04	mg/L	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-8-SW-092620

20I0446-36 (Water)

Wet Chemistry

Method: SM 2320 B-97 — Sampled: 09/26/2020 08:20

Instrument: Accumet AB150 Analyst: UW — Analyzed: 10/01/2020 09:49

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-36 D

Preparation Batch: BIJ0014 — Sample Size: 100 mL

Prepared: 10/01/2020 — Final Volume: 100 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Bicarbonate		1	1.00	1.00	9.78	mg/L CaCO3	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Carbonate		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Hydroxide		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Total		1	1.00	1.00	9.78	mg/L CaCO3	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-8-SW-092620

20I0446-36 (Water)

Wet Chemistry

Method: SM 2540 C-97 — Sampled: 09/26/2020 08:20

Instrument: BAL2 Analyst: KLE — Analyzed: 10/01/2020 08:08

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-36

Preparation Batch: BIJ0002 — Sample Size: 200 mL

Prepared: 10/01/2020 — Final Volume: 200 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Solids		1	5	5	21	mg/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-8-SW-092620

20I0446-36 (Water)

Wet Chemistry

Method: SM 2540 D-97 — Sampled: 09/26/2020 08:20

Instrument: BAL2 Analyst: KLE — Analyzed: 09/30/2020 06:58

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-36

Preparation Batch: BII0869 — Sample Size: 950 mL

Prepared: 09/30/2020 — Final Volume: 1000 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Suspended Solids		1	1	1	2	mg/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-8-SW-092620

20I0446-36 (Water)

Wet Chemistry

Method: SM 5310 B-00 — Sampled: 09/26/2020 08:20

Instrument: TOC-LCSH Analyst: WCW — Analyzed: 10/08/2020 17:47

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-36 F

Preparation Batch: BIJ0123 — Sample Size: 20 mL

Prepared: 10/05/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Organic Carbon, Dissolved		1	0.50	0.50	0.74	mg/L	

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-36 E

Preparation Batch: BIJ0297 — Sample Size: 20 mL

Prepared: 10/08/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Organic Carbon		1	0.50	0.50	0.74	mg/L	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-8-SW-092620

20I0446-36 (Water)

Calculation

Method: SM 2340 B-97 — Sampled: 09/26/2020 08:20

Instrument: [CALC] Analyst: TCH — Analyzed: 10/09/2020 13:25

Sample Preparation: Preparation Method: [CALC] — Extract ID: 20I0446-36

Preparation Batch: [CALC]

Prepared: 10/06/2020 Final Volume: 1

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness		1	0.207	14.1	mg/L CaCO3	

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Analytical Report

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-8-SW-092620

20I0446-36RE1 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/26/2020 08:20

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/09/2020 18:17

Sample Preparation: Preparation Method: RHN EPA 600/4-79-020 4.1.4 HNO3 matrix 5x — Extract ID: 20I0446-36RE1 C 02

Preparation Batch: BIJ0284 — Sample Size: 100 mL

Prepared: 10/09/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Cadmium	7440-43-9	1	0.00600	0.0200	0.0340	ug/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-11-SW-092720

20I0446-37 (Water)

Metals and Metallic Compounds

Method: EPA 6020A — Sampled: 09/27/2020 08:40

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/07/2020 02:42

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0446-37 C 01

Preparation Batch: BIJ0139 — Sample Size: 25 mL

Prepared: 10/06/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Aluminum	7429-90-5	1	2.37	20.0	81.3	ug/L	
Lead	7439-92-1	1	0.0680	0.100	0.0940	ug/L	J

Instrument: ICPMS2 Analyst: TCH — Analyzed: 10/09/2020 13:26

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0446-37 C 01

Preparation Batch: BIJ0139 — Sample Size: 25 mL

Prepared: 10/06/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Calcium	7440-70-2	1	1.91	50.0	7590	ug/L	
Iron	7439-89-6	1	6.27	20.0	160	ug/L	
Magnesium	7439-95-4	1	0.307	20.0	726	ug/L	
Manganese	7439-96-5	1	0.0850	0.500	16.5	ug/L	
Potassium	7440-09-7	1	1.41	20.0	607	ug/L	
Sodium	7440-23-5	1	7.18	100	839	ug/L	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-11-SW-092720

20I0446-37 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/27/2020 08:40

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/07/2020 02:42

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0446-37 C 01

Preparation Batch: BIJ0139 — Sample Size: 25 mL

Prepared: 10/06/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Copper	7440-50-8	1	0.340	0.500	1.10	ug/L	
Zinc	7440-66-6	1	0.820	4.00	6.74	ug/L	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-11-SW-092720

20I0446-37 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/27/2020 08:40

Instrument: IC930 Analyst: KOTT — Analyzed: 09/28/2020 20:39

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-37 B

Preparation Batch: BII0818 — Sample Size: 10 mL

Prepared: 09/28/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Chloride	16887-00-6	1	0.100	0.100	0.284	mg/L	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Nitrate-N	14797-55-8	1	0.100	0.100	ND	mg/L	U

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-11-SW-092720

20I0446-37 (Water)

Wet Chemistry

Method: SM 2320 B-97 — Sampled: 09/27/2020 08:40
Instrument: Accumet AB150 Analyst: UW — Analyzed: 10/01/2020 09:49

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-37 D
Preparation Batch: BIJ0014 — Sample Size: 100 mL
Prepared: 10/01/2020 — Final Volume: 100 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Bicarbonate		1	1.00	1.00	10.5	mg/L CaCO3	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Carbonate		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Hydroxide		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Total		1	1.00	1.00	10.5	mg/L CaCO3	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-11-SW-092720

20I0446-37 (Water)

Wet Chemistry

Method: SM 2540 C-97 — Sampled: 09/27/2020 08:40

Instrument: BAL2 Analyst: KLE — Analyzed: 10/01/2020 08:08

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-37

Preparation Batch: BIJ0002 — Sample Size: 200 mL

Prepared: 10/01/2020 — Final Volume: 200 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Solids		1	5	5	11	mg/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-11-SW-092720

20I0446-37 (Water)

Wet Chemistry

Method: SM 2540 D-97 — Sampled: 09/27/2020 08:40

Instrument: BAL2 Analyst: KLE — Analyzed: 09/30/2020 06:58

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-37

Preparation Batch: BII0869 — Sample Size: 950 mL

Prepared: 09/30/2020 — Final Volume: 1000 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Suspended Solids		1	1	1	ND	mg/L	U

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-11-SW-092720

20I0446-37 (Water)

Wet Chemistry

Method: SM 5310 B-00 — Sampled: 09/27/2020 08:40

Instrument: TOC-LCSH Analyst: WCW — Analyzed: 10/08/2020 18:08

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-37 F

Preparation Batch: BIJ0123 — Sample Size: 20 mL

Prepared: 10/05/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Organic Carbon, Dissolved		1	0.50	0.50	0.64	mg/L	

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-37 E

Preparation Batch: BIJ0297 — Sample Size: 20 mL

Prepared: 10/08/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Organic Carbon		1	0.50	0.50	0.66	mg/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-11-SW-092720

20I0446-37 (Water)

Calculation

Method: SM 2340 B-97 — Sampled: 09/27/2020 08:40

Instrument: [CALC] Analyst: TCH — Analyzed: 10/09/2020 13:26

Sample Preparation: Preparation Method: [CALC] — Extract ID: 20I0446-37

Preparation Batch: [CALC]

Prepared: 10/06/2020 Final Volume: 1

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness		1	0.207	21.9	mg/L CaCO3	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-11-SW-092720

20I0446-37RE1 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/27/2020 08:40

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/09/2020 18:21

Sample Preparation: Preparation Method: RHN EPA 600/4-79-020 4.1.4 HNO3 matrix 5x — Extract ID: 20I0446-37RE1 C 02

Preparation Batch: BIJ0284 — Sample Size: 100 mL

Prepared: 10/09/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Cadmium	7440-43-9	1	0.00600	0.0200	0.0472	ug/L	

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Analytical Report

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-11-SW-092720

20I0446-37RE1 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/27/2020 08:40

Instrument: IC930 Analyst: KOTT — Analyzed: 09/29/2020 16:42

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-37RE1 B

Preparation Batch: BII0818 — Sample Size: 10 mL

Prepared: 09/28/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Sulfate	14808-79-8	2	0.200	0.200	10.3	mg/L	D

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-10-SW-092720

20I0446-38 (Water)

Metals and Metallic Compounds

Method: EPA 6020A — Sampled: 09/27/2020 08:47
Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/07/2020 02:46

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0446-38 C 01
Preparation Batch: BIJ0139 — Sample Size: 25 mL
Prepared: 10/06/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Aluminum	7429-90-5	1	2.37	20.0	82.8	ug/L	
Lead	7439-92-1	1	0.0680	0.100	0.0960	ug/L	J

Instrument: ICPMS2 Analyst: TCH — Analyzed: 10/09/2020 13:28

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0446-38 C 01
Preparation Batch: BIJ0139 — Sample Size: 25 mL
Prepared: 10/06/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Calcium	7440-70-2	1	1.91	50.0	7440	ug/L	
Iron	7439-89-6	1	6.27	20.0	159	ug/L	
Magnesium	7439-95-4	1	0.307	20.0	695	ug/L	
Manganese	7439-96-5	1	0.0850	0.500	19.1	ug/L	
Potassium	7440-09-7	1	1.41	20.0	606	ug/L	
Sodium	7440-23-5	1	7.18	100	828	ug/L	

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Analytical Report

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-10-SW-092720

20I0446-38 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/27/2020 08:47

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/07/2020 02:46

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0446-38 C 01

Preparation Batch: BIJ0139 — Sample Size: 25 mL

Prepared: 10/06/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Copper	7440-50-8	1	0.340	0.500	1.05	ug/L	
Zinc	7440-66-6	1	0.820	4.00	6.99	ug/L	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-10-SW-092720

20I0446-38 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/27/2020 08:47

Instrument: IC930 Analyst: KOTT — Analyzed: 09/28/2020 20:59

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-38 B

Preparation Batch: BII0818 — Sample Size: 10 mL

Prepared: 09/28/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Chloride	16887-00-6	1	0.100	0.100	0.283	mg/L	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Nitrate-N	14797-55-8	1	0.100	0.100	ND	mg/L	U

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-10-SW-092720

20I0446-38 (Water)

Wet Chemistry

Method: SM 2320 B-97 — Sampled: 09/27/2020 08:47

Instrument: Accumet AB150 Analyst: UW — Analyzed: 10/01/2020 09:49

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-38 D

Preparation Batch: BIJ0014 — Sample Size: 100 mL

Prepared: 10/01/2020 — Final Volume: 100 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Bicarbonate		1	1.00	1.00	10.5	mg/L CaCO3	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Carbonate		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Hydroxide		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Total		1	1.00	1.00	10.5	mg/L CaCO3	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-10-SW-092720

20I0446-38 (Water)

Wet Chemistry

Method: SM 2540 C-97 — Sampled: 09/27/2020 08:47

Instrument: BAL2 Analyst: KLE — Analyzed: 10/01/2020 08:08

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-38

Preparation Batch: BIJ0002 — Sample Size: 200 mL

Prepared: 10/01/2020 — Final Volume: 200 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Solids		1	5	5	31	mg/L	

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Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-10-SW-092720

20I0446-38 (Water)

Wet Chemistry

Method: SM 2540 D-97 — Sampled: 09/27/2020 08:47

Instrument: BAL2 Analyst: KLE — Analyzed: 09/30/2020 06:58

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-38

Preparation Batch: BII0869 — Sample Size: 925 mL

Prepared: 09/30/2020 — Final Volume: 1000 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Suspended Solids		1	1	1	1	mg/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-10-SW-092720

20I0446-38 (Water)

Wet Chemistry

Method: SM 5310 B-00 — Sampled: 09/27/2020 08:47

Instrument: TOC-LCSH Analyst: WCW — Analyzed: 10/08/2020 18:29

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-38 F

Preparation Batch: BIJ0123 — Sample Size: 20 mL

Prepared: 10/05/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Organic Carbon, Dissolved		1	0.50	0.50	0.65	mg/L	

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-38 E

Preparation Batch: BIJ0297 — Sample Size: 20 mL

Prepared: 10/08/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Organic Carbon		1	0.50	0.50	0.65	mg/L	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-10-SW-092720

20I0446-38 (Water)

Calculation

Method: SM 2340 B-97 — Sampled: 09/27/2020 08:47

Instrument: [CALC] Analyst: TCH — Analyzed: 10/09/2020 13:28

Sample Preparation: Preparation Method: [CALC]
Preparation Batch: [CALC]
Prepared: 10/06/2020 Final Volume: 1

Extract ID: 20I0446-38

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness		1	0.207	21.4	mg/L CaCO3	

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Analytical Report

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-10-SW-092720

20I0446-38RE1 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/27/2020 08:47

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/09/2020 18:25

Sample Preparation: Preparation Method: RHN EPA 600/4-79-020 4.1.4 HNO3 matrix 5x — Extract ID: 20I0446-38RE1 C 02

Preparation Batch: BIJ0284 — Sample Size: 100 mL

Prepared: 10/09/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Cadmium	7440-43-9	1	0.00600	0.0200	0.0488	ug/L	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-10-SW-092720

20I0446-38RE1 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/27/2020 08:47

Instrument: IC930 Analyst: KOTT — Analyzed: 09/29/2020 17:01

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-38RE1 B

Preparation Batch: BII0818 — Sample Size: 10 mL

Prepared: 09/28/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Sulfate	14808-79-8	2	0.200	0.200	10.7	mg/L	D

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-9-SW-092720

20I0446-39 (Water)

Metals and Metallic Compounds

Method: EPA 6020A — Sampled: 09/27/2020 09:23

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/07/2020 02:51

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0446-39 C 01

Preparation Batch: BIJ0139 — Sample Size: 25 mL

Prepared: 10/06/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Aluminum	7429-90-5	1	2.37	20.0	72.8	ug/L	
Lead	7439-92-1	1	0.0680	0.100	0.101	ug/L	

Instrument: ICPMS2 Analyst: TCH — Analyzed: 10/09/2020 13:40

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0446-39 C 01

Preparation Batch: BIJ0139 — Sample Size: 25 mL

Prepared: 10/06/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Calcium	7440-70-2	1	1.91	50.0	9620	ug/L	
Iron	7439-89-6	1	6.27	20.0	161	ug/L	
Magnesium	7439-95-4	1	0.307	20.0	859	ug/L	
Manganese	7439-96-5	1	0.0850	0.500	19.8	ug/L	
Potassium	7440-09-7	1	1.41	20.0	670	ug/L	
Sodium	7440-23-5	1	7.18	100	945	ug/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-9-SW-092720

20I0446-39 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/27/2020 09:23

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/07/2020 02:51

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0446-39 C 01

Preparation Batch: BIJ0139 — Sample Size: 25 mL

Prepared: 10/06/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Copper	7440-50-8	1	0.340	0.500	1.03	ug/L	
Zinc	7440-66-6	1	0.820	4.00	6.98	ug/L	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-9-SW-092720

20I0446-39 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/27/2020 09:23

Instrument: IC930 Analyst: KOTT — Analyzed: 09/28/2020 21:19

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-39 B

Preparation Batch: BII0818 — Sample Size: 10 mL

Prepared: 09/28/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Chloride	16887-00-6	1	0.100	0.100	0.295	mg/L	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Nitrate-N	14797-55-8	1	0.100	0.100	ND	mg/L	U

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-9-SW-092720

20I0446-39 (Water)

Wet Chemistry

Method: SM 2320 B-97 — Sampled: 09/27/2020 09:23

Instrument: Accumet AB150 Analyst: UW — Analyzed: 10/01/2020 09:49

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-39 D

Preparation Batch: BIJ0014 — Sample Size: 100 mL

Prepared: 10/01/2020 — Final Volume: 100 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Bicarbonate		1	1.00	1.00	11.2	mg/L CaCO3	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Carbonate		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Hydroxide		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Total		1	1.00	1.00	11.2	mg/L CaCO3	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-9-SW-092720

20I0446-39 (Water)

Wet Chemistry

Method: SM 2540 C-97 — Sampled: 09/27/2020 09:23

Instrument: BAL2 Analyst: KLE — Analyzed: 10/01/2020 08:08

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-39

Preparation Batch: BIJ0002 — Sample Size: 200 mL

Prepared: 10/01/2020 — Final Volume: 200 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Solids		1	5	5	45	mg/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-9-SW-092720

20I0446-39 (Water)

Wet Chemistry

Method: SM 2540 D-97 — Sampled: 09/27/2020 09:23

Instrument: BAL2 Analyst: KLE — Analyzed: 09/30/2020 06:58

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-39

Preparation Batch: BII0869 — Sample Size: 940 mL

Prepared: 09/30/2020 — Final Volume: 1000 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Suspended Solids		1	1	1	1	mg/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-9-SW-092720

20I0446-39 (Water)

Wet Chemistry

Method: SM 5310 B-00 — Sampled: 09/27/2020 09:23

Instrument: TOC-LCSH Analyst: WCW — Analyzed: 10/08/2020 19:34

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-39 F

Preparation Batch: BIJ0123 — Sample Size: 20 mL

Prepared: 10/05/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Organic Carbon, Dissolved		1	0.50	0.50	0.69	mg/L	

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-39 E

Preparation Batch: BIJ0297 — Sample Size: 20 mL

Prepared: 10/08/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Organic Carbon		1	0.50	0.50	0.65	mg/L	

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Analytical Report

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-9-SW-092720

20I0446-39 (Water)

Calculation

Method: SM 2340 B-97 — Sampled: 09/27/2020 09:23

Instrument: [CALC] Analyst: TCH — Analyzed: 10/09/2020 13:40

Sample Preparation: Preparation Method: [CALC] — Extract ID: 20I0446-39

Preparation Batch: [CALC]

Prepared: 10/06/2020 Final Volume: 1

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness		1	0.207	27.6	mg/L CaCO3	

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Analytical Chemists and Consultants

Analytical Report

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-9-SW-092720

20I0446-39RE1 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/27/2020 09:23

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/09/2020 18:30

Sample Preparation: Preparation Method: RHN EPA 600/4-79-020 4.1.4 HNO3 matrix 5x — Extract ID: 20I0446-39RE1 C 02

Preparation Batch: BIJ0284 — Sample Size: 100 mL

Prepared: 10/09/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Cadmium	7440-43-9	1	0.00600	0.0200	0.0398	ug/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SG-9-SW-092720

20I0446-39RE1 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/27/2020 09:23

Instrument: IC930 Analyst: KOTT — Analyzed: 09/29/2020 17:21

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-39RE1 B

Preparation Batch: BII0818 — Sample Size: 10 mL

Prepared: 09/28/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Sulfate	14808-79-8	4	0.400	0.400	18.0	mg/L	D

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

RC-6-SW-092720

20I0446-40 (Water)

Metals and Metallic Compounds

Method: EPA 6020A — Sampled: 09/27/2020 10:10

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/07/2020 02:57

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0446-40 C 01

Preparation Batch: BIJ0139 — Sample Size: 25 mL

Prepared: 10/06/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Aluminum	7429-90-5	1	2.37	20.0	90.2	ug/L	
Lead	7439-92-1	1	0.0680	0.100	0.133	ug/L	

Instrument: ICPMS2 Analyst: TCH — Analyzed: 10/09/2020 13:41

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0446-40 C 01

Preparation Batch: BIJ0139 — Sample Size: 25 mL

Prepared: 10/06/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Calcium	7440-70-2	1	1.91	50.0	4780	ug/L	
Iron	7439-89-6	1	6.27	20.0	176	ug/L	
Magnesium	7439-95-4	1	0.307	20.0	465	ug/L	
Manganese	7439-96-5	1	0.0850	0.500	3.94	ug/L	
Potassium	7440-09-7	1	1.41	20.0	484	ug/L	
Sodium	7440-23-5	1	7.18	100	735	ug/L	

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Analytical Report

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

RC-6-SW-092720

20I0446-40 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/27/2020 10:10

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/07/2020 02:57

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0446-40 C 01

Preparation Batch: BIJ0139 — Sample Size: 25 mL

Prepared: 10/06/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Copper	7440-50-8	1	0.340	0.500	0.868	ug/L	
Zinc	7440-66-6	1	0.820	4.00	2.62	ug/L	J

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

RC-6-SW-092720

20I0446-40 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/27/2020 10:10

Instrument: IC930 Analyst: KOTT — Analyzed: 09/28/2020 21:39

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-40 B

Preparation Batch: BII0818 — Sample Size: 10 mL

Prepared: 09/28/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Chloride	16887-00-6	1	0.100	0.100	0.290	mg/L	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Nitrate-N	14797-55-8	1	0.100	0.100	ND	mg/L	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Sulfate	14808-79-8	1	0.100	0.100	3.58	mg/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

RC-6-SW-092720

20I0446-40 (Water)

Wet Chemistry

Method: SM 2320 B-97 — Sampled: 09/27/2020 10:10

Instrument: Accumet AB150 Analyst: UW — Analyzed: 10/01/2020 09:49

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-40 D

Preparation Batch: BIJ0014 — Sample Size: 100 mL

Prepared: 10/01/2020 — Final Volume: 100 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Bicarbonate		1	1.00	1.00	9.78	mg/L CaCO3	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Carbonate		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Hydroxide		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Total		1	1.00	1.00	9.78	mg/L CaCO3	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

RC-6-SW-092720

20I0446-40 (Water)

Wet Chemistry

Method: SM 2540 C-97 — Sampled: 09/27/2020 10:10

Instrument: BAL2 Analyst: KLE — Analyzed: 10/01/2020 08:08

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-40

Preparation Batch: BIJ0002 — Sample Size: 200 mL

Prepared: 10/01/2020 — Final Volume: 200 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Solids		1	5	5	16	mg/L	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

RC-6-SW-092720

20I0446-40 (Water)

Wet Chemistry

Method: SM 2540 D-97 — Sampled: 09/27/2020 10:10

Instrument: BAL2 Analyst: KLE — Analyzed: 09/30/2020 06:58

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-40

Preparation Batch: BII0869 — Sample Size: 950 mL

Prepared: 09/30/2020 — Final Volume: 1000 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Suspended Solids		1	1	1	1	mg/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

RC-6-SW-092720

20I0446-40 (Water)

Wet Chemistry

Method: SM 5310 B-00 — Sampled: 09/27/2020 10:10

Instrument: TOC-LCSH Analyst: WCW — Analyzed: 10/08/2020 19:52

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-40 F

Preparation Batch: BIJ0123 — Sample Size: 20 mL

Prepared: 10/05/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Organic Carbon, Dissolved		1	0.50	0.50	0.75	mg/L	

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-40 E

Preparation Batch: BIJ0297 — Sample Size: 20 mL

Prepared: 10/08/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Organic Carbon		1	0.50	0.50	0.70	mg/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

RC-6-SW-092720

20I0446-40 (Water)

Calculation

Method: SM 2340 B-97 — Sampled: 09/27/2020 10:10

Instrument: [CALC] Analyst: TCH — Analyzed: 10/09/2020 13:41

Sample Preparation: Preparation Method: [CALC] — Extract ID: 20I0446-40

Preparation Batch: [CALC]

Prepared: 10/06/2020 Final Volume: 1

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness		1	0.207	13.8	mg/L CaCO3	

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Analytical Report

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

RC-6-SW-092720

20I0446-40RE1 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/27/2020 10:10

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/09/2020 18:34

Sample Preparation: Preparation Method: RHN EPA 600/4-79-020 4.1.4 HNO3 matrix 5x — Extract ID: 20I0446-40RE1 C 02

Preparation Batch: BIJ0284 — Sample Size: 100 mL

Prepared: 10/09/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Cadmium	7440-43-9	1	0.00600	0.0200	0.0198	ug/L	J

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

RC-24-SW-092720

20I0446-41 (Water)

Metals and Metallic Compounds

Method: EPA 6020A — Sampled: 09/27/2020 11:15

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/19/2020 15:13

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0446-41 C 01

Preparation Batch: BIJ0193 — Sample Size: 25 mL

Prepared: 10/06/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Aluminum	7429-90-5	1	2.37	20.0	93.1	ug/L	
Calcium	7440-70-2	1	1.91	50.0	4730	ug/L	
Iron	7439-89-6	1	6.27	20.0	196	ug/L	
Lead	7439-92-1	1	0.0680	0.100	0.115	ug/L	
Magnesium	7439-95-4	1	0.307	20.0	451	ug/L	
Manganese	7439-96-5	1	0.0850	0.500	5.77	ug/L	
Potassium	7440-09-7	1	1.41	20.0	480	ug/L	
Sodium	7440-23-5	1	7.18	100	607	ug/L	

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Analytical Report

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

RC-24-SW-092720

20I0446-41 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/27/2020 11:15

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/09/2020 01:16

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0446-41 C 01

Preparation Batch: BIJ0193 — Sample Size: 25 mL

Prepared: 10/06/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Copper	7440-50-8	1	0.340	0.500	1.16	ug/L	
Zinc	7440-66-6	1	0.820	4.00	5.84	ug/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

RC-24-SW-092720

20I0446-41 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/27/2020 11:15

Instrument: IC930 Analyst: KOTT — Analyzed: 09/28/2020 21:59

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-41 B

Preparation Batch: BII0818 — Sample Size: 10 mL

Prepared: 09/28/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Chloride	16887-00-6	1	0.100	0.100	0.278	mg/L	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Nitrate-N	14797-55-8	1	0.100	0.100	ND	mg/L	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Sulfate	14808-79-8	1	0.100	0.100	4.47	mg/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

RC-24-SW-092720

20I0446-41 (Water)

Wet Chemistry

Method: SM 2320 B-97 — Sampled: 09/27/2020 11:15

Instrument: Accumet AB150 Analyst: UW — Analyzed: 10/01/2020 09:49

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-41 D

Preparation Batch: BIJ0014 — Sample Size: 100 mL

Prepared: 10/01/2020 — Final Volume: 100 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Bicarbonate		1	1.00	1.00	10.6	mg/L CaCO3	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Carbonate		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Hydroxide		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Total		1	1.00	1.00	10.6	mg/L CaCO3	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

RC-24-SW-092720

20I0446-41 (Water)

Wet Chemistry

Method: SM 2540 C-97 — Sampled: 09/27/2020 11:15

Instrument: BAL2 Analyst: KLE — Analyzed: 10/02/2020 12:09

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-41

Preparation Batch: BIJ0068 — Sample Size: 200 mL

Prepared: 10/02/2020 — Final Volume: 200 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Solids		1	5	5	22	mg/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

RC-24-SW-092720

20I0446-41 (Water)

Wet Chemistry

Method: SM 2540 D-97 — Sampled: 09/27/2020 11:15

Instrument: BAL2 Analyst: KLE — Analyzed: 09/30/2020 07:36

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-41

Preparation Batch: BII0875 — Sample Size: 950 mL

Prepared: 09/30/2020 — Final Volume: 1000 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Suspended Solids		1	1	1	1	mg/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

RC-24-SW-092720

20I0446-41 (Water)

Wet Chemistry

Method: SM 5310 B-00 — Sampled: 09/27/2020 11:15

Instrument: TOC-LCSH Analyst: WCW — Analyzed: 10/08/2020 21:15

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-41 F

Preparation Batch: BIJ0124 — Sample Size: 20 mL

Prepared: 10/05/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Organic Carbon, Dissolved		1	0.50	0.50	0.84	mg/L	

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-41 E

Preparation Batch: BIJ0289 — Sample Size: 20 mL

Prepared: 10/08/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Organic Carbon		1	0.50	0.50	0.79	mg/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

RC-24-SW-092720

20I0446-41 (Water)

Calculation

Method: SM 2340 B-97 — Sampled: 09/27/2020 11:15

Instrument: [CALC] Analyst: MCB — Analyzed: 10/19/2020 15:13

Sample Preparation: Preparation Method: [CALC] — Extract ID: 20I0446-41

Preparation Batch: [CALC]

Prepared: 10/06/2020 Final Volume: 1

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness		1	0.207	13.7	mg/L CaCO3	

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Analytical Report

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

RC-24-SW-092720

20I0446-41RE1 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/27/2020 11:15

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/16/2020 03:24

Sample Preparation: Preparation Method: RHN EPA 600/4-79-020 4.1.4 HNO3 matrix 5x — Extract ID: 20I0446-41RE1 C 02

Preparation Batch: BIJ0345 — Sample Size: 100 mL

Prepared: 10/12/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Cadmium	7440-43-9	1	0.00600	0.0200	0.0316	ug/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SP-31-092720

20I0446-42 (Water)

Metals and Metallic Compounds

Method: EPA 6020A — Sampled: 09/27/2020 08:45

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/17/2020 15:00

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0446-42 B 01

Preparation Batch: BIJ0193 — Sample Size: 25 mL

Prepared: 10/06/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Aluminum	7429-90-5	1	2.37	20.0	114	ug/L	
Calcium	7440-70-2	1	1.91	50.0	4430	ug/L	
Iron	7439-89-6	1	6.27	20.0	336	ug/L	
Lead	7439-92-1	1	0.0680	0.100	0.130	ug/L	
Magnesium	7439-95-4	1	0.307	20.0	451	ug/L	
Manganese	7439-96-5	1	0.0850	0.500	6.25	ug/L	
Potassium	7440-09-7	1	1.41	20.0	457	ug/L	
Sodium	7440-23-5	1	7.18	100	612	ug/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SP-31-092720

20I0446-42 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/27/2020 08:45

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/09/2020 02:26

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0446-42 B 01

Preparation Batch: BIJ0193 — Sample Size: 25 mL

Prepared: 10/06/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Copper	7440-50-8	1	0.340	0.500	2.21	ug/L	
Zinc	7440-66-6	1	0.820	4.00	6.09	ug/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SP-31-092720

20I0446-42 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/27/2020 08:45

Instrument: IC930 Analyst: KOTT — Analyzed: 09/28/2020 22:19

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-42 C

Preparation Batch: BII0818 — Sample Size: 10 mL

Prepared: 09/28/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Chloride	16887-00-6	1	0.100	0.100	0.280	mg/L	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Nitrate-N	14797-55-8	1	0.100	0.100	ND	mg/L	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Sulfate	14808-79-8	1	0.100	0.100	4.32	mg/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SP-31-092720

20I0446-42 (Water)

Wet Chemistry

Method: SM 2320 B-97 — Sampled: 09/27/2020 08:45

Instrument: Accumet AB150 Analyst: UW — Analyzed: 10/01/2020 14:20

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-42 D

Preparation Batch: BIJ0026 — Sample Size: 100 mL

Prepared: 10/01/2020 — Final Volume: 100 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Bicarbonate		1	1.00	1.00	10.5	mg/L CaCO3	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Carbonate		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Hydroxide		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Total		1	1.00	1.00	10.5	mg/L CaCO3	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SP-31-092720

20I0446-42 (Water)

Wet Chemistry

Method: SM 5310 B-00 — Sampled: 09/27/2020 08:45

Instrument: TOC-LCSH Analyst: WCW — Analyzed: 10/08/2020 21:40

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-42 G

Preparation Batch: BIJ0124 — Sample Size: 20 mL

Prepared: 10/05/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Organic Carbon, Dissolved		1	0.50	0.50	0.65	mg/L	

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Analytical Report

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SP-31-092720

20I0446-42 (Water)

Calculation

Method: SM 2340 B-97 — Sampled: 09/27/2020 08:45

Instrument: [CALC] Analyst: MCB — Analyzed: 10/17/2020 15:00

Sample Preparation: Preparation Method: [CALC] — Extract ID: 20I0446-42

Preparation Batch: [CALC]

Prepared: 10/06/2020 Final Volume: 1

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness		1	0.207	12.9	mg/L CaCO3	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SP-31-092720

20I0446-42RE1 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/27/2020 08:45

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/16/2020 03:29

Sample Preparation: Preparation Method: RHN EPA 600/4-79-020 4.1.4 HNO3 matrix 5x — Extract ID: 20I0446-42RE1 B 02

Preparation Batch: BIJ0345 — Sample Size: 100 mL

Prepared: 10/12/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Cadmium	7440-43-9	1	0.00600	0.0200	0.0270	ug/L	

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Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SP-131-092720

20I0446-43 (Water)

Metals and Metallic Compounds

Method: EPA 6020A — Sampled: 09/27/2020 09:00

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/19/2020 15:00

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0446-43 A 01

Preparation Batch: BIJ0193 — Sample Size: 25 mL

Prepared: 10/06/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Aluminum	7429-90-5	1	2.37	20.0	121	ug/L	
Calcium	7440-70-2	1	1.91	50.0	4690	ug/L	
Iron	7439-89-6	1	6.27	20.0	403	ug/L	
Lead	7439-92-1	1	0.0680	0.100	0.174	ug/L	
Magnesium	7439-95-4	1	0.307	20.0	473	ug/L	
Manganese	7439-96-5	1	0.0850	0.500	6.06	ug/L	
Potassium	7440-09-7	1	1.41	20.0	480	ug/L	
Sodium	7440-23-5	1	7.18	100	648	ug/L	

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Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SP-131-092720

20I0446-43 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/27/2020 09:00

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/09/2020 01:21

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0446-43 A 01

Preparation Batch: BIJ0193 — Sample Size: 25 mL

Prepared: 10/06/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Copper	7440-50-8	1	0.340	0.500	2.37	ug/L	
Zinc	7440-66-6	1	0.820	4.00	8.15	ug/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SP-131-092720

20I0446-43 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/27/2020 09:00

Instrument: IC930 Analyst: KOTT — Analyzed: 09/29/2020 00:19

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-43 B

Preparation Batch: BII0818 — Sample Size: 10 mL

Prepared: 09/28/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Chloride	16887-00-6	1	0.100	0.100	0.281	mg/L	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Nitrate-N	14797-55-8	1	0.100	0.100	ND	mg/L	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Sulfate	14808-79-8	1	0.100	0.100	4.34	mg/L	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SP-131-092720

20I0446-43 (Water)

Wet Chemistry

Method: SM 2320 B-97 — Sampled: 09/27/2020 09:00

Instrument: Accumet AB150 Analyst: UW — Analyzed: 10/01/2020 09:49

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-43 C

Preparation Batch: BIJ0014 — Sample Size: 100 mL

Prepared: 10/01/2020 — Final Volume: 100 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Bicarbonate		1	1.00	1.00	9.58	mg/L CaCO3	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Carbonate		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Hydroxide		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Total		1	1.00	1.00	9.58	mg/L CaCO3	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SP-131-092720

20I0446-43 (Water)

Wet Chemistry

Method: SM 5310 B-00 — Sampled: 09/27/2020 09:00

Instrument: TOC-LCSH Analyst: WCW — Analyzed: 10/08/2020 23:43

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-43 D

Preparation Batch: BIJ0124 — Sample Size: 20 mL

Prepared: 10/05/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Organic Carbon, Dissolved		1	0.50	0.50	0.62	mg/L	

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Analytical Report

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SP-131-092720

20I0446-43 (Water)

Calculation

Method: SM 2340 B-97 — Sampled: 09/27/2020 09:00

Instrument: [CALC] Analyst: MCB — Analyzed: 10/19/2020 15:00

Sample Preparation: Preparation Method: [CALC] — Extract ID: 20I0446-43

Preparation Batch: [CALC]

Prepared: 10/06/2020 Final Volume: 1

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness		1	0.207	13.6	mg/L CaCO3	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SP-131-092720

20I0446-43RE1 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/27/2020 09:00

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/16/2020 03:33

Sample Preparation: Preparation Method: RHN EPA 600/4-79-020 4.1.4 HNO3 matrix 5x — Extract ID: 20I0446-43RE1 A 02

Preparation Batch: BIJ0393 — Sample Size: 100 mL

Prepared: 10/13/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Cadmium	7440-43-9	1	0.00600	0.0200	0.0348	ug/L	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SP-36-092720

20I0446-44 (Water)

Metals and Metallic Compounds

Method: EPA 6020A — Sampled: 09/27/2020 11:30

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/19/2020 15:02

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0446-44 A 01

Preparation Batch: BIJ0193 — Sample Size: 25 mL

Prepared: 10/06/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Aluminum	7429-90-5	1	2.37	20.0	71.9	ug/L	
Calcium	7440-70-2	1	1.91	50.0	4830	ug/L	
Iron	7439-89-6	1	6.27	20.0	149	ug/L	
Lead	7439-92-1	1	0.0680	0.100	0.0870	ug/L	J
Magnesium	7439-95-4	1	0.307	20.0	465	ug/L	
Manganese	7439-96-5	1	0.0850	0.500	3.58	ug/L	
Potassium	7440-09-7	1	1.41	20.0	468	ug/L	
Sodium	7440-23-5	1	7.18	100	688	ug/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SP-36-092720

20I0446-44 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/27/2020 11:30

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/09/2020 01:24

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0446-44 A 01

Preparation Batch: BIJ0193 — Sample Size: 25 mL

Prepared: 10/06/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Copper	7440-50-8	1	0.340	0.500	1.24	ug/L	
Zinc	7440-66-6	1	0.820	4.00	6.25	ug/L	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SP-36-092720

20I0446-44 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/27/2020 11:30

Instrument: IC930 Analyst: KOTT — Analyzed: 09/29/2020 00:39

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-44 B

Preparation Batch: BII0818 — Sample Size: 10 mL

Prepared: 09/28/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Chloride	16887-00-6	1	0.100	0.100	0.279	mg/L	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Nitrate-N	14797-55-8	1	0.100	0.100	ND	mg/L	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Sulfate	14808-79-8	1	0.100	0.100	4.33	mg/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SP-36-092720

20I0446-44 (Water)

Wet Chemistry

Method: SM 2320 B-97 — Sampled: 09/27/2020 11:30

Instrument: Accumet AB150 Analyst: UW — Analyzed: 10/01/2020 14:20

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-44 C

Preparation Batch: BIJ0026 — Sample Size: 100 mL

Prepared: 10/01/2020 — Final Volume: 100 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Bicarbonate		1	1.00	1.00	10.5	mg/L CaCO3	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Carbonate		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Hydroxide		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Total		1	1.00	1.00	10.5	mg/L CaCO3	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SP-36-092720

20I0446-44 (Water)

Wet Chemistry

Method: SM 5310 B-00 — Sampled: 09/27/2020 11:30

Instrument: TOC-LCSH Analyst: WCW — Analyzed: 10/09/2020 00:01

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-44 D

Preparation Batch: BIJ0124 — Sample Size: 20 mL

Prepared: 10/05/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Organic Carbon, Dissolved		1	0.50	0.50	0.64	mg/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SP-36-092720

20I0446-44 (Water)

Calculation

Method: SM 2340 B-97 — Sampled: 09/27/2020 11:30

Instrument: [CALC] Analyst: MCB — Analyzed: 10/19/2020 15:02

Sample Preparation: Preparation Method: [CALC] — Extract ID: 20I0446-44

Preparation Batch: [CALC]

Prepared: 10/06/2020 Final Volume: 1

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness		1	0.207	14.0	mg/L CaCO3	

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Analytical Chemists and Consultants

Analytical Report

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SP-36-092720

20I0446-44RE1 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/27/2020 11:30

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/16/2020 03:38

Sample Preparation: Preparation Method: RHN EPA 600/4-79-020 4.1.4 HNO3 matrix 5x — Extract ID: 20I0446-44RE1 A 02

Preparation Batch: BIJ0393 — Sample Size: 100 mL

Prepared: 10/13/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Cadmium	7440-43-9	1	0.00600	0.0200	0.0346	ug/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SP-40-092720

20I0446-45 (Water)

Metals and Metallic Compounds

Method: EPA 6020A — Sampled: 09/27/2020 13:50

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/17/2020 14:57

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0446-45 A 01

Preparation Batch: BIJ0193 — Sample Size: 25 mL

Prepared: 10/06/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Aluminum	7429-90-5	1	2.37	20.0	77.4	ug/L	
Calcium	7440-70-2	1	1.91	50.0	7750	ug/L	
Iron	7439-89-6	1	6.27	20.0	453	ug/L	
Lead	7439-92-1	1	0.0680	0.100	0.0980	ug/L	J
Magnesium	7439-95-4	1	0.307	20.0	929	ug/L	
Manganese	7439-96-5	1	0.0850	0.500	5.58	ug/L	
Potassium	7440-09-7	1	1.41	20.0	647	ug/L	
Sodium	7440-23-5	1	7.18	100	1380	ug/L	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SP-40-092720

20I0446-45 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/27/2020 13:50

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/09/2020 02:09

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0446-45 A 01

Preparation Batch: BIJ0193 — Sample Size: 25 mL

Prepared: 10/06/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Cadmium	7440-43-9	1	0.0300	0.100	0.434	ug/L	
Copper	7440-50-8	1	0.340	0.500	2.48	ug/L	
Zinc	7440-66-6	1	0.820	4.00	33.3	ug/L	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SP-40-092720

20I0446-45 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/27/2020 13:50

Instrument: IC930 Analyst: KOTT — Analyzed: 09/29/2020 00:59

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-45 B

Preparation Batch: BII0818 — Sample Size: 10 mL

Prepared: 09/28/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Chloride	16887-00-6	1	0.100	0.100	0.445	mg/L	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Nitrate-N	14797-55-8	1	0.100	0.100	0.108	mg/L	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SP-40-092720

20I0446-45 (Water)

Wet Chemistry

Method: SM 2320 B-97 — Sampled: 09/27/2020 13:50
Instrument: Accumet AB150 Analyst: UW — Analyzed: 10/01/2020 14:20

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-45 C
Preparation Batch: BIJ0026 — Sample Size: 100 mL
Prepared: 10/01/2020 — Final Volume: 100 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Bicarbonate		1	1.00	1.00	13.0	mg/L CaCO3	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Carbonate		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Hydroxide		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Total		1	1.00	1.00	13.0	mg/L CaCO3	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SP-40-092720

20I0446-45 (Water)

Wet Chemistry

Method: SM 5310 B-00 — Sampled: 09/27/2020 13:50

Instrument: TOC-LCSH Analyst: WCW — Analyzed: 10/09/2020 00:26

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-45 D

Preparation Batch: BIJ0124 — Sample Size: 20 mL

Prepared: 10/05/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Organic Carbon, Dissolved		1	0.50	0.50	ND	mg/L	U

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SP-40-092720

20I0446-45 (Water)

Calculation

Method: SM 2340 B-97 — Sampled: 09/27/2020 13:50

Instrument: [CALC] Analyst: MCB — Analyzed: 10/17/2020 14:57

Sample Preparation: Preparation Method: [CALC] — Extract ID: 20I0446-45

Preparation Batch: [CALC]

Prepared: 10/06/2020 Final Volume: 1

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness		1	0.207	23.2	mg/L CaCO3	

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Analytical Report

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
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Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SP-40-092720

20I0446-45RE1 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/27/2020 13:50

Instrument: IC930 Analyst: KOTT — Analyzed: 09/29/2020 17:41

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-45RE1 B

Preparation Batch: BII0818 — Sample Size: 10 mL

Prepared: 09/28/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Sulfate	14808-79-8	3	0.300	0.300	13.0	mg/L	D

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SP-44-092720

20I0446-46 (Water)

Metals and Metallic Compounds

Method: EPA 6020A — Sampled: 09/27/2020 13:15

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/19/2020 15:10

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0446-46 A 01

Preparation Batch: BIJ0193 — Sample Size: 25 mL

Prepared: 10/06/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Aluminum	7429-90-5	1	2.37	20.0	49.6	ug/L	
Calcium	7440-70-2	1	1.91	50.0	6690	ug/L	
Iron	7439-89-6	1	6.27	20.0	82.4	ug/L	
Lead	7439-92-1	1	0.0680	0.100	ND	ug/L	U
Magnesium	7439-95-4	1	0.307	20.0	740	ug/L	
Manganese	7439-96-5	1	0.0850	0.500	2.98	ug/L	
Potassium	7440-09-7	1	1.41	20.0	631	ug/L	
Sodium	7440-23-5	1	7.18	100	1090	ug/L	

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Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SP-44-092720

20I0446-46 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/27/2020 13:15

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/09/2020 02:12

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0446-46 A 01

Preparation Batch: BIJ0193 — Sample Size: 25 mL

Prepared: 10/06/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Cadmium	7440-43-9	1	0.0300	0.100	0.219	ug/L	
Copper	7440-50-8	1	0.340	0.500	1.59	ug/L	
Zinc	7440-66-6	1	0.820	4.00	12.8	ug/L	

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Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SP-44-092720

20I0446-46 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/27/2020 13:15

Instrument: IC930 Analyst: KOTT — Analyzed: 09/29/2020 01:19

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-46 B

Preparation Batch: BII0818 — Sample Size: 10 mL

Prepared: 09/28/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Chloride	16887-00-6	1	0.100	0.100	0.352	mg/L	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Nitrate-N	14797-55-8	1	0.100	0.100	0.106	mg/L	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Sulfate	14808-79-8	1	0.100	0.100	10.1	mg/L	

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Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SP-44-092720

20I0446-46 (Water)

Wet Chemistry

Method: SM 2320 B-97 — Sampled: 09/27/2020 13:15

Instrument: Accumet AB150 Analyst: UW — Analyzed: 10/01/2020 14:20

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-46 C

Preparation Batch: BIJ0026 — Sample Size: 100 mL

Prepared: 10/01/2020 — Final Volume: 100 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Bicarbonate		1	1.00	1.00	11.5	mg/L CaCO3	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Carbonate		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Hydroxide		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Total		1	1.00	1.00	11.5	mg/L CaCO3	

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Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SP-44-092720

20I0446-46 (Water)

Wet Chemistry

Method: SM 5310 B-00 — Sampled: 09/27/2020 13:15

Instrument: TOC-LCSH Analyst: WCW — Analyzed: 10/09/2020 00:47

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-46 D

Preparation Batch: BIJ0124 — Sample Size: 20 mL

Prepared: 10/05/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Organic Carbon, Dissolved		1	0.50	0.50	0.58	mg/L	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SP-44-092720

20I0446-46 (Water)

Calculation

Method: SM 2340 B-97 — Sampled: 09/27/2020 13:15

Instrument: [CALC] Analyst: MCB — Analyzed: 10/19/2020 15:10

Sample Preparation: Preparation Method: [CALC] — Extract ID: 20I0446-46

Preparation Batch: [CALC]

Prepared: 10/06/2020 Final Volume: 1

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness		1	0.207	19.8	mg/L CaCO3	

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Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SP-45-092720

20I0446-47 (Water)

Metals and Metallic Compounds

Method: EPA 6020A — Sampled: 09/27/2020 10:10

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/19/2020 15:04

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0446-47 A 01

Preparation Batch: BIJ0193 — Sample Size: 25 mL

Prepared: 10/06/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Aluminum	7429-90-5	1	2.37	20.0	51.5	ug/L	
Calcium	7440-70-2	1	1.91	50.0	4650	ug/L	
Iron	7439-89-6	1	6.27	20.0	94.7	ug/L	
Lead	7439-92-1	1	0.0680	0.100	ND	ug/L	U
Magnesium	7439-95-4	1	0.307	20.0	457	ug/L	
Manganese	7439-96-5	1	0.0850	0.500	2.13	ug/L	
Potassium	7440-09-7	1	1.41	20.0	452	ug/L	
Sodium	7440-23-5	1	7.18	100	638	ug/L	

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SP-45-092720

20I0446-47 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/27/2020 10:10

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/09/2020 02:16

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0446-47 A 01

Preparation Batch: BIJ0193 — Sample Size: 25 mL

Prepared: 10/06/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Copper	7440-50-8	1	0.340	0.500	0.969	ug/L	
Zinc	7440-66-6	1	0.820	4.00	5.89	ug/L	

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SP-45-092720

20I0446-47 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/27/2020 10:10

Instrument: IC930 Analyst: KOTT — Analyzed: 09/29/2020 01:39

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-47 B

Preparation Batch: BII0818 — Sample Size: 10 mL

Prepared: 09/28/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Chloride	16887-00-6	1	0.100	0.100	0.274	mg/L	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Nitrate-N	14797-55-8	1	0.100	0.100	ND	mg/L	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Sulfate	14808-79-8	1	0.100	0.100	4.28	mg/L	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SP-45-092720

20I0446-47 (Water)

Wet Chemistry

Method: SM 2320 B-97 — Sampled: 09/27/2020 10:10

Instrument: Accumet AB150 Analyst: UW — Analyzed: 10/01/2020 14:20

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-47 C

Preparation Batch: BIJ0026 — Sample Size: 100 mL

Prepared: 10/01/2020 — Final Volume: 100 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Bicarbonate		1	1.00	1.00	10.4	mg/L CaCO3	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Carbonate		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Hydroxide		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Total		1	1.00	1.00	10.4	mg/L CaCO3	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SP-45-092720

20I0446-47 (Water)

Wet Chemistry

Method: SM 5310 B-00 — Sampled: 09/27/2020 10:10

Instrument: TOC-LCSH Analyst: WCW — Analyzed: 10/09/2020 01:09

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-47 D

Preparation Batch: BIJ0124 — Sample Size: 20 mL

Prepared: 10/05/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Organic Carbon, Dissolved		1	0.50	0.50	0.61	mg/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SP-45-092720

20I0446-47 (Water)

Calculation

Method: SM 2340 B-97 — Sampled: 09/27/2020 10:10

Instrument: [CALC] Analyst: MCB — Analyzed: 10/19/2020 15:04

Sample Preparation: Preparation Method: [CALC] — Extract ID: 20I0446-47

Preparation Batch: [CALC]

Prepared: 10/06/2020 Final Volume: 1

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness		1	0.207	13.5	mg/L CaCO3	

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Analytical Report

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SP-45-092720

20I0446-47RE1 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/27/2020 10:10

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/16/2020 03:42

Sample Preparation: Preparation Method: RHN EPA 600/4-79-020 4.1.4 HNO3 matrix 5x — Extract ID: 20I0446-47RE1 A 02

Preparation Batch: BIJ0393 — Sample Size: 100 mL

Prepared: 10/13/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Cadmium	7440-43-9	1	0.00600	0.0200	0.0282	ug/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SP-46-092720

20I0446-48 (Water)

Metals and Metallic Compounds

Method: EPA 6020A — Sampled: 09/27/2020 10:55

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/19/2020 15:06

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0446-48 A 01

Preparation Batch: BIJ0193 — Sample Size: 25 mL

Prepared: 10/06/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Aluminum	7429-90-5	1	2.37	20.0	52.5	ug/L	
Calcium	7440-70-2	1	1.91	50.0	4810	ug/L	
Iron	7439-89-6	1	6.27	20.0	111	ug/L	
Lead	7439-92-1	1	0.0680	0.100	ND	ug/L	U
Magnesium	7439-95-4	1	0.307	20.0	471	ug/L	
Manganese	7439-96-5	1	0.0850	0.500	2.77	ug/L	
Potassium	7440-09-7	1	1.41	20.0	472	ug/L	
Sodium	7440-23-5	1	7.18	100	677	ug/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SP-46-092720

20I0446-48 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/27/2020 10:55

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/09/2020 02:19

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0446-48 A 01

Preparation Batch: BIJ0193 — Sample Size: 25 mL

Prepared: 10/06/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Copper	7440-50-8	1	0.340	0.500	1.05	ug/L	
Zinc	7440-66-6	1	0.820	4.00	5.15	ug/L	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SP-46-092720

20I0446-48 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/27/2020 10:55

Instrument: IC930 Analyst: KOTT — Analyzed: 09/29/2020 01:59

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-48 B

Preparation Batch: BII0818 — Sample Size: 10 mL

Prepared: 09/28/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Chloride	16887-00-6	1	0.100	0.100	0.275	mg/L	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Nitrate-N	14797-55-8	1	0.100	0.100	ND	mg/L	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Sulfate	14808-79-8	1	0.100	0.100	4.30	mg/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SP-46-092720

20I0446-48 (Water)

Wet Chemistry

Method: SM 2320 B-97 — Sampled: 09/27/2020 10:55

Instrument: Accumet AB150 Analyst: UW — Analyzed: 10/01/2020 14:20

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-48 C

Preparation Batch: BIJ0026 — Sample Size: 100 mL

Prepared: 10/01/2020 — Final Volume: 100 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Bicarbonate		1	1.00	1.00	10.1	mg/L CaCO3	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Carbonate		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Hydroxide		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Total		1	1.00	1.00	10.1	mg/L CaCO3	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SP-46-092720

20I0446-48 (Water)

Wet Chemistry

Method: SM 5310 B-00 — Sampled: 09/27/2020 10:55

Instrument: TOC-LCSH Analyst: WCW — Analyzed: 10/09/2020 01:26

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-48 D

Preparation Batch: BIJ0124 — Sample Size: 20 mL

Prepared: 10/05/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Organic Carbon, Dissolved		1	0.50	0.50	0.63	mg/L	

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Analytical Report

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SP-46-092720

20I0446-48 (Water)

Calculation

Method: SM 2340 B-97 — Sampled: 09/27/2020 10:55

Instrument: [CALC] Analyst: MCB — Analyzed: 10/19/2020 15:06

Sample Preparation: Preparation Method: [CALC] — Extract ID: 20I0446-48

Preparation Batch: [CALC]

Prepared: 10/06/2020 Final Volume: 1

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness		1	0.207	13.9	mg/L CaCO3	

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Analytical Report

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SP-46-092720

20I0446-48RE1 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/27/2020 10:55

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/16/2020 03:47

Sample Preparation: Preparation Method: RHN EPA 600/4-79-020 4.1.4 HNO3 matrix 5x — Extract ID: 20I0446-48RE1 A 02

Preparation Batch: BIJ0393 — Sample Size: 100 mL

Prepared: 10/13/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Cadmium	7440-43-9	1	0.00600	0.0200	0.0248	ug/L	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SP-47-092720

20I0446-49 (Water)

Metals and Metallic Compounds

Method: EPA 6020A — Sampled: 09/27/2020 13:00

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/19/2020 15:07

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0446-49 A 01

Preparation Batch: BIJ0193 — Sample Size: 25 mL

Prepared: 10/06/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Aluminum	7429-90-5	1	2.37	20.0	61.2	ug/L	
Calcium	7440-70-2	1	1.91	50.0	4840	ug/L	
Iron	7439-89-6	1	6.27	20.0	124	ug/L	
Lead	7439-92-1	1	0.0680	0.100	0.0770	ug/L	J
Magnesium	7439-95-4	1	0.307	20.0	471	ug/L	
Manganese	7439-96-5	1	0.0850	0.500	2.69	ug/L	
Potassium	7440-09-7	1	1.41	20.0	481	ug/L	
Sodium	7440-23-5	1	7.18	100	717	ug/L	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SP-47-092720

20I0446-49 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/27/2020 13:00

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/09/2020 02:23

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0446-49 A 01

Preparation Batch: BIJ0193 — Sample Size: 25 mL

Prepared: 10/06/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Copper	7440-50-8	1	0.340	0.500	1.09	ug/L	
Zinc	7440-66-6	1	0.820	4.00	7.86	ug/L	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SP-47-092720

20I0446-49 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/27/2020 13:00

Instrument: IC930 Analyst: KOTT — Analyzed: 09/29/2020 02:19

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-49 B

Preparation Batch: BII0818 — Sample Size: 10 mL

Prepared: 09/28/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Chloride	16887-00-6	1	0.100	0.100	0.275	mg/L	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Nitrate-N	14797-55-8	1	0.100	0.100	ND	mg/L	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Sulfate	14808-79-8	1	0.100	0.100	4.35	mg/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SP-47-092720

20I0446-49 (Water)

Wet Chemistry

Method: SM 2320 B-97 — Sampled: 09/27/2020 13:00
Instrument: Accumet AB150 Analyst: UW — Analyzed: 10/01/2020 14:20

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-49 C
Preparation Batch: BIJ0026 — Sample Size: 100 mL
Prepared: 10/01/2020 — Final Volume: 100 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Bicarbonate		1	1.00	1.00	10.4	mg/L CaCO3	

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Carbonate		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Hydroxide		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Total		1	1.00	1.00	10.4	mg/L CaCO3	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SP-47-092720

20I0446-49 (Water)

Wet Chemistry

Method: SM 5310 B-00 — Sampled: 09/27/2020 13:00

Instrument: TOC-LCSH Analyst: WCW — Analyzed: 10/09/2020 01:48

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0446-49 D

Preparation Batch: BIJ0124 — Sample Size: 20 mL

Prepared: 10/05/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Organic Carbon, Dissolved		1	0.50	0.50	0.62	mg/L	

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Analytical Report

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SP-47-092720

20I0446-49 (Water)

Calculation

Method: SM 2340 B-97 — Sampled: 09/27/2020 13:00

Instrument: [CALC] Analyst: MCB — Analyzed: 10/19/2020 15:07

Sample Preparation: Preparation Method: [CALC] — Extract ID: 20I0446-49

Preparation Batch: [CALC]

Prepared: 10/06/2020 Final Volume: 1

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness		1	0.207	14.0	mg/L CaCO3	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SP-47-092720

20I0446-49RE1 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/27/2020 13:00

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/16/2020 03:52

Sample Preparation: Preparation Method: RHN EPA 600/4-79-020 4.1.4 HNO3 matrix 5x — Extract ID: 20I0446-49RE1 A 02

Preparation Batch: BIJ0393 — Sample Size: 100 mL

Prepared: 10/13/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Cadmium	7440-43-9	1	0.00600	0.0200	0.0324	ug/L	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

Metals and Metallic Compounds - Quality Control

Batch BIJ0096 - REN EPA 600/4-79-020 4.1.4 HNO3 matrix

Instrument: ICPMS1 Analyst: MCB

QC Sample/Analyte	Isotope	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BIJ0096-BLK1)					Prepared: 05-Oct-2020 Analyzed: 06-Oct-2020 04:16							
Aluminum	27	ND	2.37	20.0	ug/L							U
Lead	208	ND	0.0680	0.100	ug/L							U
Cadmium	111	ND	0.0300	0.100	ug/L							U
Cadmium	114	ND	0.0400	0.100	ug/L							U
Copper	63	ND	0.340	0.500	ug/L							U
Copper	65	ND	0.350	0.500	ug/L							U
Zinc	66	0.929	0.820	4.00	ug/L							J
Zinc	67	ND	0.940	4.00	ug/L							U
Blank (BIJ0096-BLK2)					Prepared: 05-Oct-2020 Analyzed: 17-Oct-2020 13:42							
Calcium	44	3.54	1.91	50.0	ug/L							J
Iron	54	ND	6.27	20.0	ug/L							U
Iron	57	ND	1.40	20.0	ug/L							U
Magnesium	24	0.914	0.307	20.0	ug/L							J
Manganese	55	ND	0.0850	0.500	ug/L							U
Potassium	39	8.00	1.41	20.0	ug/L							J
Sodium	23	ND	7.18	100	ug/L							U
LCS (BIJ0096-BS1)					Prepared: 05-Oct-2020 Analyzed: 06-Oct-2020 04:21							
Aluminum	27	4720	2.37	20.0	ug/L	5000		94.3	80-120			
Lead	208	26.9	0.0680	0.100	ug/L	25.0		108	80-120			
Cadmium	111	25.6	0.0300	0.100	ug/L	25.0		102	80-120			
Cadmium	114	25.7	0.0400	0.100	ug/L	25.0		103	80-120			
Copper	63	25.3	0.340	0.500	ug/L	25.0		101	80-120			
Copper	65	25.1	0.350	0.500	ug/L	25.0		100	80-120			
Zinc	66	82.1	0.820	4.00	ug/L	80.0		103	80-120			
Zinc	67	79.1	0.940	4.00	ug/L	80.0		98.9	80-120			
LCS (BIJ0096-BS2)					Prepared: 05-Oct-2020 Analyzed: 17-Oct-2020 13:44							
Calcium	44	4660	1.91	50.0	ug/L	5000		93.2	80-120			
Iron	54	4760	6.27	20.0	ug/L	5000		95.2	80-120			
Iron	57	4770	1.40	20.0	ug/L	5000		95.5	80-120			
Magnesium	24	4700	0.307	20.0	ug/L	5000		94.0	80-120			
Manganese	55	24.7	0.0850	0.500	ug/L	25.0		98.6	80-120			
Potassium	39	4700	1.41	20.0	ug/L	5000		94.1	80-120			
Sodium	23	4770	7.18	100	ug/L	5000		95.3	80-120			

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

Metals and Metallic Compounds - Quality Control

Batch BIJ0096 - REN EPA 600/4-79-020 4.1.4 HNO3 matrix

Instrument: ICPMS1 Analyst: MCB

QC Sample/Analyte	Isotope	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
LCS (BIJ0096-BS2)						Prepared: 05-Oct-2020 Analyzed: 17-Oct-2020 13:44						
Duplicate (BIJ0096-DUP1)			**Source: 20I0446-09**			Prepared: 05-Oct-2020 Analyzed: 06-Oct-2020 05:44						
Aluminum	27	58.9	2.37	20.0	ug/L		55.8			5.43	20	
Lead	208	0.167	0.0680	0.100	ug/L		0.0930			56.90	20	L
Cadmium	111	0.0320	0.0300	0.100	ug/L		0.0320			0.00		J
Copper	63	2.64	0.340	0.500	ug/L		1.09			83.10	20	*
Zinc	66	5.60	0.820	4.00	ug/L		4.38			24.30	20	L
Duplicate (BIJ0096-DUP2)			**Source: 20I0446-09**			Prepared: 05-Oct-2020 Analyzed: 17-Oct-2020 17:10						
Iron	54	120	6.27	20.0	ug/L		112			6.34	20	
Manganese	55	3.32	0.0850	0.500	ug/L		2.92			12.60	20	
Sodium	23	602	7.18	100	ug/L		591			1.73	20	
Duplicate (BIJ0096-DUP3)			**Source: 20I0446-09**			Prepared: 05-Oct-2020 Analyzed: 19-Oct-2020 13:45						
Calcium	44	4630	1.91	50.0	ug/L		4310			7.09	20	
Magnesium	24	461	0.307	20.0	ug/L		441			4.44	20	
Potassium	39	482	1.41	20.0	ug/L		460			4.77	20	
Matrix Spike (BIJ0096-MS1)			**Source: 20I0446-09**			Prepared: 05-Oct-2020 Analyzed: 06-Oct-2020 05:49						
Aluminum	27	4620	2.37	20.0	ug/L	5000	55.8	91.2	75-125			
Lead	208	26.7	0.0680	0.100	ug/L	25.0	0.0930	107	75-125			
Cadmium	111	25.5	0.0300	0.100	ug/L	25.0	0.0320	102	75-125			
Copper	63	26.5	0.340	0.500	ug/L	25.0	1.09	102	75-125			
Zinc	66	85.0	0.820	4.00	ug/L	80.0	4.38	101	75-125			

Recovery limits for target analytes in MS/MSD QC samples are advisory only.

Matrix Spike (BIJ0096-MS2)			**Source: 20I0446-09**			Prepared: 05-Oct-2020 Analyzed: 17-Oct-2020 17:12						
Iron	54	4720	6.27	20.0	ug/L	5000	112	92.2	75-125			
Manganese	55	28.1	0.0850	0.500	ug/L	25.0	2.92	101	75-125			
Sodium	23	5230	7.18	100	ug/L	5000	591	92.8	75-125			

Recovery limits for target analytes in MS/MSD QC samples are advisory only.

Matrix Spike (BIJ0096-MS3)			**Source: 20I0446-09**			Prepared: 05-Oct-2020 Analyzed: 19-Oct-2020 13:47						
Calcium	44	9480	1.91	50.0	ug/L	5000	4310	103	75-125			
Magnesium	24	5200	0.307	20.0	ug/L	5000	441	95.1	75-125			
Potassium	39	5290	1.41	20.0	ug/L	5000	460	96.6	75-125			

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

Metals and Metallic Compounds - Quality Control

Batch BIJ0096 - REN EPA 600/4-79-020 4.1.4 HNO3 matrix

Instrument: ICPMS1 Analyst: MCB

QC Sample/Analyte	Isotope	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Matrix Spike (BIJ0096-MS3)			**Source: 20I0446-09**			Prepared: 05-Oct-2020	Analyzed: 19-Oct-2020 13:47					

Recovery limits for target analytes in MS/MSD QC samples are advisory only.

Matrix Spike Dup (BIJ0096-MSD1)			**Source: 20I0446-09**			Prepared: 05-Oct-2020	Analyzed: 06-Oct-2020 05:54					
Aluminum	27	4750	2.37	20.0	ug/L	5000	55.8	93.9	75-125	2.88	20	
Lead	208	27.0	0.0680	0.100	ug/L	25.0	0.0930	108	75-125	1.04	20	
Cadmium	111	25.4	0.0300	0.100	ug/L	25.0	0.0320	102	75-125	0.16	20	
Copper	63	26.7	0.340	0.500	ug/L	25.0	1.09	102	75-125	0.64	20	
Zinc	66	84.2	0.820	4.00	ug/L	80.0	4.38	99.7	75-125	0.96	20	

Recovery limits for target analytes in MS/MSD QC samples are advisory only.

Matrix Spike Dup (BIJ0096-MSD2)			**Source: 20I0446-09**			Prepared: 05-Oct-2020	Analyzed: 17-Oct-2020 17:15					
Iron	54	4740	6.27	20.0	ug/L	5000	112	92.5	75-125	0.30	20	
Manganese	55	27.8	0.0850	0.500	ug/L	25.0	2.92	99.5	75-125	1.14	20	
Sodium	23	5210	7.18	100	ug/L	5000	591	92.3	75-125	0.49	20	

Recovery limits for target analytes in MS/MSD QC samples are advisory only.

Matrix Spike Dup (BIJ0096-MSD3)			**Source: 20I0446-09**			Prepared: 05-Oct-2020	Analyzed: 19-Oct-2020 13:50					
Calcium	44	9460	1.91	50.0	ug/L	5000	4310	103	75-125	0.26	20	
Magnesium	24	5370	0.307	20.0	ug/L	5000	441	98.6	75-125	3.25	20	
Potassium	39	5460	1.41	20.0	ug/L	5000	460	100	75-125	3.15	20	

Recovery limits for target analytes in MS/MSD QC samples are advisory only.

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

Metals and Metallic Compounds - Quality Control

Batch BIJ0139 - REN EPA 600/4-79-020 4.1.4 HNO3 matrix

Instrument: ICPMS1 Analyst: MCB

QC Sample/Analyte	Isotope	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BIJ0139-BLK1)					Prepared: 06-Oct-2020 Analyzed: 06-Oct-2020 21:53							
Aluminum	27	ND	2.37	20.0	ug/L							U
Lead	208	ND	0.0680	0.100	ug/L							U
Cadmium	111	ND	0.0300	0.100	ug/L							U
Cadmium	114	ND	0.0400	0.100	ug/L							U
Copper	63	ND	0.340	0.500	ug/L							U
Copper	65	ND	0.350	0.500	ug/L							U
Blank (BIJ0139-BLK2)					Prepared: 06-Oct-2020 Analyzed: 07-Oct-2020 13:13							
Zinc	66	1.21	0.820	4.00	ug/L							J
Zinc	67	1.11	0.940	4.00	ug/L							J
LCS (BIJ0139-BS1)					Prepared: 06-Oct-2020 Analyzed: 06-Oct-2020 21:58							
Aluminum	27	5040	2.37	20.0	ug/L	5000		101	80-120			
Lead	208	26.2	0.0680	0.100	ug/L	25.0		105	80-120			
Cadmium	111	25.4	0.0300	0.100	ug/L	25.0		102	80-120			
Cadmium	114	25.5	0.0400	0.100	ug/L	25.0		102	80-120			
Copper	63	24.9	0.340	0.500	ug/L	25.0		99.7	80-120			
Copper	65	25.1	0.350	0.500	ug/L	25.0		100	80-120			
Zinc	66	83.2	0.820	4.00	ug/L	80.0		104	80-120			
Zinc	67	78.4	0.940	4.00	ug/L	80.0		98.0	80-120			
Duplicate (BIJ0139-DUP1)			**Source: 20I0446-23**		Prepared: 06-Oct-2020 Analyzed: 07-Oct-2020 01:42							
Aluminum	27	85.4	2.37	20.0	ug/L		86.7			1.51	20	
Lead	208	0.120	0.0680	0.100	ug/L		0.120			0.00		
Cadmium	111	ND	0.0300	0.100	ug/L		ND					U
Copper	63	1.02	0.340	0.500	ug/L		1.04			1.65	20	
Zinc	66	3.27	0.820	4.00	ug/L		2.88			12.90	20	J
Matrix Spike (BIJ0139-MS1)			**Source: 20I0446-23**		Prepared: 06-Oct-2020 Analyzed: 07-Oct-2020 01:46							
Aluminum	27	5000	2.37	20.0	ug/L	5000	86.7	98.2	75-125			
Lead	208	26.4	0.0680	0.100	ug/L	25.0	0.120	105	75-125			
Cadmium	111	24.7	0.0300	0.100	ug/L	25.0	ND	99.0	75-125			
Copper	63	26.3	0.340	0.500	ug/L	25.0	1.04	101	75-125			
Zinc	66	83.6	0.820	4.00	ug/L	80.0	2.88	101	75-125			

Recovery limits for target analytes in MS/MSD QC samples are advisory only.

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

Metals and Metallic Compounds - Quality Control

Batch BIJ0139 - REN EPA 600/4-79-020 4.1.4 HNO3 matrix

Instrument: ICPMS1 Analyst: MCB

QC Sample/Analyte	Isotope	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Matrix Spike Dup (BIJ0139-MSD1)			**Source: 20I0446-23**		Prepared: 06-Oct-2020 Analyzed: 07-Oct-2020 01:51							
Aluminum	27	5250	2.37	20.0	ug/L	5000	86.7	103	75-125	4.84	20	
Lead	208	26.8	0.0680	0.100	ug/L	25.0	0.120	107	75-125	1.57	20	
Cadmium	111	25.2	0.0300	0.100	ug/L	25.0	ND	101	75-125	1.80	20	
Copper	63	26.4	0.340	0.500	ug/L	25.0	1.04	102	75-125	0.68	20	
Zinc	66	84.7	0.820	4.00	ug/L	80.0	2.88	102	75-125	1.35	20	

Recovery limits for target analytes in MS/MSD QC samples are advisory only.

Instrument: ICPMS2 Analyst: TCH

QC Sample/Analyte	Isotope	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BIJ0139-BLK3)					Prepared: 06-Oct-2020 Analyzed: 09-Oct-2020 12:47							
Calcium	44	3.13	1.91	50.0	ug/L							J
Iron	54	ND	6.27	20.0	ug/L							U
Iron	57	3.77	1.40	20.0	ug/L							J
Magnesium	24	0.447	0.307	20.0	ug/L							J
Manganese	55	ND	0.0850	0.500	ug/L							U
Potassium	39	8.32	1.41	20.0	ug/L							J
Sodium	23	ND	7.18	100	ug/L							U
LCS (BIJ0139-BS3)					Prepared: 06-Oct-2020 Analyzed: 09-Oct-2020 12:49							
Calcium	44	5180	1.91	50.0	ug/L	5000		104	80-120			
Iron	54	5090	6.27	20.0	ug/L	5000		102	80-120			
Iron	57	5200	1.40	20.0	ug/L	5000		104	80-120			
Magnesium	24	5190	0.307	20.0	ug/L	5000		104	80-120			
Manganese	55	24.7	0.0850	0.500	ug/L	25.0		98.9	80-120			
Potassium	39	5180	1.41	20.0	ug/L	5000		104	80-120			
Sodium	23	5380	7.18	100	ug/L	5000		108	80-120			
Duplicate (BIJ0139-DUP2)			**Source: 20I0446-23**		Prepared: 06-Oct-2020 Analyzed: 09-Oct-2020 12:59							
Calcium	44	4760	1.91	50.0	ug/L		4780			0.31	20	
Iron	54	173	6.27	20.0	ug/L		170			1.48	20	
Magnesium	24	493	0.307	20.0	ug/L		482			2.34	20	
Manganese	55	3.82	0.0850	0.500	ug/L		4.45			15.20	20	
Potassium	39	513	1.41	20.0	ug/L		500			2.62	20	
Sodium	23	724	7.18	100	ug/L		745			2.88	20	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

Metals and Metallic Compounds - Quality Control

Batch BIJ0139 - REN EPA 600/4-79-020 4.1.4 HNO3 matrix

Instrument: ICPMS2 Analyst: TCH

QC Sample/Analyte	Isotope	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Matrix Spike (BIJ0139-MS2)			**Source: 20I0446-23**			Prepared: 06-Oct-2020		Analyzed: 09-Oct-2020 13:00				
Calcium	44	9950	1.91	50.0	ug/L	5000	4780	103	75-125			
Iron	54	5210	6.27	20.0	ug/L	5000	170	101	75-125			
Magnesium	24	5680	0.307	20.0	ug/L	5000	482	104	75-125			
Manganese	55	28.6	0.0850	0.500	ug/L	25.0	4.45	96.7	75-125			
Potassium	39	5590	1.41	20.0	ug/L	5000	500	102	75-125			
Sodium	23	6110	7.18	100	ug/L	5000	745	107	75-125			

Recovery limits for target analytes in MS/MSD QC samples are advisory only.

QC Sample/Analyte	Isotope	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Matrix Spike Dup (BIJ0139-MSD2)			**Source: 20I0446-23**			Prepared: 06-Oct-2020		Analyzed: 09-Oct-2020 13:02				
Calcium	44	9540	1.91	50.0	ug/L	5000	4780	95.4	75-125	4.15	20	
Iron	54	5090	6.27	20.0	ug/L	5000	170	98.4	75-125	2.47	20	
Magnesium	24	5490	0.307	20.0	ug/L	5000	482	100	75-125	3.40	20	
Manganese	55	27.5	0.0850	0.500	ug/L	25.0	4.45	92.4	75-125	3.80	20	
Potassium	39	5450	1.41	20.0	ug/L	5000	500	99.0	75-125	2.49	20	
Sodium	23	5840	7.18	100	ug/L	5000	745	102	75-125	4.42	20	

Recovery limits for target analytes in MS/MSD QC samples are advisory only.

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

Metals and Metallic Compounds - Quality Control

Batch BIJ0193 - REN EPA 600/4-79-020 4.1.4 HNO3 matrix

Instrument: ICPMS1 Analyst: MCB

QC Sample/Analyte	Isotope	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BIJ0193-BLK1)					Prepared: 06-Oct-2020 Analyzed: 08-Oct-2020 18:55							
Lead	208	ND	0.0680	0.100	ug/L							U
Manganese	55	0.127	0.0850	0.500	ug/L							J
Cadmium	111	ND	0.0300	0.100	ug/L							U
Cadmium	114	ND	0.0400	0.100	ug/L							U
Copper	63	ND	0.340	0.500	ug/L							U
Copper	65	ND	0.350	0.500	ug/L							U
Zinc	66	1.09	0.820	4.00	ug/L							J
Zinc	67	ND	0.940	4.00	ug/L							U
Blank (BIJ0193-BLK2)					Prepared: 06-Oct-2020 Analyzed: 17-Oct-2020 14:14							
Aluminum	27	2.75	2.37	20.0	ug/L							J
Calcium	44	3.69	1.91	50.0	ug/L							J
Iron	54	6.42	6.27	20.0	ug/L							J
Iron	57	ND	1.40	20.0	ug/L							U
Magnesium	24	0.572	0.307	20.0	ug/L							J
Potassium	39	10.1	1.41	20.0	ug/L							J
Sodium	23	ND	7.18	100	ug/L							U
LCS (BIJ0193-BS1)					Prepared: 06-Oct-2020 Analyzed: 08-Oct-2020 18:59							
Lead	208	26.5	0.0680	0.100	ug/L	25.0		106	80-120			
Manganese	55	28.8	0.0850	0.500	ug/L	25.0		115	80-120			
Cadmium	111	26.7	0.0300	0.100	ug/L	25.0		107	80-120			
Cadmium	114	26.2	0.0400	0.100	ug/L	25.0		105	80-120			
Copper	63	25.5	0.340	0.500	ug/L	25.0		102	80-120			
Copper	65	25.0	0.350	0.500	ug/L	25.0		100	80-120			
Zinc	66	84.8	0.820	4.00	ug/L	80.0		106	80-120			
Zinc	67	79.8	0.940	4.00	ug/L	80.0		99.7	80-120			
LCS (BIJ0193-BS2)					Prepared: 06-Oct-2020 Analyzed: 17-Oct-2020 14:16							
Aluminum	27	4770	2.37	20.0	ug/L	5000		95.4	80-120			
Calcium	44	4650	1.91	50.0	ug/L	5000		93.1	80-120			
Iron	54	4800	6.27	20.0	ug/L	5000		96.1	80-120			
Iron	57	4760	1.40	20.0	ug/L	5000		95.2	80-120			
Magnesium	24	4740	0.307	20.0	ug/L	5000		94.7	80-120			
Potassium	39	4840	1.41	20.0	ug/L	5000		96.7	80-120			
Sodium	23	4820	7.18	100	ug/L	5000		96.4	80-120			

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

Metals and Metallic Compounds - Quality Control

Batch BIJ0193 - REN EPA 600/4-79-020 4.1.4 HNO3 matrix

Instrument: ICPMS1 Analyst: MCB

QC Sample/Analyte	Isotope	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
LCS (BIJ0193-BS2)						Prepared: 06-Oct-2020 Analyzed: 17-Oct-2020 14:16						
Duplicate (BIJ0193-DUP2)			**Source: 20I0446-42**			Prepared: 06-Oct-2020 Analyzed: 09-Oct-2020 02:30						
Lead	208	0.136	0.0680	0.100	ug/L		0.130			4.51	20	
Manganese	55	6.23	0.0850	0.500	ug/L		6.25			0.26	20	
Cadmium	111	0.0430	0.0300	0.100	ug/L		ND					J
Copper	63	2.28	0.340	0.500	ug/L		2.21			2.85	20	
Zinc	66	6.29	0.820	4.00	ug/L		6.09			3.15	20	
Duplicate (BIJ0193-DUP4)			**Source: 20I0446-42**			Prepared: 06-Oct-2020 Analyzed: 17-Oct-2020 15:06						
Aluminum	27	122	2.37	20.0	ug/L		114			7.21	20	
Calcium	44	4470	1.91	50.0	ug/L		4430			0.88	20	
Iron	54	385	6.27	20.0	ug/L		336			13.80	20	
Magnesium	24	451	0.307	20.0	ug/L		451			0.04	20	
Potassium	39	465	1.41	20.0	ug/L		457			1.75	20	
Sodium	23	629	7.18	100	ug/L		612			2.74	20	
Matrix Spike (BIJ0193-MS2)			**Source: 20I0446-42**			Prepared: 06-Oct-2020 Analyzed: 09-Oct-2020 02:34						
Lead	208	26.9	0.0680	0.100	ug/L	25.0	0.130	107	75-125			
Manganese	55	33.1	0.0850	0.500	ug/L	25.0	6.25	107	75-125			
Cadmium	111	25.7	0.0300	0.100	ug/L	25.0	ND	103	75-125			
Copper	63	28.1	0.340	0.500	ug/L	25.0	2.21	104	75-125			
Zinc	66	86.3	0.820	4.00	ug/L	80.0	6.09	100	75-125			

Recovery limits for target analytes in MS/MSD QC samples are advisory only.

Matrix Spike (BIJ0193-MS4)			**Source: 20I0446-42**			Prepared: 06-Oct-2020 Analyzed: 17-Oct-2020 15:07						
Aluminum	27	4520	2.37	20.0	ug/L	5000	114	88.2	75-125			
Calcium	44	8890	1.91	50.0	ug/L	5000	4430	89.3	75-125			
Iron	54	4920	6.27	20.0	ug/L	5000	336	91.6	75-125			
Magnesium	24	4950	0.307	20.0	ug/L	5000	451	90.0	75-125			
Potassium	39	4920	1.41	20.0	ug/L	5000	457	89.3	75-125			
Sodium	23	5220	7.18	100	ug/L	5000	612	92.2	75-125			

Recovery limits for target analytes in MS/MSD QC samples are advisory only.

Matrix Spike Dup (BIJ0193-MSD2)			**Source: 20I0446-42**			Prepared: 06-Oct-2020 Analyzed: 09-Oct-2020 02:39						
Lead	208	26.4	0.0680	0.100	ug/L	25.0	0.130	105	75-125	1.85	20	
Manganese	55	32.6	0.0850	0.500	ug/L	25.0	6.25	105	75-125	1.66	20	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

Metals and Metallic Compounds - Quality Control

Batch BIJ0193 - REN EPA 600/4-79-020 4.1.4 HNO3 matrix

Instrument: ICPMS1 Analyst: MCB

QC Sample/Analyte	Isotope	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Matrix Spike Dup (BIJ0193-MSD2)			**Source: 20I0446-42**			Prepared: 06-Oct-2020	Analyzed: 09-Oct-2020 02:39					
Cadmium	111	25.4	0.0300	0.100	ug/L	25.0	ND	102	75-125	1.41	20	
Copper	63	28.7	0.340	0.500	ug/L	25.0	2.21	106	75-125	2.13	20	
Zinc	66	85.8	0.820	4.00	ug/L	80.0	6.09	99.7	75-125	0.52	20	

Recovery limits for target analytes in MS/MSD QC samples are advisory only.

Matrix Spike Dup (BIJ0193-MSD4)			**Source: 20I0446-42**			Prepared: 06-Oct-2020	Analyzed: 17-Oct-2020 15:09					
Aluminum	27	4600	2.37	20.0	ug/L	5000	114	89.8	75-125	1.71	20	
Calcium	44	8840	1.91	50.0	ug/L	5000	4430	88.2	75-125	0.61	20	
Iron	54	4900	6.27	20.0	ug/L	5000	336	91.2	75-125	0.41	20	
Magnesium	24	4930	0.307	20.0	ug/L	5000	451	89.5	75-125	0.52	20	
Potassium	39	4990	1.41	20.0	ug/L	5000	457	90.6	75-125	1.31	20	
Sodium	23	5150	7.18	100	ug/L	5000	612	90.8	75-125	1.42	20	

Recovery limits for target analytes in MS/MSD QC samples are advisory only.

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

Metals and Metallic Compounds - Quality Control

Batch BIJ0194 - RHN EPA 600/4-79-020 4.1.4 HNO3 matrix 5x

Instrument: ICPMS1 Analyst: MCB

QC Sample/Analyte	Isotope	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BIJ0194-BLK1)					Prepared: 08-Oct-2020 Analyzed: 09-Oct-2020 14:15							
Cadmium	111	ND	0.00600	0.0200	ug/L							U
Cadmium	114	ND	0.00800	0.0200	ug/L							U
LCS (BIJ0194-BS1)					Prepared: 08-Oct-2020 Analyzed: 09-Oct-2020 14:19							
Cadmium	111	5.00	0.00600	0.0200	ug/L	5.00		100	80-120			
Cadmium	114	5.03	0.00800	0.0200	ug/L	5.00		101	80-120			
LCS Dup (BIJ0194-BSD1)					Prepared: 08-Oct-2020 Analyzed: 09-Oct-2020 14:23							
Cadmium	111	4.97	0.00600	0.0200	ug/L	5.00		99.4	80-120	0.55	20	
Cadmium	114	4.92	0.00800	0.0200	ug/L	5.00		98.5	80-120	2.20	20	

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

Metals and Metallic Compounds - Quality Control

Batch BIJ0284 - RHN EPA 600/4-79-020 4.1.4 HNO3 matrix 5x

Instrument: ICPMS1 Analyst: MCB

QC Sample/Analyte	Isotope	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BIJ0284-BLK1)						Prepared: 09-Oct-2020 Analyzed: 09-Oct-2020 15:15						
Cadmium	111	ND	0.00600	0.0200	ug/L							U
Cadmium	114	ND	0.00800	0.0200	ug/L							U
LCS (BIJ0284-BS1)						Prepared: 09-Oct-2020 Analyzed: 09-Oct-2020 15:19						
Cadmium	111	5.08	0.00600	0.0200	ug/L	5.00		102	80-120			
Cadmium	114	5.03	0.00800	0.0200	ug/L	5.00		101	80-120			
LCS Dup (BIJ0284-BSD1)						Prepared: 09-Oct-2020 Analyzed: 09-Oct-2020 15:23						
Cadmium	111	5.11	0.00600	0.0200	ug/L	5.00		102	80-120	0.54	20	
Cadmium	114	5.09	0.00800	0.0200	ug/L	5.00		102	80-120	1.18	20	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

Metals and Metallic Compounds - Quality Control

Batch BIJ0345 - RHN EPA 600/4-79-020 4.1.4 HNO3 matrix 5x

Instrument: ICPMS1 Analyst: MCB

QC Sample/Analyte	Isotope	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BIJ0345-BLK1)					Prepared: 12-Oct-2020 Analyzed: 15-Oct-2020 22:08							
Cadmium	111	ND	0.00600	0.0200	ug/L							U
Cadmium	114	ND	0.00800	0.0200	ug/L							U
LCS (BIJ0345-BS1)					Prepared: 12-Oct-2020 Analyzed: 15-Oct-2020 22:13							
Cadmium	111	5.03	0.00600	0.0200	ug/L	5.00		101	80-120			
Cadmium	114	4.88	0.00800	0.0200	ug/L	5.00		97.7	80-120			
LCS Dup (BIJ0345-BSD1)					Prepared: 12-Oct-2020 Analyzed: 15-Oct-2020 22:17							
Cadmium	111	5.05	0.00600	0.0200	ug/L	5.00		101	80-120	0.50	20	
Cadmium	114	5.10	0.00800	0.0200	ug/L	5.00		102	80-120	4.33	20	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

Metals and Metallic Compounds - Quality Control

Batch BIJ0393 - RHN EPA 600/4-79-020 4.1.4 HNO3 matrix 5x

Instrument: ICPMS1 Analyst: MCB

QC Sample/Analyte	Isotope	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BIJ0393-BLK1)					Prepared: 13-Oct-2020 Analyzed: 15-Oct-2020 23:10							
Cadmium	111	ND	0.00600	0.0200	ug/L							U
Cadmium	114	ND	0.00800	0.0200	ug/L							U
LCS (BIJ0393-BS1)					Prepared: 13-Oct-2020 Analyzed: 15-Oct-2020 23:14							
Cadmium	111	4.90	0.00600	0.0200	ug/L	5.00		98.0	80-120			
Cadmium	114	4.83	0.00800	0.0200	ug/L	5.00		96.6	80-120			
LCS Dup (BIJ0393-BSD1)					Prepared: 13-Oct-2020 Analyzed: 15-Oct-2020 23:19							
Cadmium	111	4.98	0.00600	0.0200	ug/L	5.00		99.6	80-120	1.63	20	
Cadmium	114	4.88	0.00800	0.0200	ug/L	5.00		97.5	80-120	0.96	20	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

Wet Chemistry - Quality Control

Batch BII0818 - No Prep Wet Chem

Instrument: IC930 Analyst: KOTT

QC Sample/Analyte	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BII0818-BLK1)				Prepared: 28-Sep-2020 Analyzed: 28-Sep-2020 19:59							
Chloride	ND	0.100	0.100	mg/L							U
Nitrate-N	ND	0.100	0.100	mg/L							U
Sulfate	ND	0.100	0.100	mg/L							U
LCS (BII0818-BS1)				Prepared: 28-Sep-2020 Analyzed: 28-Sep-2020 20:19							
Chloride	4.79	0.100	0.100	mg/L	5.00		95.8	90-110			
Nitrate-N	4.92	0.100	0.100	mg/L	5.00		98.3	90-110			
Sulfate	5.24	0.100	0.100	mg/L	5.00		105	90-110			
Duplicate (BII0818-DUP1)		**Source: 20I0446-42**		Prepared: 28-Sep-2020 Analyzed: 28-Sep-2020 22:39							
Chloride	0.278	0.100	0.100	mg/L		0.280			0.72	20	
Nitrate-N	ND	0.100	0.100	mg/L		ND					U
Sulfate	4.31	0.100	0.100	mg/L		4.32			0.28	20	
Matrix Spike (BII0818-MS1)		**Source: 20I0446-42**		Prepared: 28-Sep-2020 Analyzed: 28-Sep-2020 23:39							
Chloride	2.20	0.100	0.100	mg/L	2.00	0.280	95.8	75-125			
Nitrate-N	2.04	0.100	0.100	mg/L	2.00	ND	102	75-125			
Sulfate	6.54	0.100	0.100	mg/L	2.00	4.32	111	75-125			

Recovery limits for target analytes in MS/MSD QC samples are advisory only.

Matrix Spike Dup (BII0818-MSD1)		**Source: 20I0446-42**		Prepared: 28-Sep-2020 Analyzed: 28-Sep-2020 23:59							
Chloride	2.21	0.100	0.100	mg/L	2.00	0.280	96.2	75-125	0.36	20	
Nitrate-N	2.04	0.100	0.100	mg/L	2.00	ND	102	75-125	0.39	20	
Sulfate	6.54	0.100	0.100	mg/L	2.00	4.32	111	75-125	0.03	20	

Recovery limits for target analytes in MS/MSD QC samples are advisory only.

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

Wet Chemistry - Quality Control

Batch BII0820 - No Prep Wet Chem

Instrument: IC930 Analyst: KOTT

QC Sample/Analyte	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BII0820-BLK1)				Prepared: 28-Sep-2020 Analyzed: 29-Sep-2020 06:00							
Chloride	ND	0.100	0.100	mg/L							U
Nitrate-N	ND	0.100	0.100	mg/L							U
Sulfate	ND	0.100	0.100	mg/L							U
LCS (BII0820-BS1)				Prepared: 28-Sep-2020 Analyzed: 29-Sep-2020 06:20							
Chloride	4.80	0.100	0.100	mg/L	5.00		95.9	90-110			
Nitrate-N	4.92	0.100	0.100	mg/L	5.00		98.5	90-110			H
Sulfate	5.16	0.100	0.100	mg/L	5.00		103	90-110			
Duplicate (BII0820-DUP1)		**Source: 20I0446-23**		Prepared: 28-Sep-2020 Analyzed: 29-Sep-2020 13:01							
Chloride	0.299	0.100	0.100	mg/L		0.299			0.00		
Nitrate-N	ND	0.100	0.100	mg/L		ND					H, U
Sulfate	3.81	0.100	0.100	mg/L		3.89			2.10	20	
Matrix Spike (BII0820-MS1)		**Source: 20I0446-23**		Prepared: 28-Sep-2020 Analyzed: 29-Sep-2020 13:21							
Chloride	2.22	0.100	0.100	mg/L	2.00	0.299	96.0	75-125			
Nitrate-N	2.02	0.100	0.100	mg/L	2.00	ND	101	75-125			H
Sulfate	6.09	0.100	0.100	mg/L	2.00	3.89	110	75-125			

Recovery limits for target analytes in MS/MSD QC samples are advisory only.

Matrix Spike Dup (BII0820-MSD1)		**Source: 20I0446-23**		Prepared: 28-Sep-2020 Analyzed: 29-Sep-2020 13:41							
Chloride	2.23	0.100	0.100	mg/L	2.00	0.299	96.7	75-125	0.63	20	
Nitrate-N	2.04	0.100	0.100	mg/L	2.00	ND	102	75-125	0.69	20	H
Sulfate	6.14	0.100	0.100	mg/L	2.00	3.89	112	75-125	0.72	20	

Recovery limits for target analytes in MS/MSD QC samples are advisory only.

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

Wet Chemistry - Quality Control

Batch BII0841 - No Prep Wet Chem

Instrument: IC930 Analyst: KOTT

QC Sample/Analyte	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BII0841-BLK1)				Prepared: 29-Sep-2020 Analyzed: 29-Sep-2020 20:00							
Chloride	ND	0.100	0.100	mg/L							U
Nitrate-N	ND	0.100	0.100	mg/L							U
Sulfate	ND	0.100	0.100	mg/L							U
LCS (BII0841-BS1)				Prepared: 29-Sep-2020 Analyzed: 29-Sep-2020 20:20							
Chloride	4.80	0.100	0.100	mg/L	5.00		96.0	90-110			
Nitrate-N	4.93	0.100	0.100	mg/L	5.00		98.6	90-110			
Sulfate	5.22	0.100	0.100	mg/L	5.00		104	90-110			
Duplicate (BII0841-DUP1)		**Source: 20I0446-09**		Prepared: 29-Sep-2020 Analyzed: 30-Sep-2020 00:41							
Chloride	0.276	0.100	0.100	mg/L		0.277			0.36	20	
Nitrate-N	ND	0.100	0.100	mg/L		ND					H, U
Sulfate	4.08	0.100	0.100	mg/L		4.10			0.44	20	
Matrix Spike (BII0841-MS1)		**Source: 20I0446-09**		Prepared: 29-Sep-2020 Analyzed: 30-Sep-2020 01:01							
Chloride	2.20	0.100	0.100	mg/L	2.00	0.277	96.0	75-125			
Nitrate-N	2.02	0.100	0.100	mg/L	2.00	ND	101	75-125			H
Sulfate	6.29	0.100	0.100	mg/L	2.00	4.10	110	75-125			

Recovery limits for target analytes in MS/MSD QC samples are advisory only.

Matrix Spike Dup (BII0841-MSD1)		**Source: 20I0446-09**		Prepared: 29-Sep-2020 Analyzed: 30-Sep-2020 01:21							
Chloride	2.19	0.100	0.100	mg/L	2.00	0.277	95.8	75-125	0.18	20	
Nitrate-N	2.02	0.100	0.100	mg/L	2.00	ND	101	75-125	0.20	20	H
Sulfate	6.28	0.100	0.100	mg/L	2.00	4.10	109	75-125	0.24	20	

Recovery limits for target analytes in MS/MSD QC samples are advisory only.

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Floyd - Snider	Project:	Rio Tinto Holden Mine Reclamation/Remediation
601 Union Street Two Union Square, Suite 600	Project Number:	RT-Holden
Seattle WA, 98101-2341	Project Manager:	Amanda McKay

Reported:
26-Oct-2020 12:46

Wet Chemistry - Quality Control

Batch BII0867 - No Prep Wet Chem

Instrument: BAL2 Analyst: KLE

QC Sample/Analyte	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BII0867-BLK1)				Prepared: 30-Sep-2020 Analyzed: 30-Sep-2020 06:14							
Suspended Solids	ND	1	1	mg/L							U
LCS (BII0867-BS1)				Prepared: 30-Sep-2020 Analyzed: 30-Sep-2020 06:14							
Suspended Solids	49	1	1	mg/L	50.00		98.4	90-110			
Duplicate (BII0867-DUP1)		**Source: 20I0446-09**		Prepared: 30-Sep-2020 Analyzed: 30-Sep-2020 06:14							
Suspended Solids	ND	1	1	mg/L		2					U

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Floyd - Snider	Project:	Rio Tinto Holden Mine Reclamation/Remediation
601 Union Street Two Union Square, Suite 600	Project Number:	RT-Holden
Seattle WA, 98101-2341	Project Manager:	Amanda McKay

Reported:
26-Oct-2020 12:46

Wet Chemistry - Quality Control

Batch BII0869 - No Prep Wet Chem

Instrument: BAL2 Analyst: KLE

QC Sample/Analyte	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BII0869-BLK1)					Prepared: 30-Sep-2020 Analyzed: 30-Sep-2020 06:58						
Suspended Solids	ND	1	1	mg/L							U
LCS (BII0869-BS1)					Prepared: 30-Sep-2020 Analyzed: 30-Sep-2020 06:58						
Suspended Solids	50	1	1	mg/L	50.00		99.2	90-110			
Duplicate (BII0869-DUP1)		**Source: 20I0446-23**			Prepared: 30-Sep-2020 Analyzed: 30-Sep-2020 06:58						
Suspended Solids	ND	1	1	mg/L		1					U

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

Wet Chemistry - Quality Control

Batch BII0875 - No Prep Wet Chem

Instrument: BAL2 Analyst: KLE

QC Sample/Analyte	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BII0875-BLK1)				Prepared: 30-Sep-2020 Analyzed: 30-Sep-2020 07:36							
Suspended Solids	ND	1	1	mg/L							U
LCS (BII0875-BS1)				Prepared: 30-Sep-2020 Analyzed: 30-Sep-2020 07:36							
Suspended Solids	50	1	1	mg/L	50.00		100	90-110			

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

Wet Chemistry - Quality Control

Batch BII0880 - No Prep Wet Chem

Instrument: Accumet AB150 Analyst: UW

QC Sample/Analyte	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BII0880-BLK1)					Prepared: 30-Sep-2020 Analyzed: 30-Sep-2020 09:33						
Alkalinity, Total	ND	1.00	1.00	mg/L CaCO3							U
Reference (BII0880-SRM1)					Prepared: 30-Sep-2020 Analyzed: 30-Sep-2020 09:33						
Alkalinity, Total	105	1.00	1.00	mg/L CaCO3	106		98.8	90.57-107.55			

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

Wet Chemistry - Quality Control

Batch BII0890 - No Prep Wet Chem

Instrument: Accumet AB150 Analyst: UW

QC Sample/Analyte	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BII0890-BLK1)					Prepared: 30-Sep-2020 Analyzed: 30-Sep-2020 13:46						
Alkalinity, Total	ND	1.00	1.00	mg/L CaCO3							U
Duplicate (BII0890-DUP1)			**Source: 20I0446-09**		Prepared: 30-Sep-2020 Analyzed: 30-Sep-2020 13:46						
Alkalinity, Total	9.90	1.00	1.00	mg/L CaCO3		10.0			1.03	20	
Reference (BII0890-SRM1)					Prepared: 30-Sep-2020 Analyzed: 30-Sep-2020 13:46						
Alkalinity, Total	105	1.00	1.00	mg/L CaCO3	106		98.8	90.57-107.55			

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

Wet Chemistry - Quality Control

Batch BIJ0001 - No Prep Wet Chem

Instrument: BAL2 Analyst: KLE

QC Sample/Analyte	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BIJ0001-BLK1)				Prepared: 01-Oct-2020 Analyzed: 01-Oct-2020 08:00							
Dissolved Solids	ND	5	5	mg/L							U
LCS (BIJ0001-BS1)				Prepared: 01-Oct-2020 Analyzed: 01-Oct-2020 08:00							
Dissolved Solids	508	10	10	mg/L	500		102	90-110			
Duplicate (BIJ0001-DUP1)		**Source: 20I0446-09**		Prepared: 01-Oct-2020 Analyzed: 01-Oct-2020 08:00							
Dissolved Solids	21	5	5	mg/L		24			13.30	20	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

Wet Chemistry - Quality Control

Batch BIJ0002 - No Prep Wet Chem

Instrument: BAL2 Analyst: KLE

QC Sample/Analyte	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BIJ0002-BLK1)				Prepared: 01-Oct-2020 Analyzed: 01-Oct-2020 08:08							
Dissolved Solids	ND	5	5	mg/L							U
LCS (BIJ0002-BS1)				Prepared: 01-Oct-2020 Analyzed: 01-Oct-2020 08:08							
Dissolved Solids	494	10	10	mg/L	500		98.8	90-110			
Duplicate (BIJ0002-DUP1)		**Source: 20I0446-23**		Prepared: 01-Oct-2020 Analyzed: 01-Oct-2020 08:08							
Dissolved Solids	10	5	5	mg/L		9			10.50	20	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

Wet Chemistry - Quality Control

Batch BIJ0014 - No Prep Wet Chem

Instrument: Accumet AB150 Analyst: UW

QC Sample/Analyte	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BIJ0014-BLK1)					Prepared: 01-Oct-2020 Analyzed: 01-Oct-2020 09:49						
Alkalinity, Total	ND	1.00	1.00	mg/L CaCO3							U
Duplicate (BIJ0014-DUP1)			**Source: 20I0446-23**		Prepared: 01-Oct-2020 Analyzed: 01-Oct-2020 09:49						
Alkalinity, Total	9.78	1.00	1.00	mg/L CaCO3		9.48			3.17	20	
Reference (BIJ0014-SRM1)					Prepared: 01-Oct-2020 Analyzed: 01-Oct-2020 09:49						
Alkalinity, Total	105	1.00	1.00	mg/L CaCO3	106		99.0	90.57-107.55			

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

Wet Chemistry - Quality Control

Batch BIJ0026 - No Prep Wet Chem

Instrument: Accumet AB150 Analyst: UW

QC Sample/Analyte	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BIJ0026-BLK1)					Prepared: 01-Oct-2020 Analyzed: 01-Oct-2020 14:20						
Alkalinity, Total	ND	1.00	1.00	mg/L CaCO3							U
Duplicate (BIJ0026-DUP1)			**Source: 20I0446-42**		Prepared: 01-Oct-2020 Analyzed: 01-Oct-2020 14:20						
Alkalinity, Total	10.3	1.00	1.00	mg/L CaCO3		10.5			1.96	20	
Reference (BIJ0026-SRM1)					Prepared: 01-Oct-2020 Analyzed: 01-Oct-2020 14:20						
Alkalinity, Total	105	1.00	1.00	mg/L CaCO3	106		99.0	90.57-107.55			

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

Wet Chemistry - Quality Control

Batch BIJ0068 - No Prep Wet Chem

Instrument: BAL2 Analyst: KLE

QC Sample/Analyte	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BIJ0068-BLK1)				Prepared: 02-Oct-2020 Analyzed: 02-Oct-2020 12:09							
Dissolved Solids	ND	5	5	mg/L							U
LCS (BIJ0068-BS1)				Prepared: 02-Oct-2020 Analyzed: 02-Oct-2020 12:09							
Dissolved Solids	501	5	5	mg/L	500		100	90-110			
Duplicate (BIJ0068-DUP1)		**Source: 20I0446-41**		Prepared: 02-Oct-2020 Analyzed: 02-Oct-2020 12:09							
Dissolved Solids	19	5	5	mg/L		22			15.00	20	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

Wet Chemistry - Quality Control

Batch BIJ0121 - No Prep Wet Chem

Instrument: TOC-LCSH Analyst: WCW

QC Sample/Analyte	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BIJ0121-BLK1)				Prepared: 05-Oct-2020 Analyzed: 07-Oct-2020 20:31							
Dissolved Organic Carbon, Dissolved	ND	0.50	0.50	mg/L							U
LCS (BIJ0121-BS1)				Prepared: 05-Oct-2020 Analyzed: 07-Oct-2020 20:49							
Dissolved Organic Carbon, Dissolved	19.49	0.50	0.50	mg/L	20.00		97.5	90-110			
Duplicate (BIJ0121-DUP1)		**Source: 20I0446-09**		Prepared: 05-Oct-2020 Analyzed: 08-Oct-2020 00:59							
Dissolved Organic Carbon, Dissolved	0.71	0.50	0.50	mg/L		0.70			1.25	20	
Matrix Spike (BIJ0121-MS1)		**Source: 20I0446-09**		Prepared: 05-Oct-2020 Analyzed: 08-Oct-2020 01:25							
Dissolved Organic Carbon, Dissolved	19.79	0.50	0.50	mg/L	20.00	0.70	95.5	75-125			

Recovery limits for target analytes in MS/MSD QC samples are advisory only.

Matrix Spike Dup (BIJ0121-MSD1)		**Source: 20I0446-09**		Prepared: 05-Oct-2020 Analyzed: 08-Oct-2020 01:44							
Dissolved Organic Carbon, Dissolved	19.88	0.50	0.50	mg/L	20.00	0.70	95.9	75-125	0.45	20	

Recovery limits for target analytes in MS/MSD QC samples are advisory only.

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

Wet Chemistry - Quality Control

Batch BIJ0123 - No Prep Wet Chem

Instrument: TOC-LCSH Analyst: WCW

QC Sample/Analyte	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BIJ0123-BLK1)				Prepared: 05-Oct-2020 Analyzed: 08-Oct-2020 06:44							
Dissolved Organic Carbon, Dissolved	ND	0.50	0.50	mg/L							U
LCS (BIJ0123-BS1)				Prepared: 05-Oct-2020 Analyzed: 08-Oct-2020 07:02							
Dissolved Organic Carbon, Dissolved	19.44	0.50	0.50	mg/L	20.00		97.2	90-110			
Duplicate (BIJ0123-DUP1)		**Source: 20I0446-23**		Prepared: 05-Oct-2020 Analyzed: 08-Oct-2020 09:18							
Dissolved Organic Carbon, Dissolved	0.68	0.50	0.50	mg/L		0.67			2.57	20	
Matrix Spike (BIJ0123-MS1)		**Source: 20I0446-23**		Prepared: 05-Oct-2020 Analyzed: 08-Oct-2020 09:37							
Dissolved Organic Carbon, Dissolved	19.98	0.50	0.50	mg/L	20.00	0.67	96.6	75-125			

Recovery limits for target analytes in MS/MSD QC samples are advisory only.

Matrix Spike Dup (BIJ0123-MSD1)		**Source: 20I0446-23**		Prepared: 05-Oct-2020 Analyzed: 08-Oct-2020 09:56							
Dissolved Organic Carbon, Dissolved	19.75	0.50	0.50	mg/L	20.00	0.67	95.4	75-125	1.16	20	

Recovery limits for target analytes in MS/MSD QC samples are advisory only.

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

Wet Chemistry - Quality Control

Batch BIJ0124 - No Prep Wet Chem

Instrument: TOC-LCSH Analyst: WCW

QC Sample/Analyte	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BIJ0124-BLK1)				Prepared: 05-Oct-2020 Analyzed: 08-Oct-2020 20:34							
Dissolved Organic Carbon, Dissolved	ND	0.50	0.50	mg/L							U
LCS (BIJ0124-BS1)				Prepared: 05-Oct-2020 Analyzed: 08-Oct-2020 20:56							
Dissolved Organic Carbon, Dissolved	19.87	0.50	0.50	mg/L	20.00		99.4	90-110			
Duplicate (BIJ0124-DUP1)		**Source: 20I0446-42**		Prepared: 05-Oct-2020 Analyzed: 08-Oct-2020 22:01							
Dissolved Organic Carbon, Dissolved	0.65	0.50	0.50	mg/L		0.65			0.00		
Matrix Spike (BIJ0124-MS1)		**Source: 20I0446-42**		Prepared: 05-Oct-2020 Analyzed: 08-Oct-2020 22:19							
Dissolved Organic Carbon, Dissolved	20.23	0.50	0.50	mg/L	20.00	0.65	97.9	75-125			

Recovery limits for target analytes in MS/MSD QC samples are advisory only.

Matrix Spike Dup (BIJ0124-MSD1)		**Source: 20I0446-42**		Prepared: 05-Oct-2020 Analyzed: 08-Oct-2020 22:38							
Dissolved Organic Carbon, Dissolved	20.27	0.50	0.50	mg/L	20.00	0.65	98.1	75-125	0.20	20	

Recovery limits for target analytes in MS/MSD QC samples are advisory only.

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

Wet Chemistry - Quality Control

Batch BIJ0289 - No Prep Wet Chem

Instrument: TOC-LCSH Analyst: WCW

QC Sample/Analyte	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BIJ0289-BLK1)				Prepared: 08-Oct-2020 Analyzed: 10-Oct-2020 02:23							
Total Organic Carbon	ND	0.50	0.50	mg/L							U
LCS (BIJ0289-BS1)				Prepared: 08-Oct-2020 Analyzed: 10-Oct-2020 02:42							
Total Organic Carbon	19.79	0.50	0.50	mg/L	20.00		99.0	90-110			

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

Wet Chemistry - Quality Control

Batch BIJ0296 - No Prep Wet Chem

Instrument: TOC-LCSH Analyst: WCW

QC Sample/Analyte	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BIJ0296-BLK1)				Prepared: 08-Oct-2020 Analyzed: 10-Oct-2020 13:03							
Total Organic Carbon	ND	0.50	0.50	mg/L							U
LCS (BIJ0296-BS1)				Prepared: 08-Oct-2020 Analyzed: 10-Oct-2020 13:22							
Total Organic Carbon	19.72	0.50	0.50	mg/L	20.00		98.6	90-110			
Duplicate (BIJ0296-DUP1)		**Source: 20I0446-09**		Prepared: 08-Oct-2020 Analyzed: 10-Oct-2020 17:27							
Total Organic Carbon	0.66	0.50	0.50	mg/L		0.66			0.38	20	
Matrix Spike (BIJ0296-MS1)		**Source: 20I0446-09**		Prepared: 08-Oct-2020 Analyzed: 10-Oct-2020 17:50							
Total Organic Carbon	20.25	0.50	0.50	mg/L	20.00	0.66	98.0	75-125			

Recovery limits for target analytes in MS/MSD QC samples are advisory only.

Matrix Spike Dup (BIJ0296-MSD1)		**Source: 20I0446-09**		Prepared: 08-Oct-2020 Analyzed: 12-Oct-2020 10:45							
Total Organic Carbon	20.75	0.50	0.50	mg/L	20.00	0.66	100	75-125	2.44	20	

Recovery limits for target analytes in MS/MSD QC samples are advisory only.

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

Wet Chemistry - Quality Control

Batch BIJ0297 - No Prep Wet Chem

Instrument: TOC-LCSH Analyst: WCW

QC Sample/Analyte	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BIJ0297-BLK1)				Prepared: 08-Oct-2020 Analyzed: 12-Oct-2020 16:13							
Total Organic Carbon	ND	0.50	0.50	mg/L							U
LCS (BIJ0297-BS1)				Prepared: 08-Oct-2020 Analyzed: 12-Oct-2020 16:32							
Total Organic Carbon	19.91	0.50	0.50	mg/L	20.00		99.6	90-110			
Duplicate (BIJ0297-DUP1)		**Source: 20I0446-23**		Prepared: 08-Oct-2020 Analyzed: 12-Oct-2020 18:06							
Total Organic Carbon	0.70	0.50	0.50	mg/L		0.69			1.93	20	
Matrix Spike (BIJ0297-MS1)		**Source: 20I0446-23**		Prepared: 08-Oct-2020 Analyzed: 12-Oct-2020 19:11							
Total Organic Carbon	20.34	0.50	0.50	mg/L	20.00	0.69	98.3	75-125			

Recovery limits for target analytes in MS/MSD QC samples are advisory only.

Matrix Spike Dup (BIJ0297-MSD1)		**Source: 20I0446-23**		Prepared: 08-Oct-2020 Analyzed: 12-Oct-2020 19:29							
Total Organic Carbon	20.80	0.50	0.50	mg/L	20.00	0.69	101	75-125	2.24	20	

Recovery limits for target analytes in MS/MSD QC samples are advisory only.

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

Certified Analyses included in this Report

Analyte	Certifications
EPA 300.0 in Water	
Chloride	DoD-ELAP,WADOE,WA-DW,NELAP
Chloride	DoD-ELAP,WADOE,WA-DW
Chloride	DoD-ELAP,WA-DW,NELAP
Chloride	DoD-ELAP,WADOE,NELAP
Nitrate-N	DoD-ELAP,WADOE,WA-DW,NELAP
Nitrate-N	DoD-ELAP,WADOE,WA-DW
Nitrate-N	DoD-ELAP,WA-DW,NELAP
Nitrate-N	DoD-ELAP,WADOE,NELAP
Sulfate	DoD-ELAP,WA-DW,NELAP
Sulfate	DoD-ELAP,WADOE,WA-DW
Sulfate	DoD-ELAP,WADOE,WA-DW,NELAP
Sulfate	DoD-ELAP,WADOE,NELAP
EPA 6020A in Water	
Aluminum-27	NELAP,WADOE,DoD-ELAP
Aluminum-27	NELAP,WADOE,DoD-ELAP
Aluminum-27	WADOE,DoD-ELAP
Aluminum-27	NELAP,DoD-ELAP
Calcium-44	NELAP,DoD-ELAP
Calcium-44	NELAP,DoD-ELAP,WADOE
Calcium-44	NELAP,DoD-ELAP,WADOE
Calcium-44	DoD-ELAP,WADOE
Iron-54	NELAP,WADOE,DoD-ELAP
Iron-54	WADOE,DoD-ELAP
Iron-54	NELAP,DoD-ELAP
Iron-54	NELAP,WADOE,DoD-ELAP
Iron-57	NELAP,WADOE,DoD-ELAP
Iron-57	WADOE,DoD-ELAP
Iron-57	NELAP,DoD-ELAP
Iron-57	NELAP,WADOE,DoD-ELAP
Potassium-39	NELAP,DoD-ELAP
Potassium-39	NELAP,DoD-ELAP,WADOE
Potassium-39	NELAP,DoD-ELAP,WADOE
Potassium-39	DoD-ELAP,WADOE
Magnesium-24	NELAP,DoD-ELAP,WADOE
Magnesium-24	NELAP,DoD-ELAP

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

Magnesium-24	DoD-ELAP,WADOE
Magnesium-24	NELAP,DoD-ELAP,WADOE
Manganese-55	NELAP,WADOE,DoD-ELAP
Manganese-55	NELAP,DoD-ELAP
Manganese-55	WADOE,DoD-ELAP
Manganese-55	NELAP,WADOE,DoD-ELAP
Sodium-23	NELAP,DoD-ELAP
Sodium-23	WADOE,DoD-ELAP
Sodium-23	NELAP,WADOE,DoD-ELAP
Sodium-23	NELAP,WADOE,DoD-ELAP
Lead-208	NELAP,WADOE,DoD-ELAP,ADEC
Lead-208	WADOE,DoD-ELAP,ADEC
Lead-208	NELAP,DoD-ELAP,ADEC
Lead-208	NELAP,WADOE,DoD-ELAP,ADEC

EPA 6020A UCT-KED in Water

Cadmium-111	NELAP,DoD-ELAP,ADEC
Cadmium-111	WADOE,DoD-ELAP,ADEC
Cadmium-111	NELAP,WADOE,DoD-ELAP,ADEC
Cadmium-111	NELAP,WADOE,DoD-ELAP,ADEC
Cadmium-114	NELAP,WADOE,DoD-ELAP,ADEC
Cadmium-114	WADOE,DoD-ELAP,ADEC
Cadmium-114	NELAP,DoD-ELAP,ADEC
Cadmium-114	NELAP,WADOE,DoD-ELAP,ADEC
Copper-63	NELAP,WADOE,DoD-ELAP
Copper-63	NELAP,WADOE,DoD-ELAP
Copper-63	NELAP,DoD-ELAP
Copper-63	WADOE,DoD-ELAP
Copper-65	NELAP,WADOE,DoD-ELAP
Copper-65	WADOE,DoD-ELAP
Copper-65	NELAP,DoD-ELAP
Copper-65	NELAP,WADOE,DoD-ELAP
Zinc-66	WADOE,WA-DW,DoD-ELAP
Zinc-66	WADOE,WA-DW,DoD-ELAP
Zinc-66	WA-DW,DoD-ELAP
Zinc-66	WADOE,DoD-ELAP
Zinc-67	WADOE,WA-DW,DoD-ELAP
Zinc-67	WADOE,WA-DW,DoD-ELAP
Zinc-67	WA-DW,DoD-ELAP
Zinc-67	WADOE,DoD-ELAP

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

SM 2320 B-97 in Water

Alkalinity, Bicarbonate	NELAP,WA-DW,DoD-ELAP
Alkalinity, Bicarbonate	NELAP,WADOE,DoD-ELAP
Alkalinity, Bicarbonate	WADOE,WA-DW,DoD-ELAP
Alkalinity, Bicarbonate	NELAP,WADOE,WA-DW,DoD-ELAP
Alkalinity, Carbonate	WADOE,WA-DW,DoD-ELAP,NELAP
Alkalinity, Carbonate	WADOE,WA-DW,DoD-ELAP
Alkalinity, Carbonate	WA-DW,DoD-ELAP,NELAP
Alkalinity, Carbonate	WADOE,DoD-ELAP,NELAP
Alkalinity, Hydroxide	WADOE,WA-DW,DoD-ELAP,NELAP
Alkalinity, Hydroxide	WADOE,WA-DW,DoD-ELAP
Alkalinity, Hydroxide	WA-DW,DoD-ELAP,NELAP
Alkalinity, Hydroxide	WADOE,DoD-ELAP,NELAP
Alkalinity, Total	DoD-ELAP,WADOE,NELAP
Alkalinity, Total	DoD-ELAP,WADOE,WA-DW,NELAP
Alkalinity, Total	DoD-ELAP,WADOE,WA-DW
Alkalinity, Total	DoD-ELAP,WA-DW,NELAP

SM 2540 C-97 in Water

Dissolved Solids	DoD-ELAP,WADOE,NELAP
Dissolved Solids	DoD-ELAP,WADOE,WA-DW,NELAP
Dissolved Solids	DoD-ELAP,WADOE,WA-DW
Dissolved Solids	DoD-ELAP,WA-DW,NELAP

SM 2540 D-97 in Water

Suspended Solids	DoD-ELAP,WADOE,NELAP
Suspended Solids	DoD-ELAP,NELAP
Suspended Solids	DoD-ELAP,WADOE
Suspended Solids	DoD-ELAP,WADOE,NELAP

SM 5310 B-00 in Water

Dissolved Organic Carbon	WADOE,WA-DW
Dissolved Organic Carbon	WA-DW,NELAP
Dissolved Organic Carbon	WADOE,NELAP
Dissolved Organic Carbon	WADOE,WA-DW,NELAP
Total Organic Carbon	WA-DW,NELAP
Total Organic Carbon	WA-DW,WADOE
Total Organic Carbon	WADOE,NELAP
Total Organic Carbon	WA-DW,WADOE,NELAP

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

Code	Description	Number	Expires
ADEC	Alaska Dept of Environmental Conservation	17-015	01/31/2021
DoD-ELAP	DoD-Environmental Laboratory Accreditation Program	66169	01/01/2021

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	26-Oct-2020 12:46

Notes and Definitions

*	Flagged value is not within established control limits.
D	The reported value is from a dilution
H	Hold time violation - Hold time was exceeded.
J	Estimated concentration value detected below the reporting limit.
L	Analyte concentration is <=5 times the reporting limit and the replicate control limit defaults to +/- RL instead of 20% RPD
U	This analyte is not detected above the reporting limit (RL) or if noted, not detected above the limit of detection (LOD).
DET	Analyte DETECTED
ND	Analyte NOT DETECTED at or above the reporting limit
NR	Not Reported
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference
[2C]	Indicates this result was quantified on the second column on a dual column analysis.

Analytical Resources, Incorporated
Analytical Chemists and Consultants

09 November 2020

Amanda McKay
Floyd - Snider
601 Union Street Two Union Square, Suite 600
Seattle, WA 98101-2341

RE: Rio Tinto Holden Mine Reclamation/Remediation

Please find enclosed sample receipt documentation and analytical results for samples from the project referenced above.

Sample analyses were performed according to ARI's Quality Assurance Plan and any provided project specific Quality Assurance Plan. Each analytical section of this report has been approved and reviewed by an analytical peer, the appropriate Laboratory Supervisor or qualified substitute, and a technical reviewer.

Should you have any questions or problems, please feel free to contact us at your convenience.

Associated Work Order(s)	Associated SDG ID(s)
20I0500	N/A

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed in the enclose Narrative. ARI, an accredited laboratory, certifies that the report results for which ARI is accredited meets all the requirements of the accrediting body. A list of certified analyses, accreditations, and expiration dates is included in this report.

Release of the data contained in this hardcopy data package has been authorized by the Laboratory Manager or his/her designee, as verified by the following signature.

Analytical Resources, Inc.



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ACCREDITED IN ACCORDANCE WITH nelac
Cert# 100006-012

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Chain of Custody Record & Laboratory Analysis Request

ARI Assigned Number: 20I0500	Turn-around Requested:	Page: 1 of 2	
ARI Client Company: Floyd Snider	Phone: 206-795-0523	Date: 9/29/20	Ice Present? Yes
Client Contact: Kara Hitchko / Pam Osterhout		No. of Coolers: 2	Cooler Temps: 5.9, 2.4
Client Project Name: Holden			
Client Project #:	Samplers: KH, EM		

Analytical Resources, Incorporated
Analytical Chemists and Consultants
4611 South 134th Place, Suite 100
Tukwila, WA 98168
206-695-6200 206-695-6201 (fax)
www.arilabs.com

Sample ID	Date	Time	Matrix	No. Containers	Analysis Requested: Metals*	AVS/SEM	TOC	total solids	Grain size	ris/ris SD			Notes/Comments
LB-1-SS-092720	9/27/20	12:06	Sediment	3	X	X	X	X	X				*Metals =
LB-2-SS-092720	9/27/20	10:49		3									aluminum, beryllium,
RC-10-SS-092720	9/27/20	14:45		3									cadmium, chromium,
RC-5A-SS-092620	9/26/20	16:05		3									copper, iron, silver,
RC-4-SS-092620	9/26/20	09:48		3									zinc
RC-1-SS-092620	9/26/20	12:02		3									
RC-2(SG-7)-SS-092920	9/29/20	9:21		4						X			
RC-6-SS-092920	9/29/20	11:00		3									
RC-102(SG-107)-SS-092920	9/29/20	9:25		3									
EB-SS-092920	9/29/20	11:25	Water	1	X								

Comments/Special Instructions	Relinquished by: (Signature)	Received by: (Signature)	Relinquished by: (Signature)	Received by: (Signature)
	Printed Name: Pamela Osterhout	Printed Name: Kenny Dang	Printed Name:	Printed Name:
	Company: Floyd Snider	Company: ARI	Company:	Company:
	Date & Time: 9/30/20 @ 1347	Date & Time: 9/30/20 1347	Date & Time:	Date & Time:

Limits of Liability: *ARI will perform all requested services in accordance with appropriate methodology following ARI Standard Operating Procedures and the ARI Quality Assurance Program. This program meets standards for the industry. The total liability of ARI, its officers, agents, employees, or successors, arising out of or in connection with the requested services, shall not exceed the Invoiced amount for said services. The acceptance by the client of a proposal for services by ARI release ARI from any liability in excess thereof, not withstanding any provision to the contrary in any contract, purchase order or co-signed agreement between ARI and the Client.*

Sample Retention Policy: All samples submitted to ARI will be appropriately discarded no sooner than 90 days after receipt or 60 days after submission of hardcopy data, whichever is longer, unless alternate retention schedules have been established by work-order or contract.

Chain of Custody Record & Laboratory Analysis Request

ARI Assigned Number: 20I0500	Turn-around Requested: Standard	Date: 9/29/20	
ARI Client Company: Floyd Snider	Phone: 206-292-2078	Page: 2 of 2	
Client Contact: Amanda McKay or Pamela Osterhout		No. of Coolers: 2	Cooler Temps: 5.9, 2.4
Client Project Name: RT-Holden			
Client Project #: RT-Holden Task 5.4	Samplers: G.C., K.H., E.M., T.S., B.B., P.O., G.W., N.W.		

Analytical Resources, Incorporated
Analytical Chemists and Consultants
4611 South 134th Place, Suite 100
Tukwila, WA 98168
206-695-6200 206-695-6201 (fax)

Sample ID	Date	Time	Matrix	No. Containers	Total Metals Cations	Diss. Metals (FF)	Alkalinity (A2320)	TSS /TDS (SM2540D/C)	TOC (A5310B)	DOC (FF)	Anions (300.0)	Hardness (Calculate)	Notes/Comments
					Analysis Requested								
Field-Blank-3-092920	9/29/20	11:15	W	7	X	X	X	X	X	X	X	X	Run low level Cd.

Comments/Special Instructions
- Metals by E6020A include Al, Cd, Cu, Fe, Pb, Zn, Mn, Ca, K, Mg, Na
- Anions: Chloride, sulfate and nitrate
- DOC and dissolved metals field filtered (FF) at 0.45 micron.
- If Cadmium is non-detect, run low-level analysis to PQL of 0.02 ug/L
- Alkalinity: report total, carbonate, bicarbonate and hydroxide.

Relinquished by: (Signature)	Received by: (Signature)	Relinquished by: (Signature)	Received by: (Signature)
Printed Name: Pamela Osterhout	Printed Name: Kenny Davy	Printed Name:	Printed Name:
Company: Floyd Snider	Company: ARI	Company:	Company:
Date & Time: 9/30/20 @ 1347	Date & Time: 9/30/20 1347	Date & Time:	Date & Time:

Limits of Liability: *ARI will perform all requested services in accordance with appropriate methodology following ARI Standard Operating Procedures and the ARI Quality Assurance Program. This program meets standards for the industry. The total liability of ARI, its officers, agents, employees, or successors, arising out of or in connection with the requested services, shall not exceed the Invoiced amount for said services. The acceptance by the client of a proposal for services by ARI release ARI from any liability in excess thereof, not withstanding any provision to the contrary in any contract, purchase order or co-signed agreement between ARI and the Client.*

Sample Retention Policy: Unless specified by workorder or contract, all water/soil samples submitted to ARI will be discarded or returned, no sooner than 90 days after receipt or 60 days after submission of hardcopy data, whichever is longer. Sediment samples submitted under PSDDA/PSEP/SMS protocol will be stored frozen for up to one year and then discarded.

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	09-Nov-2020 14:20

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
LB-1-SS-092720	20I0500-01	Solid	27-Sep-2020 12:06	30-Sep-2020 13:47
LB-2-SS-092720	20I0500-02	Solid	27-Sep-2020 10:49	30-Sep-2020 13:47
RC-10-SS-092720	20I0500-03	Solid	27-Sep-2020 14:45	30-Sep-2020 13:47
RC-5A-SS-092620	20I0500-04	Solid	26-Sep-2020 16:05	30-Sep-2020 13:47
RC-4-SS-092620	20I0500-05	Solid	26-Sep-2020 09:48	30-Sep-2020 13:47
RC-1-SS-092620	20I0500-06	Solid	26-Sep-2020 12:02	30-Sep-2020 13:47
RC-2(SG-7)-SS-092920	20I0500-07	Solid	29-Sep-2020 09:21	30-Sep-2020 13:47
RC-6-SS-092920	20I0500-08	Solid	29-Sep-2020 11:00	30-Sep-2020 13:47
RC-102(SG-107)-SS-092920	20I0500-09	Solid	29-Sep-2020 09:25	30-Sep-2020 13:47
EB-SS-092920	20I0500-10	Water	29-Sep-2020 11:25	30-Sep-2020 13:47
Field-Blank-3-092920	20I0500-11	Water	29-Sep-2020 11:15	30-Sep-2020 13:47
Field-Blank-3-092920	20I0500-12	Water	29-Sep-2020 11:15	30-Sep-2020 13:47
LB-1-SS-092720	20I0500-13	Solid	27-Sep-2020 12:06	30-Sep-2020 13:47
LB-2-SS-092720	20I0500-14	Solid	27-Sep-2020 10:49	30-Sep-2020 13:47
RC-10-SS-092720	20I0500-15	Solid	27-Sep-2020 14:45	30-Sep-2020 13:47
RC-5A-SS-092620	20I0500-16	Solid	26-Sep-2020 16:05	30-Sep-2020 13:47
RC-4-SS-092620	20I0500-17	Solid	26-Sep-2020 09:48	30-Sep-2020 13:47
RC-1-SS-092620	20I0500-18	Solid	26-Sep-2020 12:02	30-Sep-2020 13:47
RC-2(SG-7)-SS-092920	20I0500-19	Solid	29-Sep-2020 09:21	30-Sep-2020 13:47
RC-6-SS-092920	20I0500-20	Solid	29-Sep-2020 11:00	30-Sep-2020 13:47
RC-102(SG-107)-SS-092920	20I0500-21	Solid	29-Sep-2020 09:25	30-Sep-2020 13:47

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	09-Nov-2020 14:20

Work Order Case Narrative

Total and Dissolved Metals - EPA Method 6020A

The sample(s) were digested and analyzed within the recommended holding times.

Initial and continuing calibrations were within method requirements.

The method blank(s) were clean at the reporting limits with the exception of the method blank in association batch BIJ0454 which contained copper and zinc.
Samples associated with method blank batch BIJ0454 have been flagged with a "B" qualifer.

The blank spike (BS/LCS) percent recoveries were within control limits.

The matrix spike (MS) percent recoveries and the duplicate (DUP) relative percent difference (RPD) were within advisory control limits with the exception
of analytes flagged on the associated forms.

Wet Chemistry

The sample(s) were prepared and analyzed within the recommended holding times.

Initial and continuing calibrations were within method requirements.

The method blank(s) were clean at the reporting limits.

The blank spike (BS/LCS) percent recoveries were within control limits.

The reference material (SRM) percent recoveries were within control limits.

The matrix spike (MS) percent recoveries and the duplicate (DUP) relative percent difference (RPD) were within advisory control limits.

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

4611 S. 134th Place, Suite 100 • Tukwila, WA 98168 • Ph: (206) 695-6200 • Fax: (206) 695-6202

WORK ORDER

20I0500

Client: Floyd - Snider **Project Manager:** Kelly Bottem

Project: Rio Tinto Holden Mine Reclamation/Remediation **Project Number:** RT-Holden

Preservation Confirmation

Container ID	Container Type	pH
20I0500-01 A	Glass WM, Clear, 16 oz	
20I0500-01 B	Glass WM, Clear, 16 oz	
20I0500-01 C	Glass WM, Clear, 4 oz	
20I0500-02 A	Glass WM, Clear, 16 oz	
20I0500-02 B	Glass WM, Clear, 16 oz	
20I0500-02 C	Glass WM, Clear, 4 oz	
20I0500-03 A	Glass WM, Clear, 16 oz	
20I0500-03 B	Glass WM, Clear, 16 oz	
20I0500-03 C	Glass WM, Clear, 4 oz	
20I0500-04 A	Glass WM, Clear, 16 oz	
20I0500-04 B	Glass WM, Clear, 16 oz	
20I0500-04 C	Glass WM, Clear, 4 oz	
20I0500-05 A	Glass WM, Clear, 16 oz	
20I0500-05 B	Glass WM, Clear, 16 oz	
20I0500-05 C	Glass WM, Clear, 4 oz	
20I0500-06 A	Glass WM, Clear, 16 oz	
20I0500-06 B	Glass WM, Clear, 16 oz	
20I0500-06 C	Glass WM, Clear, 4 oz	
20I0500-07 A	Glass WM, Clear, 16 oz	
20I0500-07 B	Glass WM, Clear, 16 oz	
20I0500-07 C	Glass WM, Clear, 16 oz	
20I0500-07 D	Glass WM, Clear, 4 oz	
20I0500-08 A	Glass WM, Clear, 16 oz	
20I0500-08 B	Glass WM, Clear, 16 oz	
20I0500-08 C	Glass WM, Clear, 4 oz	
20I0500-09 A	Glass WM, Clear, 16 oz	
20I0500-09 B	Glass WM, Clear, 16 oz	
20I0500-09 C	Glass WM, Clear, 4 oz	
20I0500-10 A	HDPE NM, 500 mL, 1:1 HNO3	<2 Pass
20I0500-11 A	Large OJ, 1000 mL	
20I0500-11 B	Large OJ, 1000 mL	
20I0500-11 C	HDPE NM, 500 mL, 1:1 HNO3	<2 Pass
20I0500-11 D	Small OJ, 500 mL	
20I0500-11 E	Glass NM, Amber, 250 mL, 9N H2SO4	<2 Pass
20I0500-11 F	Glass NM, Amber, 250 mL, 9N H2SO4	<2 Pass

Reviewed By

Date

WORK ORDER

20I0500

Client: Floyd - Snider **Project Manager:** Kelly Bottem

Project: Rio Tinto Holden Mine Reclamation/Remediation **Project Number:** RT-Holden

20I0500-12 A	HDPE NM, 500 mL, 1:1 HNO3 (FF)	<2 Pass

KP
Preservation Confirmed By

9/30/20
Date

Reviewed By

Date

Analytical Resources, Incorporated
Analytical Chemists and Consultants

Cooler Receipt Form

ARI Client: Floyd Snider
Project Name: RT Holden
COC No(s): (NA)
Delivered by: Fed-Ex UPS Courier Hand Delivered Other:
Assigned ARI Job No: 20I0500
Tracking No: (NA)

Preliminary Examination Phase:

Were intact, properly signed and dated custody seals attached to the outside of the cooler?	YES	(NO)
Were custody papers included with the cooler?	(YES)	NO
Were custody papers properly filled out (ink, signed, etc.)	(YES)	NO

Temperature of Cooler(s) (°C) (recommended 2.0-6.0 °C for chemistry)

Time 1347 — 5.9 — 2.4 — ___ — ___ — ___ — ___

If cooler temperature is out of compliance fill out form 00070F
Temp Gun ID#: DOO S20C

Cooler Accepted by: KD Date: 9/30/20 Time: 1347

Complete custody forms and attach all shipping documents

Log-In Phase:

Was a temperature blank included in the cooler?			(NO)
What kind of packing material was used?	Bubble Wrap (Wet) Ice Gel Packs Baggies Foam Block Paper Other:		
Was sufficient ice used (if appropriate)?	NA	(YES)	NO
How were bottles sealed in plastic bags?	Individually	(Grouped)	Not
Did all bottles arrive in good condition (unbroken)?		(YES)	NO
Were all bottle labels complete and legible?		(YES)	NO
Did the number of containers listed on COC match with the number of containers received?		(YES)	NO
Did all bottle labels and tags agree with custody papers?		(YES)	NO
Were all bottles used correct for the requested analyses?		(YES)	NO
Do any of the analyses (bottles) require preservation? (attach preservation sheet, excluding VOCs)	NA	(YES)	NO
Were all VOC vials free of air bubbles?	(NA)	YES	NO
Was sufficient amount of sample sent in each bottle?		(YES)	NO
Date VOC Trip Blank was made at ARI	(NA)		

Were the sample(s) split by ARI? (NA) YES Date/Time: ___ Equipment: ___ Split by: ___

Samples Logged by: KD Date: 9/30/20 Time: ~~1417~~ 1516 Labels checked by: KD

*** Notify Project Manager of discrepancies or concerns ***

Sample ID on Bottle	Sample ID on COC	Sample ID on Bottle	Sample ID on COC

Additional Notes, Discrepancies, & Resolutions:

By: Date:

Harold L Benny & Associates, LLC

Project:	20I0500	**Client:**	Analytical Resources, Inc.
Date Received:	October 3, 2020	**HLB Project #:**	20-115
Date Started:	October 8, 2020	**Tested By:**	H Benny
Date Finished:	November 3, 2020		

CASE NARRATIVE

1. Nine samples were submitted for grain size analysis according to Puget Sound Estuary Protocol (PSEP) methodology.
2. The samples were run in a single batch and one sample from the job was chosen for triplicate analysis. The triplicate data is reported on the QA summary. The samples were mostly gravel and sand and did not have enough fines to pipette.
3. The samples contained organic matter which may have broken down during the oven drying and sieving process, affecting the grain size analysis.
5. The data is provided in summary tables and plots.
6. There were no other noted anomalies in the testing or samples on project.

Reviewed by: HBenny

Harold L Benny & Associates, LLC

Project: 20I0500
Date Received: October 3, 2020
Date Started: October 8, 2020
Date Finished: November 3, 2020

Client: Analytical Resources, Inc.
Project #: 20-115
Tested by: H Benny

Apparent Grain Size Distribution Summary

Percent Finer Than Indicated Size

Sample No.	Gravel			Very Coarse Sand	Coarse Sand	Medium Sand	Fine Sand	Very Fine Sand	Silt				Clay	
Phi Size	-3	-2	-1	0	1	2	3	4	5	6	7	8	9	10
Sieve Size (microns)	3/8"	#4 (4750)	#10 (2000)	#18 (1000)	#35 (500)	#60 (250)	#120 (125)	#230 (63)	31.0	15.6	7.8	3.9	2.0	1.0
20I0500-01	100.0	100.0	100.0	98.2	88.8	58.2	26.8	8.6	-	-	-	-	-	-
	100.0	100.0	96.8	85.2	57.5	26.8	8.7	2.7	-	-	-	-	-	-
	100.0	100.0	97.8	88.2	57.9	26.8	9.0	2.7	-	-	-	-	-	-
20I0500-02	100.0	95.1	83.5	60.8	28.8	6.5	1.5	0.9	-	-	-	-	-	-
20I0500-03	90.9	75.8	56.3	33.2	16.6	5.1	1.9	1.4	-	-	-	-	-	-
20I0500-04	81.0	54.3	35.4	18.8	9.6	3.7	2.5	2.2	-	-	-	-	-	-
20I0500-05	43.4	28.4	20.9	9.8	5.1	1.6	0.4	0.0	-	-	-	-	-	-
20I0500-06	74.0	64.3	56.6	42.1	23.6	9.1	4.9	3.7	-	-	-	-	-	-
20I0500-07	90.7	85.5	76.9	69.7	47.1	19.5	8.0	3.6	-	-	-	-	-	-
20I0500-08	59.3	51.2	43.8	36.3	25.1	13.7	5.8	3.0	-	-	-	-	-	-
20I0500-09	92.0	86.6	84.2	77.4	50.8	21.1	8.7	3.7	-	-	-	-	-	-

Reviewed by: HBenny

Page 10 of 146 20I0500 ARISample FINAL 09 Nov 2020 1420

Harold L Benny & Associates, LLC

Project: 20I0500
Date Received: October 3, 2020
Date Started: October 8, 2020
Date Finished: November 3, 2020

Client: Analytical Resources, Inc.
HLB Project #: 20-115
Tested by: H Benny

Apparent Grain Size Distribution Summary
Percent Retained in Each Size Fraction

Sample No.	Gravel	Very Coarse Sand	Coarse Sand	Medium Sand	Fine Sand	Very Fine Sand	Coarse Silt	Medium Silt	Fine Silt	Very Fine Silt	Clay			Total Fines
Phi Size	< -1	-1 to 0	0 to 1	1 to 2	2 to 3	3 to 4	4 to 5	5 to 6	6 to 7	7 to 8	8 to 9	9 to 10	> 10	> 4
Sieve Size (microns)	> #10 (2000)	10-18 (2000-1000)	18-35 (1000-500)	35-60 (500-250)	60-120 (250-125)	120-230 (125-62)	62.5-31.0	31.0-15.6	15.6-7.8	7.8-3.9	3.9-2.0	2.0-1.0	<1.0	<230 (<62)
20I0500-01	0.0	1.8	9.3	30.7	31.4	18.2	-	-	-	-	-	-	-	8.6
	3.2	11.6	27.7	30.8	18.1	6.0	-	-	-	-	-	-	-	2.7
	2.2	9.6	30.3	31.1	17.8	6.3	-	-	-	-	-	-	-	2.7
20I0500-02	16.5	22.7	32.0	22.3	5.0	0.6	-	-	-	-	-	-	-	0.9
20I0500-03	43.7	23.1	16.6	11.6	3.2	0.5	-	-	-	-	-	-	-	1.4
20I0500-04	64.6	16.7	9.1	6.0	1.2	0.3	-	-	-	-	-	-	-	2.2
20I0500-05	79.1	11.1	4.7	3.5	1.3	0.4	-	-	-	-	-	-	-	0.0
20I0500-06	43.4	14.5	18.5	14.5	4.3	1.1	-	-	-	-	-	-	-	3.7
20I0500-07	23.1	7.1	22.6	27.6	11.5	4.4	-	-	-	-	-	-	-	3.6
20I0500-08	56.2	7.5	11.2	11.4	7.9	2.9	-	-	-	-	-	-	-	3.0
20I0500-09	15.8	6.7	26.6	29.7	12.4	5.0	-	-	-	-	-	-	-	3.7

Reviewed by: HBenny

Harold L Benny & Associates, LLC

Project: 20I0500
Date Received: October 3, 2020
Date Started: October 8, 2020
Date Finished: November 3, 2020

Client: Analytical Resources, Inc.
HLB Project #: 20-115
Tested by: H Benny

Relative Standard Deviation, By Phi Size

Sample ID	-3	-2	-1	0	1	2	3	4	5	6	7	8	9	10
20I0500-01	100.0	100.0	98.2	88.8	58.2	26.8	8.6	2.5	-	-	-	-	-	-
	100.0	100.0	96.8	85.2	57.5	26.8	8.7	2.7	-	-	-	-	-	-
	100.0	100.0	97.8	88.2	57.9	26.8	9.0	2.7	-	-	-	-	-	-
AVE	100.0	100.0	97.6	87.4	57.9	26.8	8.8	2.6	-	-	-	-	-	-
STDEV	0.0	0.0	0.6	1.6	0.3	0.0	0.2	0.1	-	-	-	-	-	-
%RSD	0.0	0.0	0.6	1.8	0.5	0.1	2.0	2.9	-	-	-	-	-	-

The Triplicate Applies To The Following Samples

Client ID	Date Sampled	Date Extracted	Date Complete	QA Ratio (95-105)	Data Qualifiers	Pipette Portion (5.0-25.0g)
20I0500-01	6/22/2020	8/22/2020	8/26/2020	104.3	SS	1.3
	6/22/2020	8/22/2020	8/26/2020	104.4	SS	1.4
	6/22/2020	8/22/2020	8/26/2020	104.3	SS	1.5
20I0500-02	6/22/2020	8/22/2020	8/26/2020	102.1	SS	0.6
20I0500-03	6/22/2020	8/22/2020	8/26/2020	102.3	SS	1.3
20I0500-04	6/22/2020	8/22/2020	8/26/2020	103.3	SS	1.9
20I0500-05	6/22/2020	8/22/2020	8/26/2020	100.7	SS	0.0
20I0500-06	6/22/2020	8/22/2020	8/26/2020	104.7	SS	4.0
20I0500-07	6/22/2020	8/22/2020	8/26/2020	104.7	SS	3.3
20I0500-08	6/22/2020	8/22/2020	8/26/2020	103.9	SS	3.2
20I0500-09	6/22/2020	8/22/2020	8/26/2020	104.8	SS	3.3

Notes to the Testing: Organic matter was not removed prior to testing, thus the reported values are the "apparent" grain size distribution.

Reviewed by: 

Harold L Benny & Associates, LLC

Project: 20I0500
Date Received: October 3, 2020
Date Started: October 8, 2020
Date Finished: November 3, 2020

Client: Analytical Resources, Inc.
HLB Project #: 20-115
Tested by: H Benny

Data Qualifiers

PSEP Grain Size Analysis

SM - The sample matrix was not appropriate for the requested analysis. This normally refers to samples contaminated with an organic product that interferes with the sieving process and/or moisture content, porosity and saturation calculations.

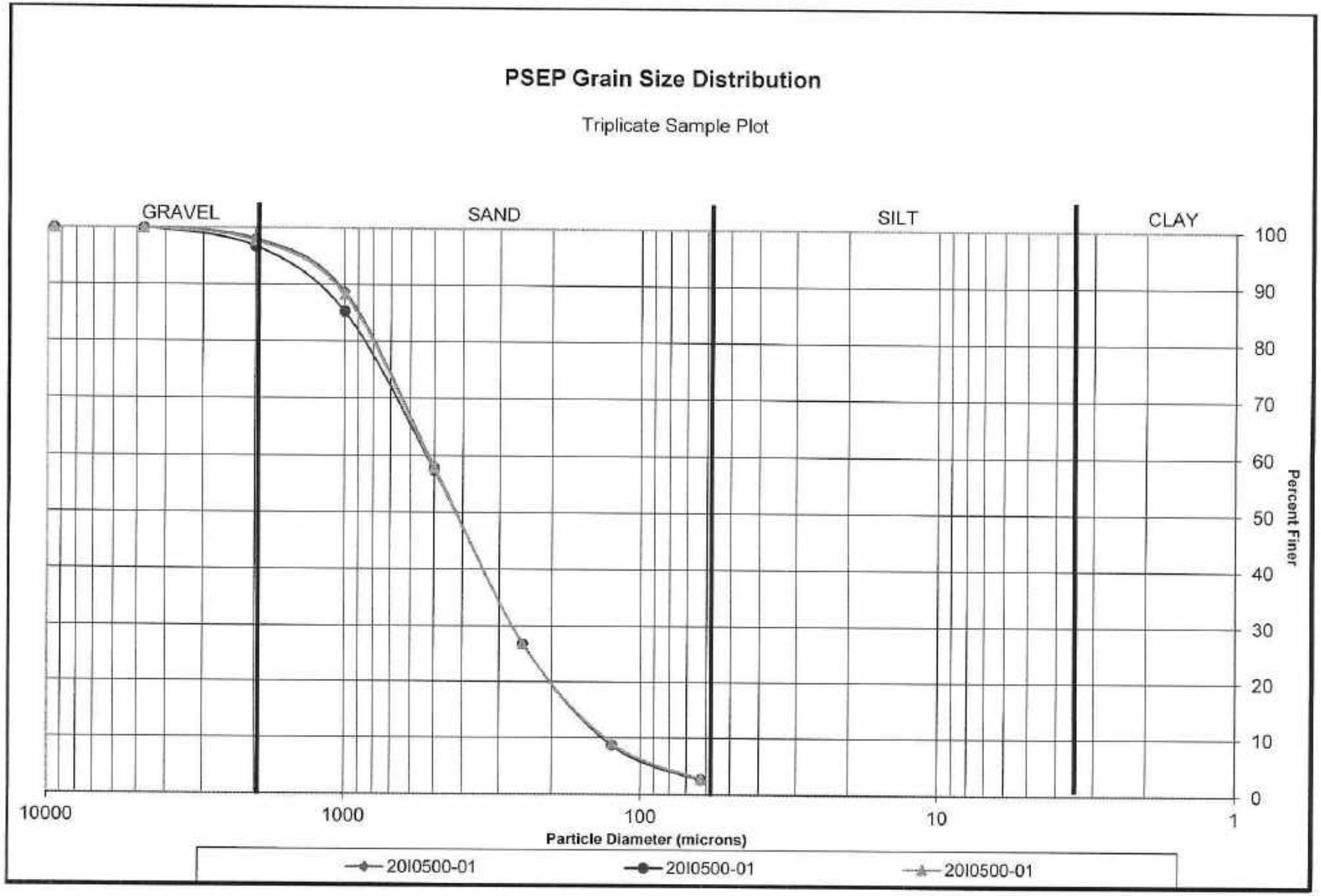
SS - The sample did not contain the proportion of "fines" required to perform the pipette portion of the grain size analysis.

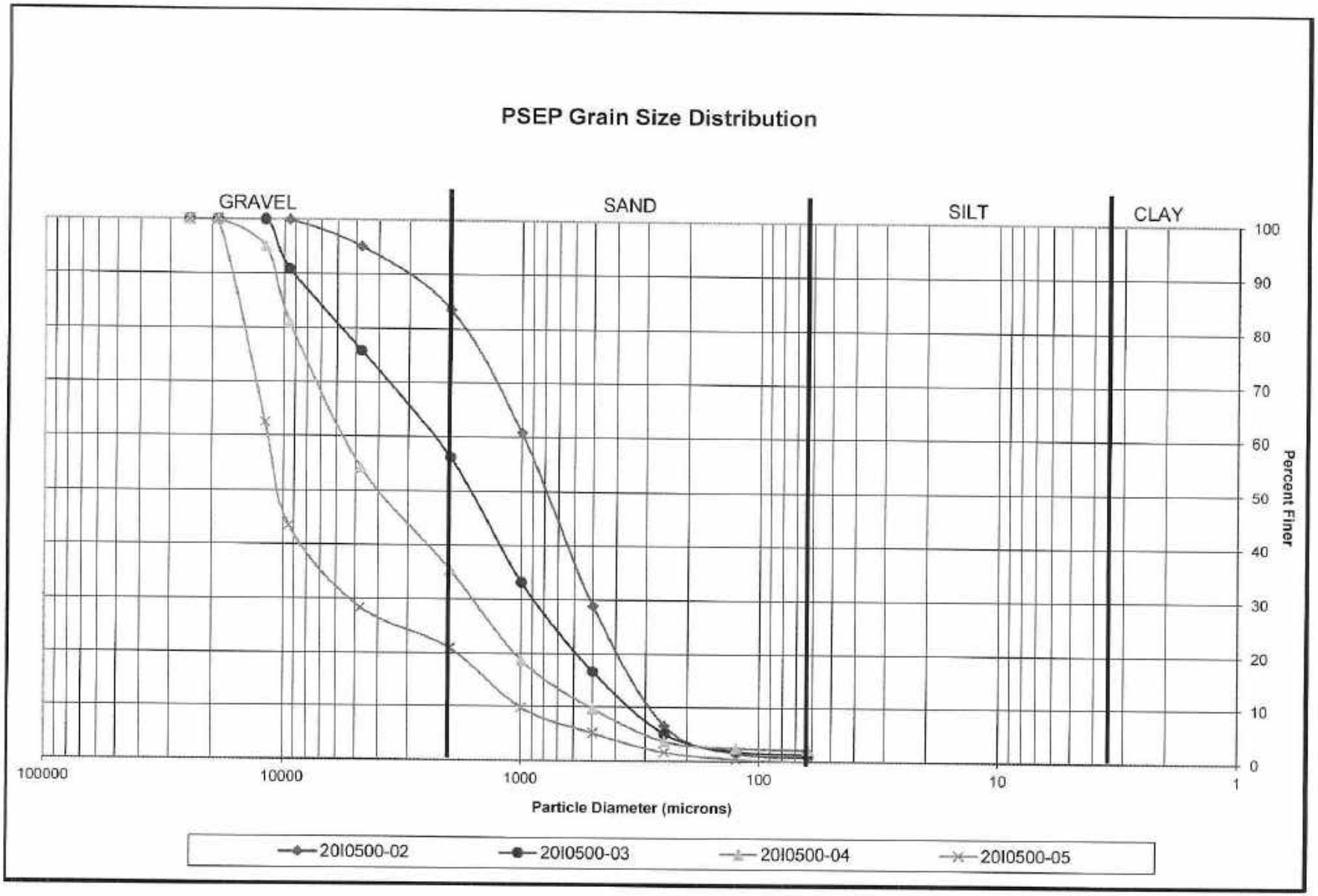
W - The weight of the sample in some pipette aliquots was below the level required for accurate weighing.

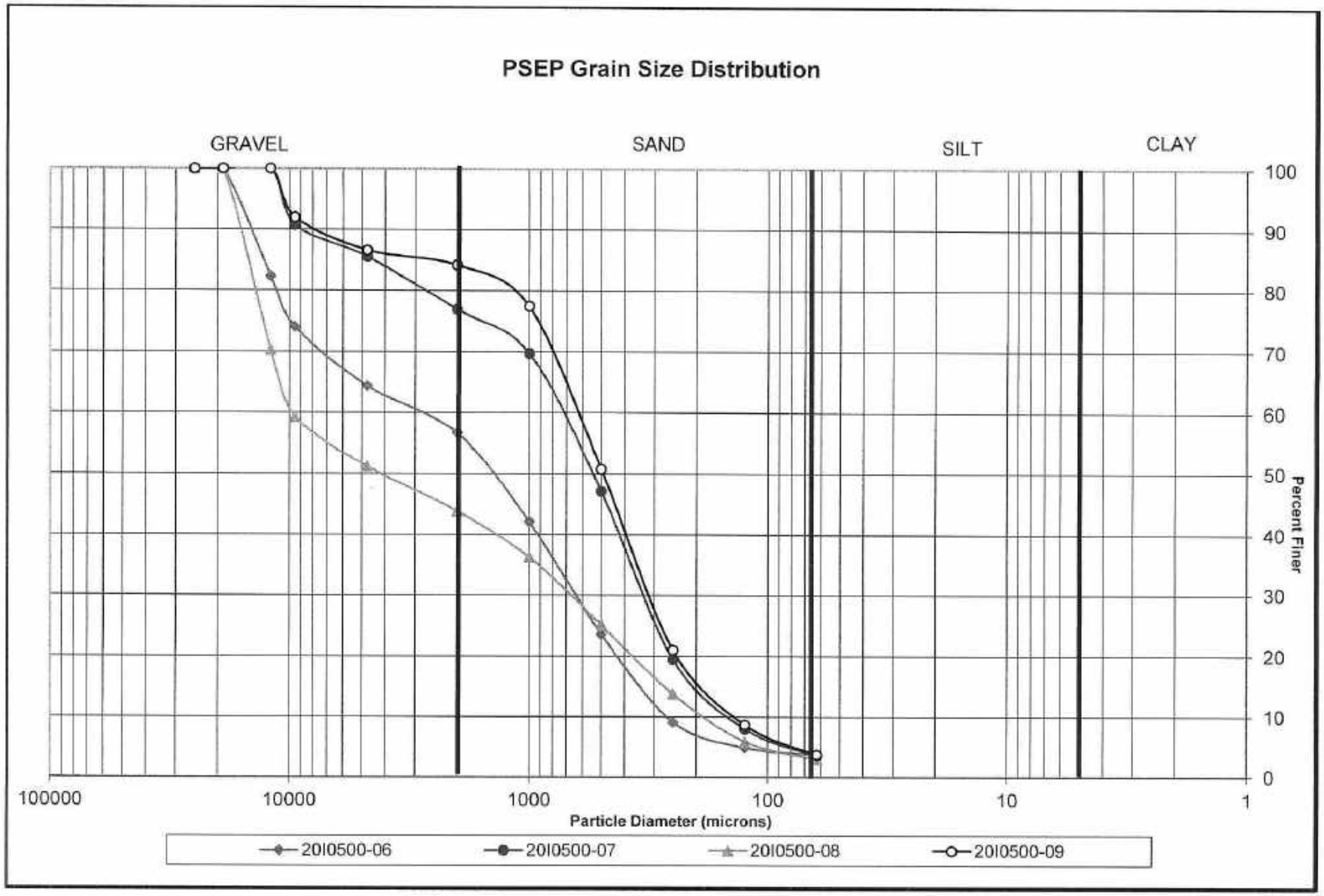
F - The samples were frozen prior to particle size determination.

LV - Due to low sample volume provided, the samples could not be rerun to meet QA requirements.

Reviewed by: HBenny


PSEP Grain Size Distribution
Triplicate Sample Plot
GRAVEL
SAND
SILT
CLAY
100
90
80
70
60
50
40
30
20
10
0
Percent Finer
10000
1000
100
10
1
Particle Diameter (microns)
20I0500-01
20I0500-01
20I0500-01


PSEP Grain Size Distribution
GRAVEL
SAND
SILT
CLAY
100
90
80
70
60
50
40
30
20
10
0
Percent Finer
100000
10000
1000
100
10
1
Particle Diameter (microns)
20I0500-02
20I0500-03
20I0500-04
20I0500-05


PSEP Grain Size Distribution
GRAVEL
SAND
SILT
CLAY
100
90
80
70
60
50
40
30
20
10
0
Percent Finer
100000
10000
1000
100
10
1
Particle Diameter (microns)
20I0500-06
20I0500-07
20I0500-08
20I0500-09

Analytical Resources, Incorporated
Analytical Chemists and Consultants

SUBCONTRACT ORDER
To: Harold L. Benny & Associates, LLC.
ARI Work Order:20I0500

SENDING LABORATORY:

Analytical Resources, Inc.
4611 S. 134th Place, Suite 100
Tukwila, WA 98168
Phone: (206) 695-6200
Fax: (206) 695-6201
Project Manager: Kelly Bottem
E-Mail: kelly.bottem@arilabs.com

RECEIVING LABORATORY:

Harold L. Benny & Associates, LLC.
18027 10th Place NE
Poulsbo, WA 98370
Phone :(360) 979-9250
Fax: -

PLEASE SEND DATA TO subdata@arilabs.com

Analysis	Due	Expires	Sub Laboratory ID	Comments
Sample ID: 20I0500-01 **Sampled: 09/27/20 12:06** **Matrix: Solid**				
Grainsize PSEP (Subc)	10/14/20	03/29/21 04:54		
Containers Supplied: **20I0500-01 B** Glass WM, Clear, 16 oz				
Sample ID: 20I0500-02 **Sampled: 09/27/20 10:49** **Matrix: Solid**				
Grainsize PSEP (Subc)	10/14/20	03/29/21 03:37		
Containers Supplied: **20I0500-02 B** Glass WM, Clear, 16 oz				
Sample ID: 20I0500-03 **Sampled: 09/27/20 14:45** **Matrix: Solid**				
Grainsize PSEP (Subc)	10/14/20	03/29/21 07:33		
Containers Supplied: **20I0500-03 B** Glass WM, Clear, 16 oz				
Sample ID: 20I0500-04 **Sampled: 09/26/20 16:05** **Matrix: Solid**				
Grainsize PSEP (Subc)	10/14/20	03/28/21 08:53		
Containers Supplied: **20I0500-04 B** Glass WM, Clear, 16 oz				

Run one sample in Triplicate, EDD and full package. Thanks!

Jacob Walter 10/01/2020 1440 — Released By — Date

H Benny 10/3/2020 7:30 AM — Received By — Date

Released By — Date — Received By — Date

Printed: 9/30/2020 3:46:43PM

Analytical Resources, Incorporated
Analytical Chemists and Consultants

SUBCONTRACT ORDER
To: Harold L. Benny & Associates, LLC.
ARI Work Order:20I0500

Analysis	Due	Expires	Sub Laboratory ID	Comments
Sample ID: 20I0500-05				
Sampled: 09/26/20 09:48 Matrix: Solid				
Grainsize PSEP (Subc)	10/14/20	03/28/21 02:36		
Containers Supplied:				
20I0500-05 B Glass WM, Clear, 16 oz				
Sample ID: 20I0500-06				
Sampled: 09/26/20 12:02 Matrix: Solid				
Grainsize PSEP (Subc)	10/14/20	03/28/21 04:50		
Containers Supplied:				
20I0500-06 B Glass WM, Clear, 16 oz				
Sample ID: 20I0500-07				**MS/MSD**
Sampled: 09/29/20 09:21 Matrix: Solid				
Grainsize PSEP (Subc)	10/14/20	03/31/21 02:09		
Containers Supplied:				
20I0500-07 C Glass WM, Clear, 16 oz				
Sample ID: 20I0500-08				
Sampled: 09/29/20 11:00 Matrix: Solid				
Grainsize PSEP (Subc)	10/14/20	03/31/21 03:48		
Containers Supplied:				
20I0500-08 B Glass WM, Clear, 16 oz				
Sample ID: 20I0500-09				
Sampled: 09/29/20 09:25 Matrix: Solid				
Grainsize PSEP (Subc)	10/14/20	03/31/21 02:13		
Containers Supplied:				
20I0500-09 B Glass WM, Clear, 16 oz				

Jacob Hyatt 10/01/2020 1440
Released By Date

H Benny 10/3/2020 7:30 AM
Received By Date

Released By Date

Received By Date

Printed: 9/30/2020 3:46:43PM

Harold L Benny & Associates, LLC

Project: 20I0500 **Client:** ARJ
HLB Project #: 20-115
Date Started: 10-8-20 **Date Complete:**
Sample ID: 20I0500-01A **Tested by:** HB

Sample Description: Brown Sand

Calgon Batch: **Temperature:**

Solids Content

Moisture Content	Tare No.	207
	Tare Wt	1.5746
	Wet Wt + Tare	57.4196
	Dry Wt + Tare	43.1789
Test Sample	Tare No.	207
	Tare Wt	50.1651
	Wet Wt + Tare	121.1041
	Dry Wt + Tare	102.4004
	Cylinder #	C-54

Sieve Analysis

Tare Weight	50.1690
4	—
10	51.1396
18	56.0674
35	72.2799
60	88.8501
120	98.4757
230	101.6797
Pan	0.5321

Pipette Analysis

Time Sticker	Tare #	Tare Weight	Dry Weight
	1		
	2		
	3		
	4		
	5		
	6		
	7		

Notes:

Harold L Benny & Associates, LLC

Project: 20I0500 **Client:** ARI
HLB Project #: 20-115
Date Started: 10-8-2020 **Date Complete:**
Sample ID: 20I0500-01B **Tested by:** HB

Sample Description: Brown Sand

Calgon Batch: **Temperature:**

Solids Content

Moisture Content	Tare No.	232
	Tare Wt	1.5733
	Wet Wt + Tare	53.4393
	Dry Wt + Tare	40.0674
Test Sample	Tare No.	232
	Tare Wt	51.7359
	Wet Wt + Tare	122.2764
	Dry Wt + Tare	103.1451
	Cylinder #	C-53

Sieve Analysis

Tare Weight	51.7383
4	—
10	57.4235
18	59.4706
35	73.9773
60	90.0789
120	99.5512
230	102.7045
Pan	0.4328

Pipette Analysis

Time Sticker	Tare #	Tare Weight	Dry Weight
	1		
	2		
	3		
	4		
	5		
	6		
	7		

Notes:

Harold L Benny & Associates, LLC

Project: 20I0500 **Client:** ARI
HLB Project #: 20-115
Date Started: 10-8-2020 **Date Complete:**
Sample ID: 20I0500-01C **Tested by:** HB

Sample Description: Brown sand

Calgon Batch: **Temperature:**

Solids Content

Moisture Content	Tare No.	Z46
	Tare Wt	1.5891
	Wet Wt + Tare	50.6403
	Dry Wt + Tare	48.1173
Test Sample	Tare No.	246
	Tare Wt	51.7945
	Wet Wt + Tare	127.5715
	Dry Wt + Tare	107.2800
	Cylinder #	C-75

Sieve Analysis

Tare Weight	517996
4	—
10	53.0434
18	58.4550
35	75.5994
60	93.2025
120	103.2679
230	106.8179
Pan	0.5414

Pipette Analysis

Time Sticker	Tare #	Tare Weight	Dry Weight
	1		
	2		
	3		
	4		
	5		
	6		
	7		

Notes:

Harold L Benny & Associates, LLC

Project: 20I0500 **Client:** ARI
HLB Project #: 20-115
Date Started: 10-8-2020 **Date Complete:**
Sample ID: 20I0500-02 **Tested by:** HB

Sample Description: Brown Sand

Calgon Batch: **Temperature:**

Solids Content

Moisture Content	Tare No.	224
	Tare Wt	1.5873
	Wet Wt + Tare	56.6338
	Dry Wt + Tare	44.6693
Test Sample	Tare No.	224
	Tare Wt	52.0232
	Wet Wt + Tare	140.1575
	Dry Wt + Tare	120.4665
	Cylinder #	C-72

Sieve Analysis

Tare Weight	52.0225
#5	55.3693
10	63.4037
18	79.0560
35	101.1005
60	116.4986
120	119.9560
230	120.3893
Pan	0.1228

5/16 = 52.0503

Pipette Analysis

Time Sticker	Tare #	Tare Weight	Dry Weight
	1		
	2		
	3		
	4		
	5		
	6		
	7		

Notes:

Harold L Benny & Associates, LLC

Project: 20I0500 **Client:** ARI
HLB Project #: 20-115
Date Started: 10-8-2020 **Date Complete:**
Sample ID: 20I0500-03 **Tested by:** HB

Sample Description: Brown Sand and Gravel

Calgon Batch: **Temperature:**

Solids Content

Moisture Content	Tare No.	234
	Tare Wt	1.5769
	Wet Wt + Tare	69.8947
	Dry Wt + Tare	59.1726
Test Sample	Tare No.	234
	Tare Wt	51.5741
	Wet Wt + Tare	166.1306
	Dry Wt + Tare	147.5323
	Cylinder #	C-8

Sieve Analysis

Tare Weight	51.5764
#5	75.0250
10	94.0285
18	116.4148
35	132.4968
60	143.7433
120	146.8458
230	147.3129
Pan	0.1844

5/16 = 60.4361

Pipette Analysis

Time Sticker	Tare #	Tare Weight	Dry Weight
	1		
	2		
	3		
	4		
	5		
	6		
	7		

Notes:

Harold L Benny & Associates, LLC

Project: 20I0500 **Client:** ARI
HLB Project #: 20-115
Date Started: 10-8-2020 **Date Complete:**
Sample ID: 20I 0500-04 **Tested by:** HB

Sample Description: Brown Sand and Gravel

Calgon Batch: **Temperature:**

Solids Content

Moisture Content	Tare No.	252
	Tare Wt	1.5609
	Wet Wt + Tare	75.8060
	Dry Wt + Tare	66.0151
Test Sample	Tare No.	252
	Tare Wt	52.1925
	Wet Wt + Tare	151.2974
	Dry Wt + Tare	136.5113
	Cylinder #	C-16

Sieve Analysis

Tare Weight	52.1913
#5	91.5340
10	107.7279
18	122.0917
35	129.9275
60	135.0651
120	136.1026
230	136.3187
Pan	0.1175

$5/_8$ = 56.4964
$5/_{16}$ = 68.5375

Pipette Analysis

Time Sticker	Tare #	Tare Weight	Dry Weight
	1		
	2		
	3		
	4		
	5		
	6		
	7		

Notes:

Harold L Benny & Associates, LLC

Project: 20I0500 **Client:** ARI
HLB Project #: 20-15
Date Started: 10-8-2020 **Date Complete:**
Sample ID: 20I0500-05 **Tested by:** HB

Sample Description: Brown Sand and Gravel

Calgon Batch: **Temperature:**

Solids Content

Moisture Content	Tare No.	240
	Tare Wt	1.5666
	Wet Wt + Tare	73.3414
	Dry Wt + Tare	65.9971
Test Sample	Tare No.	240
	Tare Wt	52.0210
	Wet Wt + Tare	177.1107
	Dry Wt + Tare	164.6456
	Cylinder #	C-33

Sieve Analysis

Tare Weight	52.0219
#5	132.4732
10	140.9604
18	153.3265
35	158.5556
60	162.4813
120	163.8873
230	164.3326
Pan	0.1521

5/8 = 93.9742
5/16 = 15.5578

Pipette Analysis

Time Sticker	Tare #	Tare Weight	Dry Weight
	1		
	2		
	3		
	4		
	5		
	6		
	7		

Notes:

Harold L Benny & Associates, LLC

Project: 20I0500 **Client:** ARI
HLB Project #: 20-115
Date Started: 10-8-2020 **Date Complete:**
Sample ID: 20I0500-06 **Tested by:** HB

Sample Description: Brown Sand

Calgon Batch: **Temperature:**

Solids Content

Moisture Content	Tare No.	222
	Tare Wt	1.5737
	Wet Wt + Tare	76.0642
	Dry Wt + Tare	64.7790
Test Sample	Tare No.	222
	Tare Wt	51.5409
	Wet Wt + Tare	177.2655
	Dry Wt + Tare	154.8172
	Cylinder #	C-4

Sieve Analysis

Tare Weight	51.5479
#5	89.6063
10	97.1676
18	113.2317
35	132.9359
60	148.4150
120	152.9614
230	154.1557
Pan	0.5274

5/8 = 70.4329
5/16 = 79.2575

Pipette Analysis

Time Sticker	Tare #	Tare Weight	Dry Weight
	1		
	2		
	3		
	4		
	5		
	6		
	7		

Notes:

Harold L Benny & Associates, LLC

Project: 20I0500 **Client:** ARI
HLB Project #: 20-115
Date Started: 10-8-2020 **Date Complete:**
Sample ID: 20I0500-07 **Tested by:** HB

Sample Description: Brown Sand

Calgon Batch: **Temperature:**

Solids Content

Moisture Content	Tare No.	205
	Tare Wt	1.5815
	Wet Wt + Tare	67.0754
	Dry Wt + Tare	56.4173
Test Sample	Tare No.	205
	Tare Wt	50.0223
	Wet Wt + Tare	162.9951
	Dry Wt + Tare	138.6780
	Cylinder #	C-55

Sieve Analysis

Tare Weight	50.0184	58.4690
#5	~~58.3040~~	5/16 = ~~65.7473~~ 63.2200
10	~~76.2922~~	71.0808
18	~~84.4898~~	77.5914
35	~~96.6282~~	98.2051
60	~~109.0242~~	123.3883
120	~~117.6152~~	133.8761
230	~~120.1450~~	137.9052
Pan	~~0.42 41~~	0.6791

HB

Pipette Analysis

Time Sticker	Tare #	Tare Weight	Dry Weight
	1		
	2		
	3		
	4		
	5		
	6		
	7		

Notes:

Harold L Benny & Associates, LLC

Project: 20I0500 **Client:** ARI
HLB Project #: 20-115
Date Started: 10-8-2020 **Date Complete:**
Sample ID: 20I0500-08 **Tested by:** HB

Sample Description: Brown Sand and Gravel

Calgon Batch: **Temperature:**

Solids Content

Moisture Content	Tare No.	236
	Tare Wt	1.5673
	Wet Wt + Tare	76.7732
	Dry Wt + Tare	65.7895
Test Sample	Tare No.	236
	Tare Wt	50.7882
	Wet Wt + Tare	177.8155
	Dry Wt + Tare	156.7881
	Cylinder #	C-27

Sieve Analysis

Tare Weight	50.7860
#5	103.9274
10	111.9106
18	120.1082
35	132.2466
60	144.6426
120	153.2336
230	156.3634
Pan	0.4241

5/8 = 83.1678
5/16 = 95.0524

Pipette Analysis

Time Sticker	Tare #	Tare Weight	Dry Weight
	1		
	2		
	3		
	4		
	5		
	6		
	7		

Notes:

Harold L Benny & Associates, LLC

Project: 20I 0500 **Client:** ARI
HLB Project #: 20-115
Date Started: 10-8-2020 **Date Complete:**
Sample ID: 20I-0500-09 **Tested by:** HB
Sample Description: Brown Sand and Gravel

Calgon Batch: **Temperature:**

Solids Content

Moisture Content	Tare No.	204
	Tare Wt	1.5774
	Wet Wt + Tare	59.9548
	Dry Wt + Tare	45.7176
Test Sample	Tare No.	204
	Tare Wt	51.3128
	Wet Wt + Tare	169.1007
	Dry Wt + Tare	138.7128
	Cylinder #	C-58

Sieve Analysis

5/16 = 58.4608

Tare Weight	51.3153
#5	63.2766
10	65.4559
18	71.4675
35	95.2284
60	121.7433
120	132.8130
230	137.2393
Pan	138.10

Pipette Analysis

Time Sticker	Tare #	Tare Weight	Dry Weight
	1		
	2		
	3		
	4		
	5		
	6		
	7		

Notes:

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	09-Nov-2020 14:20

LB-1-SS-092720

20I0500-01 (Solid)

Metals and Metallic Compounds

Method: EPA 6020A — Sampled: 09/27/2020 12:06

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/22/2020 19:11

Sample Preparation: Preparation Method: SWN EPA 3050B — Extract ID: 20I0500-01 A 02

Preparation Batch: BIJ0454 — Sample Size: 5.188 g (wet) — Dry Weight:3.50 g

Prepared: 10/16/2020 — Final Volume: 150 mL — % Solids: 67.45

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Silver	7440-22-4	10	0.007	0.09	0.02	mg/kg	J, D

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	09-Nov-2020 14:20

LB-1-SS-092720

20I0500-01 (Solid)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/27/2020 12:06

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/17/2020 01:42

Sample Preparation: Preparation Method: SWN EPA 3050B — Extract ID: 20I0500-01 A 02

Preparation Batch: BIJ0454 — Sample Size: 5.188 g (wet) — Dry Weight:3.50 g

Prepared: 10/16/2020 — Final Volume: 150 mL — % Solids: 67.45

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Cadmium	7440-43-9	5	0.006	0.02	0.31	mg/kg	D
Copper	7440-50-8	5	0.07	0.11	18.0	mg/kg	B, D
Zinc	7440-66-6	10	0.4	1.7	67.5	mg/kg	B, D

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	09-Nov-2020 14:20

LB-1-SS-092720

20I0500-01 (Solid)

Wet Chemistry

Method: EPA 9060A m — Sampled: 09/27/2020 12:06

Instrument: TOC Cube Analyst: KLE — Analyzed: 10/09/2020 17:58

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0500-01 A

Preparation Batch: BIJ0157 — Sample Size: 0.5856 g (wet) — Dry Weight:0.39 g

Prepared: 10/06/2020 — Final Volume: 0.5856 g — % Solids: 67.45

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Organic Carbon		1	0.02	0.02	0.96	%	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	09-Nov-2020 14:20

LB-1-SS-092720

20I0500-01 (Solid)

Wet Chemistry

Method: SM 2540 G-97 — Sampled: 09/27/2020 12:06

Instrument: BAL2 Analyst: KLE — Analyzed: 10/06/2020 13:28

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0500-01

Preparation Batch: BIJ0171 — Sample Size: 10 g (wet) — Dry Weight:6.74 g

Prepared: 10/06/2020 — Final Volume: 10 g — % Solids: 67.45

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Solids		1	0.04	0.04	67.45	%	

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	09-Nov-2020 14:20

LB-1-SS-092720

20I0500-01 (Solid)

Wet Chemistry

Method: SM 4500-S2 D-00 (AVS) — Sampled: 09/27/2020 12:06

Instrument: UV1800-2 Analyst: CDE — Analyzed: 10/05/2020 19:06

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0500-01 A

Preparation Batch: BIJ0117 — Sample Size: 5.188 g (wet) — Dry Weight:3.50 g

Prepared: 10/05/2020 — Final Volume: 100 g — % Solids: 67.45

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Sulfide	18496-25-8	1	0.05	0.05	0.06	umol/g-S	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	09-Nov-2020 14:20

LB-1-SS-092720

20I0500-01 (Solid)

Geotechnical Methods

Method: PSEP-PS — Sampled: 09/27/2020 12:06

Instrument: HLB& Analyst: — Analyzed: 11/03/2020 00:00

Analysis by: Harold L. Benny & Associates, LLC.

Sample Preparation: Preparation Method: No Prep Geo — Extract ID: 20I0500-01

Preparation Batch: B110320

Prepared: 11/03/2020 Final Volume:

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Phi Size <-1	GS_GRAVEL	1	0.1	ND	%	U
Phi Size -1 to 0	GS_VCS	1	0.1	1.8	%	
Phi Size 0 to 1	GS_CS	1	0.1	9.3	%	
Phi Size 1 to 2	GS_MS	1	0.1	30.7	%	
Phi Size 2 to 3	GS_FS	1	0.1	31.4	%	
Phi Size 3 to 4	GS_VFS	1	0.1	18.2	%	
Phi Size 4 to 5	GS_CSILT	1	0.1	ND	%	U
Phi Size 5 to 6	GS_MSILT	1	0.1	ND	%	U
Phi Size 6 to 7	GS_FSILT	1	0.1	ND	%	U
Phi Size 7 to 8	GS_VFSILT	1	0.1	ND	%	U
Phi Size 8 to 9	GS_CCLAY	1	0.1	ND	%	U
Phi Size 9 to 10	GS_MCLAY	1	0.1	ND	%	U
Phi Size >10	GS_FCLAY	1	0.1	ND	%	U
Total Fines	GS_TOTFINES	1	0.1	8.6	%	

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	09-Nov-2020 14:20

LB-2-SS-092720

20I0500-02 (Solid)

Metals and Metallic Compounds

Method: EPA 6020A — Sampled: 09/27/2020 10:49

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/22/2020 19:18

Sample Preparation: Preparation Method: SWN EPA 3050B — Extract ID: 20I0500-02 A 02

Preparation Batch: BIJ0454 — Sample Size: 5.192 g (wet) — Dry Weight:3.81 g

Prepared: 10/16/2020 — Final Volume: 150 mL — % Solids: 73.46

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Silver	7440-22-4	10	0.007	0.08	0.01	mg/kg	J, D

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	09-Nov-2020 14:20

LB-2-SS-092720

20I0500-02 (Solid)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/27/2020 10:49

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/17/2020 01:47

Sample Preparation: Preparation Method: SWN EPA 3050B — Extract ID: 20I0500-02 A 02

Preparation Batch: BIJ0454 — Sample Size: 5.192 g (wet) — Dry Weight:3.81 g

Prepared: 10/16/2020 — Final Volume: 150 mL — % Solids: 73.46

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Cadmium	7440-43-9	5	0.006	0.02	0.21	mg/kg	D
Copper	7440-50-8	5	0.07	0.10	8.08	mg/kg	B, D
Zinc	7440-66-6	5	0.2	0.8	42.7	mg/kg	B, D

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	09-Nov-2020 14:20

LB-2-SS-092720

20I0500-02 (Solid)

Wet Chemistry

Method: SM 2540 G-97 — Sampled: 09/27/2020 10:49

Instrument: BAL2 Analyst: KLE — Analyzed: 10/06/2020 13:28

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0500-02

Preparation Batch: BIJ0171 — Sample Size: 10 g (wet) — Dry Weight:7.35 g

Prepared: 10/06/2020 — Final Volume: 10 g — % Solids: 73.46

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Solids		1	0.04	0.04	73.46	%	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	09-Nov-2020 14:20

LB-2-SS-092720

20I0500-02 (Solid)

Wet Chemistry

Method: SM 4500-S2 D-00 (AVS) — Sampled: 09/27/2020 10:49

Instrument: UV1800-2 Analyst: CDE — Analyzed: 10/05/2020 19:07

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0500-02 A

Preparation Batch: BIJ0117 — Sample Size: 5.192 g (wet) — Dry Weight:3.81 g

Prepared: 10/05/2020 — Final Volume: 100 g — % Solids: 73.46

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Sulfide	18496-25-8	1	0.04	0.04	ND	umol/g-S	U

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	09-Nov-2020 14:20

LB-2-SS-092720

20I0500-02 (Solid)

Geotechnical Methods

Method: PSEP-PS — Sampled: 09/27/2020 10:49

Instrument: HLB& Analyst: — Analyzed: 11/03/2020 00:00

Analysis by: Harold L. Benny & Associates, LLC.

Sample Preparation: Preparation Method: No Prep Geo — Extract ID: 20I0500-02

Preparation Batch: B110320

Prepared: 11/03/2020 Final Volume:

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Phi Size <-1	GS_GRAVEL	1	0.1	16.5	%	
Phi Size -1 to 0	GS_VCS	1	0.1	22.7	%	
Phi Size 0 to 1	GS_CS	1	0.1	32.0	%	
Phi Size 1 to 2	GS_MS	1	0.1	22.3	%	
Phi Size 2 to 3	GS_FS	1	0.1	5.0	%	
Phi Size 3 to 4	GS_VFS	1	0.1	0.6	%	
Phi Size 4 to 5	GS_CSILT	1	0.1	ND	%	U
Phi Size 5 to 6	GS_MSILT	1	0.1	ND	%	U
Phi Size 6 to 7	GS_FSILT	1	0.1	ND	%	U
Phi Size 7 to 8	GS_VFSILT	1	0.1	ND	%	U
Phi Size 8 to 9	GS_CCLAY	1	0.1	ND	%	U
Phi Size 9 to 10	GS_MCLAY	1	0.1	ND	%	U
Phi Size >10	GS_FCLAY	1	0.1	ND	%	U
Total Fines	GS_TOTFINES	1	0.1	0.9	%	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	09-Nov-2020 14:20

LB-2-SS-092720

20I0500-02RE1 (Solid)

Wet Chemistry

Method: EPA 9060A m — Sampled: 09/27/2020 10:49

Instrument: TOC Cube Analyst: KLE — Analyzed: 10/14/2020 10:17

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0500-02RE1 A

Preparation Batch: BIJ0157 — Sample Size: 0.5905 g (wet) — Dry Weight:0.43 g

Prepared: 10/06/2020 — Final Volume: 0.5905 g — % Solids: 73.46

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Organic Carbon		1	0.02	0.02	0.07	%	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	09-Nov-2020 14:20

RC-10-SS-092720

20I0500-03 (Solid)

Metals and Metallic Compounds

Method: EPA 6020A — Sampled: 09/27/2020 14:45

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/26/2020 14:11

Sample Preparation: Preparation Method: SWN EPA 3050B — Extract ID: 20I0500-03 A 02

Preparation Batch: BIJ0454 — Sample Size: 5.028 g (wet) — Dry Weight:3.74 g

Prepared: 10/16/2020 — Final Volume: 150 mL — % Solids: 74.39

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Silver	7440-22-4	10	0.007	0.08	0.04	mg/kg	J, D

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	09-Nov-2020 14:20

RC-10-SS-092720

20I0500-03 (Solid)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/27/2020 14:45

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/17/2020 01:53

Sample Preparation: Preparation Method: SWN EPA 3050B — Extract ID: 20I0500-03 A 02

Preparation Batch: BIJ0454 — Sample Size: 5.028 g (wet) — Dry Weight:3.74 g

Prepared: 10/16/2020 — Final Volume: 150 mL — % Solids: 74.39

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Cadmium	7440-43-9	5	0.006	0.02	0.34	mg/kg	D
Copper	7440-50-8	5	0.07	0.10	18.6	mg/kg	B, D
Zinc	7440-66-6	5	0.2	0.8	45.0	mg/kg	B, D

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	09-Nov-2020 14:20

RC-10-SS-092720

20I0500-03 (Solid)

Wet Chemistry

Method: SM 2540 G-97 — Sampled: 09/27/2020 14:45

Instrument: BAL2 Analyst: KLE — Analyzed: 10/06/2020 13:28

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0500-03

Preparation Batch: BIJ0171 — Sample Size: 10 g (wet) — Dry Weight:7.44 g

Prepared: 10/06/2020 — Final Volume: 10 g — % Solids: 74.39

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Solids		1	0.04	0.04	74.39	%	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	09-Nov-2020 14:20

RC-10-SS-092720

20I0500-03 (Solid)

Wet Chemistry

Method: SM 4500-S2 D-00 (AVS) — Sampled: 09/27/2020 14:45

Instrument: UV1800-2 Analyst: CDE — Analyzed: 10/05/2020 19:07

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0500-03 A

Preparation Batch: BIJ0117 — Sample Size: 5.028 g (wet) — Dry Weight:3.74 g

Prepared: 10/05/2020 — Final Volume: 100 g — % Solids: 74.39

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Sulfide	18496-25-8	1	0.04	0.04	ND	umol/g-S	U

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	09-Nov-2020 14:20

RC-10-SS-092720

20I0500-03 (Solid)

Geotechnical Methods

Method: PSEP-PS — Sampled: 09/27/2020 14:45

Instrument: HLB& Analyst: — Analyzed: 11/03/2020 00:00

Analysis by: Harold L. Benny & Associates, LLC.

Sample Preparation: Preparation Method: No Prep Geo — Extract ID: 20I0500-03

Preparation Batch: B110320

Prepared: 11/03/2020 Final Volume:

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Phi Size <-1	GS_GRAVEL	1	0.1	43.7	%	
Phi Size -1 to 0	GS_VCS	1	0.1	23.1	%	
Phi Size 0 to 1	GS_CS	1	0.1	16.6	%	
Phi Size 1 to 2	GS_MS	1	0.1	11.6	%	
Phi Size 2 to 3	GS_FS	1	0.1	3.2	%	
Phi Size 3 to 4	GS_VFS	1	0.1	0.5	%	
Phi Size 4 to 5	GS_CSILT	1	0.1	ND	%	U
Phi Size 5 to 6	GS_MSILT	1	0.1	ND	%	U
Phi Size 6 to 7	GS_FSILT	1	0.1	ND	%	U
Phi Size 7 to 8	GS_VFSILT	1	0.1	ND	%	U
Phi Size 8 to 9	GS_CCLAY	1	0.1	ND	%	U
Phi Size 9 to 10	GS_MCLAY	1	0.1	ND	%	U
Phi Size >10	GS_FCLAY	1	0.1	ND	%	U
Total Fines	GS_TOTFINES	1	0.1	1.4	%	

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	09-Nov-2020 14:20

RC-10-SS-092720

20I0500-03RE1 (Solid)

Wet Chemistry

Method: EPA 9060A m — Sampled: 09/27/2020 14:45

Instrument: TOC Cube Analyst: KLE — Analyzed: 10/14/2020 10:48

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0500-03RE1 A

Preparation Batch: BIJ0157 — Sample Size: 0.5924 g (wet) — Dry Weight:0.44 g

Prepared: 10/06/2020 — Final Volume: 0.5924 g — % Solids: 74.39

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Organic Carbon		1	0.02	0.02	0.18	%	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	09-Nov-2020 14:20

RC-5A-SS-092620

20I0500-04 (Solid)

Metals and Metallic Compounds

Method: EPA 6020A — Sampled: 09/26/2020 16:05

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/26/2020 14:54

Sample Preparation: Preparation Method: SWN EPA 3050B — Extract ID: 20I0500-04 A 02

Preparation Batch: BIJ0454 — Sample Size: 5.414 g (wet) — Dry Weight:4.76 g

Prepared: 10/16/2020 — Final Volume: 150 mL — % Solids: 87.83

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Silver	7440-22-4	10	0.005	0.06	0.02	mg/kg	J, D

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	09-Nov-2020 14:20

RC-5A-SS-092620

20I0500-04 (Solid)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/26/2020 16:05
Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/17/2020 02:07

Sample Preparation: Preparation Method: SWN EPA 3050B — Extract ID: 20I0500-04 A 02
Preparation Batch: BIJ0454 — Sample Size: 5.414 g (wet) — Dry Weight:4.76 g
Prepared: 10/16/2020 — Final Volume: 150 mL — % Solids: 87.83

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Cadmium	7440-43-9	5	0.005	0.02	0.25	mg/kg	D
Copper	7440-50-8	5	0.05	0.08	17.5	mg/kg	B, D
Zinc	7440-66-6	5	0.1	0.6	30.1	mg/kg	B, D

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	09-Nov-2020 14:20

RC-5A-SS-092620

20I0500-04 (Solid)

Wet Chemistry

Method: SM 2540 G-97 — Sampled: 09/26/2020 16:05

Instrument: BAL2 Analyst: KLE — Analyzed: 10/06/2020 13:28

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0500-04

Preparation Batch: BIJ0171 — Sample Size: 10 g (wet) — Dry Weight:8.78 g

Prepared: 10/06/2020 — Final Volume: 10 g — % Solids: 87.83

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Solids		1	0.04	0.04	87.83	%	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	09-Nov-2020 14:20

RC-5A-SS-092620

20I0500-04 (Solid)

Wet Chemistry

Method: SM 4500-S2 D-00 (AVS) — Sampled: 09/26/2020 16:05

Instrument: UV1800-2 Analyst: CDE — Analyzed: 10/05/2020 19:07

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0500-04 A

Preparation Batch: BIJ0117 — Sample Size: 5.414 g (wet) — Dry Weight:4.76 g

Prepared: 10/05/2020 — Final Volume: 100 g — % Solids: 87.83

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Sulfide	18496-25-8	1	0.03	0.03	ND	umol/g-S	U

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	09-Nov-2020 14:20

RC-5A-SS-092620

20I0500-04 (Solid)

Geotechnical Methods

Method: PSEP-PS — Sampled: 09/26/2020 16:05

Instrument: HLB& Analyst: — Analyzed: 11/03/2020 00:00

Analysis by: Harold L. Benny & Associates, LLC.

Sample Preparation: Preparation Method: No Prep Geo — Extract ID: 20I0500-04

Preparation Batch: B110320

Prepared: 11/03/2020 Final Volume:

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Phi Size <-1	GS_GRAVEL	1	0.1	64.6	%	
Phi Size -1 to 0	GS_VCS	1	0.1	16.7	%	
Phi Size 0 to 1	GS_CS	1	0.1	9.1	%	
Phi Size 1 to 2	GS_MS	1	0.1	6.0	%	
Phi Size 2 to 3	GS_FS	1	0.1	1.2	%	
Phi Size 3 to 4	GS_VFS	1	0.1	0.3	%	
Phi Size 4 to 5	GS_CSILT	1	0.1	ND	%	U
Phi Size 5 to 6	GS_MSILT	1	0.1	ND	%	U
Phi Size 6 to 7	GS_FSILT	1	0.1	ND	%	U
Phi Size 7 to 8	GS_VFSILT	1	0.1	ND	%	U
Phi Size 8 to 9	GS_CCLAY	1	0.1	ND	%	U
Phi Size 9 to 10	GS_MCLAY	1	0.1	ND	%	U
Phi Size >10	GS_FCLAY	1	0.1	ND	%	U
Total Fines	GS_TOTFINES	1	0.1	2.2	%	

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	09-Nov-2020 14:20

RC-5A-SS-092620

20I0500-04RE1 (Solid)

Wet Chemistry

Method: EPA 9060A m — Sampled: 09/26/2020 16:05

Instrument: TOC Cube Analyst: KLE — Analyzed: 10/14/2020 11:19

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0500-04RE1 A

Preparation Batch: BIJ0157 — Sample Size: 0.533 g (wet) — Dry Weight:0.47 g

Prepared: 10/06/2020 — Final Volume: 0.533 g — % Solids: 87.83

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Organic Carbon		1	0.02	0.02	0.11	%	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	09-Nov-2020 14:20

RC-4-SS-092620

20I0500-05 (Solid)

Metals and Metallic Compounds

Method: EPA 6020A — Sampled: 09/26/2020 09:48

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/26/2020 14:25

Sample Preparation: Preparation Method: SWN EPA 3050B — Extract ID: 20I0500-05 A 02

Preparation Batch: BIJ0454 — Sample Size: 5.022 g (wet) — Dry Weight:4.19 g

Prepared: 10/16/2020 — Final Volume: 150 mL — % Solids: 83.35

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Silver	7440-22-4	10	0.006	0.07	0.03	mg/kg	J, D

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	09-Nov-2020 14:20

RC-4-SS-092620

20I0500-05 (Solid)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/26/2020 09:48

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/17/2020 02:11

Sample Preparation: Preparation Method: SWN EPA 3050B — Extract ID: 20I0500-05 A 02

Preparation Batch: BIJ0454 — Sample Size: 5.022 g (wet) — Dry Weight:4.19 g

Prepared: 10/16/2020 — Final Volume: 150 mL — % Solids: 83.35

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Cadmium	7440-43-9	5	0.005	0.02	0.31	mg/kg	D
Copper	7440-50-8	20	0.25	0.36	52.7	mg/kg	B
Zinc	7440-66-6	5	0.1	0.7	41.1	mg/kg	B, D

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	09-Nov-2020 14:20

RC-4-SS-092620

20I0500-05 (Solid)

Wet Chemistry

Method: SM 2540 G-97 — Sampled: 09/26/2020 09:48

Instrument: BAL2 Analyst: KLE — Analyzed: 10/06/2020 13:28

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0500-05

Preparation Batch: BIJ0171 — Sample Size: 10 g (wet) — Dry Weight:8.33 g

Prepared: 10/06/2020 — Final Volume: 10 g — % Solids: 83.35

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Solids		1	0.04	0.04	83.35	%	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	09-Nov-2020 14:20

RC-4-SS-092620

20I0500-05 (Solid)

Wet Chemistry

Method: SM 4500-S2 D-00 (AVS) — Sampled: 09/26/2020 09:48

Instrument: UV1800-2 Analyst: CDE — Analyzed: 10/05/2020 19:08

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0500-05 A

Preparation Batch: BIJ0117 — Sample Size: 5.022 g (wet) — Dry Weight:4.19 g

Prepared: 10/05/2020 — Final Volume: 100 g — % Solids: 83.35

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Sulfide	18496-25-8	1	0.04	0.04	ND	umol/g-S	U

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	09-Nov-2020 14:20

RC-4-SS-092620

20I0500-05 (Solid)

Geotechnical Methods

Method: PSEP-PS — Sampled: 09/26/2020 09:48

Instrument: HLB& Analyst: — Analyzed: 11/03/2020 00:00

Analysis by: Harold L. Benny & Associates, LLC.

Sample Preparation: Preparation Method: No Prep Geo — Extract ID: 20I0500-05

Preparation Batch: B110320

Prepared: 11/03/2020 Final Volume:

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Phi Size <-1	GS_GRAVEL	1	0.1	79.1	%	
Phi Size -1 to 0	GS_VCS	1	0.1	11.1	%	
Phi Size 0 to 1	GS_CS	1	0.1	4.7	%	
Phi Size 1 to 2	GS_MS	1	0.1	3.5	%	
Phi Size 2 to 3	GS_FS	1	0.1	1.3	%	
Phi Size 3 to 4	GS_VFS	1	0.1	0.4	%	
Phi Size 4 to 5	GS_CSILT	1	0.1	ND	%	U
Phi Size 5 to 6	GS_MSILT	1	0.1	ND	%	U
Phi Size 6 to 7	GS_FSILT	1	0.1	ND	%	U
Phi Size 7 to 8	GS_VFSILT	1	0.1	ND	%	U
Phi Size 8 to 9	GS_CCLAY	1	0.1	ND	%	U
Phi Size 9 to 10	GS_MCLAY	1	0.1	ND	%	U
Phi Size >10	GS_FCLAY	1	0.1	ND	%	U
Total Fines	GS_TOTFINES	1	0.1	ND	%	U

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	09-Nov-2020 14:20

RC-4-SS-092620

20I0500-05RE1 (Solid)

Wet Chemistry

Method: EPA 9060A m — Sampled: 09/26/2020 09:48

Instrument: TOC Cube Analyst: KLE — Analyzed: 10/14/2020 11:50

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0500-05RE1 A

Preparation Batch: BIJ0157 — Sample Size: 0.5344 g (wet) — Dry Weight:0.45 g

Prepared: 10/06/2020 — Final Volume: 0.5344 g — % Solids: 83.35

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Organic Carbon		1	0.02	0.02	0.07	%	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	09-Nov-2020 14:20

RC-1-SS-092620

20I0500-06 (Solid)

Metals and Metallic Compounds

Method: EPA 6020A — Sampled: 09/26/2020 12:02

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/26/2020 14:34

Sample Preparation: Preparation Method: SWN EPA 3050B — Extract ID: 20I0500-06 A 02

Preparation Batch: BIJ0454 — Sample Size: 5.053 g (wet) — Dry Weight:3.63 g

Prepared: 10/16/2020 — Final Volume: 150 mL — % Solids: 71.88

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Silver	7440-22-4	10	0.007	0.08	0.02	mg/kg	J, D

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	09-Nov-2020 14:20

RC-1-SS-092620

20I0500-06 (Solid)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/26/2020 12:02

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/17/2020 02:17

Sample Preparation: Preparation Method: SWN EPA 3050B — Extract ID: 20I0500-06 A 02

Preparation Batch: BIJ0454 — Sample Size: 5.053 g (wet) — Dry Weight:3.63 g

Prepared: 10/16/2020 — Final Volume: 150 mL — % Solids: 71.88

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Cadmium	7440-43-9	5	0.006	0.02	0.13	mg/kg	D
Copper	7440-50-8	5	0.07	0.10	10.3	mg/kg	B, D
Zinc	7440-66-6	5	0.2	0.8	15.3	mg/kg	B, D

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	09-Nov-2020 14:20

RC-1-SS-092620

20I0500-06 (Solid)

Wet Chemistry

Method: SM 2540 G-97 — Sampled: 09/26/2020 12:02

Instrument: BAL2 Analyst: KLE — Analyzed: 10/06/2020 13:28

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0500-06

Preparation Batch: BIJ0171 — Sample Size: 10 g (wet) — Dry Weight:7.19 g

Prepared: 10/06/2020 — Final Volume: 10 g — % Solids: 71.88

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Solids		1	0.04	0.04	71.88	%	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	09-Nov-2020 14:20

RC-1-SS-092620

20I0500-06 (Solid)

Wet Chemistry

Method: SM 4500-S2 D-00 (AVS) — Sampled: 09/26/2020 12:02

Instrument: UV1800-2 Analyst: CDE — Analyzed: 10/05/2020 19:08

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0500-06 A

Preparation Batch: BIJ0117 — Sample Size: 5.053 g (wet) — Dry Weight:3.63 g

Prepared: 10/05/2020 — Final Volume: 100 g — % Solids: 71.88

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Sulfide	18496-25-8	1	0.04	0.04	ND	umol/g-S	U

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	09-Nov-2020 14:20

RC-1-SS-092620

20I0500-06 (Solid)

Geotechnical Methods

Method: PSEP-PS — Sampled: 09/26/2020 12:02

Instrument: HLB& Analyst: — Analyzed: 11/03/2020 00:00

Analysis by: Harold L. Benny & Associates, LLC.

Sample Preparation: Preparation Method: No Prep Geo — Extract ID: 20I0500-06

Preparation Batch: B110320

Prepared: 11/03/2020 Final Volume:

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Phi Size <-1	GS_GRAVEL	1	0.1	43.4	%	
Phi Size -1 to 0	GS_VCS	1	0.1	14.5	%	
Phi Size 0 to 1	GS_CS	1	0.1	18.5	%	
Phi Size 1 to 2	GS_MS	1	0.1	14.5	%	
Phi Size 2 to 3	GS_FS	1	0.1	4.3	%	
Phi Size 3 to 4	GS_VFS	1	0.1	1.1	%	
Phi Size 4 to 5	GS_CSILT	1	0.1	ND	%	U
Phi Size 5 to 6	GS_MSILT	1	0.1	ND	%	U
Phi Size 6 to 7	GS_FSILT	1	0.1	ND	%	U
Phi Size 7 to 8	GS_VFSILT	1	0.1	ND	%	U
Phi Size 8 to 9	GS_CCLAY	1	0.1	ND	%	U
Phi Size 9 to 10	GS_MCLAY	1	0.1	ND	%	U
Phi Size >10	GS_FCLAY	1	0.1	ND	%	U
Total Fines	GS_TOTFINES	1	0.1	3.7	%	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	09-Nov-2020 14:20

RC-1-SS-092620

20I0500-06RE1 (Solid)

Wet Chemistry

Method: EPA 9060A m — Sampled: 09/26/2020 12:02

Instrument: TOC Cube Analyst: KLE — Analyzed: 10/14/2020 12:21

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0500-06RE1 A

Preparation Batch: BIJ0157 — Sample Size: 0.5734 g (wet) — Dry Weight:0.41 g

Prepared: 10/06/2020 — Final Volume: 0.5734 g — % Solids: 71.88

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Organic Carbon		1	0.02	0.02	0.24	%	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	09-Nov-2020 14:20

RC-2(SG-7)-SS-092920

20I0500-07 (Solid)

Metals and Metallic Compounds

Method: EPA 6020A — Sampled: 09/29/2020 09:21

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/22/2020 19:34

Sample Preparation: Preparation Method: SWN EPA 3050B — Extract ID: 20I0500-07 A 02

Preparation Batch: BIJ0454 — Sample Size: 5.207 g (wet) — Dry Weight:3.91 g

Prepared: 10/16/2020 — Final Volume: 150 mL — % Solids: 75.17

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Silver	7440-22-4	10	0.007	0.08	0.03	mg/kg	J, D

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	09-Nov-2020 14:20

RC-2(SG-7)-SS-092920

20I0500-07 (Solid)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/29/2020 09:21
Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/17/2020 03:12

Sample Preparation: Preparation Method: SWN EPA 3050B — Extract ID: 20I0500-07 A 02
Preparation Batch: BIJ0454 — Sample Size: 5.207 g (wet) — Dry Weight:3.91 g
Prepared: 10/16/2020 — Final Volume: 150 mL — % Solids: 75.17

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Cadmium	7440-43-9	5	0.006	0.02	0.29	mg/kg	D
Copper	7440-50-8	5	0.07	0.10	24.0	mg/kg	B, D
Zinc	7440-66-6	10	0.4	1.5	45.6	mg/kg	B, D

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	09-Nov-2020 14:20

RC-2(SG-7)-SS-092920

20I0500-07 (Solid)

Wet Chemistry

Method: EPA 9060A m — Sampled: 09/29/2020 09:21

Instrument: TOC Cube Analyst: KLE — Analyzed: 10/10/2020 00:08

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0500-07 A

Preparation Batch: BIJ0157 — Sample Size: 0.5457 g (wet) — Dry Weight:0.41 g

Prepared: 10/06/2020 — Final Volume: 0.5457 g — % Solids: 75.17

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Organic Carbon		1	0.02	0.02	0.30	%	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	09-Nov-2020 14:20

RC-2(SG-7)-SS-092920

20I0500-07 (Solid)

Wet Chemistry

Method: SM 2540 G-97 — Sampled: 09/29/2020 09:21

Instrument: BAL2 Analyst: KLE — Analyzed: 10/06/2020 13:28

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0500-07

Preparation Batch: BIJ0171 — Sample Size: 10 g (wet) — Dry Weight:7.52 g

Prepared: 10/06/2020 — Final Volume: 10 g — % Solids: 75.17

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Solids		1	0.04	0.04	75.17	%	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	09-Nov-2020 14:20

RC-2(SG-7)-SS-092920

20I0500-07 (Solid)

Wet Chemistry

Method: SM 4500-S2 D-00 (AVS) — Sampled: 09/29/2020 09:21

Instrument: UV1800-2 Analyst: CDE — Analyzed: 10/05/2020 19:09

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0500-07 A

Preparation Batch: BIJ0117 — Sample Size: 5.207 g (wet) — Dry Weight:3.91 g

Prepared: 10/05/2020 — Final Volume: 100 g — % Solids: 75.17

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Sulfide	18496-25-8	1	0.04	0.04	ND	umol/g-S	U

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	09-Nov-2020 14:20

RC-2(SG-7)-SS-092920

20I0500-07 (Solid)

Geotechnical Methods

Method: PSEP-PS — Sampled: 09/29/2020 09:21

Instrument: HLB& Analyst: — Analyzed: 11/03/2020 00:00

Analysis by: Harold L. Benny & Associates, LLC.

Sample Preparation: Preparation Method: No Prep Geo — Extract ID: 20I0500-07

Preparation Batch: B110320

Prepared: 11/03/2020 Final Volume:

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Phi Size <-1	GS_GRAVEL	1	0.1	23.1	%	
Phi Size -1 to 0	GS_VCS	1	0.1	7.1	%	
Phi Size 0 to 1	GS_CS	1	0.1	22.6	%	
Phi Size 1 to 2	GS_MS	1	0.1	27.6	%	
Phi Size 2 to 3	GS_FS	1	0.1	11.5	%	
Phi Size 3 to 4	GS_VFS	1	0.1	4.4	%	
Phi Size 4 to 5	GS_CSILT	1	0.1	ND	%	U
Phi Size 5 to 6	GS_MSILT	1	0.1	ND	%	U
Phi Size 6 to 7	GS_FSILT	1	0.1	ND	%	U
Phi Size 7 to 8	GS_VFSILT	1	0.1	ND	%	U
Phi Size 8 to 9	GS_CCLAY	1	0.1	ND	%	U
Phi Size 9 to 10	GS_MCLAY	1	0.1	ND	%	U
Phi Size >10	GS_FCLAY	1	0.1	ND	%	U
Total Fines	GS_TOTFINES	1	0.1	3.6	%	

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	09-Nov-2020 14:20

RC-6-SS-092920

20I0500-08 (Solid)

Metals and Metallic Compounds

Method: EPA 6020A — Sampled: 09/29/2020 11:00

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/26/2020 14:40

Sample Preparation: Preparation Method: SWN EPA 3050B — Extract ID: 20I0500-08 A 02

Preparation Batch: BIJ0454 — Sample Size: 5.512 g (wet) — Dry Weight:3.98 g

Prepared: 10/16/2020 — Final Volume: 150 mL — % Solids: 72.26

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Silver	7440-22-4	10	0.006	0.08	0.03	mg/kg	J, D

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	09-Nov-2020 14:20

RC-6-SS-092920

20I0500-08 (Solid)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/29/2020 11:00

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/17/2020 02:58

Sample Preparation: Preparation Method: SWN EPA 3050B — Extract ID: 20I0500-08 A 02

Preparation Batch: BIJ0454 — Sample Size: 5.512 g (wet) — Dry Weight:3.98 g

Prepared: 10/16/2020 — Final Volume: 150 mL — % Solids: 72.26

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Cadmium	7440-43-9	5	0.006	0.02	0.22	mg/kg	D
Copper	7440-50-8	5	0.06	0.09	11.3	mg/kg	B, D
Zinc	7440-66-6	5	0.2	0.8	24.0	mg/kg	B, D

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	09-Nov-2020 14:20

RC-6-SS-092920

20I0500-08 (Solid)

Wet Chemistry

Method: EPA 9060A m — Sampled: 09/29/2020 11:00

Instrument: TOC Cube Analyst: KLE — Analyzed: 10/10/2020 00:39

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0500-08 A

Preparation Batch: BIJ0157 — Sample Size: 0.5263 g (wet) — Dry Weight:0.38 g

Prepared: 10/06/2020 — Final Volume: 0.5263 g — % Solids: 72.26

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Organic Carbon		1	0.02	0.02	0.52	%	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	09-Nov-2020 14:20

RC-6-SS-092920

20I0500-08 (Solid)

Wet Chemistry

Method: SM 2540 G-97 — Sampled: 09/29/2020 11:00

Instrument: BAL2 Analyst: KLE — Analyzed: 10/06/2020 13:28

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0500-08

Preparation Batch: BIJ0171 — Sample Size: 10 g (wet) — Dry Weight:7.23 g

Prepared: 10/06/2020 — Final Volume: 10 g — % Solids: 72.26

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Solids		1	0.04	0.04	72.26	%	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	09-Nov-2020 14:20

RC-6-SS-092920

20I0500-08 (Solid)

Wet Chemistry

Method: SM 4500-S2 D-00 (AVS) — Sampled: 09/29/2020 11:00

Instrument: UV1800-2 Analyst: CDE — Analyzed: 10/05/2020 19:11

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0500-08 A

Preparation Batch: BIJ0117 — Sample Size: 5.512 g (wet) — Dry Weight:3.98 g

Prepared: 10/05/2020 — Final Volume: 100 g — % Solids: 72.26

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Sulfide	18496-25-8	1	0.04	0.04	ND	umol/g-S	U

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	09-Nov-2020 14:20

RC-6-SS-092920

20I0500-08 (Solid)

Geotechnical Methods

Method: PSEP-PS — Sampled: 09/29/2020 11:00

Instrument: HLB& Analyst: — Analyzed: 11/03/2020 00:00

Analysis by: Harold L. Benny & Associates, LLC.

Sample Preparation: Preparation Method: No Prep Geo — Extract ID: 20I0500-08

Preparation Batch: B110320

Prepared: 11/03/2020 Final Volume:

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Phi Size <-1	GS_GRAVEL	1	0.1	56.2	%	
Phi Size -1 to 0	GS_VCS	1	0.1	7.5	%	
Phi Size 0 to 1	GS_CS	1	0.1	11.2	%	
Phi Size 1 to 2	GS_MS	1	0.1	11.4	%	
Phi Size 2 to 3	GS_FS	1	0.1	7.9	%	
Phi Size 3 to 4	GS_VFS	1	0.1	2.9	%	
Phi Size 4 to 5	GS_CSILT	1	0.1	ND	%	U
Phi Size 5 to 6	GS_MSILT	1	0.1	ND	%	U
Phi Size 6 to 7	GS_FSILT	1	0.1	ND	%	U
Phi Size 7 to 8	GS_VFSILT	1	0.1	ND	%	U
Phi Size 8 to 9	GS_CCLAY	1	0.1	ND	%	U
Phi Size 9 to 10	GS_MCLAY	1	0.1	ND	%	U
Phi Size >10	GS_FCLAY	1	0.1	ND	%	U
Total Fines	GS_TOTFINES	1	0.1	3.0	%	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	09-Nov-2020 14:20

RC-102(SG-107)-SS-092920

20I0500-09 (Solid)

Metals and Metallic Compounds

Method: EPA 6020A — Sampled: 09/29/2020 09:25

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/26/2020 14:47

Sample Preparation: Preparation Method: SWN EPA 3050B — Extract ID: 20I0500-09 A 02

Preparation Batch: BIJ0454 — Sample Size: 5.105 g (wet) — Dry Weight:3.62 g

Prepared: 10/16/2020 — Final Volume: 150 mL — % Solids: 70.91

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Silver	7440-22-4	10	0.007	0.08	0.04	mg/kg	J, D

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	09-Nov-2020 14:20

RC-102(SG-107)-SS-092920

20I0500-09 (Solid)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/29/2020 09:25

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/17/2020 02:52

Sample Preparation: Preparation Method: SWN EPA 3050B — Extract ID: 20I0500-09 A 02

Preparation Batch: BIJ0454 — Sample Size: 5.105 g (wet) — Dry Weight:3.62 g

Prepared: 10/16/2020 — Final Volume: 150 mL — % Solids: 70.91

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Cadmium	7440-43-9	5	0.006	0.02	0.30	mg/kg	D
Copper	7440-50-8	5	0.07	0.10	27.3	mg/kg	B, D
Zinc	7440-66-6	5	0.2	0.8	48.0	mg/kg	B, D

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	09-Nov-2020 14:20

RC-102(SG-107)-SS-092920

20I0500-09 (Solid)

Wet Chemistry

Method: EPA 9060A m — Sampled: 09/29/2020 09:25

Instrument: TOC Cube Analyst: KLE — Analyzed: 10/10/2020 01:09

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0500-09 A

Preparation Batch: BIJ0157 — Sample Size: 0.5682 g (wet) — Dry Weight:0.40 g

Prepared: 10/06/2020 — Final Volume: 0.5682 g — % Solids: 70.91

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Organic Carbon		1	0.02	0.02	0.30	%	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	09-Nov-2020 14:20

RC-102(SG-107)-SS-092920

20I0500-09 (Solid)

Wet Chemistry

Method: SM 2540 G-97 — Sampled: 09/29/2020 09:25

Instrument: BAL2 Analyst: KLE — Analyzed: 10/06/2020 13:28

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0500-09

Preparation Batch: BIJ0171 — Sample Size: 10 g (wet) — Dry Weight:7.09 g

Prepared: 10/06/2020 — Final Volume: 10 g — % Solids: 70.91

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Solids		1	0.04	0.04	70.91	%	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	09-Nov-2020 14:20

RC-102(SG-107)-SS-092920

20I0500-09 (Solid)

Wet Chemistry

Method: SM 4500-S2 D-00 (AVS) — Sampled: 09/29/2020 09:25

Instrument: UV1800-2 Analyst: CDE — Analyzed: 10/05/2020 19:12

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0500-09 A

Preparation Batch: BIJ0117 — Sample Size: 5.105 g (wet) — Dry Weight:3.62 g

Prepared: 10/05/2020 — Final Volume: 100 g — % Solids: 70.91

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Sulfide	18496-25-8	1	0.04	0.04	ND	umol/g-S	U

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	09-Nov-2020 14:20

RC-102(SG-107)-SS-092920

20I0500-09 (Solid)

Geotechnical Methods

Method: PSEP-PS — Sampled: 09/29/2020 09:25

Instrument: HLB& Analyst: — Analyzed: 11/03/2020 00:00

Analysis by: Harold L. Benny & Associates, LLC.

Sample Preparation: Preparation Method: No Prep Geo — Extract ID: 20I0500-09

Preparation Batch: B110320

Prepared: 11/03/2020 Final Volume:

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Phi Size <-1	GS_GRAVEL	1	0.1	15.8	%	
Phi Size -1 to 0	GS_VCS	1	0.1	6.7	%	
Phi Size 0 to 1	GS_CS	1	0.1	26.6	%	
Phi Size 1 to 2	GS_MS	1	0.1	29.7	%	
Phi Size 2 to 3	GS_FS	1	0.1	12.4	%	
Phi Size 3 to 4	GS_VFS	1	0.1	5.0	%	
Phi Size 4 to 5	GS_CSILT	1	0.1	ND	%	U
Phi Size 5 to 6	GS_MSILT	1	0.1	ND	%	U
Phi Size 6 to 7	GS_FSILT	1	0.1	ND	%	U
Phi Size 7 to 8	GS_VFSILT	1	0.1	ND	%	U
Phi Size 8 to 9	GS_CCLAY	1	0.1	ND	%	U
Phi Size 9 to 10	GS_MCLAY	1	0.1	ND	%	U
Phi Size >10	GS_FCLAY	1	0.1	ND	%	U
Total Fines	GS_TOTFINES	1	0.1	3.7	%	

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	09-Nov-2020 14:20

EB-SS-092920

20I0500-10 (Water)

Metals and Metallic Compounds

Method: EPA 6020A — Sampled: 09/29/2020 11:25

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/17/2020 16:04

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0500-10 A 01

Preparation Batch: BIJ0288 — Sample Size: 25 mL

Prepared: 10/08/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Aluminum	7429-90-5	1	2.37	20.0	18.1	ug/L	J
Barium	7440-39-3	1	0.0560	0.500	2.12	ug/L	
Chromium	7440-47-3	1	0.130	0.500	0.465	ug/L	J
Iron	7439-89-6	1	6.27	20.0	9.23	ug/L	J
Silver	7440-22-4	1	0.0170	0.200	ND	ug/L	U

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	09-Nov-2020 14:20

EB-SS-092920

20I0500-10 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/29/2020 11:25

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/12/2020 18:51

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0500-10 A 01

Preparation Batch: BIJ0288 — Sample Size: 25 mL

Prepared: 10/08/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Copper	7440-50-8	1	0.340	0.500	ND	ug/L	U
Zinc	7440-66-6	1	0.820	4.00	1.56	ug/L	J

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	09-Nov-2020 14:20

EB-SS-092920

20I0500-10RE1 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/29/2020 11:25

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/15/2020 23:23

Sample Preparation: Preparation Method: RHN EPA 600/4-79-020 4.1.4 HNO3 matrix 5x — Extract ID: 20I0500-10RE1 A 02

Preparation Batch: BIJ0436 — Sample Size: 100 mL

Prepared: 10/14/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Cadmium	7440-43-9	1	0.00600	0.0200	ND	ug/L	U

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	09-Nov-2020 14:20

Field-Blank-3-092920

20I0500-11 (Water)

Metals and Metallic Compounds

Method: EPA 6020A — Sampled: 09/29/2020 11:15
Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/17/2020 16:06

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0500-11 C 01
Preparation Batch: BIJ0288 — Sample Size: 25 mL
Prepared: 10/08/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Aluminum	7429-90-5	1	2.37	20.0	3.51	ug/L	J
Calcium	7440-70-2	1	1.91	50.0	ND	ug/L	U
Iron	7439-89-6	1	6.27	20.0	8.15	ug/L	J
Lead	7439-92-1	1	0.0680	0.100	ND	ug/L	U
Magnesium	7439-95-4	1	0.307	20.0	0.481	ug/L	J
Manganese	7439-96-5	1	0.0850	0.500	ND	ug/L	U
Potassium	7440-09-7	1	1.41	20.0	8.47	ug/L	J
Sodium	7440-23-5	1	7.18	100	ND	ug/L	U

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	09-Nov-2020 14:20

Field-Blank-3-092920

20I0500-11 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/29/2020 11:15
Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/12/2020 18:56

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0500-11 C 01
Preparation Batch: BIJ0288 — Sample Size: 25 mL
Prepared: 10/08/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Copper	7440-50-8	1	0.340	0.500	ND	ug/L	U
Zinc	7440-66-6	1	0.820	4.00	ND	ug/L	U

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	09-Nov-2020 14:20

Field-Blank-3-092920

20I0500-11 (Water)

Wet Chemistry

Method: EPA 300.0 — Sampled: 09/29/2020 11:15
Instrument: IC930 Analyst: KOTT — Analyzed: 10/01/2020 18:57

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0500-11 B
Preparation Batch: BII0908 — Sample Size: 10 mL
Prepared: 09/30/2020 — Final Volume: 10 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Chloride	16887-00-6	1	0.100	0.100	ND	mg/L	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Nitrate-N	14797-55-8	1	0.100	0.100	ND	mg/L	H, U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Sulfate	14808-79-8	1	0.100	0.100	ND	mg/L	U

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	09-Nov-2020 14:20

Field-Blank-3-092920

20I0500-11 (Water)

Wet Chemistry

Method: SM 2320 B-97 — Sampled: 09/29/2020 11:15

Instrument: Accumet AB150 Analyst: UW — Analyzed: 10/01/2020 14:20

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0500-11 D

Preparation Batch: BIJ0026 — Sample Size: 100 mL

Prepared: 10/01/2020 — Final Volume: 100 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Bicarbonate		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Carbonate		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Hydroxide		1	1.00	1.00	ND	mg/L CaCO3	U

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Alkalinity, Total		1	1.00	1.00	ND	mg/L CaCO3	U

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	09-Nov-2020 14:20

Field-Blank-3-092920

20I0500-11 (Water)

Wet Chemistry

Method: SM 2540 C-97 — Sampled: 09/29/2020 11:15

Instrument: BAL2 Analyst: KLE — Analyzed: 10/04/2020 16:00

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0500-11

Preparation Batch: BIJ0092 — Sample Size: 200 mL

Prepared: 10/04/2020 — Final Volume: 200 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Solids		1	5	5	10	mg/L	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	09-Nov-2020 14:20

Field-Blank-3-092920

20I0500-11 (Water)

Wet Chemistry

Method: SM 2540 D-97 — Sampled: 09/29/2020 11:15

Instrument: BAL2 Analyst: KLE — Analyzed: 10/04/2020 07:40

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0500-11

Preparation Batch: BIJ0086 — Sample Size: 950 mL

Prepared: 10/04/2020 — Final Volume: 1000 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Suspended Solids		1	1	1	ND	mg/L	U

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	09-Nov-2020 14:20

Field-Blank-3-092920

20I0500-11 (Water)

Wet Chemistry

Method: SM 5310 B-00 — Sampled: 09/29/2020 11:15

Instrument: TOC-LCSH Analyst: BF — Analyzed: 10/14/2020 17:19

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0500-11 F

Preparation Batch: BIJ0447 — Sample Size: 20 mL

Prepared: 10/14/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Total Organic Carbon		1	0.50	0.50	ND	mg/L	U

Sample Preparation: Preparation Method: No Prep Wet Chem — Extract ID: 20I0500-11 E

Preparation Batch: BIJ0450 — Sample Size: 20 mL

Prepared: 10/14/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Dissolved Organic Carbon, Dissolved		1	0.50	0.50	ND	mg/L	U

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	09-Nov-2020 14:20

Field-Blank-3-092920

20I0500-11 (Water)

Calculation

Method: SM 2340 B-97 — Sampled: 09/29/2020 11:15

Instrument: [CALC] Analyst: MCB — Analyzed: 10/12/2020 18:56

Sample Preparation: Preparation Method: [CALC] — Extract ID: 20I0500-11

Preparation Batch: [CALC]

Prepared: 10/08/2020 Final Volume: 1

Analyte	CAS Number	Dilution	Reporting Limit	Result	Units	Notes
Hardness		1	0.207	ND	mg/L CaCO3	U

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	09-Nov-2020 14:20

Field-Blank-3-092920

20I0500-11RE1 (Water)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/29/2020 11:15

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/15/2020 23:28

Sample Preparation: Preparation Method: RHN EPA 600/4-79-020 4.1.4 HNO3 matrix 5x — Extract ID: 20I0500-11RE1 C 02

Preparation Batch: BIJ0436 — Sample Size: 100 mL

Prepared: 10/14/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Cadmium	7440-43-9	1	0.00600	0.0200	ND	ug/L	U

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	09-Nov-2020 14:20

Field-Blank-3-092920

20I0500-12 (Water)

Metals and Metallic Compounds (dissolved)

Method: EPA 6020A — Sampled: 09/29/2020 11:15

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/17/2020 16:08

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0500-12 A 01

Preparation Batch: BIJ0290 — Sample Size: 25 mL

Prepared: 10/08/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Aluminum, Dissolved	7429-90-5	1	2.37	20.0	2.46	ug/L	J
Calcium, Dissolved	7440-70-2	1	1.91	50.0	8.24	ug/L	J
Iron, Dissolved	7439-89-6	1	6.27	20.0	8.88	ug/L	J
Lead, Dissolved	7439-92-1	1	0.0680	0.100	ND	ug/L	U
Magnesium, Dissolved	7439-95-4	1	0.307	20.0	1.15	ug/L	J
Manganese, Dissolved	7439-96-5	1	0.0850	0.500	ND	ug/L	U
Potassium, Dissolved	7440-09-7	1	1.41	20.0	10.1	ug/L	J
Sodium, Dissolved	7440-23-5	1	7.18	100	56.0	ug/L	J

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	09-Nov-2020 14:20

Field-Blank-3-092920

20I0500-12 (Water)

Metals and Metallic Compounds (dissolved)

Method: EPA 6020A UCT-KED — Sampled: 09/29/2020 11:15
Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/12/2020 19:32

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 20I0500-12 A 01
Preparation Batch: BIJ0290 — Sample Size: 25 mL
Prepared: 10/08/2020 — Final Volume: 25 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Copper, Dissolved	7440-50-8	1	0.340	0.500	ND	ug/L	U
Zinc, Dissolved	7440-66-6	1	0.820	4.00	1.89	ug/L	J

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	09-Nov-2020 14:20

Field-Blank-3-092920

20I0500-12RE1 (Water)

Metals and Metallic Compounds (dissolved)

Method: EPA 6020A UCT-KED — Sampled: 09/29/2020 11:15

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/15/2020 23:32

Sample Preparation: Preparation Method: RHN EPA 600/4-79-020 4.1.4 HNO3 matrix 5x — Extract ID: 20I0500-12RE1 A 02

Preparation Batch: BIJ0479 — Sample Size: 100 mL

Prepared: 10/15/2020 — Final Volume: 20 mL

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Cadmium, Dissolved	7440-43-9	1	0.00600	0.0200	ND	ug/L	U

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	09-Nov-2020 14:20

LB-1-SS-092720

20I0500-13 (Solid)

Metals and Metallic Compounds

Method: EPA 6020A — Sampled: 09/27/2020 12:06

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/19/2020 13:10

Sample Preparation: Preparation Method: SWN EPA 3050B — Extract ID: 20I0500-13 A 01

Preparation Batch: BIJ0455 — Sample Size: 1.0723 g (wet) — Dry Weight:0.74 g

Prepared: 10/14/2020 — Final Volume: 50 mL — % Solids: 68.82

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Aluminum	7429-90-5	20	3	27	7010	mg/kg	
Beryllium	7440-41-7	20	0.04	0.27	0.09	mg/kg	J
Chromium	7440-47-3	20	0.18	0.68	9.63	mg/kg	
Iron	7439-89-6	20	9	27	12100	mg/kg	
Silver	7440-22-4	20	0.02	0.27	0.03	mg/kg	J

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	09-Nov-2020 14:20

LB-1-SS-092720

20I0500-13 (Solid)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/27/2020 12:06

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/17/2020 00:01

Sample Preparation: Preparation Method: SWN EPA 3050B — Extract ID: 20I0500-13 A 01

Preparation Batch: BIJ0455 — Sample Size: 1.0723 g (wet) — Dry Weight:0.74 g

Prepared: 10/14/2020 — Final Volume: 50 mL — % Solids: 68.82

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Cadmium	7440-43-9	20	0.04	0.14	0.27	mg/kg	
Copper	7440-50-8	20	0.46	0.68	21.4	mg/kg	
Zinc	7440-66-6	20	1.1	5.4	71.7	mg/kg	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	09-Nov-2020 14:20

LB-2-SS-092720

20I0500-14 (Solid)

Metals and Metallic Compounds

Method: EPA 6020A — Sampled: 09/27/2020 10:49

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/19/2020 13:14

Sample Preparation: Preparation Method: SWN EPA 3050B — Extract ID: 20I0500-14 A 01

Preparation Batch: BIJ0455 — Sample Size: 1.0613 g (wet) — Dry Weight:0.81 g

Prepared: 10/14/2020 — Final Volume: 50 mL — % Solids: 76.50

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Aluminum	7429-90-5	20	3	25	6340	mg/kg	
Beryllium	7440-41-7	20	0.04	0.25	0.07	mg/kg	J
Chromium	7440-47-3	20	0.16	0.62	7.54	mg/kg	
Iron	7439-89-6	20	8	25	11300	mg/kg	
Silver	7440-22-4	20	0.02	0.25	ND	mg/kg	U

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	09-Nov-2020 14:20

LB-2-SS-092720

20I0500-14 (Solid)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/27/2020 10:49

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/17/2020 00:05

Sample Preparation: Preparation Method: SWN EPA 3050B — Extract ID: 20I0500-14 A 01

Preparation Batch: BIJ0455 — Sample Size: 1.0613 g (wet) — Dry Weight:0.81 g

Prepared: 10/14/2020 — Final Volume: 50 mL — % Solids: 76.50

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Cadmium	7440-43-9	20	0.04	0.12	0.23	mg/kg	
Copper	7440-50-8	20	0.42	0.62	13.8	mg/kg	
Zinc	7440-66-6	20	1.0	4.9	58.8	mg/kg	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	09-Nov-2020 14:20

RC-10-SS-092720

20I0500-15 (Solid)

Metals and Metallic Compounds

Method: EPA 6020A — Sampled: 09/27/2020 14:45

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/19/2020 13:17

Sample Preparation: Preparation Method: SWN EPA 3050B — Extract ID: 20I0500-15 A 01

Preparation Batch: BIJ0455 — Sample Size: 1.0684 g (wet) — Dry Weight:0.84 g

Prepared: 10/14/2020 — Final Volume: 50 mL — % Solids: 78.76

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Aluminum	7429-90-5	20	3	24	10400	mg/kg	
Beryllium	7440-41-7	20	0.03	0.24	0.09	mg/kg	J
Chromium	7440-47-3	20	0.15	0.59	8.73	mg/kg	
Iron	7439-89-6	20	2	24	19200	mg/kg	
Silver	7440-22-4	20	0.02	0.24	ND	mg/kg	U

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	09-Nov-2020 14:20

RC-10-SS-092720

20I0500-15 (Solid)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/27/2020 14:45

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/17/2020 00:10

Sample Preparation: Preparation Method: SWN EPA 3050B — Extract ID: 20I0500-15 A 01

Preparation Batch: BIJ0455 — Sample Size: 1.0684 g (wet) — Dry Weight:0.84 g

Prepared: 10/14/2020 — Final Volume: 50 mL — % Solids: 78.76

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Cadmium	7440-43-9	20	0.04	0.12	0.45	mg/kg	
Copper	7440-50-8	20	0.40	0.59	31.5	mg/kg	
Zinc	7440-66-6	20	1.0	4.8	86.0	mg/kg	

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Seattle WA, 98101-2341	Project Manager: Amanda McKay	09-Nov-2020 14:20

RC-5A-SS-092620

20I0500-16 (Solid)

Metals and Metallic Compounds

Method: EPA 6020A — Sampled: 09/26/2020 16:05

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/19/2020 13:53

Sample Preparation: Preparation Method: SWN EPA 3050B — Extract ID: 20I0500-16 A 01

Preparation Batch: BIJ0455 — Sample Size: 1.0256 g (wet) — Dry Weight:0.88 g

Prepared: 10/14/2020 — Final Volume: 50 mL — % Solids: 85.48

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Aluminum	7429-90-5	20	3	23	5870	mg/kg	
Beryllium	7440-41-7	20	0.03	0.23	0.08	mg/kg	J
Chromium	7440-47-3	20	0.15	0.57	10.3	mg/kg	
Iron	7439-89-6	20	7	23	11200	mg/kg	
Silver	7440-22-4	20	0.02	0.23	ND	mg/kg	U

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	09-Nov-2020 14:20

RC-5A-SS-092620

20I0500-16 (Solid)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/26/2020 16:05

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/17/2020 00:33

Sample Preparation: Preparation Method: SWN EPA 3050B — Extract ID: 20I0500-16 A 01

Preparation Batch: BIJ0455 — Sample Size: 1.0256 g (wet) — Dry Weight:0.88 g

Prepared: 10/14/2020 — Final Volume: 50 mL — % Solids: 85.48

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Cadmium	7440-43-9	20	0.03	0.11	0.25	mg/kg	
Copper	7440-50-8	20	0.39	0.57	37.6	mg/kg	
Zinc	7440-66-6	20	0.9	4.6	45.7	mg/kg	

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RC-4-SS-092620

20I0500-17 (Solid)

Metals and Metallic Compounds

Method: EPA 6020A — Sampled: 09/26/2020 09:48

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/19/2020 13:55

Sample Preparation: Preparation Method: SWN EPA 3050B — Extract ID: 20I0500-17 A 01

Preparation Batch: BIJ0455 — Sample Size: 1.0836 g (wet) — Dry Weight:0.95 g

Prepared: 10/14/2020 — Final Volume: 50 mL — % Solids: 87.83

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Aluminum	7429-90-5	20	2	21	9290	mg/kg	
Beryllium	7440-41-7	20	0.03	0.21	0.06	mg/kg	J
Chromium	7440-47-3	20	0.14	0.53	17.1	mg/kg	
Iron	7439-89-6	20	7	21	14800	mg/kg	
Silver	7440-22-4	20	0.02	0.21	0.04	mg/kg	J

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	09-Nov-2020 14:20

RC-4-SS-092620

20I0500-17 (Solid)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/26/2020 09:48

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/17/2020 00:37

Sample Preparation: Preparation Method: SWN EPA 3050B — Extract ID: 20I0500-17 A 01

Preparation Batch: BIJ0455 — Sample Size: 1.0836 g (wet) — Dry Weight:0.95 g

Prepared: 10/14/2020 — Final Volume: 50 mL — % Solids: 87.83

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Cadmium	7440-43-9	20	0.03	0.11	0.38	mg/kg	
Copper	7440-50-8	20	0.36	0.53	73.7	mg/kg	
Zinc	7440-66-6	20	0.9	4.2	79.0	mg/kg	

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Seattle WA, 98101-2341	Project Manager: Amanda McKay	09-Nov-2020 14:20

RC-1-SS-092620

20I0500-18 (Solid)

Metals and Metallic Compounds

Method: EPA 6020A — Sampled: 09/26/2020 12:02

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/19/2020 13:57

Sample Preparation: Preparation Method: SWN EPA 3050B — Extract ID: 20I0500-18 A 01

Preparation Batch: BIJ0455 — Sample Size: 1.0525 g (wet) — Dry Weight:0.79 g

Prepared: 10/14/2020 — Final Volume: 50 mL — % Solids: 74.64

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Aluminum	7429-90-5	20	3	25	10600	mg/kg	
Beryllium	7440-41-7	20	0.04	0.25	0.07	mg/kg	J
Chromium	7440-47-3	20	0.17	0.64	14.8	mg/kg	
Iron	7439-89-6	20	8	25	16100	mg/kg	
Silver	7440-22-4	20	0.02	0.25	0.03	mg/kg	J

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	09-Nov-2020 14:20

RC-1-SS-092620

20I0500-18 (Solid)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/26/2020 12:02

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/17/2020 00:41

Sample Preparation: Preparation Method: SWN EPA 3050B — Extract ID: 20I0500-18 A 01

Preparation Batch: BIJ0455 — Sample Size: 1.0525 g (wet) — Dry Weight:0.79 g

Prepared: 10/14/2020 — Final Volume: 50 mL — % Solids: 74.64

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Cadmium	7440-43-9	20	0.04	0.13	0.12	mg/kg	J
Copper	7440-50-8	20	0.43	0.64	26.8	mg/kg	
Zinc	7440-66-6	20	1.0	5.1	49.3	mg/kg	

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Seattle WA, 98101-2341	Project Manager: Amanda McKay	09-Nov-2020 14:20

RC-2(SG-7)-SS-092920

20I0500-19 (Solid)

Metals and Metallic Compounds

Method: EPA 6020A — Sampled: 09/29/2020 09:21

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/19/2020 13:19

Sample Preparation: Preparation Method: SWN EPA 3050B — Extract ID: 20I0500-19 A 01

Preparation Batch: BIJ0455 — Sample Size: 1.0976 g (wet) — Dry Weight:0.78 g

Prepared: 10/14/2020 — Final Volume: 50 mL — % Solids: 70.70

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Aluminum	7429-90-5	20	3	26	11400	mg/kg	
Beryllium	7440-41-7	20	0.04	0.26	0.11	mg/kg	J
Chromium	7440-47-3	20	0.17	0.64	17.6	mg/kg	
Iron	7439-89-6	20	8	26	16100	mg/kg	
Silver	7440-22-4	20	0.02	0.26	0.07	mg/kg	J

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	09-Nov-2020 14:20

RC-2(SG-7)-SS-092920

20I0500-19 (Solid)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/29/2020 09:21
Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/17/2020 00:55

Sample Preparation: Preparation Method: SWN EPA 3050B — Extract ID: 20I0500-19 A 01
Preparation Batch: BIJ0455 — Sample Size: 1.0976 g (wet) — Dry Weight:0.78 g
Prepared: 10/14/2020 — Final Volume: 50 mL — % Solids: 70.70

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Cadmium	7440-43-9	20	0.04	0.13	0.40	mg/kg	
Copper	7440-50-8	20	0.44	0.64	49.4	mg/kg	
Zinc	7440-66-6	20	1.1	5.2	90.9	mg/kg	

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	09-Nov-2020 14:20

RC-6-SS-092920

20I0500-20 (Solid)

Metals and Metallic Compounds

Method: EPA 6020A — Sampled: 09/29/2020 11:00

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/19/2020 13:59

Sample Preparation: Preparation Method: SWN EPA 3050B — Extract ID: 20I0500-20 A 01

Preparation Batch: BIJ0455 — Sample Size: 1.024 g (wet) — Dry Weight:0.79 g

Prepared: 10/14/2020 — Final Volume: 50 mL — % Solids: 77.38

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Aluminum	7429-90-5	20	3	25	10400	mg/kg	
Beryllium	7440-41-7	20	0.04	0.25	0.08	mg/kg	J
Chromium	7440-47-3	20	0.16	0.63	15.8	mg/kg	
Iron	7439-89-6	20	8	25	15800	mg/kg	
Silver	7440-22-4	20	0.02	0.25	0.03	mg/kg	J

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	09-Nov-2020 14:20

RC-6-SS-092920

20I0500-20 (Solid)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/29/2020 11:00

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/17/2020 00:46

Sample Preparation: Preparation Method: SWN EPA 3050B — Extract ID: 20I0500-20 A 01

Preparation Batch: BIJ0455 — Sample Size: 1.024 g (wet) — Dry Weight:0.79 g

Prepared: 10/14/2020 — Final Volume: 50 mL — % Solids: 77.38

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Cadmium	7440-43-9	20	0.04	0.13	0.17	mg/kg	
Copper	7440-50-8	20	0.43	0.63	23.5	mg/kg	
Zinc	7440-66-6	20	1.0	5.0	54.9	mg/kg	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	09-Nov-2020 14:20

RC-102(SG-107)-SS-092920

20I0500-21 (Solid)

Metals and Metallic Compounds

Method: EPA 6020A — Sampled: 09/29/2020 09:25

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/19/2020 14:01

Sample Preparation: Preparation Method: SWN EPA 3050B — Extract ID: 20I0500-21 A 01

Preparation Batch: BIJ0455 — Sample Size: 1.0154 g (wet) — Dry Weight:0.72 g

Prepared: 10/14/2020 — Final Volume: 50 mL — % Solids: 70.72

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Aluminum	7429-90-5	20	3	28	9700	mg/kg	
Beryllium	7440-41-7	20	0.04	0.28	0.08	mg/kg	J
Chromium	7440-47-3	20	0.18	0.70	15.4	mg/kg	
Iron	7439-89-6	20	2	28	13600	mg/kg	
Silver	7440-22-4	20	0.02	0.28	0.04	mg/kg	J

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	09-Nov-2020 14:20

RC-102(SG-107)-SS-092920

20I0500-21 (Solid)

Metals and Metallic Compounds

Method: EPA 6020A UCT-KED — Sampled: 09/29/2020 09:25

Instrument: ICPMS1 Analyst: MCB — Analyzed: 10/17/2020 00:50

Sample Preparation: Preparation Method: SWN EPA 3050B — Extract ID: 20I0500-21 A 01

Preparation Batch: BIJ0455 — Sample Size: 1.0154 g (wet) — Dry Weight:0.72 g

Prepared: 10/14/2020 — Final Volume: 50 mL — % Solids: 70.72

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Cadmium	7440-43-9	20	0.04	0.14	0.24	mg/kg	
Copper	7440-50-8	20	0.47	0.70	36.6	mg/kg	
Zinc	7440-66-6	20	1.1	5.6	73.4	mg/kg	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	09-Nov-2020 14:20

Metals and Metallic Compounds - Quality Control

Batch BIJ0288 - REN EPA 600/4-79-020 4.1.4 HNO3 matrix

Instrument: ICPMS1 Analyst: MCB

QC Sample/Analyte	Isotope	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BIJ0288-BLK1)					Prepared: 08-Oct-2020 Analyzed: 12-Oct-2020 18:35							
Barium	135	ND	0.0560	0.500	ug/L							U
Barium	137	ND	0.0530	0.500	ug/L							U
Calcium	44	3.28	1.91	50.0	ug/L							J
Chromium	52	ND	0.130	0.500	ug/L							U
Chromium	53	0.0970	0.0700	0.500	ug/L							J
Lead	208	ND	0.0680	0.100	ug/L							U
Magnesium	24	ND	0.307	20.0	ug/L							U
Silver	107	ND	0.0170	0.200	ug/L							U
Cadmium	111	ND	0.0300	0.100	ug/L							U
Cadmium	114	ND	0.0400	0.100	ug/L							U
Copper	63	ND	0.340	0.500	ug/L							U
Copper	65	ND	0.350	0.500	ug/L							U
Zinc	66	ND	0.820	4.00	ug/L							U
Zinc	67	ND	0.940	4.00	ug/L							U
Blank (BIJ0288-BLK2)					Prepared: 08-Oct-2020 Analyzed: 13-Oct-2020 13:53							
Lead	208	ND	0.0680	0.100	ug/L							U
Blank (BIJ0288-BLK3)					Prepared: 08-Oct-2020 Analyzed: 17-Oct-2020 14:48							
Aluminum	27	ND	2.37	20.0	ug/L							U
Iron	54	ND	6.27	20.0	ug/L							U
Iron	57	ND	1.40	20.0	ug/L							U
Manganese	55	ND	0.0850	0.500	ug/L							U
Potassium	39	10.1	1.41	20.0	ug/L							J
Sodium	23	ND	7.18	100	ug/L							U
LCS (BIJ0288-BS1)					Prepared: 08-Oct-2020 Analyzed: 12-Oct-2020 18:39							
Barium	135	24.2	0.0560	0.500	ug/L	25.0		96.8	80-120			
Barium	137	24.0	0.0530	0.500	ug/L	25.0		95.8	80-120			
Calcium	44	4740	1.91	50.0	ug/L	5000		94.8	80-120			
Chromium	52	25.3	0.130	0.500	ug/L	25.0		101	80-120			
Chromium	53	24.6	0.0700	0.500	ug/L	25.0		98.4	80-120			
Lead	208	25.5	0.0680	0.100	ug/L	25.0		102	80-120			
Magnesium	24	4990	0.307	20.0	ug/L	5000		99.7	80-120			
Silver	107	24.8	0.0170	0.200	ug/L	25.0		99.1	80-120			
Cadmium	111	24.4	0.0300	0.100	ug/L	25.0		97.6	80-120			

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	09-Nov-2020 14:20

Metals and Metallic Compounds - Quality Control

Batch BIJ0288 - REN EPA 600/4-79-020 4.1.4 HNO3 matrix

Instrument: ICPMS1 Analyst: MCB

QC Sample/Analyte	Isotope	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
LCS (BIJ0288-BS1)						Prepared: 08-Oct-2020 Analyzed: 12-Oct-2020 18:39						
Cadmium	114	24.3	0.0400	0.100	ug/L	25.0		97.1	80-120			
Copper	63	24.2	0.340	0.500	ug/L	25.0		97.0	80-120			
Copper	65	24.5	0.350	0.500	ug/L	25.0		97.9	80-120			
Zinc	66	80.0	0.820	4.00	ug/L	80.0		100	80-120			
Zinc	67	77.9	0.940	4.00	ug/L	80.0		97.4	80-120			
LCS (BIJ0288-BS3)						Prepared: 08-Oct-2020 Analyzed: 17-Oct-2020 14:50						
Aluminum	27	4660	2.37	20.0	ug/L	5000		93.1	80-120			
Iron	54	4690	6.27	20.0	ug/L	5000		93.9	80-120			
Iron	57	4650	1.40	20.0	ug/L	5000		93.0	80-120			
Manganese	55	24.1	0.0850	0.500	ug/L	25.0		96.3	80-120			
Potassium	39	4530	1.41	20.0	ug/L	5000		90.7	80-120			
Sodium	23	4660	7.18	100	ug/L	5000		93.1	80-120			

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	09-Nov-2020 14:20

Metals and Metallic Compounds - Quality Control

Batch BIJ0436 - RHN EPA 600/4-79-020 4.1.4 HNO3 matrix 5x

Instrument: ICPMS1 Analyst: MCB

QC Sample/Analyte	Isotope	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BIJ0436-BLK1)					Prepared: 14-Oct-2020 Analyzed: 16-Oct-2020 00:11							
Cadmium	111	ND	0.00600	0.0200	ug/L							U
Cadmium	114	ND	0.00800	0.0200	ug/L							U
LCS (BIJ0436-BS1)					Prepared: 14-Oct-2020 Analyzed: 16-Oct-2020 00:16							
Cadmium	111	5.08	0.00600	0.0200	ug/L	5.00		102	80-120			
Cadmium	114	5.06	0.00800	0.0200	ug/L	5.00		101	80-120			
LCS Dup (BIJ0436-BSD1)					Prepared: 14-Oct-2020 Analyzed: 16-Oct-2020 00:20							
Cadmium	111	4.87	0.00600	0.0200	ug/L	5.00		97.3	80-120	4.39	20	
Cadmium	114	4.98	0.00800	0.0200	ug/L	5.00		99.6	80-120	1.66	20	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	09-Nov-2020 14:20

Metals and Metallic Compounds - Quality Control

Batch BIJ0454 - SWN EPA 3050B

Instrument: ICPMS1 Analyst: MCB

QC Sample/Analyte	Isotope	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BIJ0454-BLK1)					Prepared: 16-Oct-2020 Analyzed: 17-Oct-2020 02:42							
Cadmium	111	ND	0.004	0.02	mg/kg							U
Cadmium	114	ND	0.006	0.02	mg/kg							U
Copper	63	0.09	0.05	0.07	mg/kg							D
Copper	65	0.09	0.05	0.07	mg/kg							D
Zinc	66	1.7	0.1	0.6	mg/kg							D
Zinc	67	1.6	0.1	0.6	mg/kg							D
Blank (BIJ0454-BLK2)					Prepared: 16-Oct-2020 Analyzed: 17-Oct-2020 01:33							
Cadmium	111	ND	0.0008	0.003	mg/kg							U
Cadmium	114	ND	0.001	0.003	mg/kg							U
Copper	63	ND	0.009	0.01	mg/kg							U
Copper	65	ND	0.009	0.01	mg/kg							U
Zinc	66	0.04	0.02	0.1	mg/kg							J, D
Zinc	67	0.04	0.02	0.1	mg/kg							J, D
Blank (BIJ0454-BLK3)					Prepared: 16-Oct-2020 Analyzed: 22-Oct-2020 19:00							
Silver	107	0.006	0.005	0.06	mg/kg							J, D
Blank (BIJ0454-BLK4)					Prepared: 16-Oct-2020 Analyzed: 21-Oct-2020 17:13							
Silver	107	ND	0.0004	0.005	mg/kg							U
LCS (BIJ0454-BS1)					Prepared: 16-Oct-2020 Analyzed: 17-Oct-2020 02:47							
Cadmium	111	1.54	0.004	0.02	mg/kg	1.50		103	80-120			D
Cadmium	114	1.55	0.006	0.02	mg/kg	1.50		103	80-120			D
Copper	63	1.68	0.05	0.07	mg/kg	1.50		112	80-120			B, D
Copper	65	1.67	0.05	0.07	mg/kg	1.50		111	80-120			B, D
Zinc	66	6.4	0.1	0.6	mg/kg	4.80		134	80-120			*, B, D
Zinc	67	6.3	0.1	0.6	mg/kg	4.80		132	80-120			*, B, D
LCS (BIJ0454-BS2)					Prepared: 16-Oct-2020 Analyzed: 17-Oct-2020 01:38							
Cadmium	111	1.25	0.0008	0.003	mg/kg	1.25		99.9	80-120			D
Cadmium	114	1.25	0.001	0.003	mg/kg	1.25		99.9	80-120			D
Copper	63	1.25	0.009	0.01	mg/kg	1.25		99.8	80-120			B, D
Copper	65	1.24	0.009	0.01	mg/kg	1.25		98.9	80-120			B, D
Zinc	66	4.0	0.02	0.1	mg/kg	4.00		101	80-120			B, D
Zinc	67	3.9	0.02	0.1	mg/kg	4.00		97.8	80-120			B, D

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	09-Nov-2020 14:20

Metals and Metallic Compounds - Quality Control

Batch BIJ0454 - SWN EPA 3050B

Instrument: ICPMS1 Analyst: MCB

QC Sample/Analyte	Isotope	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
LCS (BIJ0454-BS3)					Prepared: 16-Oct-2020 Analyzed: 22-Oct-2020 19:05							
Silver	107	1.54	0.005	0.06	mg/kg	1.50		103	80-120			D
LCS (BIJ0454-BS4)					Prepared: 16-Oct-2020 Analyzed: 21-Oct-2020 17:17							
Silver	107	1.36	0.0004	0.005	mg/kg	1.25		109	80-120			D
Duplicate (BIJ0454-DUP1)			**Source: 20I0500-07**		Prepared: 16-Oct-2020 Analyzed: 17-Oct-2020 03:16							
Cadmium	111	0.30	0.006	0.02	mg/kg		0.29			3.57	20	D
Copper	63	24.3	0.07	0.10	mg/kg		24.0			1.25	20	B, D
Duplicate (BIJ0454-DUP2)			**Source: 20I0500-07**		Prepared: 16-Oct-2020 Analyzed: 22-Oct-2020 19:41							
Silver	107	0.03	0.007	0.08	mg/kg		0.03			2.41	20	J, D
Zinc	67	48.7	0.4	1.5	mg/kg		45.6			6.56	20	B, D
Matrix Spike (BIJ0454-MS1)			**Source: 20I0500-07**		Prepared: 16-Oct-2020 Analyzed: 17-Oct-2020 03:21							
Cadmium	111	2.18	0.006	0.02	mg/kg	1.92	0.29	98.6	75-125			D
Copper	63	25.4	0.07	0.10	mg/kg	1.92	24.0	73.3	75-125			B, HC, D
Recovery limits for target analytes in MS/MSD QC samples are advisory only.												
Matrix Spike (BIJ0454-MS2)			**Source: 20I0500-07**		Prepared: 16-Oct-2020 Analyzed: 22-Oct-2020 19:48							
Silver	107	2.08	0.007	0.08	mg/kg	1.92	0.03	107	75-125			D
Zinc	67	53.6	0.4	1.5	mg/kg	6.13	45.6	130	75-125			B, HC, D
Recovery limits for target analytes in MS/MSD QC samples are advisory only.												
Matrix Spike Dup (BIJ0454-MSD1)			**Source: 20I0500-07**		Prepared: 16-Oct-2020 Analyzed: 17-Oct-2020 03:27							
Cadmium	111	2.24	0.006	0.02	mg/kg	1.92	0.29	102	75-125	2.68	20	D
Copper	63	25.8	0.07	0.10	mg/kg	1.92	24.0	92.4	75-125	1.43	20	B, HC, D
Recovery limits for target analytes in MS/MSD QC samples are advisory only.												
Matrix Spike Dup (BIJ0454-MSD2)			**Source: 20I0500-07**		Prepared: 16-Oct-2020 Analyzed: 22-Oct-2020 19:57							
Silver	107	2.05	0.007	0.08	mg/kg	1.92	0.03	105	75-125	1.56	20	D
Zinc	67	53.3	0.4	1.5	mg/kg	6.13	45.6	125	75-125	0.48	20	B, HC, D
Recovery limits for target analytes in MS/MSD QC samples are advisory only.												

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	09-Nov-2020 14:20

Metals and Metallic Compounds - Quality Control

Batch BIJ0455 - SWN EPA 3050B

Instrument: ICPMS1 Analyst: MCB

QC Sample/Analyte	Isotope	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BIJ0455-BLK1)					Prepared: 14-Oct-2020 Analyzed: 16-Oct-2020 19:07							
Chromium	52	ND	0.13	0.50	mg/kg							U
Chromium	53	ND	0.07	0.50	mg/kg							U
Silver	107	ND	0.02	0.20	mg/kg							U
Cadmium	111	ND	0.03	0.10	mg/kg							U
Cadmium	114	ND	0.04	0.10	mg/kg							U
Copper	63	ND	0.34	0.50	mg/kg							U
Copper	65	ND	0.35	0.50	mg/kg							U
Zinc	66	ND	0.8	4.0	mg/kg							U
Zinc	67	ND	0.9	4.0	mg/kg							U
Blank (BIJ0455-BLK2)					Prepared: 14-Oct-2020 Analyzed: 19-Oct-2020 13:04							
Aluminum	27	ND	2	20	mg/kg							U
Beryllium	9	ND	0.03	0.20	mg/kg							U
Iron	54	9	6	20	mg/kg							J
Iron	57	4	1	20	mg/kg							J
LCS (BIJ0455-BS1)					Prepared: 14-Oct-2020 Analyzed: 16-Oct-2020 19:11							
Chromium	52	23.6	0.13	0.50	mg/kg	25.0		94.5	80-120			
Chromium	53	24.1	0.07	0.50	mg/kg	25.0		96.4	80-120			
Silver	107	24.9	0.02	0.20	mg/kg	25.0		99.6	80-120			
Cadmium	111	24.0	0.03	0.10	mg/kg	25.0		96.0	80-120			
Cadmium	114	24.3	0.04	0.10	mg/kg	25.0		97.4	80-120			
Copper	63	24.1	0.34	0.50	mg/kg	25.0		96.5	80-120			
Copper	65	24.0	0.35	0.50	mg/kg	25.0		96.1	80-120			
Zinc	66	73.7	0.8	4.0	mg/kg	80.0		92.1	80-120			
Zinc	67	72.8	0.9	4.0	mg/kg	80.0		91.0	80-120			
LCS (BIJ0455-BS2)					Prepared: 14-Oct-2020 Analyzed: 19-Oct-2020 13:06							
Aluminum	27	454	2	20	mg/kg	500		90.8	80-120			
Beryllium	9	22.8	0.03	0.20	mg/kg	25.0		91.1	80-120			
Iron	54	543	6	20	mg/kg	500		109	80-120			
Iron	57	523	1	20	mg/kg	500		105	80-120			
Duplicate (BIJ0455-DUP2)			**Source: 20I0500-19**		Prepared: 14-Oct-2020 Analyzed: 17-Oct-2020 00:59							
Chromium	52	16.4	0.17	0.65	mg/kg		17.6			6.78	20	
Lead	208	3.62	0.09	0.13	mg/kg		3.55			1.92	20	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	09-Nov-2020 14:20

Metals and Metallic Compounds - Quality Control

Batch BIJ0455 - SWN EPA 3050B

Instrument: ICPMS1 Analyst: MCB

QC Sample/Analyte	Isotope	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Duplicate (BIJ0455-DUP2)			**Source: 20I0500-19**		Prepared: 14-Oct-2020 Analyzed: 17-Oct-2020 00:59							
Cadmium	111	0.27	0.04	0.13	mg/kg		0.40			41.00	20	*
Copper	63	40.8	0.44	0.65	mg/kg		49.4			19.20	20	
Zinc	66	71.1	1.1	5.2	mg/kg		90.9			24.50	20	*
Duplicate (BIJ0455-DUP4)			**Source: 20I0500-19**		Prepared: 14-Oct-2020 Analyzed: 19-Oct-2020 13:21							
Aluminum	27	9980	3	26	mg/kg		11400			13.20	20	
Beryllium	9	0.08	0.04	0.26	mg/kg		0.11			28.90	20	L, J
Iron	54	14800	8	26	mg/kg		16100			8.58	20	
Duplicate (BIJ0455-DUP6)			**Source: 20I0500-19**		Prepared: 14-Oct-2020 Analyzed: 20-Oct-2020 15:07							
Silver	107	0.03	0.02	0.26	mg/kg		0.07			67.90	20	L, J
Matrix Spike (BIJ0455-MS2)			**Source: 20I0500-19**		Prepared: 14-Oct-2020 Analyzed: 17-Oct-2020 01:04							
Chromium	52	40.3	0.17	0.65	mg/kg	32.3	17.6	70.4	75-125			*
Cadmium	111	28.8	0.04	0.13	mg/kg	32.3	0.40	87.8	75-125			
Copper	63	60.5	0.44	0.65	mg/kg	32.3	49.4	34.2	75-125			*
Zinc	66	149	1.1	5.2	mg/kg	103	90.9	56.6	75-125			*
Recovery limits for target analytes in MS/MSD QC samples are advisory only.												
Matrix Spike (BIJ0455-MS4)			**Source: 20I0500-19**		Prepared: 14-Oct-2020 Analyzed: 19-Oct-2020 13:24							
Aluminum	27	9640	3	26	mg/kg	646	11400	-269	75-125			HC
Beryllium	9	29.4	0.04	0.26	mg/kg	32.3	0.11	90.6	75-125			
Iron	54	13200	8	26	mg/kg	646	16100	-447	75-125			HC
Recovery limits for target analytes in MS/MSD QC samples are advisory only.												
Matrix Spike (BIJ0455-MS6)			**Source: 20I0500-19**		Prepared: 14-Oct-2020 Analyzed: 20-Oct-2020 15:12							
Silver	107	32.9	0.02	0.26	mg/kg	32.3	0.07	102	75-125			
Recovery limits for target analytes in MS/MSD QC samples are advisory only.												
Matrix Spike Dup (BIJ0455-MSD2)			**Source: 20I0500-19**		Prepared: 14-Oct-2020 Analyzed: 17-Oct-2020 01:09							
Chromium	52	42.2	0.17	0.64	mg/kg	32.2	17.6	76.6	75-125	4.61	20	
Cadmium	111	30.0	0.04	0.13	mg/kg	32.2	0.40	92.0	75-125	4.25	20	
Copper	63	68.7	0.44	0.64	mg/kg	32.2	49.4	60.0	75-125	12.80	20	*
Zinc	66	189	1.1	5.1	mg/kg	103	90.9	94.8	75-125	23.10	20	*
Recovery limits for target analytes in MS/MSD QC samples are advisory only.												

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	09-Nov-2020 14:20

Metals and Metallic Compounds - Quality Control

Batch BIJ0455 - SWN EPA 3050B

Instrument: ICPMS1 Analyst: MCB

QC Sample/Analyte	Isotope	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Matrix Spike Dup (BIJ0455-MSD4)		**Source: 20I0500-19**			Prepared: 14-Oct-2020 Analyzed: 19-Oct-2020 13:27							
Aluminum	27	11200	3	26	mg/kg	644	11400	-23.1	75-125	15.20	20	HC
Beryllium	9	29.3	0.04	0.26	mg/kg	32.2	0.11	90.8	75-125	0.09	20	
Iron	54	16400	8	26	mg/kg	644	16100	47.8	75-125	21.60	20	HC
Recovery limits for target analytes in MS/MSD QC samples are advisory only.												
Matrix Spike Dup (BIJ0455-MSD6)		**Source: 20I0500-19**			Prepared: 14-Oct-2020 Analyzed: 20-Oct-2020 15:17							
Silver	107	33.2	0.02	0.26	mg/kg	32.2	0.07	103	75-125	1.09	20	
Recovery limits for target analytes in MS/MSD QC samples are advisory only.												
Reference (BIJ0455-SRM1)					Prepared: 14-Oct-2020 Analyzed: 16-Oct-2020 20:20							
Chromium	52	132	0.13	0.50	mg/kg	147		90.0	81.6-117.7			
Silver	107	31.5	0.02	0.20	mg/kg	32.0		98.4	79.7-120			
Cadmium	111	110	0.03	0.10	mg/kg	114		96.7	82.8-117.5			
Copper	63	91.9	0.34	0.50	mg/kg	97.7		94.1	83.9-115.7			
Zinc	66	194	0.8	4.0	mg/kg	212		91.4	80.7-118.9			

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	09-Nov-2020 14:20

Metals and Metallic Compounds (dissolved) - Quality Control

Batch BIJ0290 - REN EPA 600/4-79-020 4.1.4 HNO3 matrix

Instrument: ICPMS1 Analyst: MCB

QC Sample/Analyte	Isotope	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BIJ0290-BLK1)					Prepared: 08-Oct-2020 Analyzed: 12-Oct-2020 18:43							
Calcium, Dissolved	44	2.95	1.91	50.0	ug/L							J
Magnesium, Dissolved	24	0.943	0.307	20.0	ug/L							J
Cadmium, Dissolved	111	ND	0.0300	0.100	ug/L							U
Cadmium, Dissolved	114	ND	0.0400	0.100	ug/L							U
Copper, Dissolved	63	ND	0.340	0.500	ug/L							U
Copper, Dissolved	65	ND	0.350	0.500	ug/L							U
Zinc, Dissolved	66	1.40	0.820	4.00	ug/L							J
Zinc, Dissolved	67	1.10	0.940	4.00	ug/L							J
Blank (BIJ0290-BLK3)					Prepared: 08-Oct-2020 Analyzed: 17-Oct-2020 14:52							
Aluminum, Dissolved	27	14.1	2.37	20.0	ug/L							J
Iron, Dissolved	54	ND	6.27	20.0	ug/L							U
Iron, Dissolved	57	ND	1.40	20.0	ug/L							U
Manganese, Dissolved	55	0.115	0.0850	0.500	ug/L							J
Potassium, Dissolved	39	12.0	1.41	20.0	ug/L							J
Sodium, Dissolved	23	ND	7.18	100	ug/L							U
LCS (BIJ0290-BS1)					Prepared: 08-Oct-2020 Analyzed: 12-Oct-2020 18:47							
Calcium, Dissolved	44	4850	1.91	50.0	ug/L	5000		97.1	80-120			
Lead, Dissolved	208	25.9	0.0680	0.100	ug/L	25.0		104	80-120			
Magnesium, Dissolved	24	5030	0.307	20.0	ug/L	5000		101	80-120			
Cadmium, Dissolved	111	24.8	0.0300	0.100	ug/L	25.0		99.3	80-120			
Cadmium, Dissolved	114	24.7	0.0400	0.100	ug/L	25.0		98.7	80-120			
Copper, Dissolved	63	24.5	0.340	0.500	ug/L	25.0		98.1	80-120			
Copper, Dissolved	65	24.6	0.350	0.500	ug/L	25.0		98.6	80-120			
Zinc, Dissolved	66	80.9	0.820	4.00	ug/L	80.0		101	80-120			
Zinc, Dissolved	67	76.7	0.940	4.00	ug/L	80.0		95.9	80-120			
LCS (BIJ0290-BS3)					Prepared: 08-Oct-2020 Analyzed: 17-Oct-2020 14:54							
Aluminum, Dissolved	27	4570	2.37	20.0	ug/L	5000		91.4	80-120			
Iron, Dissolved	54	4670	6.27	20.0	ug/L	5000		93.4	80-120			
Iron, Dissolved	57	4700	1.40	20.0	ug/L	5000		94.0	80-120			
Manganese, Dissolved	55	25.0	0.0850	0.500	ug/L	25.0		99.9	80-120			
Potassium, Dissolved	39	4660	1.41	20.0	ug/L	5000		93.2	80-120			
Sodium, Dissolved	23	4660	7.18	100	ug/L	5000		93.2	80-120			

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	09-Nov-2020 14:20

Metals and Metallic Compounds (dissolved) - Quality Control

Batch BIJ0290 - REN EPA 600/4-79-020 4.1.4 HNO3 matrix

Instrument: ICPMS1 Analyst: MCB

QC Sample/Analyte	Isotope	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Duplicate (BIJ0290-DUP1)			**Source: 20I0500-12**		Prepared: 08-Oct-2020 Analyzed: 12-Oct-2020 19:36							
Calcium, Dissolved	44	2.92	1.91	50.0	ug/L		8.24			95.20	20	L, J
Lead, Dissolved	208	ND	0.0680	0.100	ug/L		ND					U
Magnesium, Dissolved	24	1.24	0.307	20.0	ug/L		1.15			7.79	20	J
Cadmium, Dissolved	111	ND	0.0300	0.100	ug/L		ND					U
Copper, Dissolved	63	ND	0.340	0.500	ug/L		ND					U
Zinc, Dissolved	66	ND	0.820	4.00	ug/L		1.89					U
Duplicate (BIJ0290-DUP2)			**Source: 20I0500-12**		Prepared: 08-Oct-2020 Analyzed: 17-Oct-2020 16:10							
Aluminum, Dissolved	27	ND	2.37	20.0	ug/L		2.46					U
Iron, Dissolved	54	7.11	6.27	20.0	ug/L		8.88			22.20	20	L, J
Manganese, Dissolved	55	ND	0.0850	0.500	ug/L		ND					U
Potassium, Dissolved	39	9.89	1.41	20.0	ug/L		10.1			2.28	20	J
Sodium, Dissolved	23	12.7	7.18	100	ug/L		56.0			126.00	20	L, J
Matrix Spike (BIJ0290-MS1)			**Source: 20I0500-12**		Prepared: 08-Oct-2020 Analyzed: 12-Oct-2020 19:40							
Calcium, Dissolved	44	4800	1.91	50.0	ug/L	5000	8.24	95.8	75-125			
Lead, Dissolved	208	25.4	0.0680	0.100	ug/L	25.0	ND	102	75-125			
Magnesium, Dissolved	24	4930	0.307	20.0	ug/L	5000	1.15	98.6	75-125			
Cadmium, Dissolved	111	23.6	0.0300	0.100	ug/L	25.0	ND	94.3	75-125			
Copper, Dissolved	63	24.5	0.340	0.500	ug/L	25.0	ND	98.1	75-125			
Zinc, Dissolved	66	79.0	0.820	4.00	ug/L	80.0	1.89	96.4	75-125			

Recovery limits for target analytes in MS/MSD QC samples are advisory only.

Matrix Spike (BIJ0290-MS2)			**Source: 20I0500-12**		Prepared: 08-Oct-2020 Analyzed: 17-Oct-2020 16:12							
Aluminum, Dissolved	27	4520	2.37	20.0	ug/L	5000	2.46	90.4	75-125			
Iron, Dissolved	54	4660	6.27	20.0	ug/L	5000	8.88	93.0	75-125			
Manganese, Dissolved	55	25.2	0.0850	0.500	ug/L	25.0	ND	101	75-125			
Potassium, Dissolved	39	4580	1.41	20.0	ug/L	5000	10.1	91.4	75-125			
Sodium, Dissolved	23	4590	7.18	100	ug/L	5000	56.0	90.7	75-125			

Recovery limits for target analytes in MS/MSD QC samples are advisory only.

Matrix Spike Dup (BIJ0290-MSD1)			**Source: 20I0500-12**		Prepared: 08-Oct-2020 Analyzed: 12-Oct-2020 19:45							
Calcium, Dissolved	44	4800	1.91	50.0	ug/L	5000	8.24	95.9	75-125	0.05	20	
Lead, Dissolved	208	25.9	0.0680	0.100	ug/L	25.0	ND	103	75-125	1.68	20	
Magnesium, Dissolved	24	4940	0.307	20.0	ug/L	5000	1.15	98.9	75-125	0.28	20	
Cadmium, Dissolved	111	24.2	0.0300	0.100	ug/L	25.0	ND	96.9	75-125	2.72	20	

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	09-Nov-2020 14:20

Metals and Metallic Compounds (dissolved) - Quality Control

Batch BIJ0290 - REN EPA 600/4-79-020 4.1.4 HNO3 matrix

Instrument: ICPMS1 Analyst: MCB

QC Sample/Analyte	Isotope	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Matrix Spike Dup (BIJ0290-MSD1)			**Source: 20I0500-12**			Prepared: 08-Oct-2020	Analyzed: 12-Oct-2020 19:45					
Copper, Dissolved	63	24.5	0.340	0.500	ug/L	25.0	ND	98.0	75-125	0.13	20	
Zinc, Dissolved	66	79.1	0.820	4.00	ug/L	80.0	1.89	96.5	75-125	0.14	20	

Recovery limits for target analytes in MS/MSD QC samples are advisory only.

Matrix Spike Dup (BIJ0290-MSD2)			**Source: 20I0500-12**			Prepared: 08-Oct-2020	Analyzed: 17-Oct-2020 16:14					
Aluminum, Dissolved	27	4650	2.37	20.0	ug/L	5000	2.46	93.0	75-125	2.83	20	
Iron, Dissolved	54	4660	6.27	20.0	ug/L	5000	8.88	93.0	75-125	0.03	20	
Manganese, Dissolved	55	25.5	0.0850	0.500	ug/L	25.0	ND	102	75-125	1.12	20	
Potassium, Dissolved	39	4650	1.41	20.0	ug/L	5000	10.1	92.8	75-125	1.41	20	
Sodium, Dissolved	23	4730	7.18	100	ug/L	5000	56.0	93.6	75-125	3.12	20	

Recovery limits for target analytes in MS/MSD QC samples are advisory only.

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	09-Nov-2020 14:20

Metals and Metallic Compounds (dissolved) - Quality Control

Batch BIJ0479 - RHN EPA 600/4-79-020 4.1.4 HNO3 matrix 5x

Instrument: ICPMS1 Analyst: MCB

QC Sample/Analyte	Isotope	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BIJ0479-BLK1)					Prepared: 15-Oct-2020 Analyzed: 16-Oct-2020 02:14							
Cadmium, Dissolved	111	ND	0.00600	0.0200	ug/L							U
Cadmium, Dissolved	114	ND	0.00800	0.0200	ug/L							U
LCS (BIJ0479-BS1)					Prepared: 15-Oct-2020 Analyzed: 16-Oct-2020 02:18							
Cadmium, Dissolved	111	4.96	0.00600	0.0200	ug/L	5.00		99.2	80-120			
Cadmium, Dissolved	114	5.01	0.00800	0.0200	ug/L	5.00		100	80-120			
LCS Dup (BIJ0479-BSD1)					Prepared: 15-Oct-2020 Analyzed: 16-Oct-2020 02:23							
Cadmium, Dissolved	111	4.80	0.00600	0.0200	ug/L	5.00		96.1	80-120	3.19	20	
Cadmium, Dissolved	114	4.83	0.00800	0.0200	ug/L	5.00		96.7	80-120	3.66	20	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	09-Nov-2020 14:20

Wet Chemistry - Quality Control

Batch BII0908 - No Prep Wet Chem

Instrument: IC930 Analyst: KOTT

QC Sample/Analyte	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BII0908-BLK1)				Prepared: 30-Sep-2020 Analyzed: 30-Sep-2020 15:35							
Chloride	ND	0.100	0.100	mg/L							U
Nitrate-N	ND	0.100	0.100	mg/L							U
Sulfate	ND	0.100	0.100	mg/L							U
LCS (BII0908-BS1)				Prepared: 30-Sep-2020 Analyzed: 30-Sep-2020 15:55							
Chloride	4.87	0.100	0.100	mg/L	5.00		97.5	90-110			
Nitrate-N	4.99	0.100	0.100	mg/L	5.00		99.7	90-110			
Sulfate	5.32	0.100	0.100	mg/L	5.00		106	90-110			
Duplicate (BII0908-DUP2)		**Source: 20I0500-11**		Prepared: 30-Sep-2020 Analyzed: 01-Oct-2020 20:37							
Chloride	ND	0.100	0.100	mg/L		ND					U
Nitrate-N	ND	0.100	0.100	mg/L		ND					U
Sulfate	ND	0.100	0.100	mg/L		ND					U
Matrix Spike (BII0908-MS2)		**Source: 20I0500-11**		Prepared: 30-Sep-2020 Analyzed: 01-Oct-2020 20:57							
Chloride	1.88	0.100	0.100	mg/L	2.00	ND	93.9	75-125			
Nitrate-N	1.98	0.100	0.100	mg/L	2.00	ND	99.2	75-125			H
Sulfate	2.10	0.100	0.100	mg/L	2.00	ND	105	75-125			

Recovery limits for target analytes in MS/MSD QC samples are advisory only.

Matrix Spike Dup (BII0908-MSD2)		**Source: 20I0500-11**		Prepared: 30-Sep-2020 Analyzed: 01-Oct-2020 21:17							
Chloride	1.88	0.100	0.100	mg/L	2.00	ND	93.7	75-125	0.16	20	
Nitrate-N	1.98	0.100	0.100	mg/L	2.00	ND	99.0	75-125	0.20	20	
Sulfate	2.10	0.100	0.100	mg/L	2.00	ND	105	75-125	0.14	20	

Recovery limits for target analytes in MS/MSD QC samples are advisory only.

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	09-Nov-2020 14:20

Wet Chemistry - Quality Control

Batch BIJ0026 - No Prep Wet Chem

Instrument: Accumet AB150 Analyst: UW

QC Sample/Analyte	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BIJ0026-BLK1)				Prepared: 01-Oct-2020 Analyzed: 01-Oct-2020 14:20							
Alkalinity, Total	ND	1.00	1.00	mg/L CaCO3							U
Reference (BIJ0026-SRM1)				Prepared: 01-Oct-2020 Analyzed: 01-Oct-2020 14:20							
Alkalinity, Total	105	1.00	1.00	mg/L CaCO3	106		99.0	90.57-107.55			

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	09-Nov-2020 14:20

Wet Chemistry - Quality Control

Batch BIJ0086 - No Prep Wet Chem

Instrument: BAL2 Analyst: KLE

QC Sample/Analyte	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BIJ0086-BLK1)					Prepared: 04-Oct-2020 Analyzed: 04-Oct-2020 07:40						
Suspended Solids	ND	1	1	mg/L							U
LCS (BIJ0086-BS1)					Prepared: 04-Oct-2020 Analyzed: 04-Oct-2020 07:40						
Suspended Solids	50	1	1	mg/L	50.00		99.0	90-110			
LCS Dup (BIJ0086-BSD1)					Prepared: 04-Oct-2020 Analyzed: 04-Oct-2020 07:40						
Suspended Solids	49	1	1	mg/L	50.00		98.0	90-110	1.02	20	

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	09-Nov-2020 14:20

Wet Chemistry - Quality Control

Batch BIJ0092 - No Prep Wet Chem

Instrument: BAL2 Analyst: KLE

QC Sample/Analyte	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BIJ0092-BLK1)				Prepared: 04-Oct-2020 Analyzed: 04-Oct-2020 16:00							
Dissolved Solids	ND	5	5	mg/L							U
LCS (BIJ0092-BS1)				Prepared: 04-Oct-2020 Analyzed: 04-Oct-2020 16:00							
Dissolved Solids	508	10	10	mg/L	500		102	90-110			

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	09-Nov-2020 14:20

Wet Chemistry - Quality Control

Batch BIJ0117 - No Prep Wet Chem

Instrument: UV1800-2 Analyst: CDE

QC Sample/Analyte	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BIJ0117-BLK1)				Prepared: 05-Oct-2020 Analyzed: 05-Oct-2020 19:06							
Sulfide	ND	0.03	0.03	umol/g-S							U
LCS (BIJ0117-BS1)				Prepared: 05-Oct-2020 Analyzed: 05-Oct-2020 19:06							
Sulfide	5.34	0.32	0.32	umol/g-S	6.48		82.4	75-125			D
Duplicate (BIJ0117-DUP1)		**Source: 20I0500-07**		Prepared: 05-Oct-2020 Analyzed: 05-Oct-2020 19:09							
Sulfide	ND	0.04	0.04	umol/g-S		ND					U
Matrix Spike (BIJ0117-MS2)		**Source: 20I0500-07**		Prepared: 05-Oct-2020 Analyzed: 05-Oct-2020 19:36							
Sulfide	7.29	0.04	0.85	umol/g-S	8.59	ND	84.8	75-125			D
Recovery limits for target analytes in MS/MSD QC samples are advisory only.											
DL (BIJ0117-MSD2)		**Source: 20I0500-07**		Prepared: 05-Oct-2020 Analyzed: 06-Oct-2020 10:28							
Sulfide	7.38	0.04	0.77	umol/g-S	7.80	ND	94.5	75-125	1.19	200	D
Recovery limits for target analytes in MS/MSD QC samples are advisory only.											

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	09-Nov-2020 14:20

Wet Chemistry - Quality Control

Batch BIJ0157 - No Prep Wet Chem

Instrument: TOC Cube Analyst: KLE

QC Sample/Analyte	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BIJ0157-BLK1)				Prepared: 06-Oct-2020 Analyzed: 09-Oct-2020 12:17							
Total Organic Carbon	ND	0.02	0.02	%							U
LCS (BIJ0157-BS1)				Prepared: 06-Oct-2020 Analyzed: 09-Oct-2020 12:48							
Total Organic Carbon	43.7	0.02	0.02	%	44.4		98.2	80-120			
Duplicate (BIJ0157-DUP3)		**Source: 20I0500-07**		Prepared: 06-Oct-2020 Analyzed: 10-Oct-2020 01:40							
Total Organic Carbon	0.27	0.02	0.02	%		0.30			11.70	20	
Duplicate (BIJ0157-DUP4)		**Source: 20I0500-07**		Prepared: 06-Oct-2020 Analyzed: 10-Oct-2020 02:11							
Total Organic Carbon	0.53	0.02	0.02	%		0.30			56.10	20	*
Duplicate (BIJ0157-DUP5)		**Source: 20I0500-06RE1**		Prepared: 14-Oct-2020 Analyzed: 14-Oct-2020 12:51							
Total Organic Carbon	0.24	0.02	0.02	%		0.24			1.16	20	
Duplicate (BIJ0157-DUP6)		**Source: 20I0500-06RE1**		Prepared: 14-Oct-2020 Analyzed: 14-Oct-2020 13:22							
Total Organic Carbon	0.27	0.02	0.02	%		0.24			12.10	20	
Matrix Spike (BIJ0157-MS2)		**Source: 20I0500-07**		Prepared: 06-Oct-2020 Analyzed: 10-Oct-2020 02:41							
Total Organic Carbon	0.96	0.02	0.02	%	0.755	0.30	86.9	75-125			
Recovery limits for target analytes in MS/MSD QC samples are advisory only.											
Matrix Spike (BIJ0157-MS3)		**Source: 20I0500-06RE1**		Prepared: 14-Oct-2020 Analyzed: 14-Oct-2020 14:54							
Total Organic Carbon	1.00	0.02	0.02	%	0.793	0.24	95.6	75-125			
Recovery limits for target analytes in MS/MSD QC samples are advisory only.											
Matrix Spike Dup (BIJ0157-MSD2)		**Source: 20I0500-07**		Prepared: 06-Oct-2020 Analyzed: 10-Oct-2020 03:12							
Total Organic Carbon	1.05	0.02	0.02	%	0.756	0.30	99.8	75-125	9.79	20	
Recovery limits for target analytes in MS/MSD QC samples are advisory only.											
Matrix Spike Dup (BIJ0157-MSD3)		**Source: 20I0500-06RE1**		Prepared: 06-Oct-2020 Analyzed: 14-Oct-2020 15:25							
Total Organic Carbon	1.08	0.02	0.02	%	0.849	0.24	99.6	75-125	8.43	20	
Recovery limits for target analytes in MS/MSD QC samples are advisory only.											

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	09-Nov-2020 14:20

Wet Chemistry - Quality Control

Batch BIJ0171 - No Prep Wet Chem

Instrument: BAL2 Analyst: KLE

QC Sample/Analyte	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BIJ0171-BLK1)				Prepared: 06-Oct-2020 Analyzed: 06-Oct-2020 13:28							
Total Solids	ND	0.04	0.04	%							U
Duplicate (BIJ0171-DUP1)		**Source: 20I0500-07**		Prepared: 06-Oct-2020 Analyzed: 06-Oct-2020 13:28							
Total Solids	75.75	0.04	0.04	%		75.17			0.77	20	

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4611 S. 134th Place, Suite 100 • Tukwila, WA 98168 • Ph: (206) 695-6200 • Fax: (206) 695-6202

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	09-Nov-2020 14:20

Wet Chemistry - Quality Control

Batch BIJ0447 - No Prep Wet Chem

Instrument: TOC-LCSH Analyst: BF

QC Sample/Analyte	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BIJ0447-BLK1)				Prepared: 14-Oct-2020 Analyzed: 14-Oct-2020 15:54							
Total Organic Carbon	ND	0.50	0.50	mg/L							U
LCS (BIJ0447-BS1)				Prepared: 14-Oct-2020 Analyzed: 14-Oct-2020 16:12							
Total Organic Carbon	19.41	0.50	0.50	mg/L	20.00		97.1	90-110			

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	09-Nov-2020 14:20

Wet Chemistry - Quality Control

Batch BIJ0450 - No Prep Wet Chem

Instrument: TOC-LCSH Analyst: BF

QC Sample/Analyte	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BIJ0450-BLK1)				Prepared: 14-Oct-2020 Analyzed: 15-Oct-2020 05:18							
Dissolved Organic Carbon, Dissolved	ND	0.50	0.50	mg/L							U
LCS (BIJ0450-BS1)				Prepared: 14-Oct-2020 Analyzed: 15-Oct-2020 05:37							
Dissolved Organic Carbon, Dissolved	19.27	0.50	0.50	mg/L	20.00		96.4	90-110			
Duplicate (BIJ0450-DUP1)		**Source: 20I0500-11**		Prepared: 14-Oct-2020 Analyzed: 15-Oct-2020 06:19							
Dissolved Organic Carbon, Dissolved	ND	0.50	0.50	mg/L		ND					U
Matrix Spike (BIJ0450-MS1)		**Source: 20I0500-11**		Prepared: 14-Oct-2020 Analyzed: 15-Oct-2020 06:37							
Dissolved Organic Carbon, Dissolved	19.91	0.50	0.50	mg/L	20.00	ND	99.6	75-125			

Recovery limits for target analytes in MS/MSD QC samples are advisory only.

Matrix Spike Dup (BIJ0450-MSD1)		**Source: 20I0500-11**		Prepared: 14-Oct-2020 Analyzed: 15-Oct-2020 06:56							
Dissolved Organic Carbon, Dissolved	20.05	0.50	0.50	mg/L	20.00	ND	100	75-125	0.70	20	

Recovery limits for target analytes in MS/MSD QC samples are advisory only.

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	09-Nov-2020 14:20

Analysis by: Harold L. Benny & Associates, LLC.

Geotechnical Methods - Quality Control

Batch B110320 - No Prep Geo

Instrument: HLB& Analyst:

QC Sample/Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Duplicate (B110320-DUP1)	**Source: 20I0500-01**		Prepared: 03-Nov-2020 Analyzed: 03-Nov-2020 00:00							
Phi Size <-1	3.2	0.1	%		0.0		0-0	200.00		
Phi Size -1 to 0	11.6	0.1	%		1.8		0-0	146.30		
Phi Size 0 to 1	27.7	0.1	%		9.3		0-0	99.50		
Phi Size 1 to 2	30.8	0.1	%		30.7		0-0	0.30		
Phi Size 2 to 3	18.1	0.1	%		31.4		0-0	53.70		
Phi Size 3 to 4	6.0	0.1	%		18.2		0-0	100.80		
Phi Size 4 to 5	-	0.1	%		-		0-0	0.00		
Phi Size 5 to 6	-	0.1	%		-		0-0	0.00		
Phi Size 6 to 7	-	0.1	%		-		0-0	0.00		
Phi Size 7 to 8	-	0.1	%		-		0-0	0.00		
Phi Size 8 to 9	-	0.1	%		-		0-0	0.00		
Phi Size 9 to 10	-	0.1	%		-		0-0	0.00		
Phi Size >10	-	0.1	%		-		0-0	0.00		
Total Fines	2.7	0.1	%		8.6		0-0	104.40		
Triplicate (B110320-DUP2)	**Source: 20I0500-01**		Prepared: 03-Nov-2020 Analyzed: 03-Nov-2020 00:00							
Phi Size <-1	2.2	0.1	%		0.0		0-0	200.00		
Phi Size -1 to 0	9.6	0.1	%		1.8		0-0	136.80		
Phi Size 0 to 1	30.3	0.1	%		9.3		0-0	106.10		
Phi Size 1 to 2	31.1	0.1	%		30.7		0-0	1.30		
Phi Size 2 to 3	17.8	0.1	%		31.4		0-0	55.30		
Phi Size 3 to 4	6.3	0.1	%		18.2		0-0	97.10		
Phi Size 4 to 5	-	0.1	%		-		0-0	0.00		
Phi Size 5 to 6	-	0.1	%		-		0-0	0.00		
Phi Size 6 to 7	-	0.1	%		-		0-0	0.00		
Phi Size 7 to 8	-	0.1	%		-		0-0	0.00		
Phi Size 8 to 9	-	0.1	%		-		0-0	0.00		
Phi Size 9 to 10	-	0.1	%		-		0-0	0.00		
Phi Size >10	-	0.1	%		-		0-0	0.00		
Total Fines	2.7	0.1	%		8.6		0-0	104.40		

Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	09-Nov-2020 14:20

Certified Analyses included in this Report

Analyte	Certifications
EPA 300.0 in Water	
Chloride	DoD-ELAP,WADOE,NELAP
Chloride	DoD-ELAP,WADOE,WA-DW,NELAP
Chloride	DoD-ELAP,WADOE,WA-DW
Chloride	DoD-ELAP,WA-DW,NELAP
Nitrate-N	DoD-ELAP,WA-DW,NELAP
Nitrate-N	DoD-ELAP,WADOE,NELAP
Nitrate-N	DoD-ELAP,WADOE,WA-DW
Nitrate-N	DoD-ELAP,WADOE,WA-DW,NELAP
Sulfate	DoD-ELAP,WADOE,NELAP
Sulfate	DoD-ELAP,WA-DW,NELAP
Sulfate	DoD-ELAP,WADOE,WA-DW
Sulfate	DoD-ELAP,WADOE,WA-DW,NELAP
EPA 6020A in Solid	
Silver-107	NELAP,DoD-ELAP,WADOE
Silver-107	NELAP,DoD-ELAP
Silver-107	NELAP,DoD-ELAP,WADOE
Silver-107	DoD-ELAP,WADOE
Aluminum-27	NELAP,DoD-ELAP
Aluminum-27	DoD-ELAP
Aluminum-27	NELAP,DoD-ELAP
Aluminum-27	NELAP,DoD-ELAP
Beryllium-9	NELAP,DoD-ELAP,WADOE
Beryllium-9	NELAP,DoD-ELAP
Beryllium-9	DoD-ELAP,WADOE
Beryllium-9	NELAP,DoD-ELAP,WADOE
Chromium-52	DoD-ELAP,WADOE,ADEC
Chromium-52	NELAP,DoD-ELAP,WADOE,ADEC
Chromium-52	NELAP,DoD-ELAP,ADEC
Chromium-52	NELAP,DoD-ELAP,WADOE,ADEC
Chromium-53	NELAP,DoD-ELAP,WADOE,ADEC
Chromium-53	DoD-ELAP,WADOE,ADEC
Chromium-53	NELAP,DoD-ELAP,ADEC
Chromium-53	NELAP,DoD-ELAP,WADOE,ADEC
Iron-54	NELAP,DoD-ELAP,WADOE
Iron-54	DoD-ELAP,WADOE

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	09-Nov-2020 14:20

Iron-54	NELAP,DoD-ELAP
Iron-54	NELAP,DoD-ELAP,WADOE
Iron-57	NELAP,DoD-ELAP,WADOE
Iron-57	DoD-ELAP,WADOE
Iron-57	NELAP,DoD-ELAP
Iron-57	NELAP,DoD-ELAP,WADOE

EPA 6020A in Water

Silver-107	WADOE,WA-DW,DoD-ELAP
Silver-107	WADOE,DoD-ELAP,NELAP
Silver-107	WADOE,WA-DW,DoD-ELAP,NELAP
Silver-107	WA-DW,DoD-ELAP,NELAP
Aluminum-27	NELAP,WADOE,DoD-ELAP
Aluminum-27	NELAP,WADOE,DoD-ELAP
Aluminum-27	WADOE,DoD-ELAP
Aluminum-27	NELAP,DoD-ELAP
Barium-135	NELAP,WADOE,DoD-ELAP,ADEC
Barium-135	NELAP,DoD-ELAP,ADEC
Barium-135	WADOE,DoD-ELAP,ADEC
Barium-135	NELAP,WADOE,DoD-ELAP,ADEC
Barium-137	WADOE,DoD-ELAP,ADEC
Barium-137	NELAP,WADOE,DoD-ELAP,ADEC
Barium-137	NELAP,DoD-ELAP,ADEC
Barium-137	NELAP,WADOE,DoD-ELAP,ADEC
Calcium-44	NELAP,DoD-ELAP,WADOE
Calcium-44	NELAP,DoD-ELAP,WADOE
Calcium-44	NELAP,DoD-ELAP
Calcium-44	DoD-ELAP,WADOE
Chromium-52	NELAP,WADOE,DoD-ELAP,ADEC
Chromium-52	NELAP,WADOE,DoD-ELAP,ADEC
Chromium-52	NELAP,DoD-ELAP,ADEC
Chromium-52	WADOE,DoD-ELAP,ADEC
Chromium-53	NELAP,DoD-ELAP,ADEC
Chromium-53	NELAP,WADOE,DoD-ELAP,ADEC
Chromium-53	WADOE,DoD-ELAP,ADEC
Chromium-53	NELAP,WADOE,DoD-ELAP,ADEC
Iron-54	NELAP,WADOE,DoD-ELAP
Iron-54	NELAP,DoD-ELAP
Iron-54	WADOE,DoD-ELAP
Iron-54	NELAP,WADOE,DoD-ELAP

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	09-Nov-2020 14:20

Iron-57	NELAP,WADOE,DoD-ELAP
Iron-57	NELAP,DoD-ELAP
Iron-57	WADOE,DoD-ELAP
Iron-57	NELAP,WADOE,DoD-ELAP
Potassium-39	NELAP,DoD-ELAP,WADOE
Potassium-39	NELAP,DoD-ELAP
Potassium-39	NELAP,DoD-ELAP,WADOE
Potassium-39	DoD-ELAP,WADOE
Magnesium-24	NELAP,DoD-ELAP
Magnesium-24	NELAP,DoD-ELAP,WADOE
Magnesium-24	NELAP,DoD-ELAP,WADOE
Magnesium-24	DoD-ELAP,WADOE
Manganese-55	NELAP,WADOE,DoD-ELAP
Manganese-55	WADOE,DoD-ELAP
Manganese-55	NELAP,DoD-ELAP
Manganese-55	NELAP,WADOE,DoD-ELAP
Sodium-23	NELAP,WADOE,DoD-ELAP
Sodium-23	NELAP,WADOE,DoD-ELAP
Sodium-23	WADOE,DoD-ELAP
Sodium-23	NELAP,DoD-ELAP
Lead-208	NELAP,WADOE,DoD-ELAP,ADEC
Lead-208	WADOE,DoD-ELAP,ADEC
Lead-208	NELAP,DoD-ELAP,ADEC
Lead-208	NELAP,WADOE,DoD-ELAP,ADEC
Aluminum-27	NELAP,DoD-ELAP
Aluminum-27	NELAP,WADOE,DoD-ELAP
Aluminum-27	WADOE,DoD-ELAP
Aluminum-27	NELAP,WADOE,DoD-ELAP
Calcium-44	WA-DW,DoD-ELAP,NELAP
Calcium-44	WA-DW,DoD-ELAP
Calcium-44	WA-DW,DoD-ELAP,NELAP
Calcium-44	DoD-ELAP,NELAP
Iron-54	NELAP,DoD-ELAP
Iron-54	NELAP,WADOE,DoD-ELAP
Iron-54	NELAP,WADOE,DoD-ELAP
Iron-54	WADOE,DoD-ELAP
Iron-57	NELAP,WADOE,DoD-ELAP
Iron-57	NELAP,DoD-ELAP
Iron-57	NELAP,WADOE,DoD-ELAP

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	09-Nov-2020 14:20

Iron-57	WADOE,DoD-ELAP
Potassium-39	DoD-ELAP,WADOE
Potassium-39	NELAP,DoD-ELAP
Potassium-39	NELAP,DoD-ELAP,WADOE
Potassium-39	NELAP,DoD-ELAP,WADOE
Magnesium-24	NELAP,DoD-ELAP,WADOE
Magnesium-24	NELAP,DoD-ELAP,WADOE
Magnesium-24	DoD-ELAP,WADOE
Magnesium-24	NELAP,DoD-ELAP
Manganese-55	WADOE,DoD-ELAP
Manganese-55	NELAP,DoD-ELAP
Manganese-55	NELAP,WADOE,DoD-ELAP
Manganese-55	NELAP,WADOE,DoD-ELAP
Sodium-23	WADOE,DoD-ELAP,NELAP
Sodium-23	WADOE,DoD-ELAP
Sodium-23	DoD-ELAP,NELAP
Sodium-23	WADOE,DoD-ELAP,NELAP
Lead-208	NELAP,WADOE,DoD-ELAP,ADEC
Lead-208	WADOE,DoD-ELAP,ADEC
Lead-208	NELAP,DoD-ELAP,ADEC
Lead-208	NELAP,WADOE,DoD-ELAP,ADEC

EPA 6020A UCT-KED in Solid

Cadmium-111	NELAP,DoD-ELAP,WADOE,ADEC
Cadmium-111	NELAP,DoD-ELAP,WADOE,ADEC
Cadmium-111	NELAP,DoD-ELAP,ADEC
Cadmium-111	DoD-ELAP,WADOE,ADEC
Cadmium-114	NELAP,DoD-ELAP,ADEC
Cadmium-114	DoD-ELAP,WADOE,ADEC
Cadmium-114	NELAP,DoD-ELAP,WADOE,ADEC
Cadmium-114	NELAP,DoD-ELAP,WADOE,ADEC
Copper-63	NELAP,DoD-ELAP,WADOE
Copper-63	NELAP,DoD-ELAP,WADOE
Copper-63	DoD-ELAP,WADOE
Copper-63	NELAP,DoD-ELAP
Copper-65	DoD-ELAP,WADOE
Copper-65	NELAP,DoD-ELAP
Copper-65	NELAP,DoD-ELAP,WADOE
Copper-65	NELAP,DoD-ELAP,WADOE
Zinc-66	DoD-ELAP,WADOE

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601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
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Zinc-66	NELAP,DoD-ELAP
Zinc-66	NELAP,DoD-ELAP,WADOE
Zinc-66	NELAP,DoD-ELAP,WADOE
Zinc-67	NELAP,DoD-ELAP
Zinc-67	DoD-ELAP,WADOE
Zinc-67	NELAP,DoD-ELAP,WADOE
Zinc-67	NELAP,DoD-ELAP,WADOE

EPA 6020A UCT-KED in Water

Cadmium-111	NELAP,WADOE,DoD-ELAP,ADEC
Cadmium-111	WADOE,DoD-ELAP,ADEC
Cadmium-111	NELAP,DoD-ELAP,ADEC
Cadmium-111	NELAP,WADOE,DoD-ELAP,ADEC
Cadmium-114	NELAP,WADOE,DoD-ELAP,ADEC
Cadmium-114	NELAP,DoD-ELAP,ADEC
Cadmium-114	WADOE,DoD-ELAP,ADEC
Cadmium-114	NELAP,WADOE,DoD-ELAP,ADEC
Copper-63	NELAP,WADOE,DoD-ELAP
Copper-63	WADOE,DoD-ELAP
Copper-63	NELAP,DoD-ELAP
Copper-63	NELAP,WADOE,DoD-ELAP
Copper-65	NELAP,DoD-ELAP
Copper-65	WADOE,DoD-ELAP
Copper-65	NELAP,WADOE,DoD-ELAP
Copper-65	NELAP,WADOE,DoD-ELAP
Zinc-66	WADOE,WA-DW,DoD-ELAP
Zinc-66	WADOE,WA-DW,DoD-ELAP
Zinc-66	WA-DW,DoD-ELAP
Zinc-66	WADOE,DoD-ELAP
Zinc-67	WA-DW,DoD-ELAP
Zinc-67	WADOE,WA-DW,DoD-ELAP
Zinc-67	WADOE,WA-DW,DoD-ELAP
Zinc-67	WADOE,DoD-ELAP
Cadmium-111	NELAP,WADOE,DoD-ELAP,ADEC
Cadmium-111	NELAP,WADOE,DoD-ELAP,ADEC
Cadmium-111	WADOE,DoD-ELAP,ADEC
Cadmium-111	NELAP,DoD-ELAP,ADEC
Cadmium-114	NELAP,WADOE,DoD-ELAP,ADEC
Cadmium-114	WADOE,DoD-ELAP,ADEC
Cadmium-114	NELAP,DoD-ELAP,ADEC

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	09-Nov-2020 14:20

Cadmium-114	NELAP,WADOE,DoD-ELAP,ADEC
Copper-63	NELAP,WADOE,DoD-ELAP
Copper-63	WADOE,DoD-ELAP
Copper-63	NELAP,DoD-ELAP
Copper-63	NELAP,WADOE,DoD-ELAP
Copper-65	NELAP,WADOE,DoD-ELAP
Copper-65	NELAP,DoD-ELAP
Copper-65	WADOE,DoD-ELAP
Copper-65	NELAP,WADOE,DoD-ELAP
Zinc-66	WADOE,DoD-ELAP
Zinc-66	NELAP,DoD-ELAP
Zinc-66	NELAP,WADOE,DoD-ELAP
Zinc-66	NELAP,WADOE,DoD-ELAP
Zinc-67	NELAP,WADOE,DoD-ELAP
Zinc-67	WADOE,DoD-ELAP
Zinc-67	NELAP,DoD-ELAP
Zinc-67	NELAP,WADOE,DoD-ELAP
EPA 9060A m in Solid	
Total Organic Carbon	WADOE
Total Organic Carbon	
Total Organic Carbon	WADOE
Total Organic Carbon	WADOE
SM 2320 B-97 in Water	
Alkalinity, Bicarbonate	NELAP,WA-DW,DoD-ELAP
Alkalinity, Bicarbonate	NELAP,WADOE,DoD-ELAP
Alkalinity, Bicarbonate	WADOE,WA-DW,DoD-ELAP
Alkalinity, Bicarbonate	NELAP,WADOE,WA-DW,DoD-ELAP
Alkalinity, Carbonate	WADOE,WA-DW,DoD-ELAP
Alkalinity, Carbonate	WA-DW,DoD-ELAP,NELAP
Alkalinity, Carbonate	WADOE,WA-DW,DoD-ELAP,NELAP
Alkalinity, Carbonate	WADOE,DoD-ELAP,NELAP
Alkalinity, Hydroxide	WADOE,WA-DW,DoD-ELAP,NELAP
Alkalinity, Hydroxide	WADOE,WA-DW,DoD-ELAP
Alkalinity, Hydroxide	WA-DW,DoD-ELAP,NELAP
Alkalinity, Hydroxide	WADOE,DoD-ELAP,NELAP
Alkalinity, Total	DoD-ELAP,WADOE,WA-DW,NELAP
Alkalinity, Total	DoD-ELAP,WADOE,WA-DW
Alkalinity, Total	DoD-ELAP,WA-DW,NELAP
Alkalinity, Total	DoD-ELAP,WADOE,NELAP

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	09-Nov-2020 14:20

SM 2540 C-97 in Water

Dissolved Solids	DoD-ELAP,WA-DW,NELAP
Dissolved Solids	DoD-ELAP,WADOE,WA-DW,NELAP
Dissolved Solids	DoD-ELAP,WADOE,WA-DW
Dissolved Solids	DoD-ELAP,WADOE,NELAP

SM 2540 D-97 in Water

Suspended Solids	DoD-ELAP,WADOE
Suspended Solids	DoD-ELAP,NELAP
Suspended Solids	DoD-ELAP,WADOE,NELAP
Suspended Solids	DoD-ELAP,WADOE,NELAP

SM 4500-S2 D-00 (AVS) in Solid

Sulfide	NELAP,DoD-ELAP
Sulfide	WADOE,NELAP,DoD-ELAP
Sulfide	WADOE,DoD-ELAP
Sulfide	WADOE,NELAP,DoD-ELAP

SM 5310 B-00 in Water

Dissolved Organic Carbon	WADOE,WA-DW,NELAP
Dissolved Organic Carbon	WADOE,NELAP
Dissolved Organic Carbon	WA-DW,NELAP
Dissolved Organic Carbon	WADOE,WA-DW
Total Organic Carbon	WADOE,NELAP
Total Organic Carbon	WA-DW,NELAP
Total Organic Carbon	WA-DW,WADOE
Total Organic Carbon	WA-DW,WADOE,NELAP

Code	Description	Number	Expires
ADEC	Alaska Dept of Environmental Conservation	17-015	01/31/2021
DoD-ELAP	DoD-Environmental Laboratory Accreditation Program	66169	01/01/2021

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Floyd - Snider	Project: Rio Tinto Holden Mine Reclamation/Remediation	
601 Union Street Two Union Square, Suite 600	Project Number: RT-Holden	**Reported:**
Seattle WA, 98101-2341	Project Manager: Amanda McKay	09-Nov-2020 14:20

Notes and Definitions

*	Flagged value is not within established control limits.
B	This analyte was detected in the method blank.
D	The reported value is from a dilution
H	Hold time violation - Hold time was exceeded.
HC	The natural concentration of the spiked analyte is so much greater than the concentration spiked that an accurate determination of spike recovery is not possible
J	Estimated concentration value detected below the reporting limit.
L	Analyte concentration is <=5 times the reporting limit and the replicate control limit defaults to +/- RL instead of 20% RPD
U	This analyte is not detected above the reporting limit (RL) or if noted, not detected above the limit of detection (LOD).
DET	Analyte DETECTED
ND	Analyte NOT DETECTED at or above the reporting limit
NR	Not Reported
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference
[2C]	Indicates this result was quantified on the second column on a dual column analysis.

AQUATIC TOXICOLOGY REPORT

Project Name: FLOYD SNIDER

Location: SEATTLE, WASHINGTON

Prepared by: Eurofins TestAmerica - Corvallis
(aka TestAmerica – ASL)

1100 NE Circle Boulevard, Suite 310
Corvallis, Oregon 97330
541-243-6137

accredited in accordance with NELAP

Oregon Environmental Laboratory Accreditation Program #OR100022 (NELAP)
State of Washington DOE Environmental Laboratory Accreditation Program, Lab ID C556
California State Environmental Laboratory Accreditation Program, Certificate No.: 1726

Report Date: December 22, 2020 Released by: Michelle Bennett
Revision 1 Report Date: January 5, 2021 Released by: Michelle Bennett

Lab I.D. No. B4808

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LABORATORY CONTACT: Alise Lampi, Aquatic Toxicity Department Manager
Alyssa.Lampi@eurofinset.com (541) 243-0964

INTRODUCTION

Eurofins TestAmerica – Corvallis (ET-C) Aquatic Toxicology Laboratory conducted toxicity testing on sample(s) from Floyd Snider, Seattle, Washington.

Testing was initiated on: October, 2020

The test(s) were conducted using:

- the chironomid (*Chironomus tentans*)
- the amphipod (*Hyallela azteca*)

Note: A revised report is being issued January 5, 2021 to address the dissolved oxygen levels that fell below the EPA recommendation of 2.5 mg/L.

SUMMARY OF TEST RESULTS

Exhibits 1 and 2 provide a summary of the final test results.

EXHIBIT 1
Summary of 10 day Chironomid Test Results

Sample ID	Lab ID	Sample vs. Lab Control	Sample vs. RC-1 Background	Sample vs. RC-6 Background
LB-1-SS-092720	B4808-01	Non-significant	Non-significant	Non-significant
LB-2-SS-092720	B4808-02	Significant	Non-significant	Non-significant
RC-10-SS-092720	B4808-03	Significant	Non-significant	Non-significant
RC-5A-SS-092620	B4808-04	Significant	Non-significant	Significant
RC-4-SS-092620	B4808-05	Significant	Non-significant	Non-significant
RC-1-SS-092620	B4808-06	Significant	NA	Non-significant
RC-2(S6-7)-SS-092920	B4808-07	Non-significant	Non-significant	Non-significant
RC-6-SS-092920	B4808-08	Non-significant	Non-significant	NA

Note: NA – Not Available

Acronyms are as defined below.

More detailed information is provided in the Results and Discussion section.

EXHIBIT 2

Summary of 28 day Hyallela Test Results

Sample ID	Lab ID	Endpoint	Sample vs. Lab Control	Sample vs. RC-1 Background	Sample vs. RC-6 Background
LB-1-SS-092720	B4808-01	Survival	Significant	Significant	Significant
		Growth	Significant	Significant	Significant
LB-2-SS-092720	B4808-02	Survival	Significant	Significant	Significant
		Growth	Significant	Non-significant	Significant
RC-10-SS-092720	B4808-03	Survival	Significant	Non-significant	Significant
		Growth	Significant	Significant	Significant
RC-5A-SS-092620	B4808-04	Survival	Significant	Non-significant	Significant
		Growth	Significant	Non-significant	Significant
RC-4-SS-092620	B4808-05	Survival	Significant	Significant	Significant
		Growth	Significant	Significant	Significant
RC-1-SS-092620	B4808-06	Survival	Significant	NA	Significant
		Growth	Significant	NA	Significant
RC-2(S6-7)-SS-092920	B4808-07	Survival	Non-significant	Non-significant	Non-significant
		Growth	Significant	Non-significant	Non-significant
RC-6-SS-092920	B4808-08	Survival	Non-significant	Non-significant	NA
		Growth	Significant	Non-significant	NA

Note: NA – Not Available

Acronyms are as defined below.

More detailed information is provided in the Results and Discussion section.

ACRONYM DEFINITIONS (from EPA guidance):

NOEC = No Observed Effect Concentration: The highest test concentration that causes no observable adverse effects on the test organisms (i.e. no statistically significant reduction from the control).

LOEC = Low Observed Effect Concentration: The lowest test concentration that does cause an observable adverse effect on the test organisms (i.e. is statistically significant reduction from the control).

METHODS AND MATERIALS

TEST METHODS

The tests were performed according to: *Methods for Measuring the Toxicity and Bioaccumulation of Sediment-associated Contaminants with Freshwater Invertebrates*, Second Edition, EPA 600/R-99/064 (EPA 2000). (Most recent update to the EPA 600/R-94/024 method sited in the permit)

- Method 100.4 (*H. azteca*) - abbreviated
- Method 100.5 (*C. tentans*) - abbreviated

- Note: The test species *Chironomus dilutus* and *Chironomus tentans* are synonymous.

DEVIATIONS FROM PROTOCOLS

Deviations from <u>required</u> procedures in the test methods:

- None noted.

Deviations from <u>recommended</u> procedures in the test methods:

- The dissolved oxygen levels concentration in the *C. tentans* 10-day test dropped below the <u>recommended</u> minimum of 2.5 mg/L. See the Results and Discussion section for further information.

TEST DESIGN

The following summarizes the conditions used for both overall testing and the specifics for each test (observations and notations can be found on the datasheets in Appendix A):

<u>Overall Test Design:</u>

- Chronic tests: sample + dilution sediment for the control.

<u>Test Organism Conditions:</u>

- All organisms tested were fed and maintained during culturing, acclimation, and testing as prescribed by the EPA (2002).
- The test organisms appeared vigorous and in good condition prior to testing.

<u>*C. tentans* 10-day sediment test:</u>

- Source: Aquatic Biosystems, Fort Collins, Colorado
- Age: 2nd to 3rd instar (~10 days old)
- Design: Eight test vessels per sample (a minimum of 4), ten organisms per vessel
  - 100 ml of sediment per vessel.
  - 175 ml of overlying water (Reconstituted Moderately Hard water)
- Overlying Water Renewal: Twice Daily
- Monitoring:
  - Initiation and Termination: Hardness, Alkalinity, Ammonia, DO, pH, Conductivity, and Temperature in the overlying water.

    - Daily: DO and Temperature in pre-renewal solutions in the overlying water, all concentrations.
    - Termination: Survival and Ash-Free Dry Weight (AFDW).
- Feeding: 1.5 ml of a 4 g/L TetraMin slurry per vessel daily.
- Termination: 10 days after test initiation.
- Endpoints: Survival and AFDW (average AFDW per surviving organism)

H. azteca 28-day sediment test:

- Source: Aquatic Research Organisms, Hampton, New Hampshire
- Age: ~ 9 to 10 days old @ test initiation
- Design:
    - Eight test vessels (4 minimum) per sample, ten organisms per vessel.
    - 100 ml Sediment with ~ 175 ml of overlying water
    - Chambers set up 1 day prior to Test Initiation
- Overlying Water Renewal: Twice daily (including once prior to Test Initiation)
- Feeding: 1.0 ml YCT daily following the evening renewal
- Monitoring:
    - Test Initiation: Ammonia, hardness, alkalinity, DO, pH, and Conductivity, all concentrations
    - Daily: pH and temperature; all concentrations.
    - Test Termination: Ammonia, hardness, alkalinity, DO, pH, Conductivity, Survival, and Growth (dry weight) all concentrations.
    - Test Duration: 28 days
- Endpoints: Survival (at termination) and Growth (dry weight, per surviving individual)

CONTROL SEDIMENT AND OVERLAYING WATER

The dilution water used was the standard culture water used by ET-C:

- Reconstituted, moderately hard water (as per EPA protocol) with a total hardness of 75 to 105 mg/L as $CaCO_3$ and an alkalinity of 50 to 75 mg/L as $CaCO_3$.

The dilution sediment used was field collected sediment from Beaver Creek, upstream of Yaquina bay, near the town of Newport, Oregon.

- The Beaver Creek sediment was press sieved to remove indigenous organisms.

SAMPLE COLLECTION AND STORAGE

Samples were collected by Floyd Snider personnel. The samples were accepted as scheduled by ET-C. Chain of Custody and Sample Receipt Records are provided in Appendix C.

- Following receipt, the samples were stored in the dark at 0 to 6 °C until test solutions were prepared and tested.
- The stock solutions made, were stored at ambient room temperature prior to testing.

SAMPLE PREPARATION

Samples used during these tests were homogenized and evenly distributed among the test chambers.

DATA ANALYSIS

The statistical analyses performed for the acute tests were those outlined in *Methods for Measuring the Toxicity and Bioaccumulation of Sediment-associated Contaminants with Freshwater Invertebrates*, Second Edition, EPA 600/R-99/064

- The specific statistical analysis and CETIS version used for each endpoint evaluation is listed with the statistical outputs included with each test in Appendix A.
- If any additional analysis methods were also used, an explanation of the rationale and reference to the source method is included with the presentation of those results below.

RESULTS AND DISCUSSION

The raw data sheets for all tests are presented in Appendix A.

CHRONIC BIOASSAYS

Table 1 summarizes the survival and growth data for the *C. tentans* chronic test.

Table 1
Summary of Results
C. tentans

Sample ID (all concentrations @ 100%)	Lab ID	Percent Survival
Control		95.0
LB-1-SS-092720	B4808-01	91.3
LB-2-SS-092720	B4808-02	85.0 [a]
RC-10-SS-092720	B4808-03	81.3 [a]
RC-5A-SS-092620	B4808-04	68.8 [a, c]
RC-4-SS-092620	B4808-05	85.0 [a]
RC-1-SS-092620	B4808-06	82.5 [a]
RC-2(S6-7)-SS-092920	B4808-07	95.0
RC-6-SS-092920	B4808-08	86.3

[a] Indicates a statistically significant difference from the lab control at alpha = 0.05.
[b] Indicates a statistically significant difference from RC-1 background site at alpha = 0.05.
[c] Indicates a statistically significant difference from RC-6 background site at alpha = 0.05.

Note: The dissolved oxygen (DO) levels concentration in the *C. tentans* test dropped below the recommended minimum of 2.5 mg/L on days 8 and 9 in the control sample concentration. However, it should be noted that there was no statistically significant effect observed in the effected sample concentration. As such, the low DO levels did not appear to have significantly affected test results.

Daily mean test temperatures remained at 23±1°C, and instantaneous temperatures remained at 23±3°C, for the test. Other than noted, the dissolved oxygen levels in the tests remained above the EPA recommended minimum 2.5 mg/L throughout the test period.

The *C. tentans* test meets the required Test Acceptability Criteria (TAC) of a minimum 0.48 gm per surviving larvae in the control. The test meets the recommended TAC of a 70 percent survival in the control. The test proceeded without any noted deviations or interruptions.

Table 2 summarizes the survival and growth data for the *H. azteca* chronic test.

Table 2
Summary of Chronic Results
H. azteca

Sample ID (all concentrations @ 100%)	Lab ID	Percent Survival	Mean Dry Weight Per Surviving Organism (mg)
Control	NA	91.3	0.696
LB-1-SS-092720	B4808-01	51.3 [a, b, c]	0.070 [a, b, c]
LB-2-SS-092720	B4808-02	51.3 [a, b, c]	0.084 [a, c]
RC-10-SS-092720	B4808-03	68.8 [a, c]	0.076 [a, b, c]
RC-5A-SS-092620	B4808-04	77.5 [a, c]	0.096 [a, c]
RC-4-SS-092620	B4808-05	30.0 [a, b, c]	0.037 [a, b, c]
RC-1-SS-092620	B4808-06	75.0 [a, c]	0.103 [a, c]
RC-2(S6-7)-SS-092920	B4808-07	83.8	0.125 [a]
RC-6-SS-092920	B4808-08	90.0	0.128 [a]

[a] Indicates a statistically significant difference from the lab control at alpha = 0.05.
[b] Indicates a statistically significant difference from RC-1 background site at alpha = 0.05.
[c] Indicates a statistically significant difference from RC-6 background site at alpha = 0.05.

Daily mean test temperatures remained at 23±1°C, and instantaneous temperatures remained at 23±3°C, for the tests. The dissolved oxygen levels in the tests remained above the EPA recommended minimum 2.5 mg/L throughout the test period.

The *H. azteca* test meets Test Acceptability Criteria (TAC) of a minimum 80 percent control survival and measureable growth (initial dry weights were 0.0607 mg). Unless referenced above, the tests proceeded without any noted deviations or interruptions that could have affected test results. The testing should be considered "valid".

REFERENCE TOXICANT TESTS

Reference toxicant (reftox) testing is performed to document both initial and ongoing laboratory performance of the test method(s). While the health of the test organisms is primarily evaluated by the performance of the laboratory control, reftox test results also may be used to assess the health and sensitivity of the test organisms. Reftox test results within their respective cumulative summary (Cusum) chart limits are indicative of consistent laboratory performance and normal test organism sensitivity.

The results of the reftox tests indicate that the test organisms were within their respective cusum chart limits based on EPA guidelines. This demonstrates ongoing laboratory proficiency of the test methods and suggests normal test organism sensitivity in the associated client testing.

The *C. tentans* and *H. azteca* reftox tests were conducted using potassium chloride. The data sheets for the reference toxicant tests are provided in Appendix B.

Table 3 summarizes the reference toxicant test results and Cusum chart limits.

Table 3
Acute Reference Toxicant Tests (g/L)

Species	LC_{50}	Cusum Chart Limits
Chironomus tentans	3.41	2.70 to 7.05
Hyalella azteca	0.356	0.232 to 0.456

Holden Mine Site

Performance Standards Verification
2020 Annual Compliance Assessment Report

Appendix C
Electronic Data Deliverable of
2020 Monitoring Data
(provided as a separate file)

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Holden Mine Site

Performance Standards Verification
2020 Annual Compliance Assessment Report

Appendix D
Summer and Fall 2020
Data Validation Report
(to be added)

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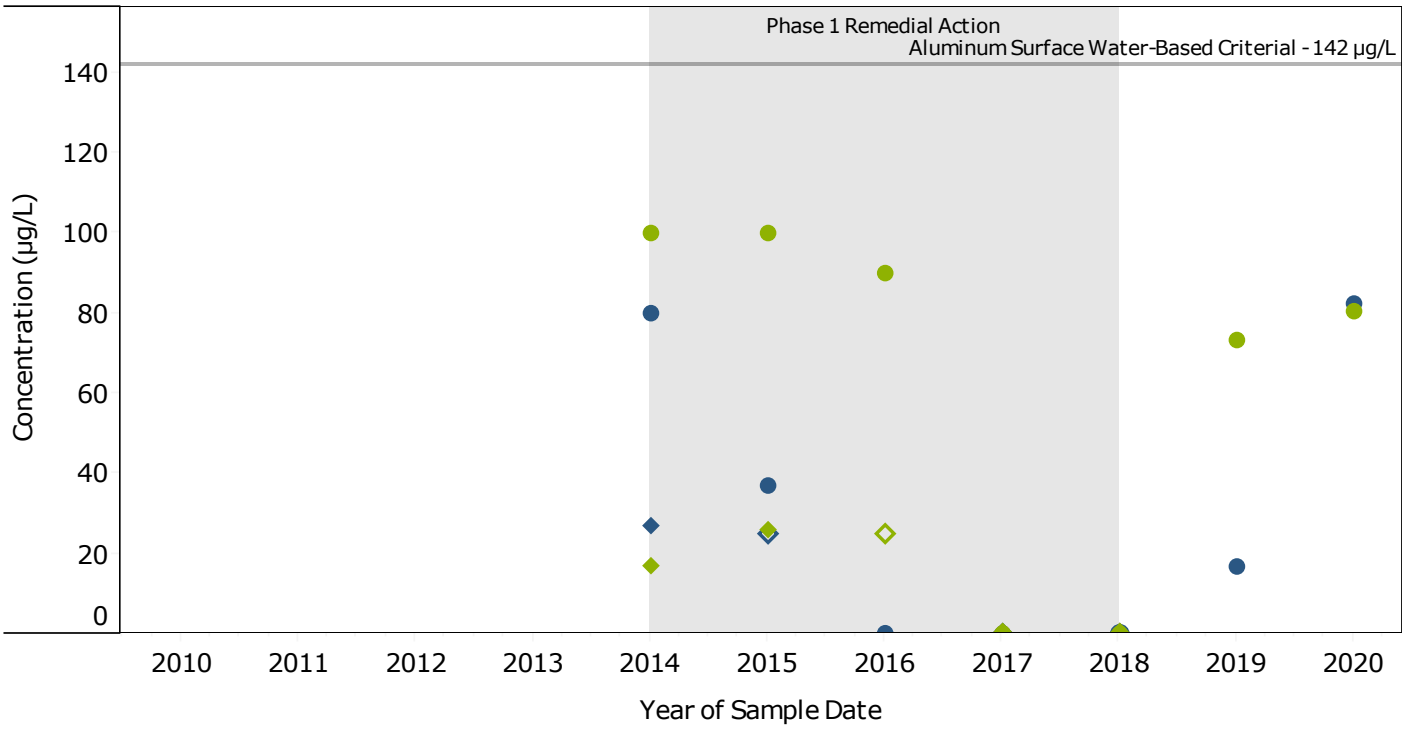
Holden Mine Site

Performance Standards Verification
2020 Annual Compliance Assessment Report

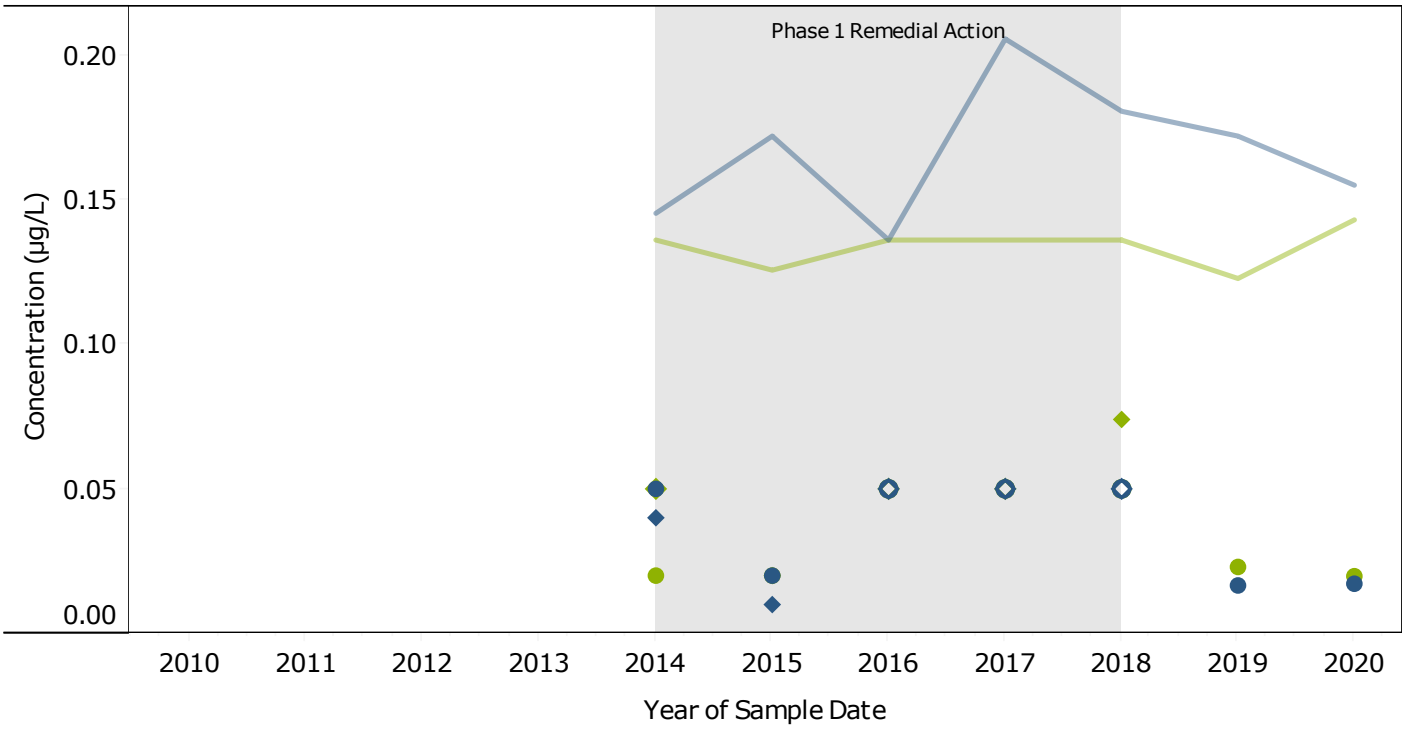
Appendix E
Time-Concentration Plots

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RC-1, Aluminum



RC-1, Cadmium



Legend

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

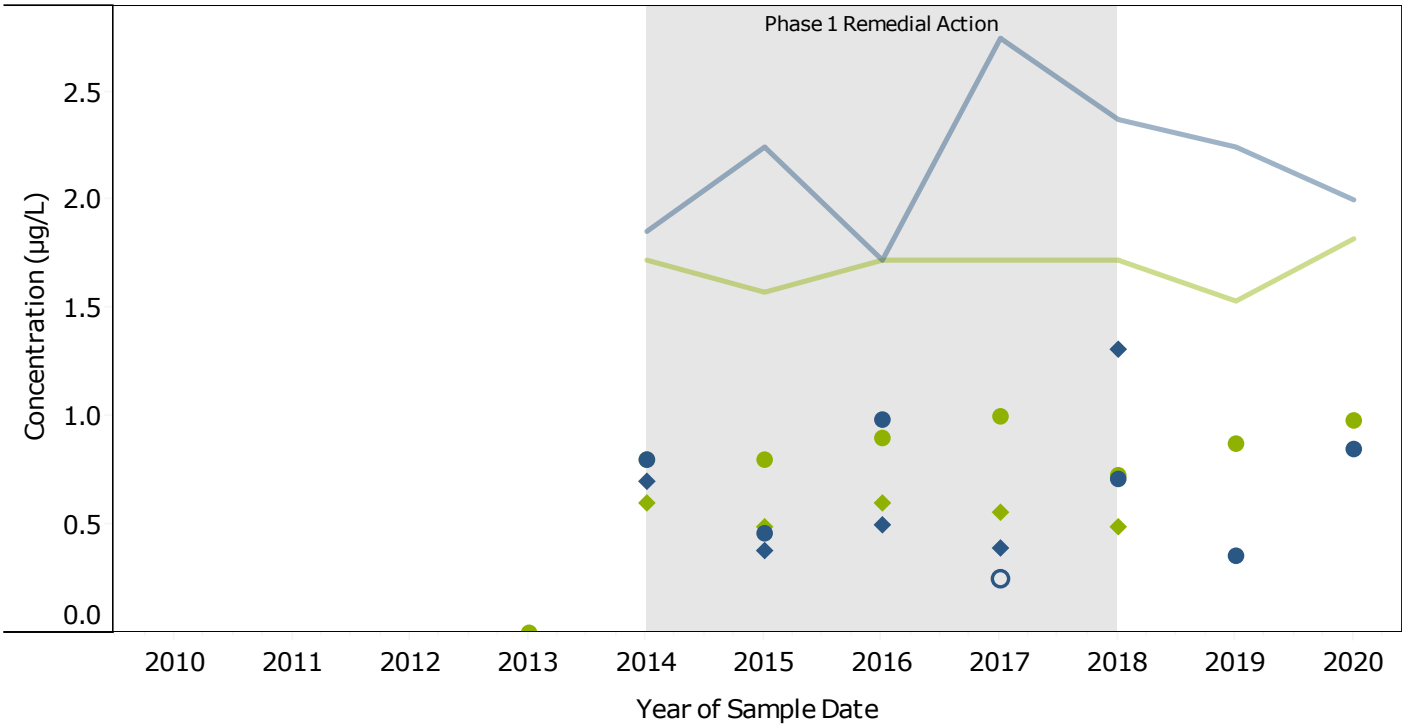
Non-Detect Results
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- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

- Hardness-adjusted surface water criteria based on spring data
- Hardness-adjusted surface water criteria based on fall data

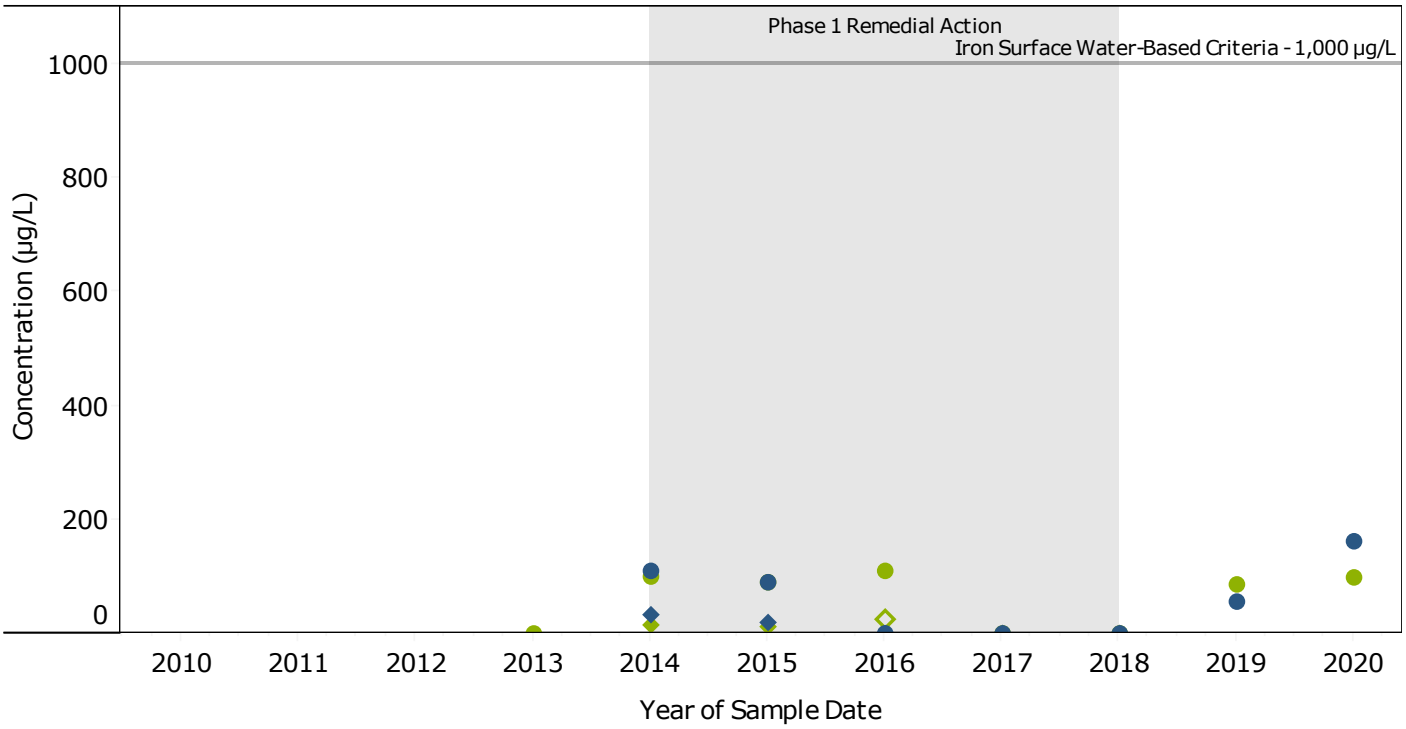
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

RC-1, Copper



RC-1, Iron



Legend

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

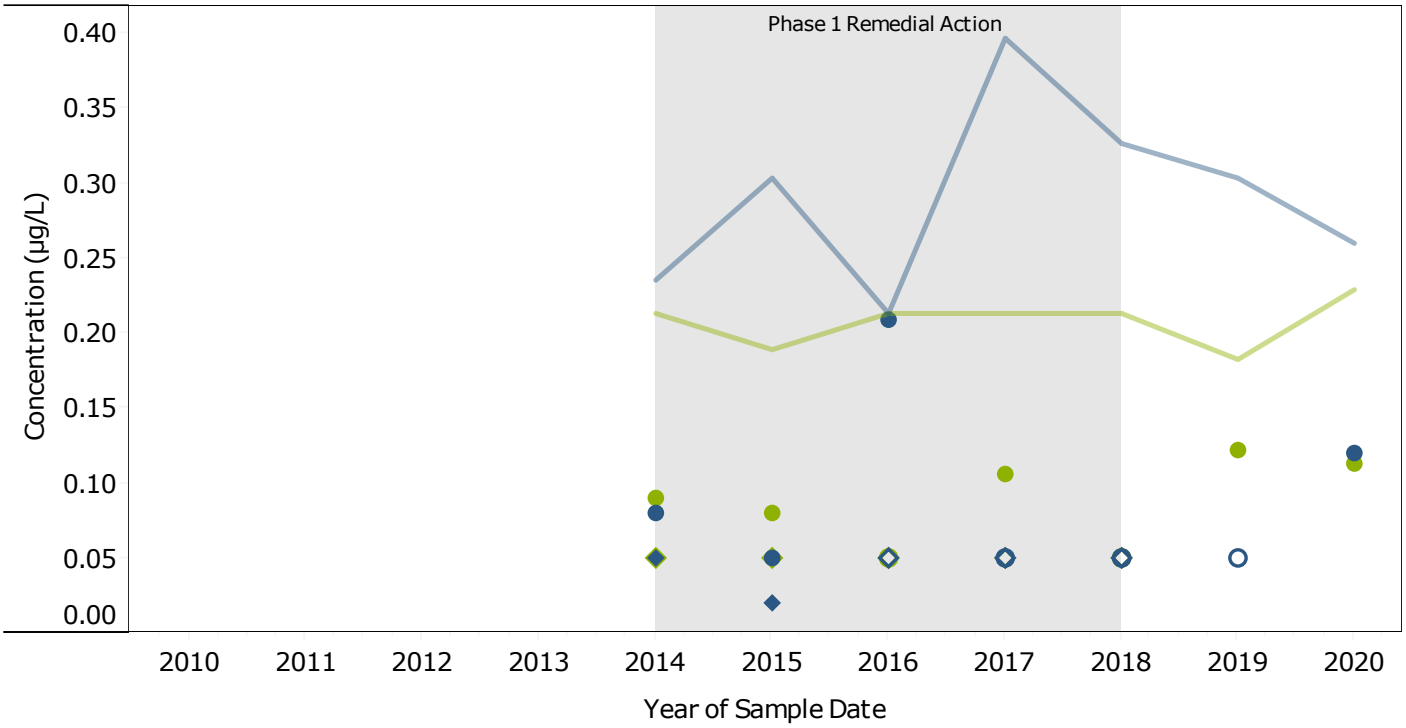
Non-Detect Results
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- Fall Sample, Dissolved

- Hardness-adjusted surface water criteria based on spring data
- Hardness-adjusted surface water criteria based on fall data

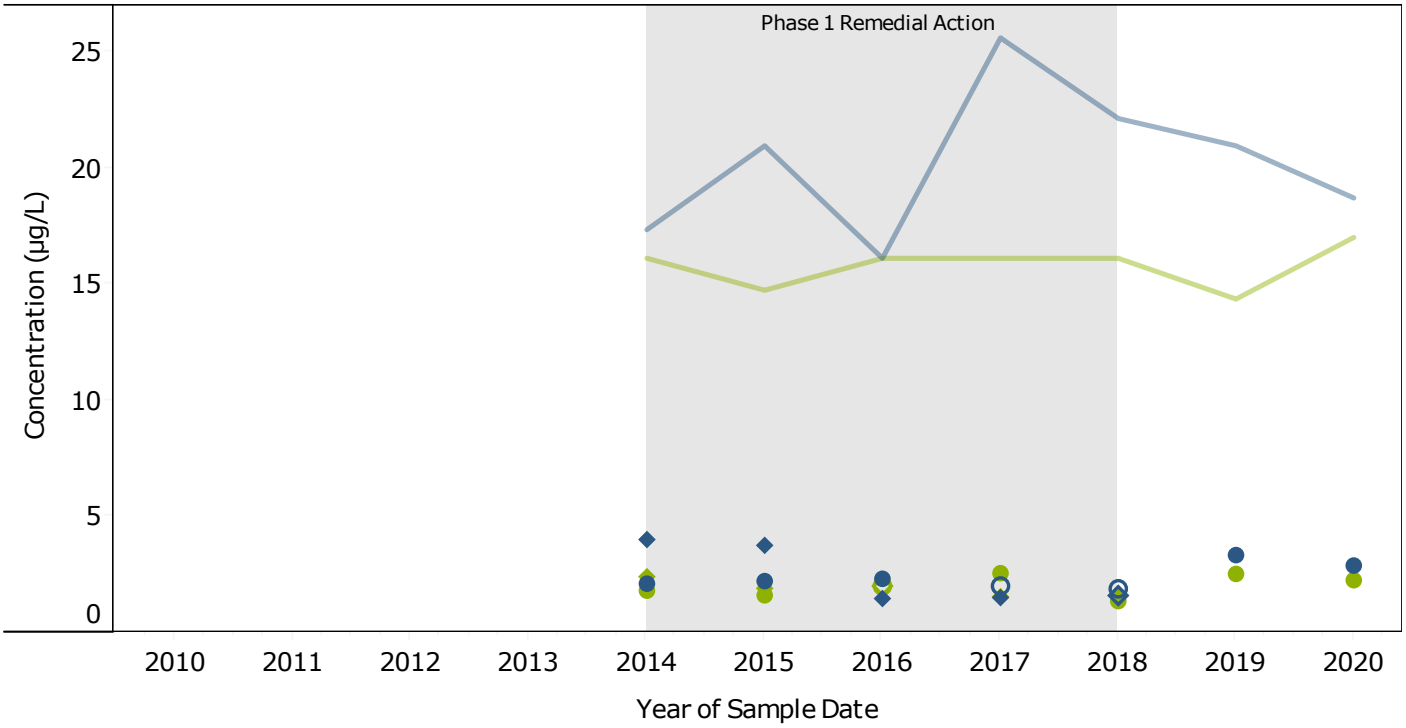
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-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

RC-1, Lead



RC-1, Zinc



Legend

Detect Results
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- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

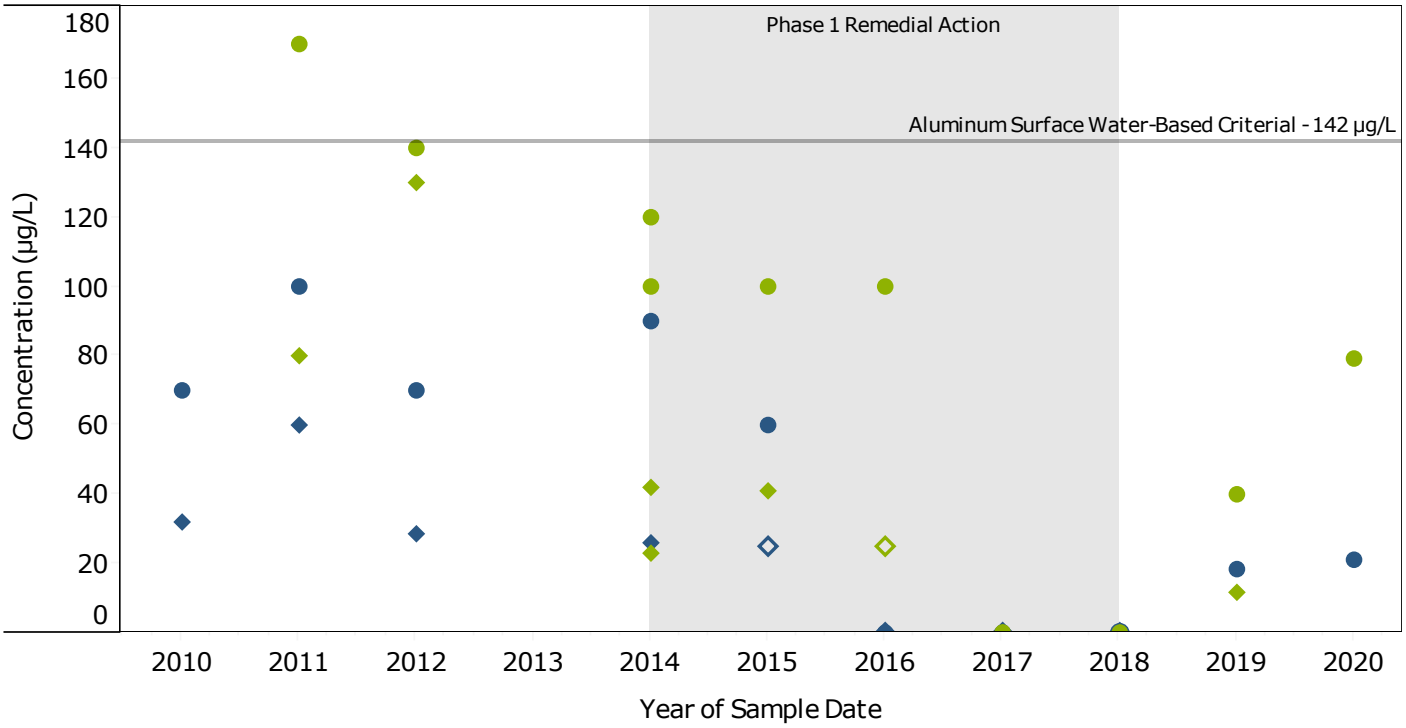
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- Fall Sample, Total
- Fall Sample, Dissolved

- Hardness-adjusted surface water criteria based on spring data
- Hardness-adjusted surface water criteria based on fall data

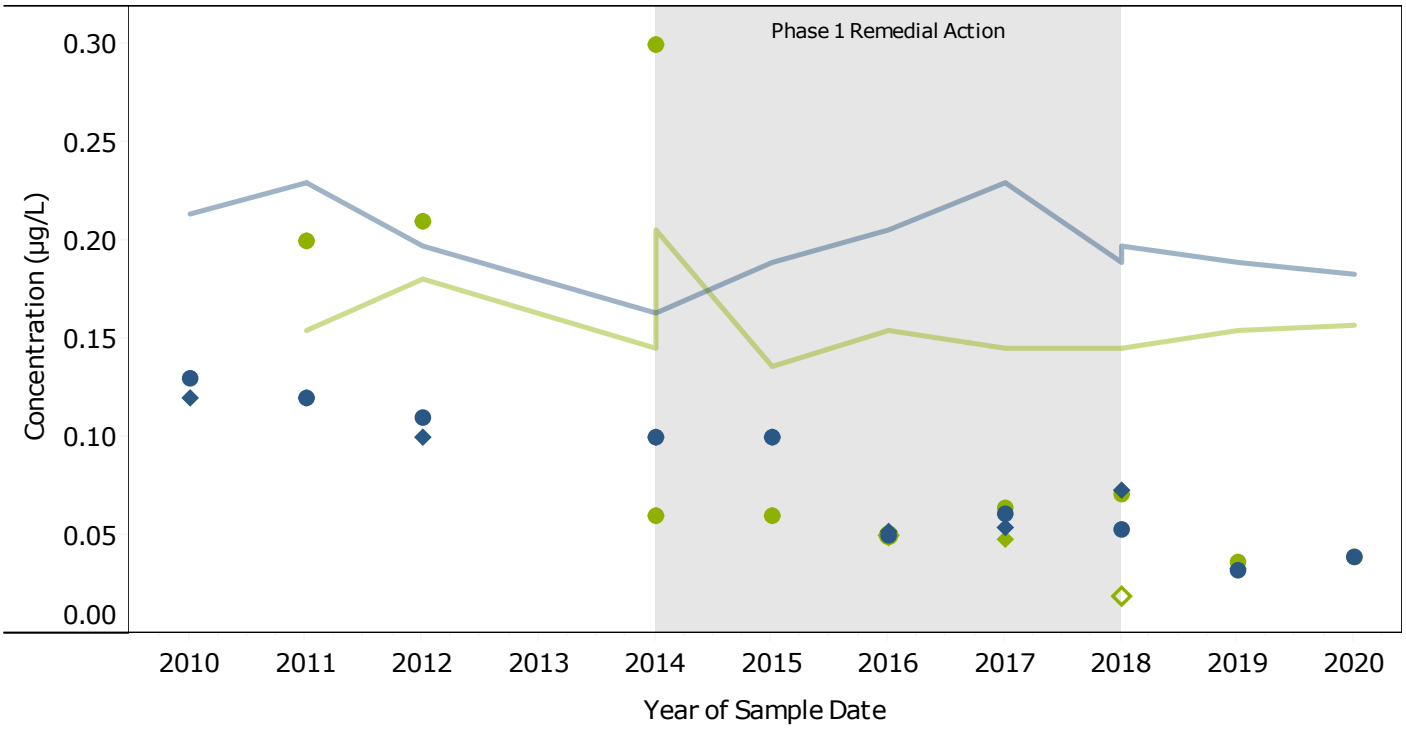
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-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

RC-2 (SG-7), Aluminum



RC-2 (SG-7), Cadmium



Legend

Detect Results
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- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

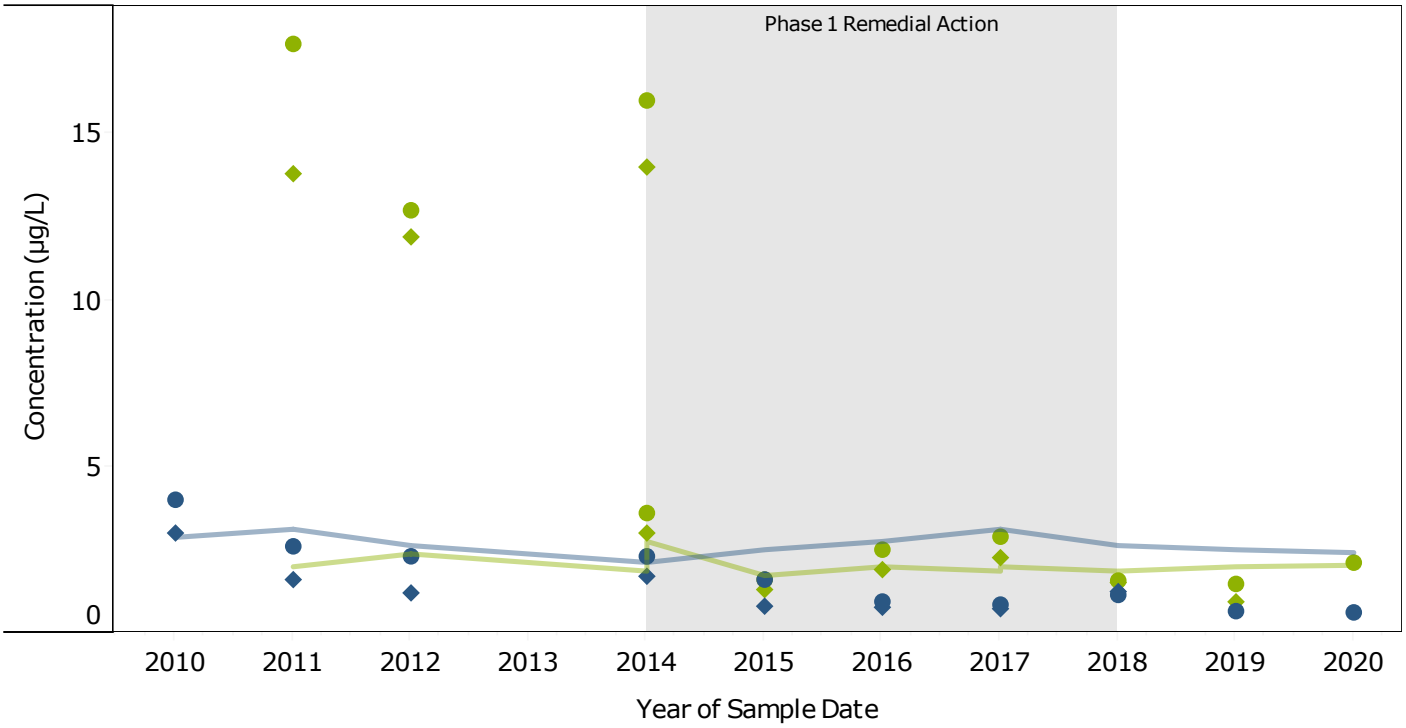
Non-Detect Results
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- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

- Hardness-adjusted surface water criteria based on spring data
- Hardness-adjusted surface water criteria based on fall data

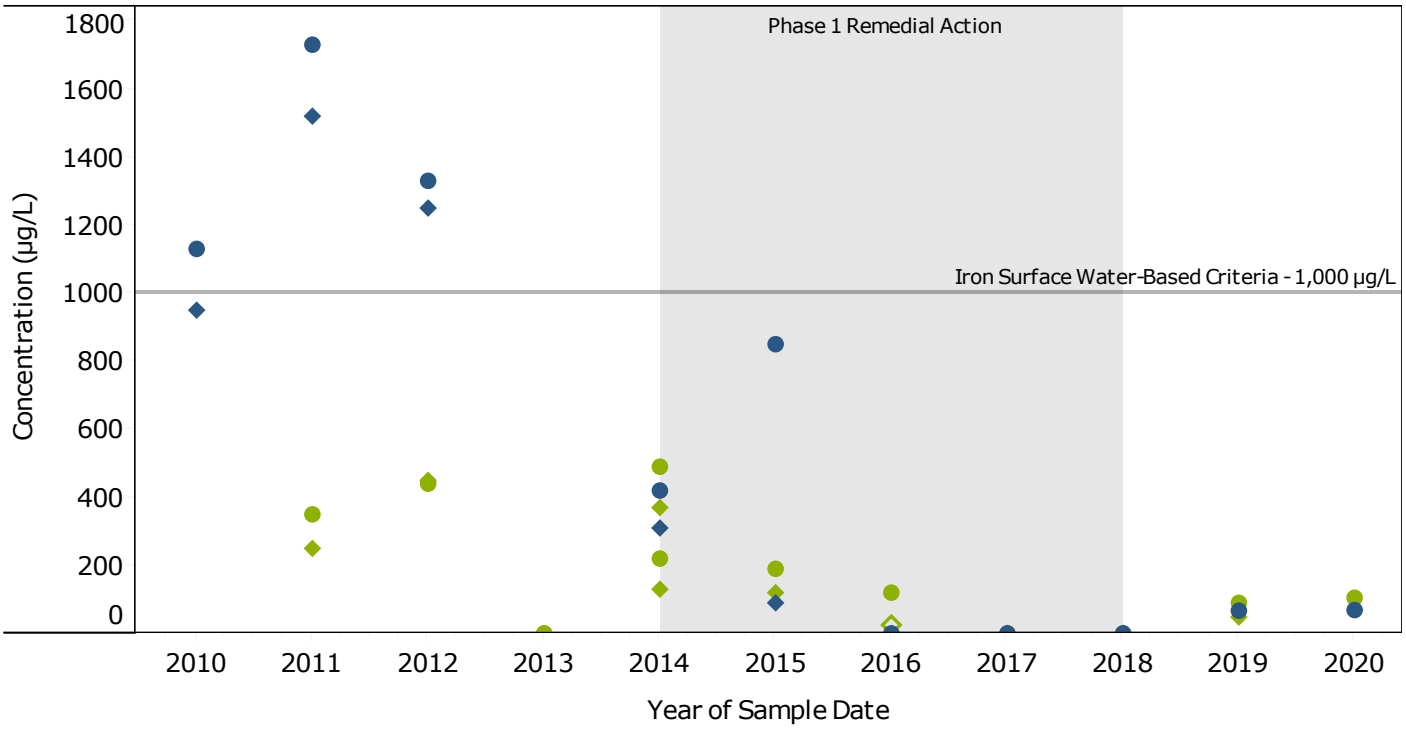
Notes:
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-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

RC-2 (SG-7), Copper



RC-2 (SG-7), Iron



Legend

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

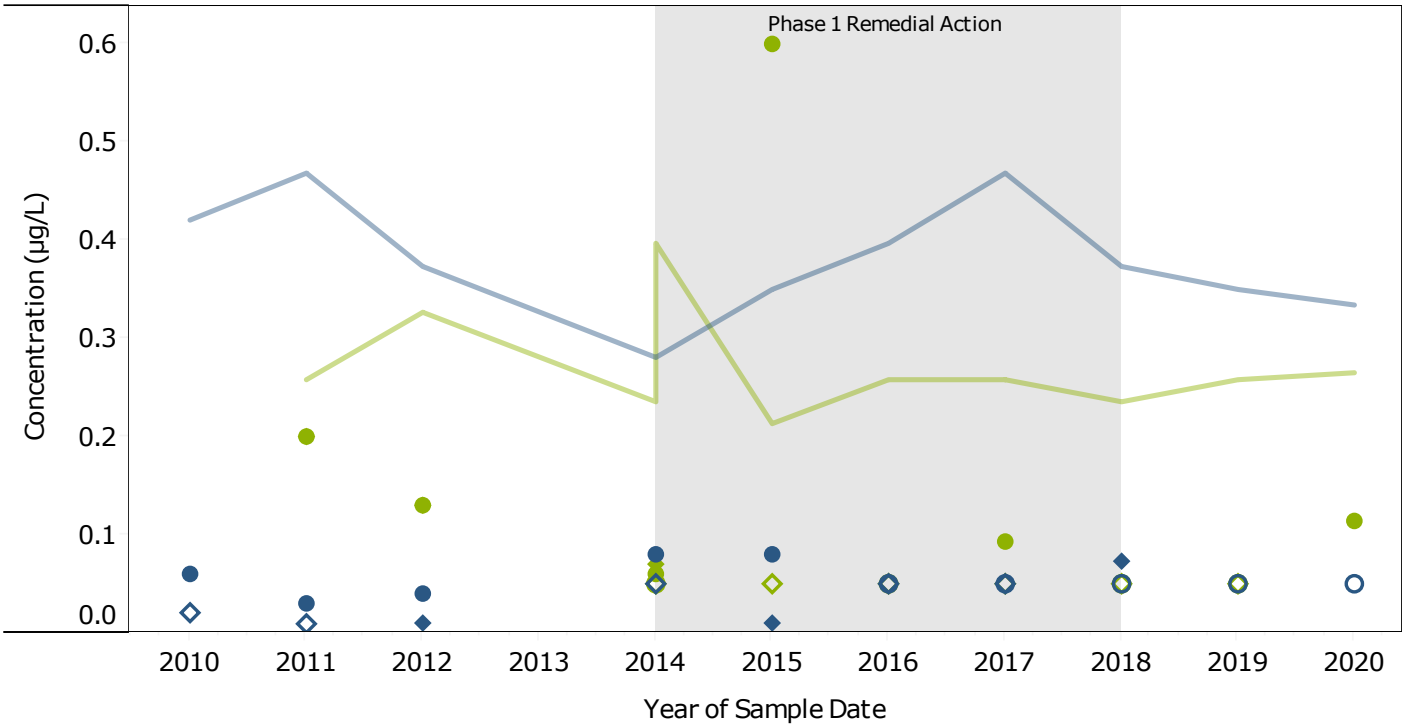
Non-Detect Results
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- Fall Sample, Total
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- Hardness-adjusted surface water criteria based on spring data
- Hardness-adjusted surface water criteria based on fall data

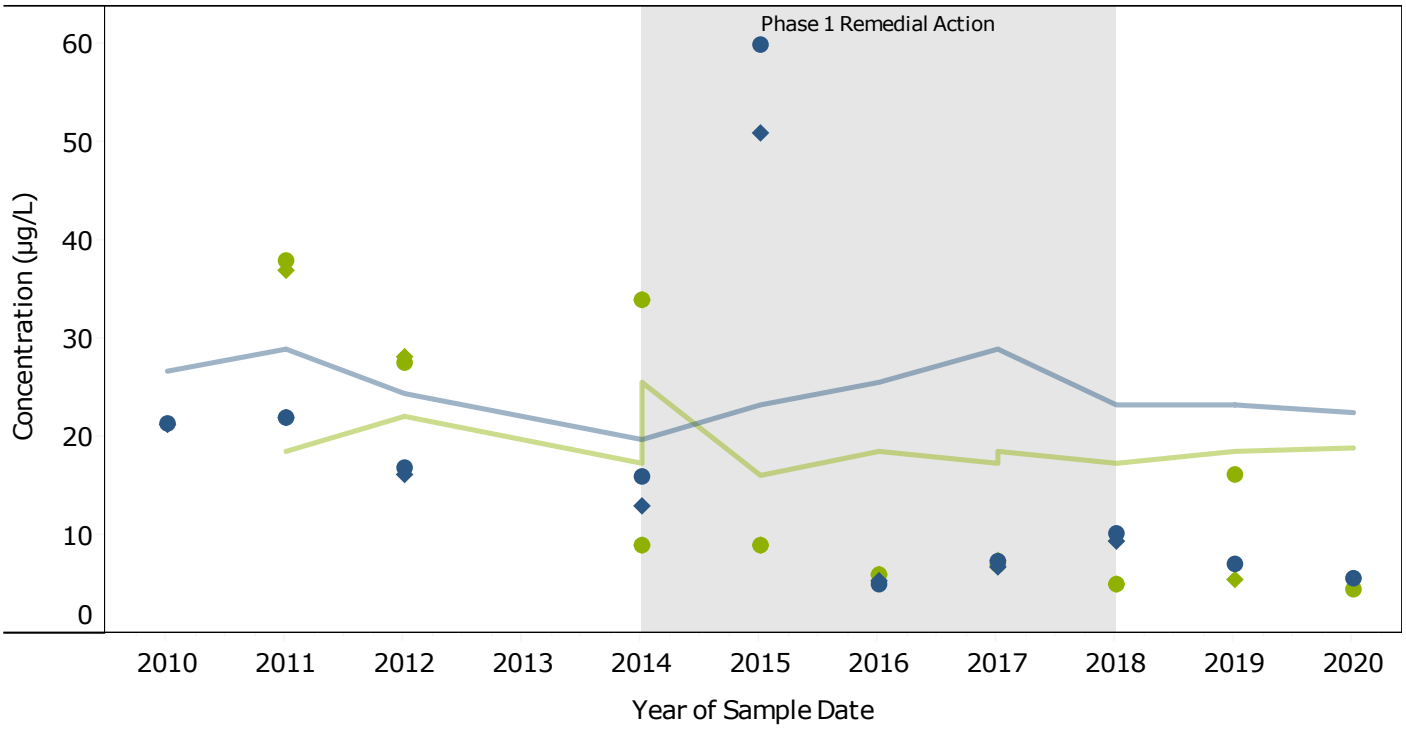
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-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

RC-2 (SG-7), Lead



RC-2 (SG-7), Zinc



Legend

Detect Results
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- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

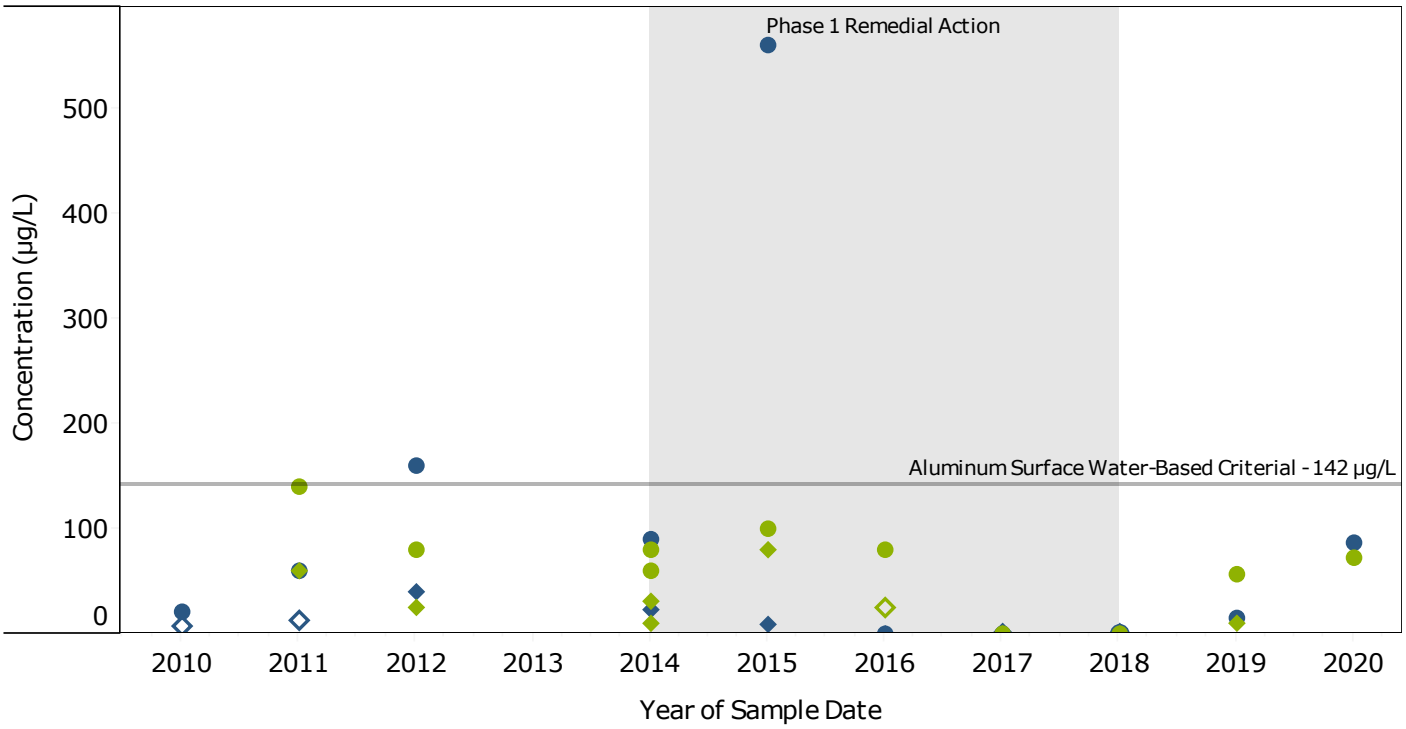
Non-Detect Results
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- Fall Sample, Total
- Fall Sample, Dissolved

- Hardness-adjusted surface water criteria based on spring data
- Hardness-adjusted surface water criteria based on fall data

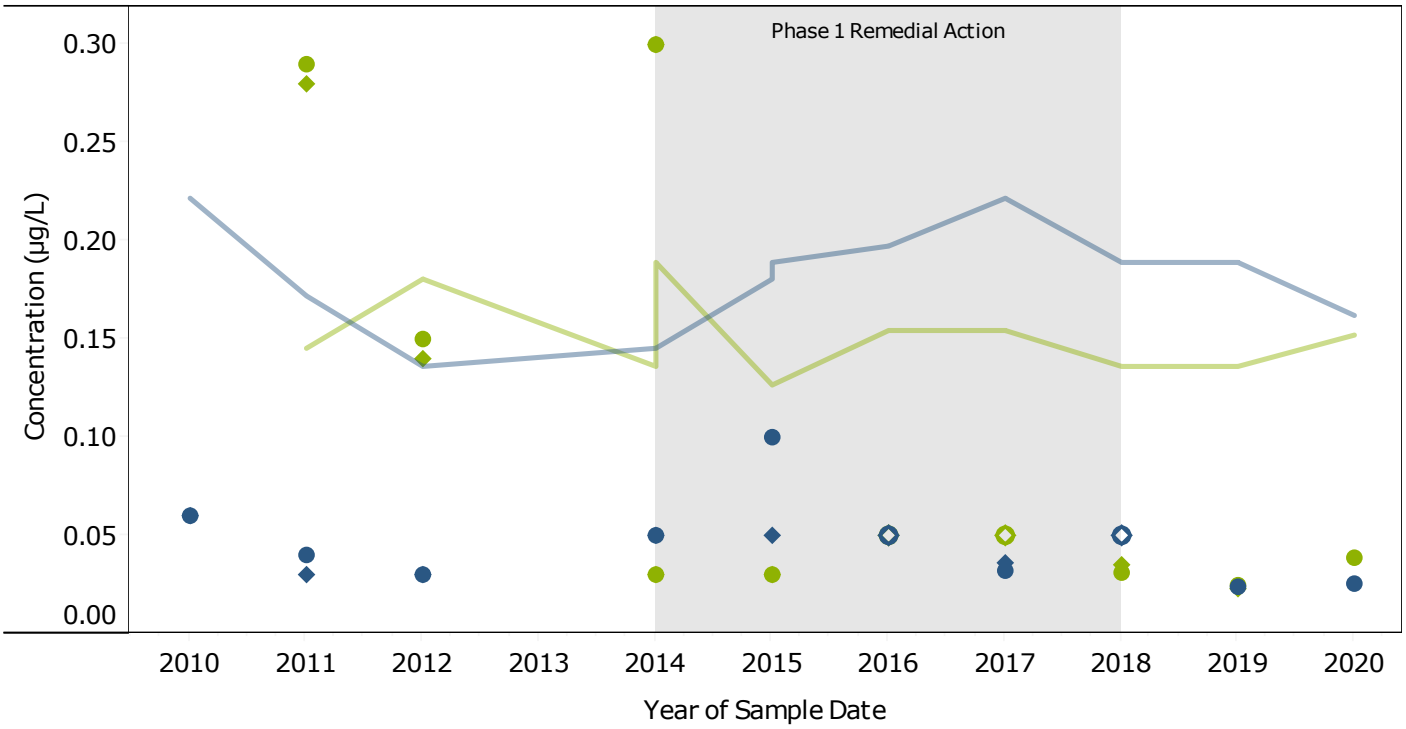
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-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

RC-4, Aluminum



RC-4, Cadmium



Legend

Detect Results
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- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

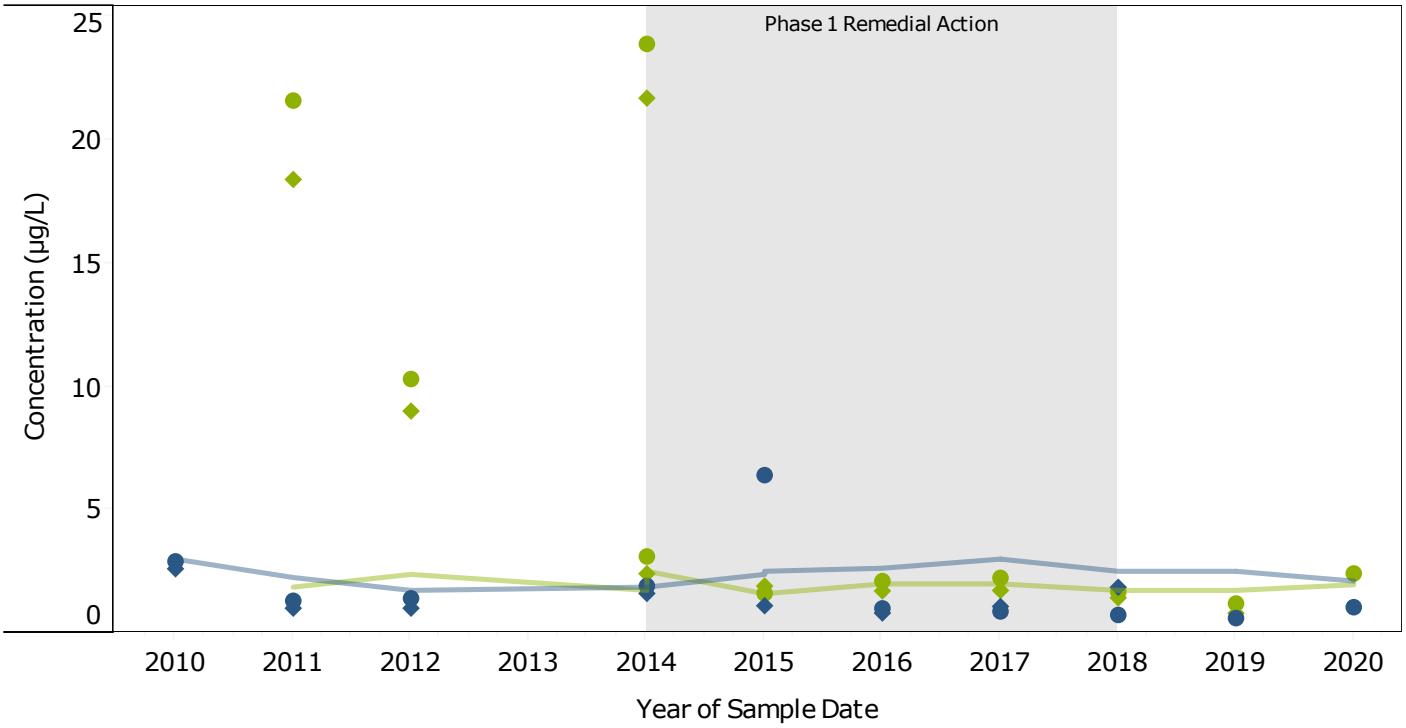
Non-Detect Results
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- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

- Hardness-adjusted surface water criteria based on spring data
- Hardness-adjusted surface water criteria based on fall data

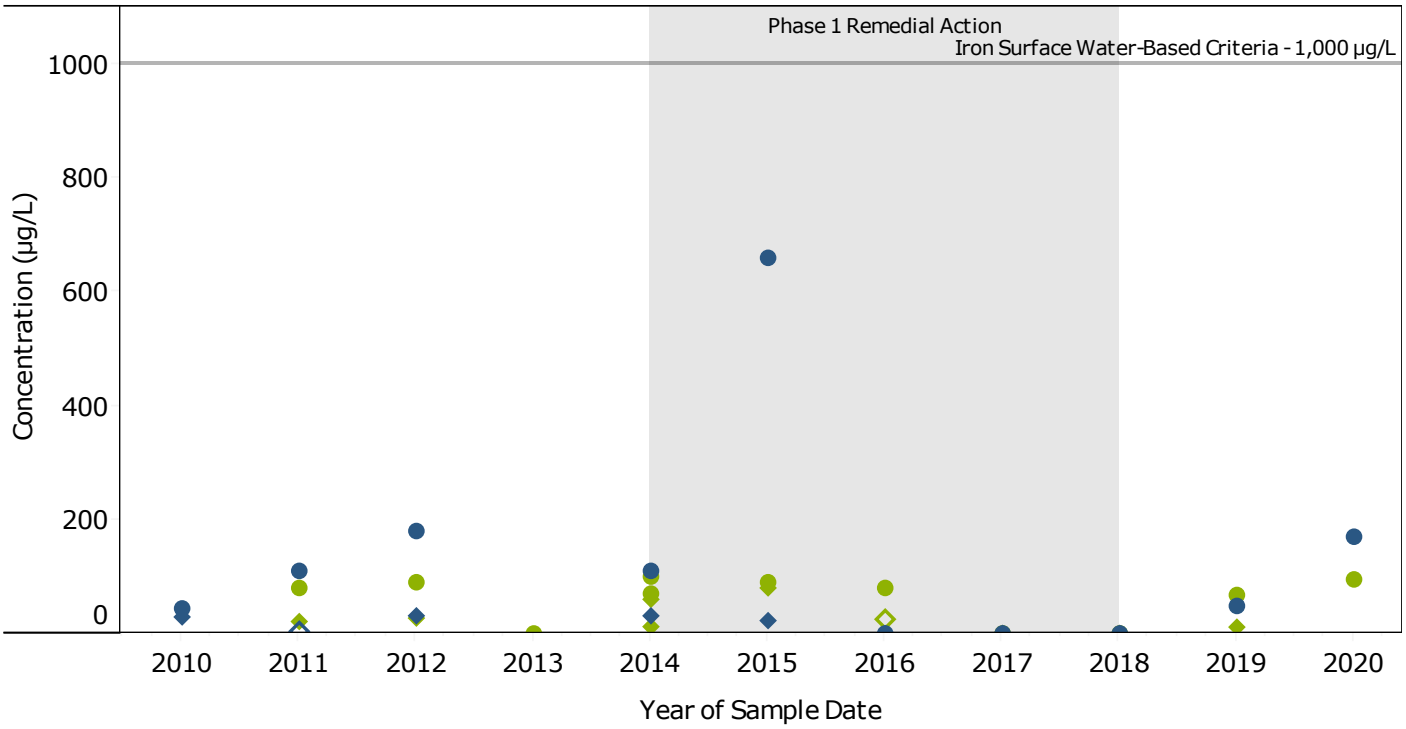
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-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

RC-4, Copper



RC-4, Iron



Legend

Detect Results
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- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

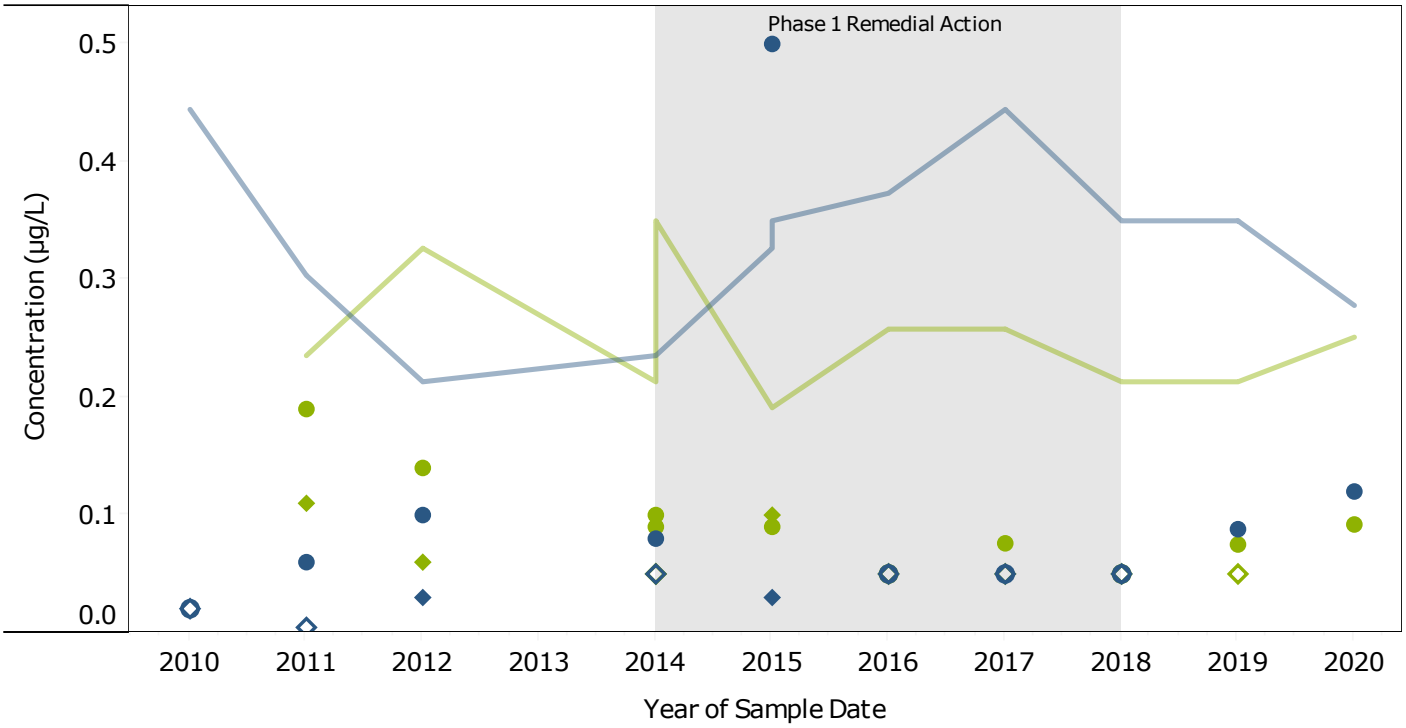
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- Fall Sample, Total
- Fall Sample, Dissolved

- Hardness-adjusted surface water criteria based on spring data
- Hardness-adjusted surface water criteria based on fall data

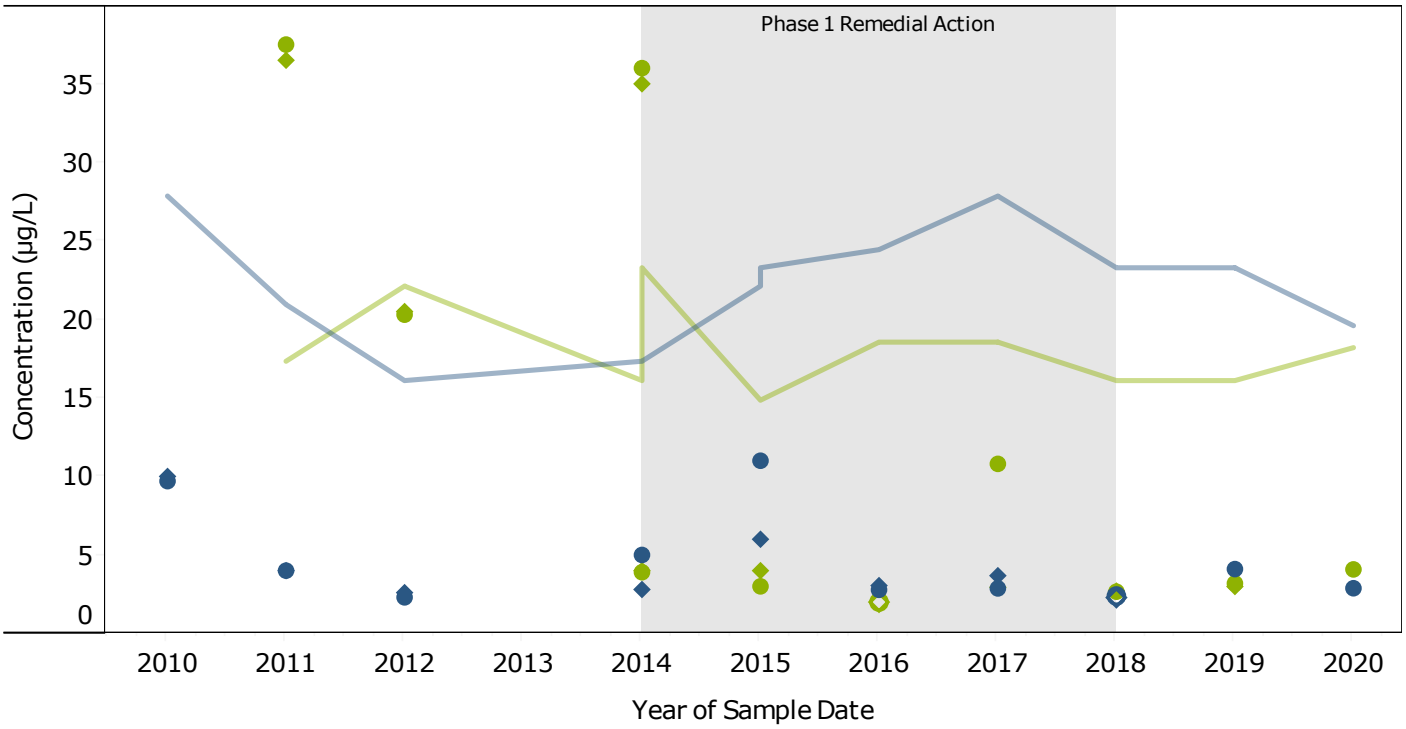
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-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

RC-4, Lead



RC-4, Zinc



Legend

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

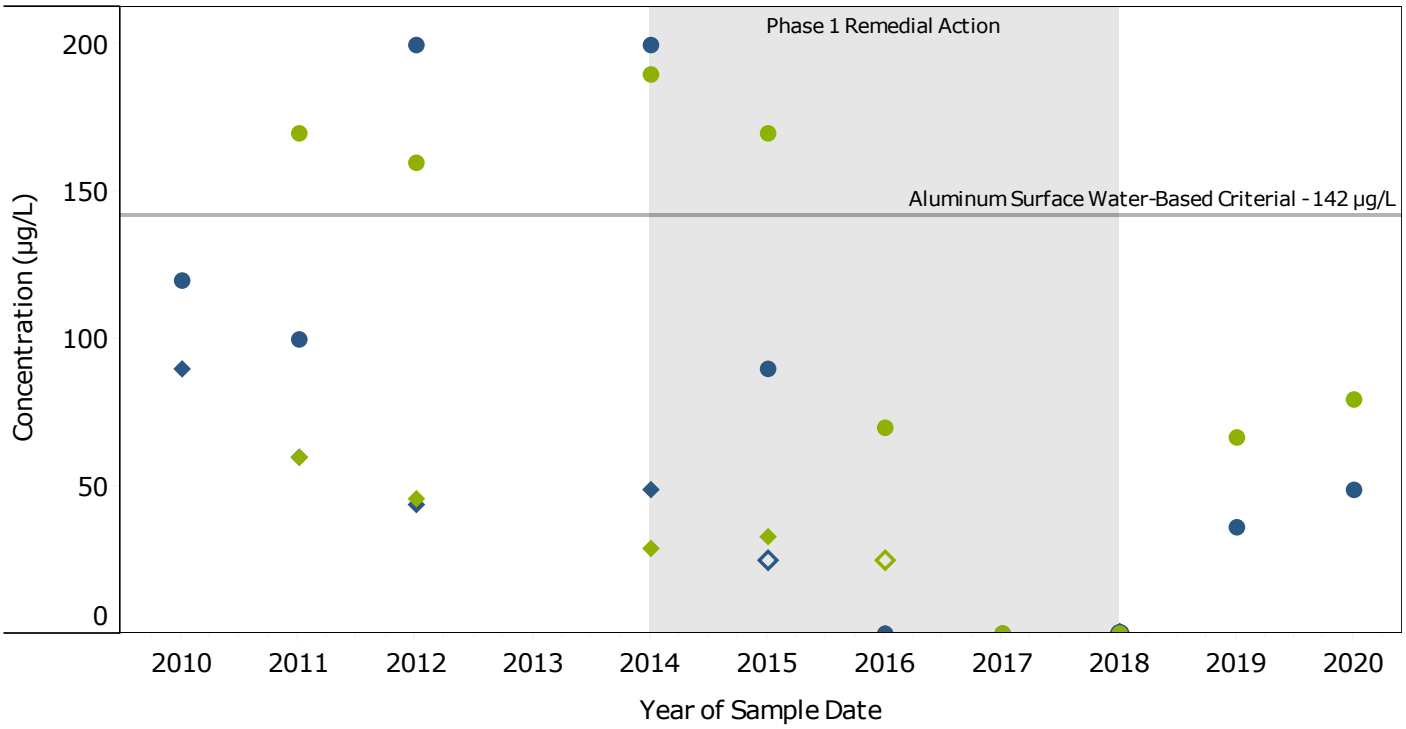
Non-Detect Results
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- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

- Hardness-adjusted surface water criteria based on spring data
- Hardness-adjusted surface water criteria based on fall data

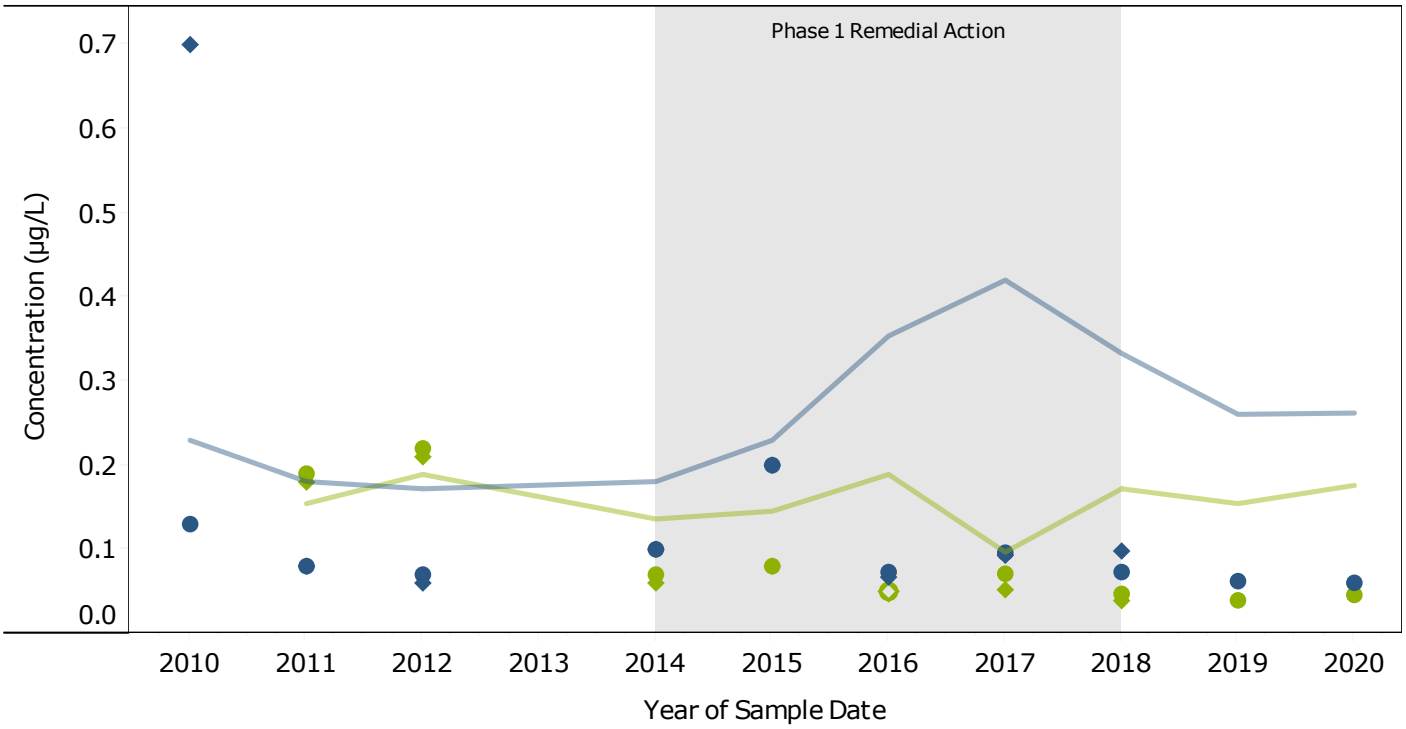
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

RC-5A, Aluminum



RC-5A, Cadmium



Legend

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

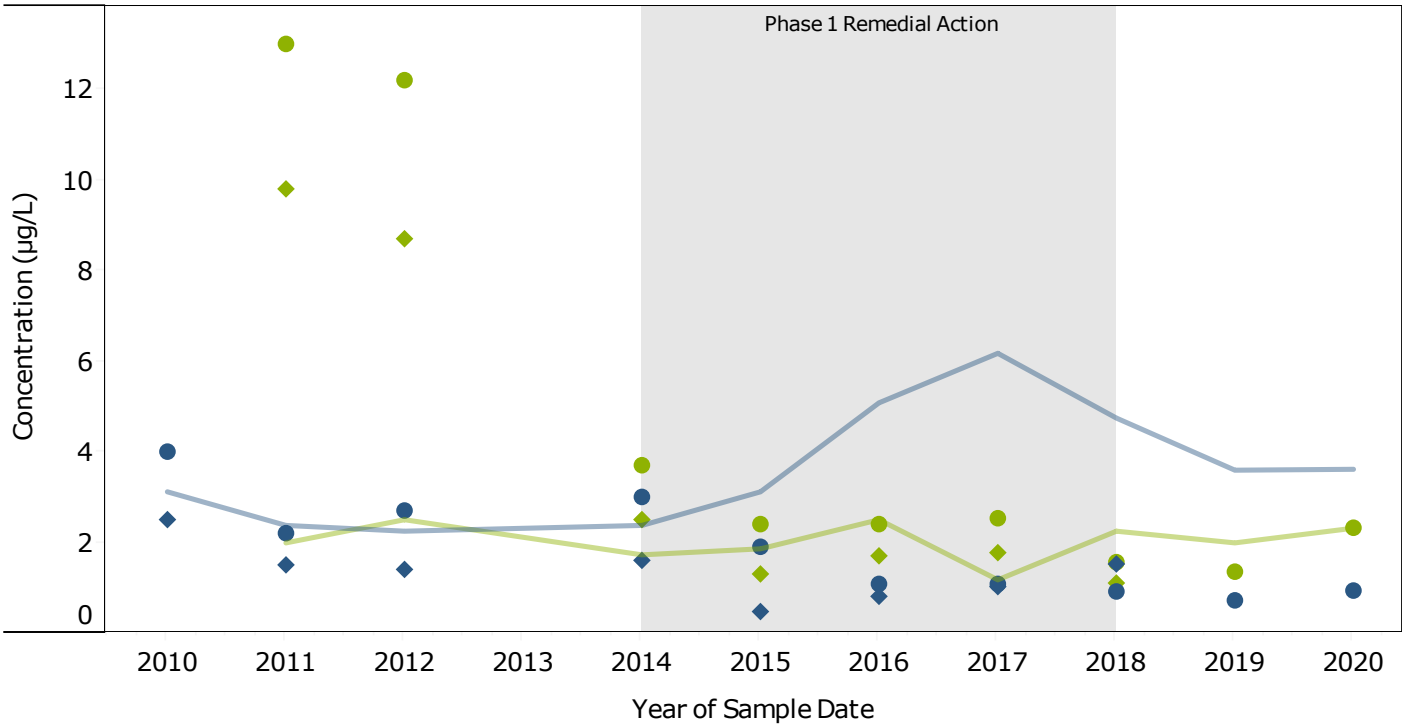
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

- Hardness-adjusted surface water criteria based on spring data
- Hardness-adjusted surface water criteria based on fall data

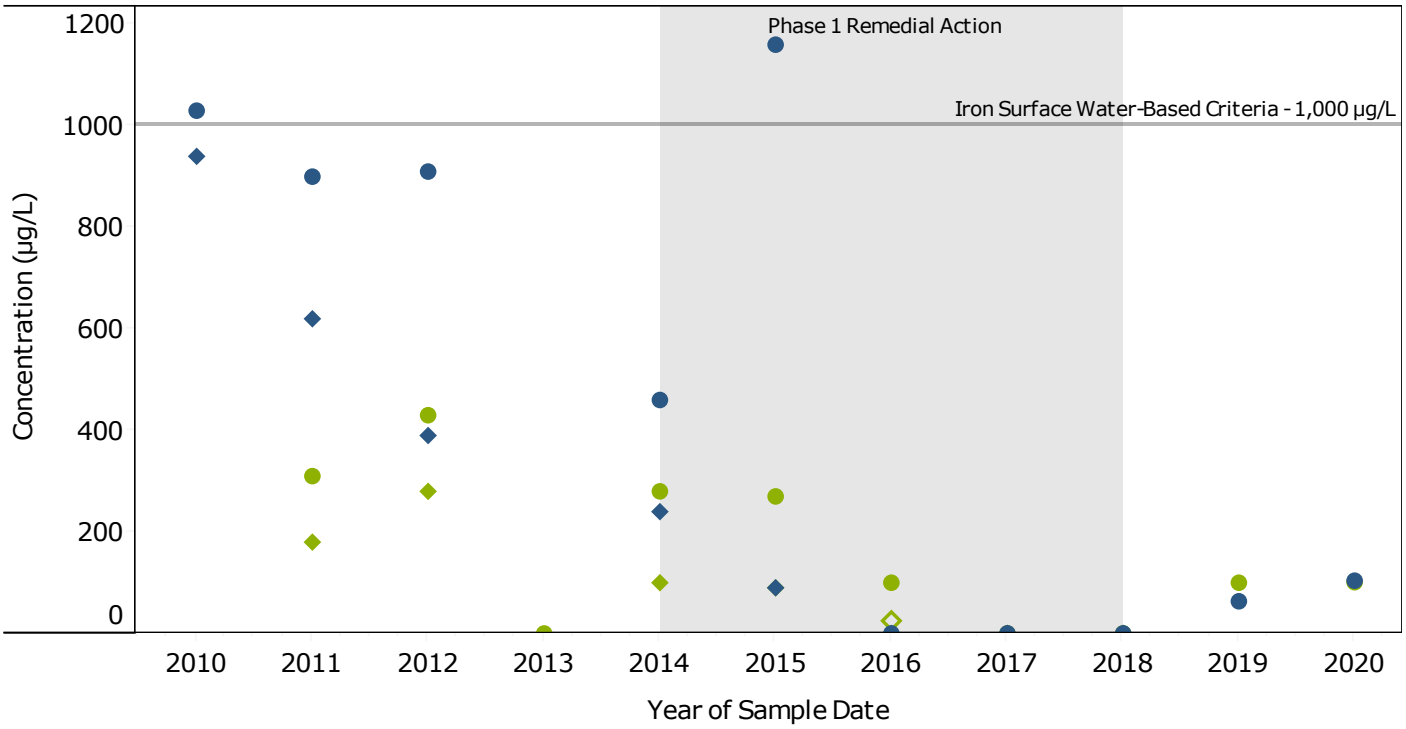
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

RC-5A, Copper



RC-5A, Iron



Legend

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

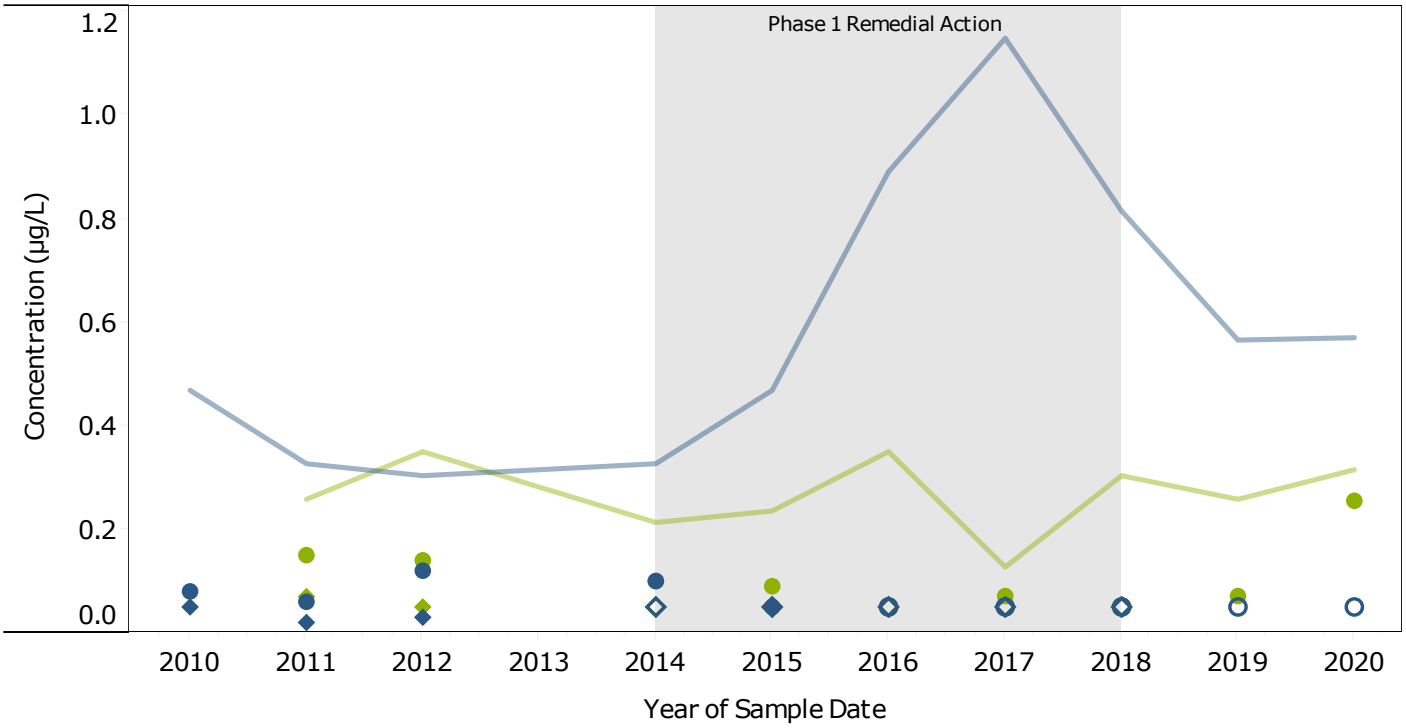
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

- Hardness-adjusted surface water criteria based on spring data
- Hardness-adjusted surface water criteria based on fall data

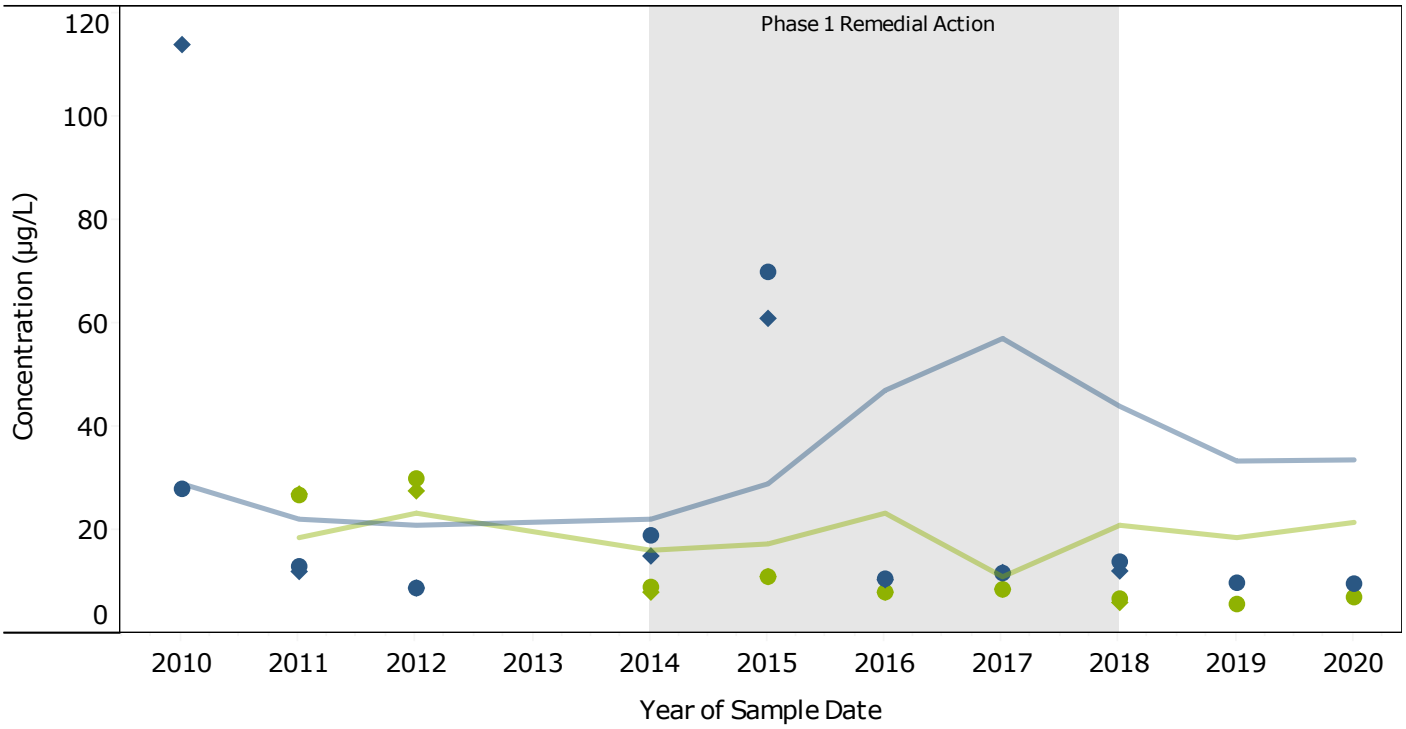
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

RC-5A, Lead



RC-5A, Zinc



Legend

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

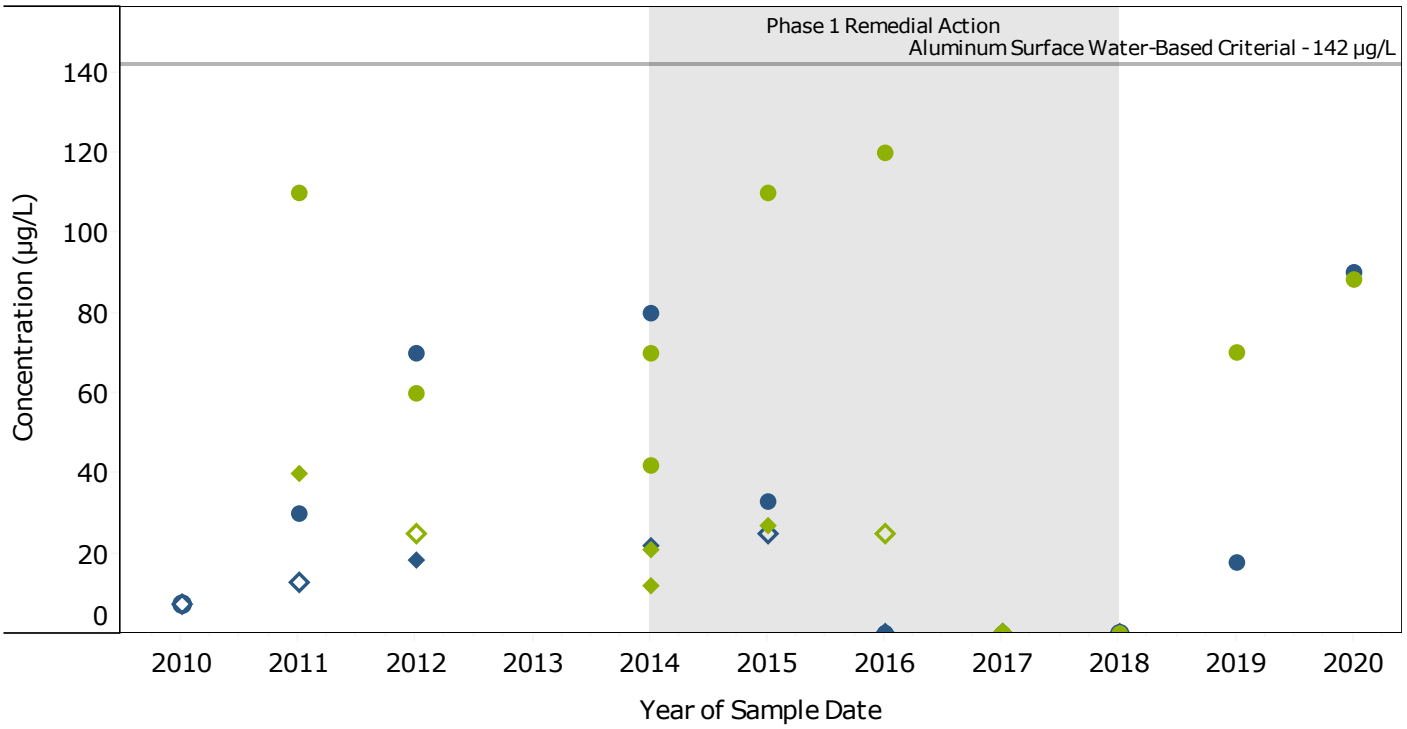
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

- Hardness-adjusted surface water criteria based on spring data
- Hardness-adjusted surface water criteria based on fall data

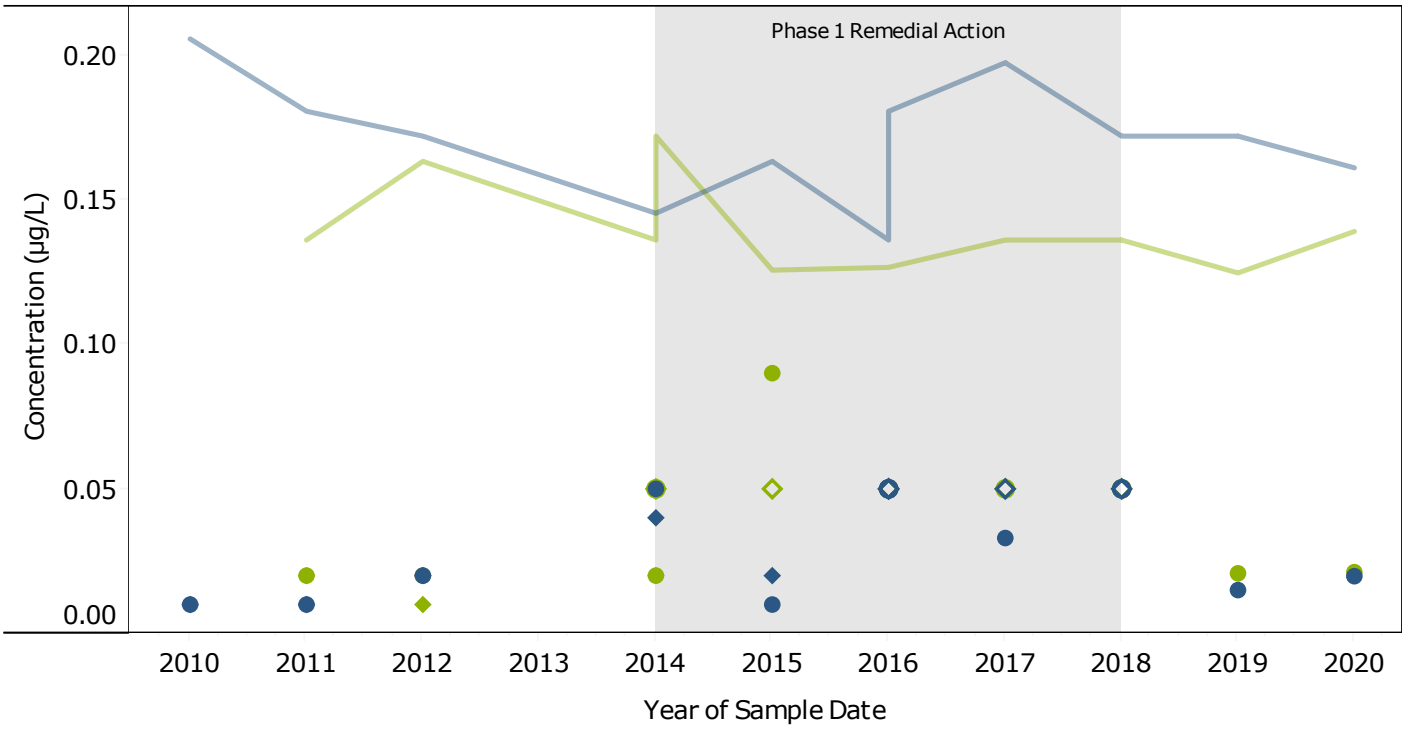
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

RC-6, Aluminum



RC-6, Cadmium



Legend

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

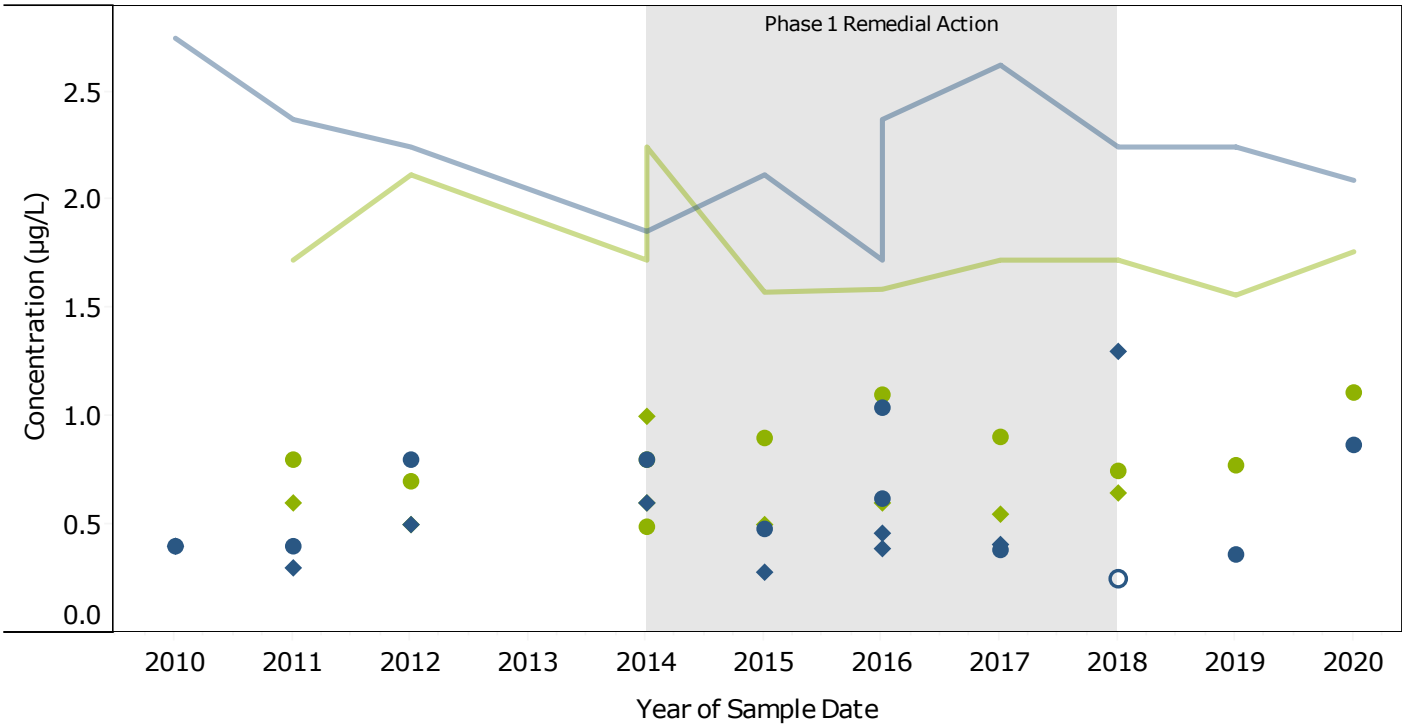
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

- Hardness-adjusted surface water criteria based on spring data
- Hardness-adjusted surface water criteria based on fall data

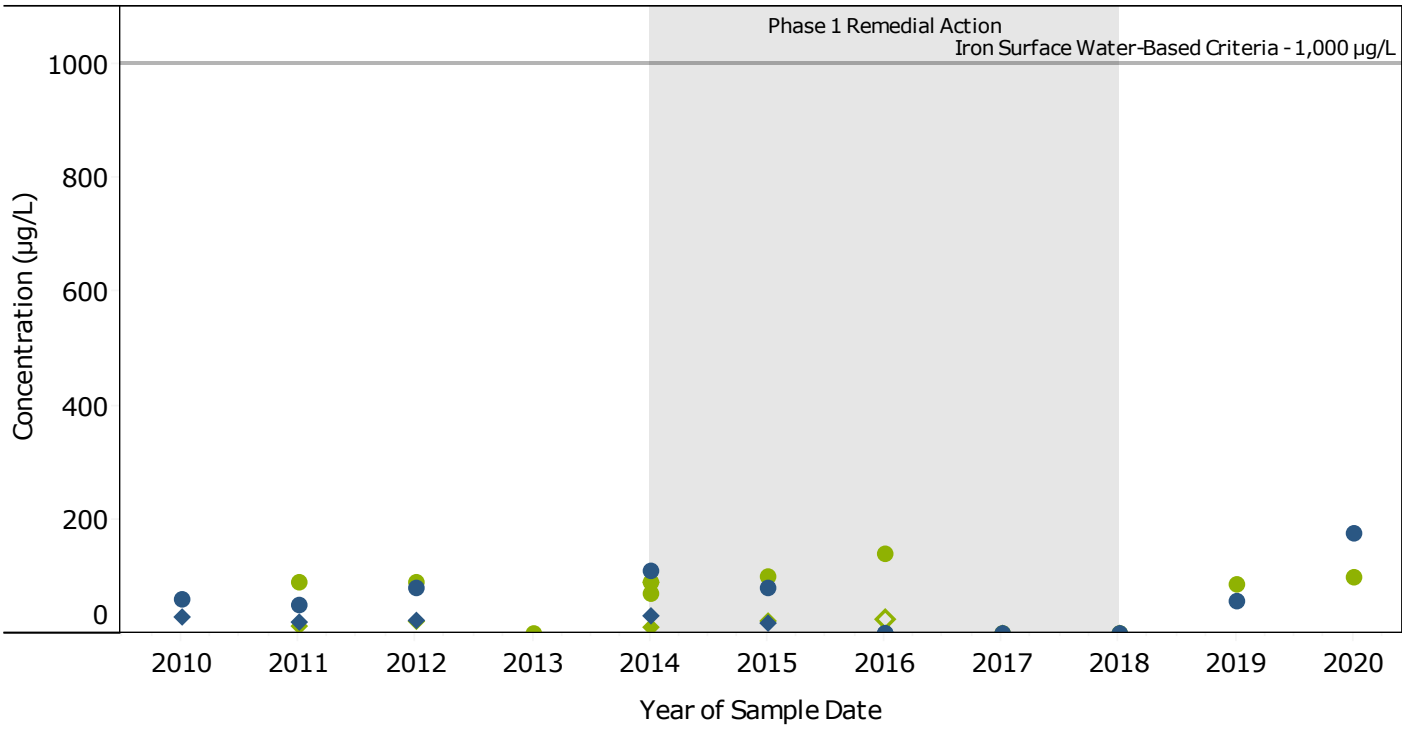
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

RC-6, Copper



RC-6, Iron



Legend

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

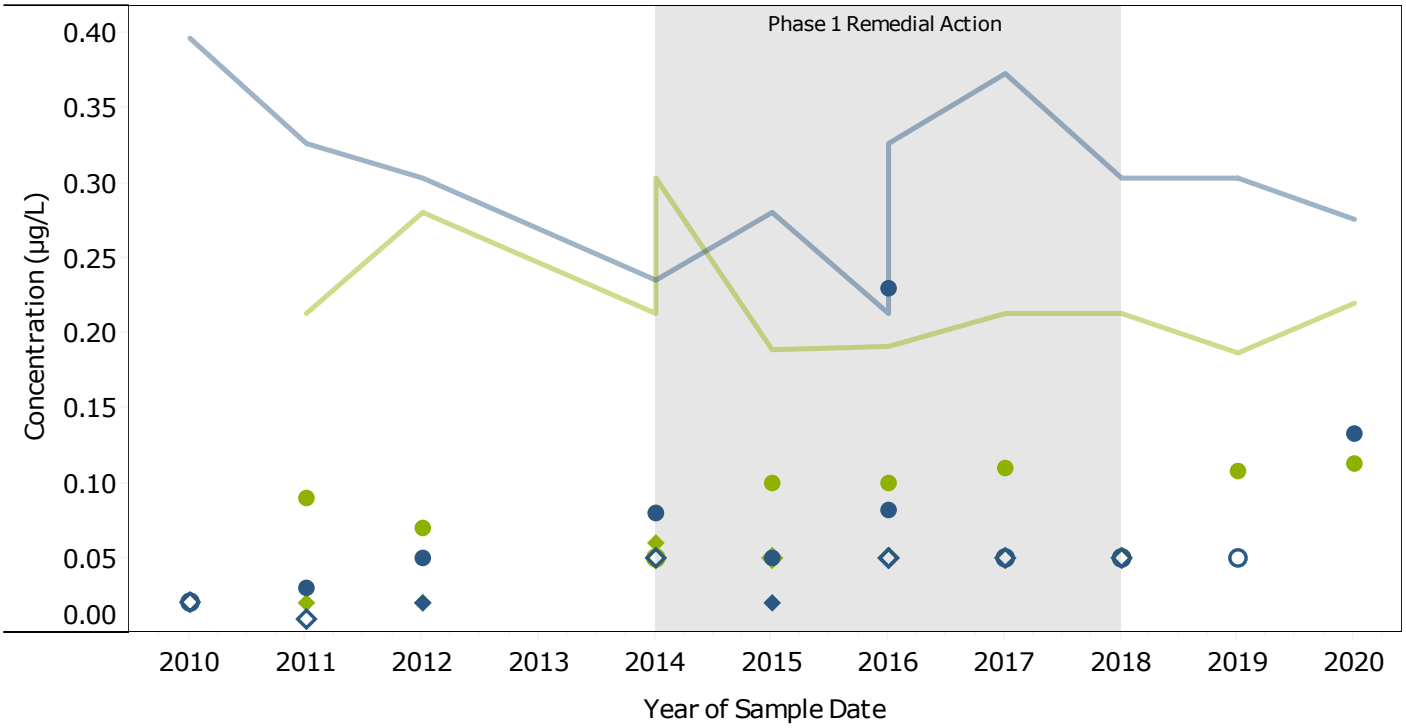
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

- Hardness-adjusted surface water criteria based on spring data
- Hardness-adjusted surface water criteria based on fall data

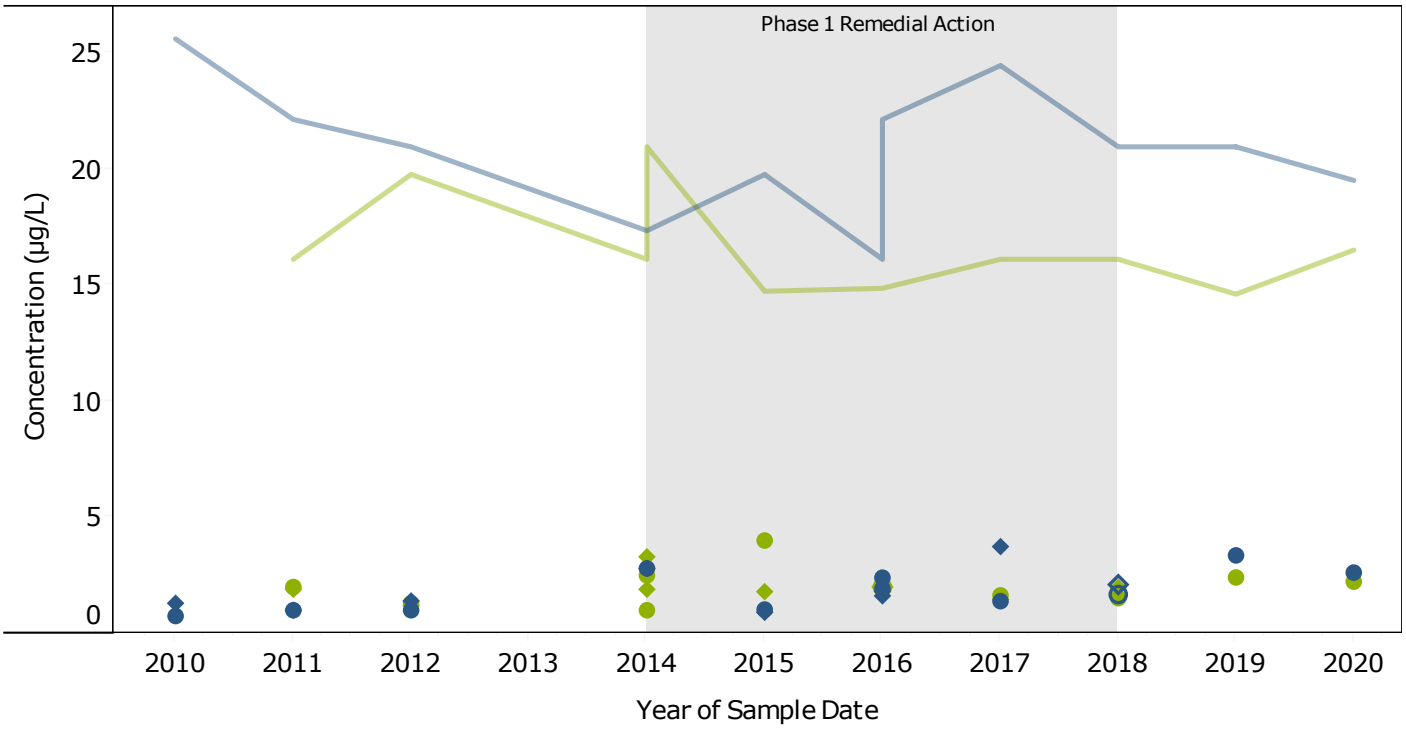
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

RC-6, Lead



RC-6, Zinc



Legend

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

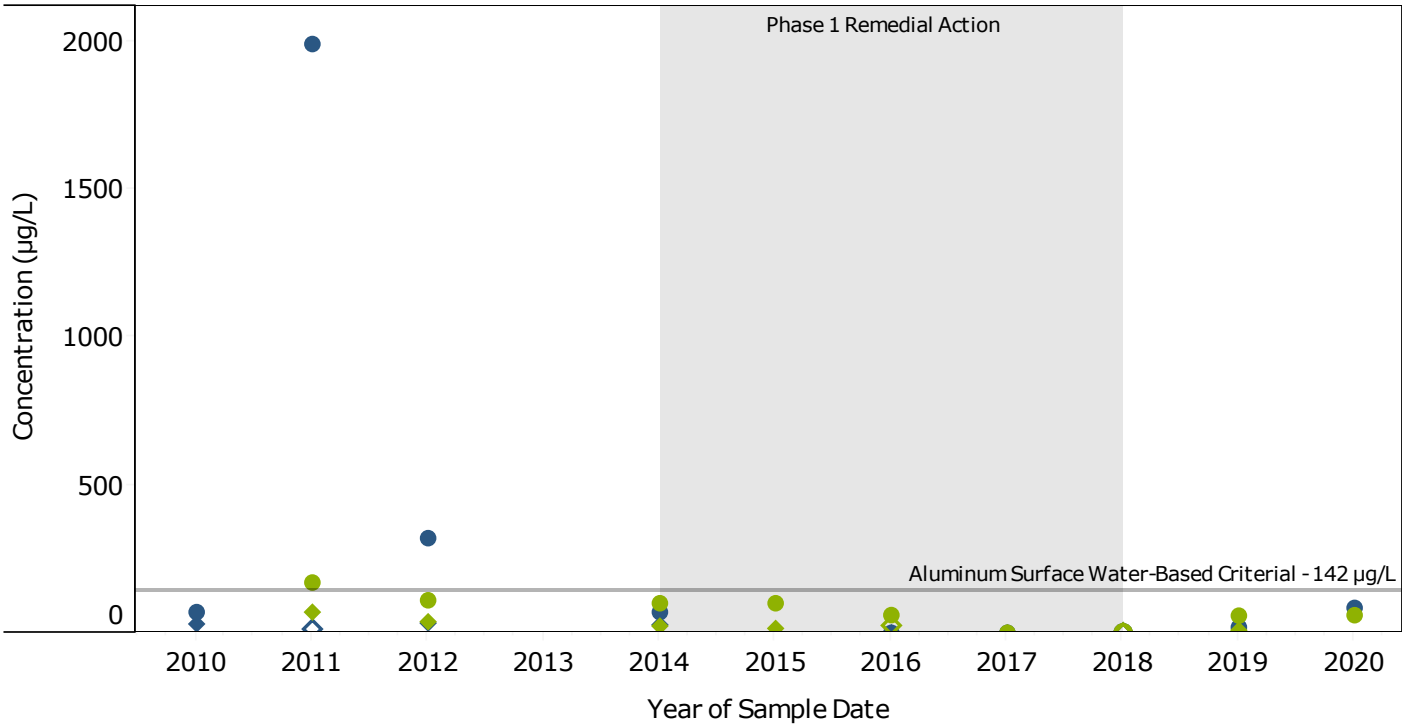
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

- Hardness-adjusted surface water criteria based on spring data
- Hardness-adjusted surface water criteria based on fall data

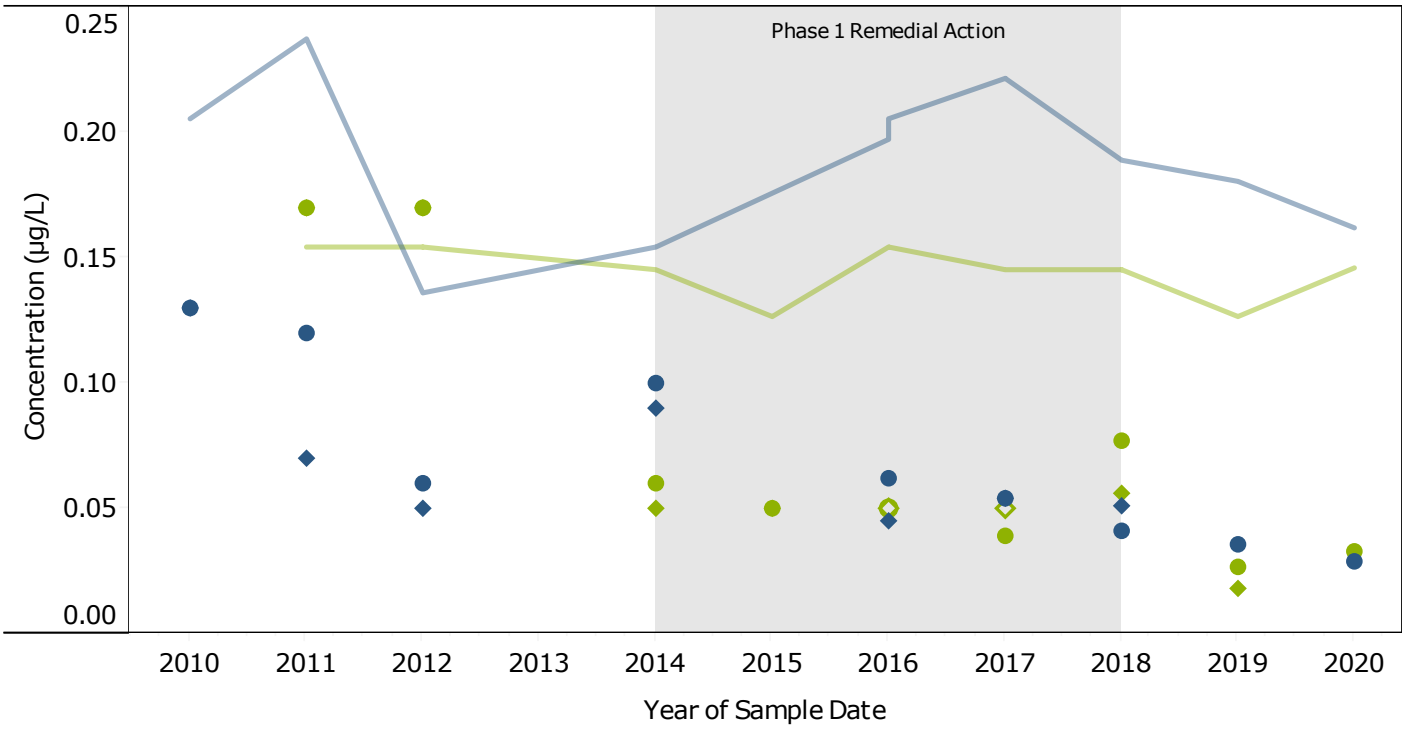
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

RC-7, Aluminum



RC-7, Cadmium



Legend

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

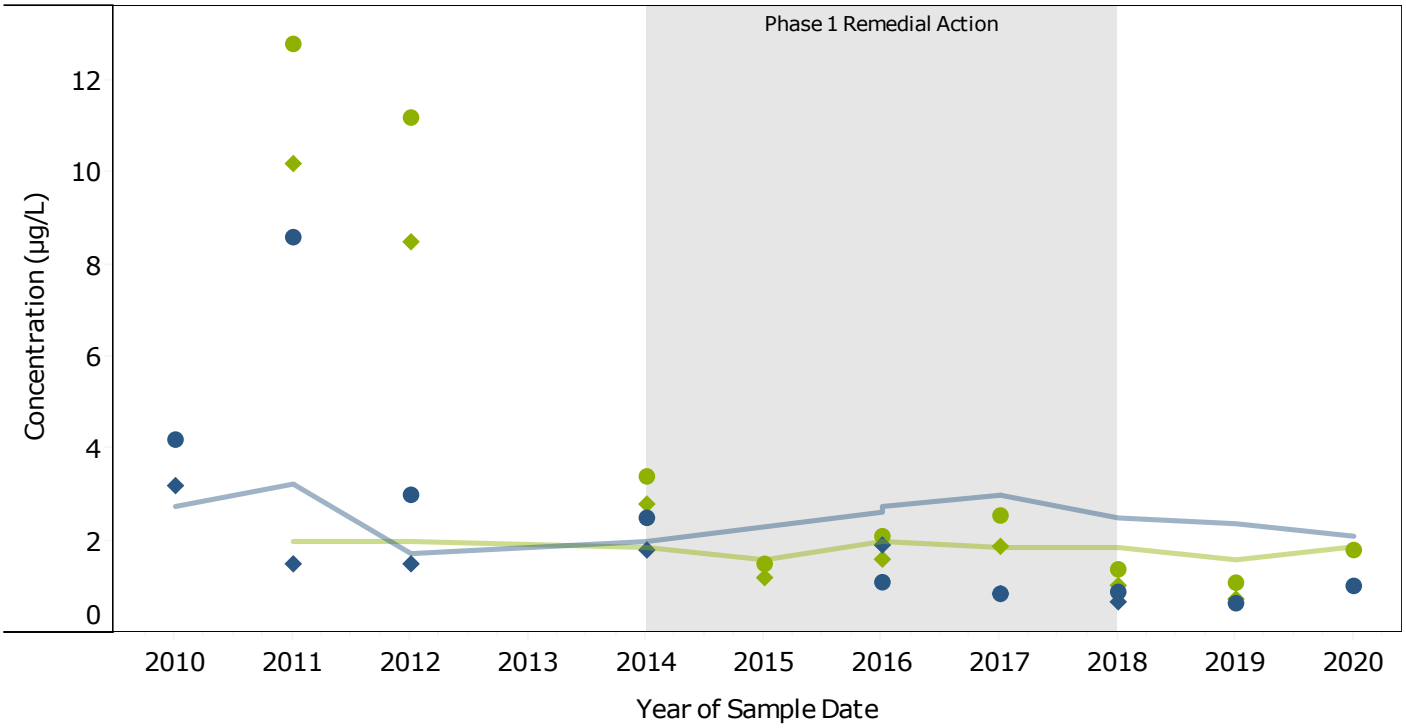
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

- Hardness-adjusted surface water criteria based on spring data
- Hardness-adjusted surface water criteria based on fall data

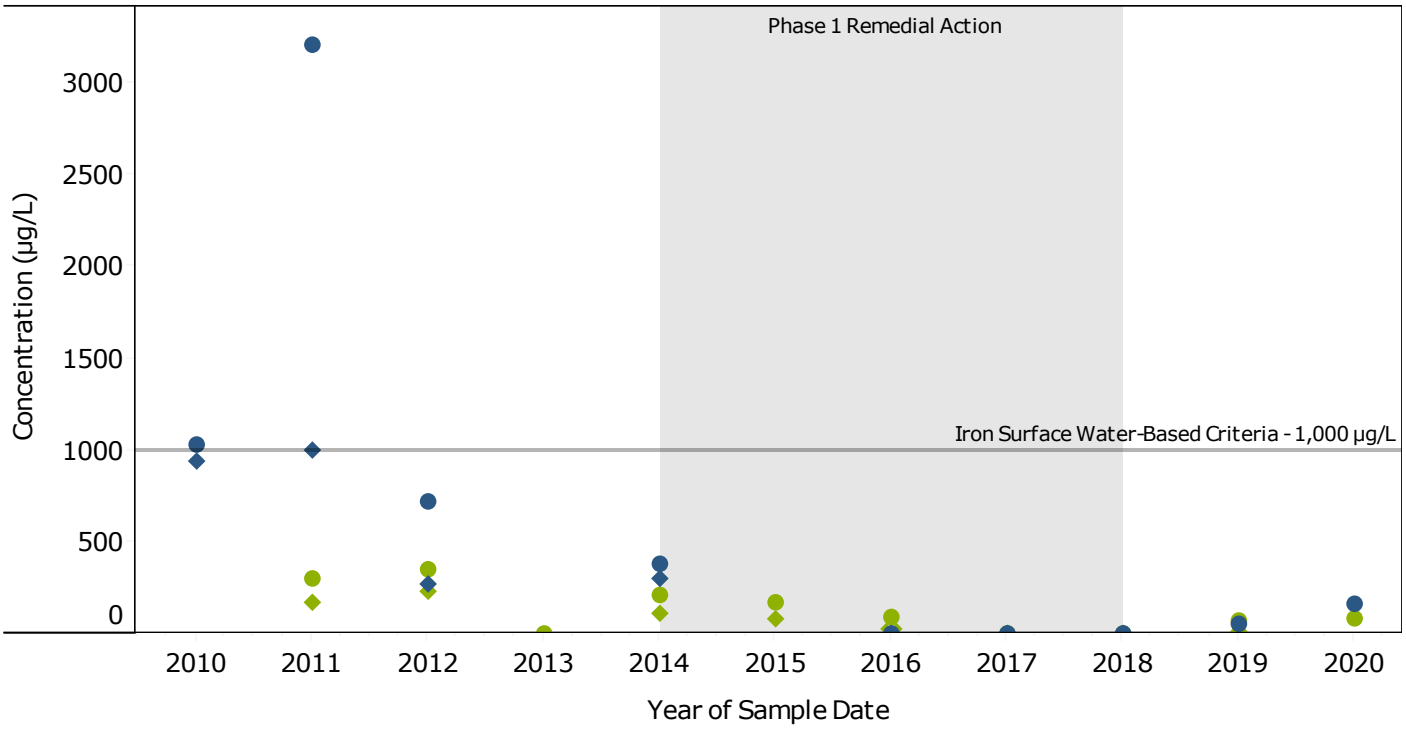
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

RC-7, Copper



RC-7, Iron



Legend

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

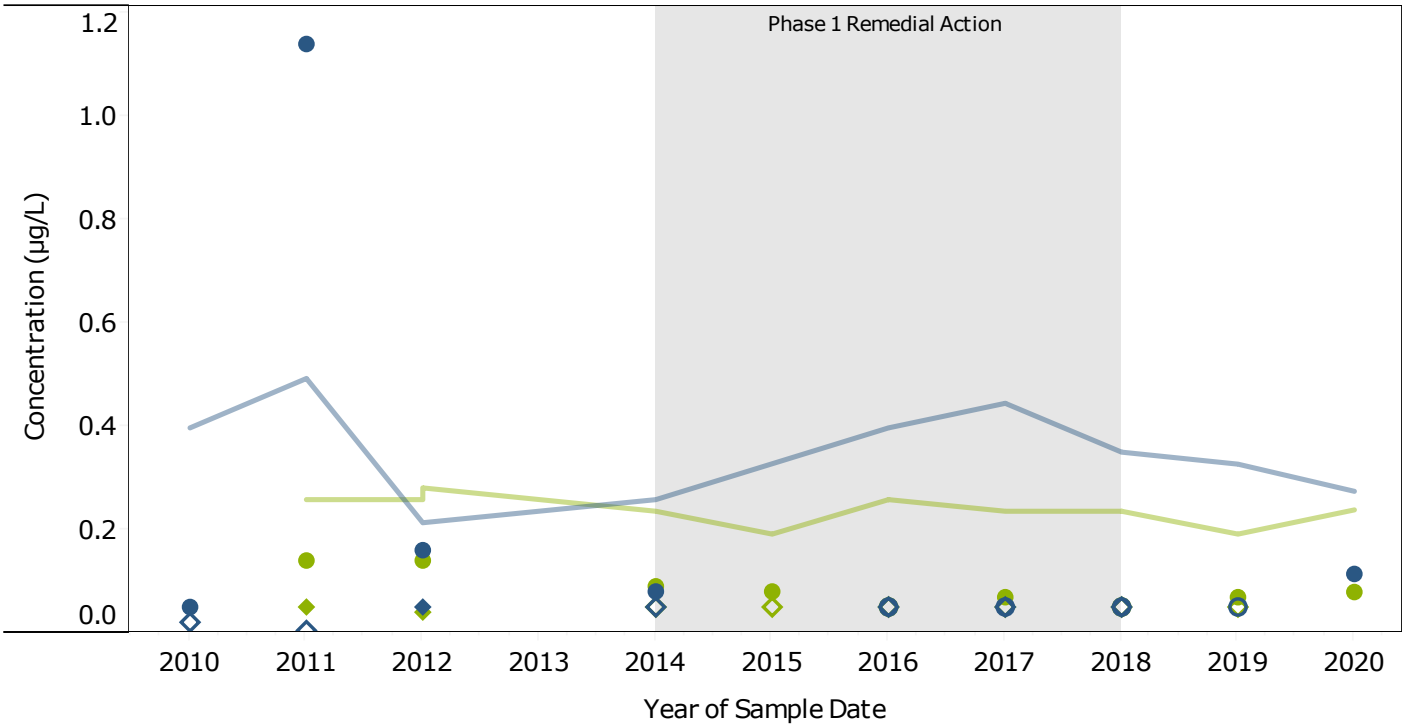
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

- Hardness-adjusted surface water criteria based on spring data
- Hardness-adjusted surface water criteria based on fall data

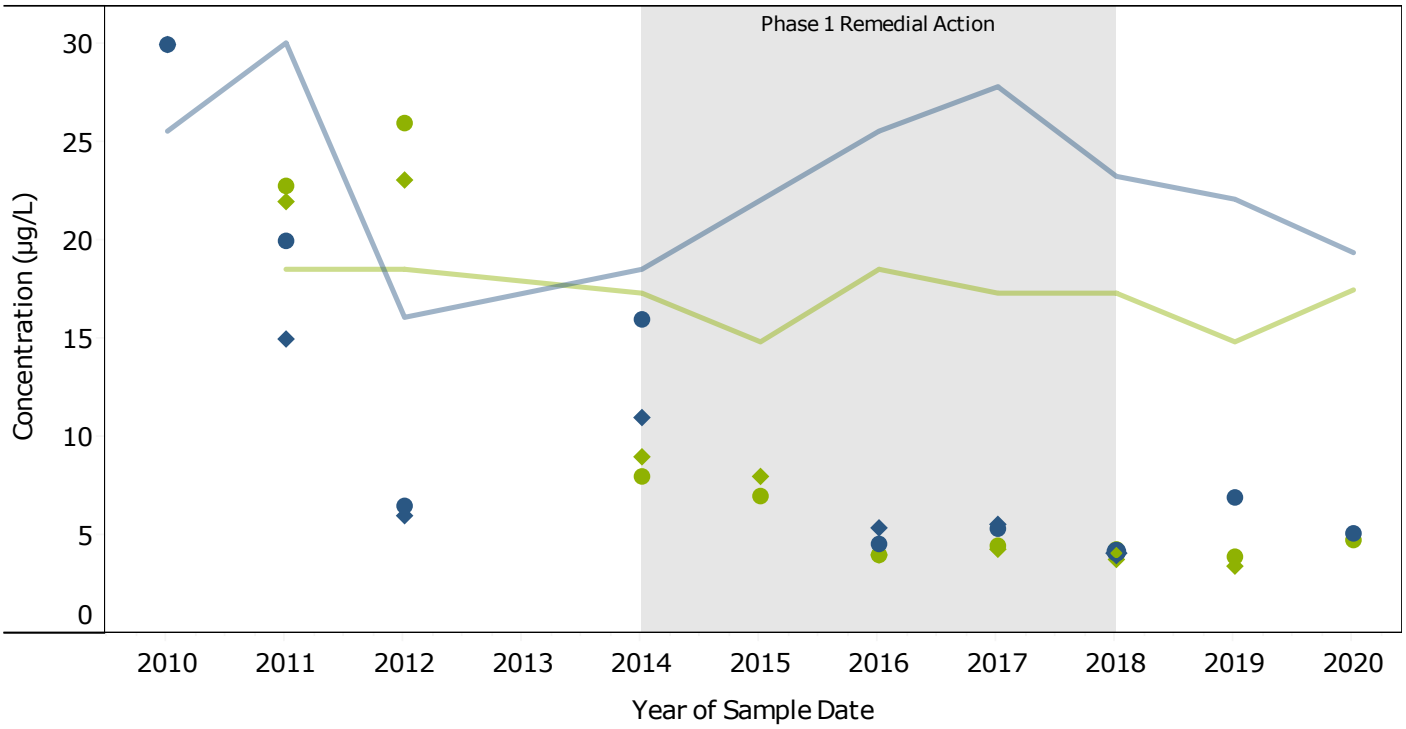
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

RC-7, Lead



RC-7, Zinc



Legend

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

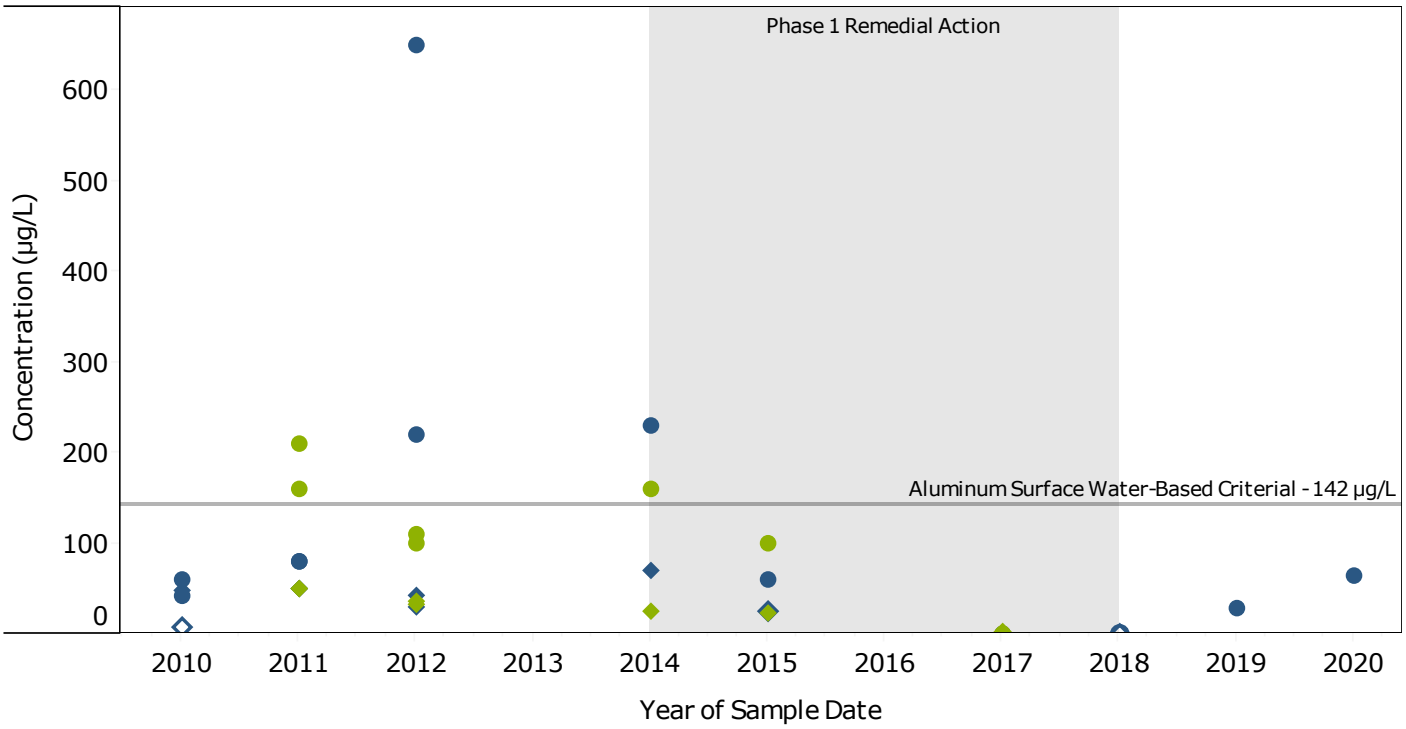
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

- Hardness-adjusted surface water criteria based on spring data
- Hardness-adjusted surface water criteria based on fall data

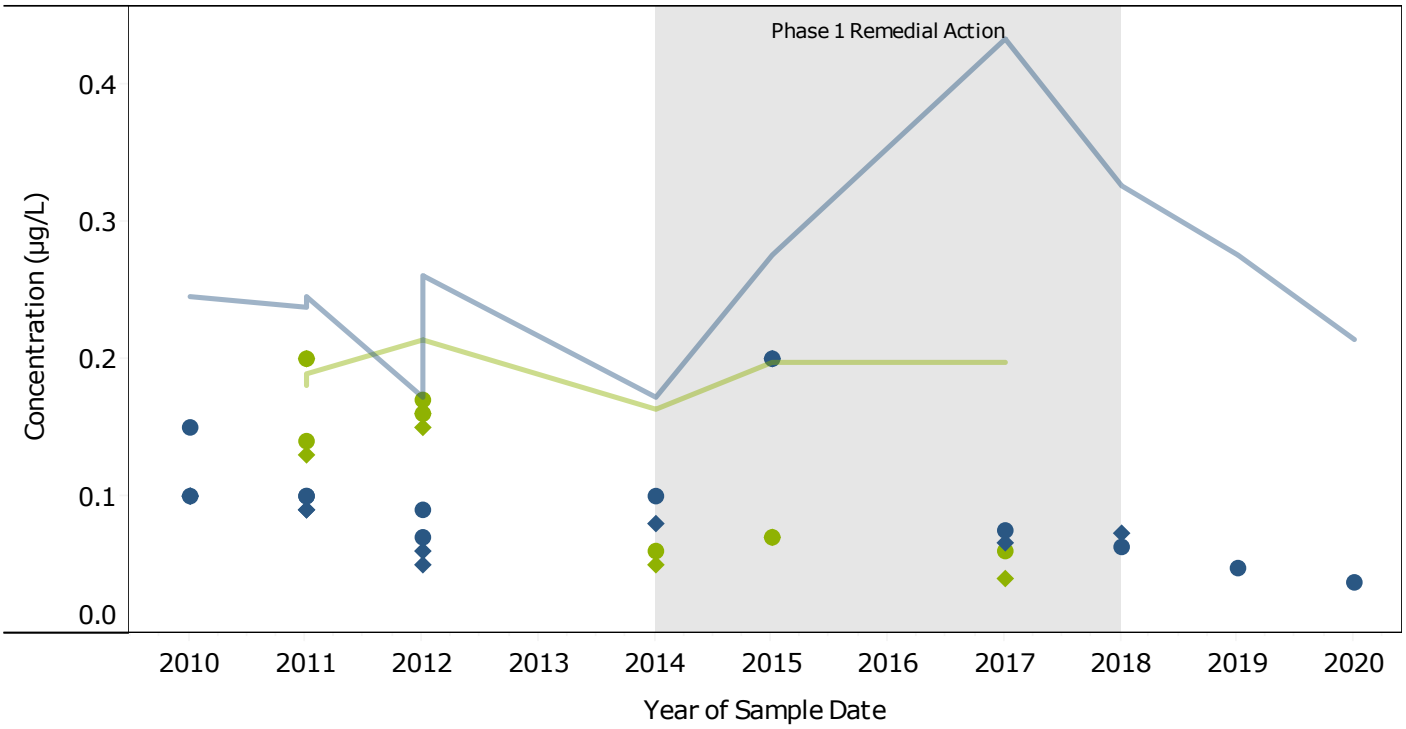
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

RC-10 (SG-20), Aluminum



RC-10 (SG-20), Cadmium



Legend

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

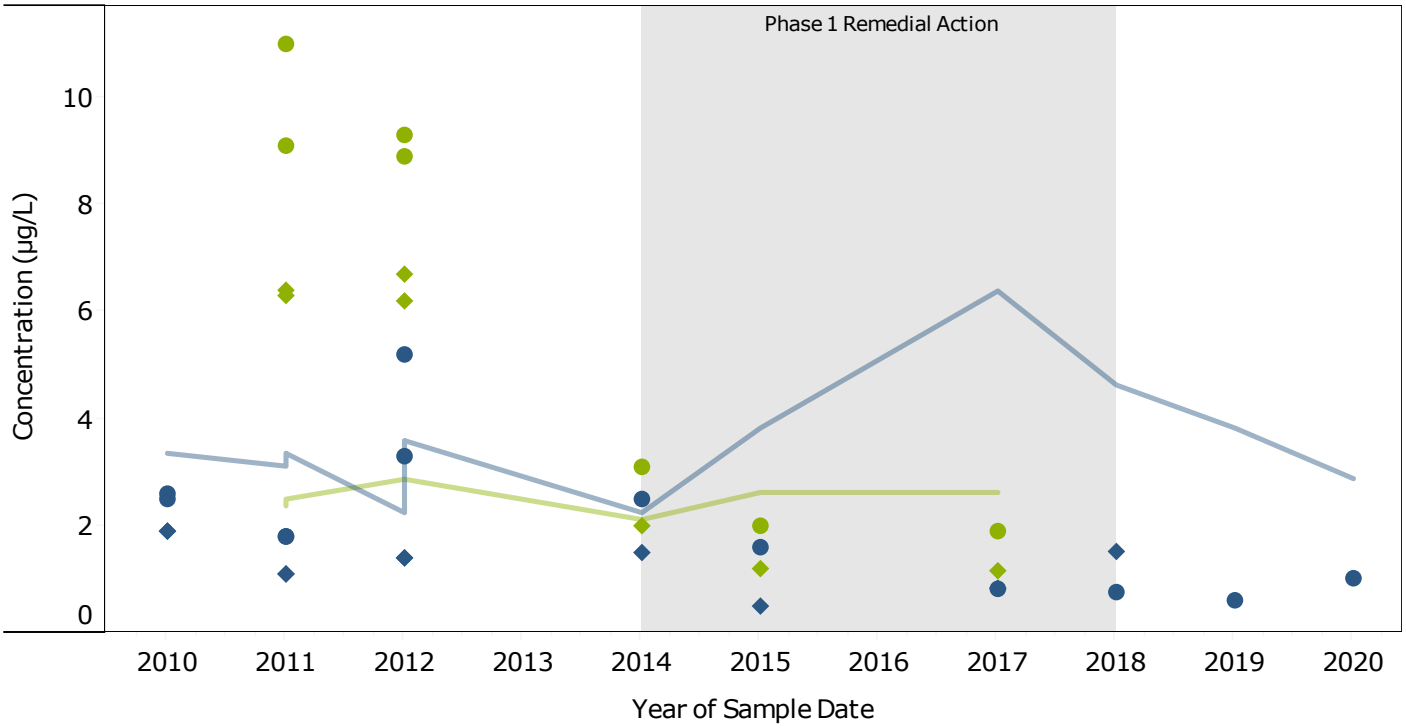
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

- Hardness-adjusted surface water criteria based on spring data
- Hardness-adjusted surface water criteria based on fall data

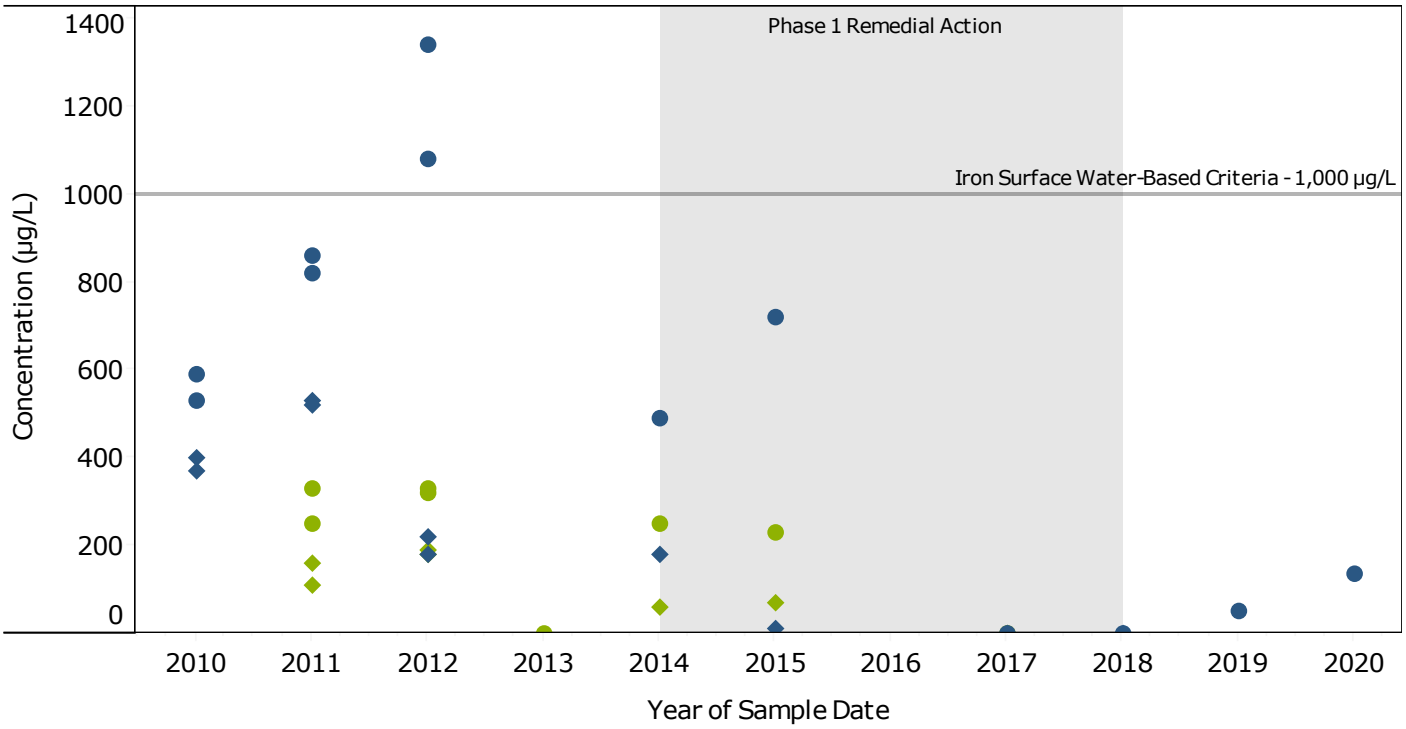
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

RC-10 (SG-20), Copper



RC-10 (SG-20), Iron



Legend

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

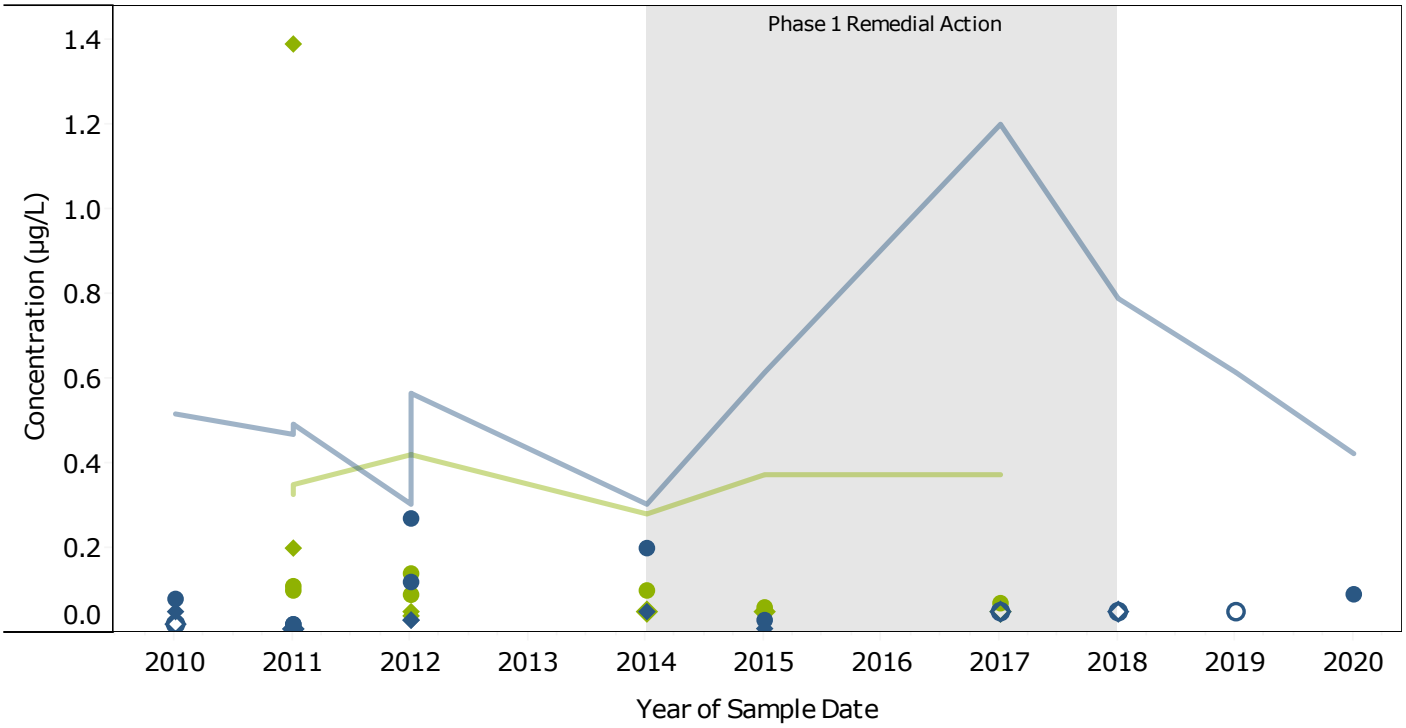
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

- Hardness-adjusted surface water criteria based on spring data
- Hardness-adjusted surface water criteria based on fall data

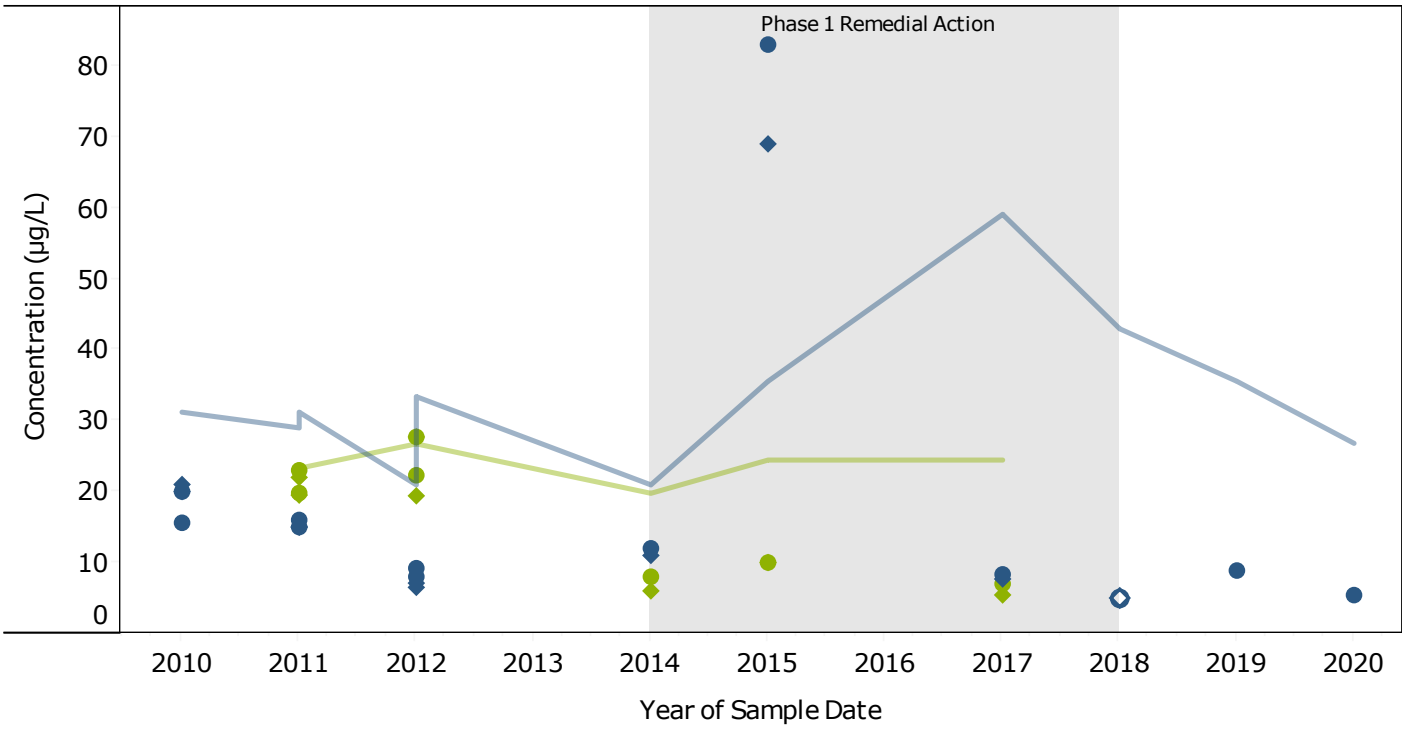
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

RC-10 (SG-20), Lead



RC-10 (SG-20), Zinc



Legend

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

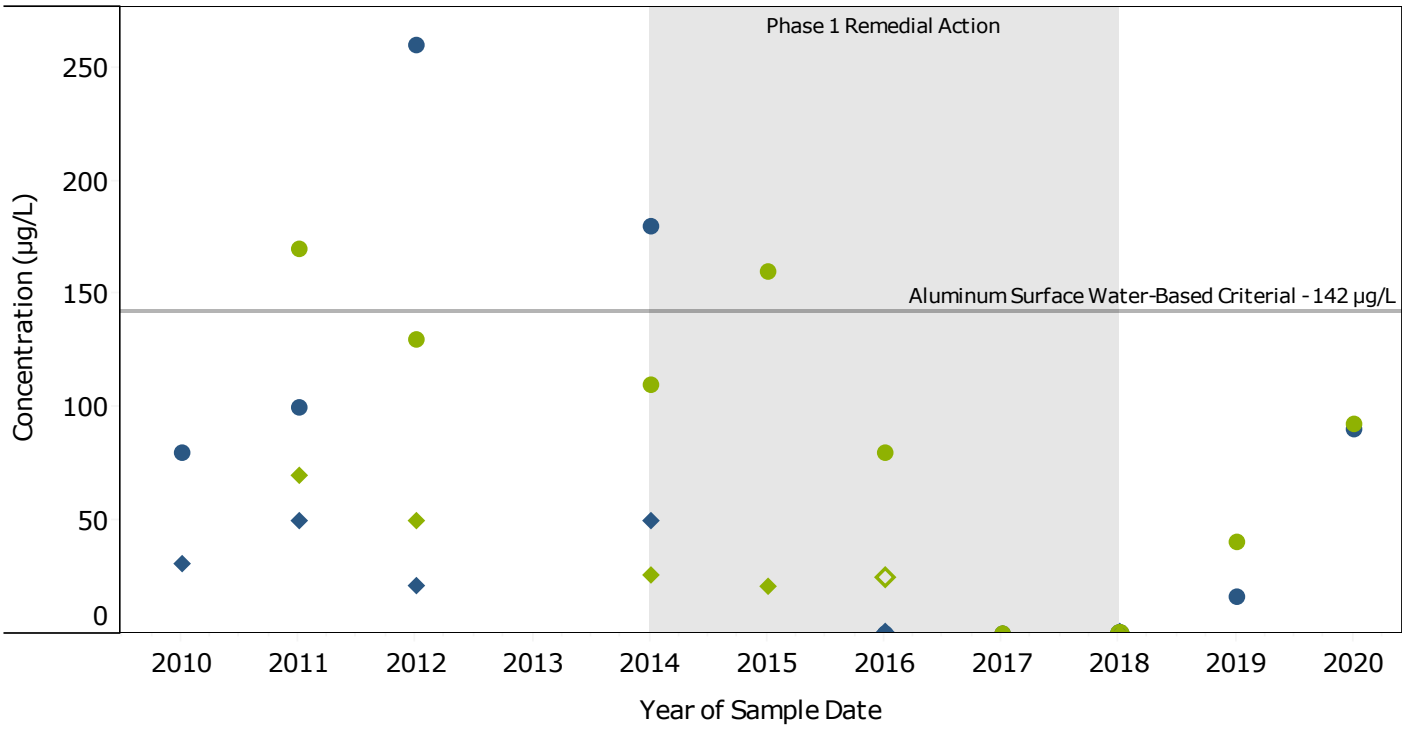
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

- Hardness-adjusted surface water criteria based on spring data
- Hardness-adjusted surface water criteria based on fall data

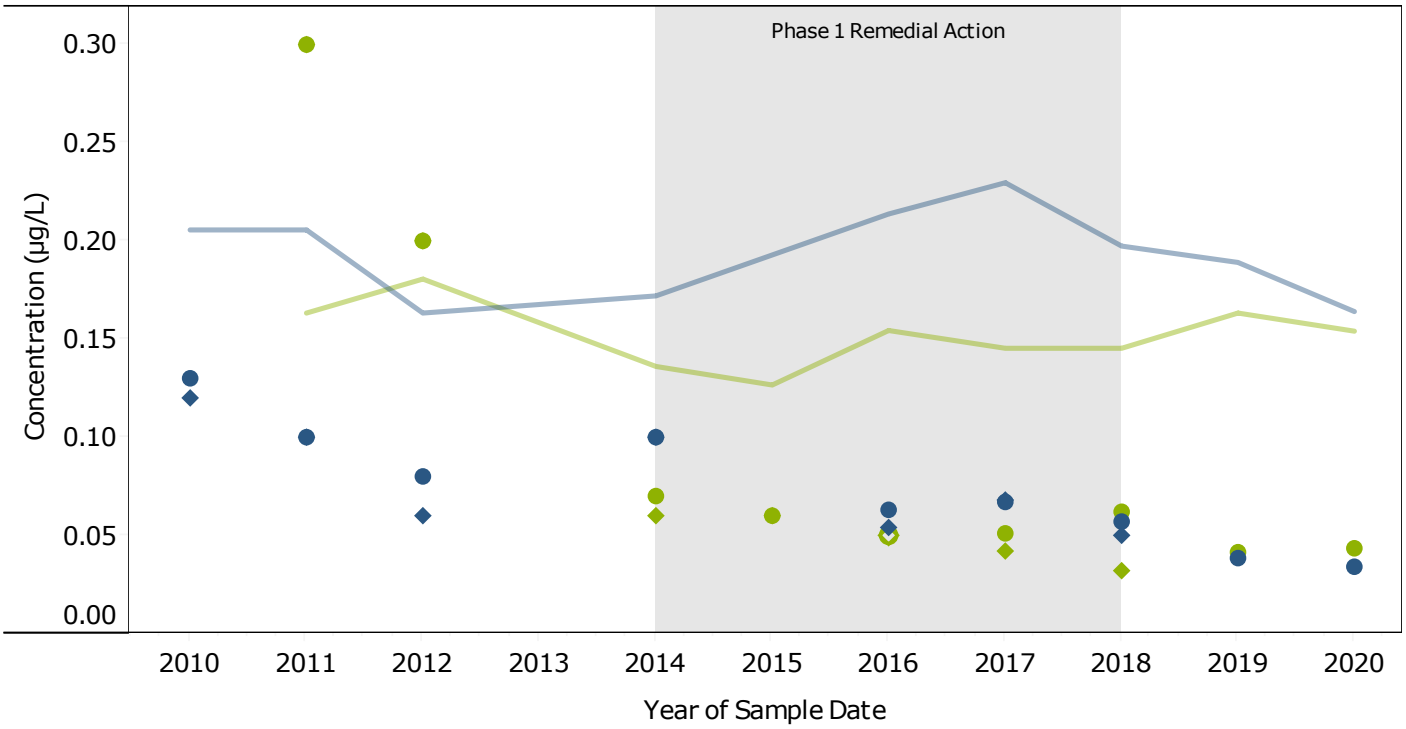
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

RC-13 (SG-8), Aluminum



RC-13 (SG-8), Cadmium



Legend

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

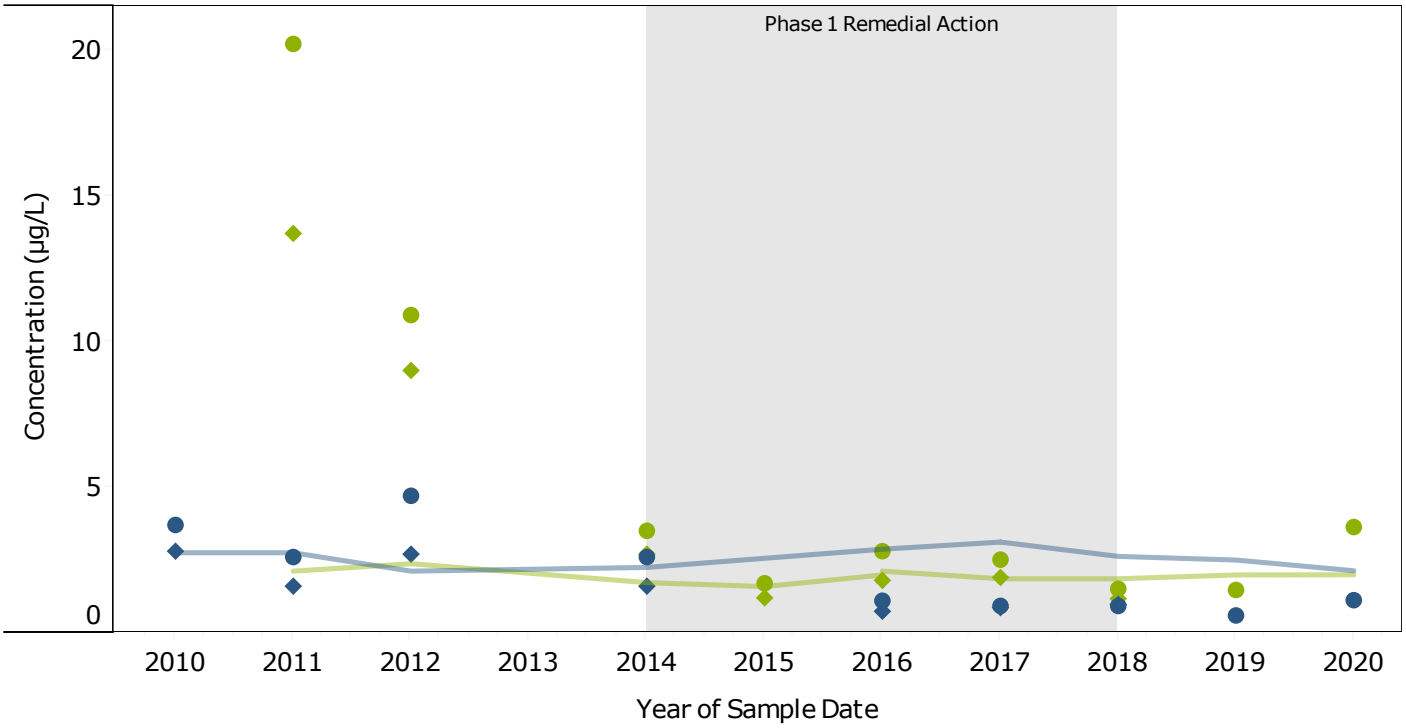
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

- Hardness-adjusted surface water criteria based on spring data
- Hardness-adjusted surface water criteria based on fall data

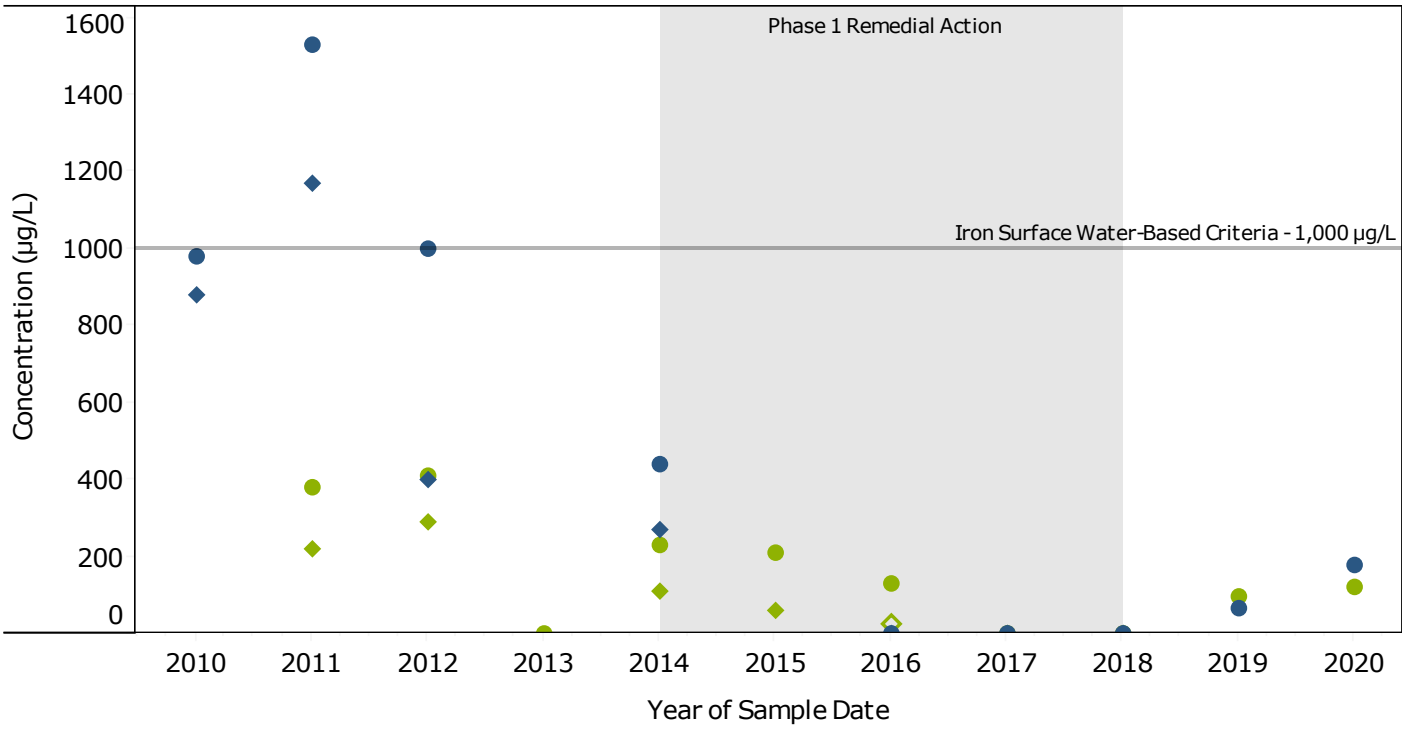
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

RC-13 (SG-8), Copper



RC-13 (SG-8), Iron



Legend

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

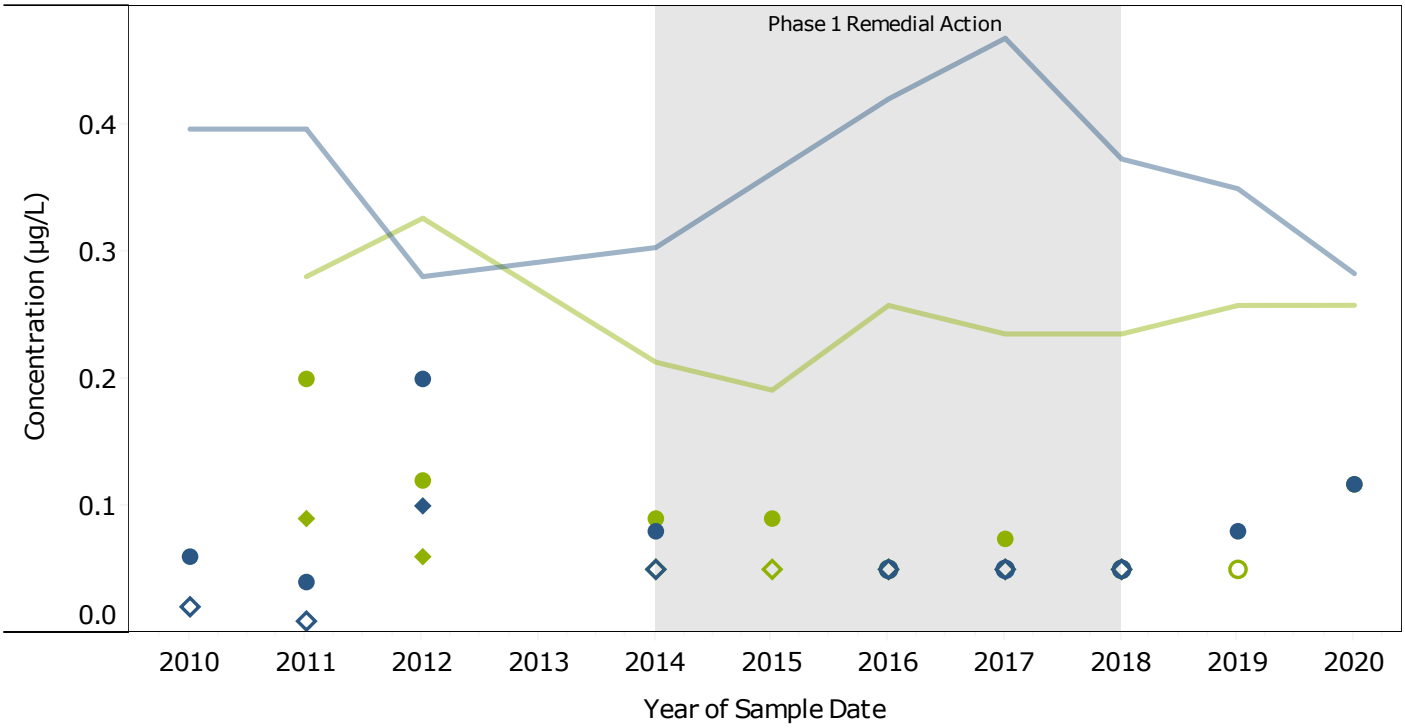
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

- Hardness-adjusted surface water criteria based on spring data
- Hardness-adjusted surface water criteria based on fall data

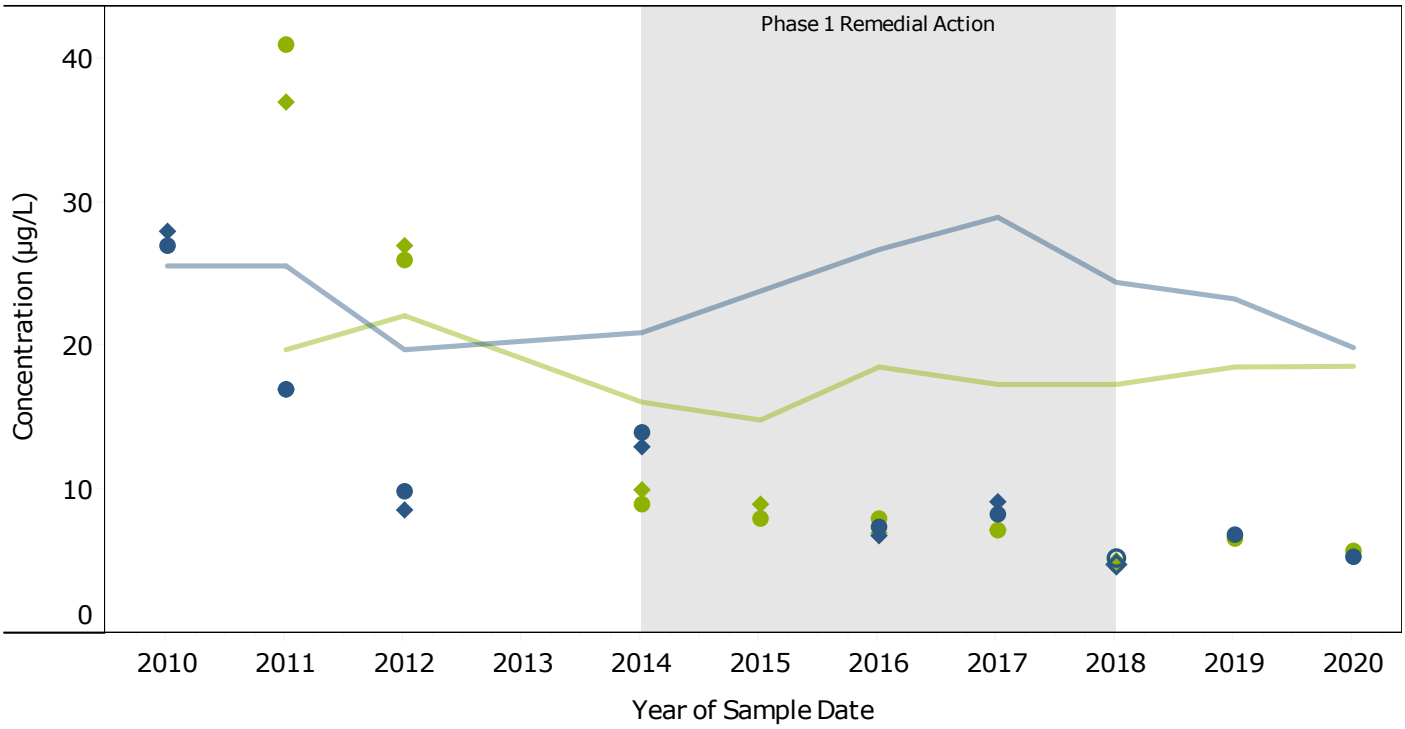
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

RC-13 (SG-8), Lead



RC-13 (SG-8), Zinc



Legend

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

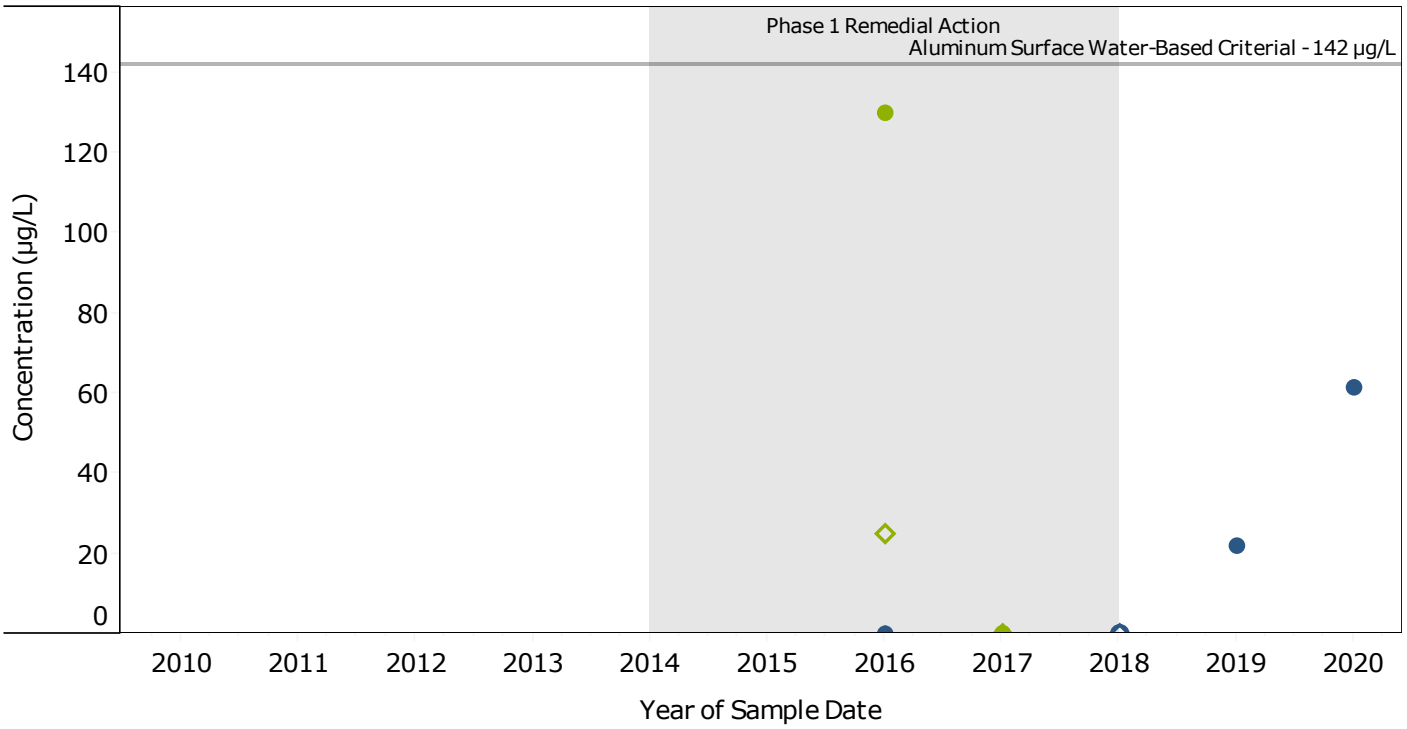
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

- Hardness-adjusted surface water criteria based on spring data
- Hardness-adjusted surface water criteria based on fall data

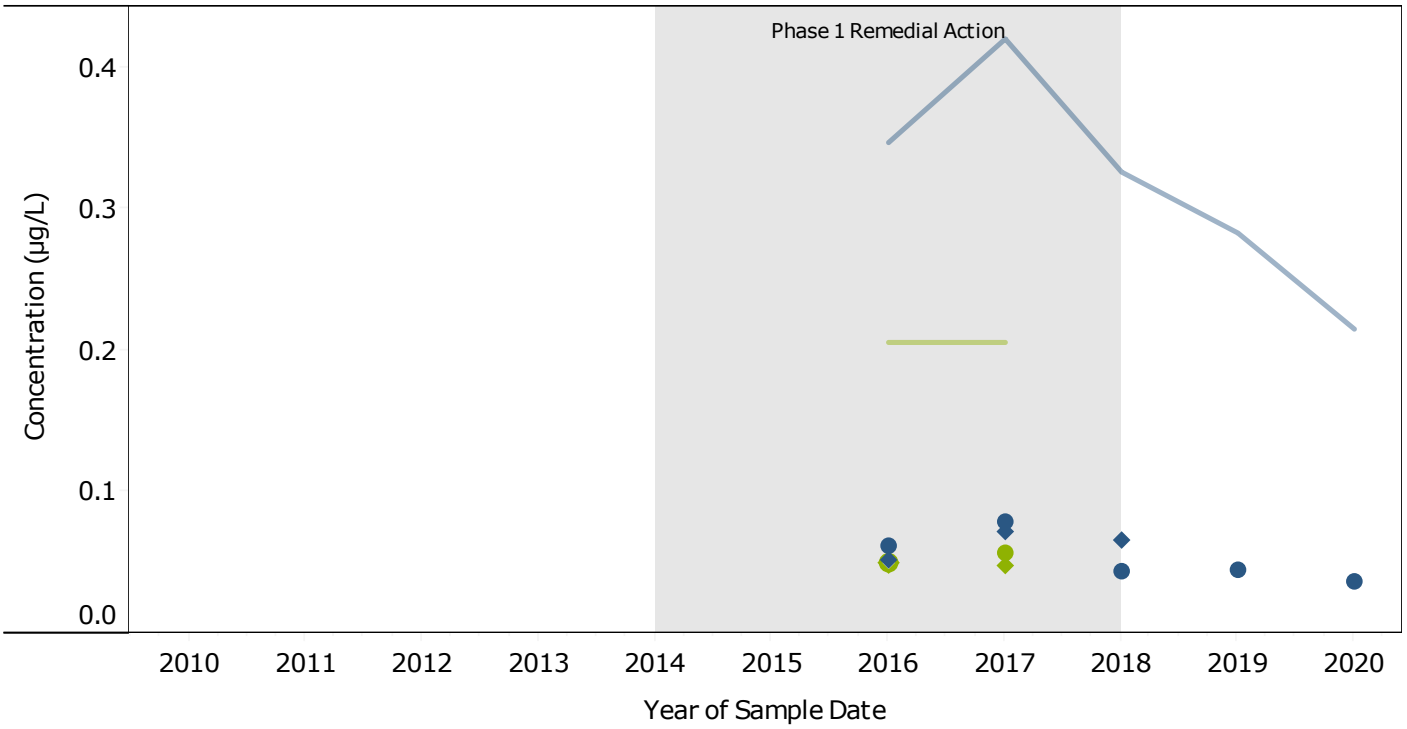
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

RC-15E, Aluminum



RC-15E, Cadmium



Legend

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

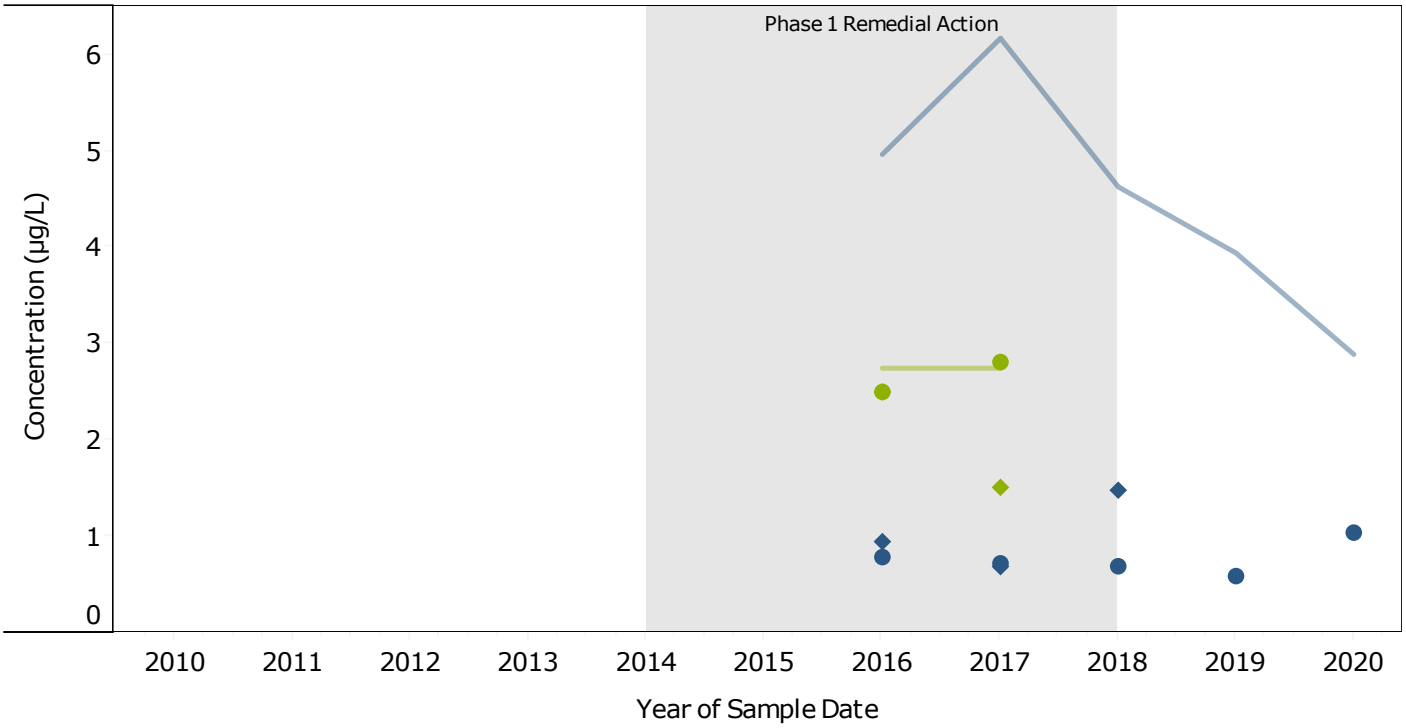
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

- Hardness-adjusted surface water criteria based on spring data
- Hardness-adjusted surface water criteria based on fall data

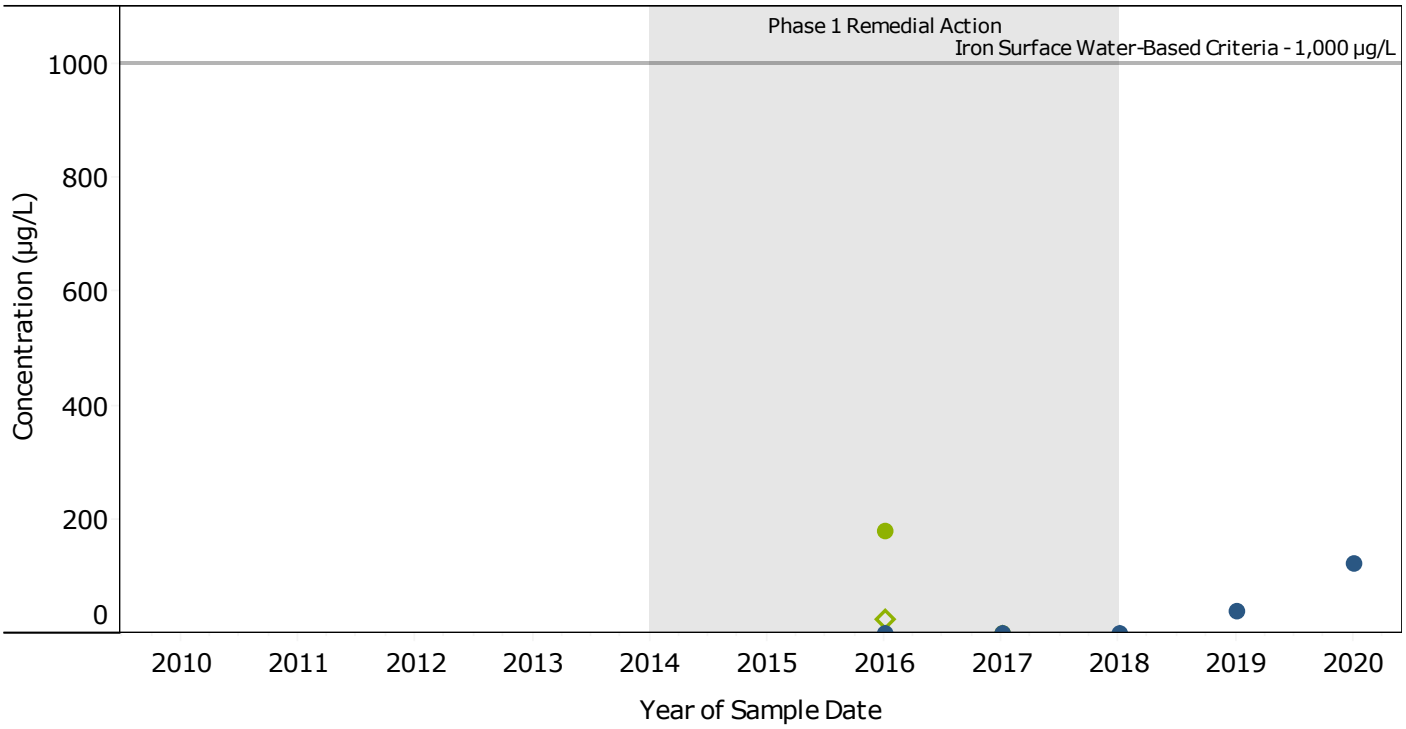
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

RC-15E, Copper



RC-15E, Iron



Legend

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

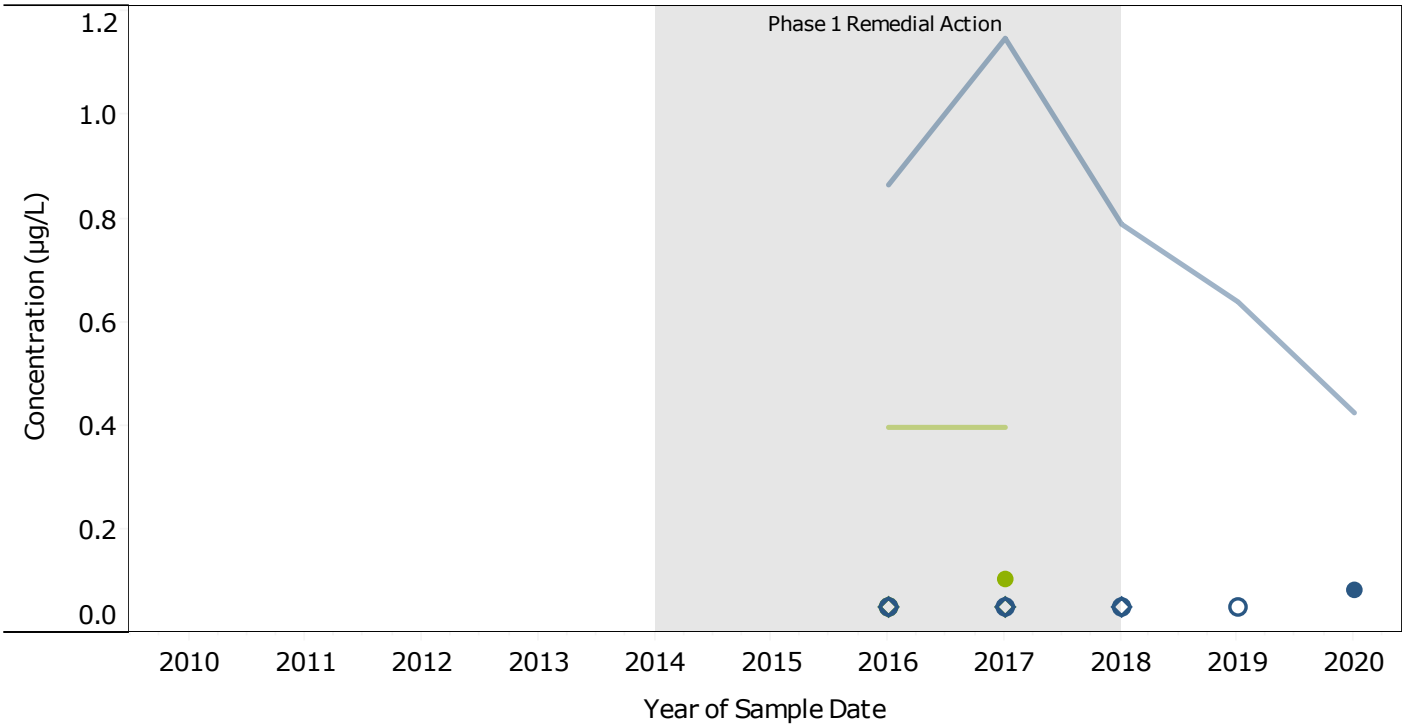
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

- Hardness-adjusted surface water criteria based on spring data
- Hardness-adjusted surface water criteria based on fall data

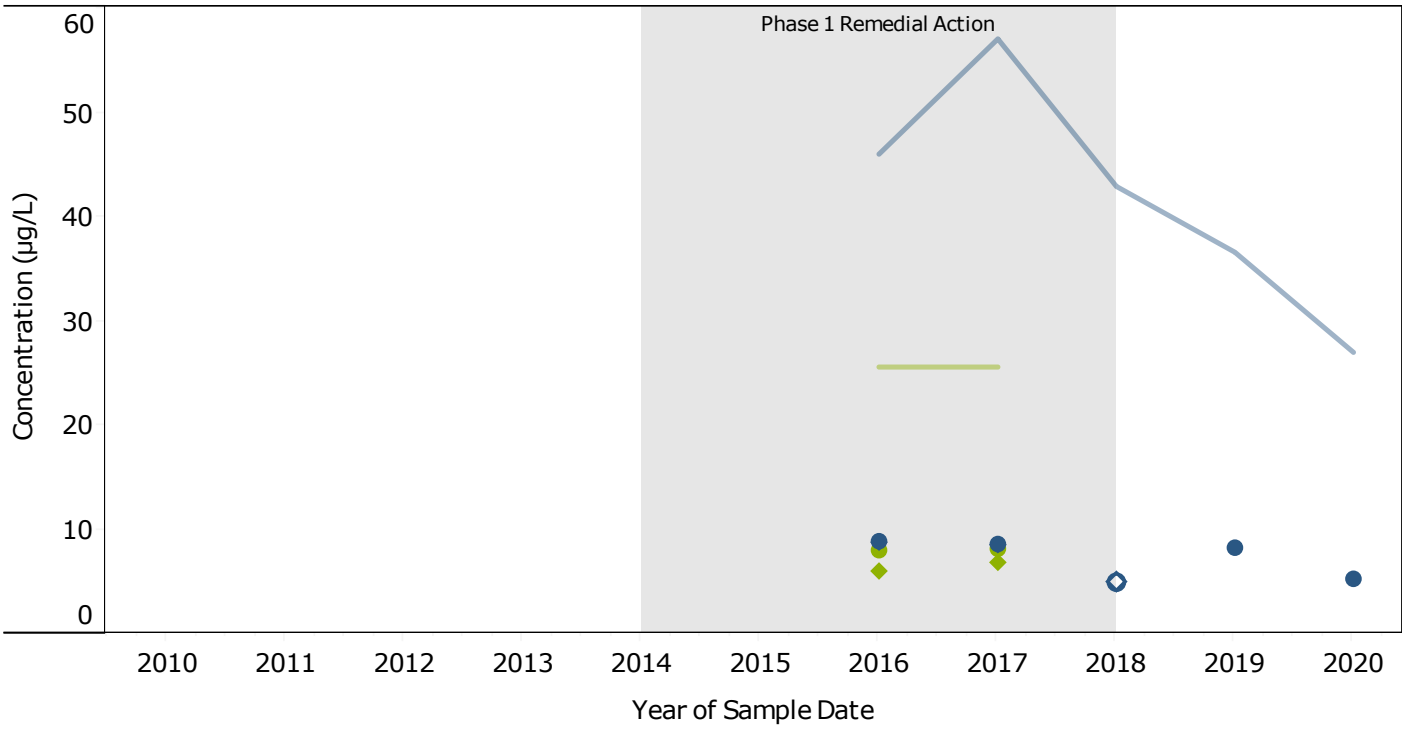
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

RC-15E, Lead



RC-15E, Zinc



Legend

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

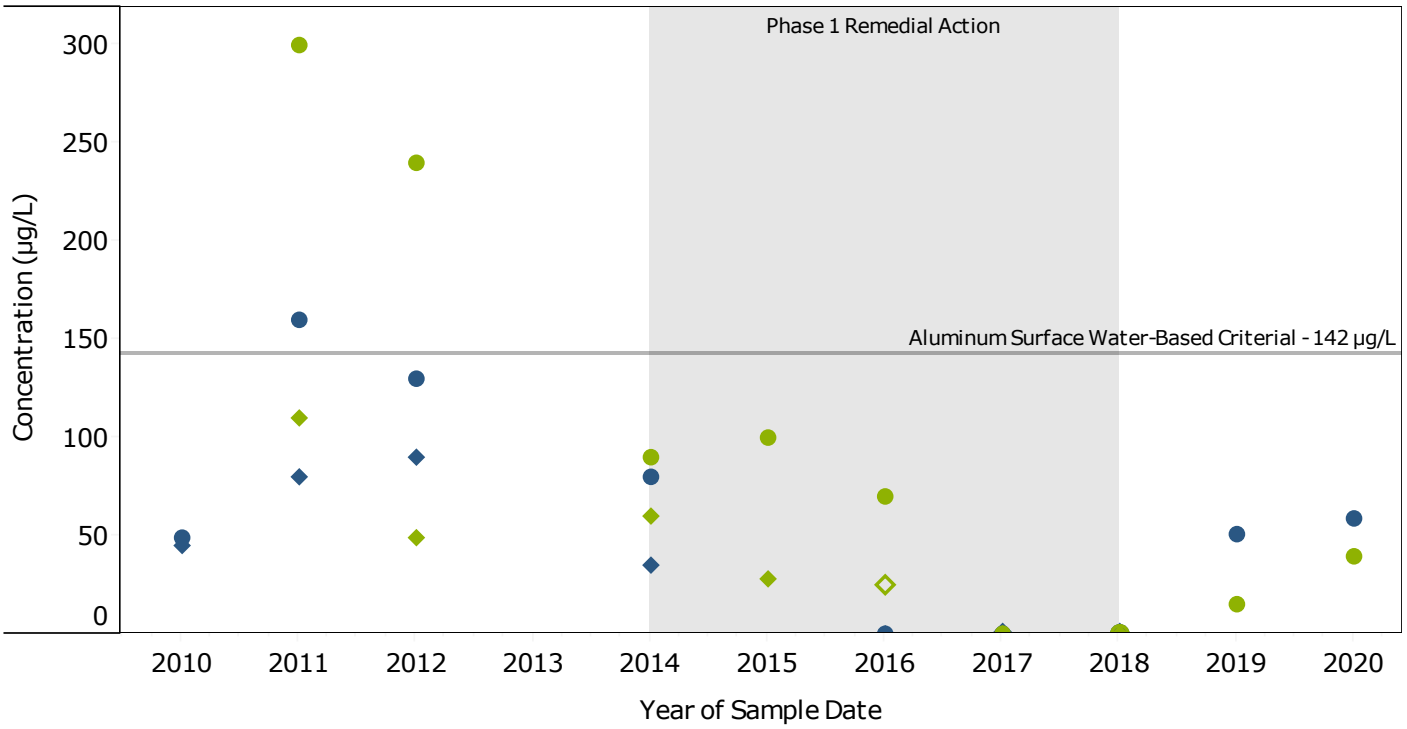
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

- Hardness-adjusted surface water criteria based on spring data
- Hardness-adjusted surface water criteria based on fall data

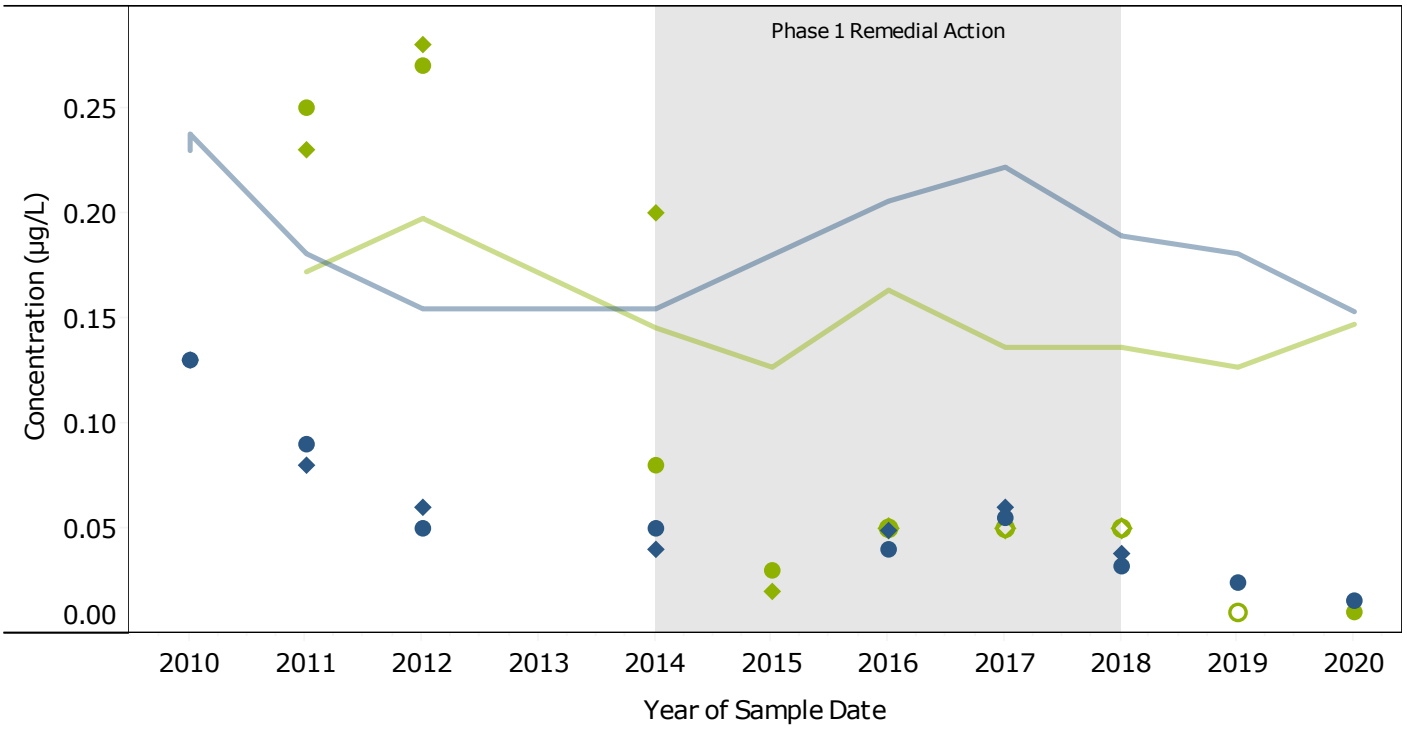
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

RC-16, Aluminum



RC-16, Cadmium



Legend

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

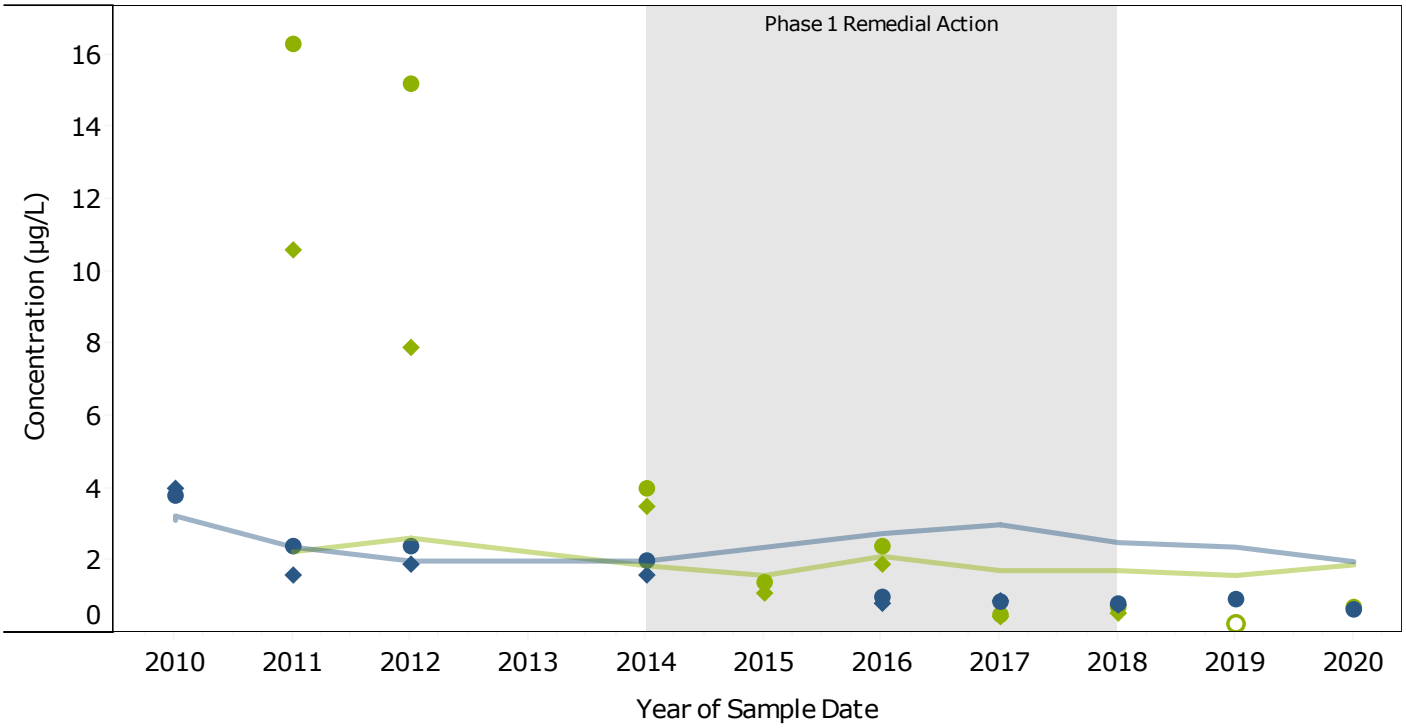
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

- Hardness-adjusted surface water criteria based on spring data
- Hardness-adjusted surface water criteria based on fall data

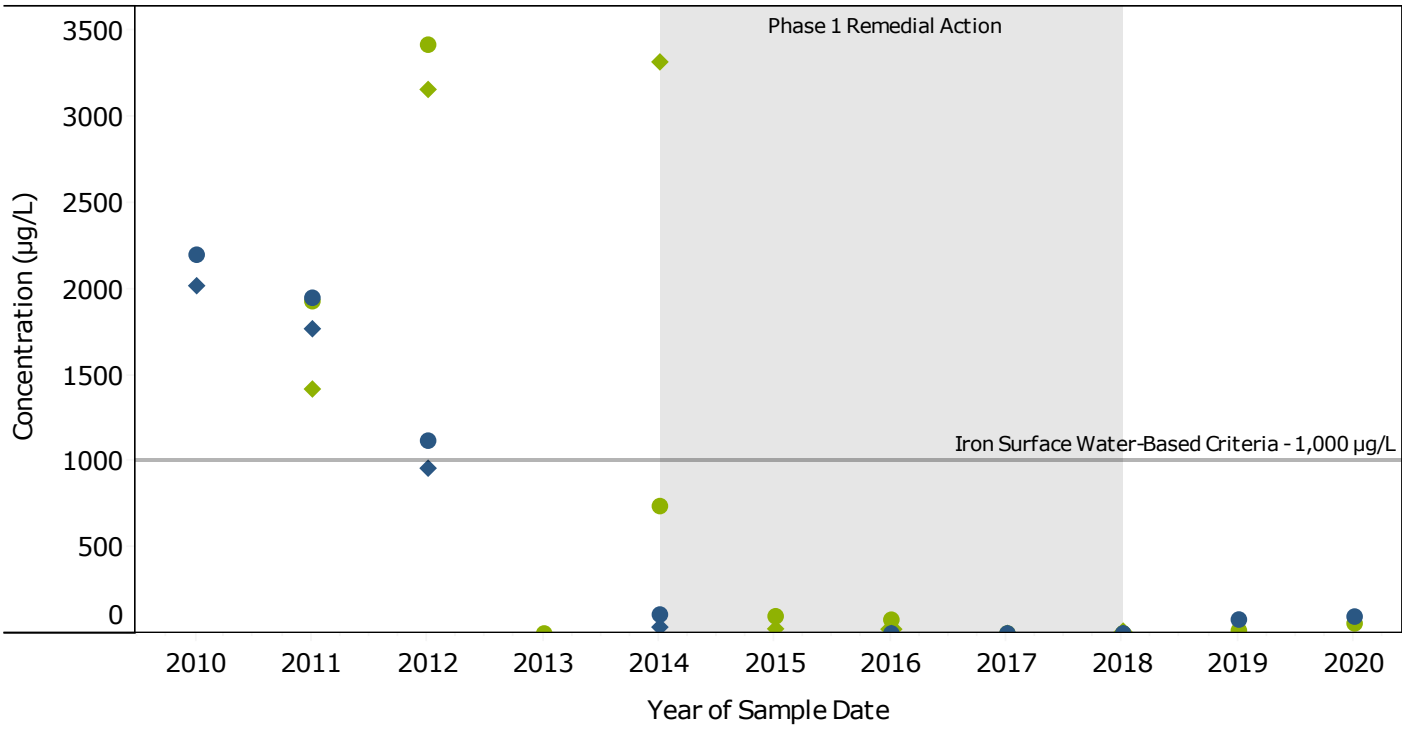
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

RC-16, Copper



RC-16, Iron



Legend

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

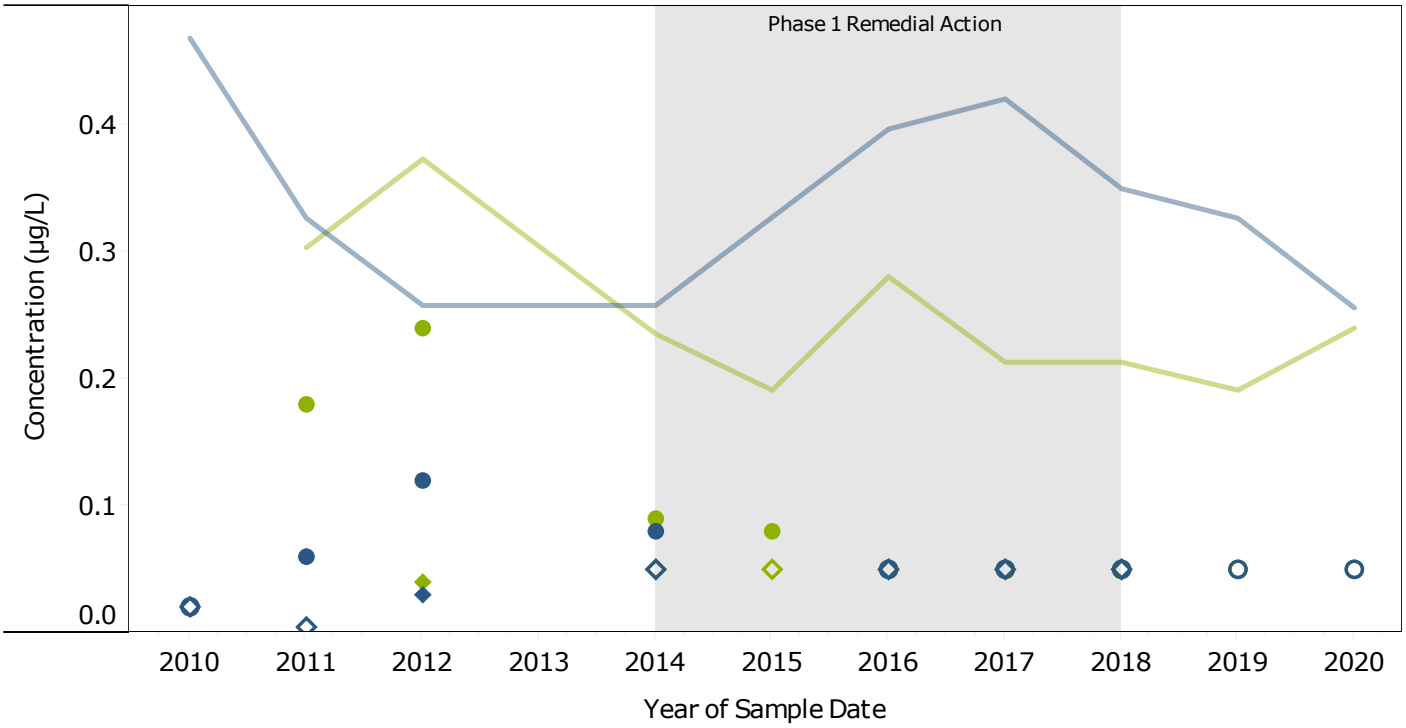
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

- Hardness-adjusted surface water criteria based on spring data
- Hardness-adjusted surface water criteria based on fall data

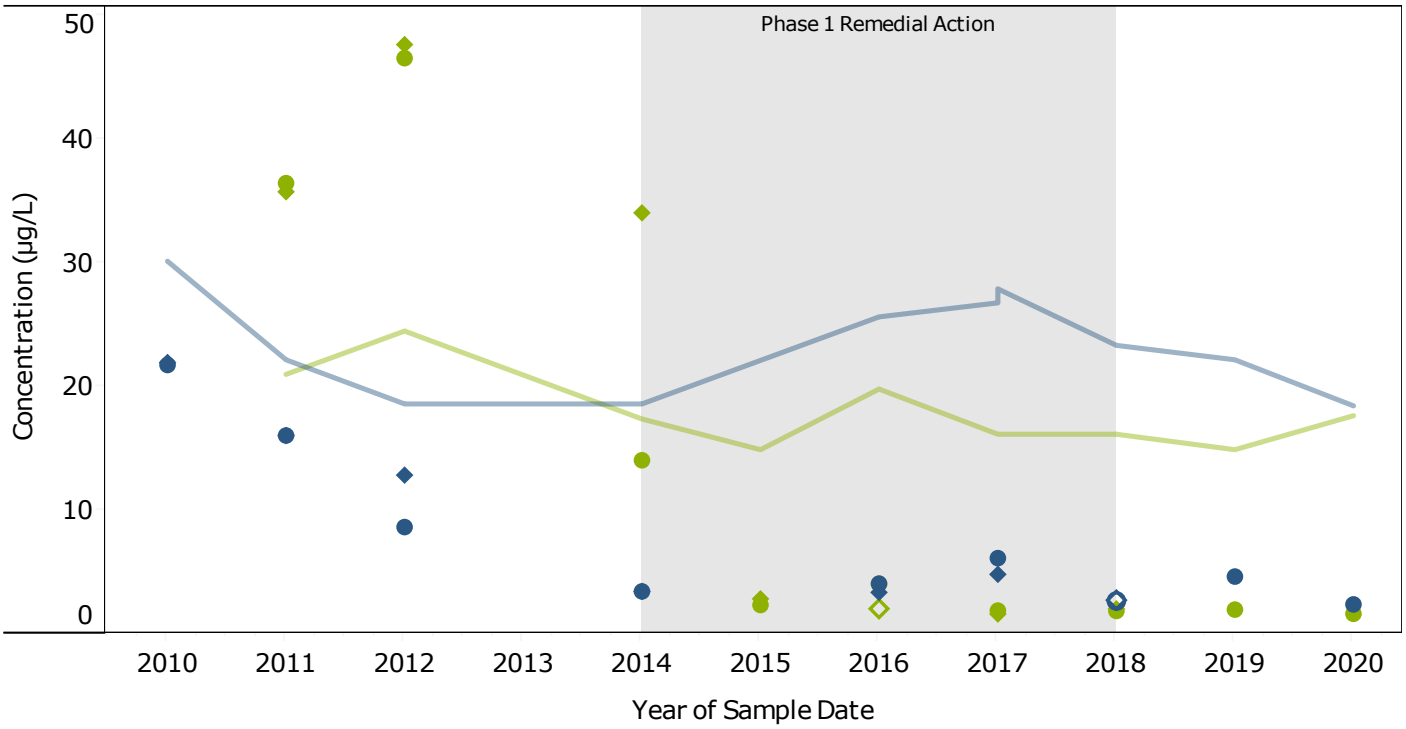
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

RC-16, Lead



RC-16, Zinc



Legend

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

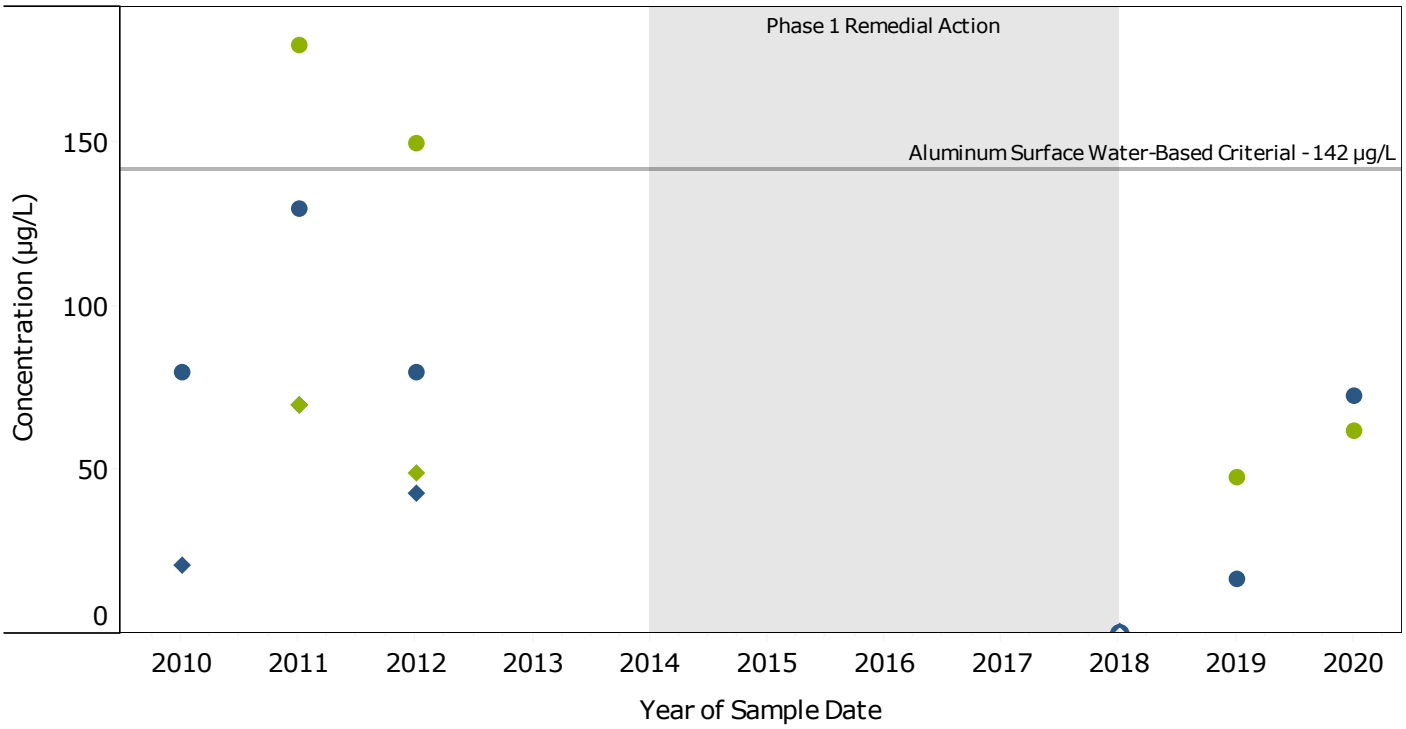
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

- Hardness-adjusted surface water criteria based on spring data
- Hardness-adjusted surface water criteria based on fall data

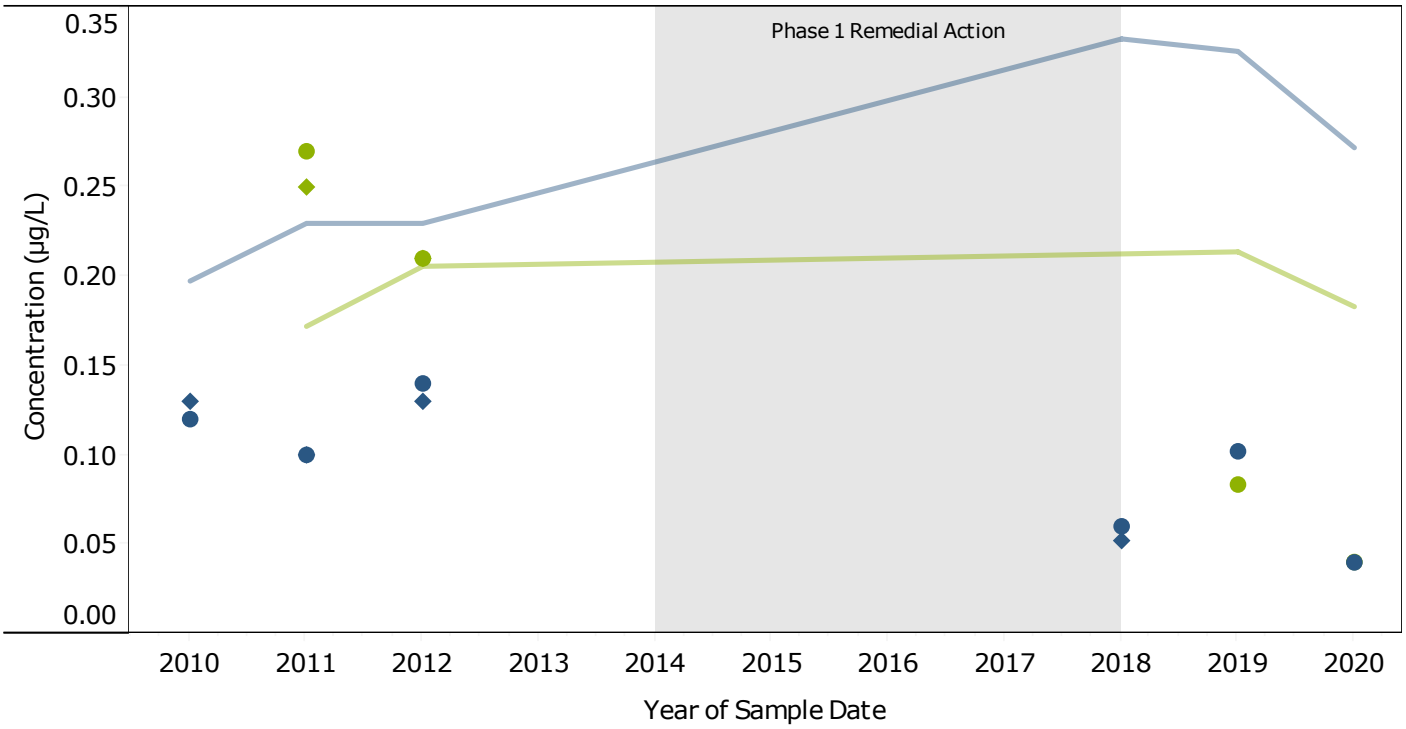
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

SG-9, Aluminum



SG-9, Cadmium



Legend

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

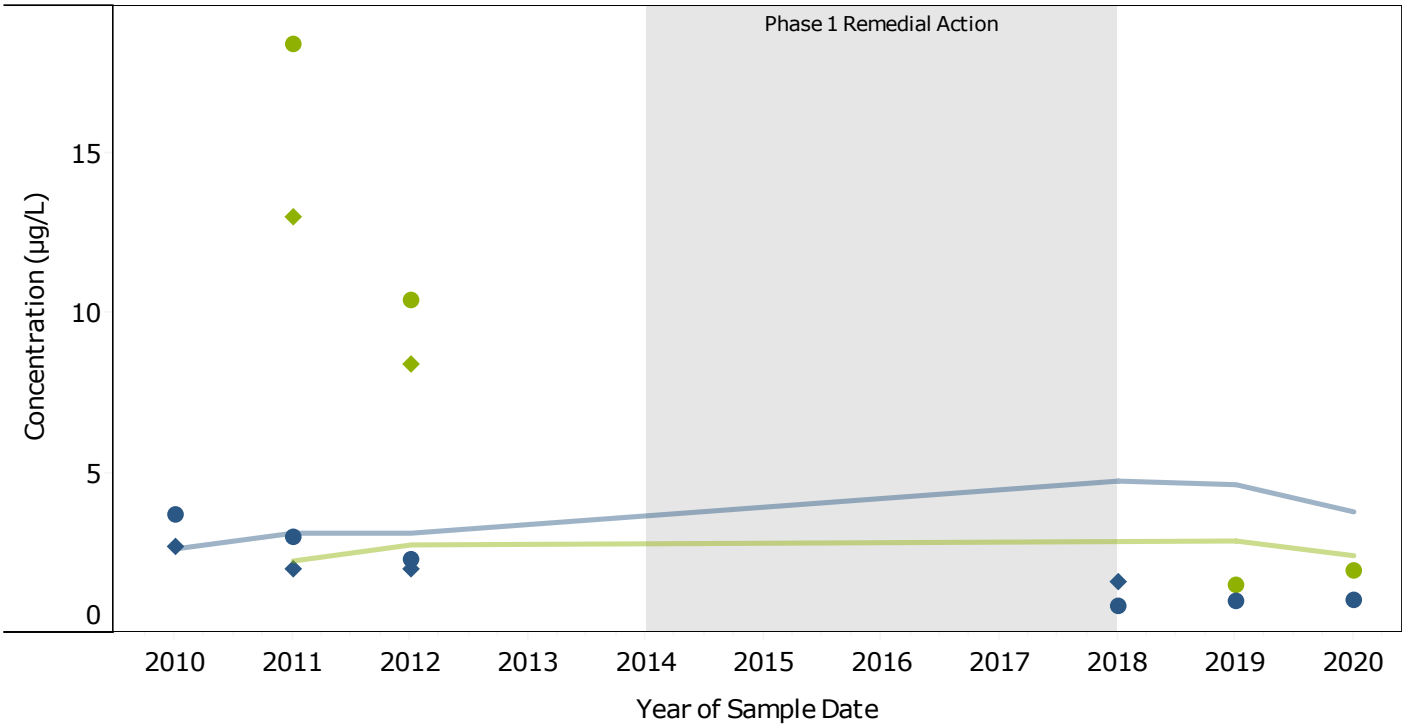
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

- Hardness-adjusted surface water criteria based on spring data
- Hardness-adjusted surface water criteria based on fall data

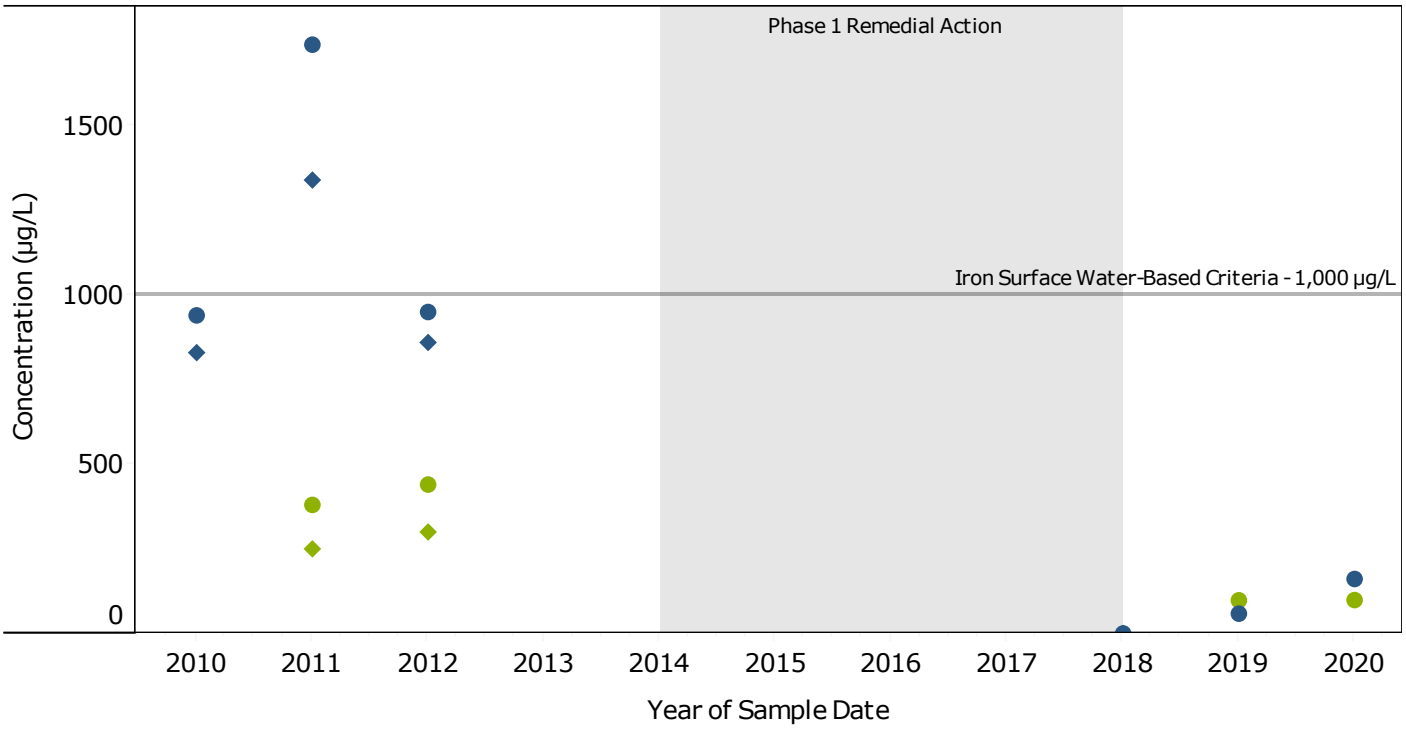
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

SG-9, Copper



SG-9, Iron



Legend

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

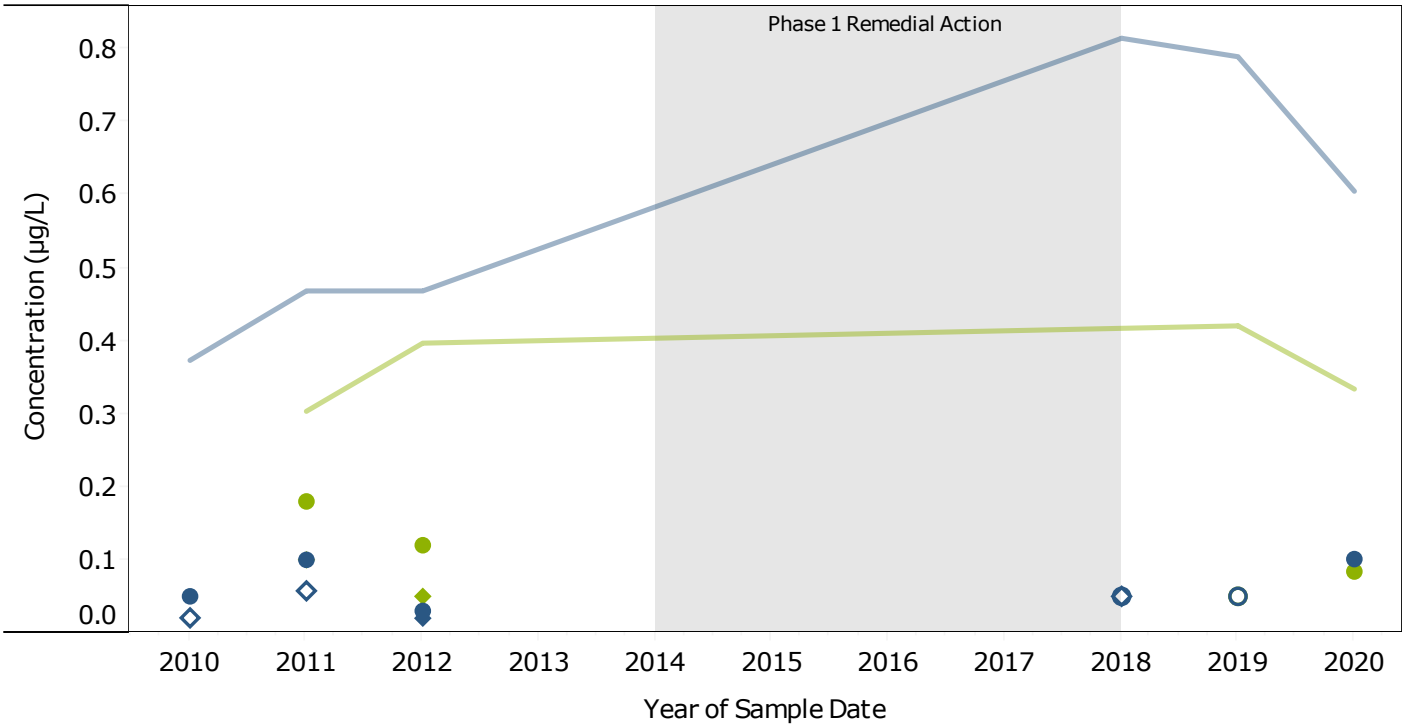
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

- Hardness-adjusted surface water criteria based on spring data
- Hardness-adjusted surface water criteria based on fall data

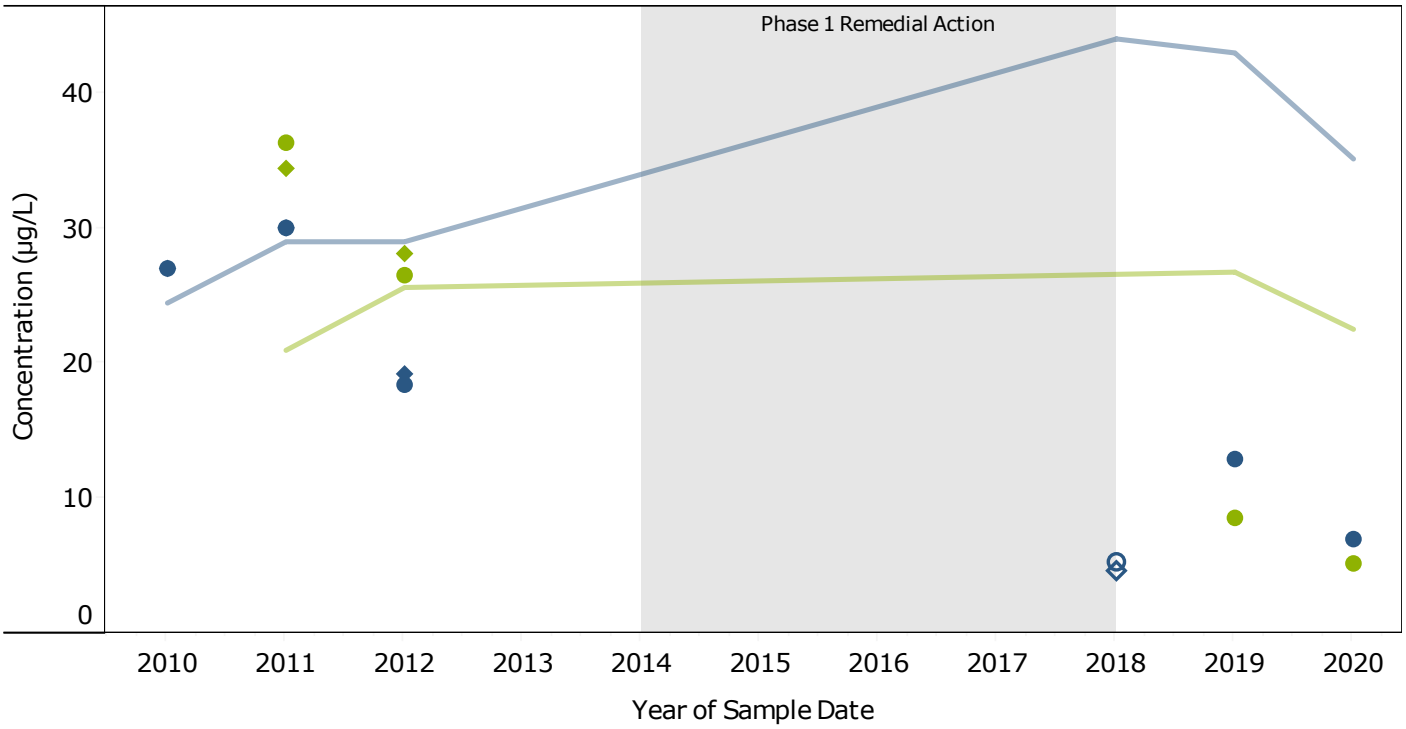
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

SG-9, Lead



SG-9, Zinc



Legend

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

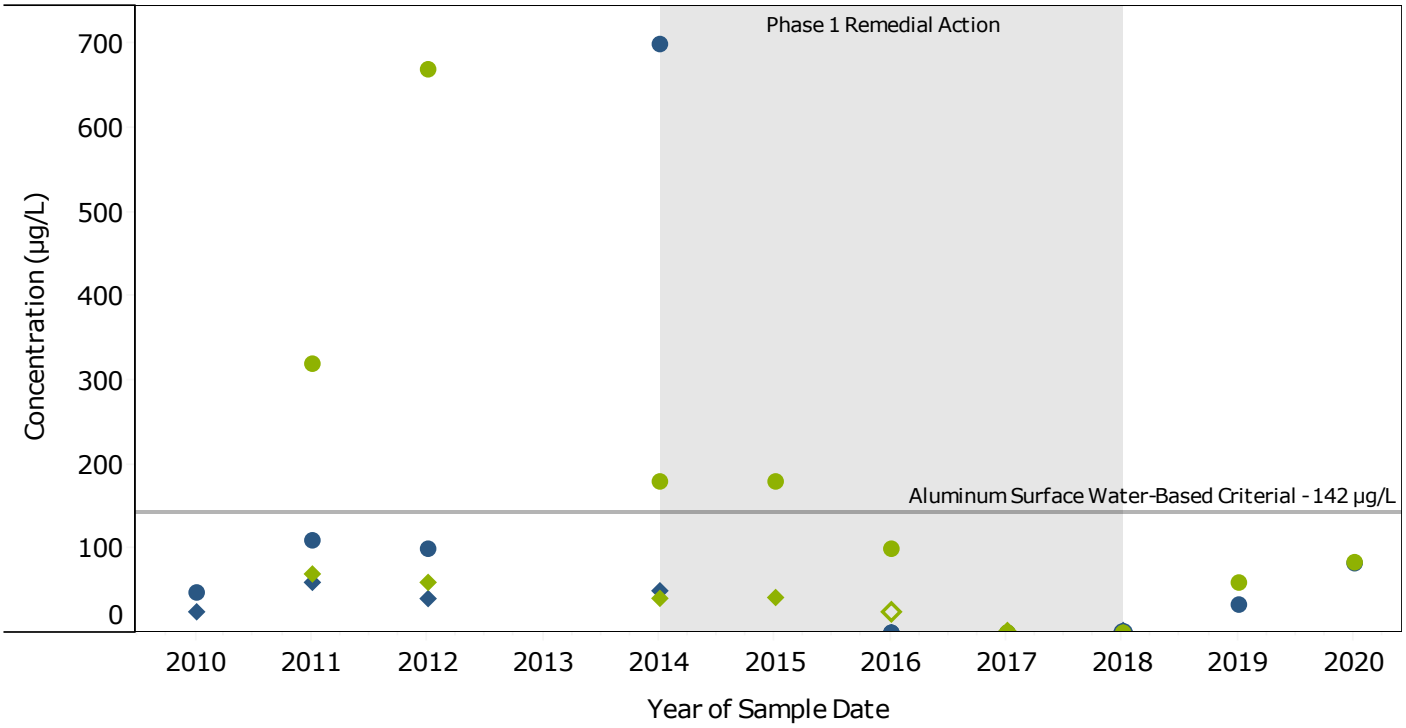
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

- Hardness-adjusted surface water criteria based on spring data
- Hardness-adjusted surface water criteria based on fall data

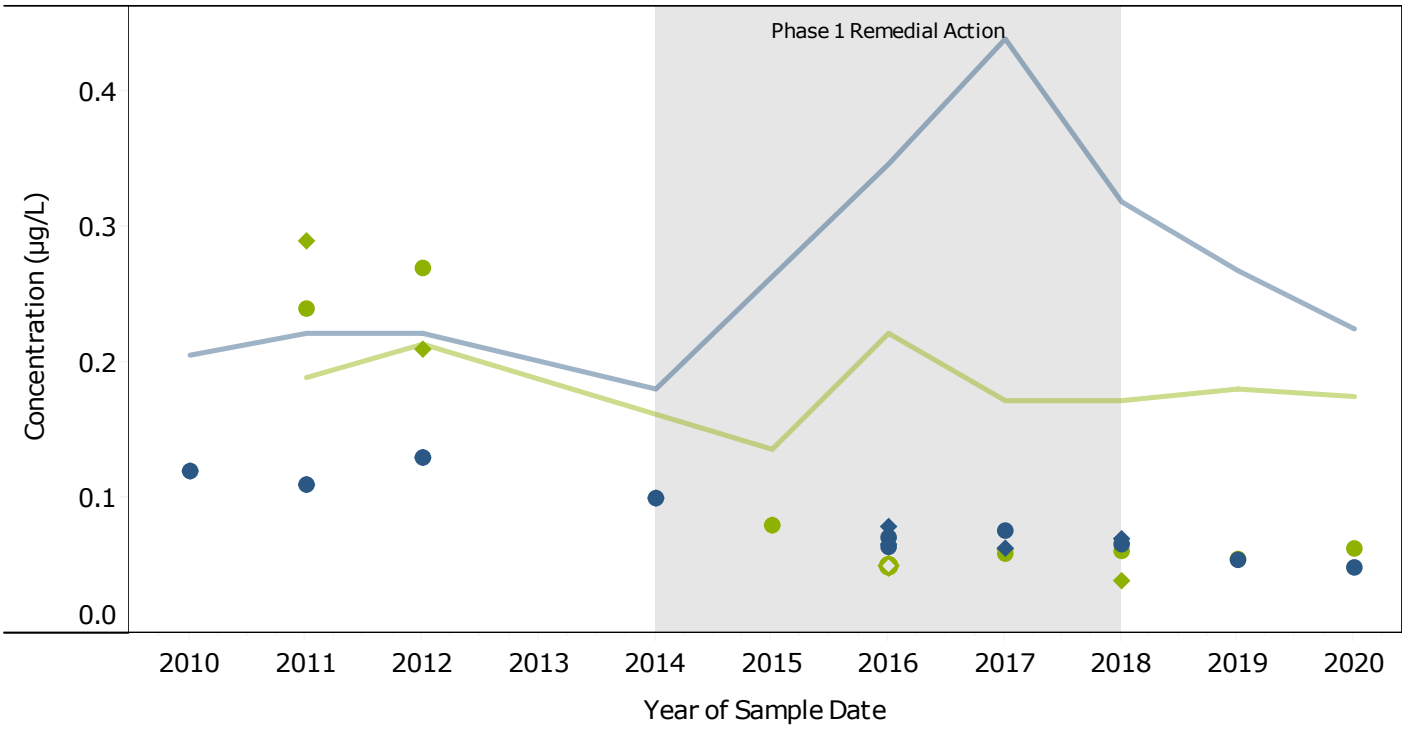
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

SG-10, Aluminum



SG-10, Cadmium



Legend

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

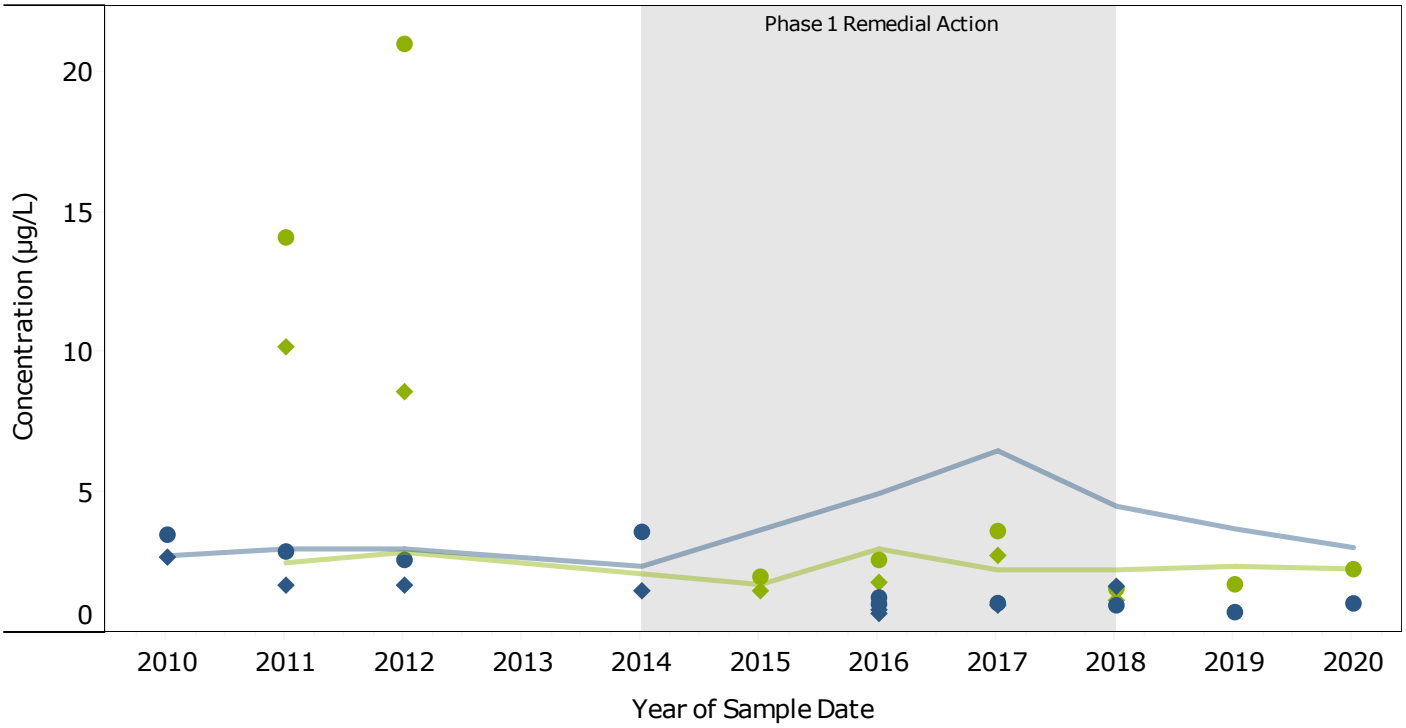
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

- Hardness-adjusted surface water criteria based on spring data
- Hardness-adjusted surface water criteria based on fall data

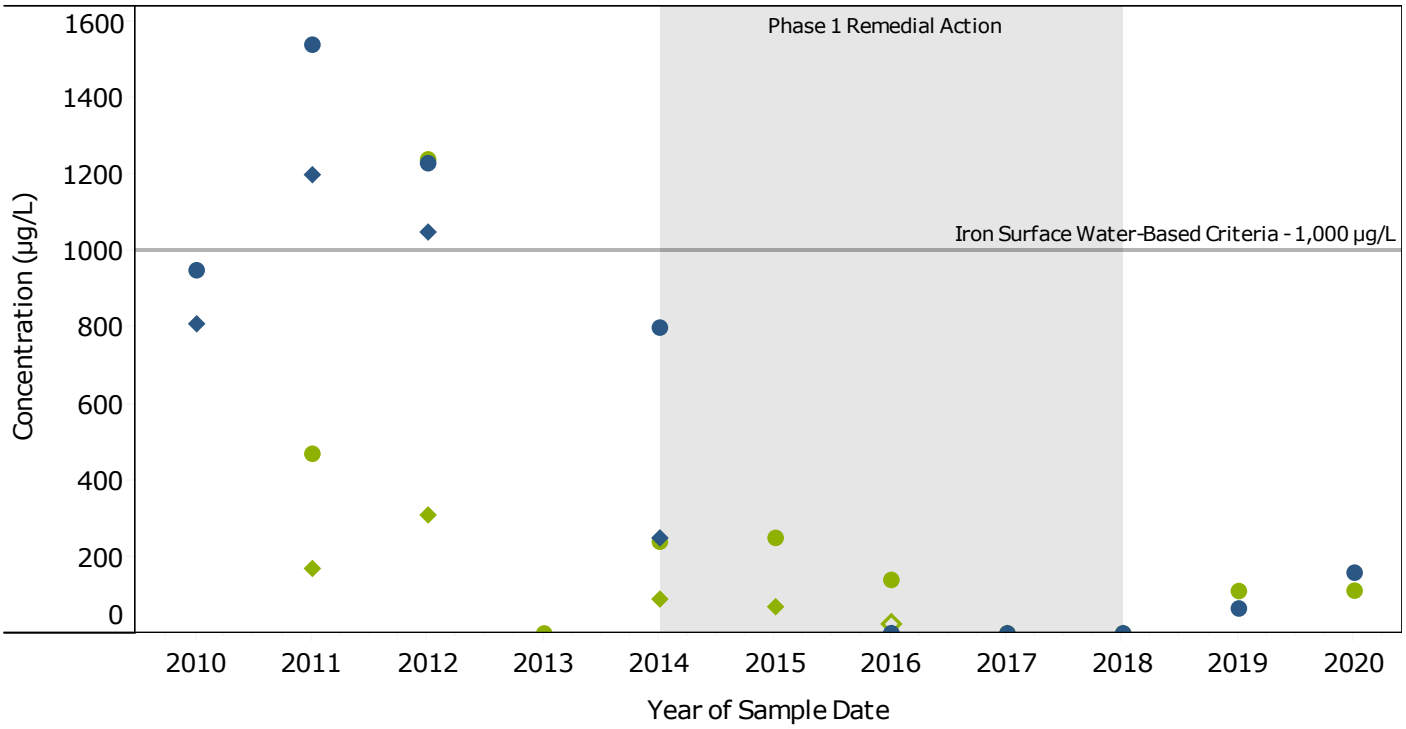
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

SG-10, Copper



SG-10, Iron



Legend

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

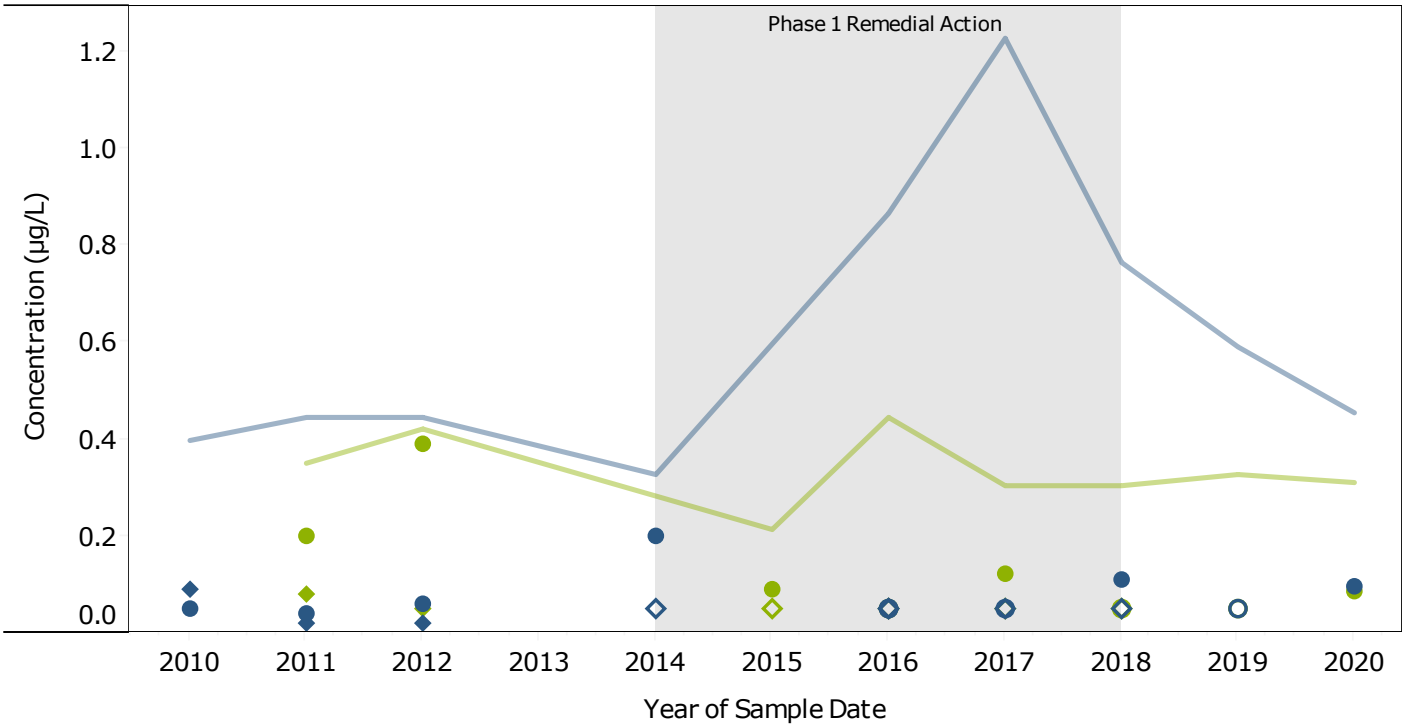
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

- Hardness-adjusted surface water criteria based on spring data
- Hardness-adjusted surface water criteria based on fall data

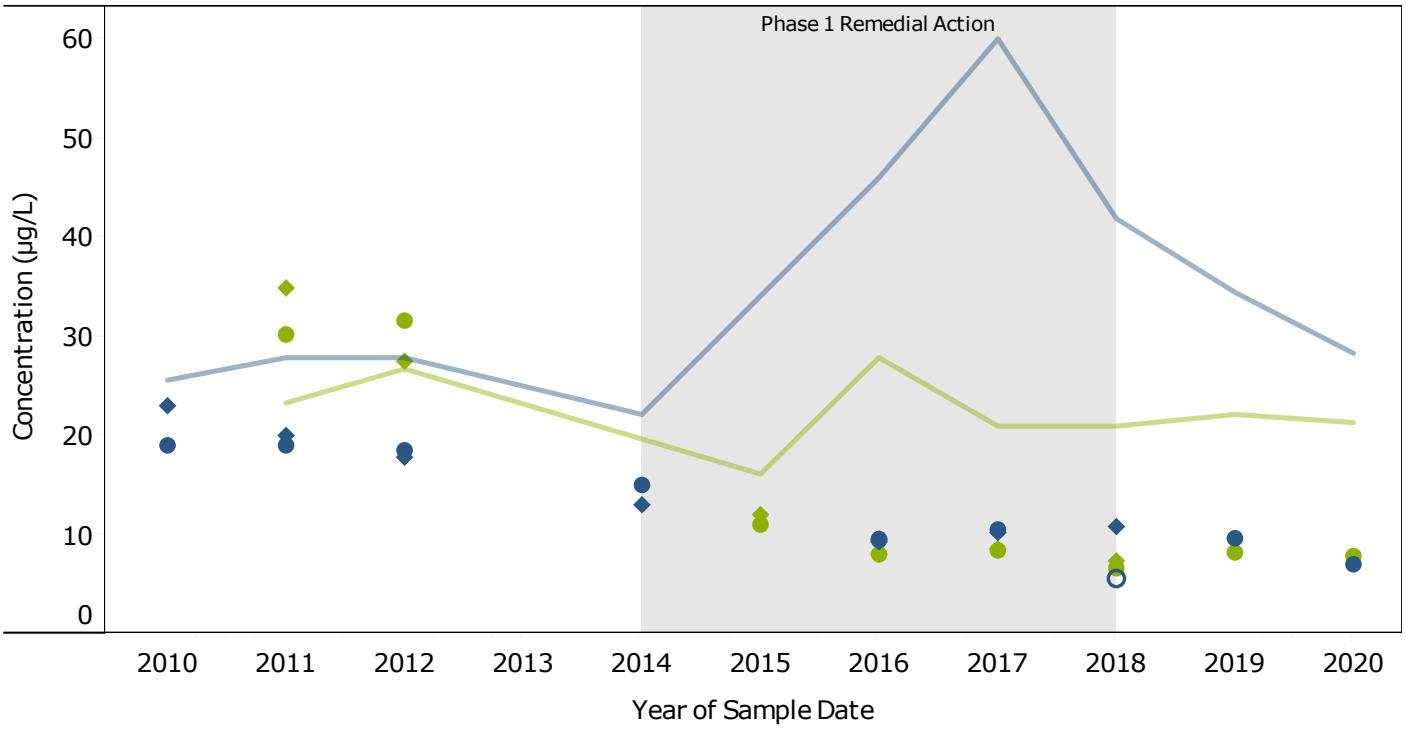
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

SG-10, Lead



SG-10, Zinc



Legend

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

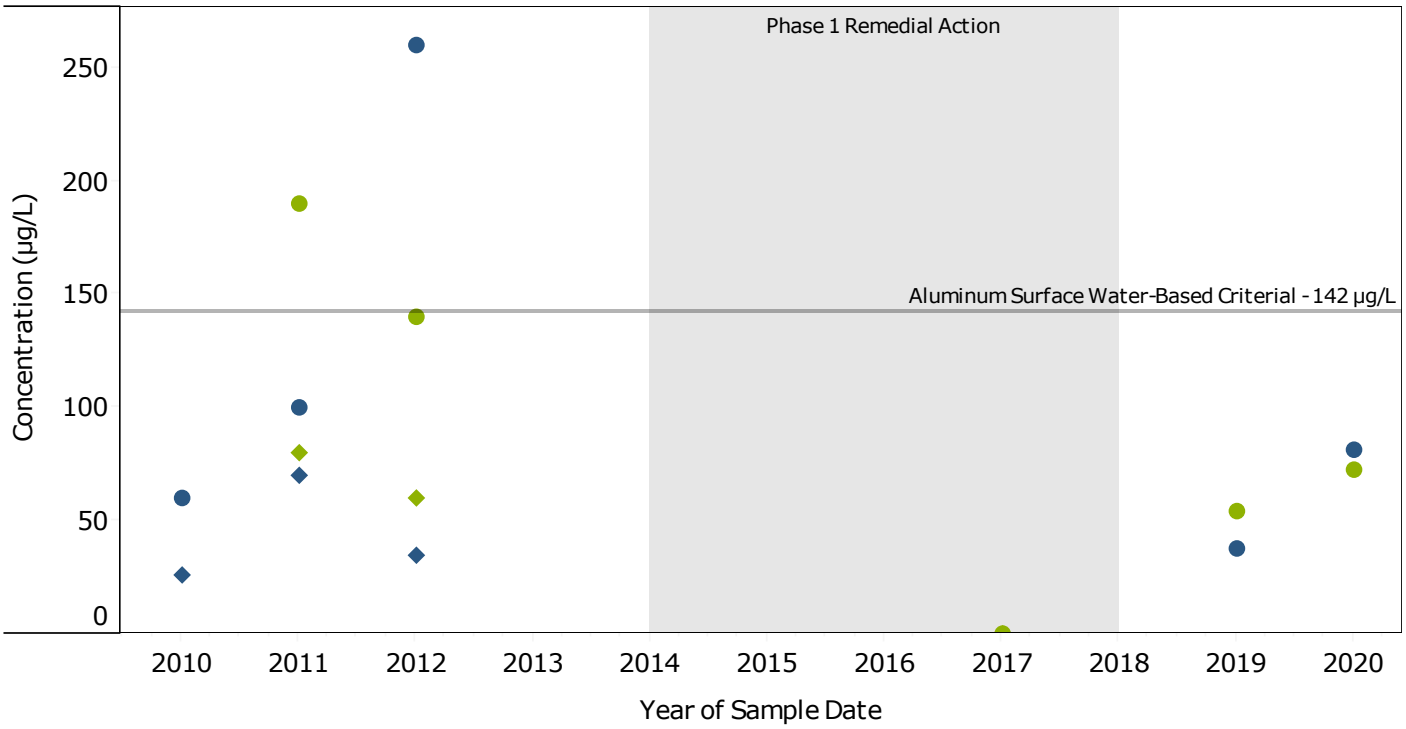
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

- Hardness-adjusted surface water criteria based on spring data
- Hardness-adjusted surface water criteria based on fall data

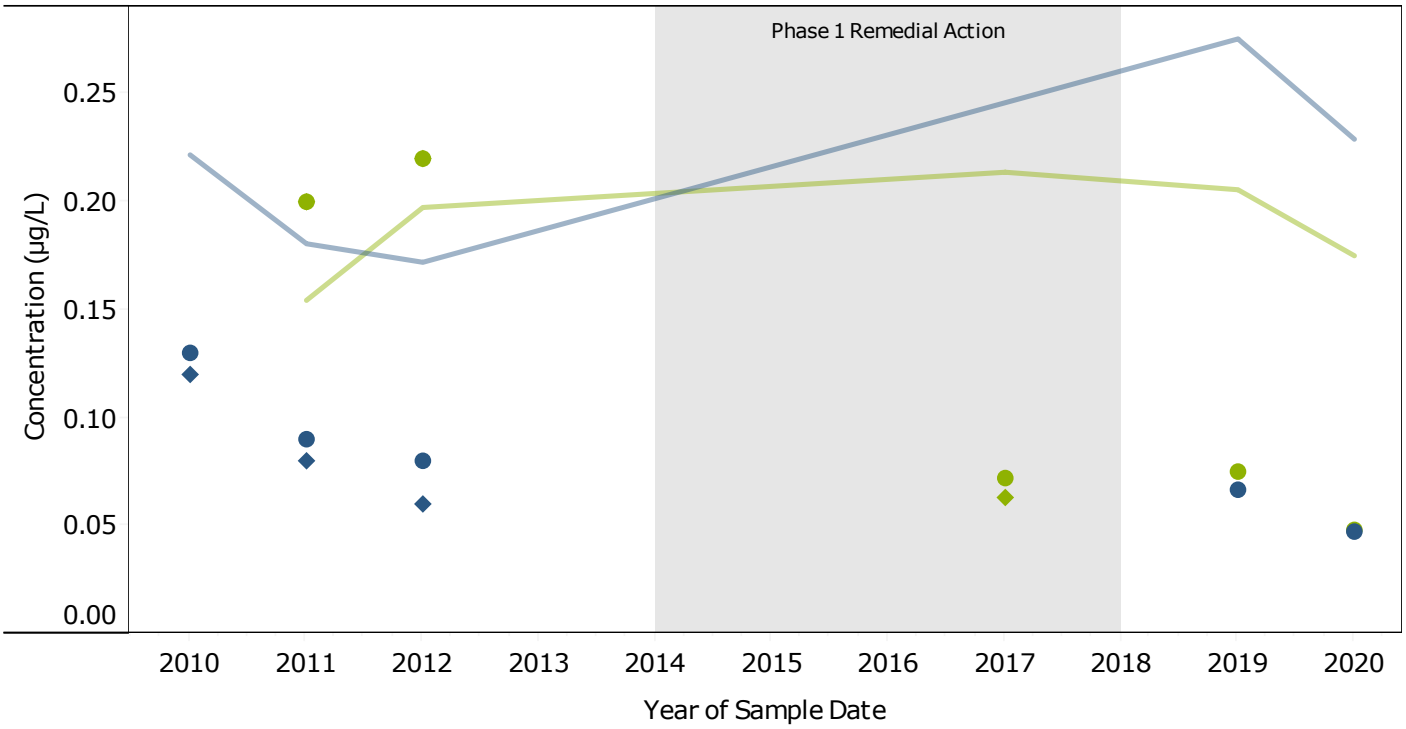
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

SG-11, Aluminum



SG-11, Cadmium



Legend

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

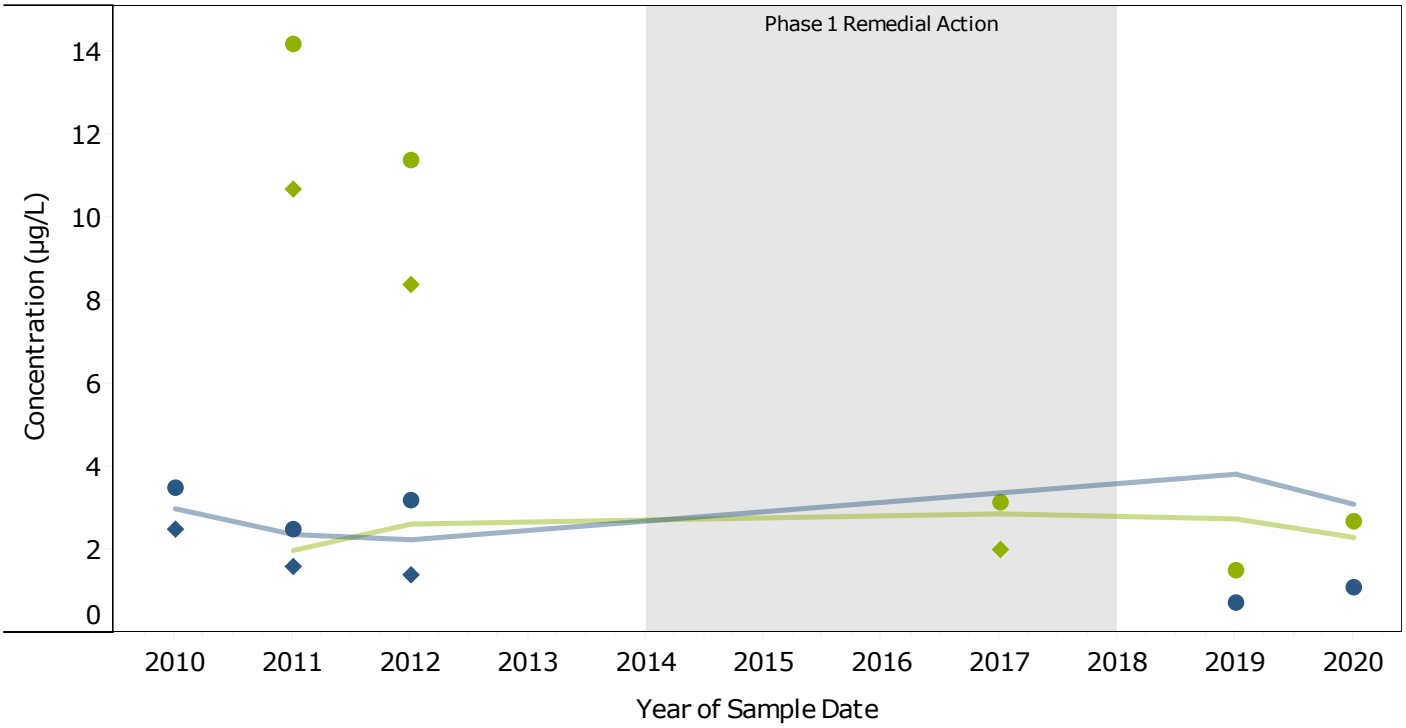
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

- Hardness-adjusted surface water criteria based on spring data
- Hardness-adjusted surface water criteria based on fall data

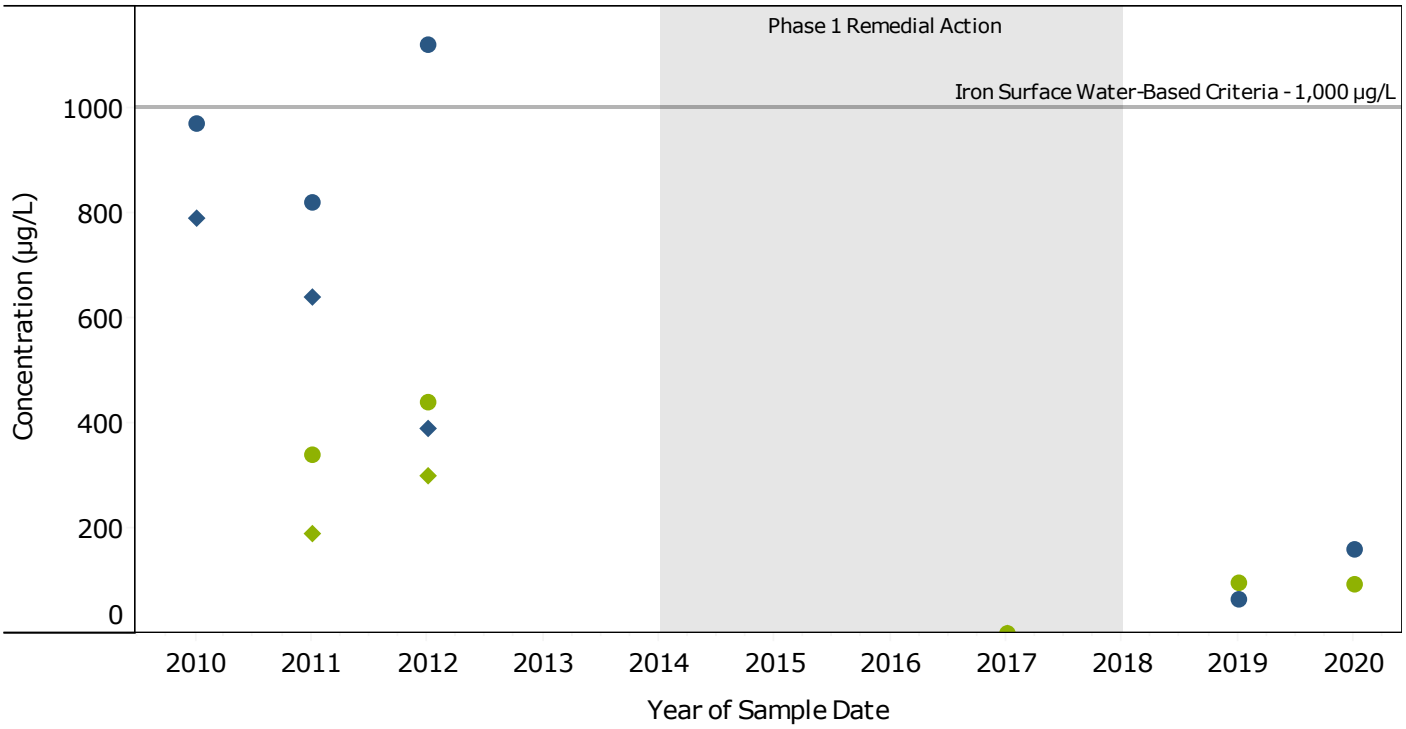
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

SG-11, Copper



SG-11, Iron



Legend

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

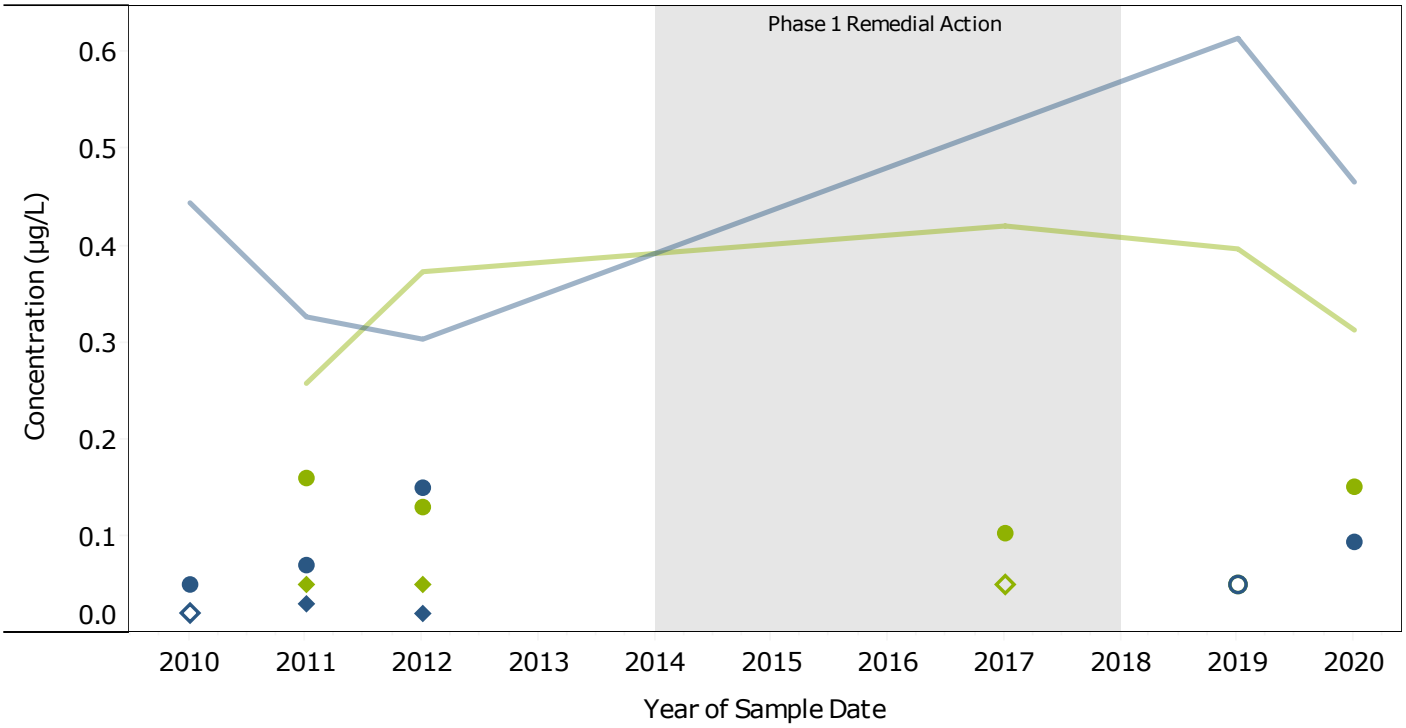
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

- Hardness-adjusted surface water criteria based on spring data
- Hardness-adjusted surface water criteria based on fall data

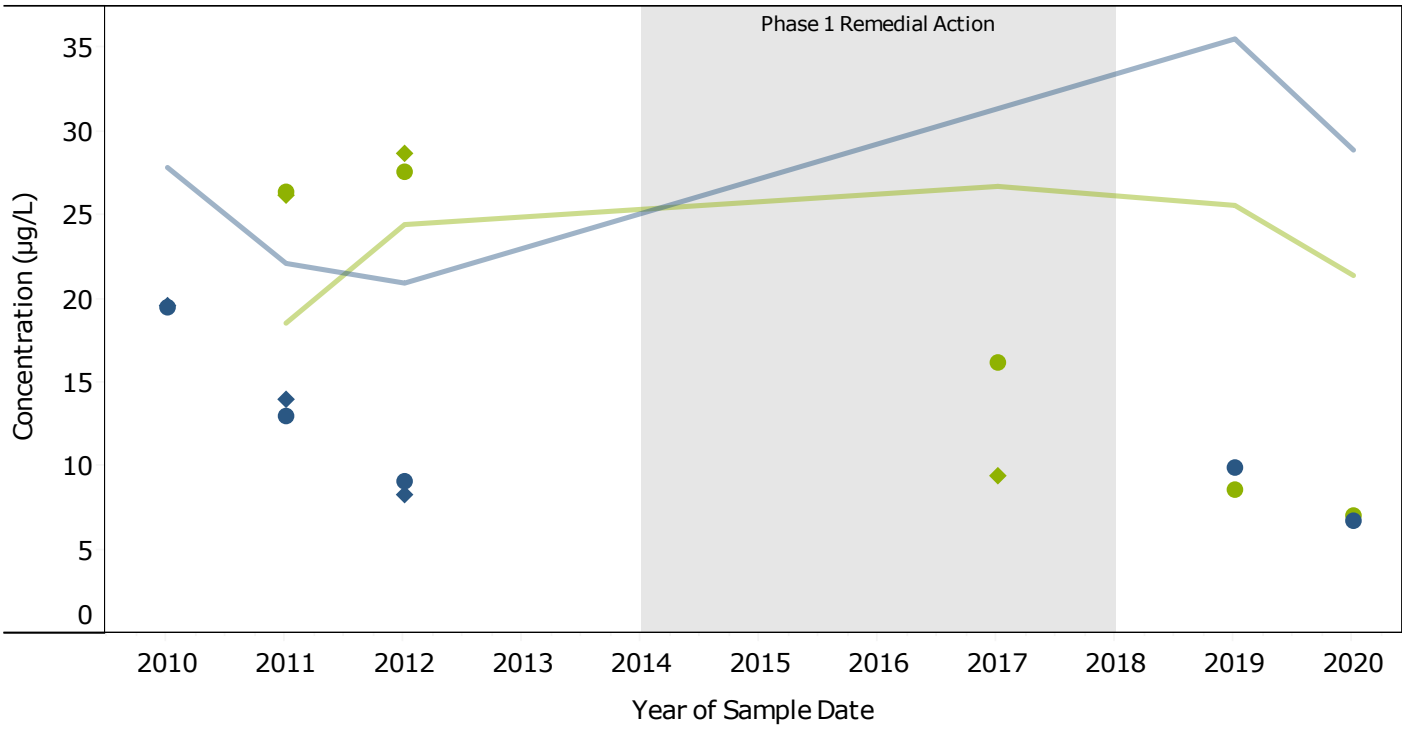
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

SG-11, Lead



SG-11, Zinc



Legend

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

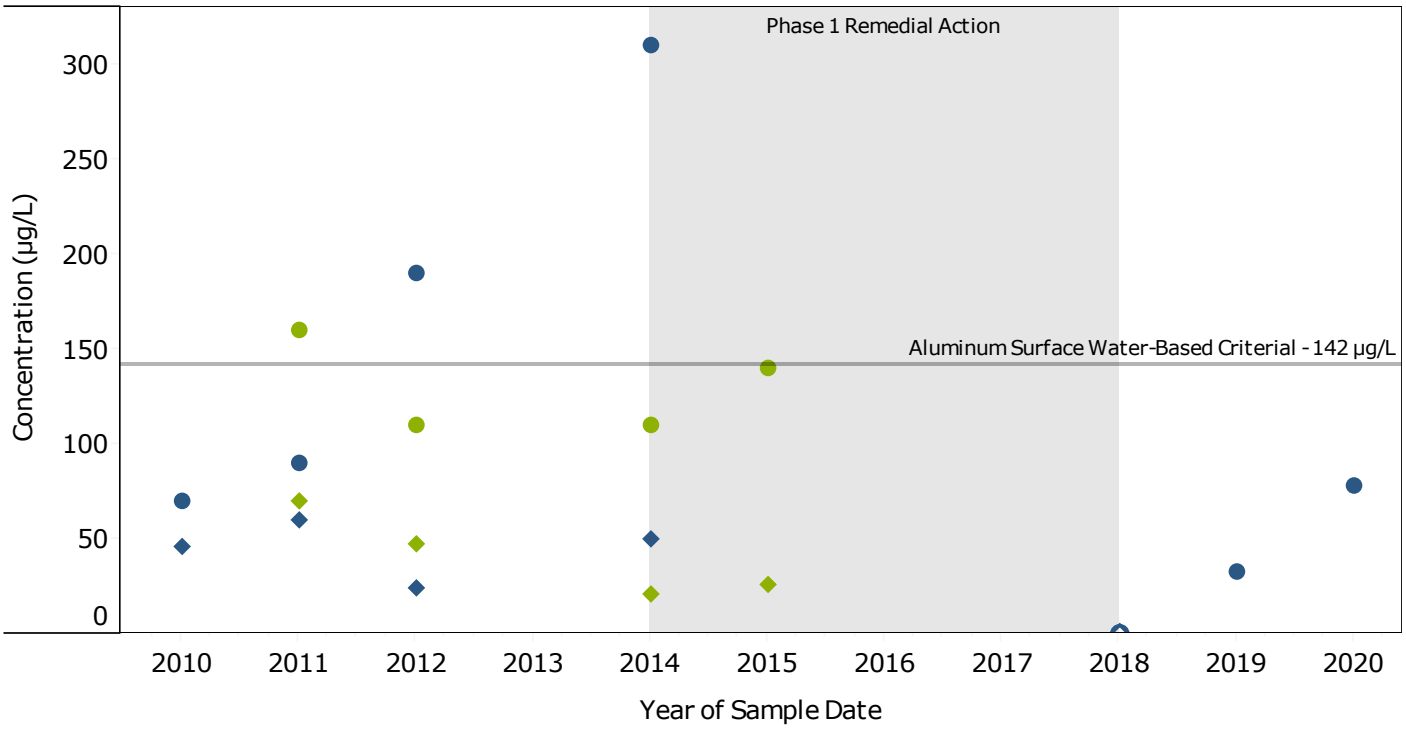
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

- Hardness-adjusted surface water criteria based on spring data
- Hardness-adjusted surface water criteria based on fall data

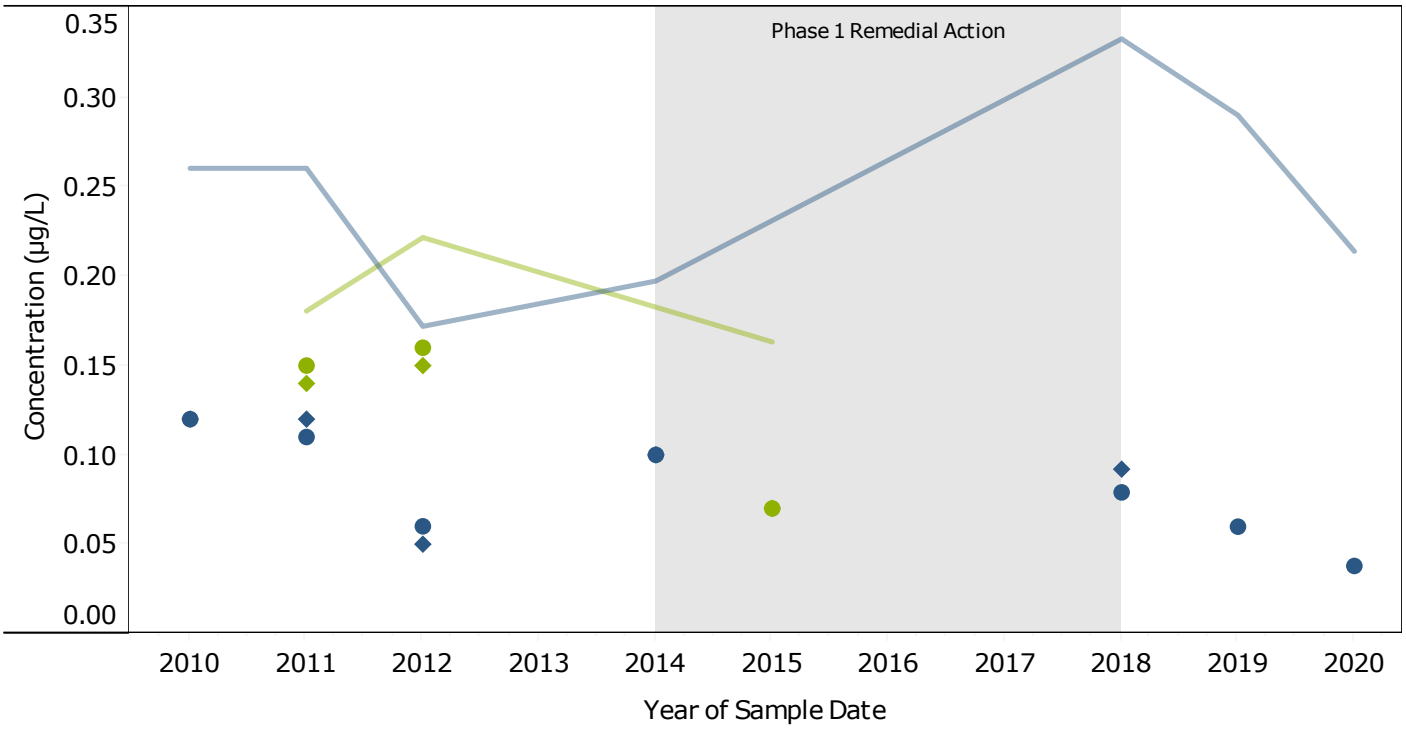
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

SG-12R, Aluminum



SG-12R, Cadmium



Legend

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

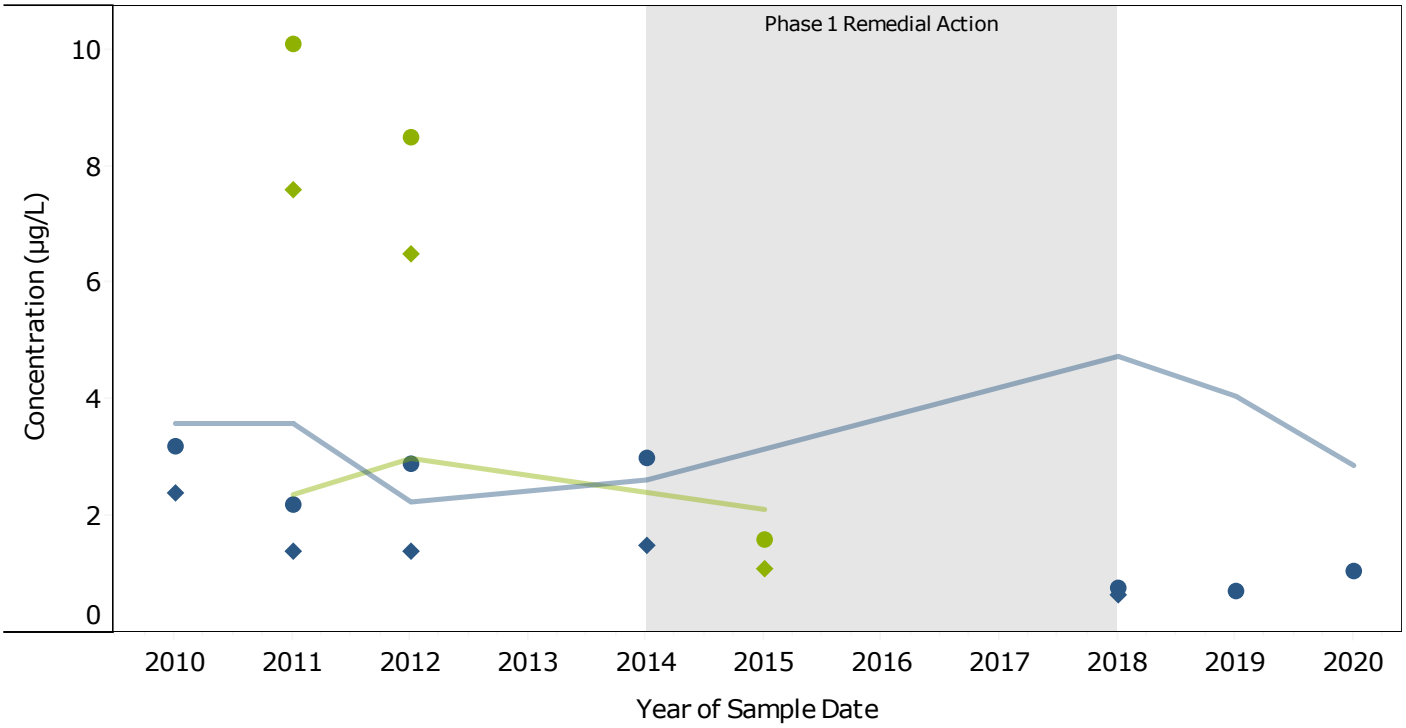
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

- Hardness-adjusted surface water criteria based on spring data
- Hardness-adjusted surface water criteria based on fall data

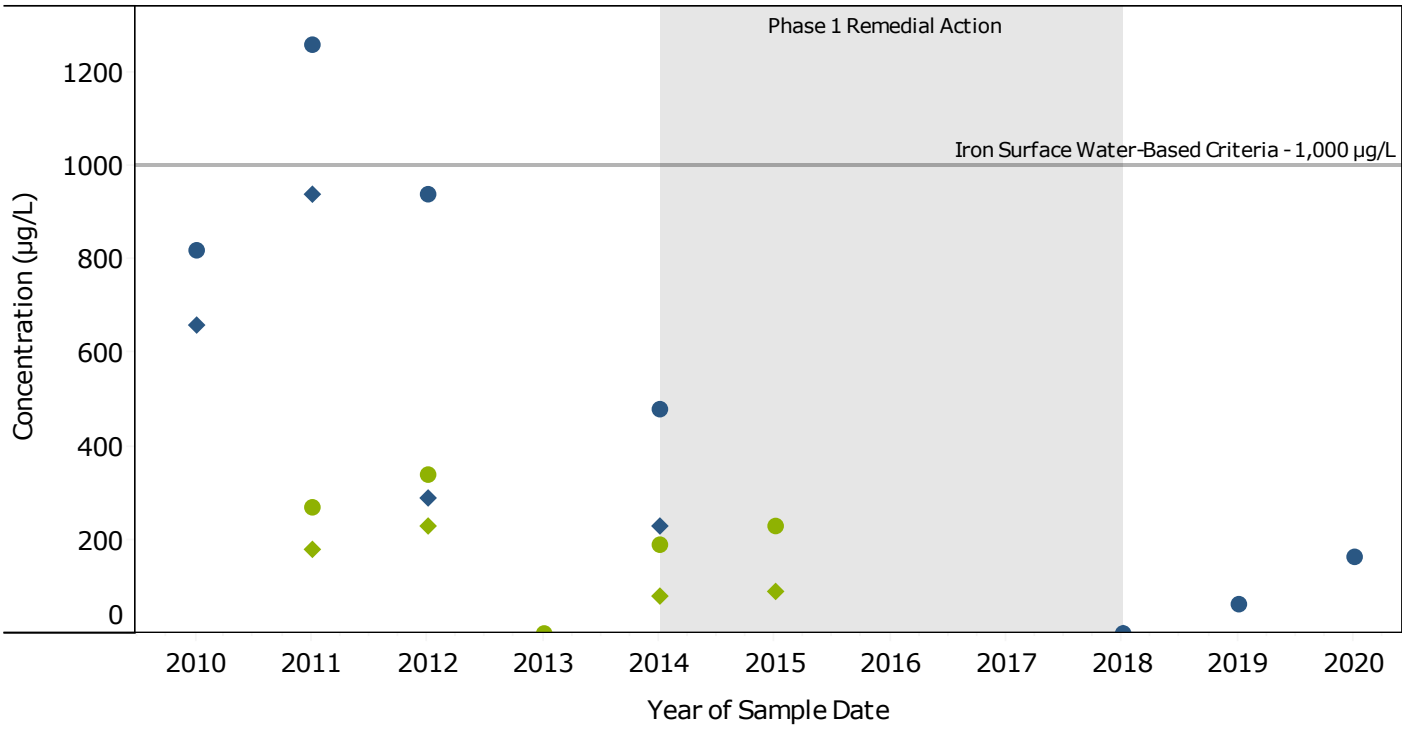
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

SG-12R, Copper



SG-12R, Iron



Legend

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

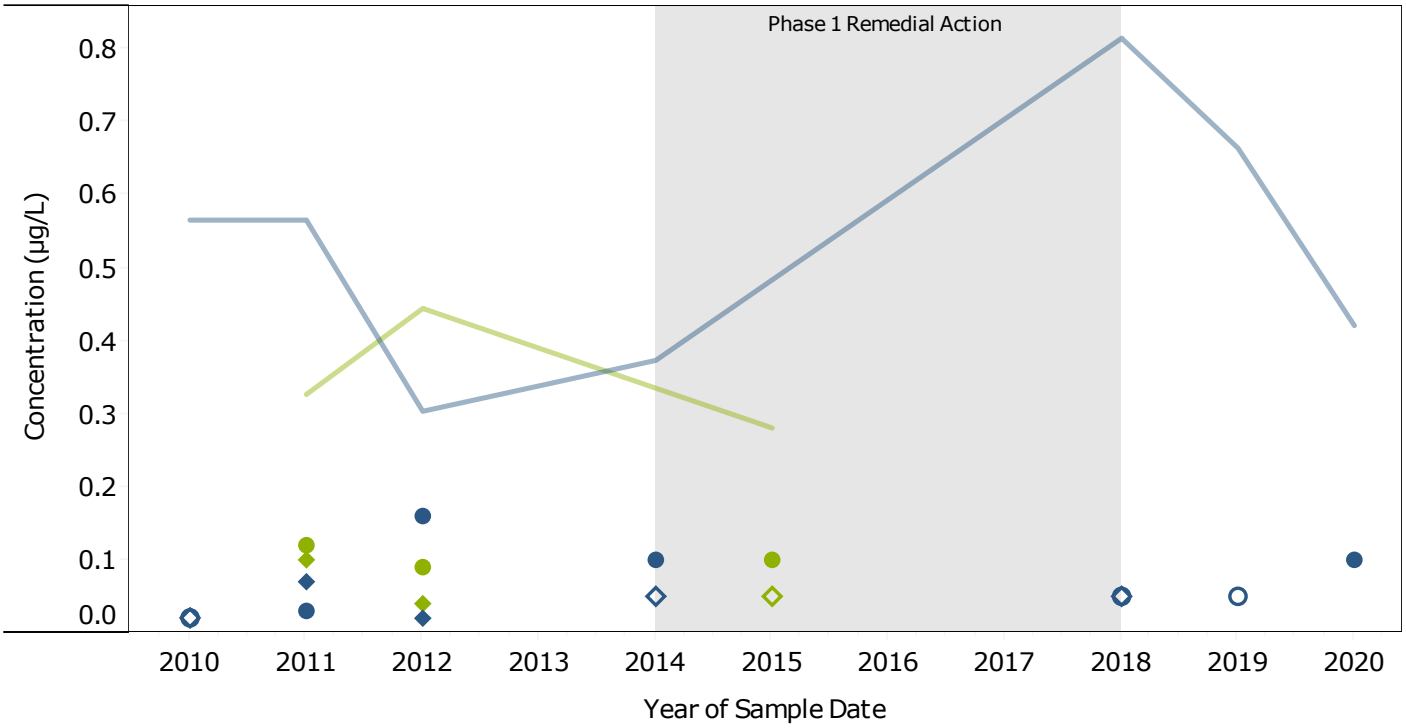
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

- Hardness-adjusted surface water criteria based on spring data
- Hardness-adjusted surface water criteria based on fall data

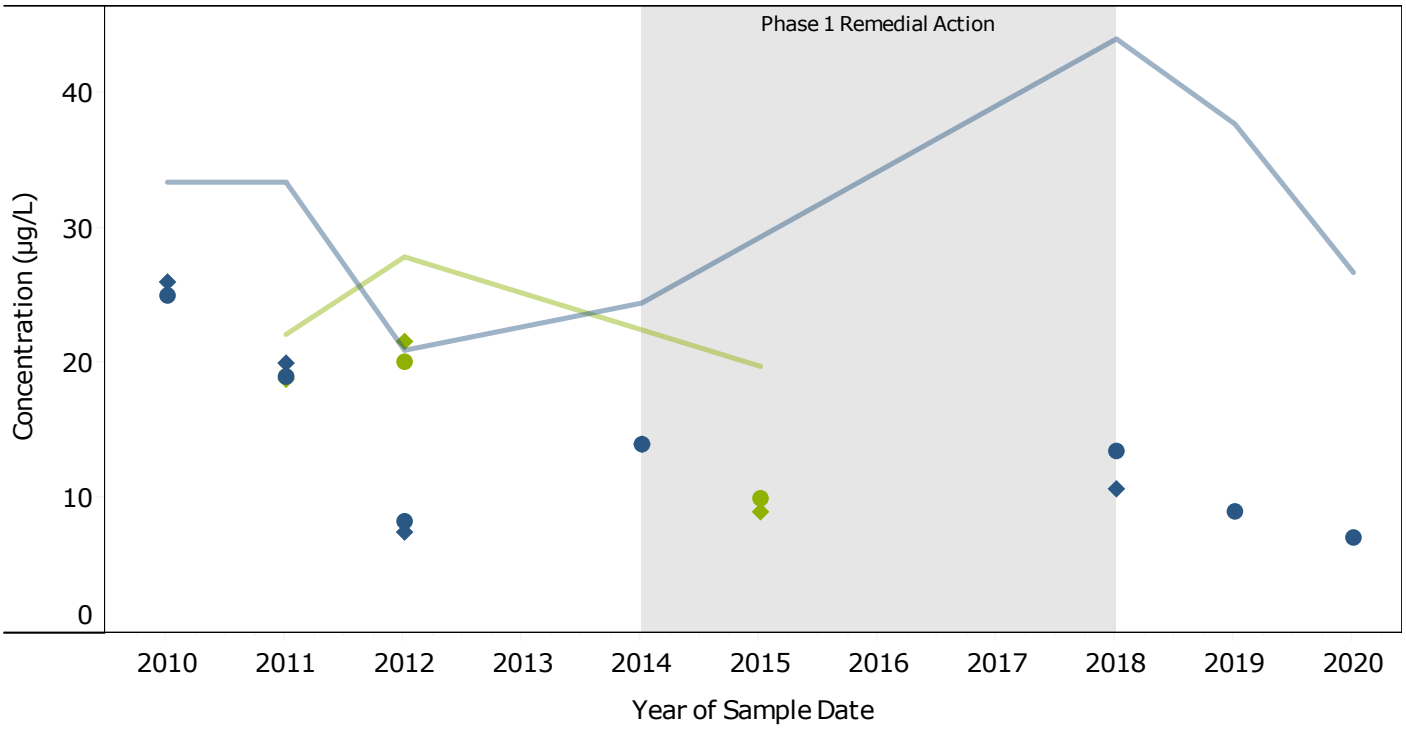
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

SG-12R, Lead



SG-12R, Zinc



Legend

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

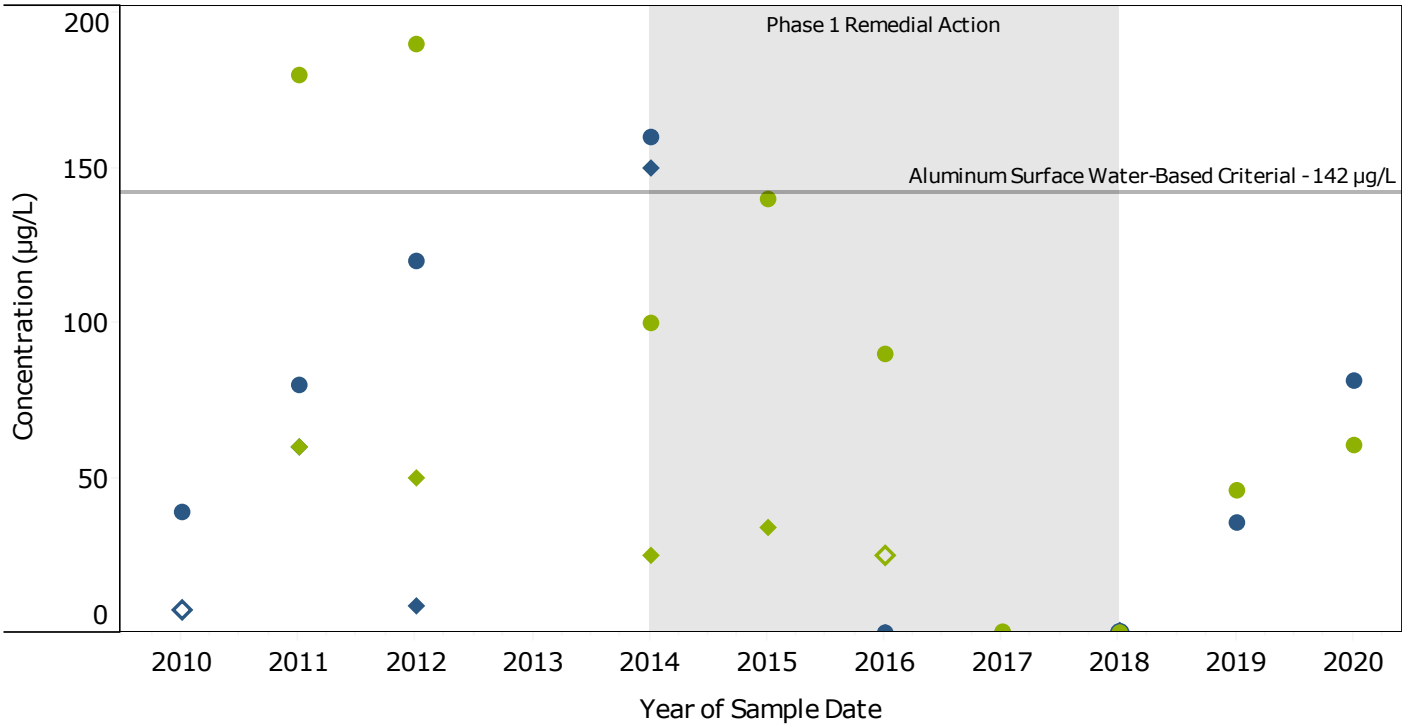
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

- Hardness-adjusted surface water criteria based on spring data
- Hardness-adjusted surface water criteria based on fall data

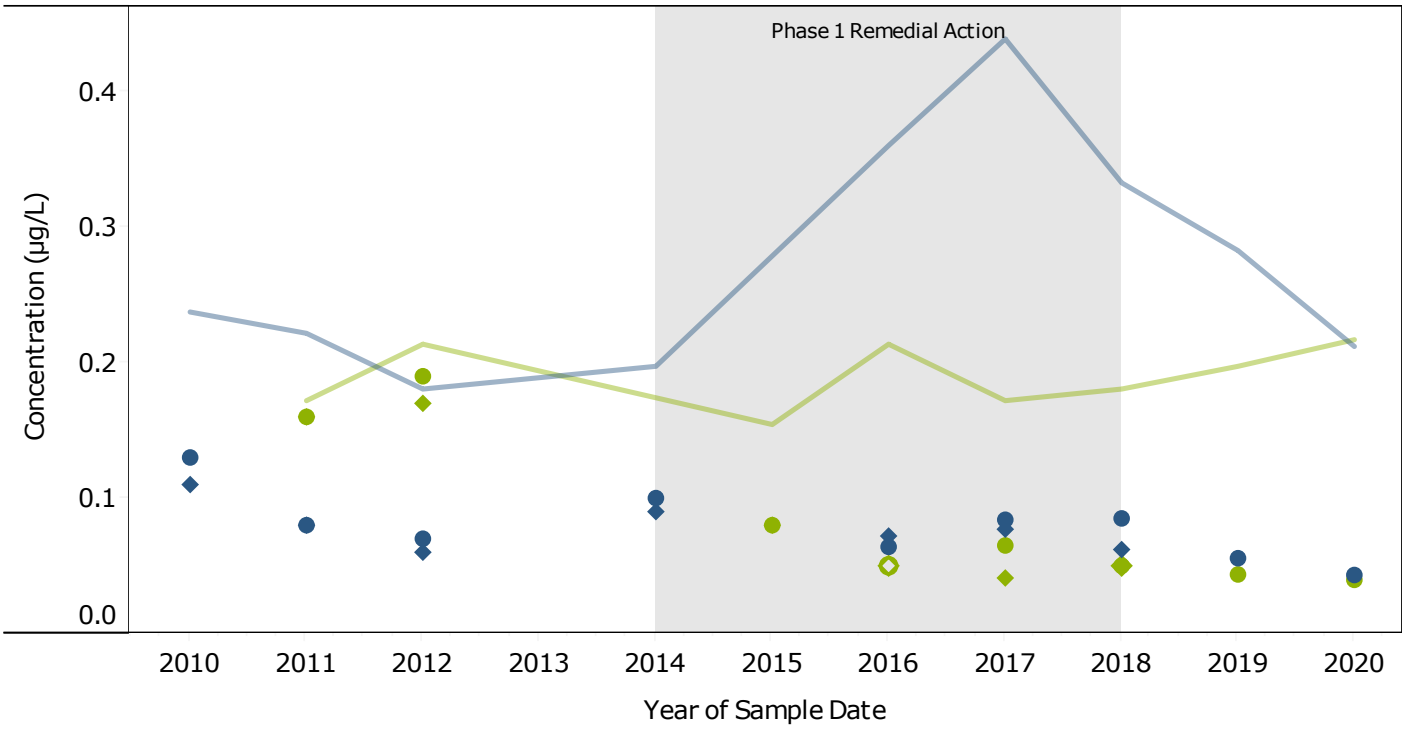
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

SG-13, Aluminum



SG-13, Cadmium



Legend

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

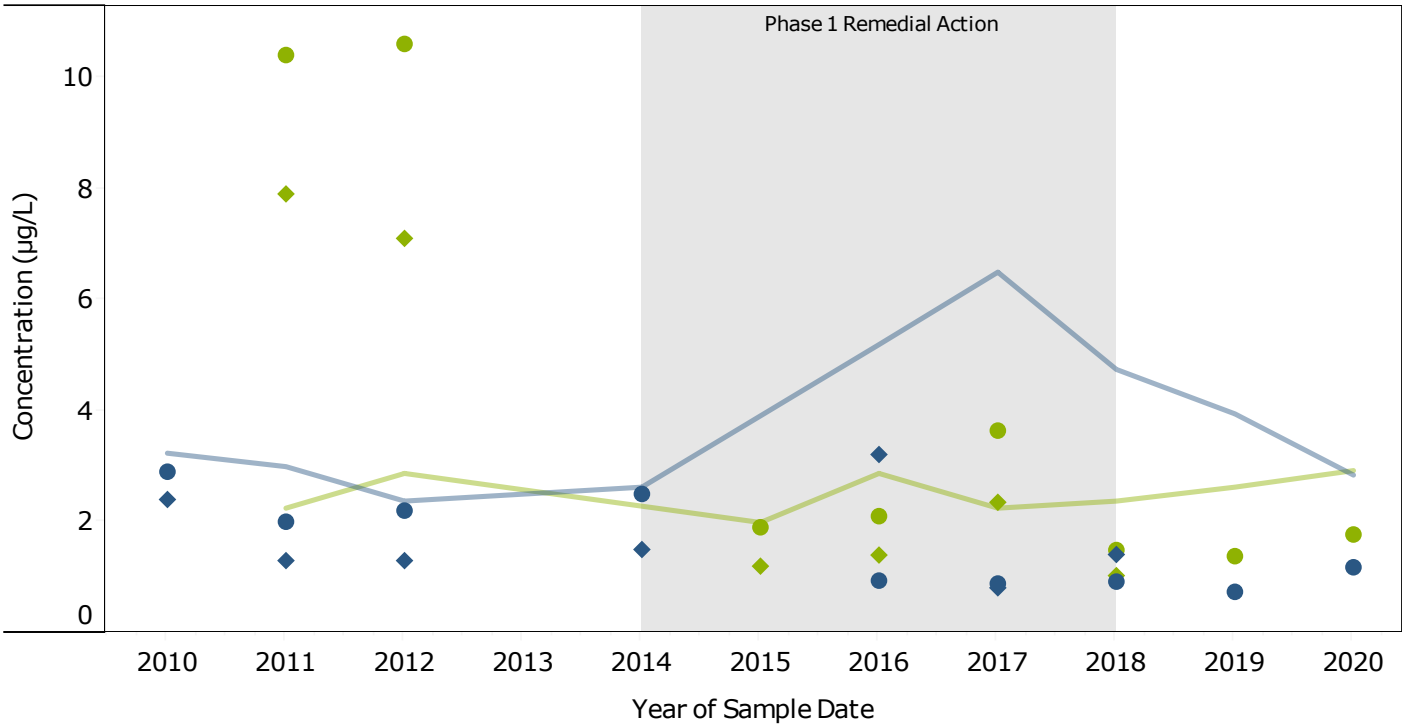
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

- Hardness-adjusted surface water criteria based on spring data
- Hardness-adjusted surface water criteria based on fall data

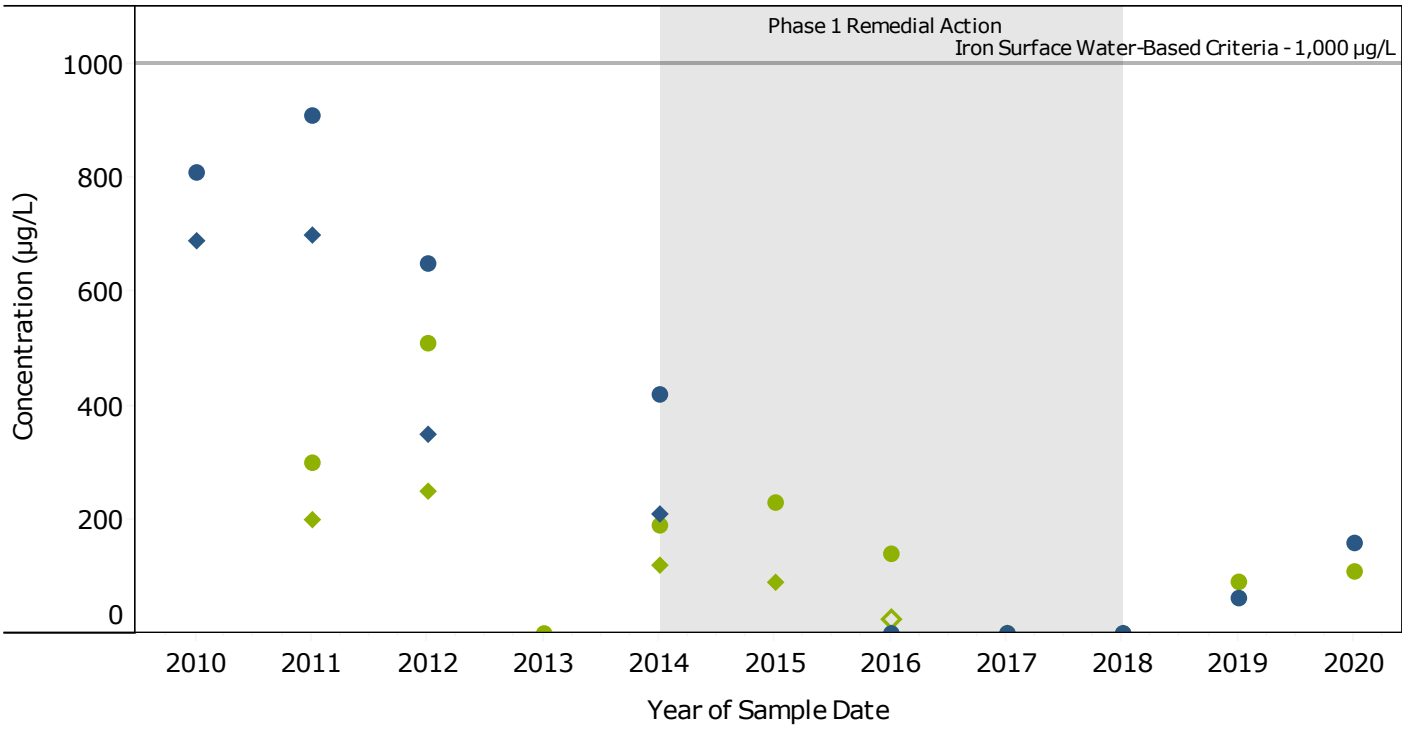
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

SG-13, Copper



SG-13, Iron



Legend

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

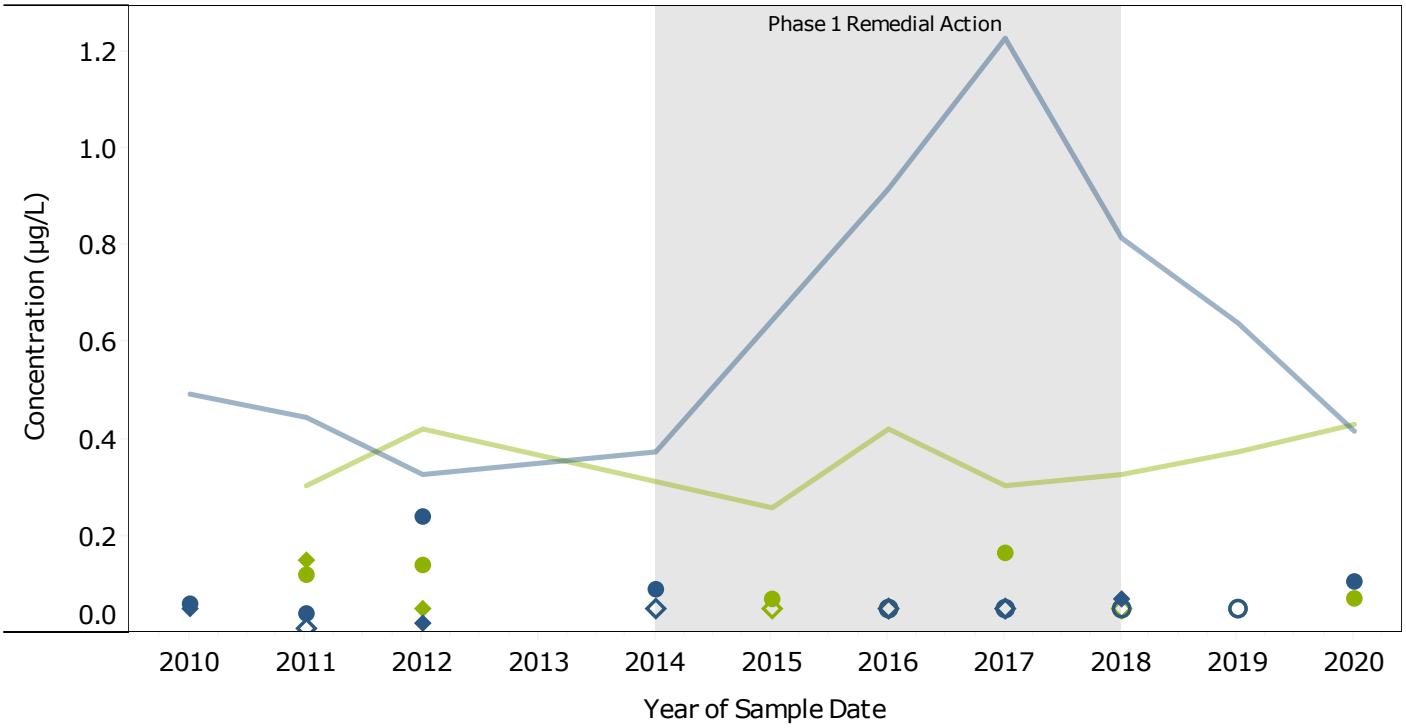
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

- Hardness-adjusted surface water criteria based on spring data
- Hardness-adjusted surface water criteria based on fall data

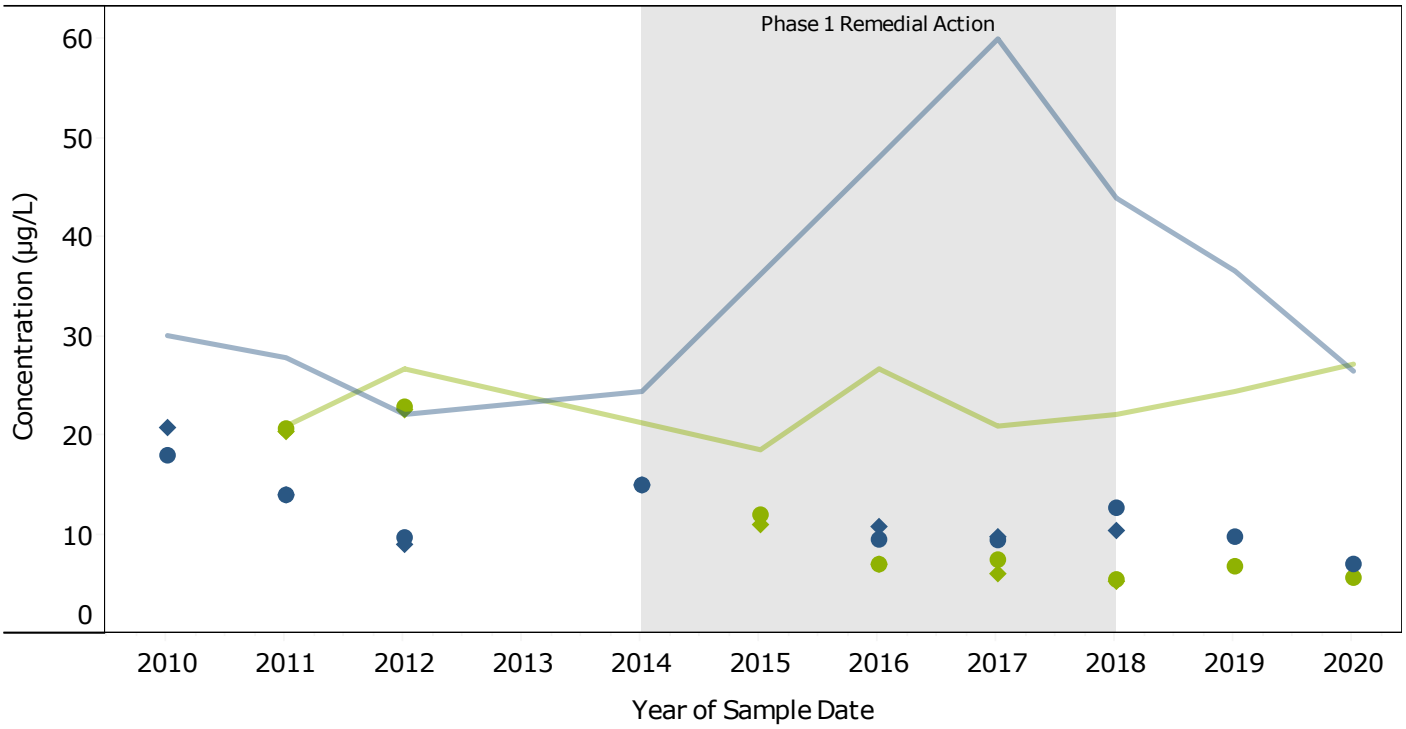
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

SG-13, Lead



SG-13, Zinc



Legend

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

- Hardness-adjusted surface water criteria based on spring data
- Hardness-adjusted surface water criteria based on fall data

Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

Summary of Surface Water Exceedances from Fall 2010 to Fall 2020 [1,2]

Sample Location	Year of Sample Date										
	2010	2011	2012	2013	2014 [1]	2015	2016	2017	2018	2019	2020
RC-6											
Aluminum	0	0	0		0	0	0	0	0	0	0
Cadmium	0	0	0		0	0	0	0	0	0	0
Copper	0	0	0		0	0	0	0	0	0	0
Iron	0	0	0		0	0	0	0	0	0	0
Lead	0	0	0		0	0	0	0	0	0	0
Zinc	0	0	0		0	0	0	0	0	0	0
RC-1											
Aluminum					0	0	0	0	0	0	0
Cadmium					0	0	0	0	0	0	0
Copper					0	0	0	0	0	0	0
Iron					0	0	0	0	0	0	0
Lead					0	0	0	0	0	0	0
Zinc					0	0	0	0	0	0	0
RC-4											
Aluminum	0	0	X		0	X	0	0	0	0	0
Cadmium	0	X	0		X	0	0	0	0	0	0
Copper	0	X	X		X	X	0	0	0	0	X
Iron	0	0	0		0	0	0	0	0	0	0
Lead	0	0	0		0	0	0	0	0	0	0
Zinc	0	X	0		X	0	0	0	0	0	0
RC-16											
Aluminum	0	X	X		0	0	0	0	0	0	0
Cadmium	0	X	X		X	0	0	0	0	0	0
Copper	X	X	X		X	0	0	0	0	0	0
Iron	X	X	X		0 [2]	0	0	0	0	0	0
Lead	0	0	0		0	0	0	0	0	0	0
Zinc	0	X	X		X	0	0	0	0	0	0
RC-7											
Aluminum	0	X	X		0	0	0	0	0	0	0
Cadmium	0	X	X		0	0	0	0	0	0	0
Copper	X	X	X		X	0	0	X	0	0	0
Iron	X	X	0		0	0	0	0	0	0	0
Lead	0	0	0		0	0	0	0	0	0	0
Zinc	X	X	X		0	0	0	0	0	0	0
RC-24											
Aluminum											0
Cadmium											0
Copper											X
Iron											0
Lead											0
Zinc											0
RC-2 (SG-7)											
Aluminum	0	X	0		0	0	0	0	0	0	0
Cadmium	0	X	X		X	0	0	0	0	0	0
Copper	X	X	X		X	0	0	X	0	0	X
Iron	X	X	X		0	0	0	0	0	0	0
Lead	0	0	0		0	0	0	0	0	0	0
Zinc	0	X	X		X	X	0	0	0	0	0

Summary of Surface Water Exceedances from Fall 2010 to Fall 2020 [1,2]

Sample Location	Year of Sample Date										
	2010	2011	2012	2013	2014 [1]	2015	2016	2017	2018	2019	2020
RC-13 (SG-8)											
Aluminum	0	X	X		X	X	0	0	0	0	0
Cadmium	0	X	X		0	0	0	0	0	0	0
Copper	X	X	X		X	0	0	X	0	0	X
Iron	0	X	0		0	0	0	0	0	0	0
Lead	0	0	0		0	0	0	0	0	0	0
Zinc	X	X	X		0	0	0	0	0	0	0
SG-9											
Aluminum	0	X	X						0	0	0
Cadmium	0	X	X						0	0	0
Copper	X	X	X						0	0	0
Iron	0	X	0						0	0	0
Lead	0	0	0						0	0	0
Zinc	X	X	X						0	0	0
SG-10											
Aluminum	0	X	X		X	X	0	0	0	0	0
Cadmium	0	X	X		0	0	0	0	0	0	0
Copper	0	X	X		0	0	0	X	0	0	0
Iron	0	X	X		0	0	0	0	0	0	0
Lead	0	0	0		0	0	0	0	0	0	0
Zinc	0	X	X		0	0	0	0	0	0	0
SG-11											
Aluminum	0	X	X					0		0	0
Cadmium	0	X	X					0		0	0
Copper	0	X	X					0		0	X
Iron	0	0	X					0		0	0
Lead	0	0	0					0		0	0
Zinc	0	X	X					0		0	0
RC-5A											
Aluminum	0	X	X		X	X	0	0	0	0	0
Cadmium	X	X	X		0	0	0	0	0	0	0
Copper	0	X	X		X	0	0	X	0	0	X
Iron	X	0	0		0	X	0	0	0	0	0
Lead	0	0	0		0	0	0	0	0	0	0
Zinc	X	X	X		0	X	0	0	0	0	0
SG-12R											
Aluminum	0	X	X		X	0			0	0	0
Cadmium	0	0	0		0	0			0	0	0
Copper	0	X	X		0	0			0	0	0
Iron	0	X	0		0	0			0	0	0
Lead	0	0	0		0	0			0	0	0
Zinc	0	0	0		0	0			0	0	0
SG-13											
Aluminum	0	X	X		X	0	0	0	0	0	0
Cadmium	0	0	0		0	0	0	0	0	0	0
Copper	0	X	X		0	0	0	X	0	0	0
Iron	0	0	0		0	0	0	0	0	0	0
Lead	0	0	0		0	0	0	0	0	0	0
Zinc	0	0	0		0	0	0	0	0	0	0

Summary of Surface Water Exceedances from Fall 2010 to Fall 2020 (1,2)

Sample Location	Year of Sample Date										
	2010	2011	2012	2013	2014 (1)	2015	2016	2017	2018	2019	2020
RC-10 (SG-20)											
Aluminum	0	X	X		X	0		0	0	0	0
Cadmium	0	X	0		0	0		0	0	0	0
Copper	0	X	X		0	0		0	0	0	0
Iron	0	0	X		0	0		0	0	0	0
Lead	0	X	0		0	0		0	0	0	0
Zinc	0	0	X		0	X		0	0	0	0
RC-15E											
Aluminum							0	0	0	0	0
Cadmium							0	0	0	0	0
Copper							0	0	0	0	0
Iron							0	0	0	0	0
Lead							0	0	0	0	0
Zinc							0	0	0	0	0

Notes:

Blank cell indicates metals data are not available.

X Indicates a metals result from the spring or fall exceeded the surface water criteria from the ROD.

0 Indicates no surface water exceedances.

Non-detects were screened at half the reporting limit. There were no exceedances based on non-detect results.

Cadmium, copper, lead, and zinc surface water criteria were adjusted for hardness on a sample-specific basis using the hardness measured at each location. Dissolved metals results, if available, were compared to the hardness adjusted criteria. If dissolved metals results were not available, the total metals results were compared to the hardness adjusted criteria. Total metals results were compared to the surface water criteria for aluminum and iron.

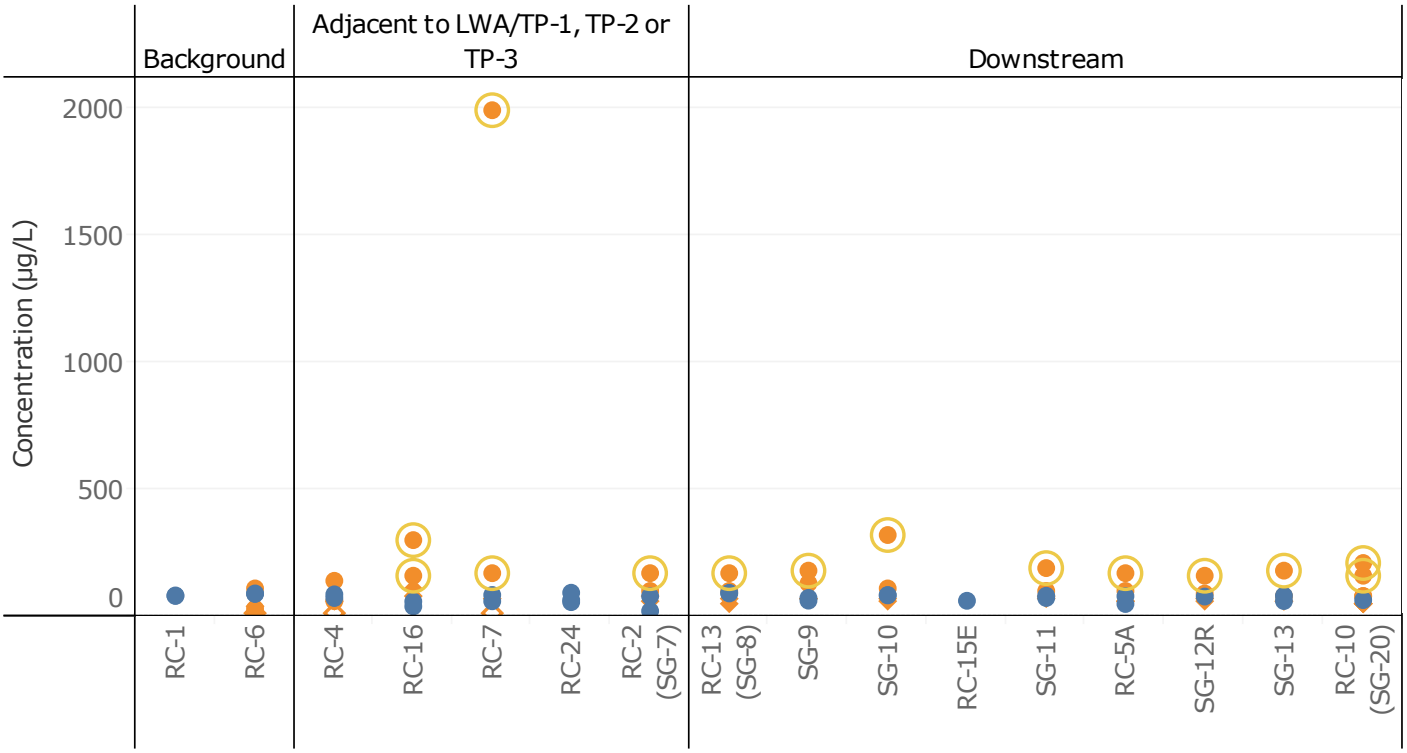
1 Spring 2014 hardness data were not available at locations SG-10, SG-12 amd SG-13, therefore surface water criteria for cadmium, copper, lead and zinc (the hardness adjusted criteria) were not calculated. Fall 2014 hardness data are available, and hardness adjusted criteria were calculated.

2 The dissolved result was greater than the total result and exceeded the surface water criteria for iron.

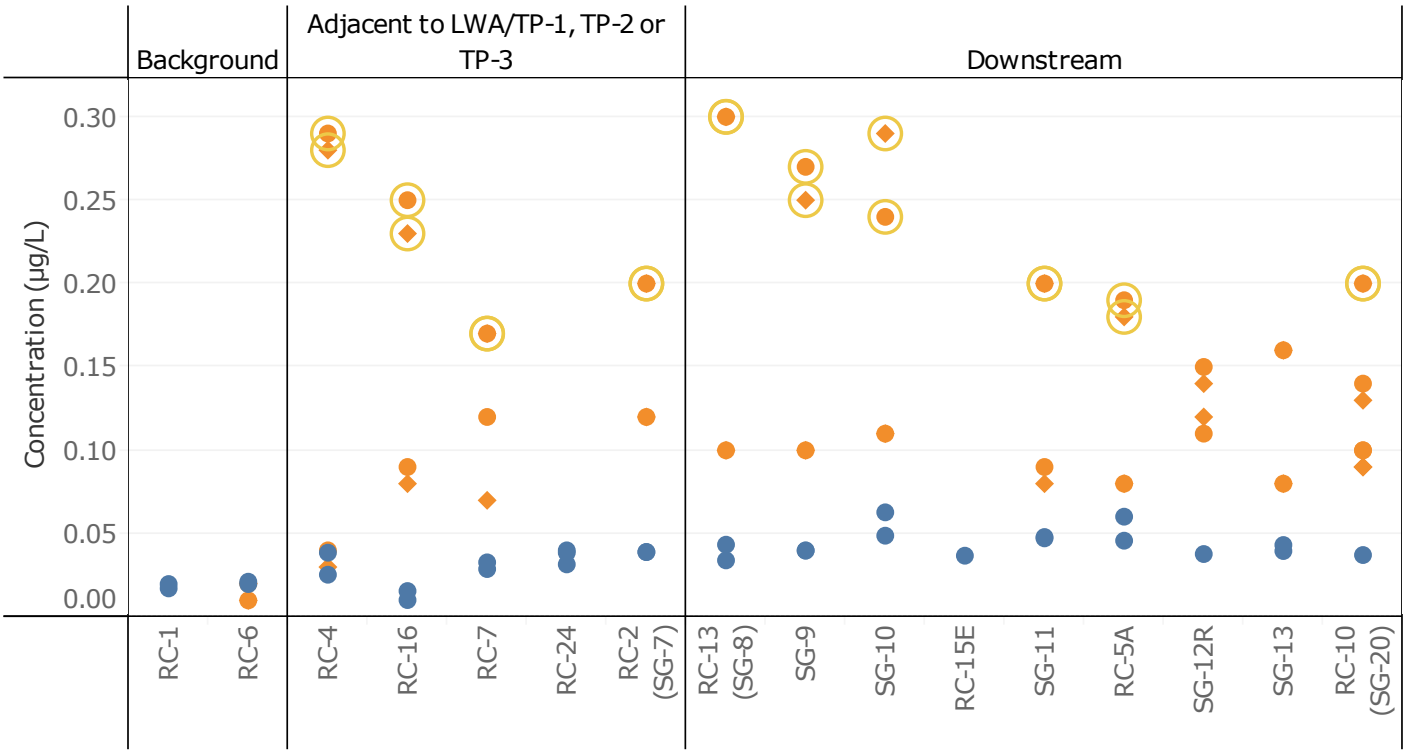
Abbreviations:

ROD Record of Decision

Aluminum



Cadmium



Legend

Non-Detect Results
- 2011 Sample, Total
- 2011 Sample, Dissolved
- 2020 Sample, Total
- 2020 Sample, Dissolved

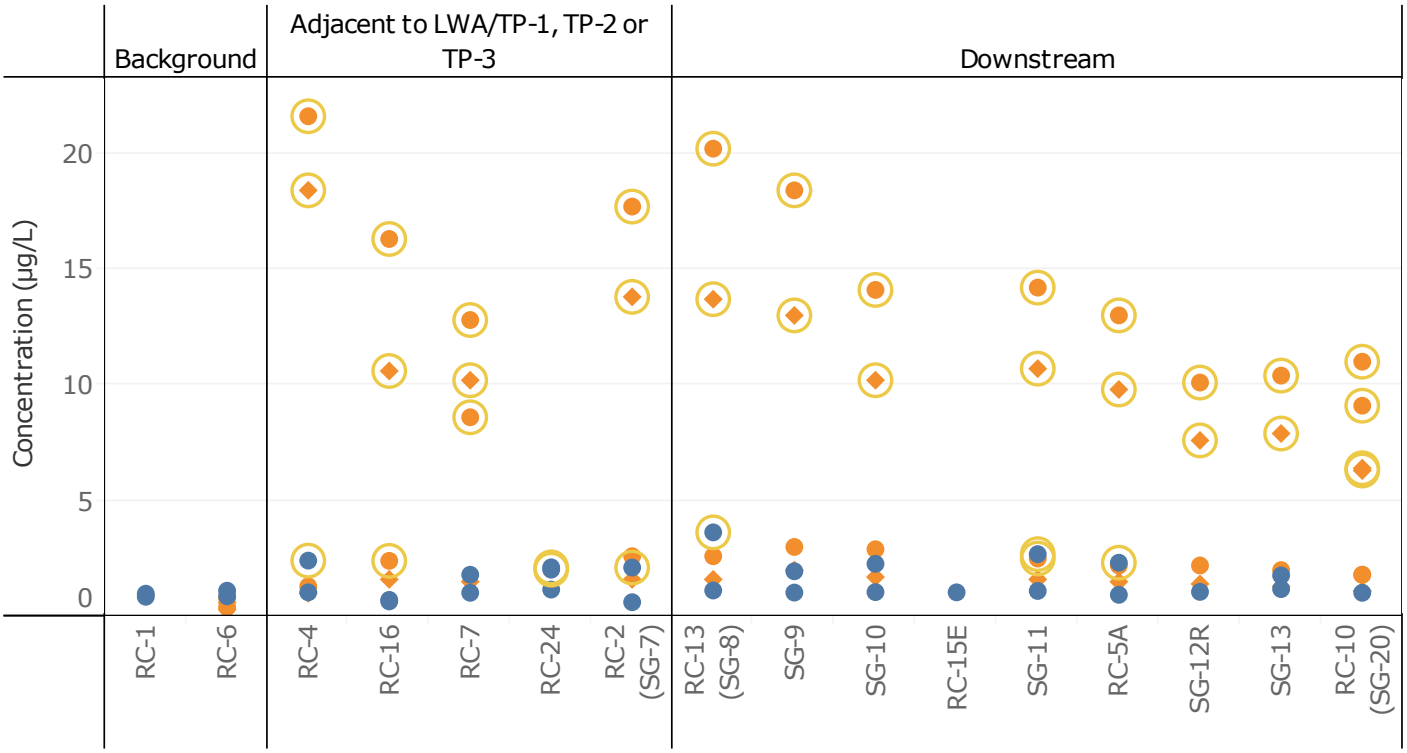
Detect Results
- 2011 Sample, Total
- 2011 Sample, Dissolved
- 2020 Sample, Total
- 2020 Sample, Dissolved

Indicates exceedance of surface water-based criteria. Criteria is hardness-adjusted for cadmium, copper, lead and zinc.

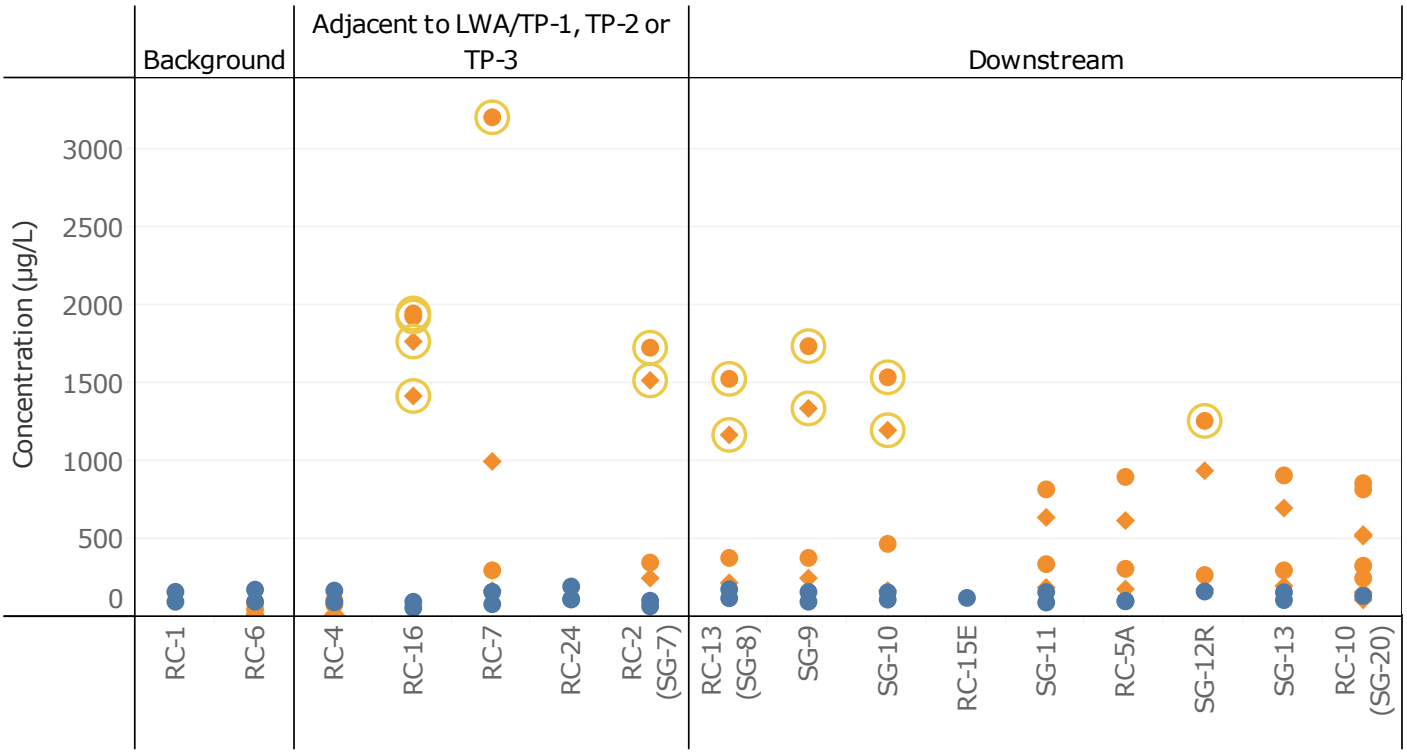
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

Copper



Iron



Legend

Non-Detect Results
- 2011 Sample, Total
- 2011 Sample, Dissolved
- 2020 Sample, Total
- 2020 Sample, Dissolved

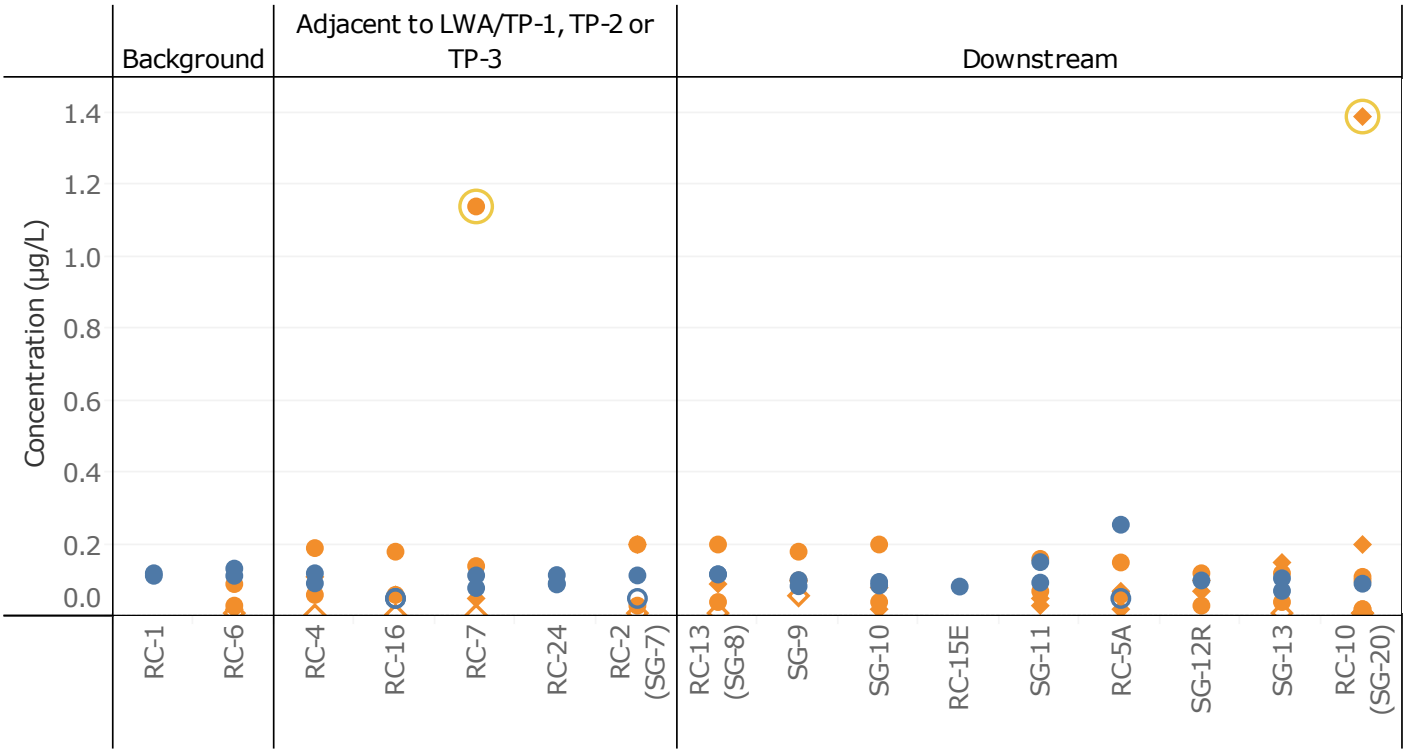
Detect Results
- 2011 Sample, Total
- 2011 Sample, Dissolved
- 2020 Sample, Total
- 2020 Sample, Dissolved

Indicates exceedance of surface water-based criteria. Criteria is hardness-adjusted for cadmium, copper, lead and zinc.

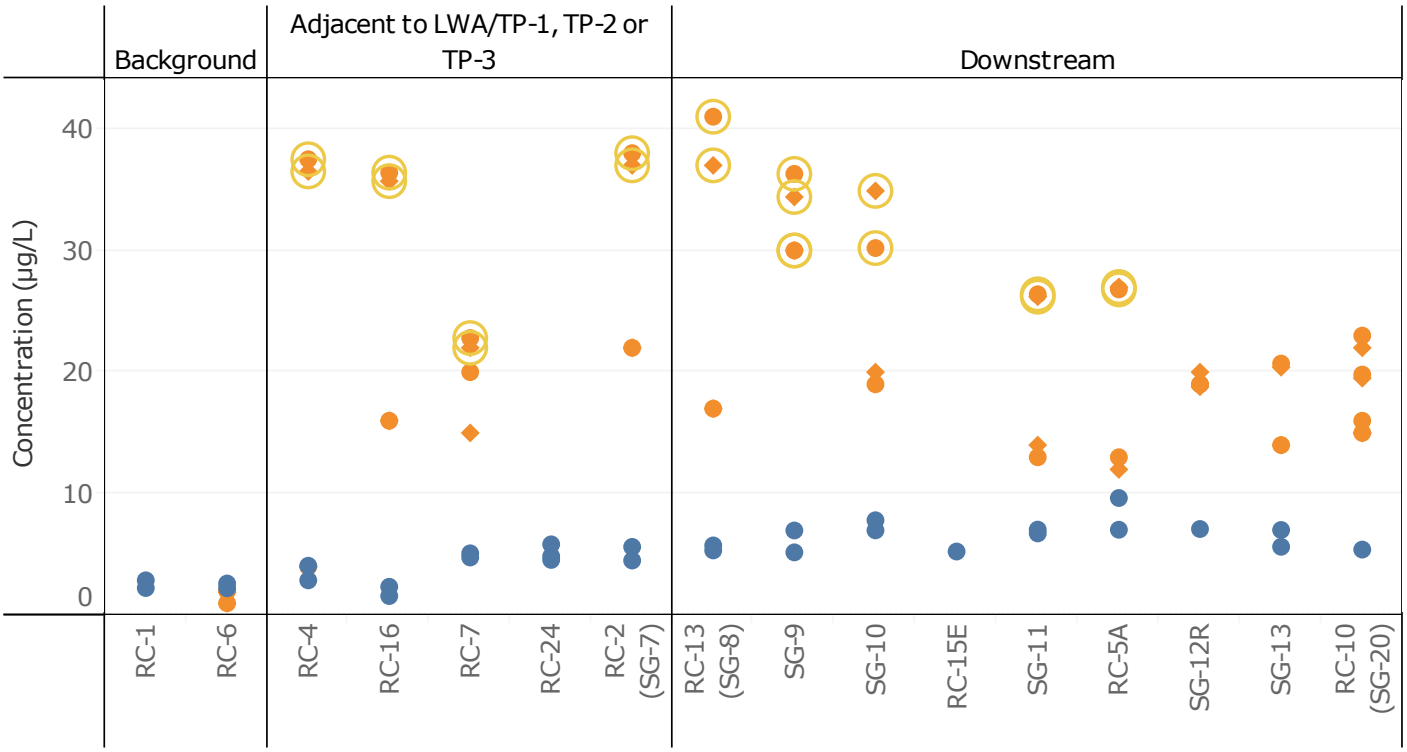
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

Lead



Zinc



Legend

Non-Detect Results
- 2011 Sample, Total
- 2011 Sample, Dissolved
- 2020 Sample, Total
- 2020 Sample, Dissolved

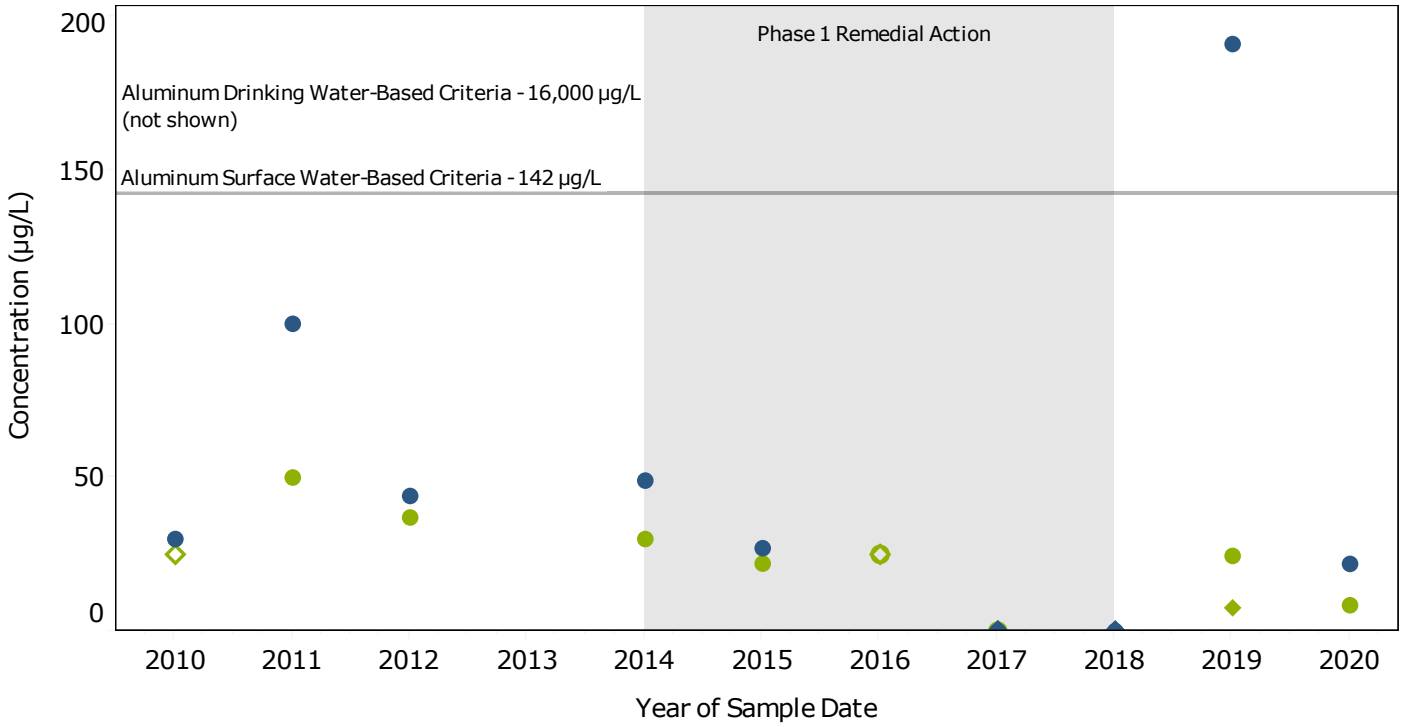
Detect Results
- 2011 Sample, Total
- 2011 Sample, Dissolved
- 2020 Sample, Total
- 2020 Sample, Dissolved

Indicates exceedance of surface water-based criteria. Criteria is hardness-adjusted for cadmium, copper, lead and zinc.

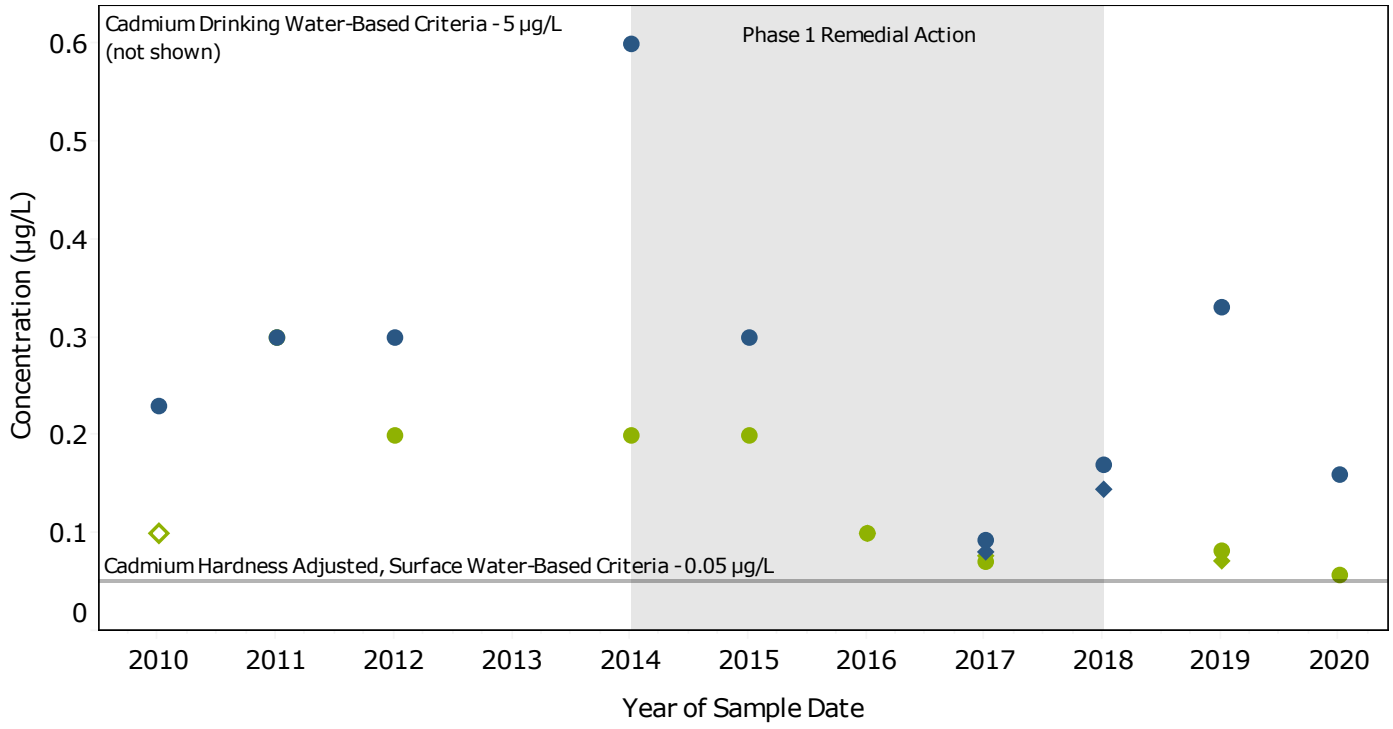
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

DS-3D, Aluminum



DS-3D, Cadmium



Legend

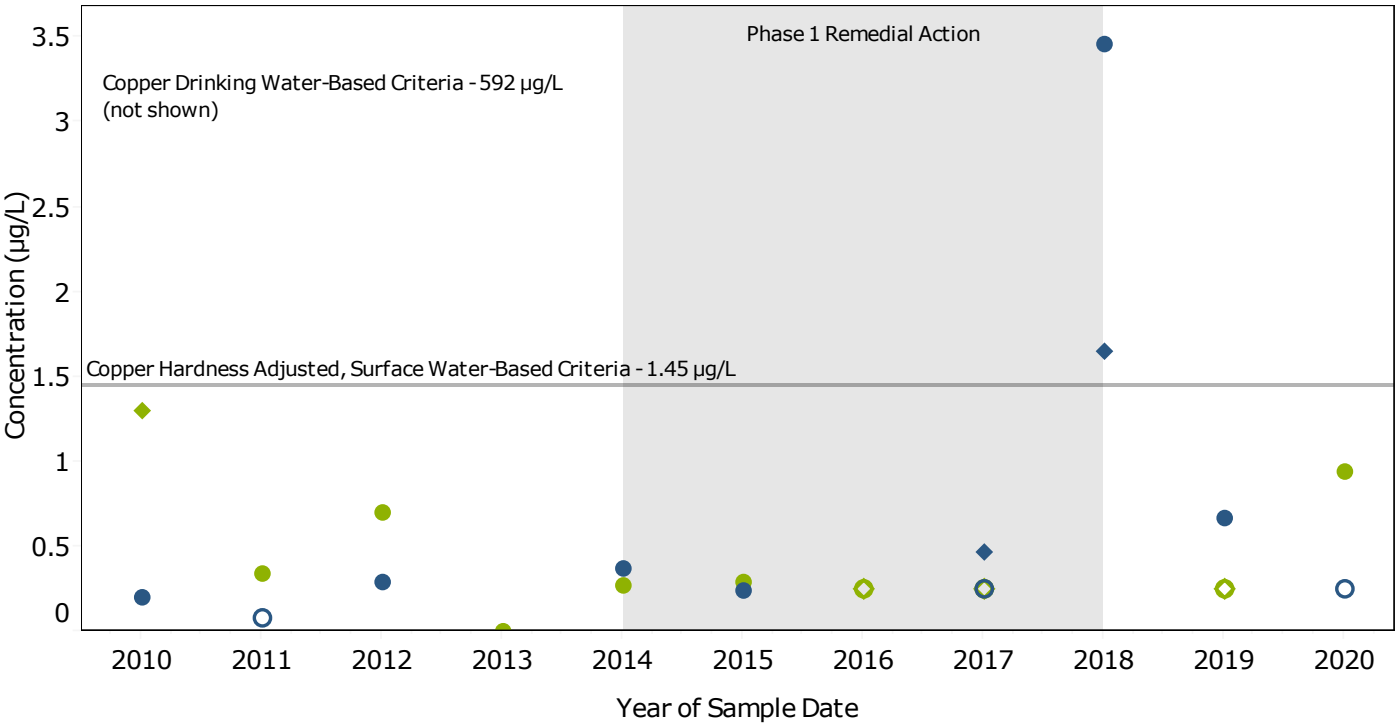
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

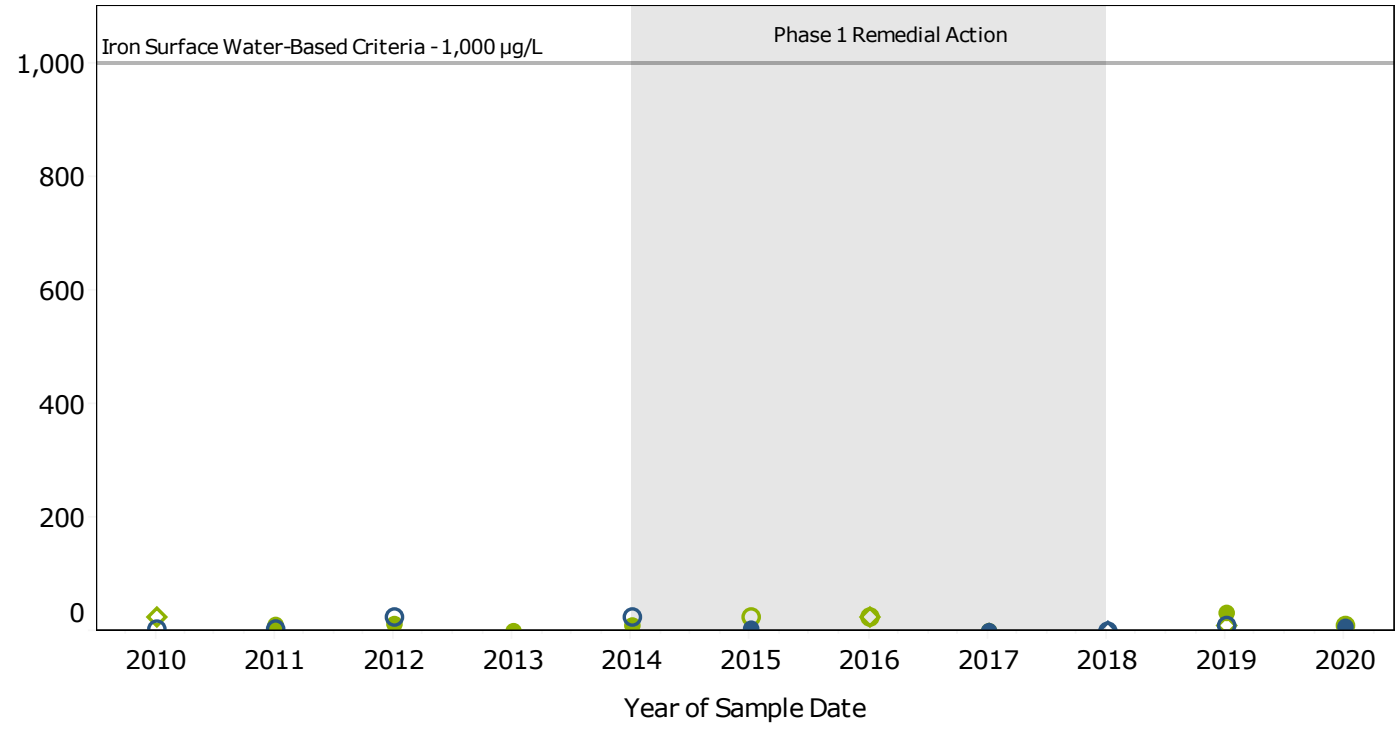
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

DS-3D, Copper



DS-3D, Iron



Legend

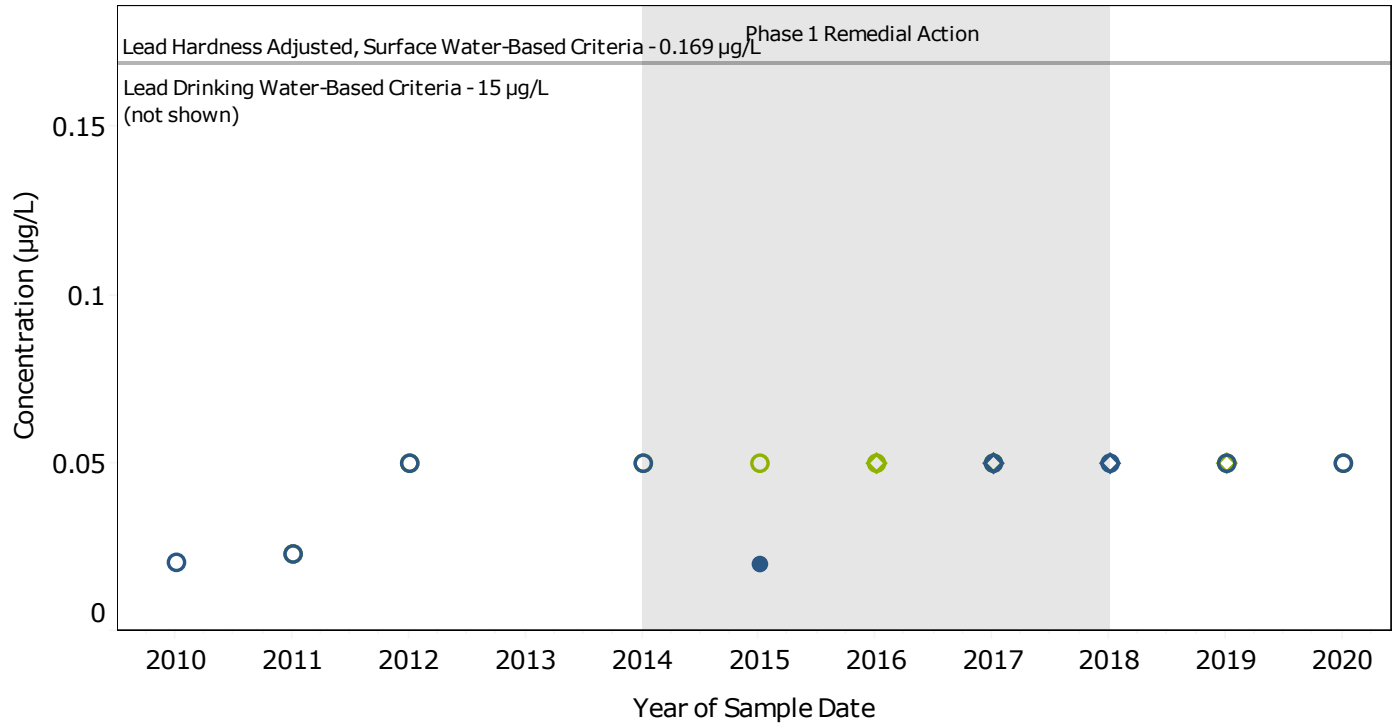
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

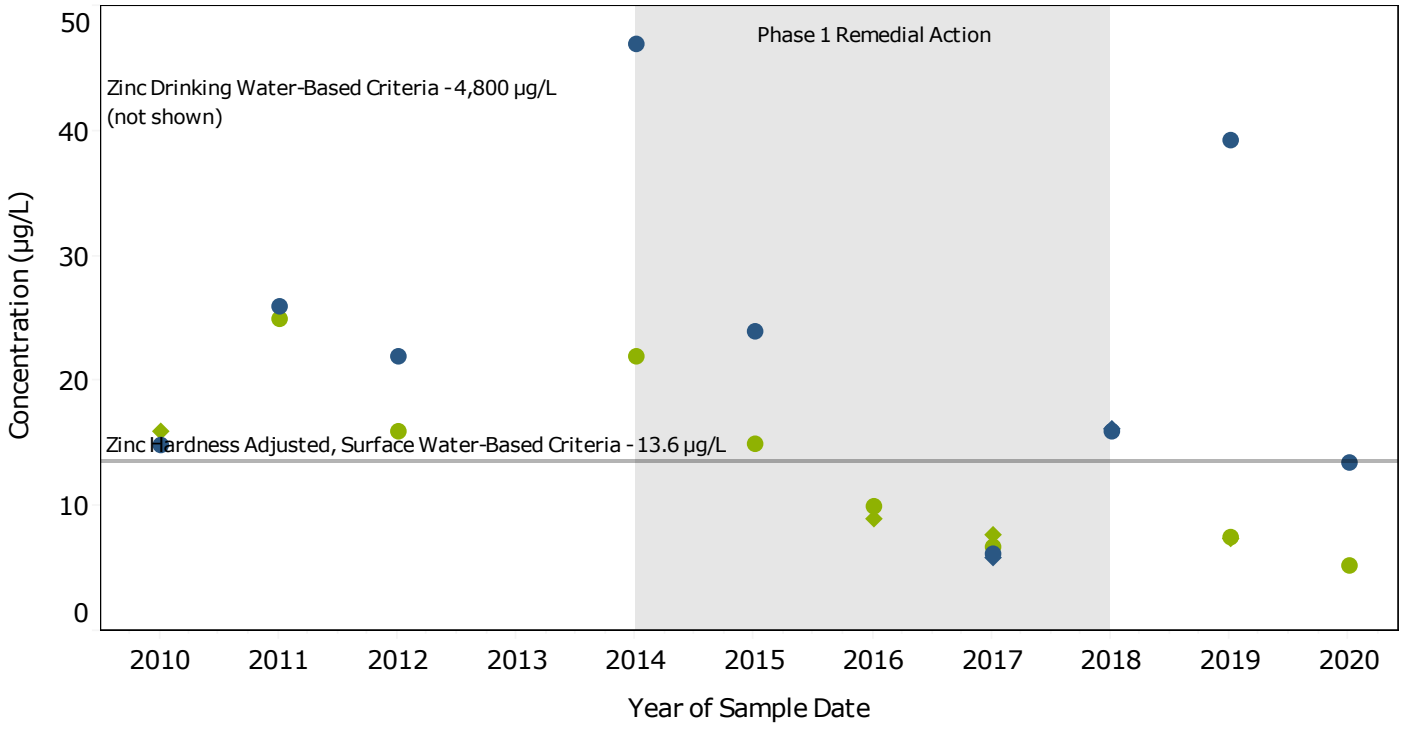
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

DS-3D, Lead



DS-3D, Zinc



Legend

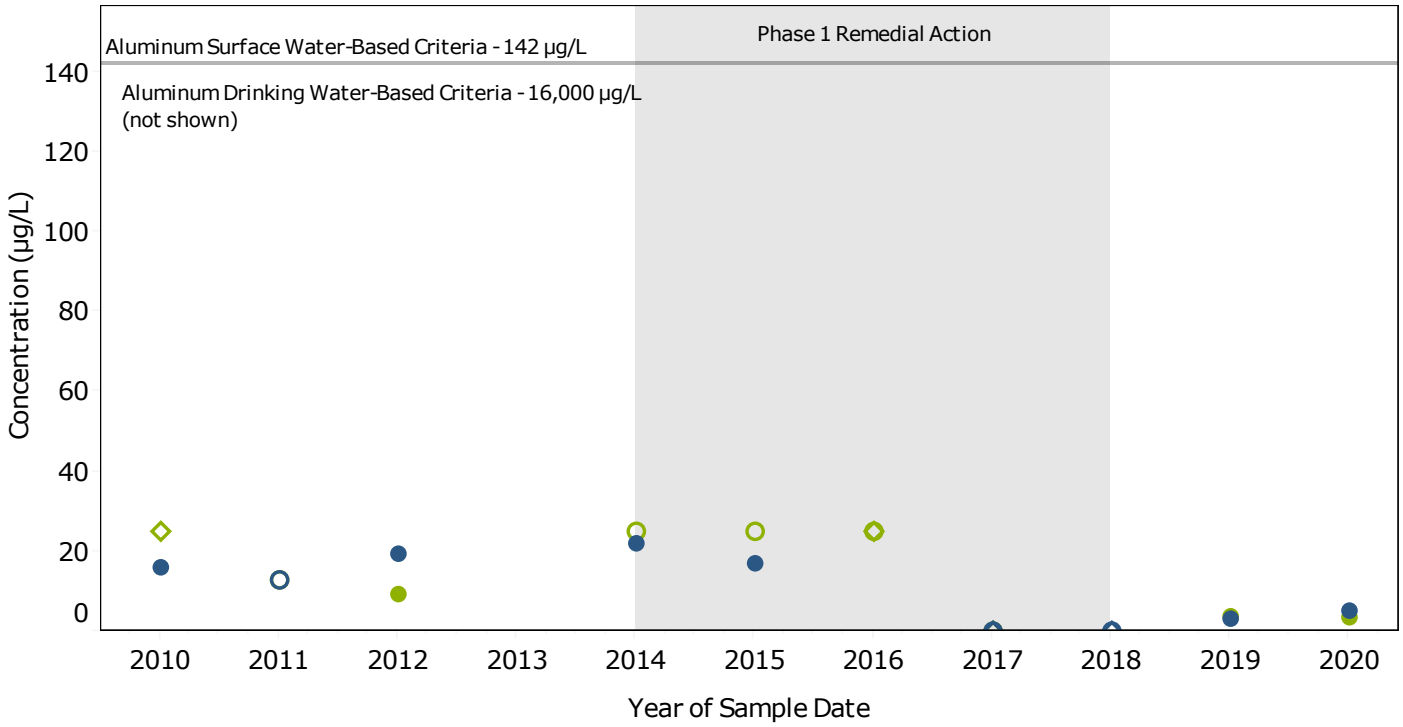
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

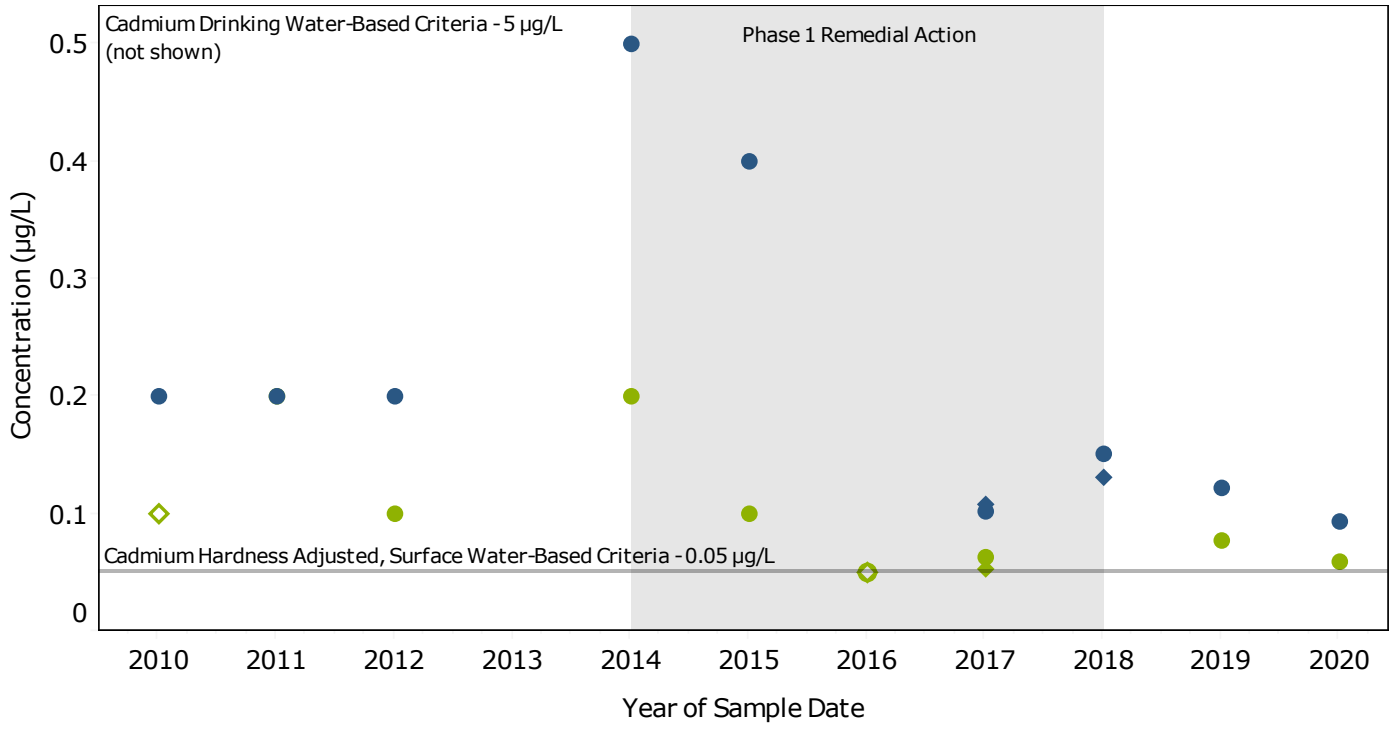
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

DS-3S, Aluminum



DS-3S, Cadmium



Legend

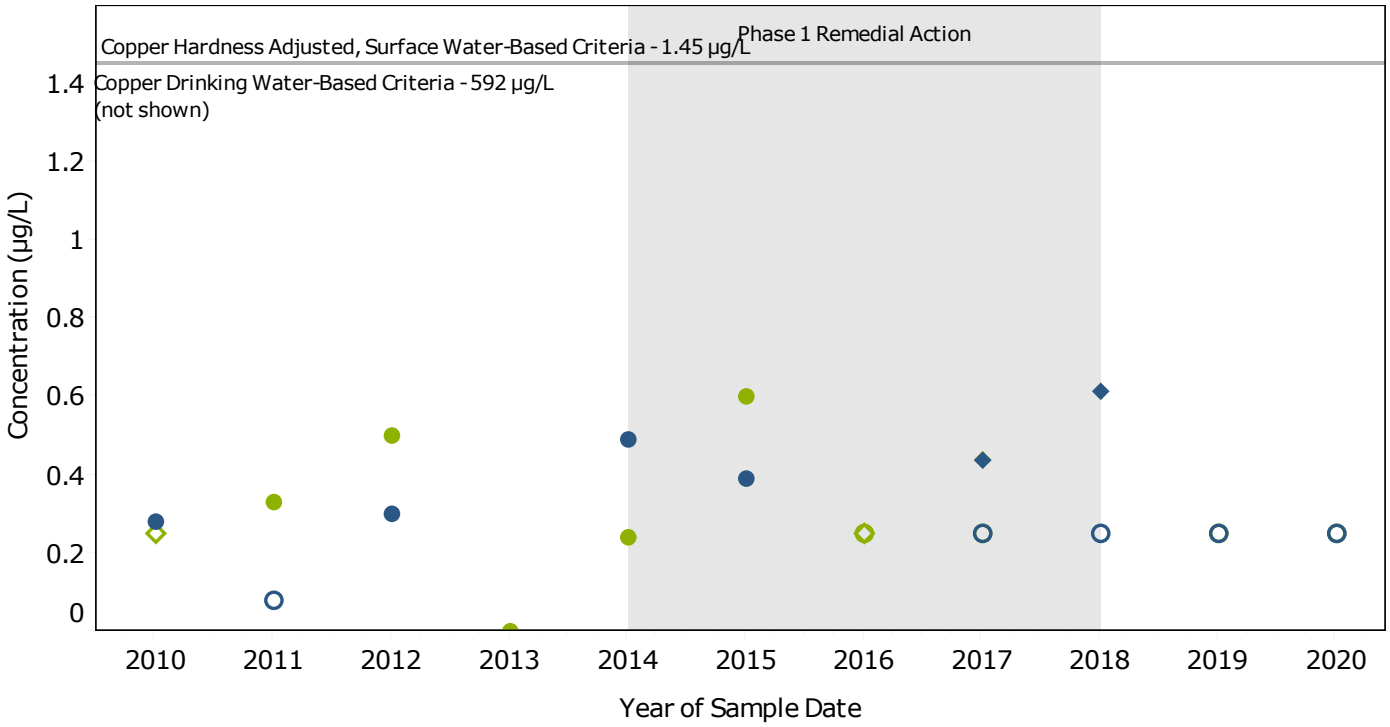
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

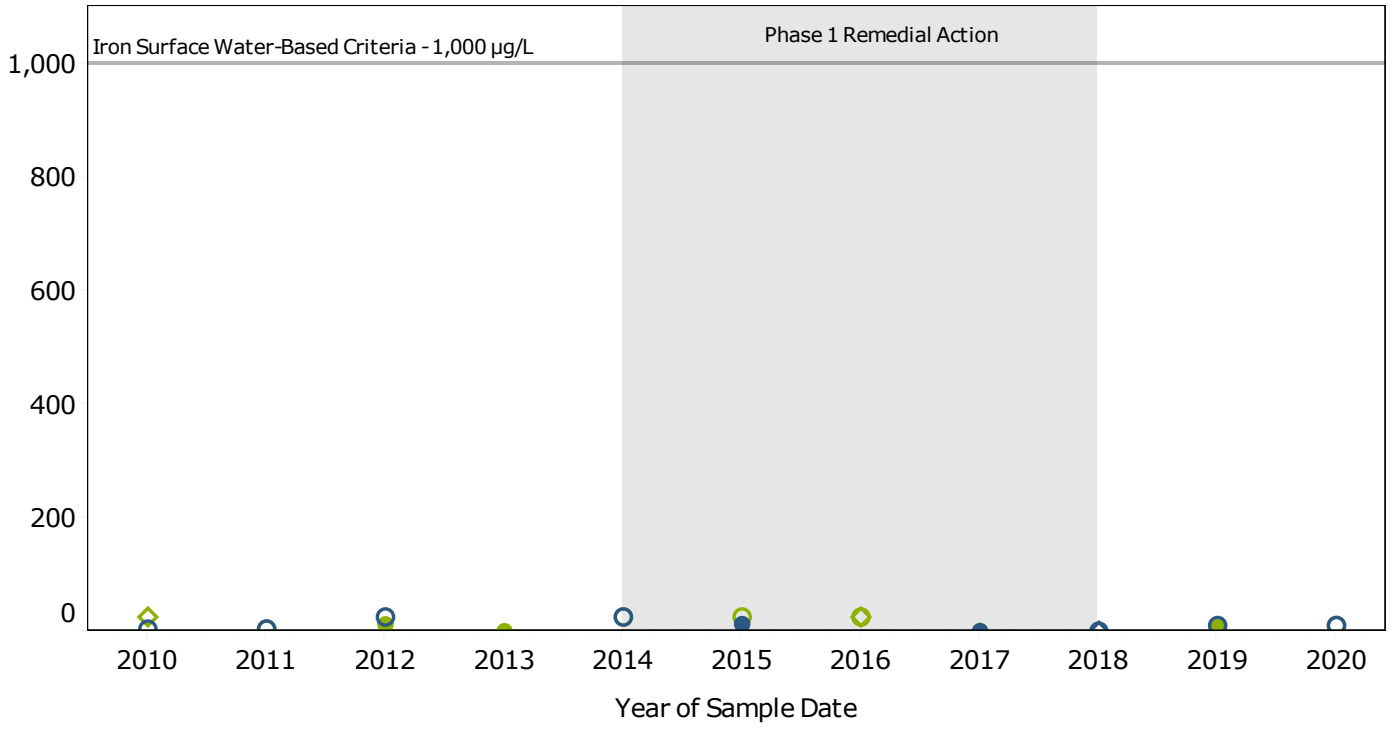
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

DS-3S, Copper



DS-3S, Iron



Legend

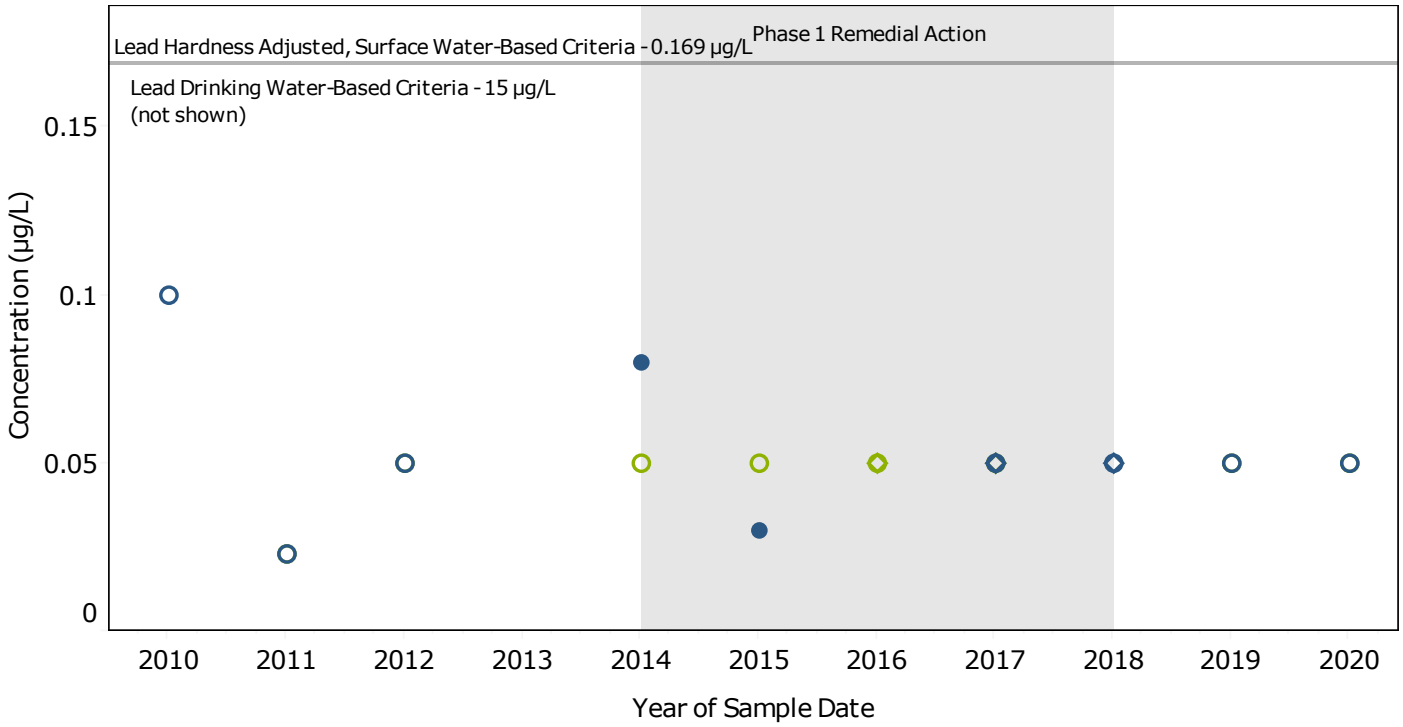
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

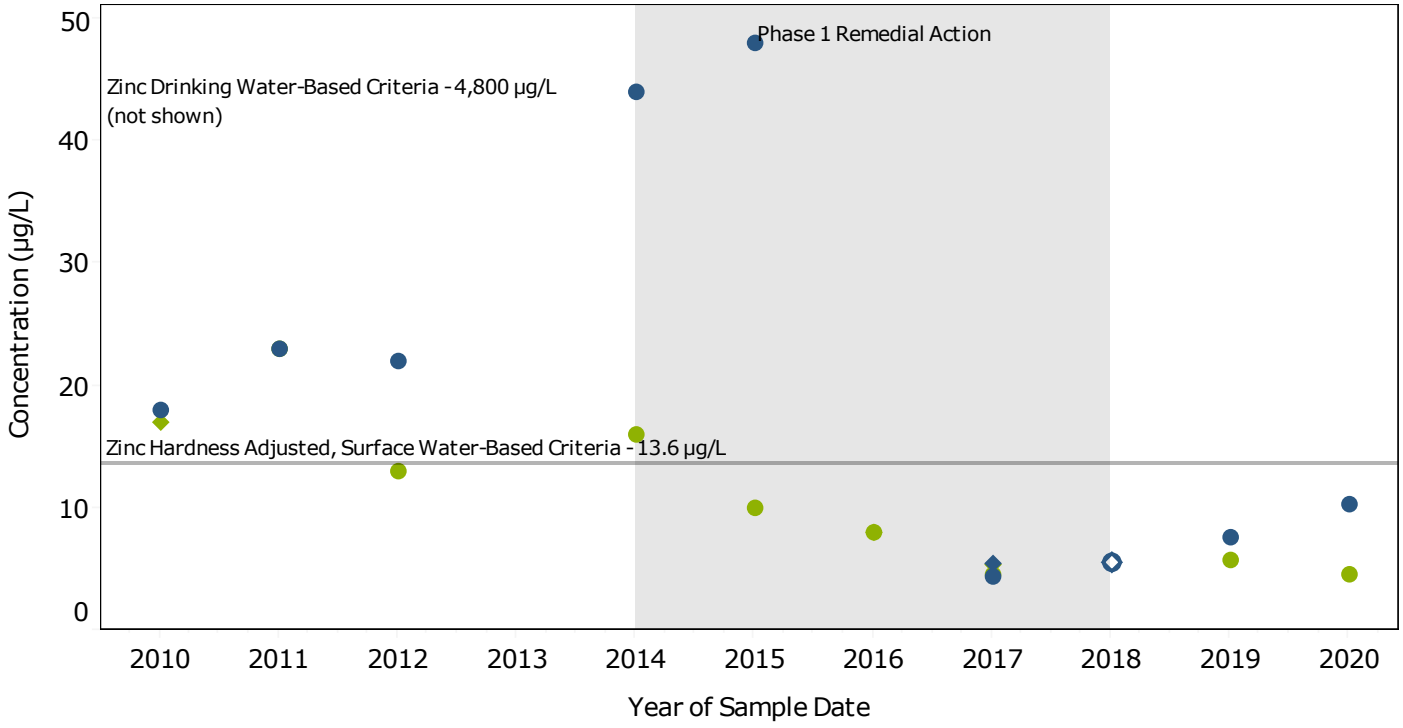
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

DS-3S, Lead



DS-3S, Zinc



Legend

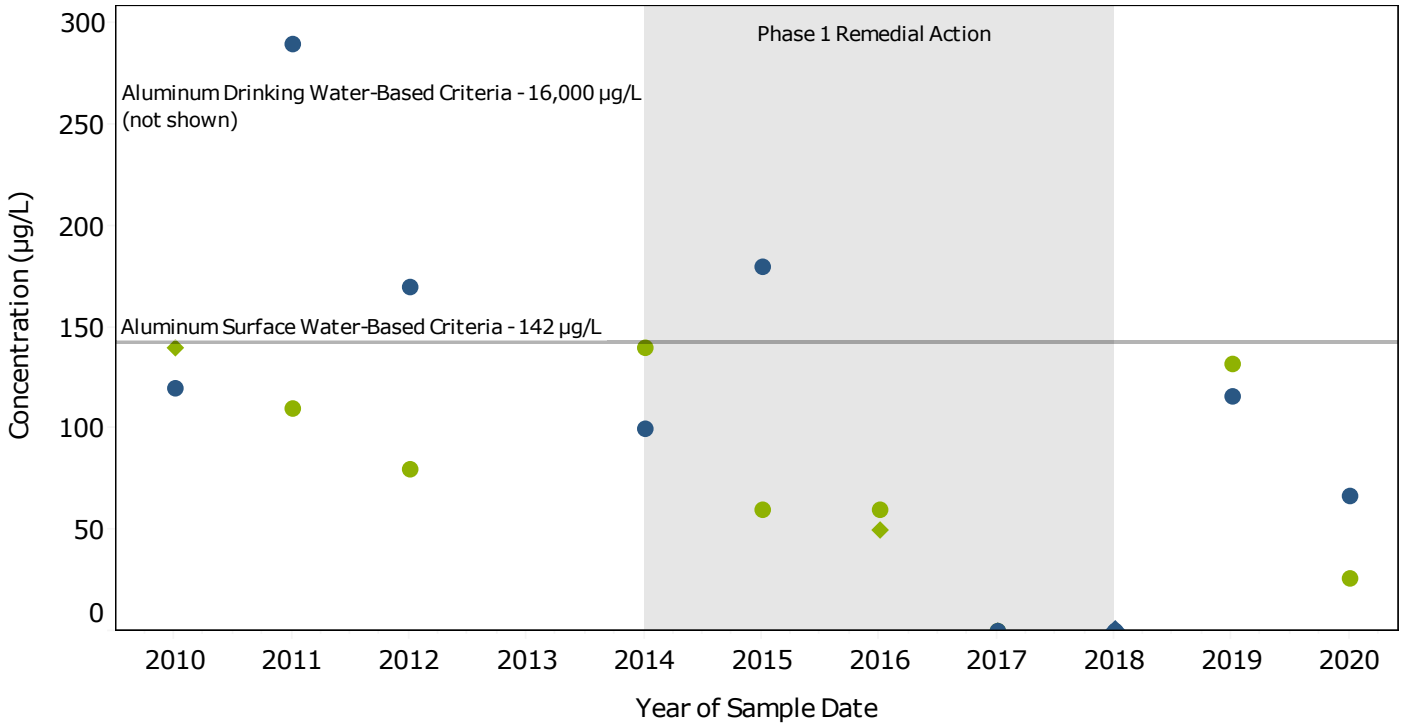
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

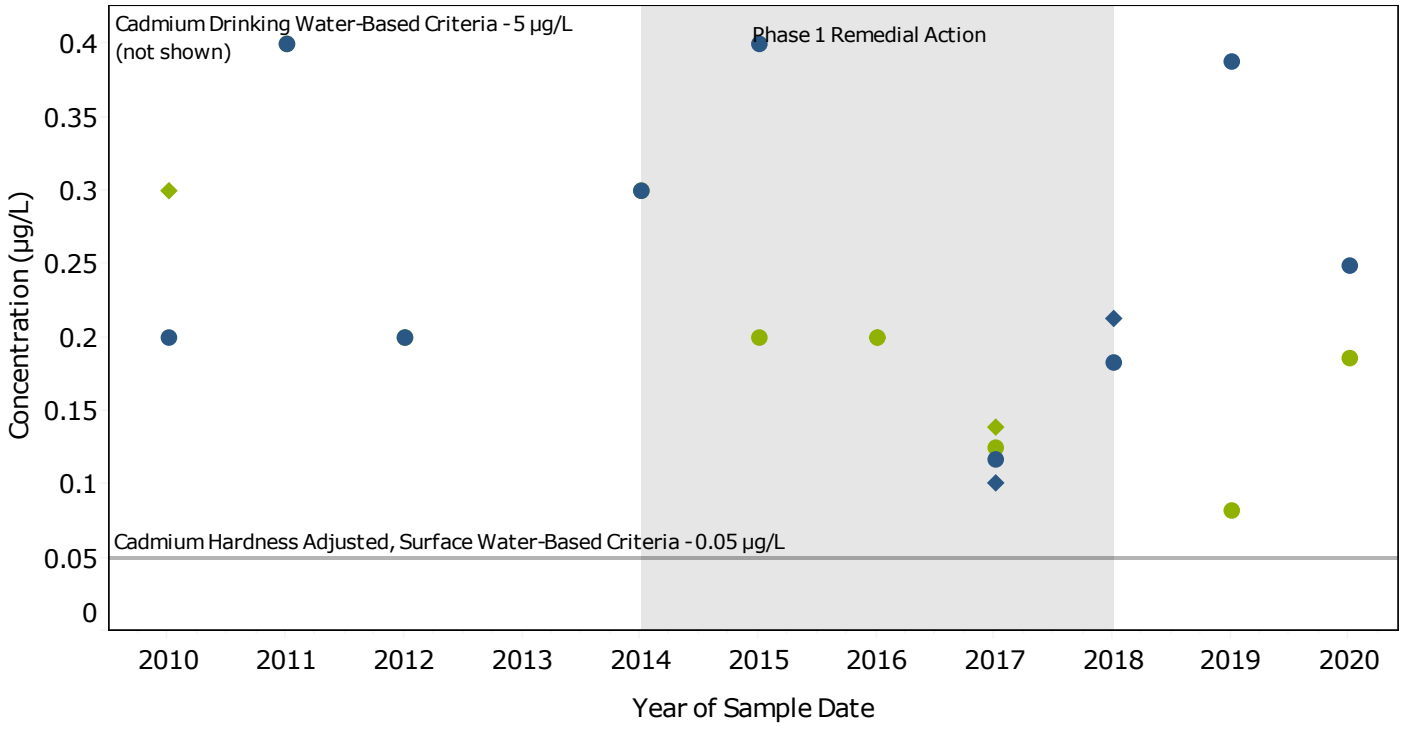
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

DS-4D, Aluminum



DS-4D, Cadmium



Legend

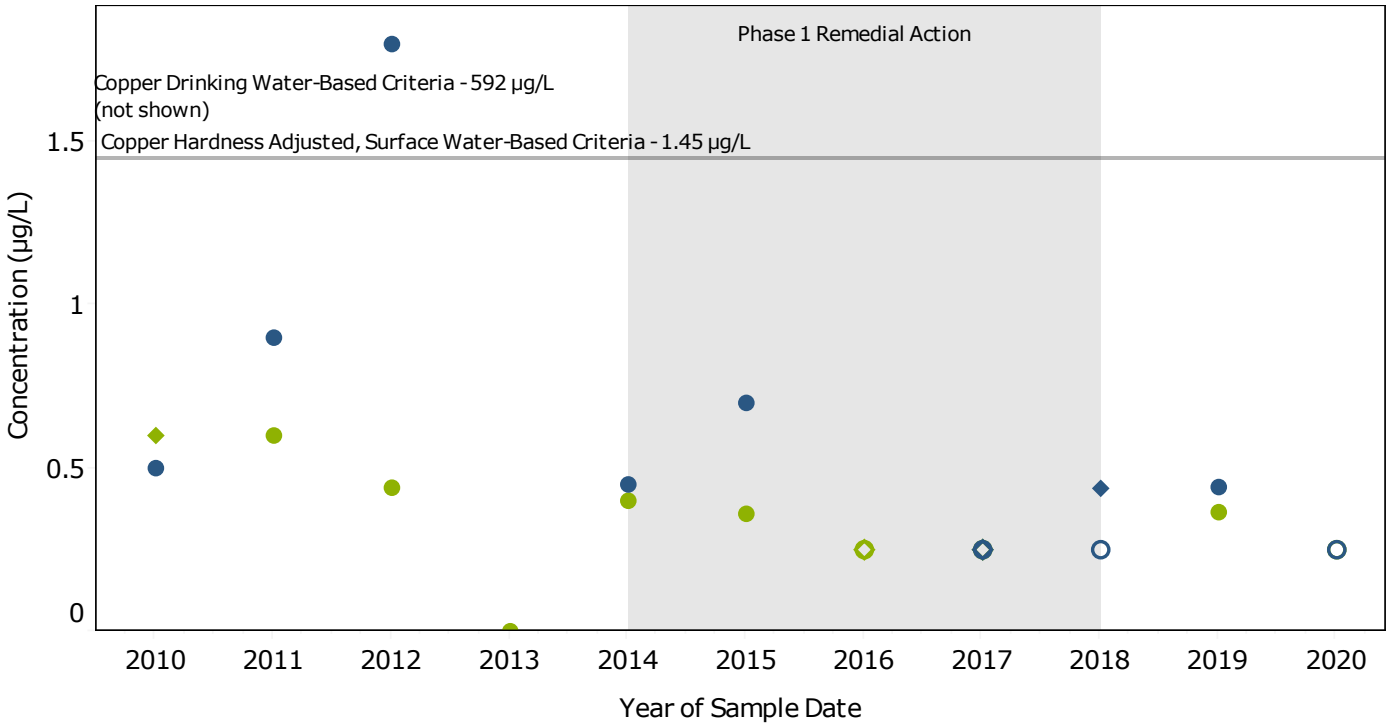
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

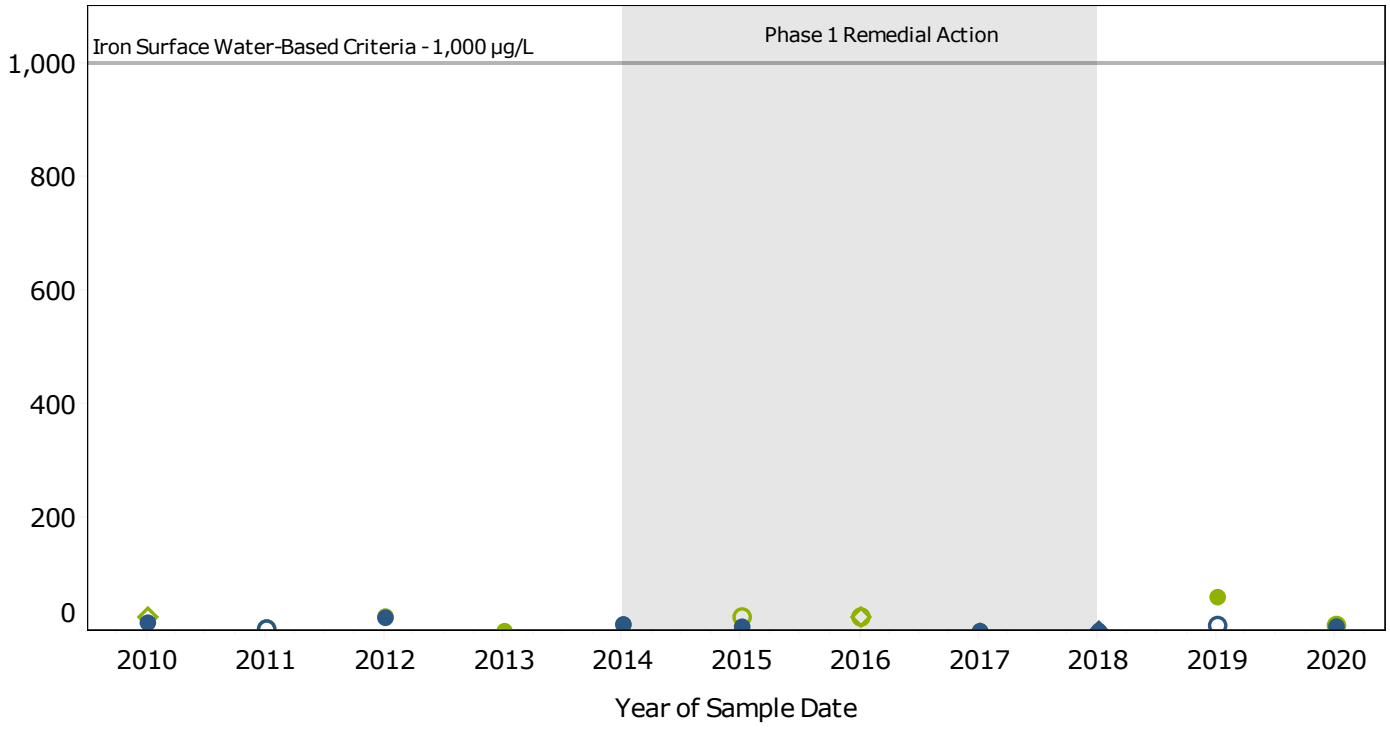
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

DS-4D, Copper



DS-4D, Iron



Legend

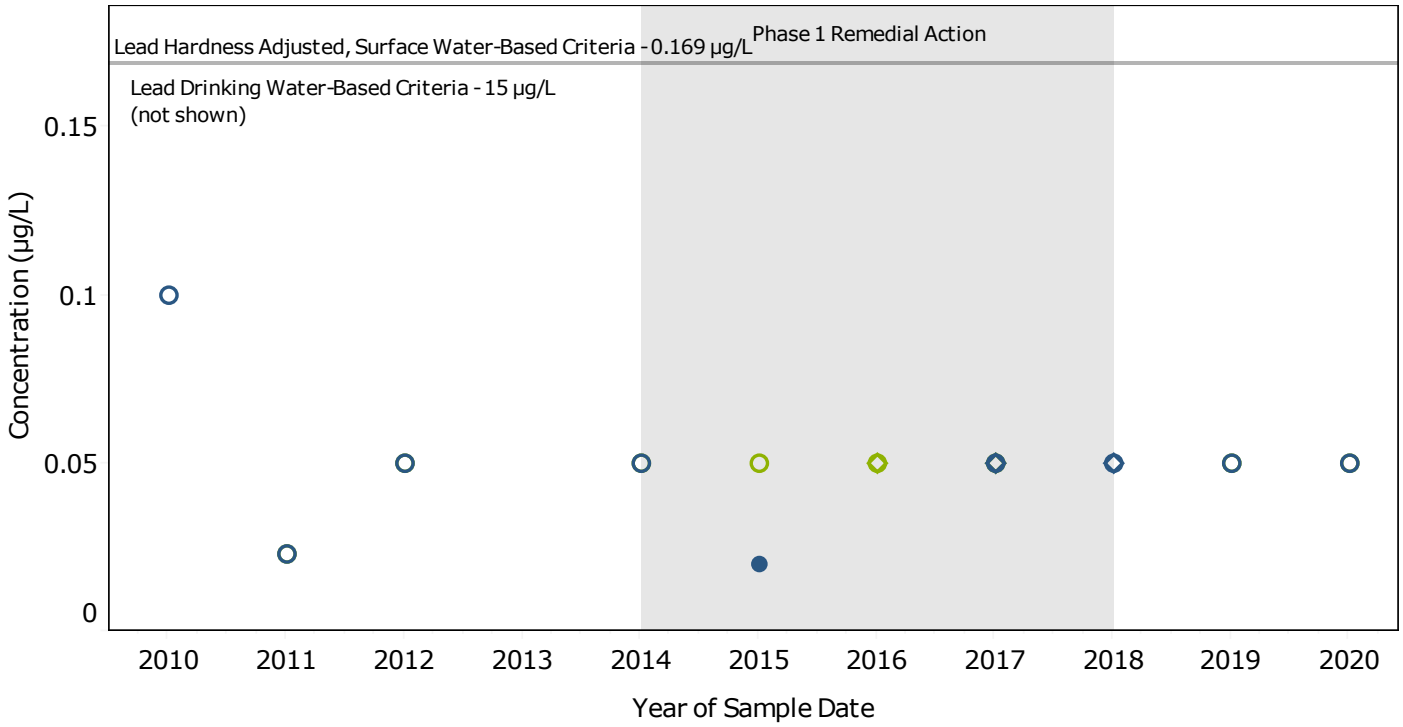
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

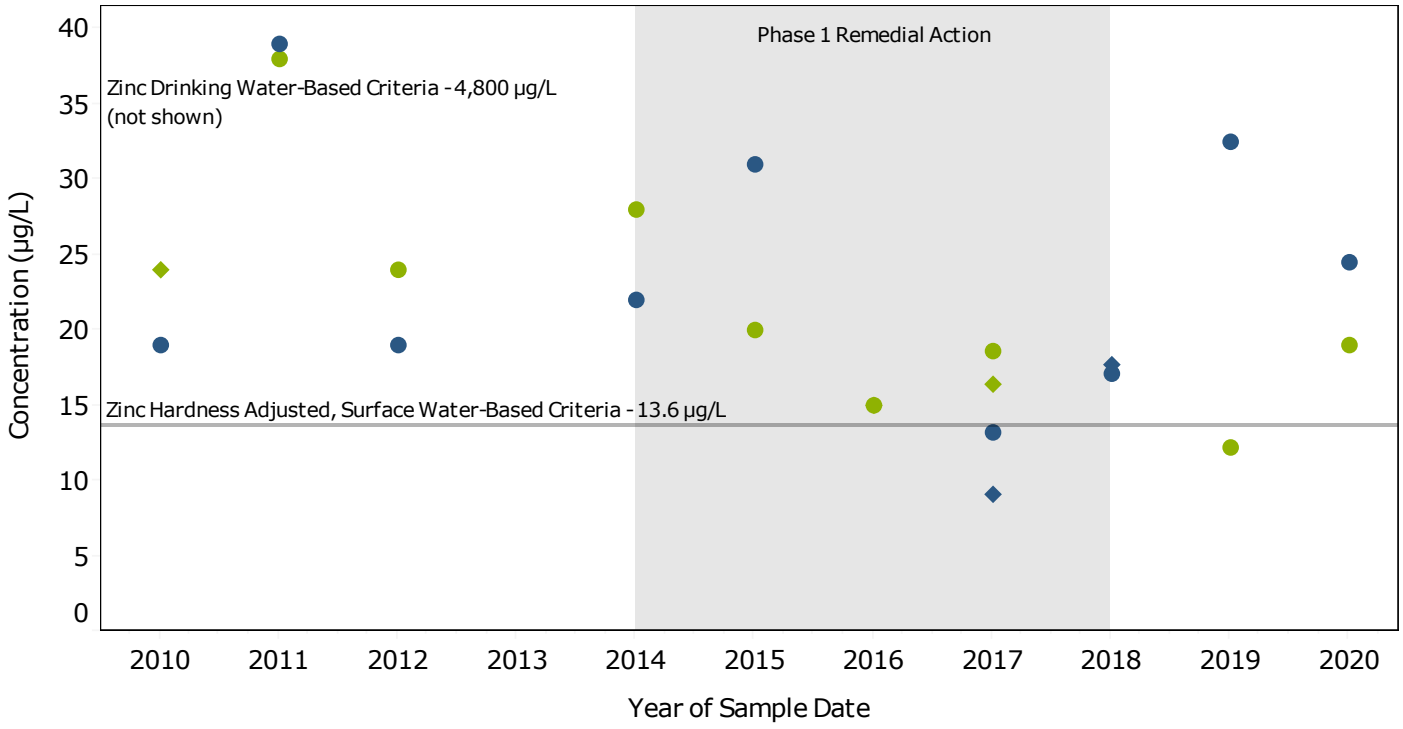
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

DS-4D, Lead



DS-4D, Zinc



Legend

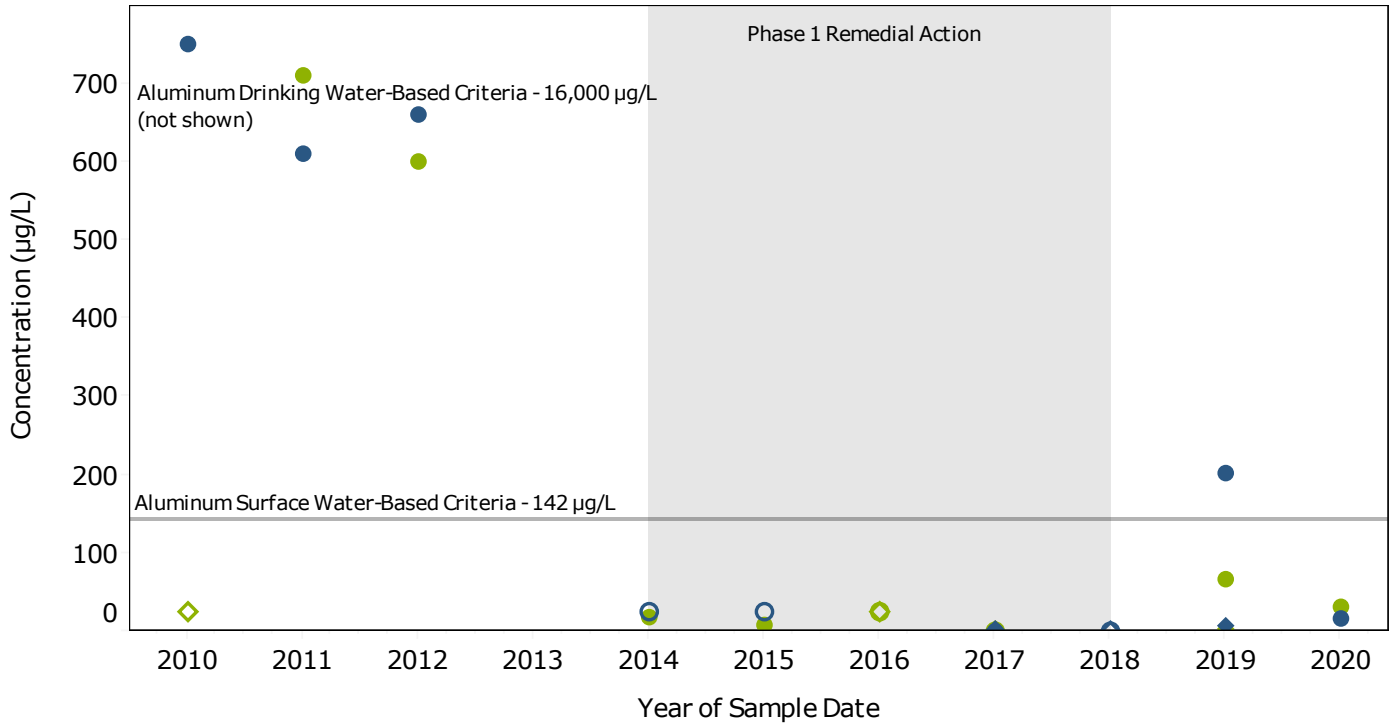
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

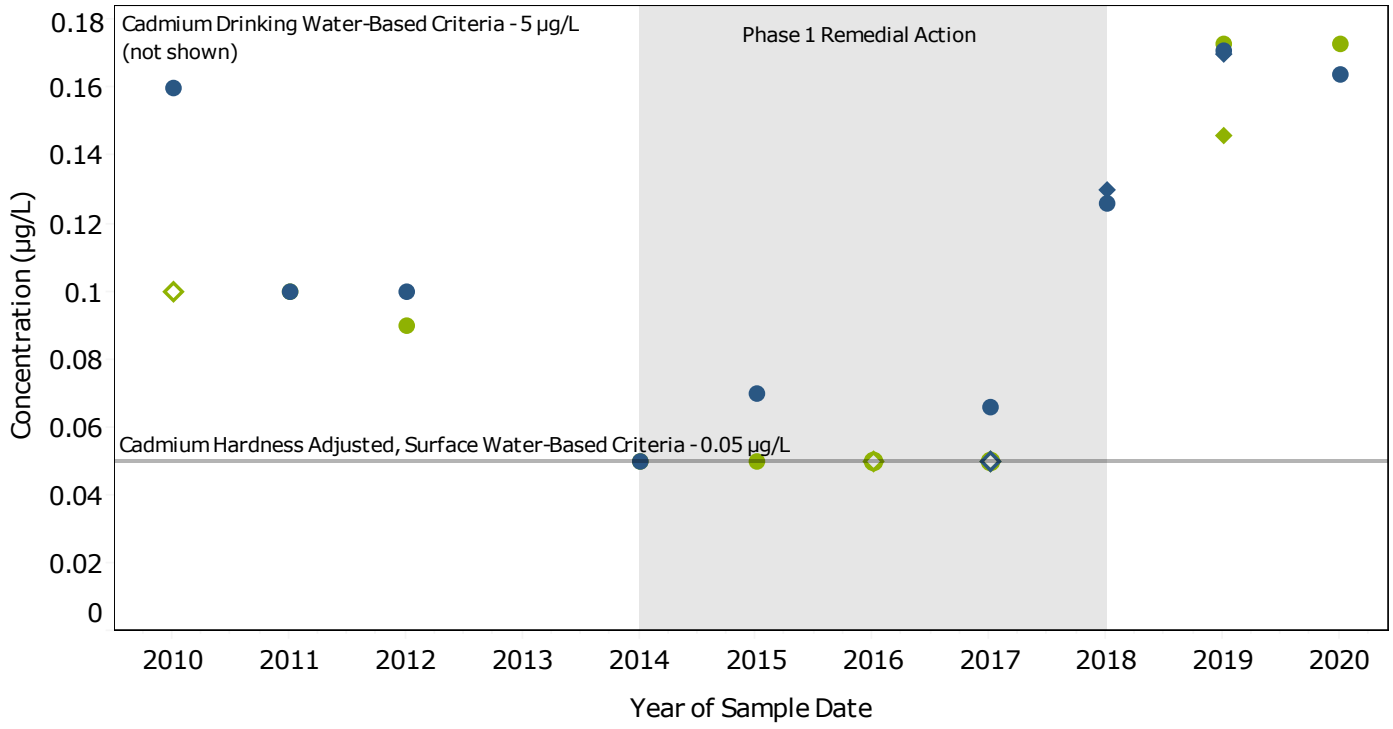
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

DS-4DD, Aluminum



DS-4DD, Cadmium



Legend

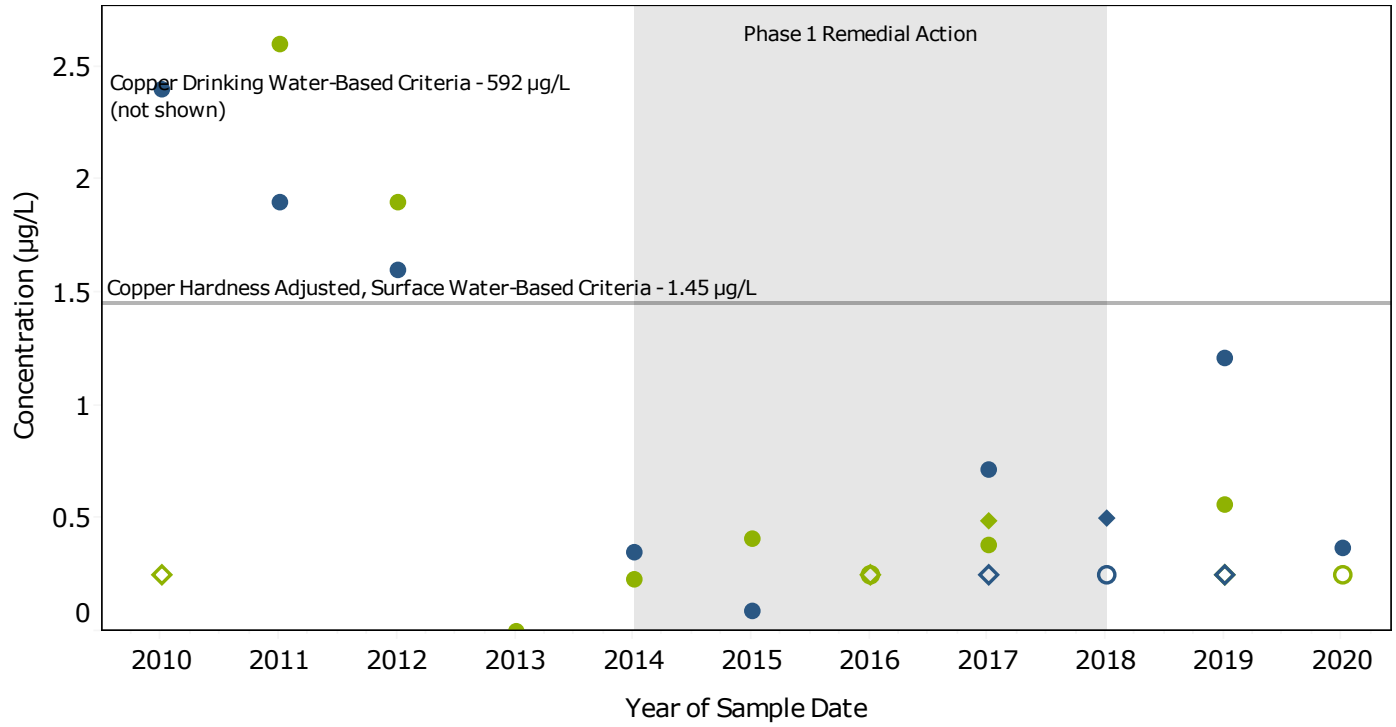
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

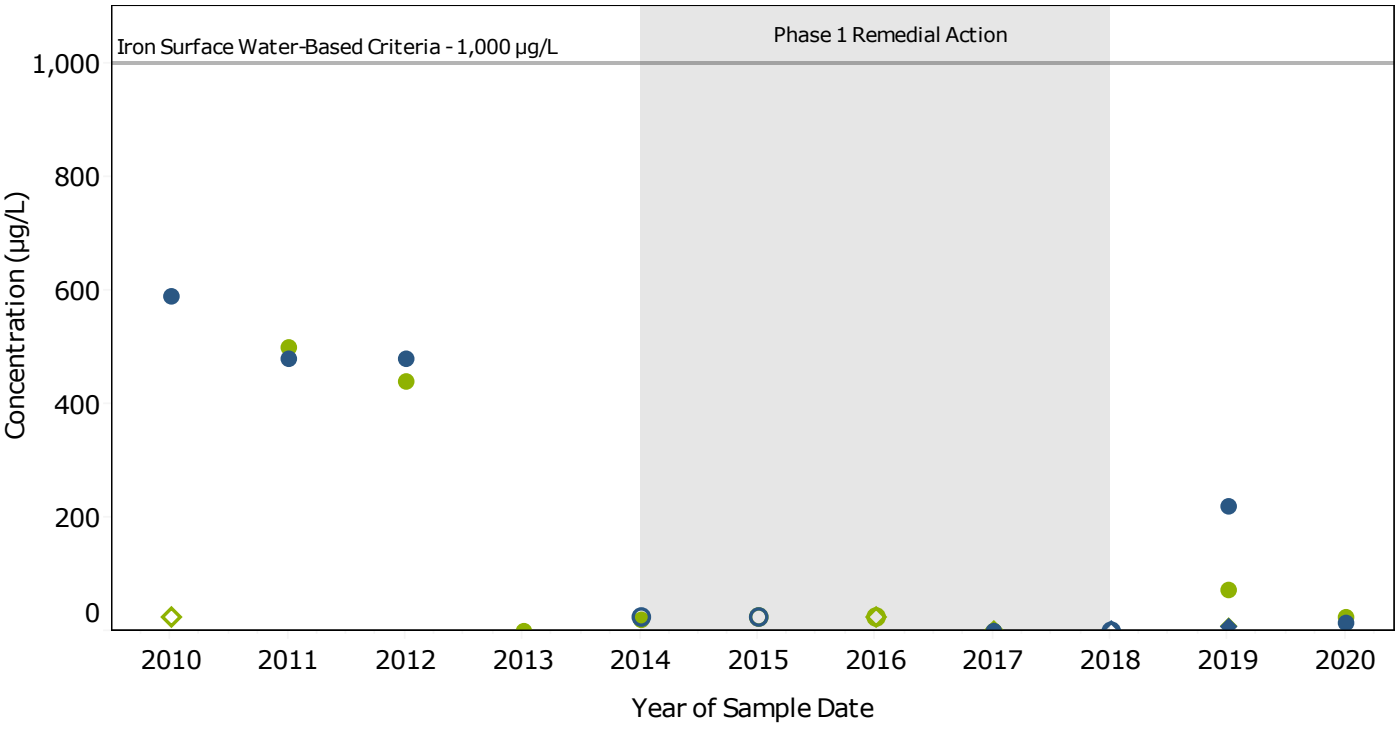
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

DS-4DD, Copper



DS-4DD, Iron



Legend

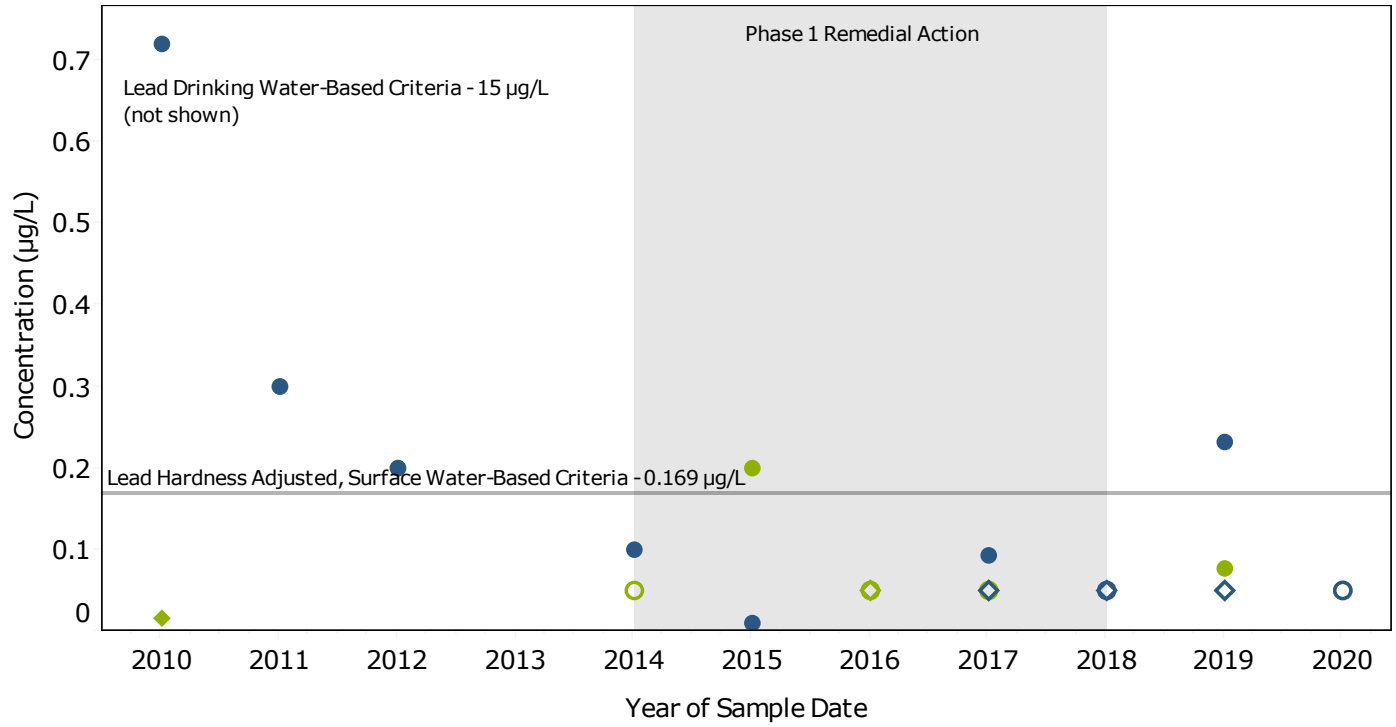
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

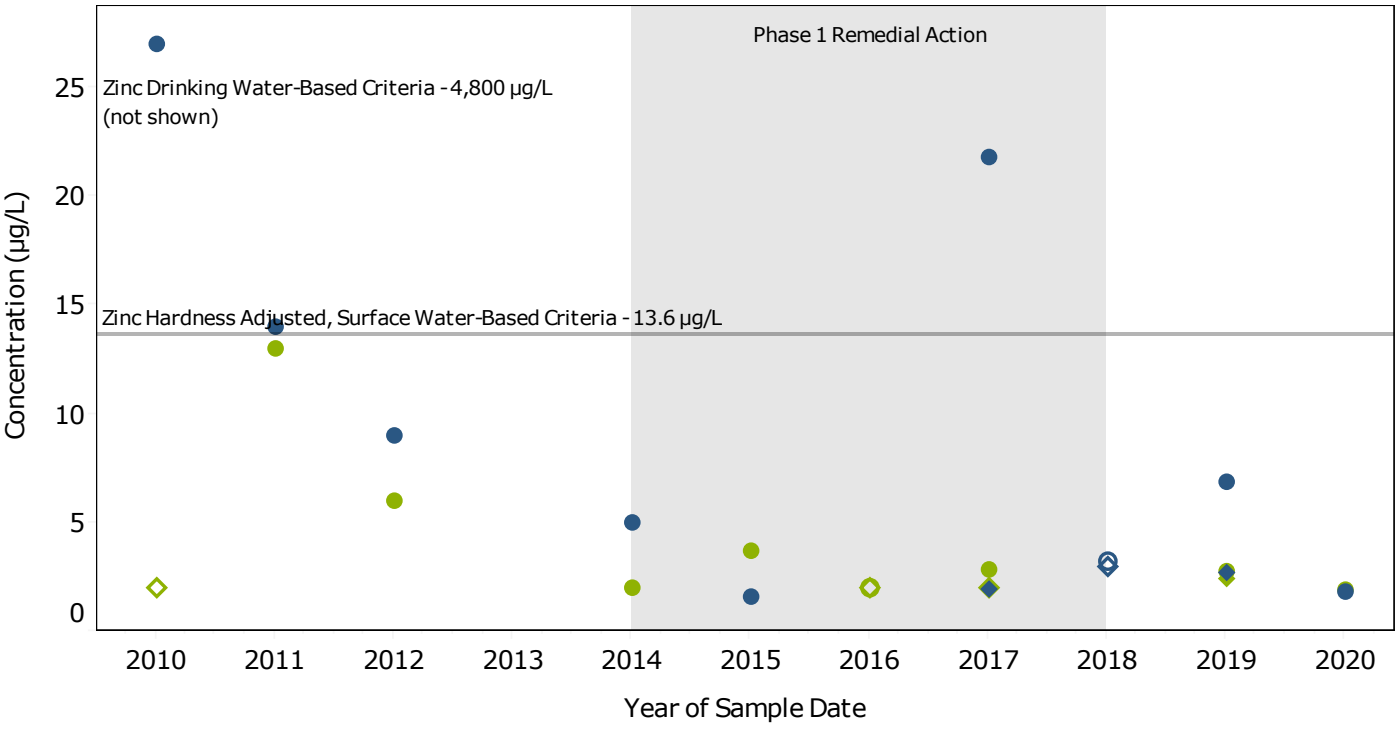
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

DS-4DD, Lead



DS-4DD, Zinc



Legend

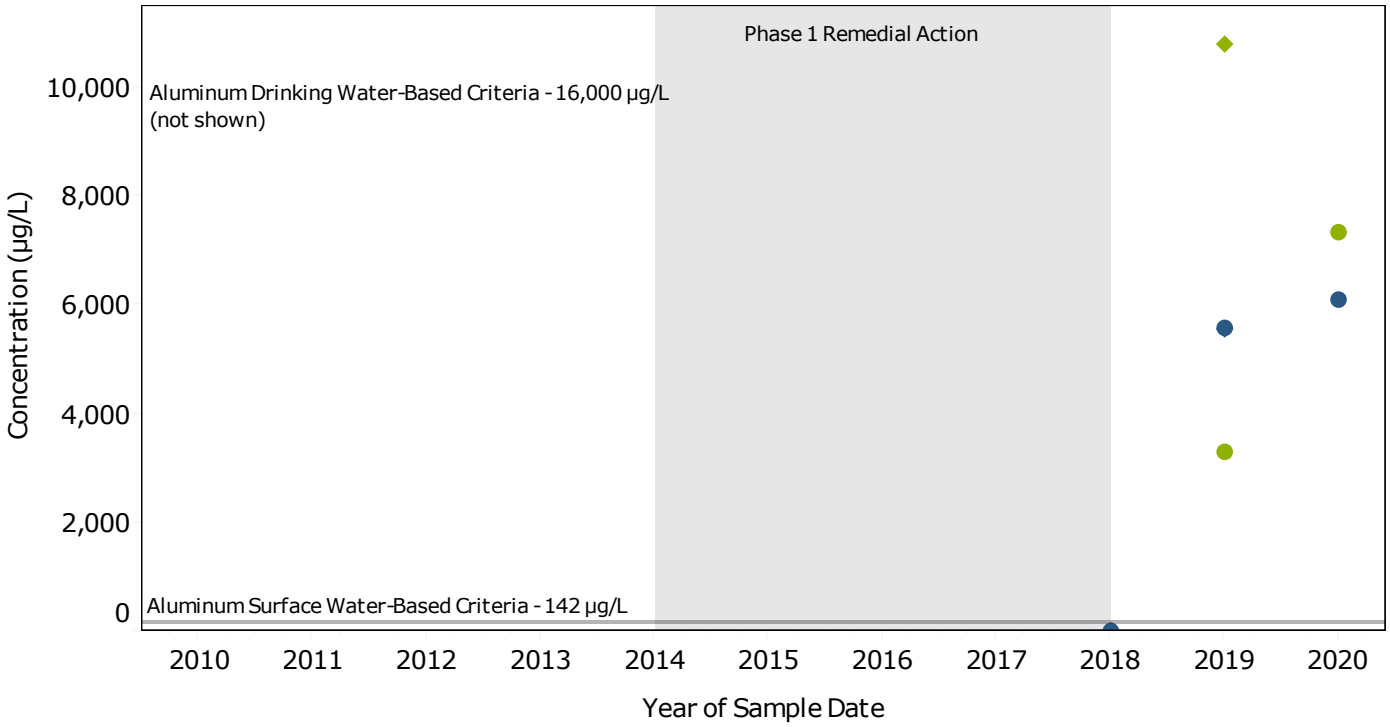
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

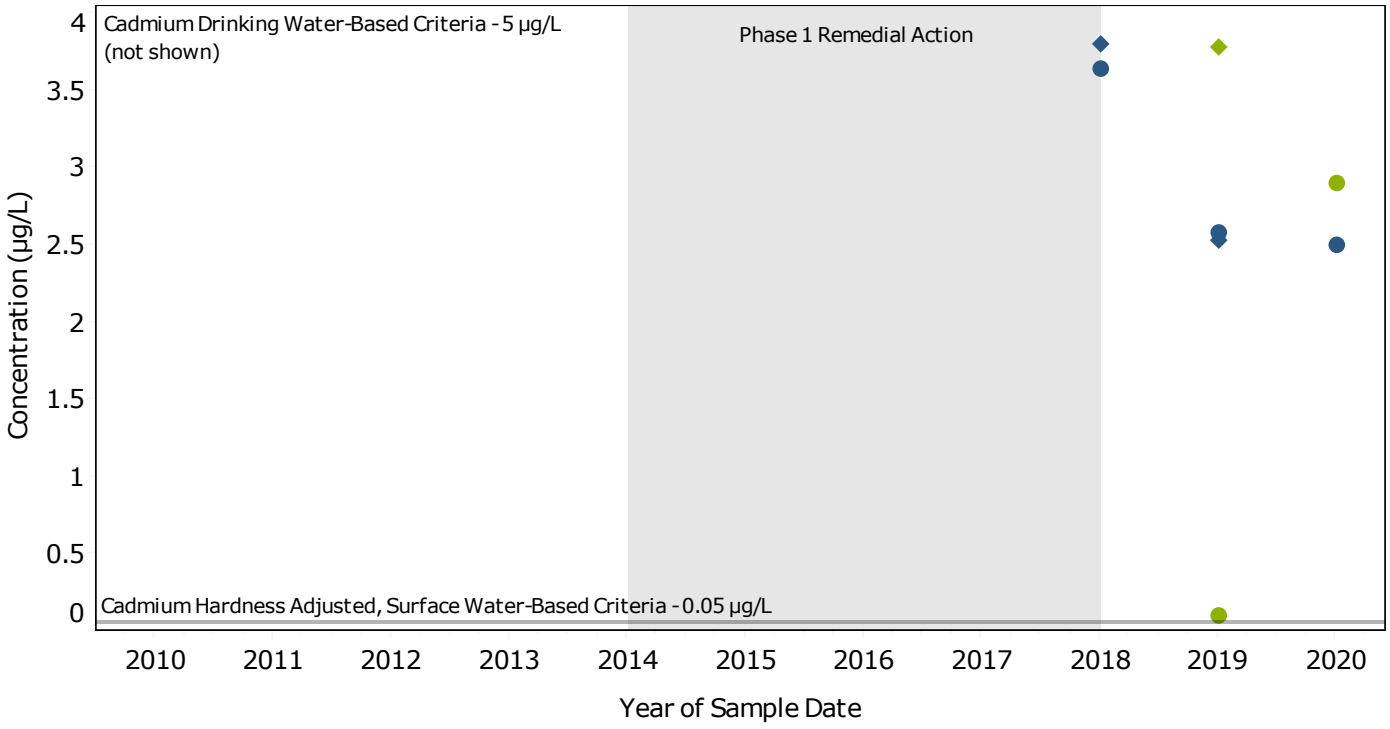
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

DS-4I, Aluminum



DS-4I, Cadmium



Legend

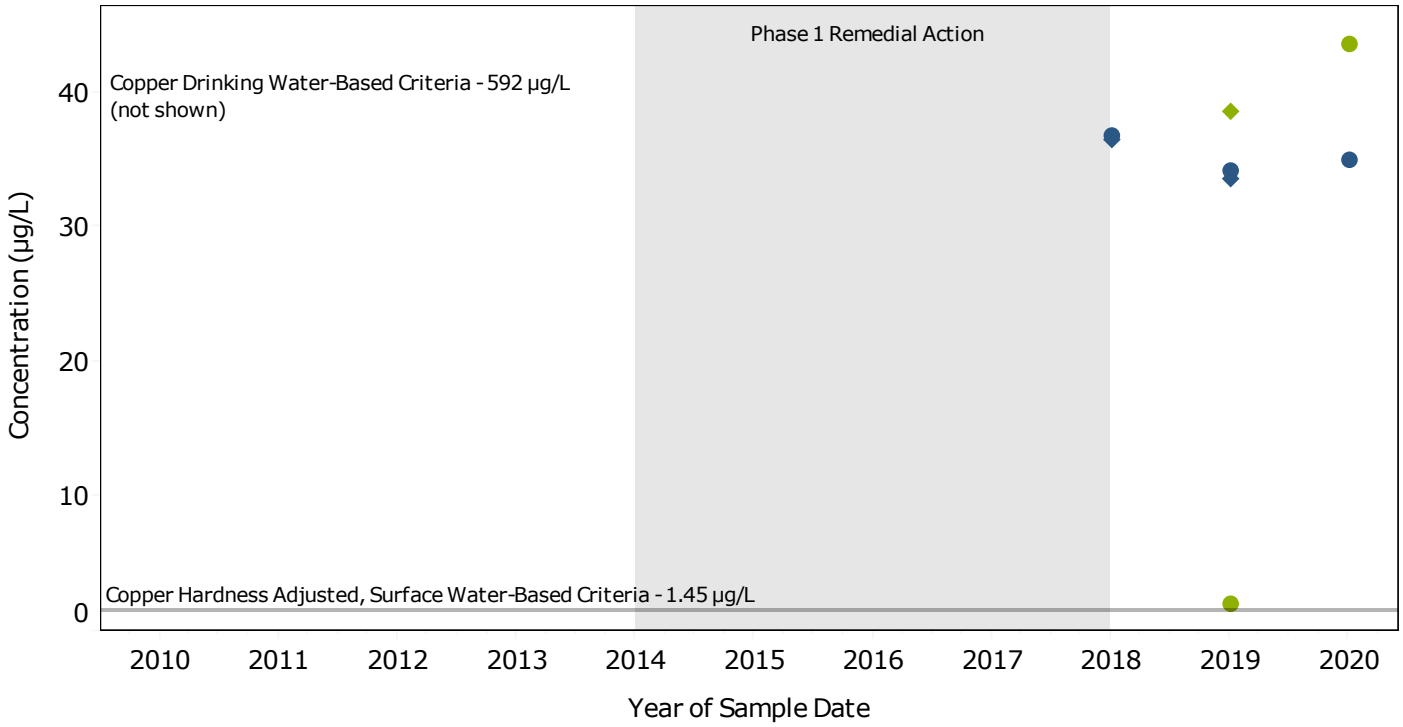
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

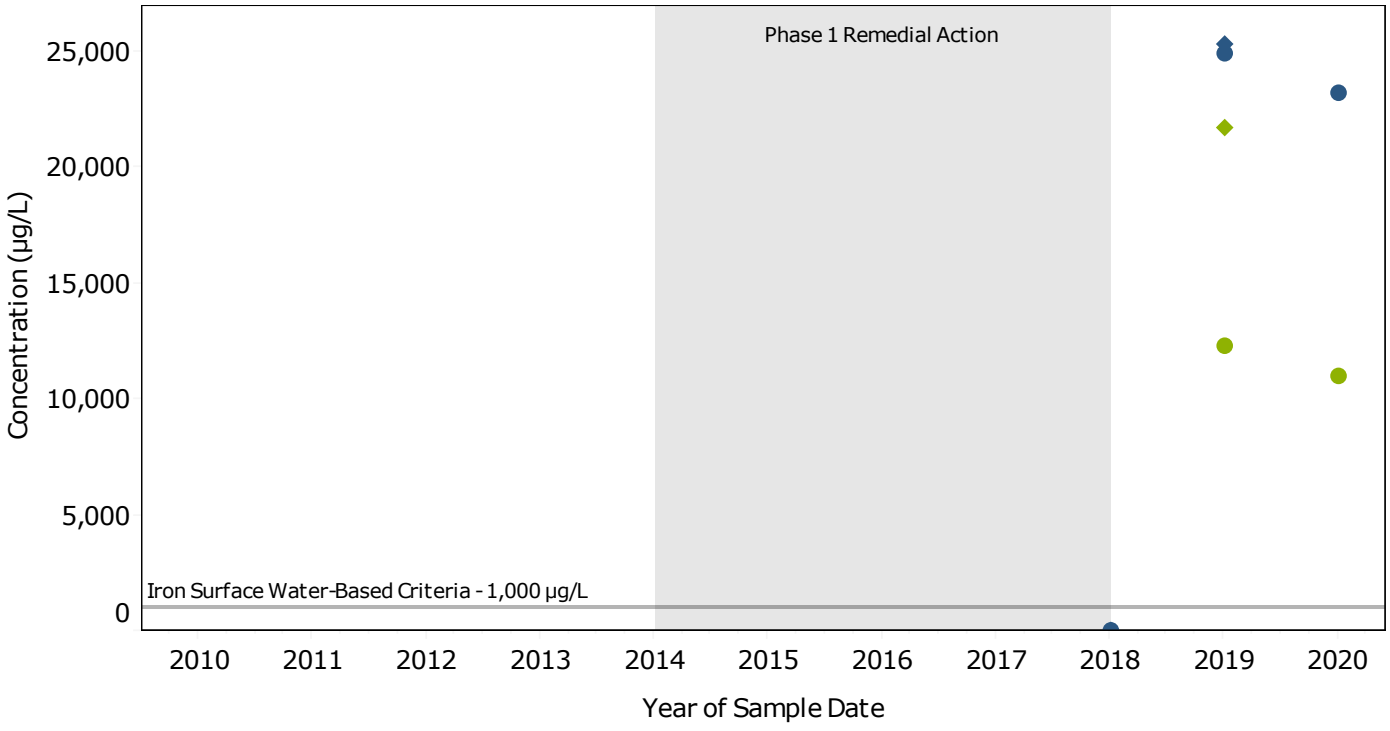
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

DS-4I, Copper



DS-4I, Iron



Legend

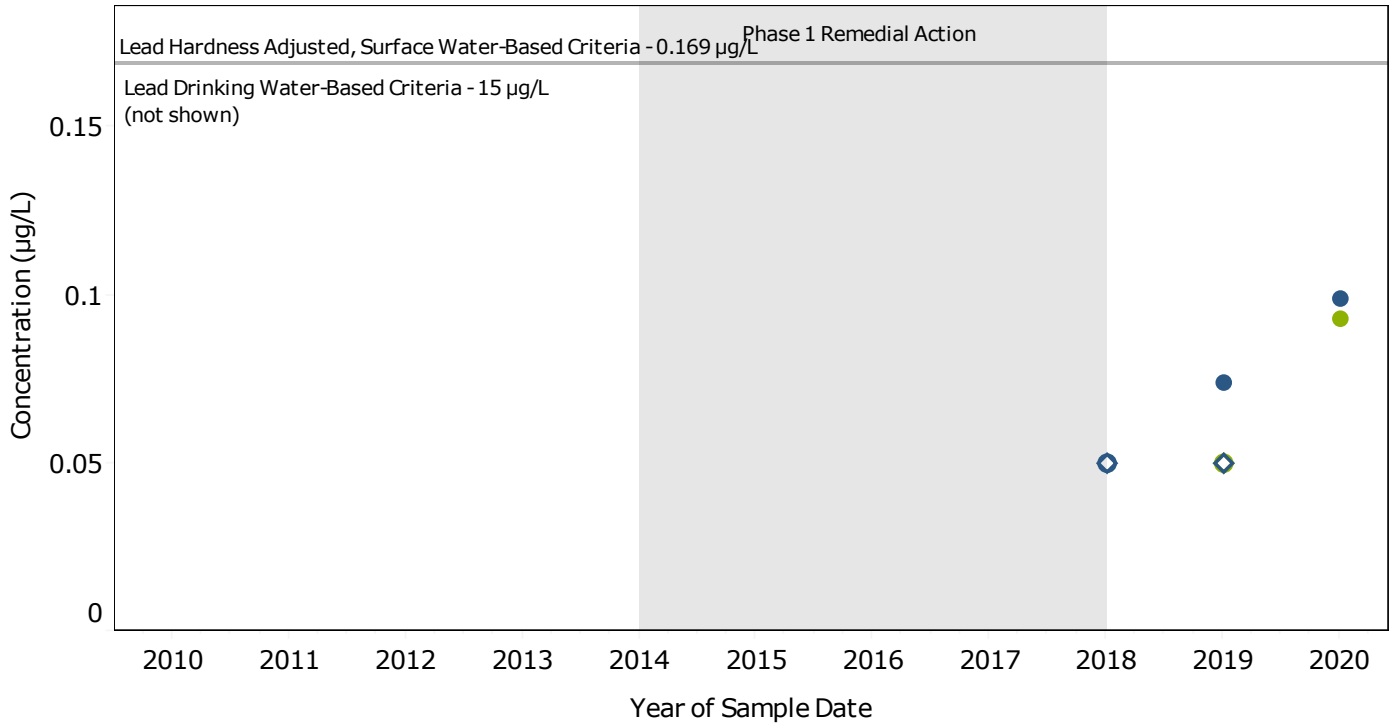
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

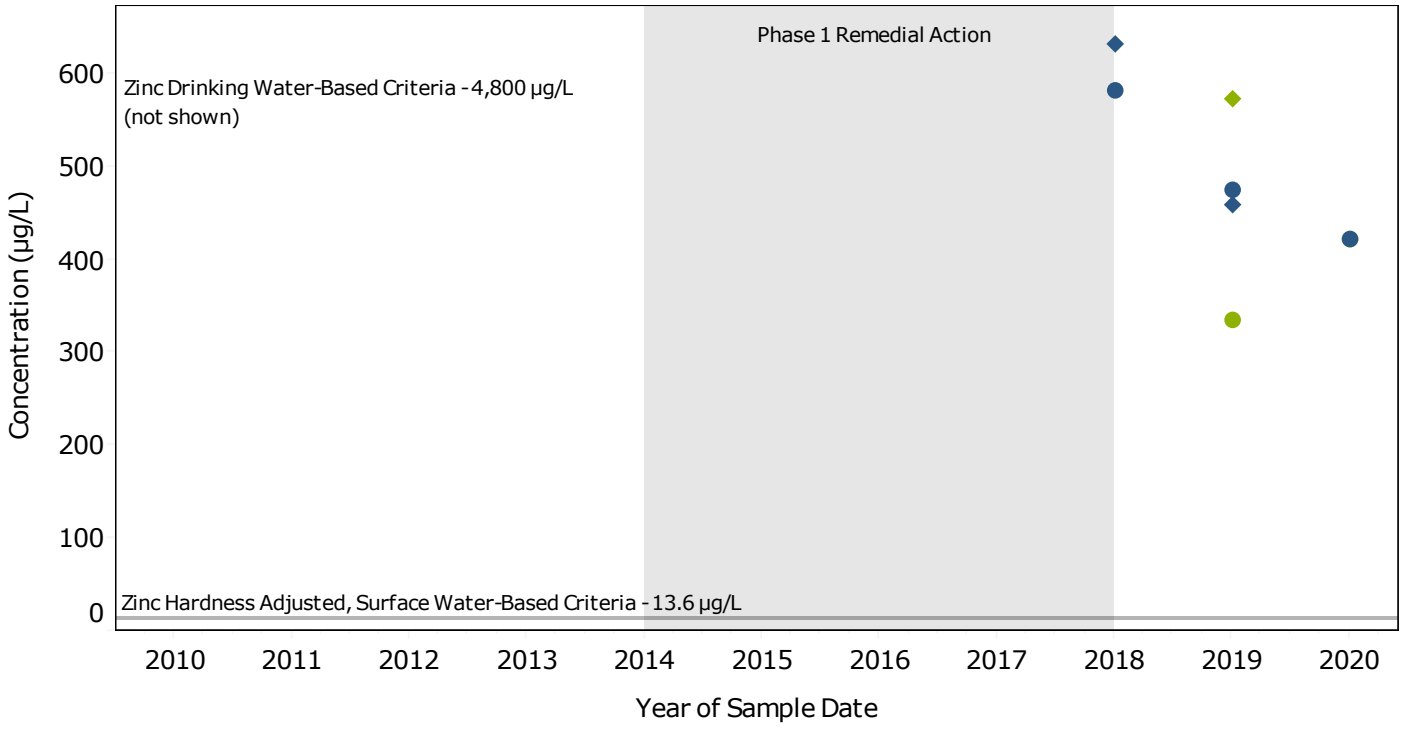
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

DS-4I, Lead



DS-4I, Zinc



Legend

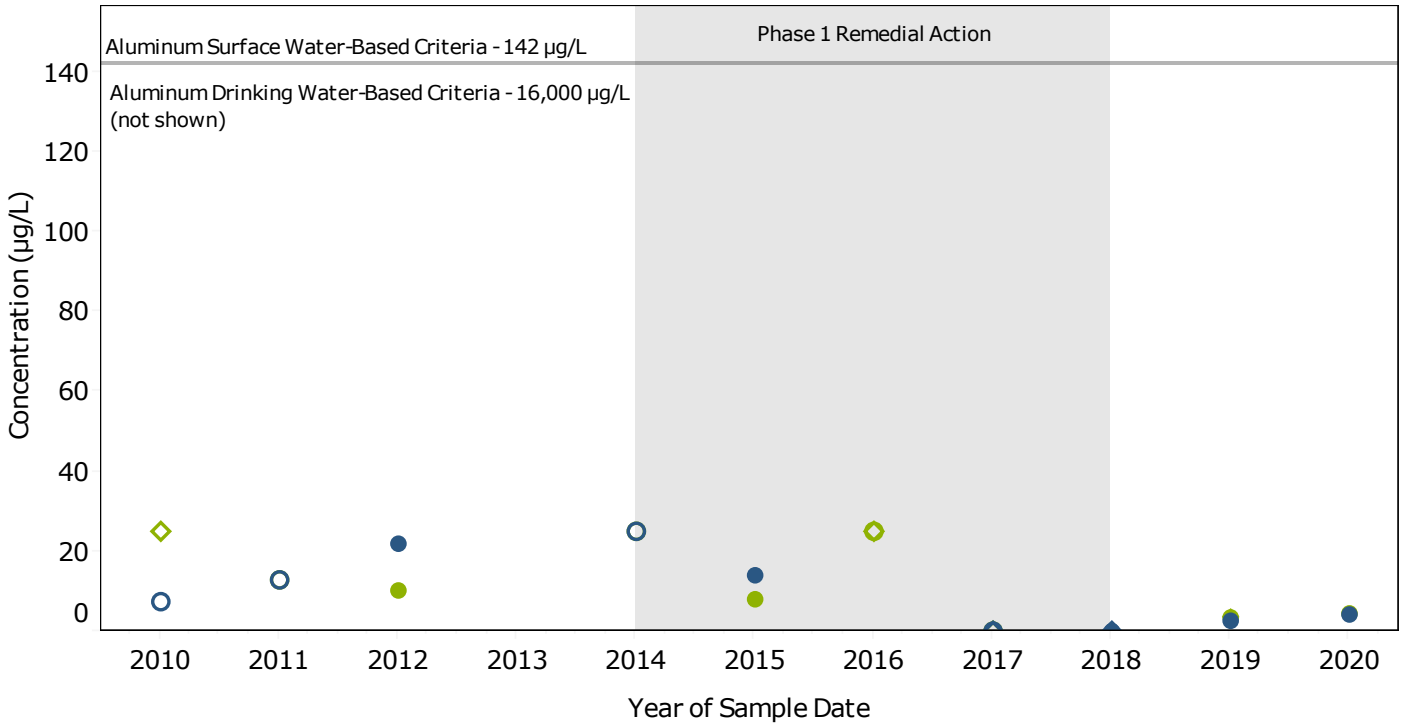
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

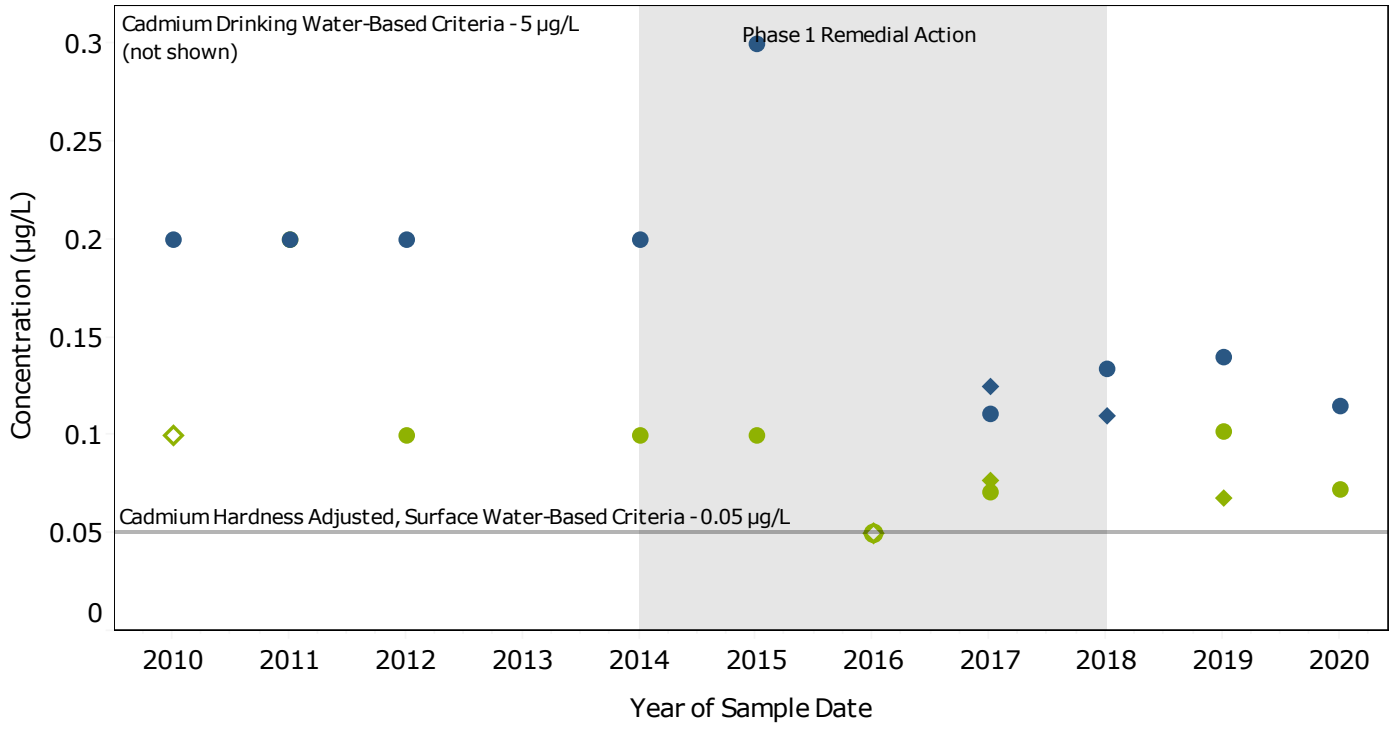
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

DS-4S, Aluminum



DS-4S, Cadmium



Legend

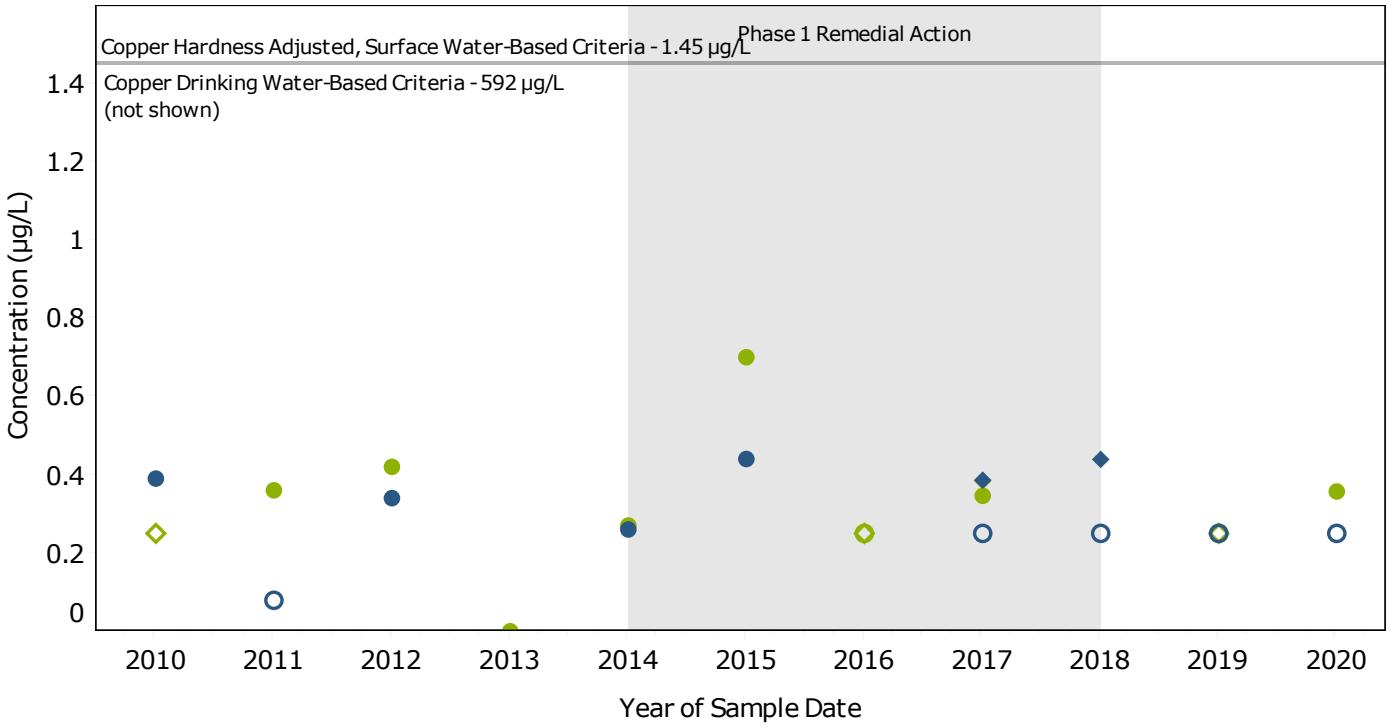
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

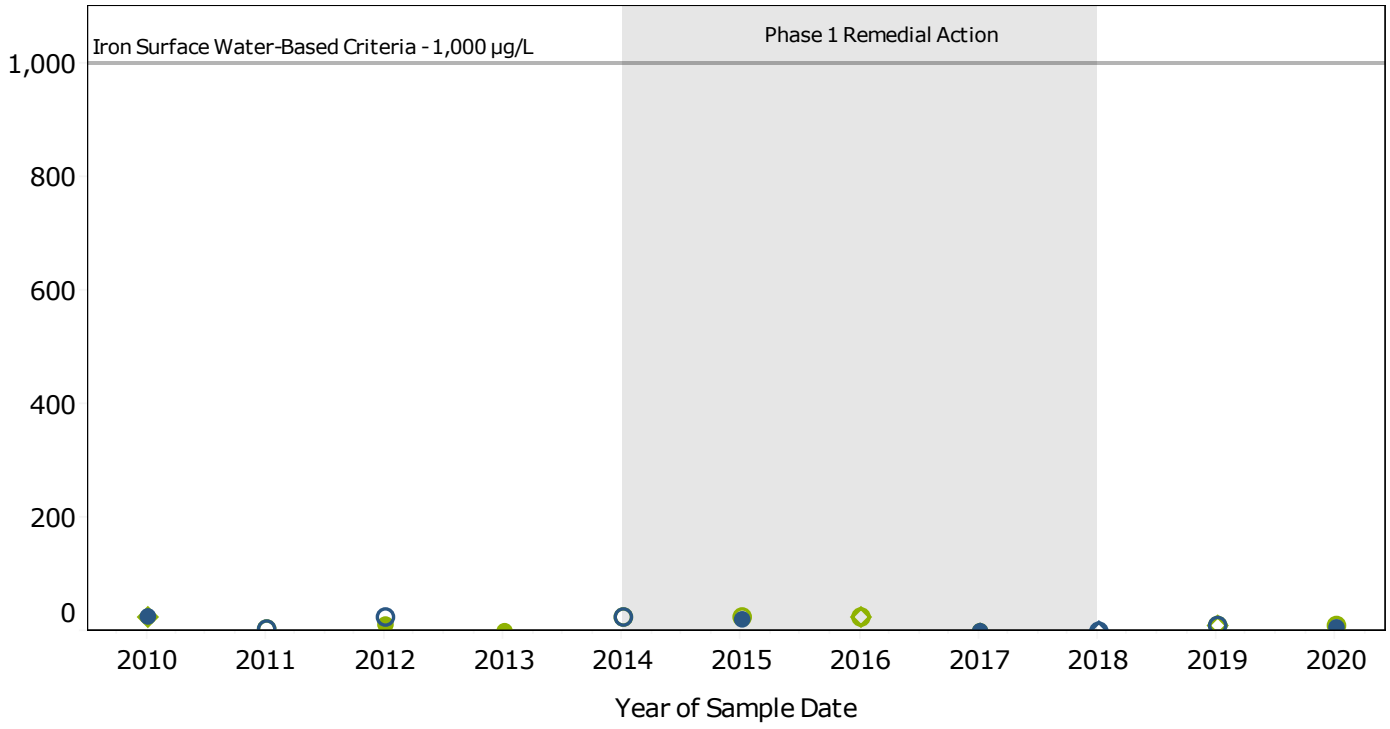
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

DS-4S, Copper



DS-4S, Iron



Legend

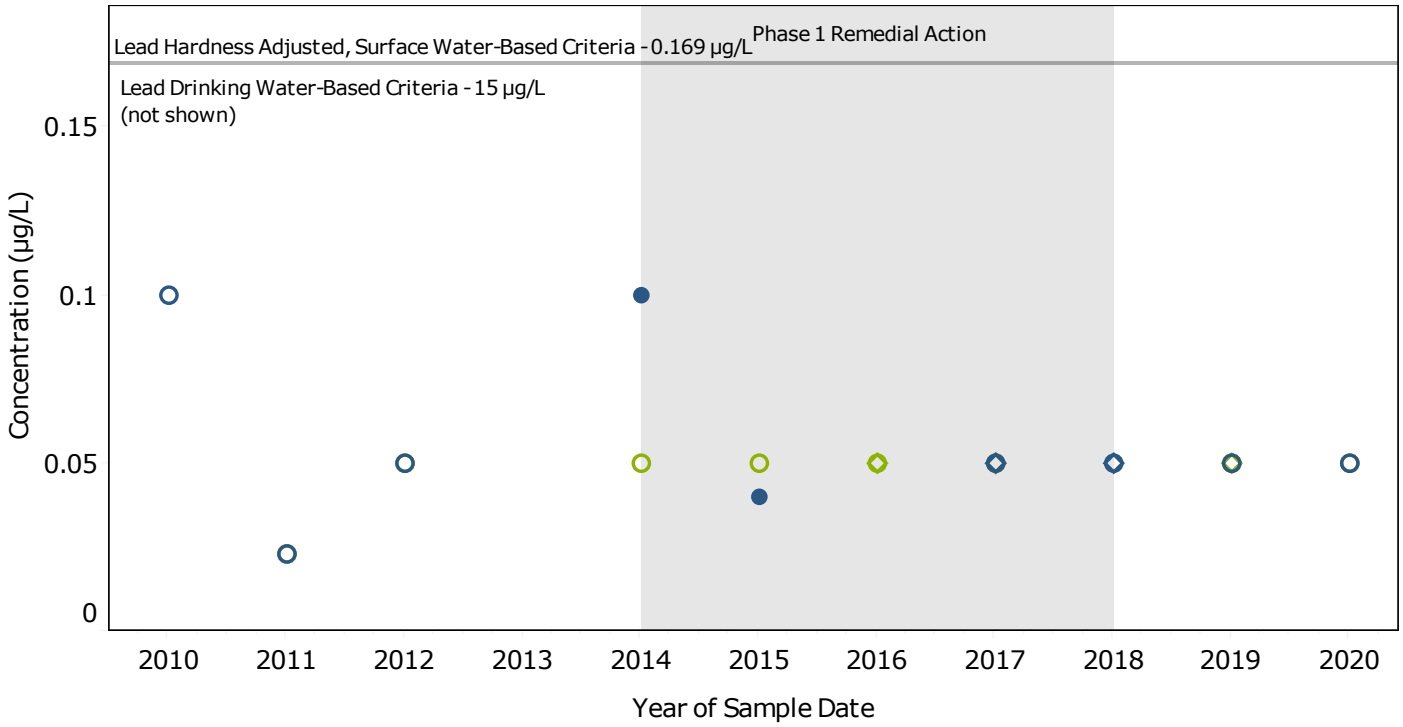
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

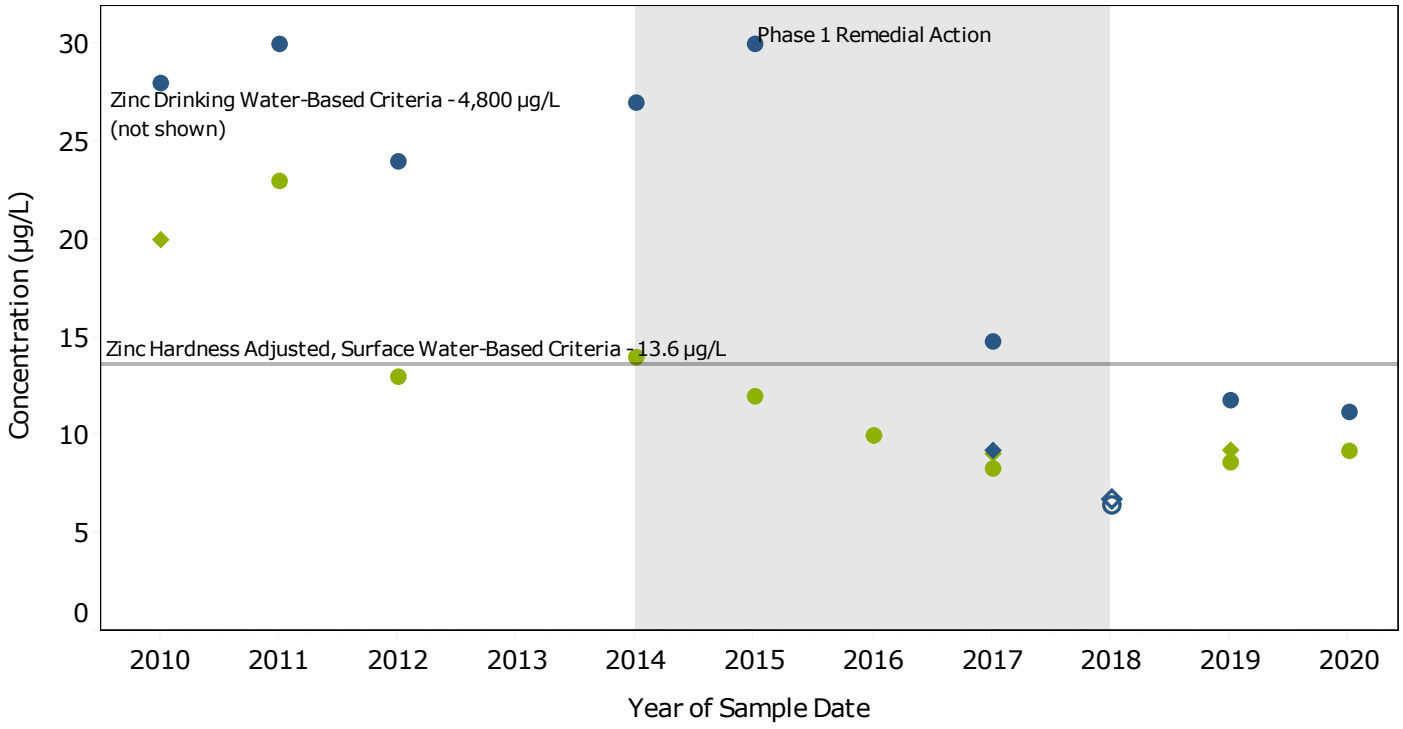
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

DS-4S, Lead



DS-4S, Zinc



Legend

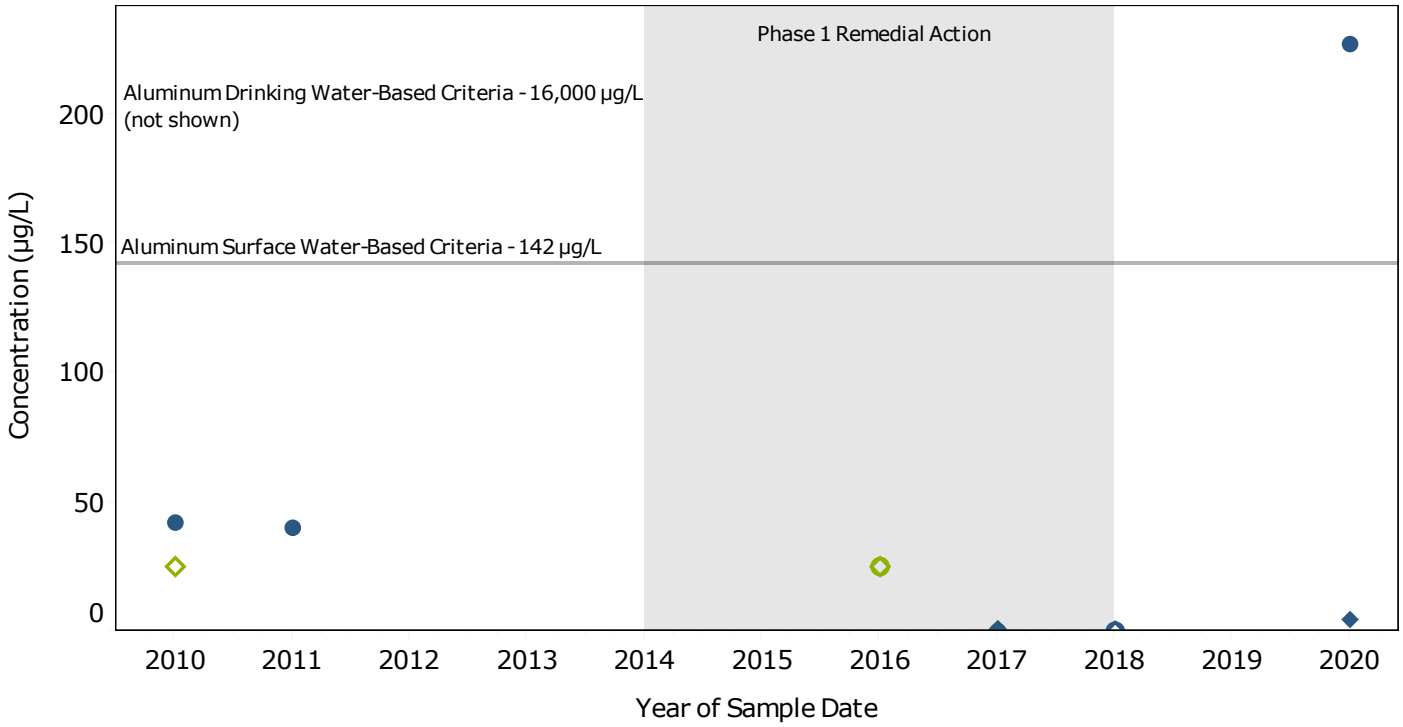
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

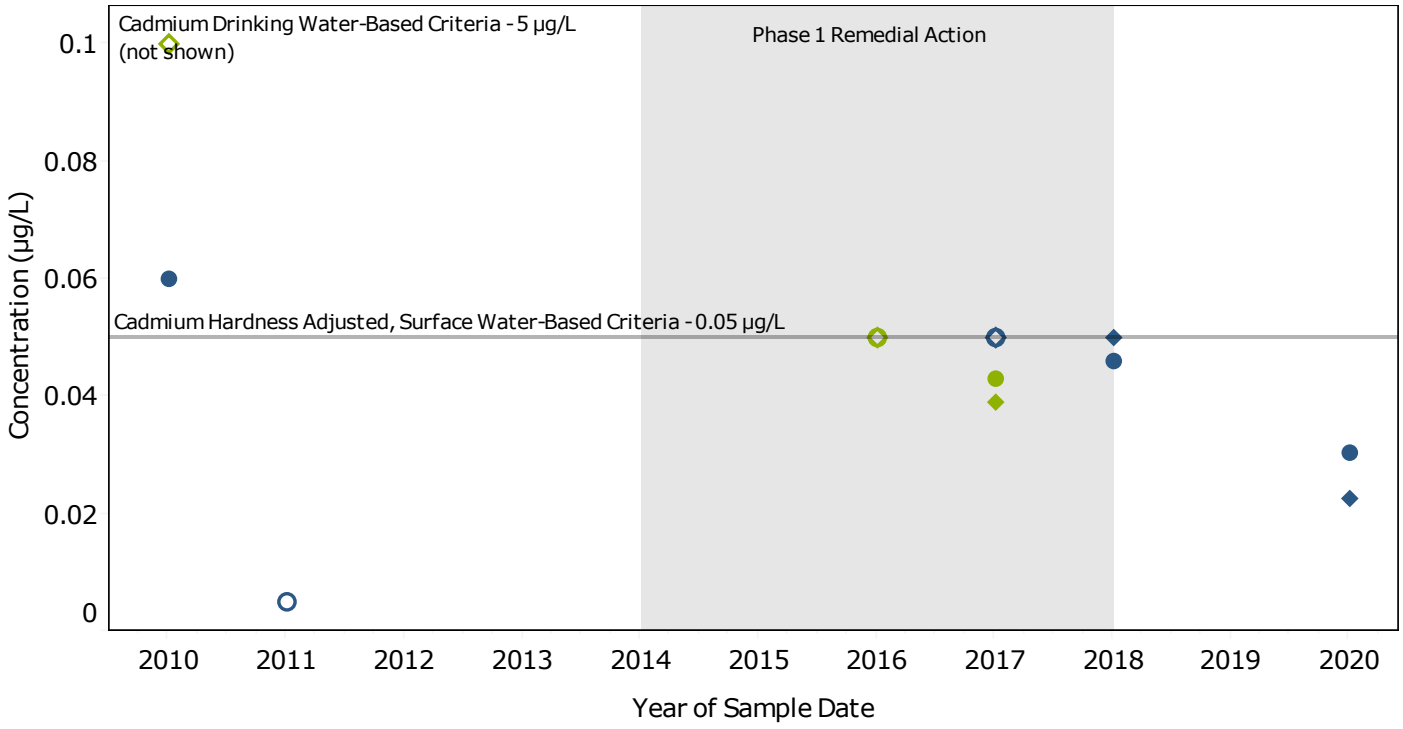
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

DS-5, Aluminum



DS-5, Cadmium



Legend

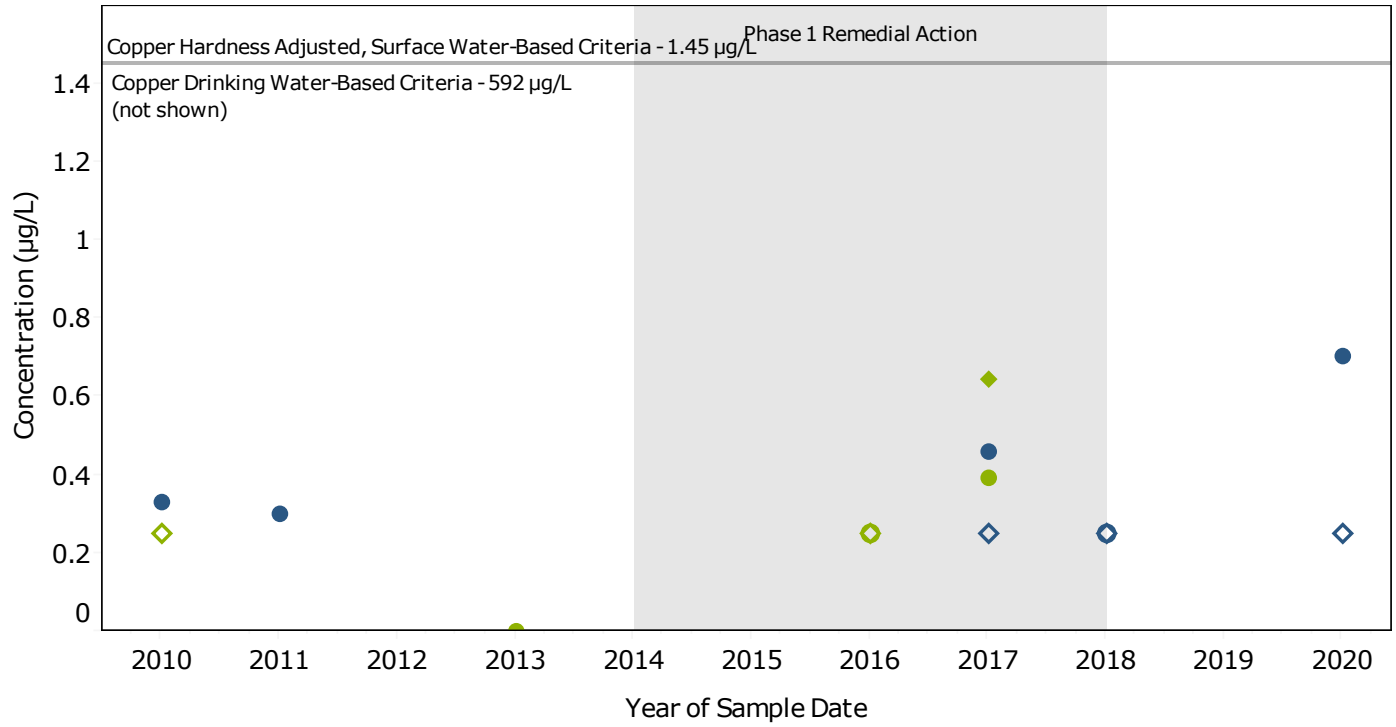
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

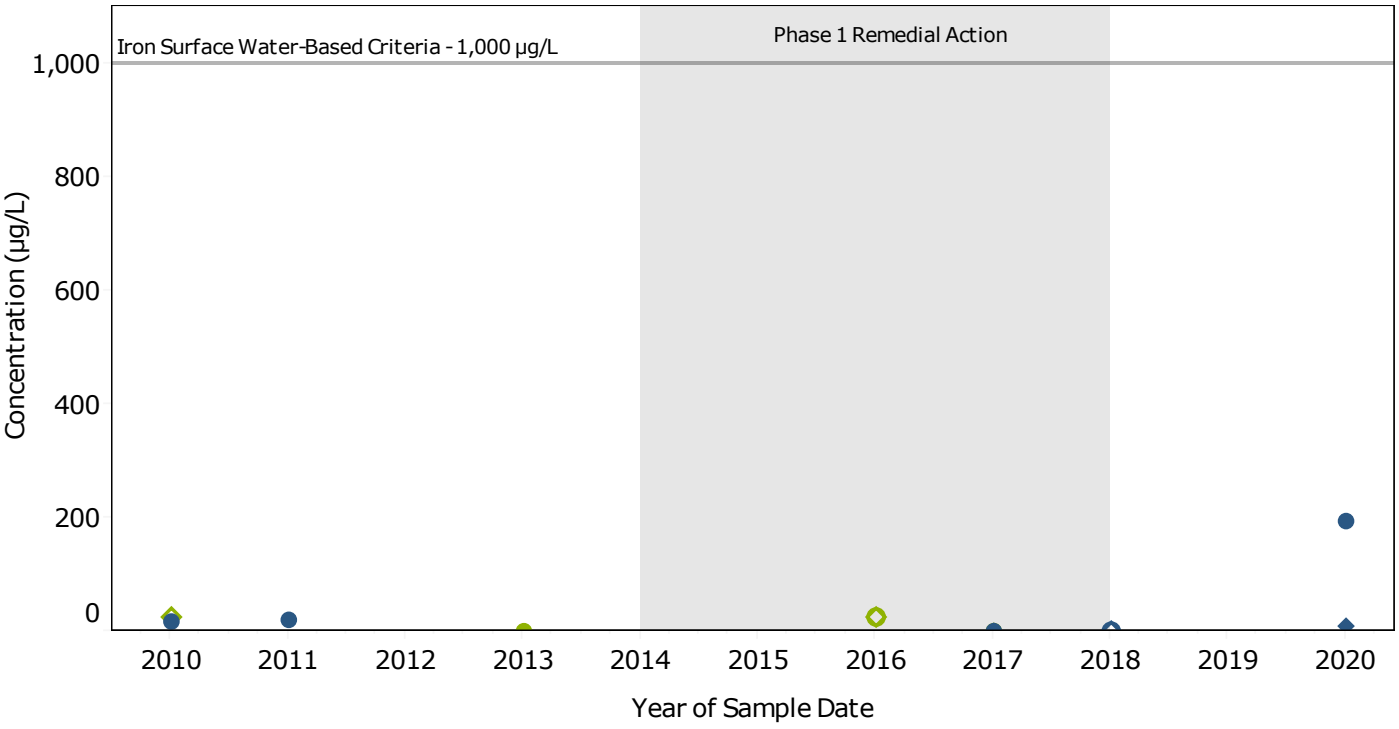
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

DS-5, Copper



DS-5, Iron



Legend

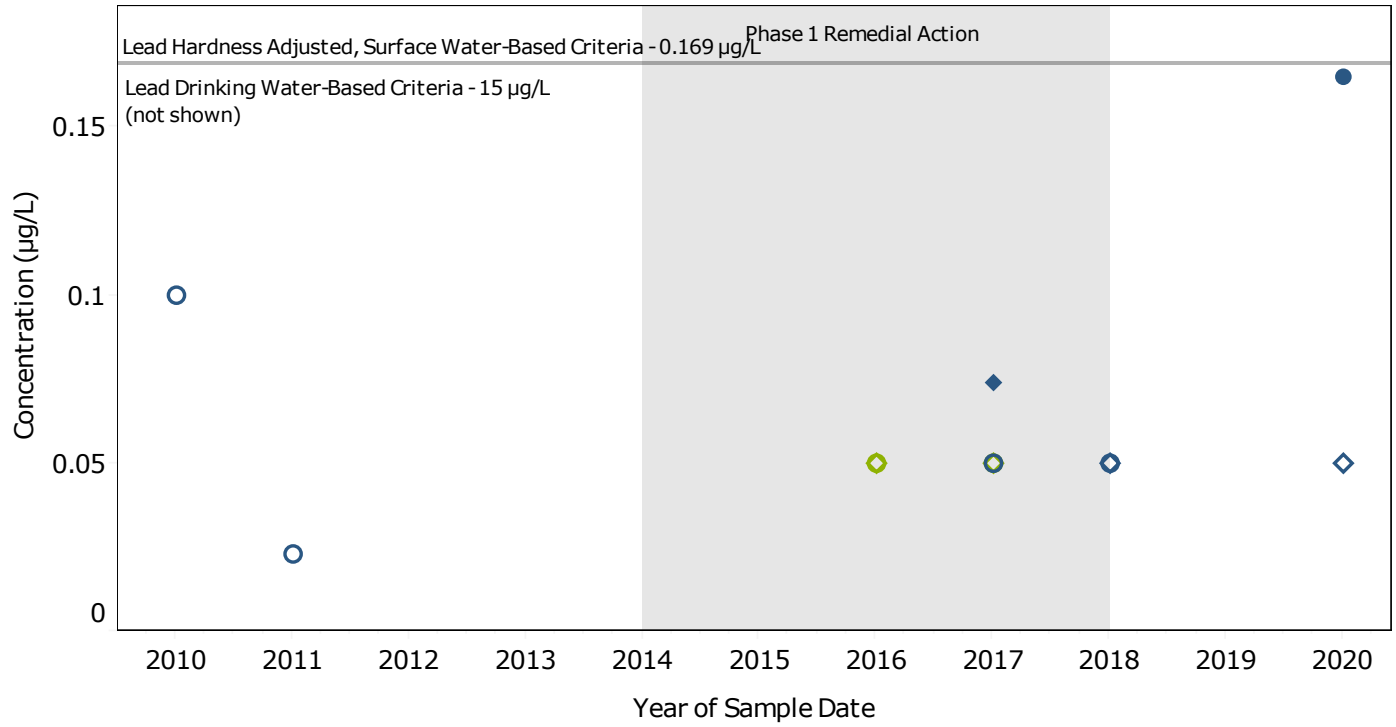
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

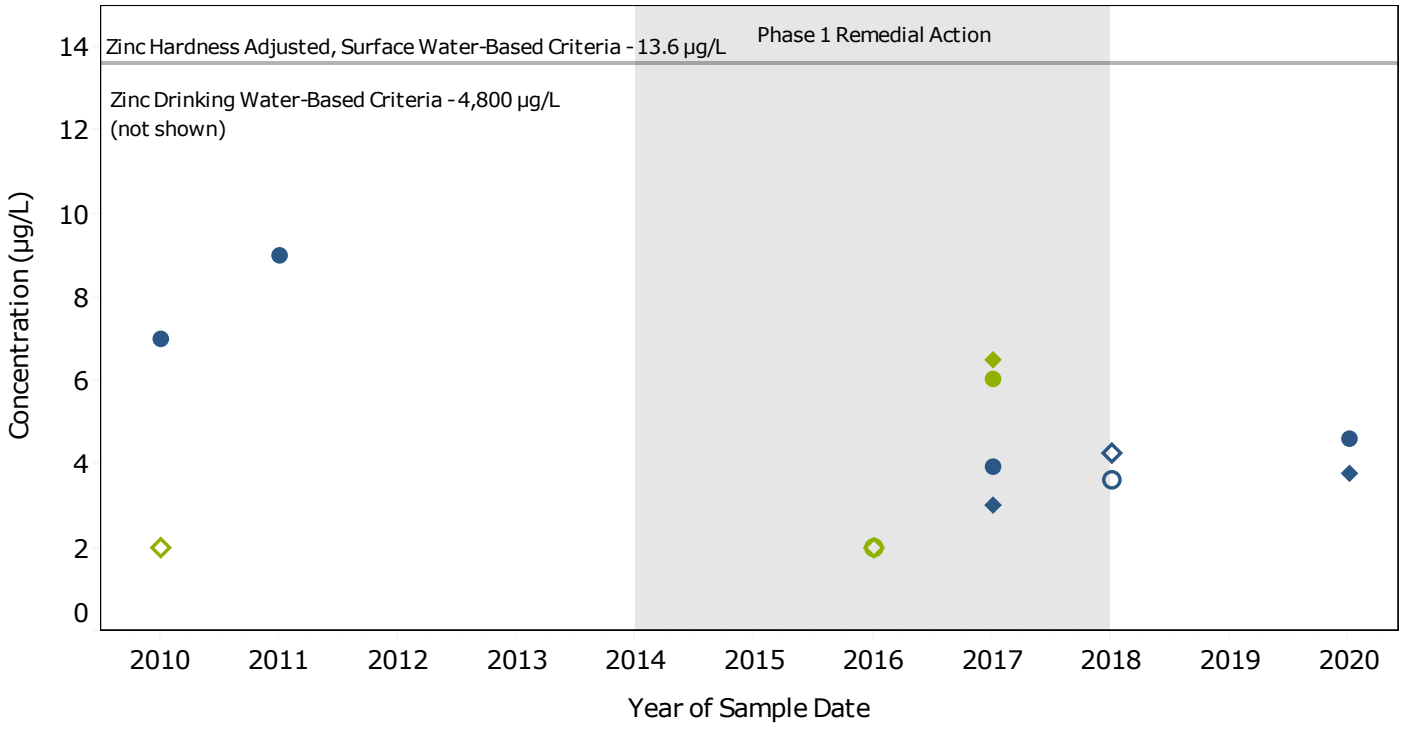
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

DS-5, Lead



DS-5, Zinc



Legend

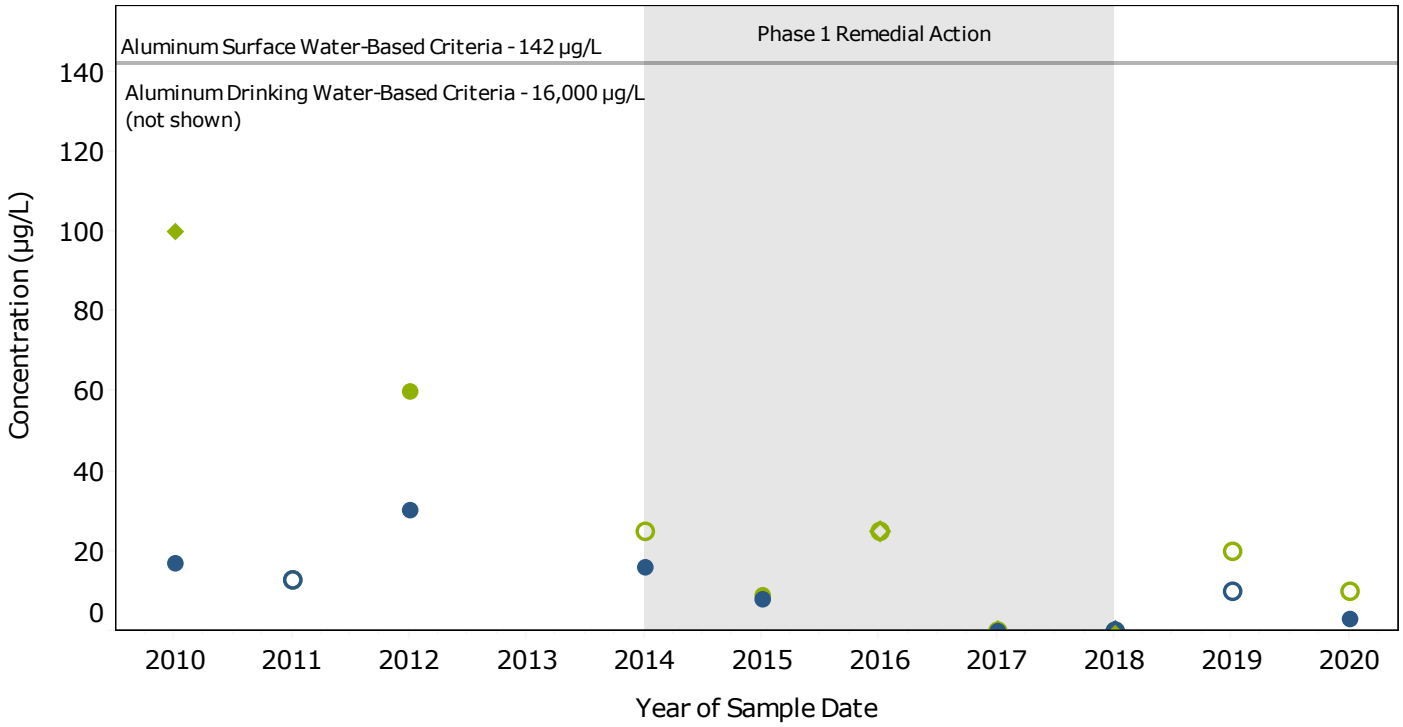
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

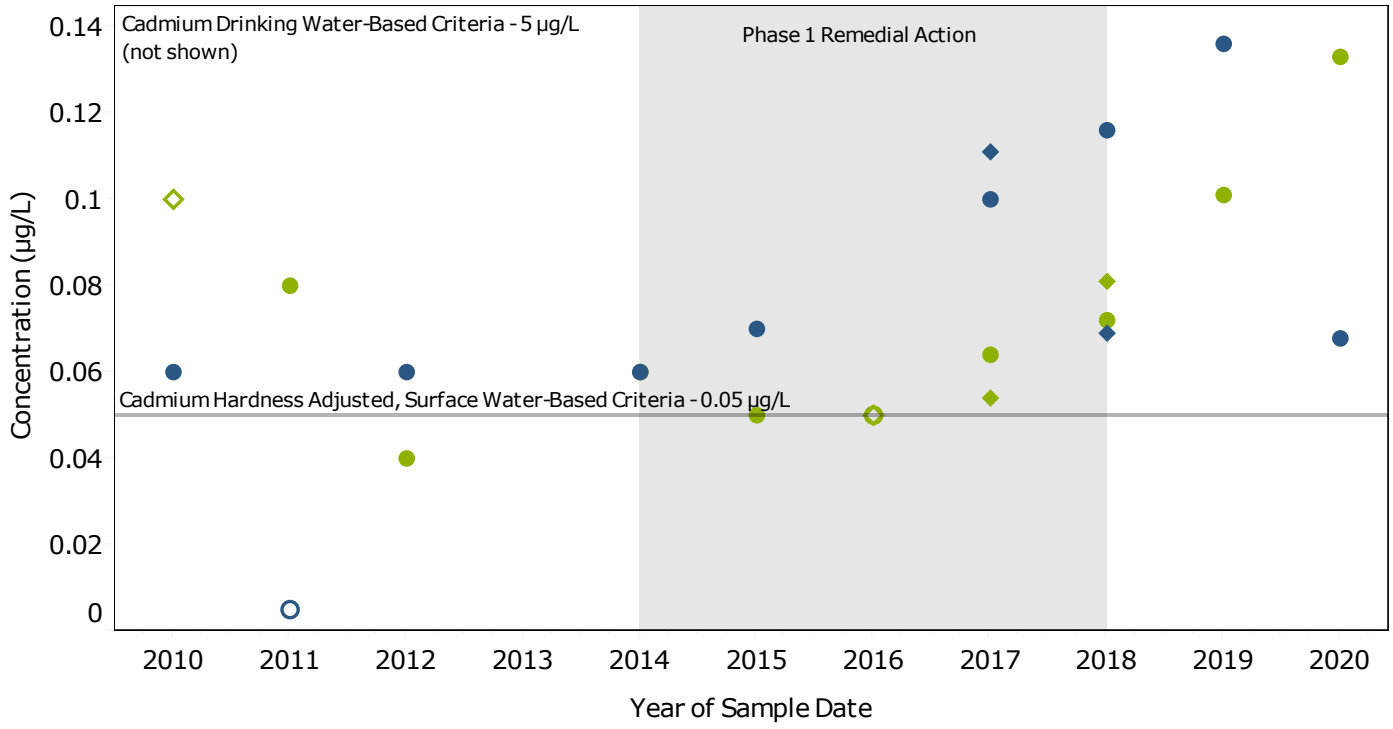
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

DS-9D, Aluminum



DS-9D, Cadmium



Legend

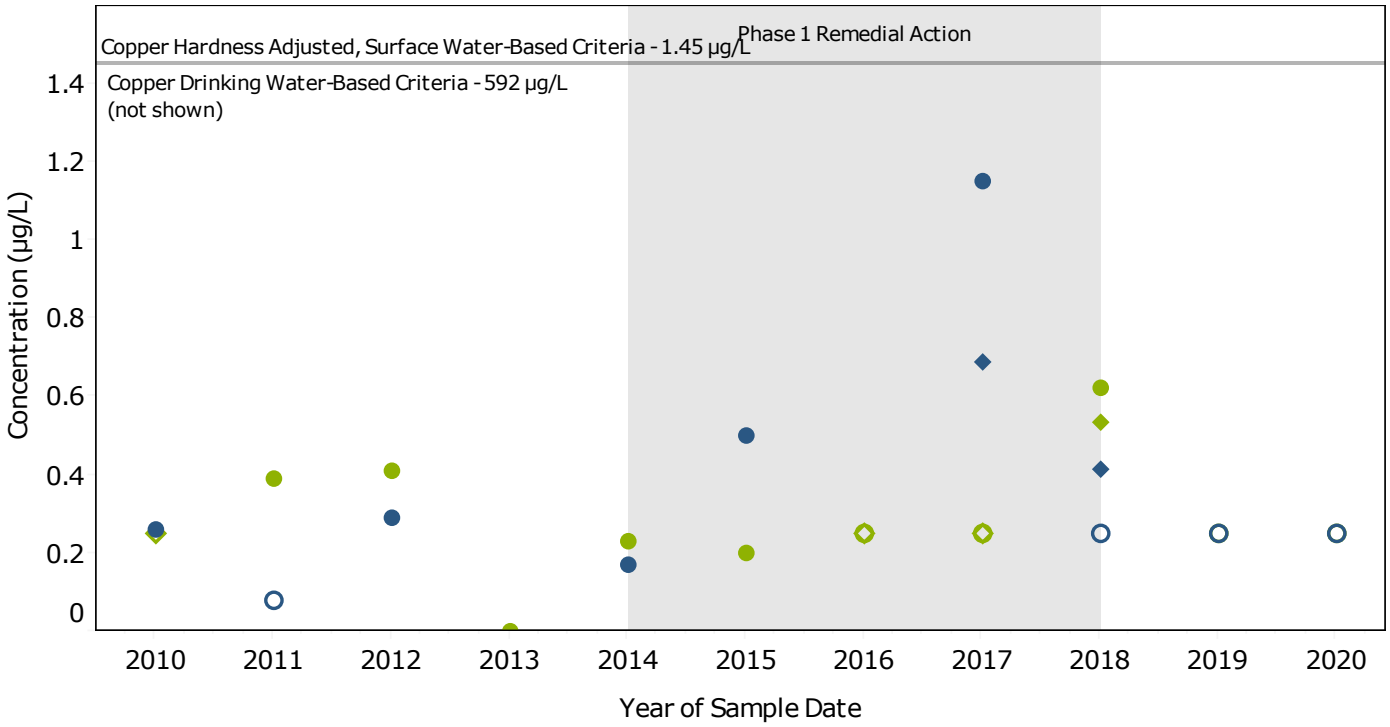
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

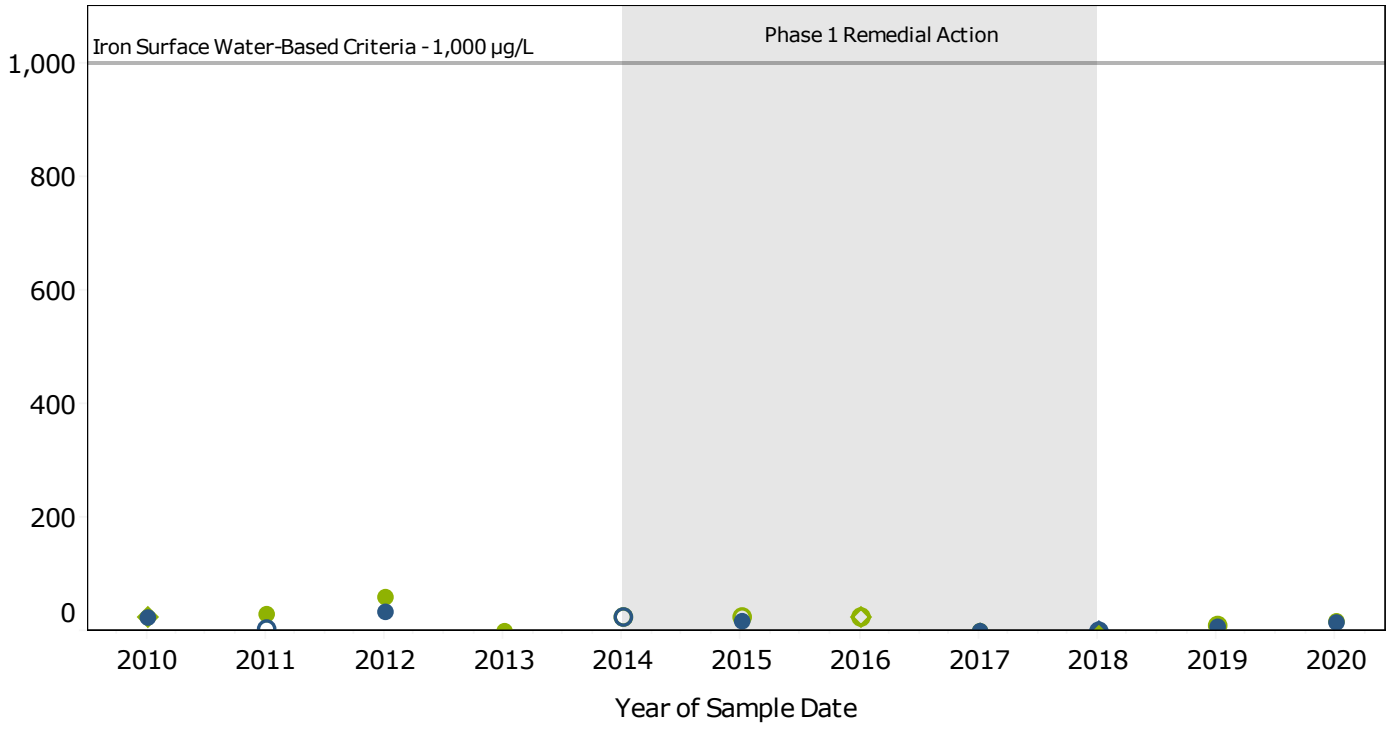
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

DS-9D, Copper



DS-9D, Iron



Legend

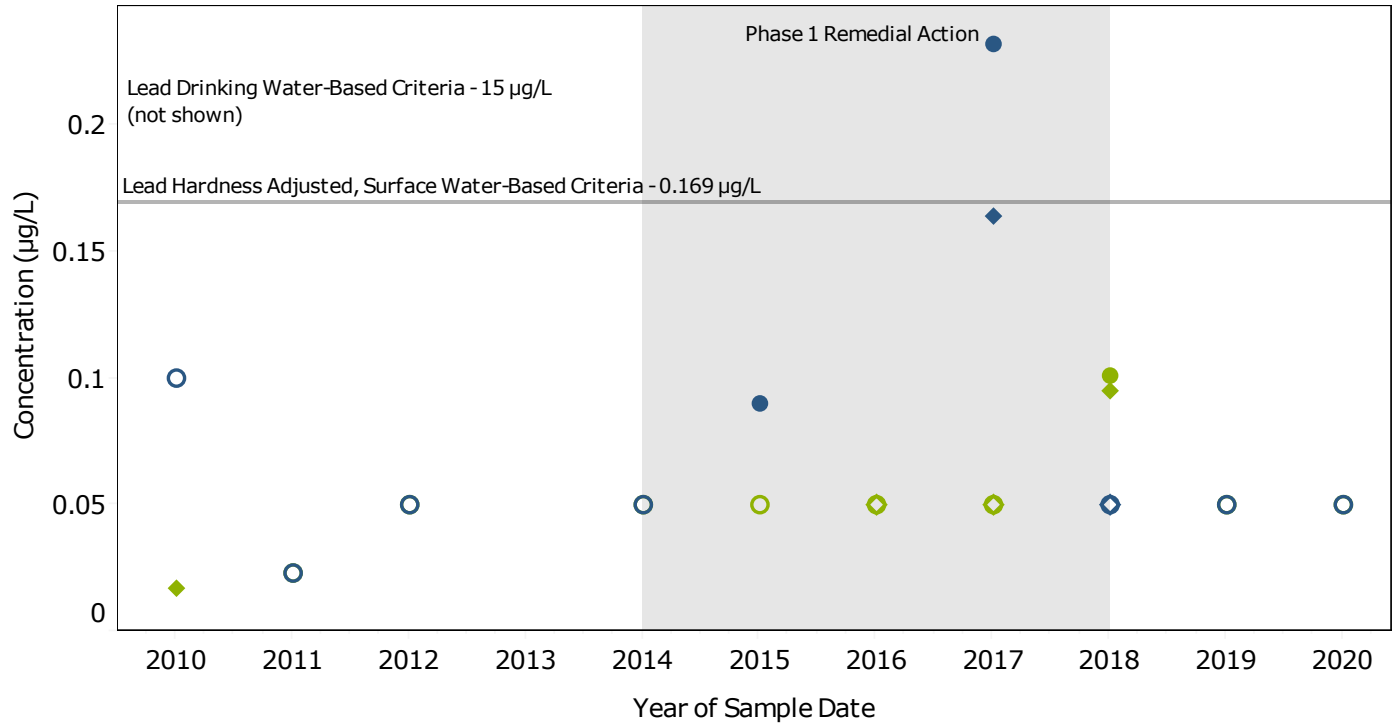
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

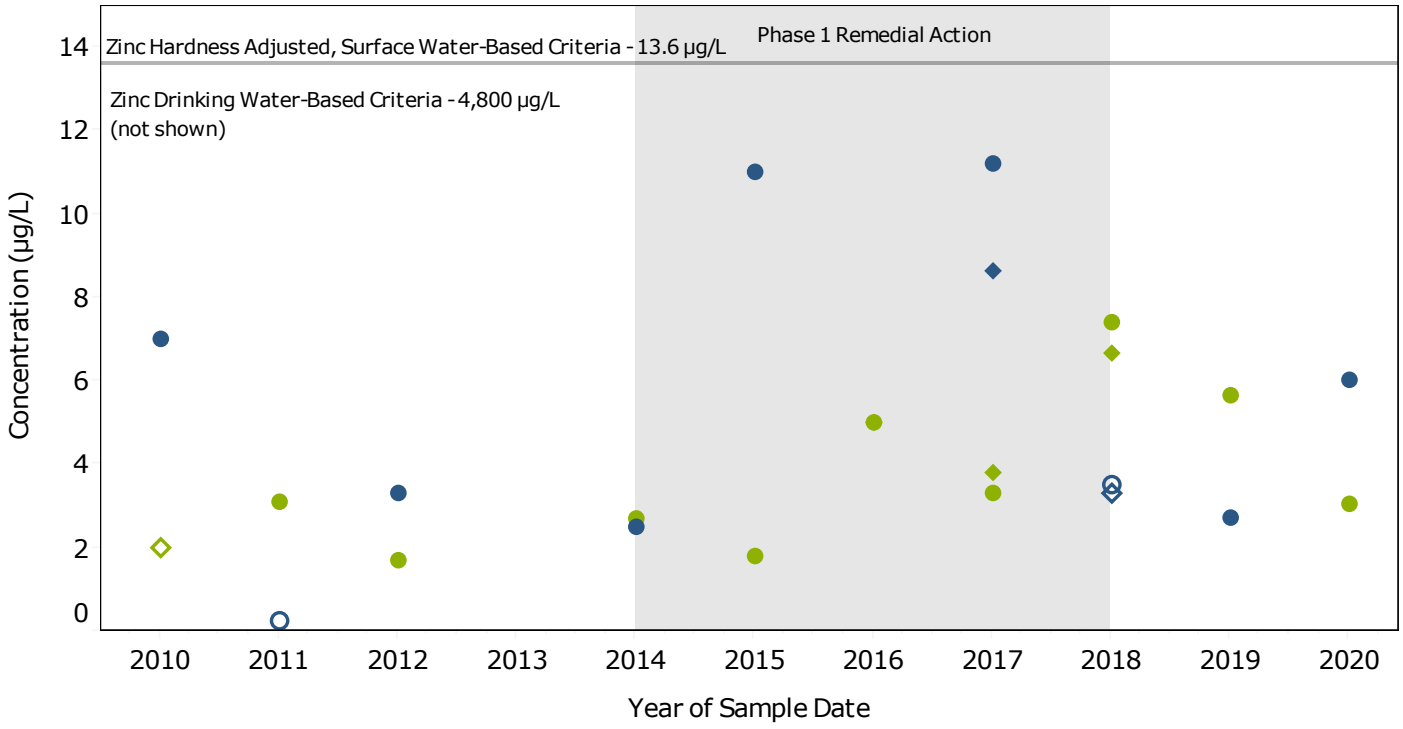
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

DS-9D, Lead



DS-9D, Zinc



Legend

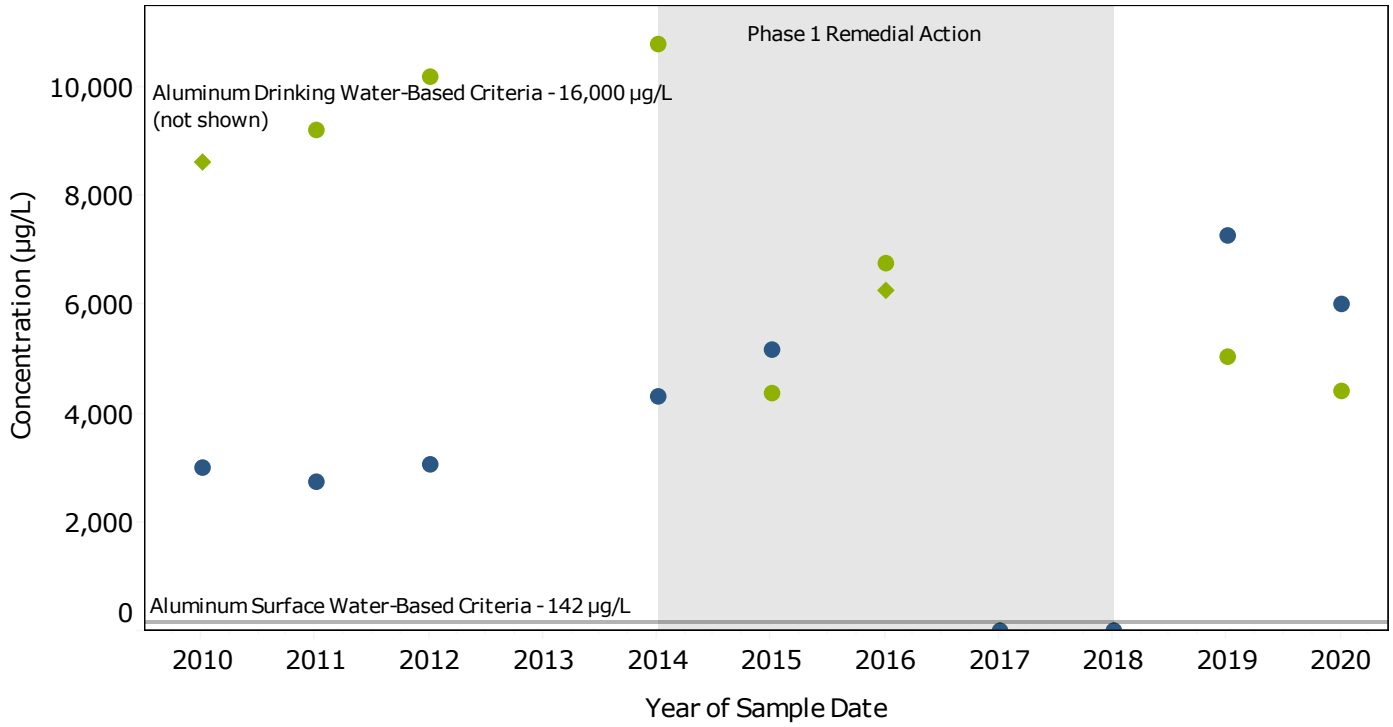
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

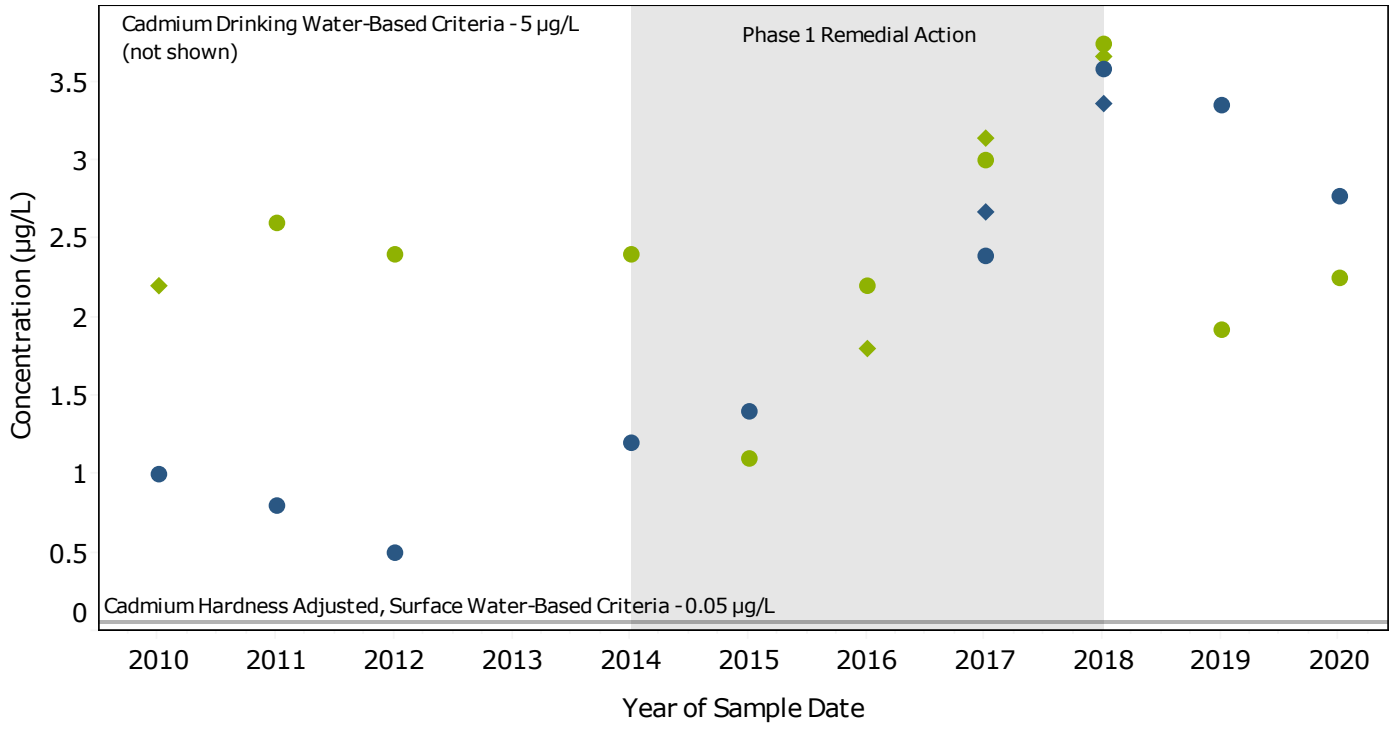
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

DS-9I, Aluminum



DS-9I, Cadmium



Legend

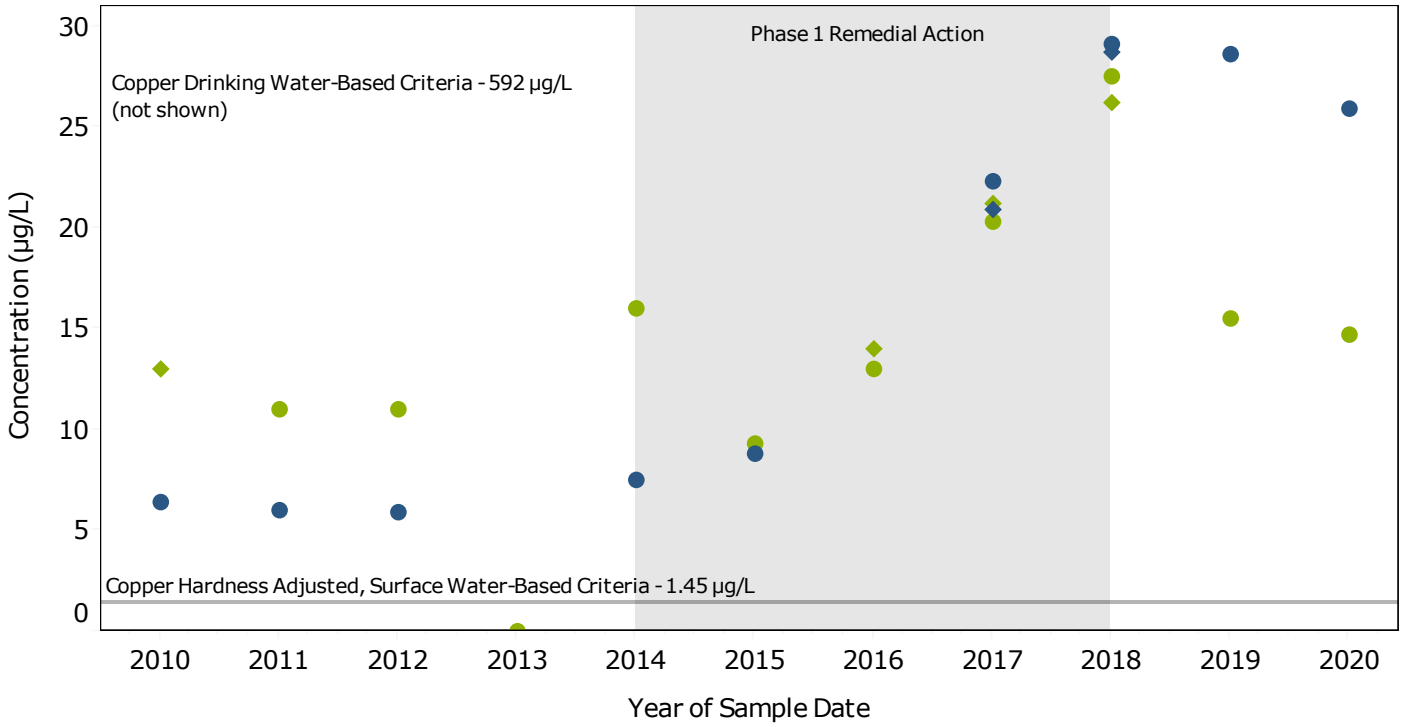
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

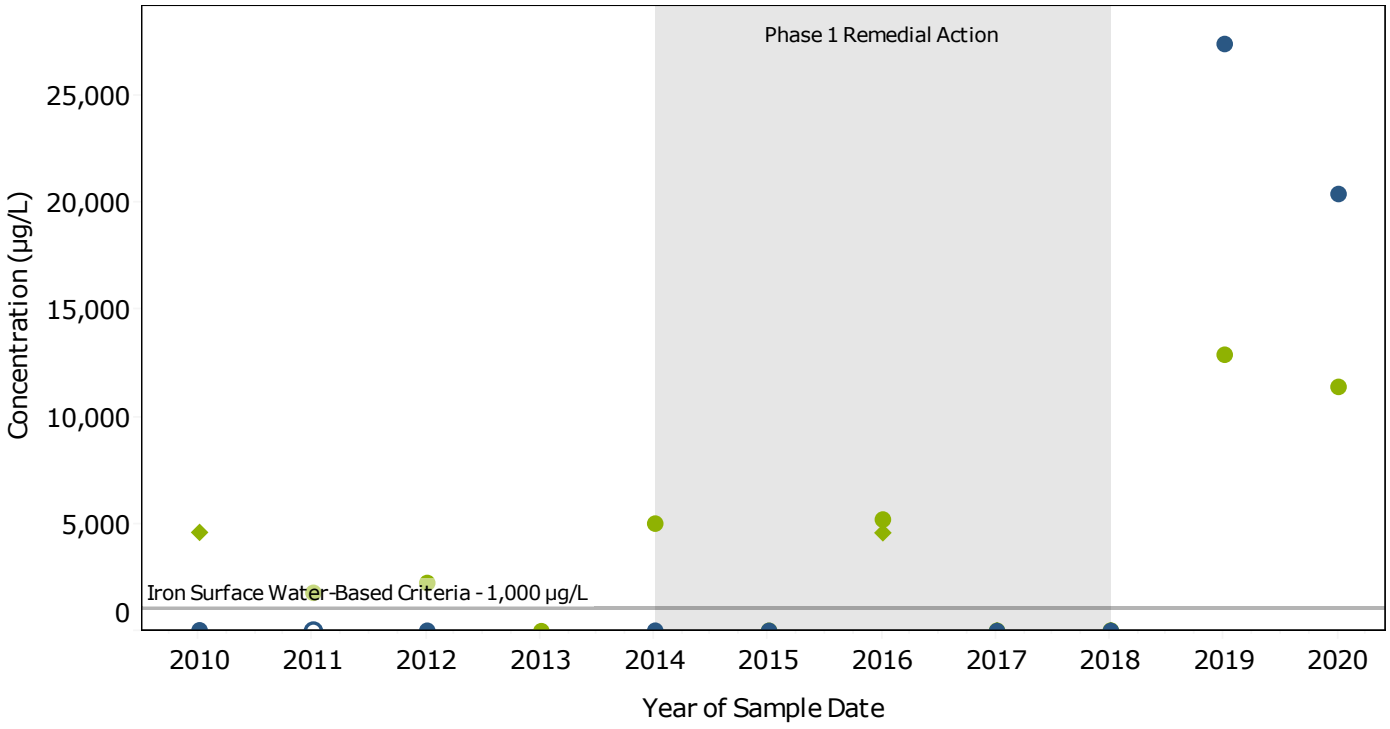
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

DS-9I, Copper



DS-9I, Iron



Legend

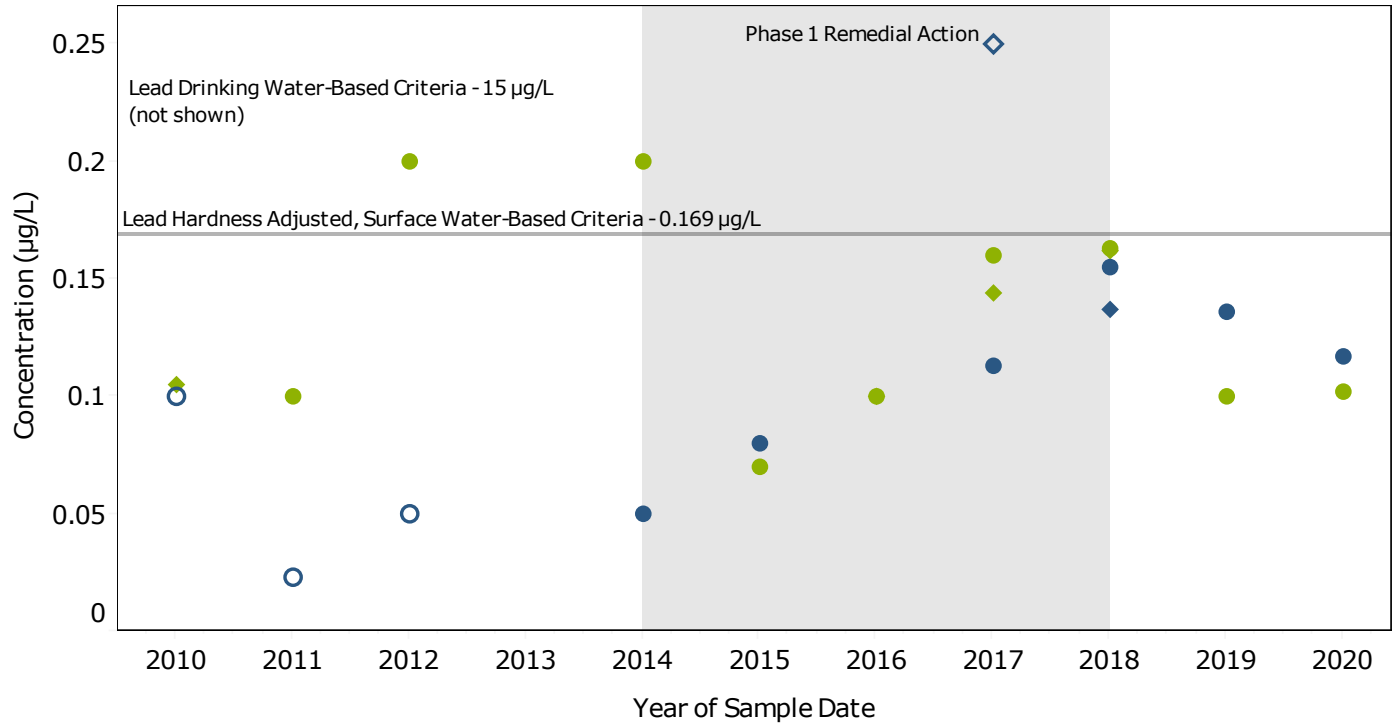
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

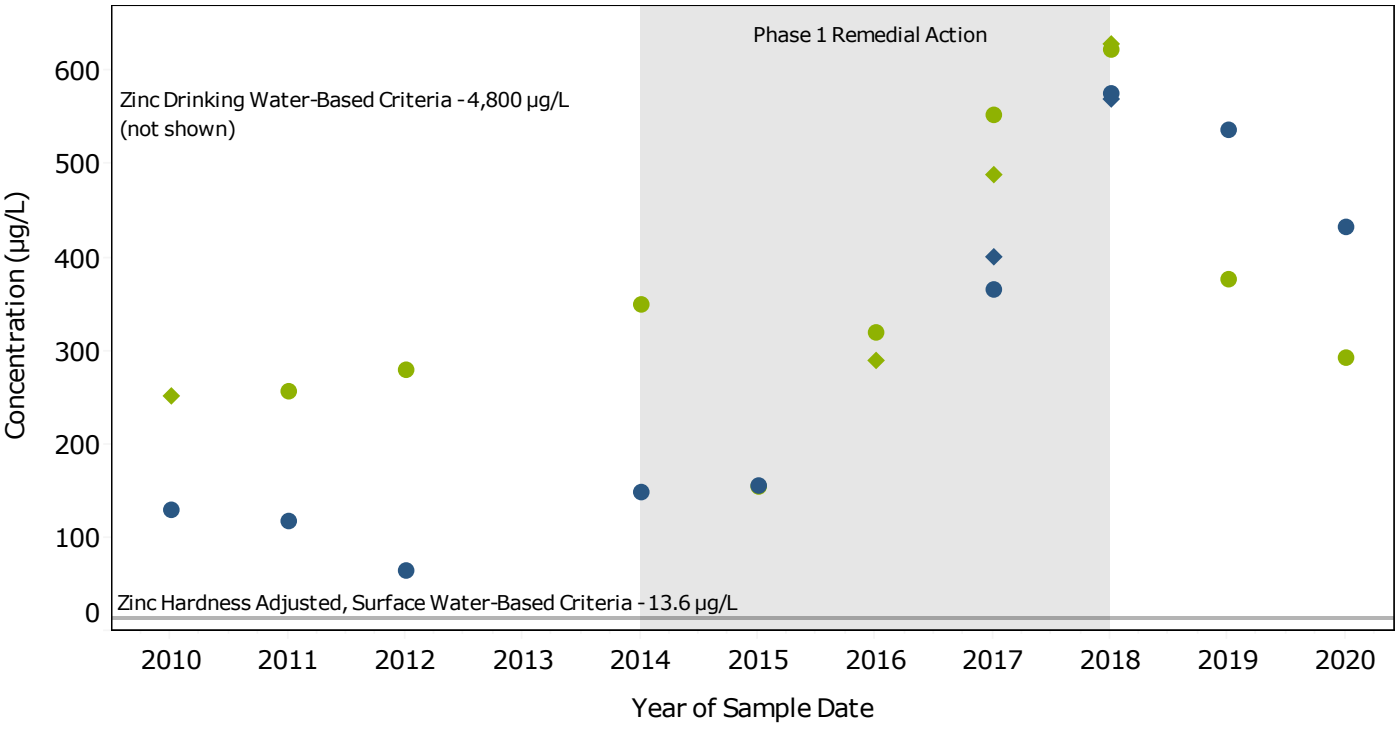
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

DS-9I, Lead



DS-9I, Zinc



Legend

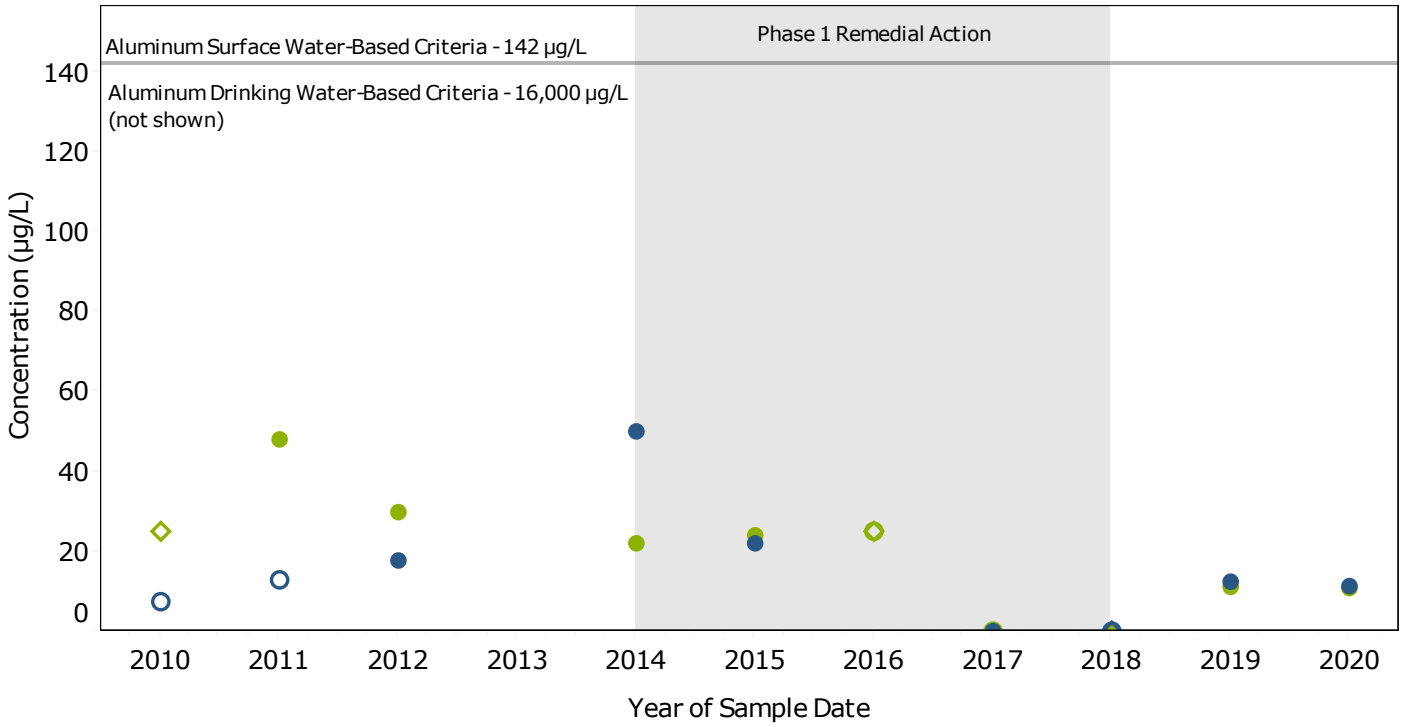
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

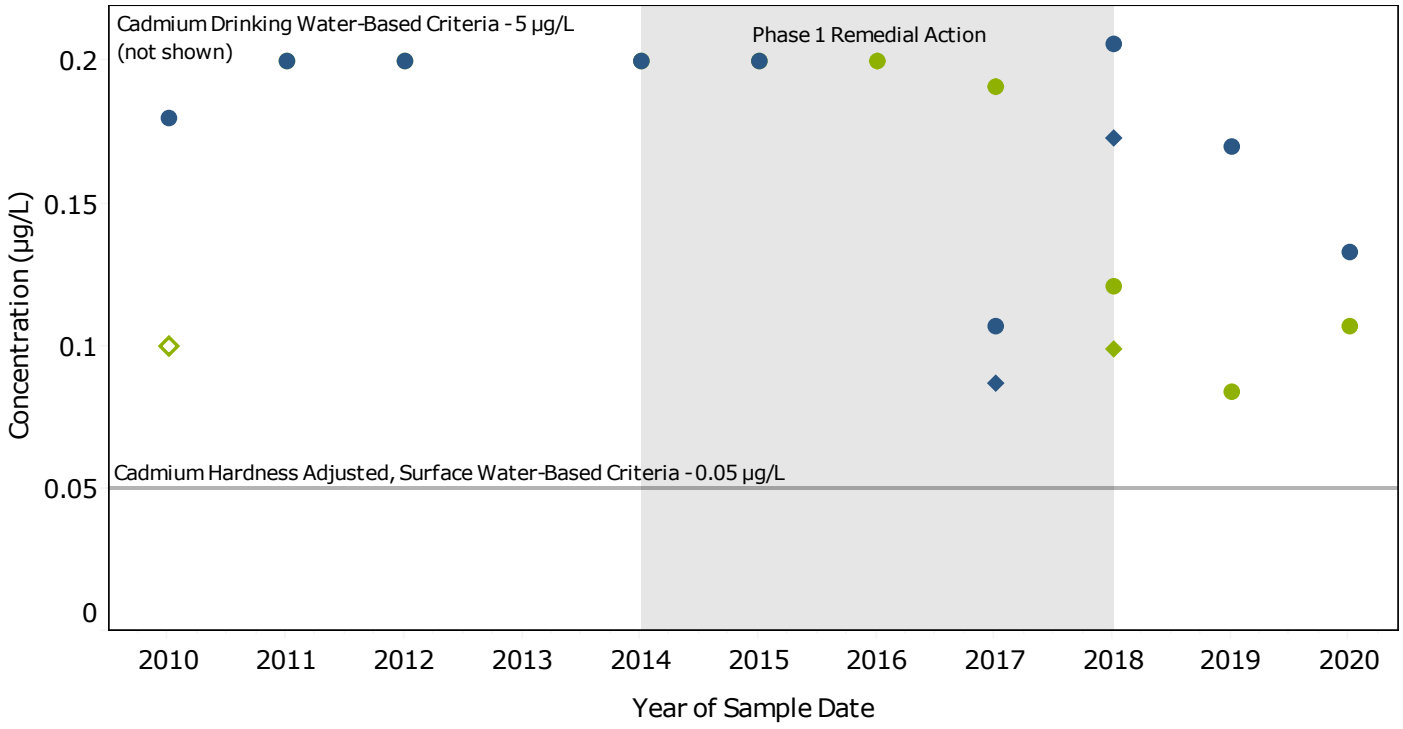
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

DS-9S, Aluminum



DS-9S, Cadmium



Legend

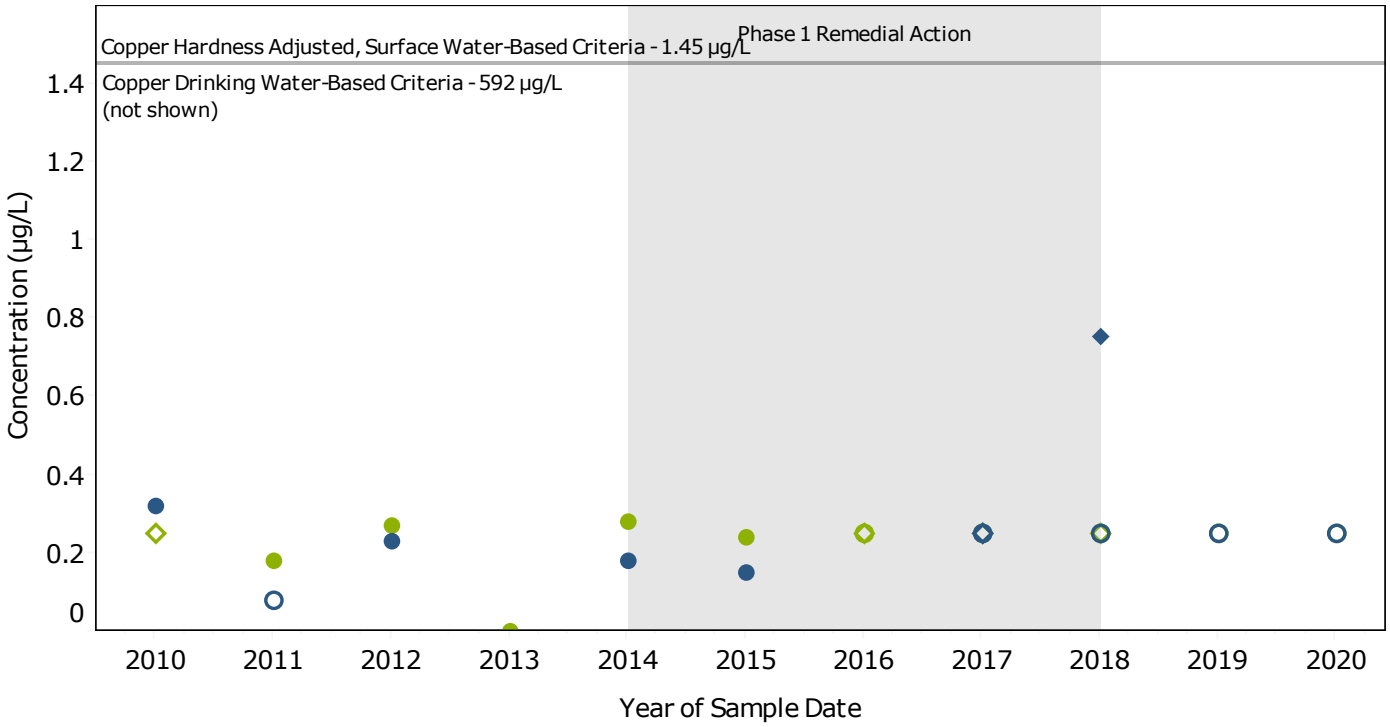
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

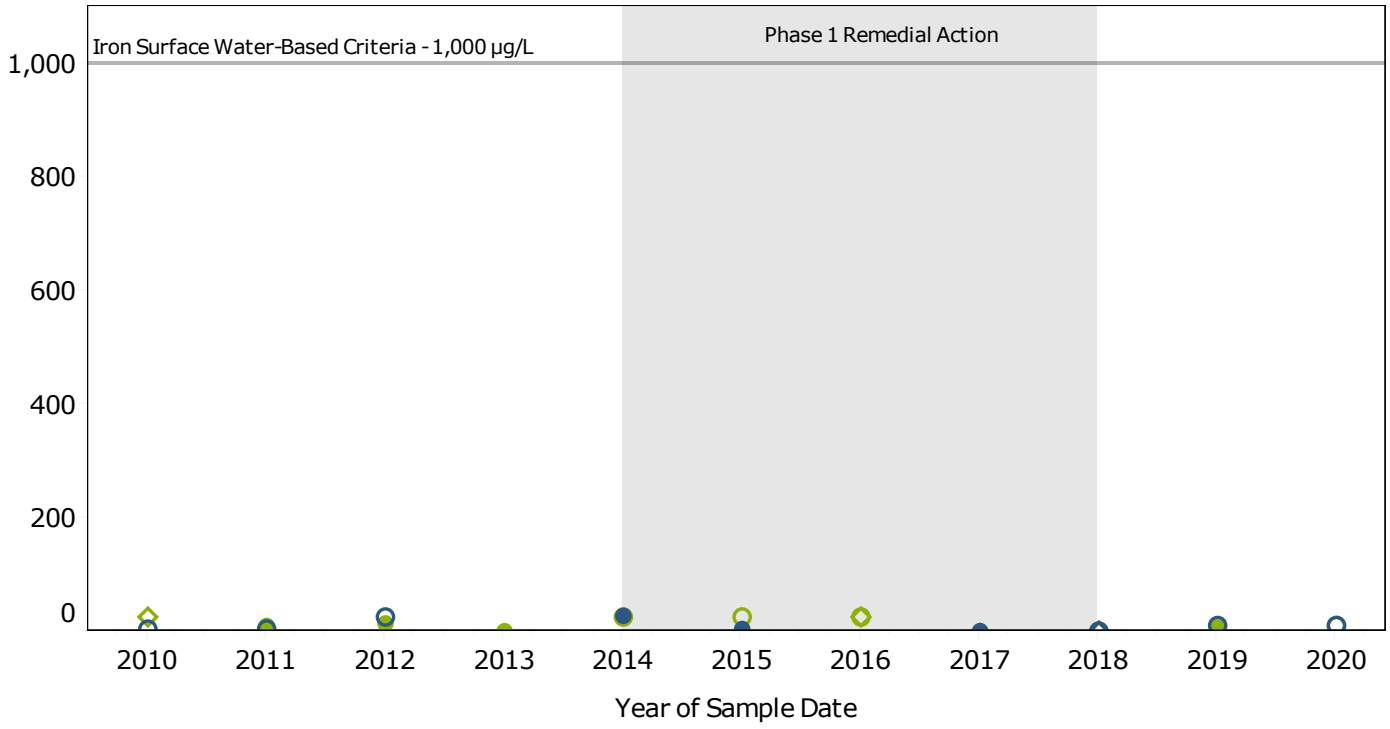
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

DS-9S, Copper



DS-9S, Iron



Legend

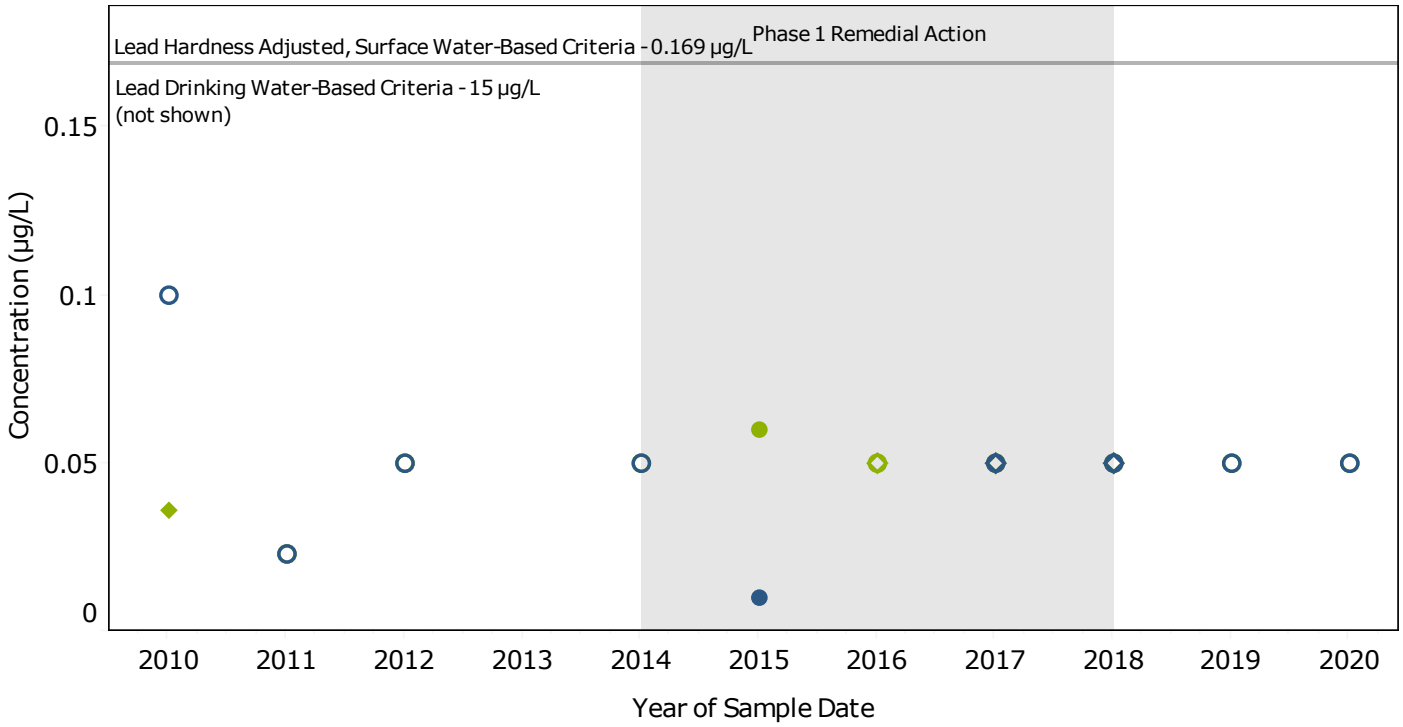
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

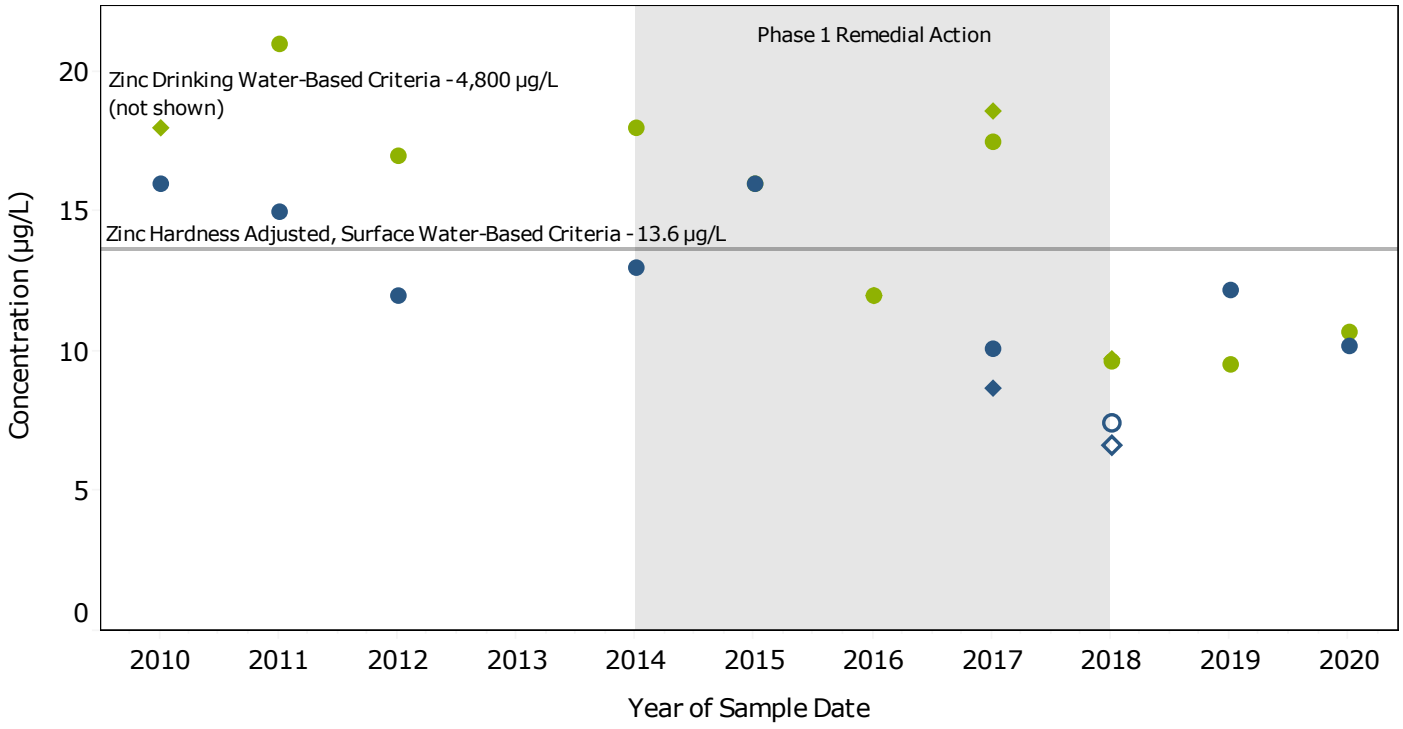
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

DS-9S, Lead



DS-9S, Zinc



Legend

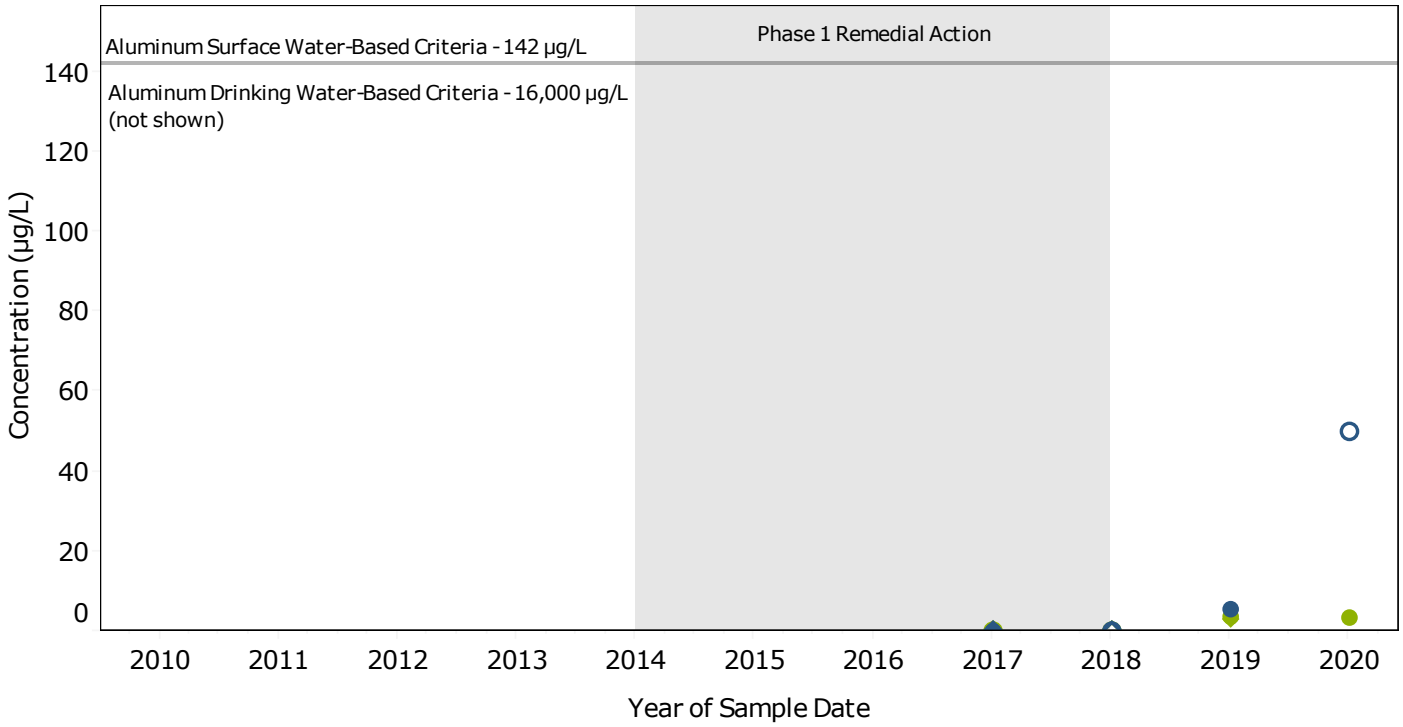
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

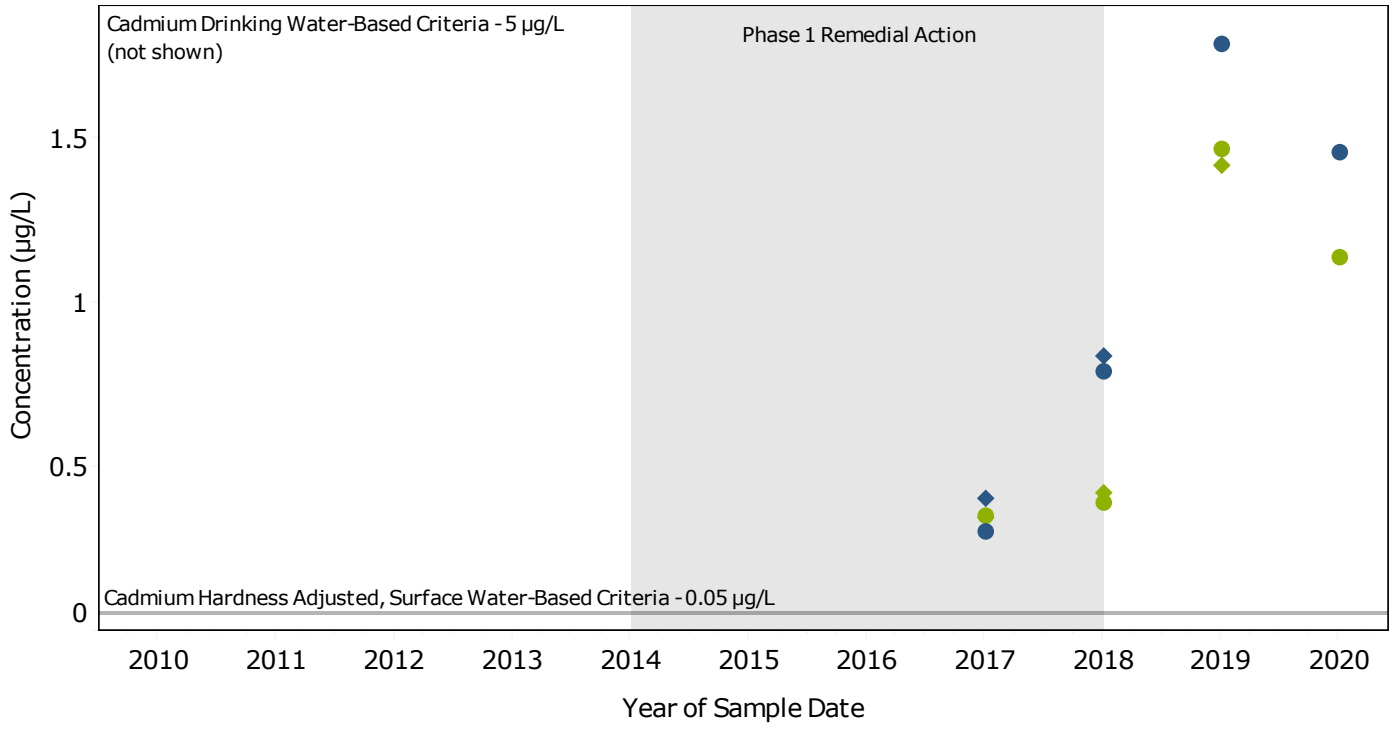
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

DS-12D, Aluminum



DS-12D, Cadmium



Legend

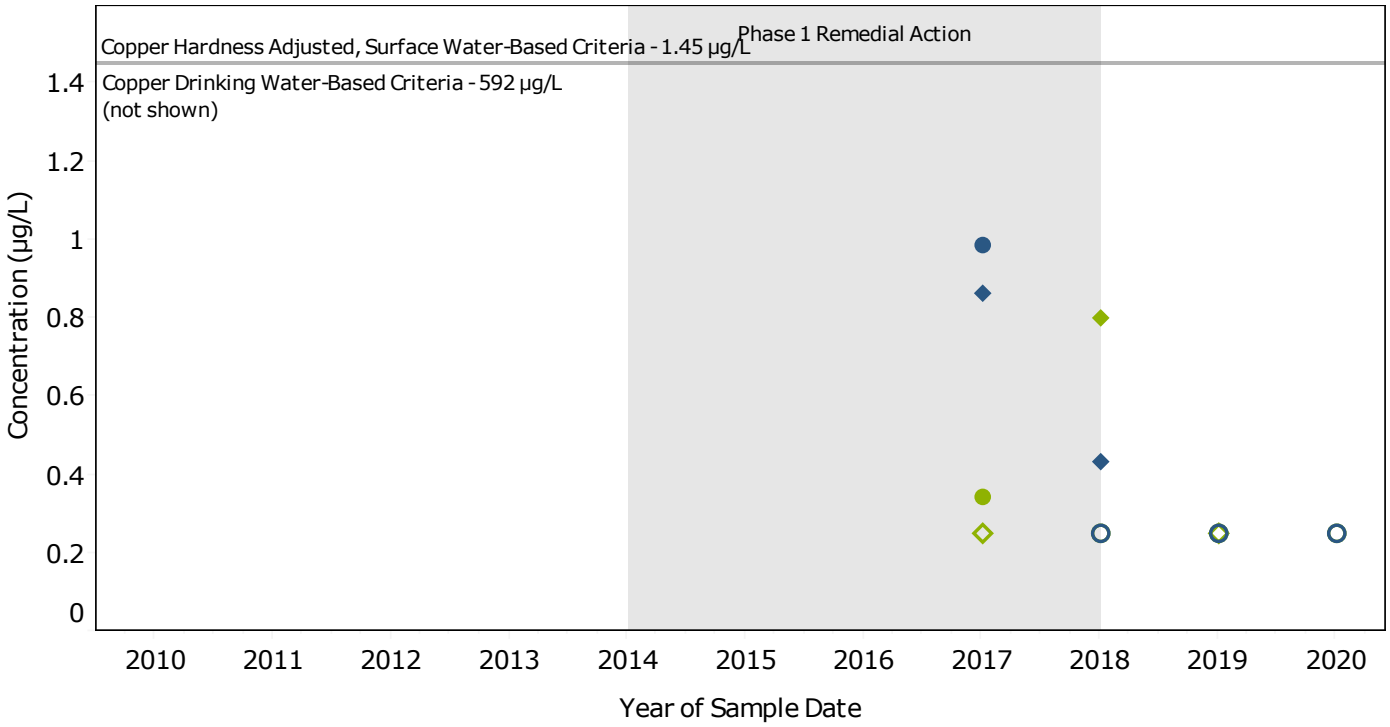
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

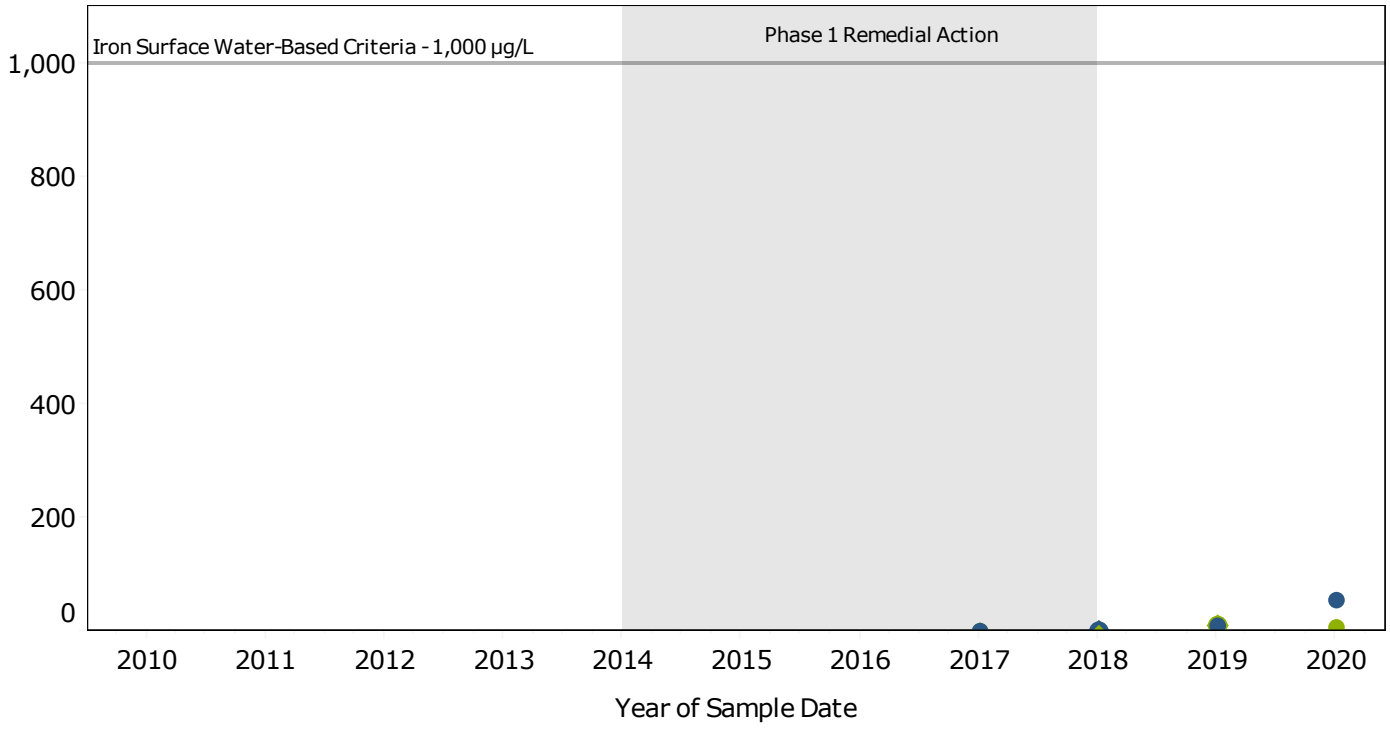
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

DS-12D, Copper



DS-12D, Iron



Legend

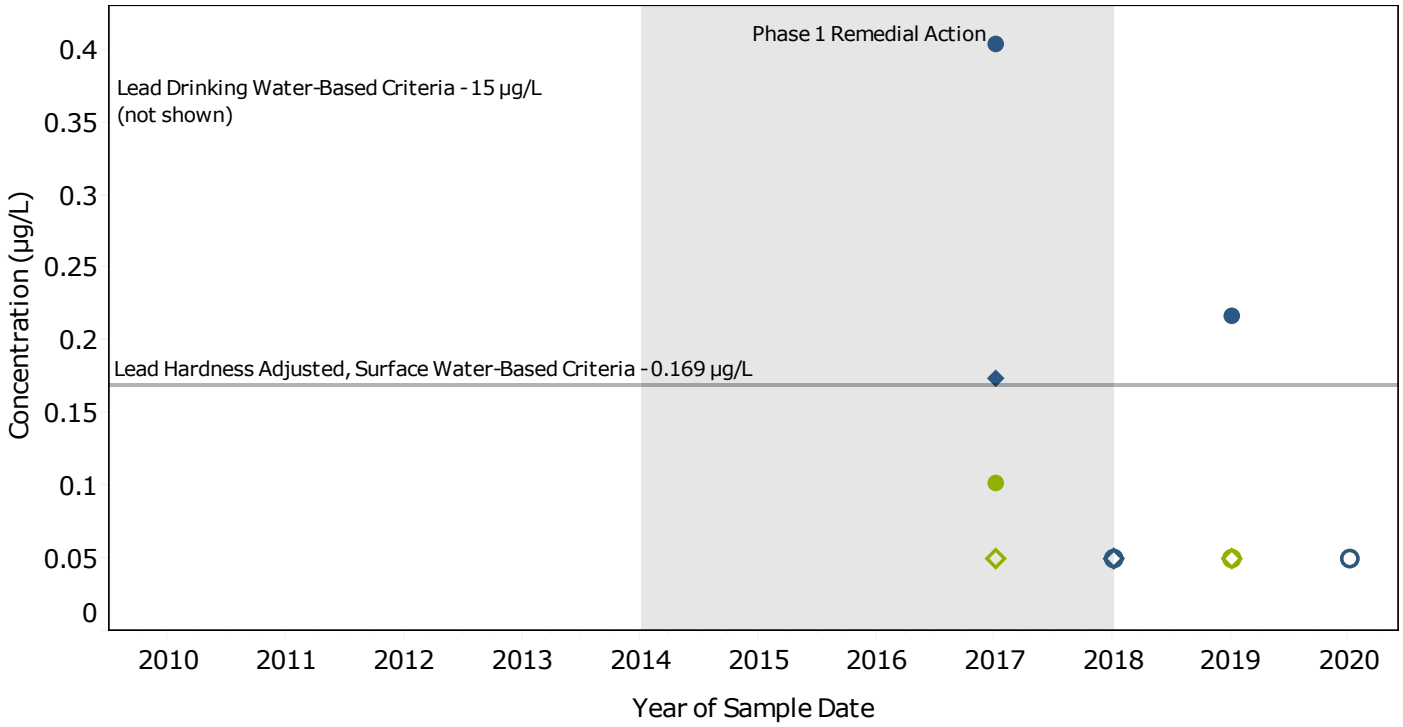
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

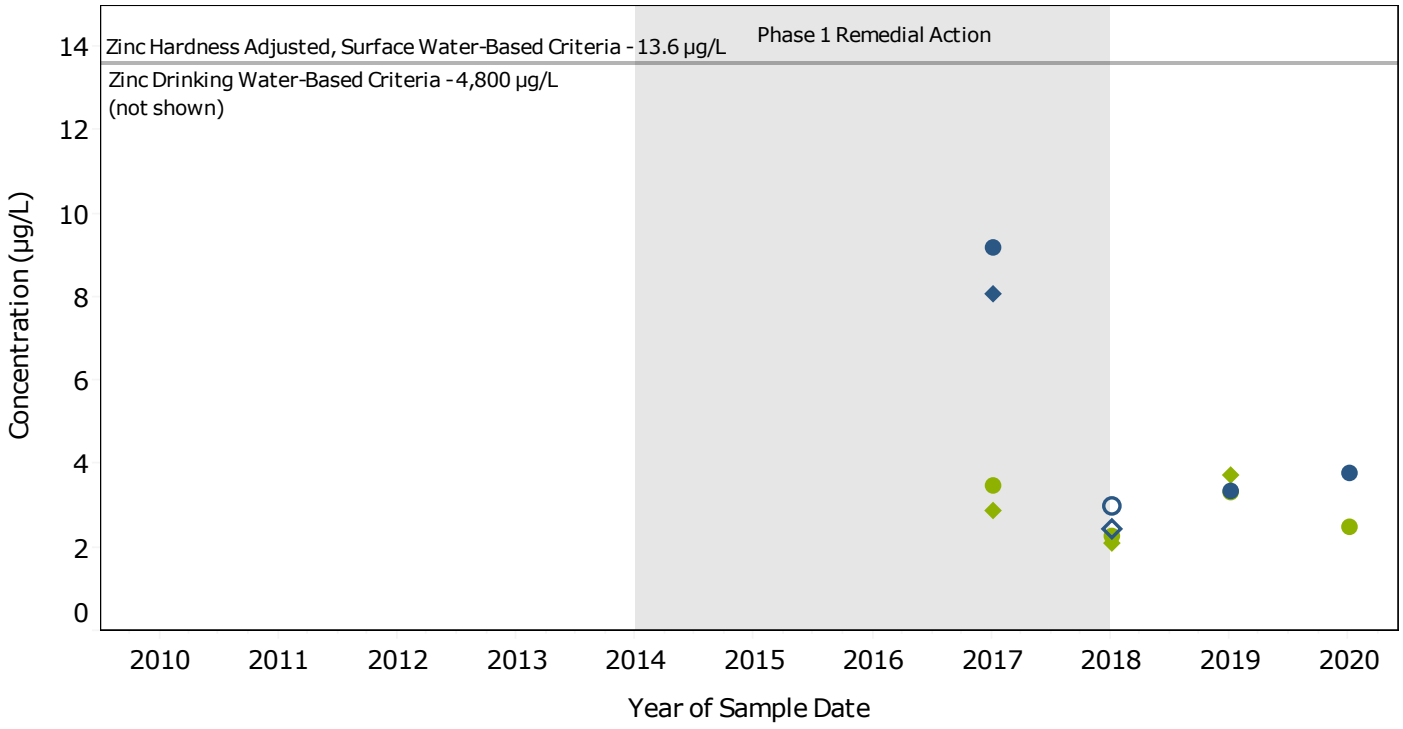
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

DS-12D, Lead



DS-12D, Zinc



Legend

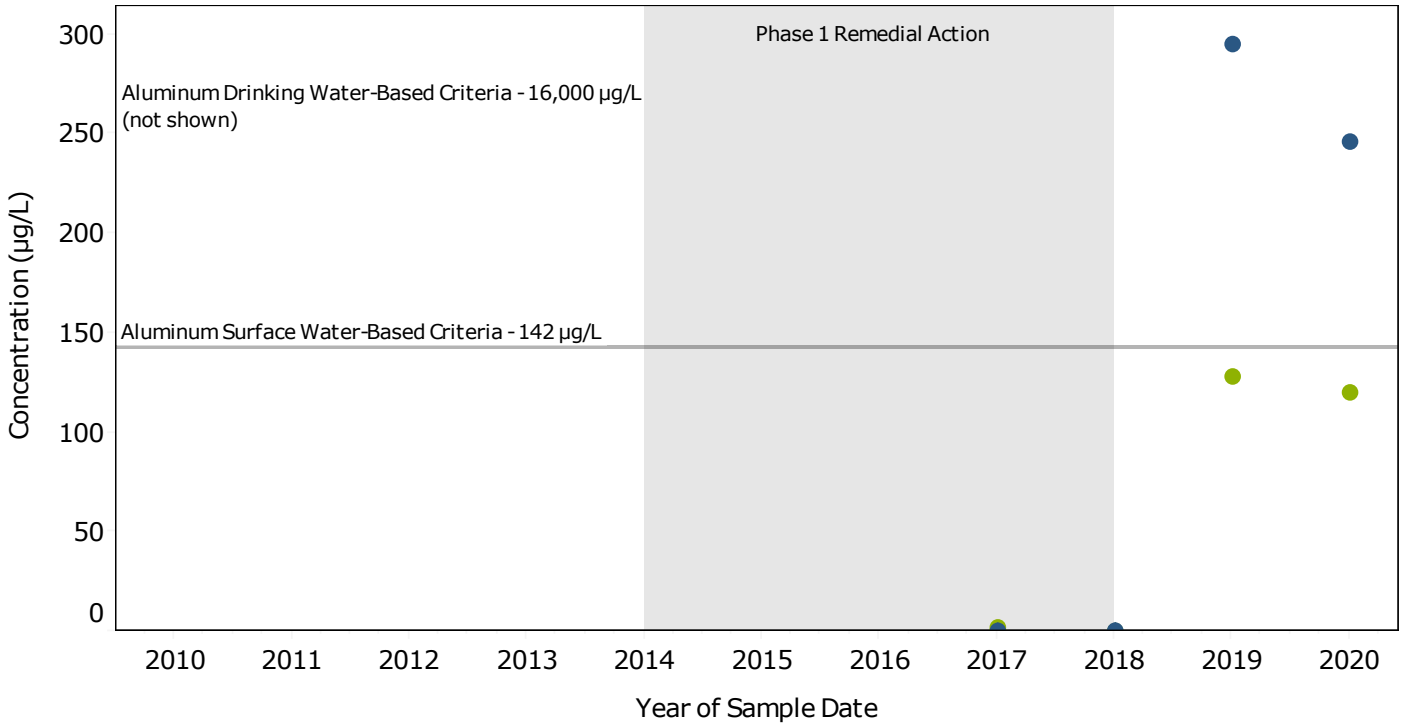
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

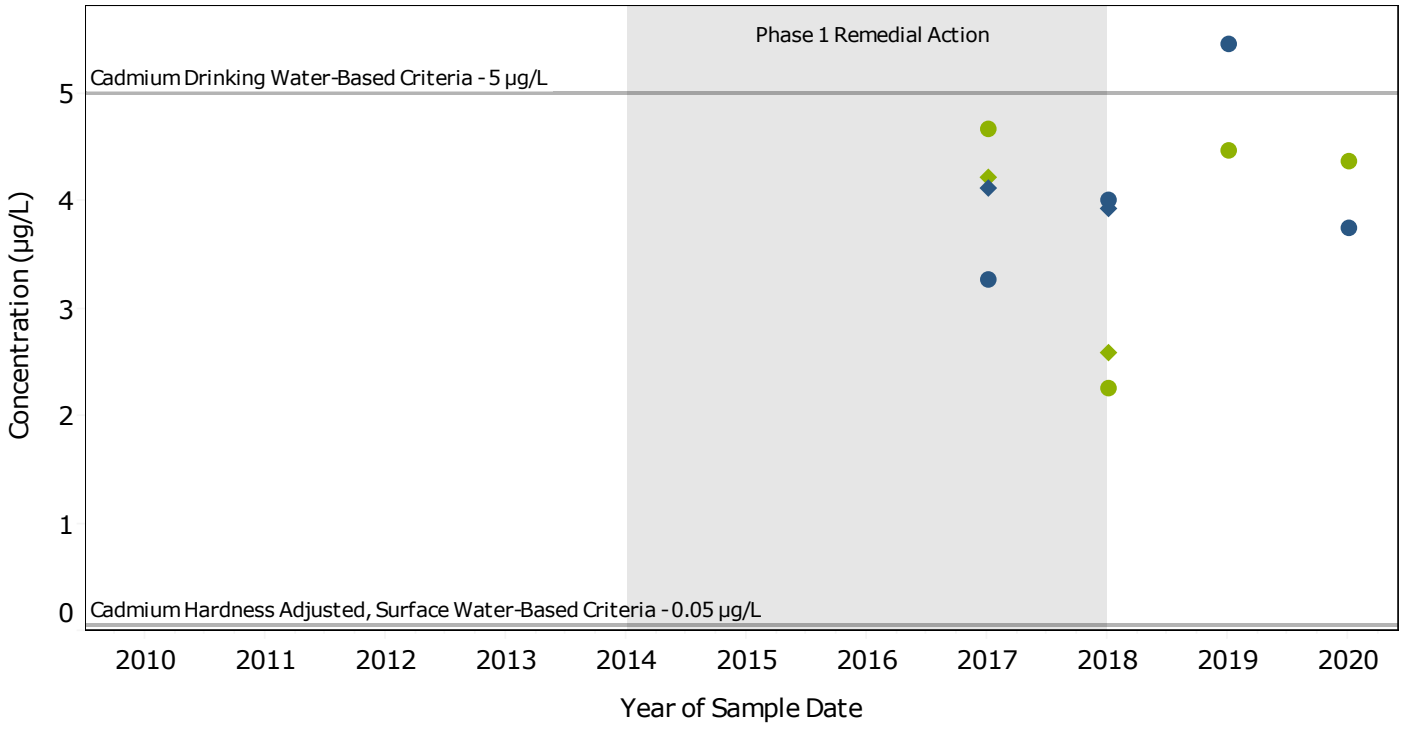
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

DS-12I, Aluminum



DS-12I, Cadmium



Legend

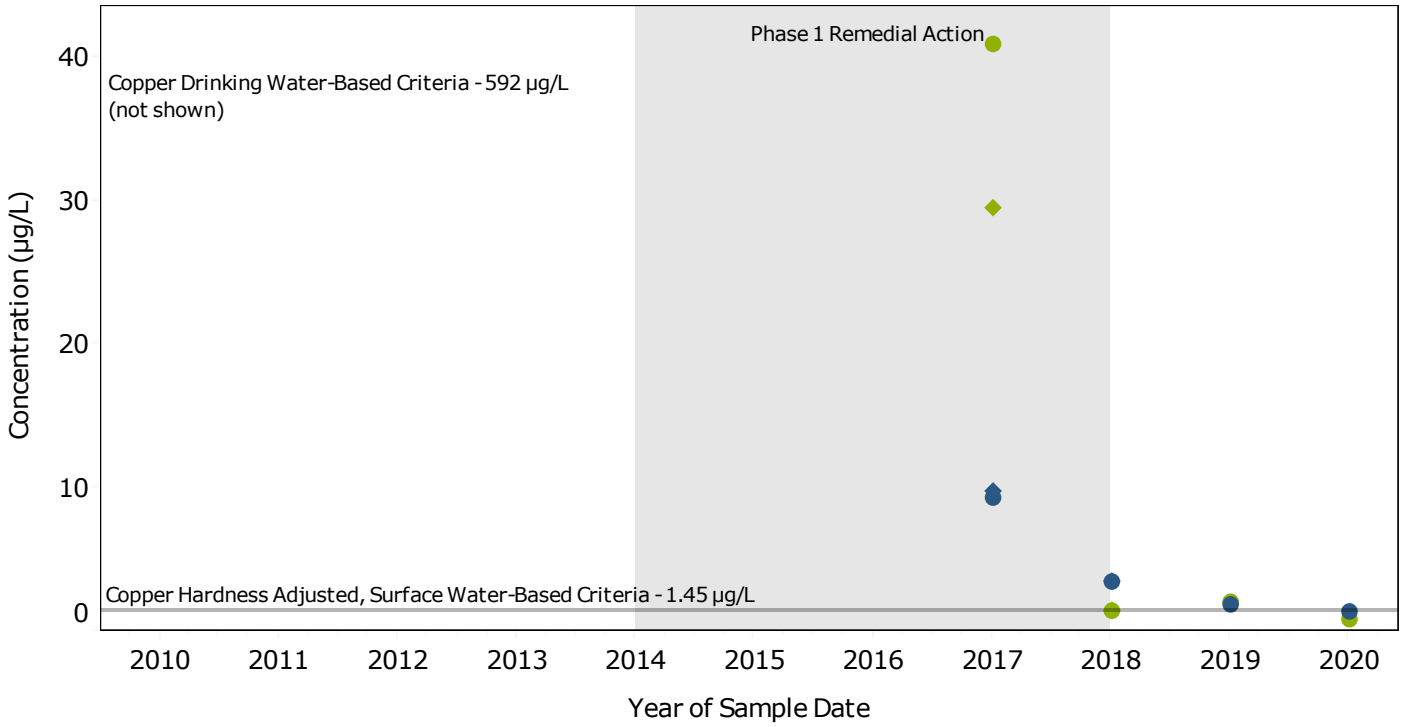
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

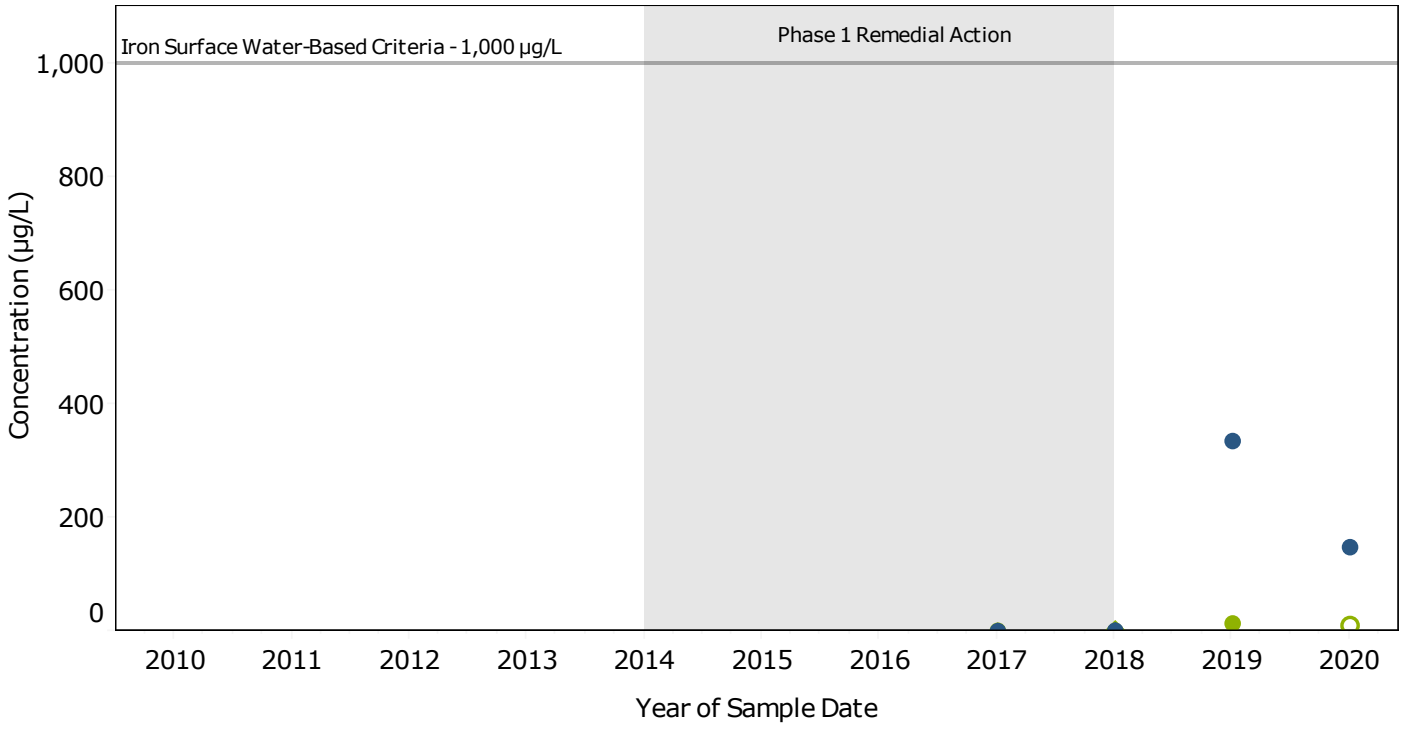
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

DS-12I, Copper



DS-12I, Iron



Legend

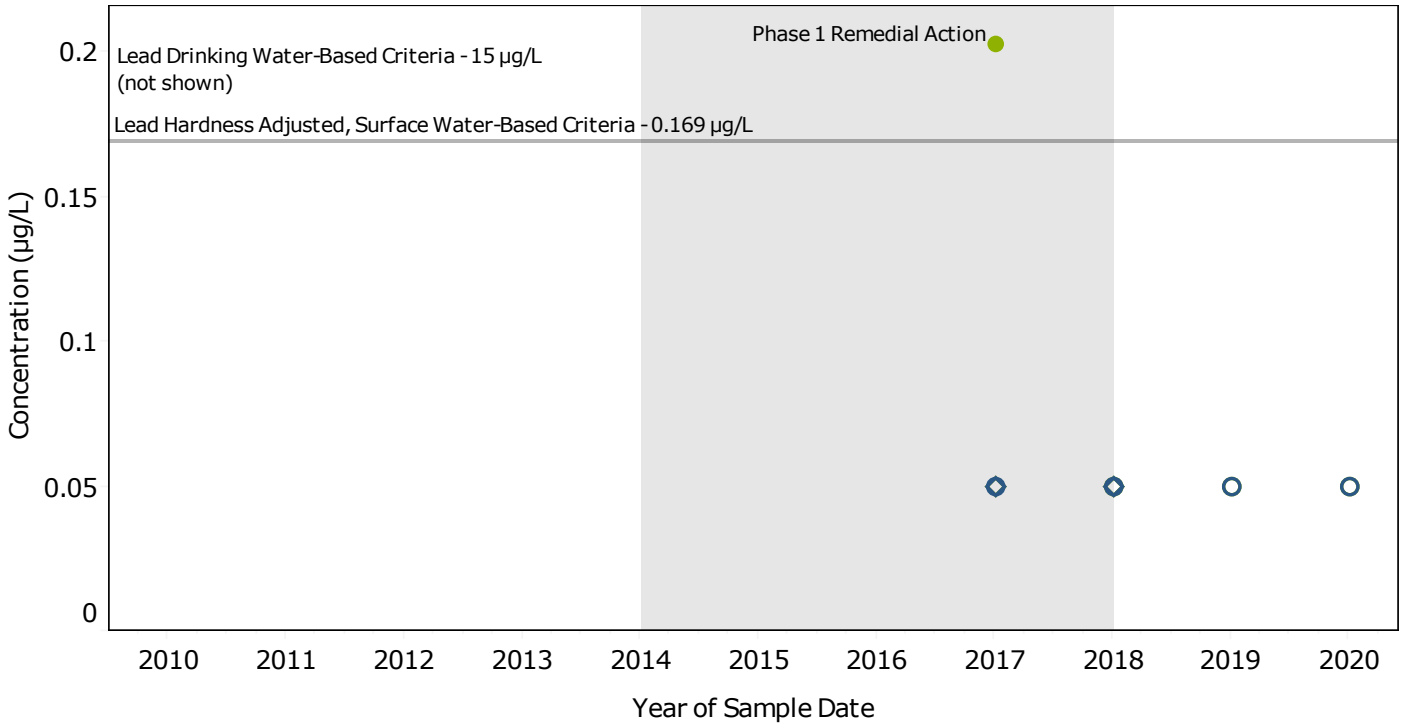
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

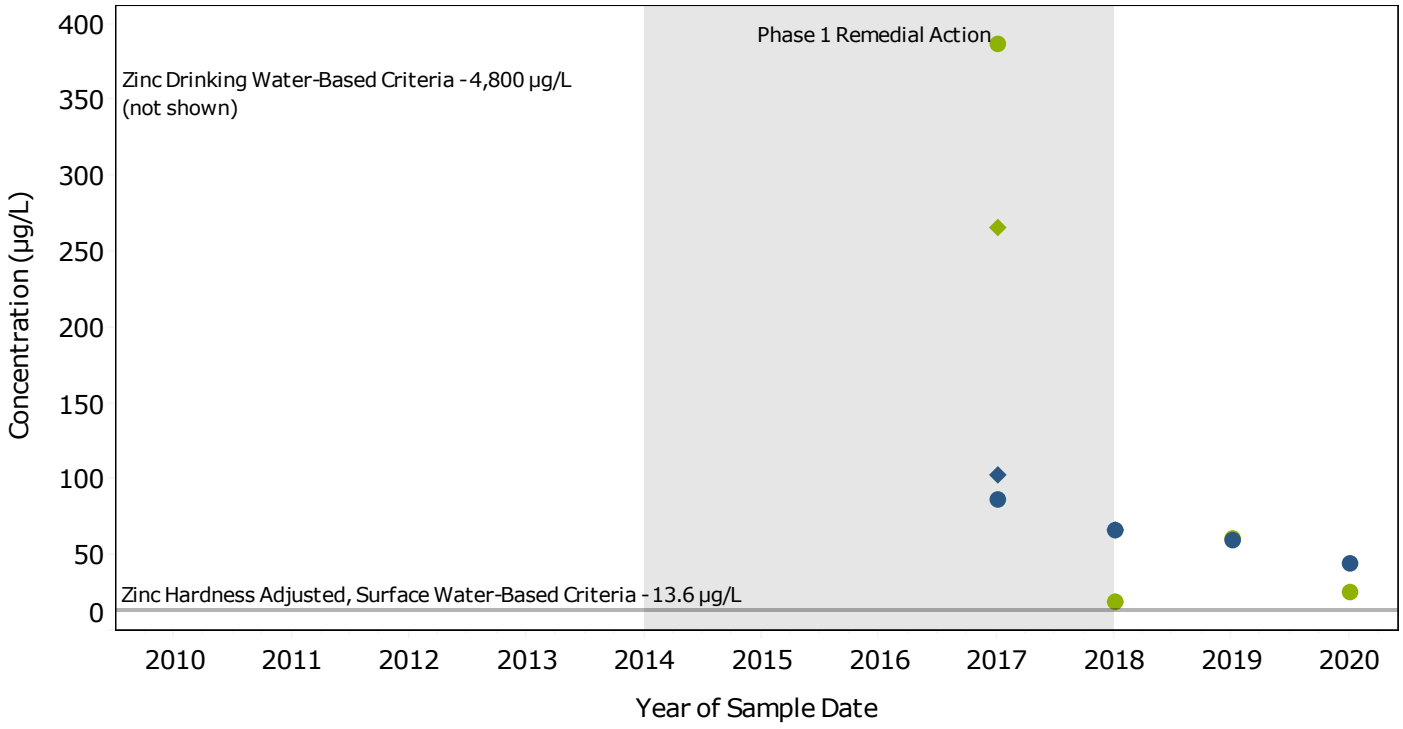
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

DS-12I, Lead



DS-12I, Zinc



Legend

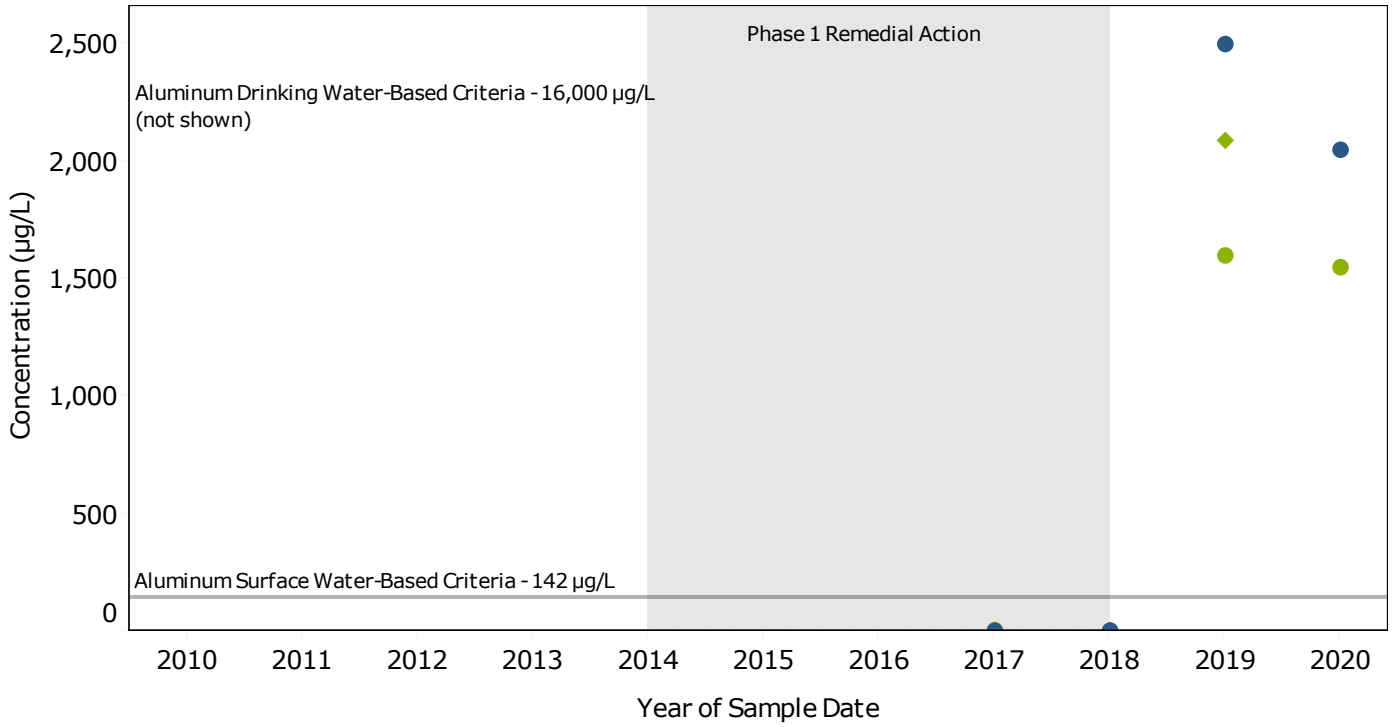
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

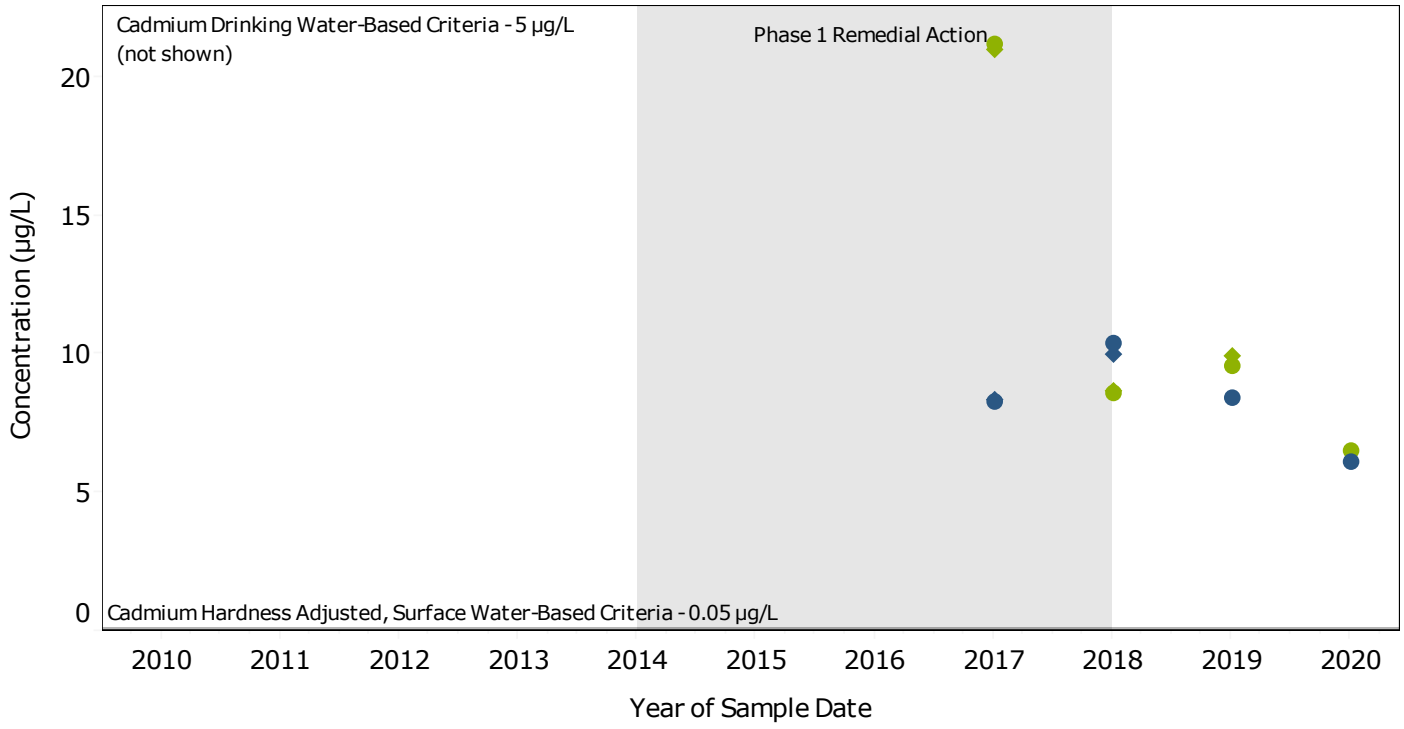
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

DS-12S, Aluminum



DS-12S, Cadmium



Legend

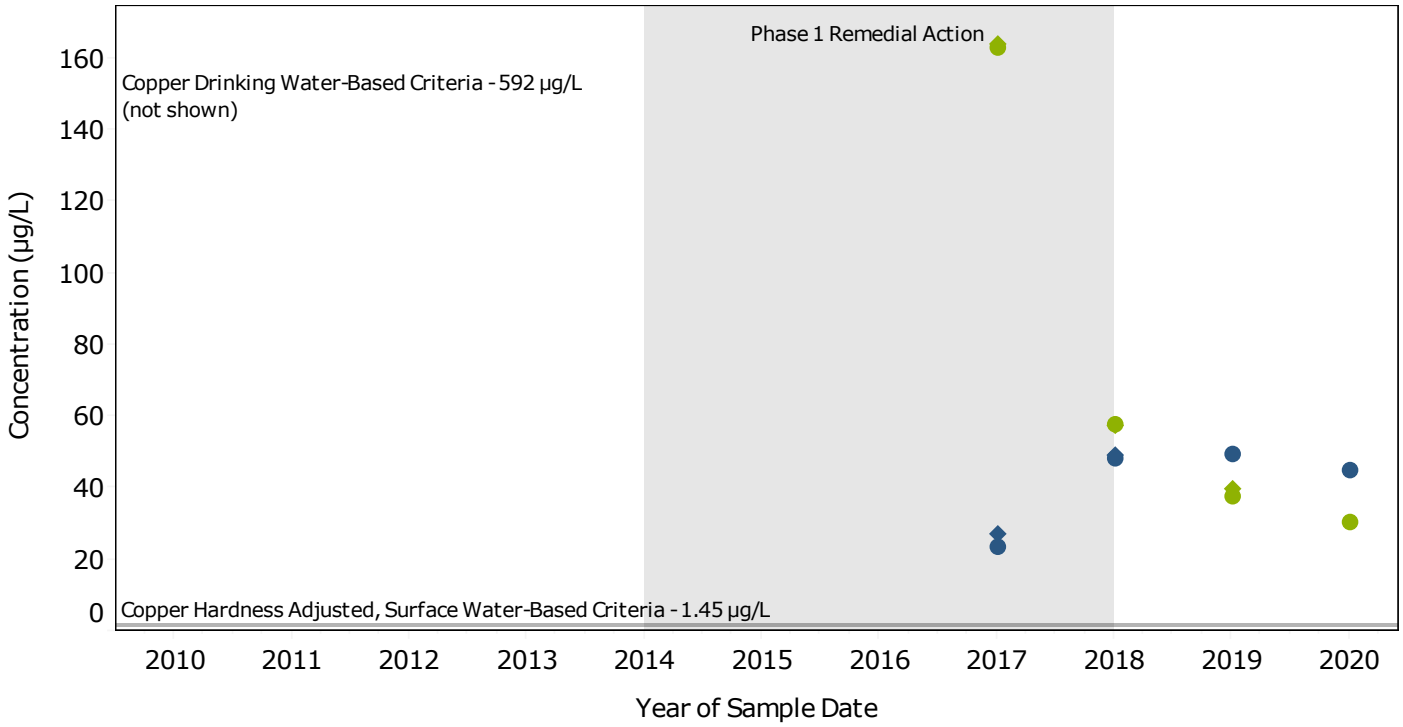
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

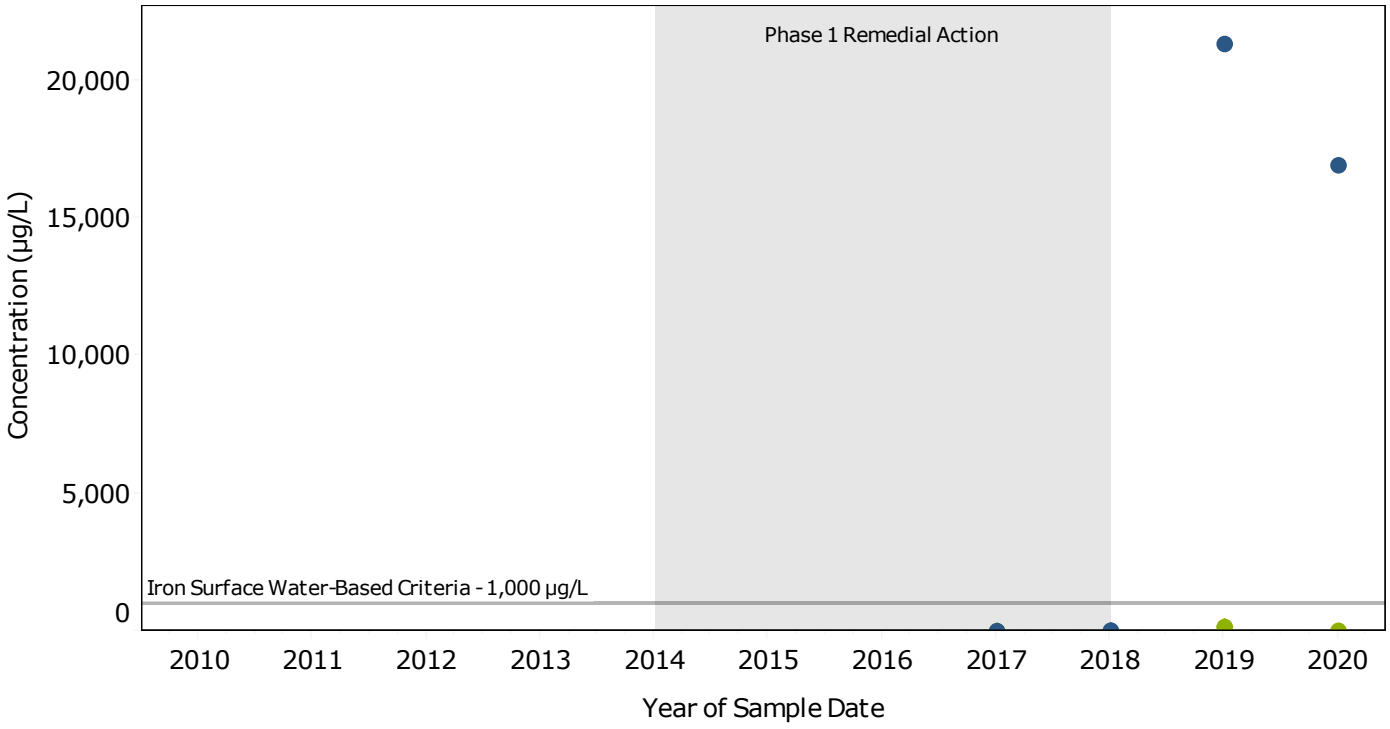
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

DS-12S, Copper



DS-12S, Iron



Legend

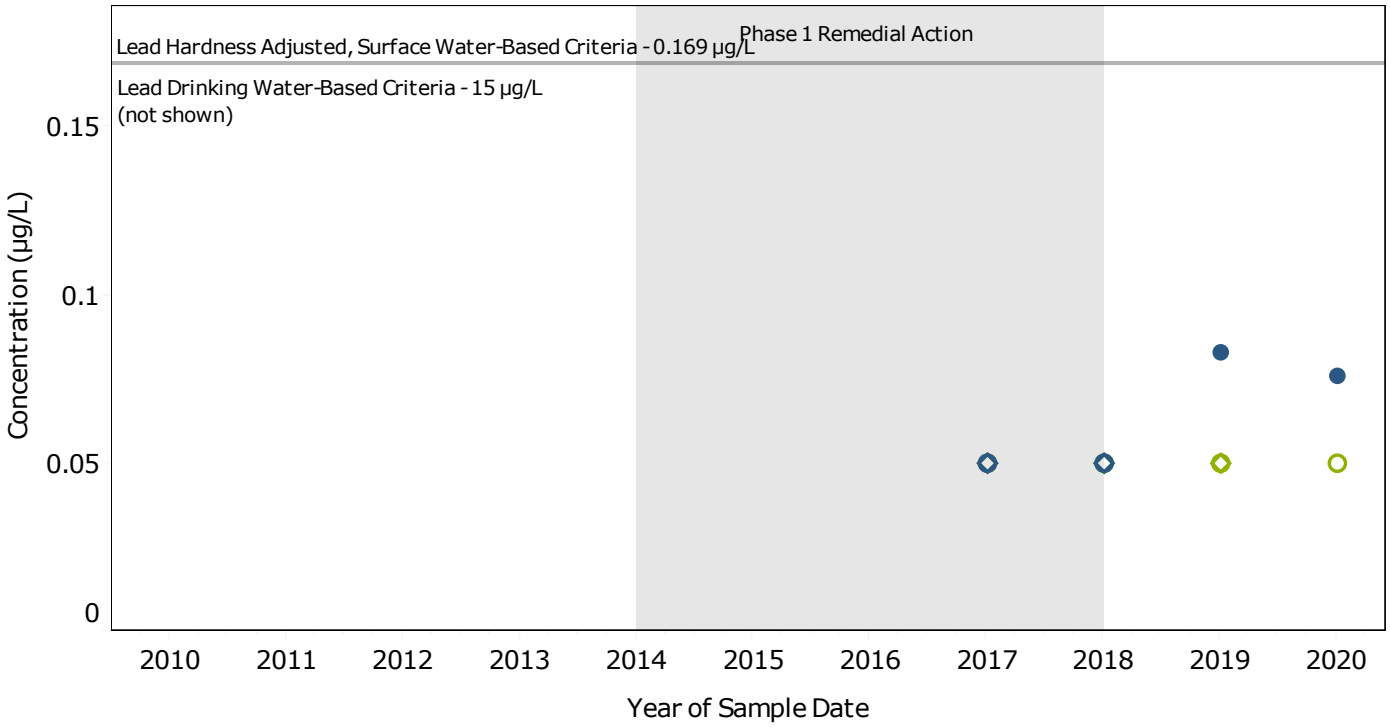
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

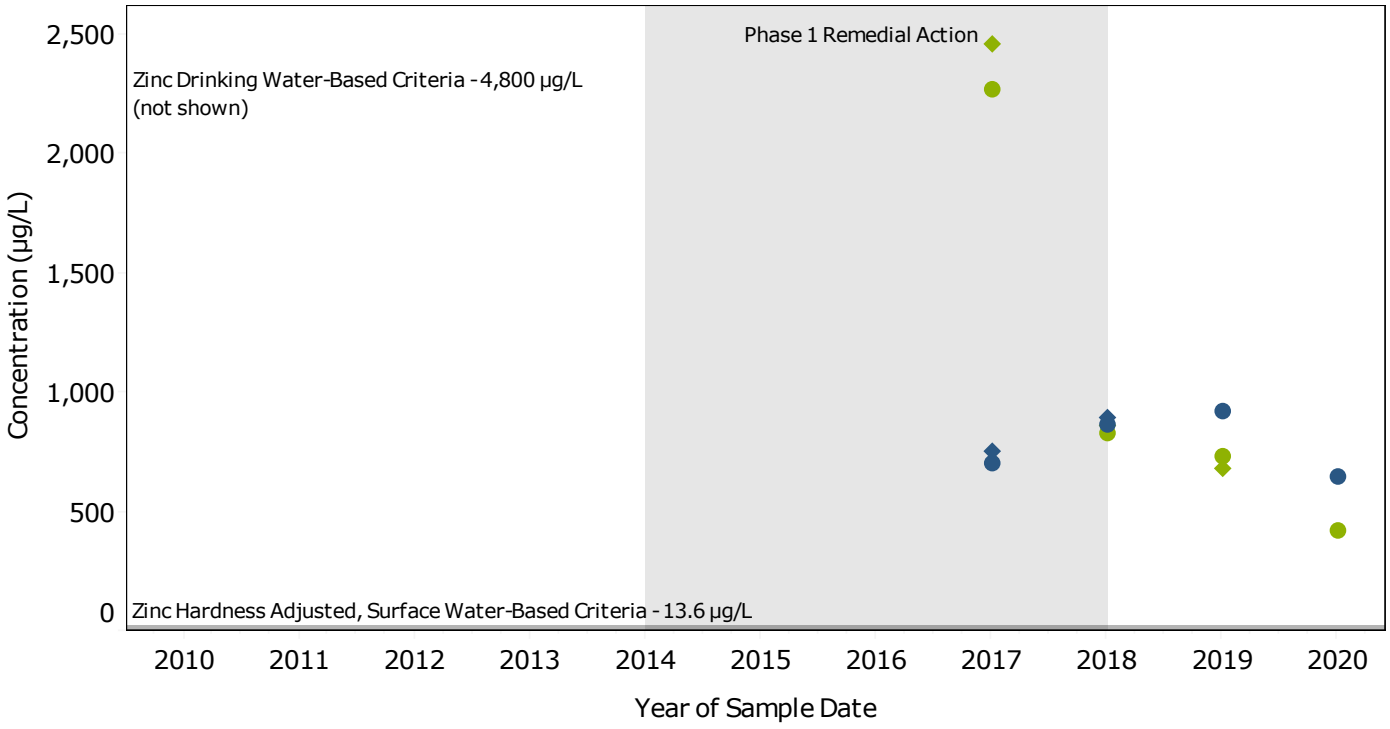
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

DS-12S, Lead



DS-12S, Zinc



Legend

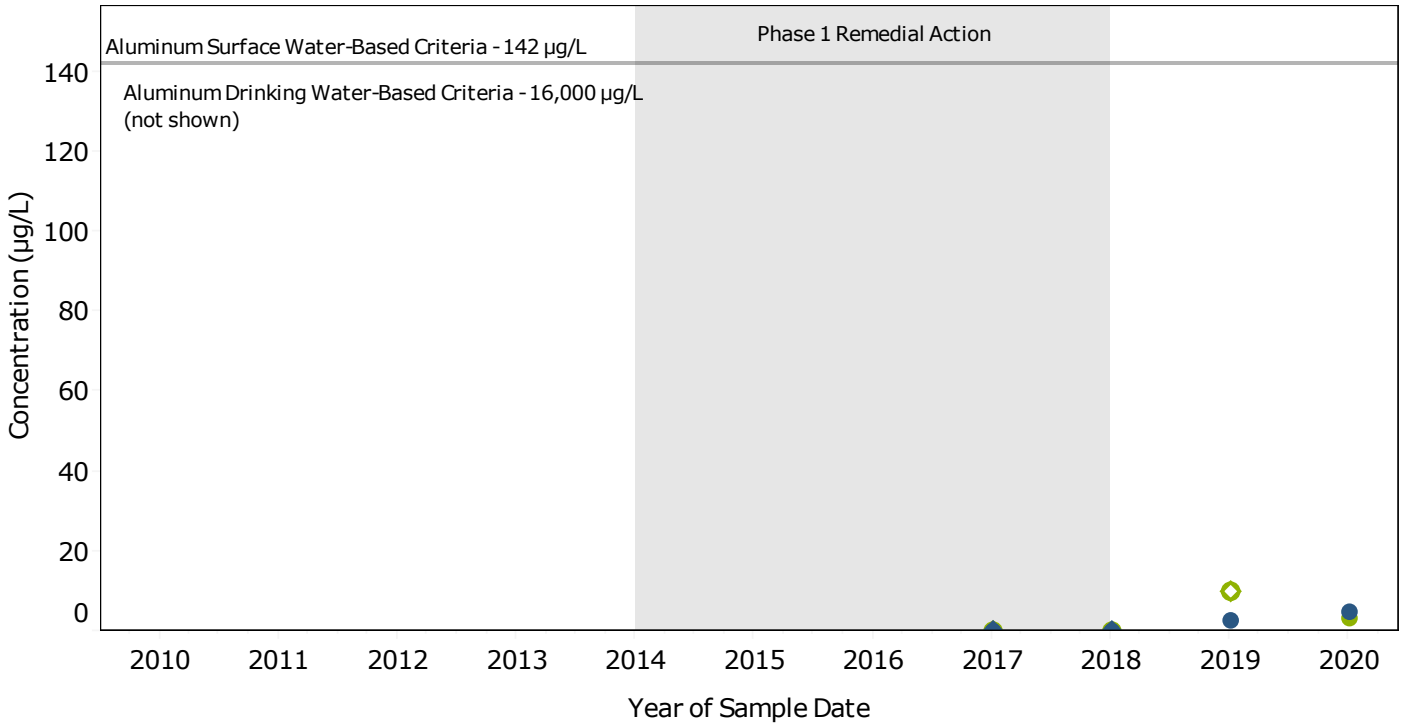
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

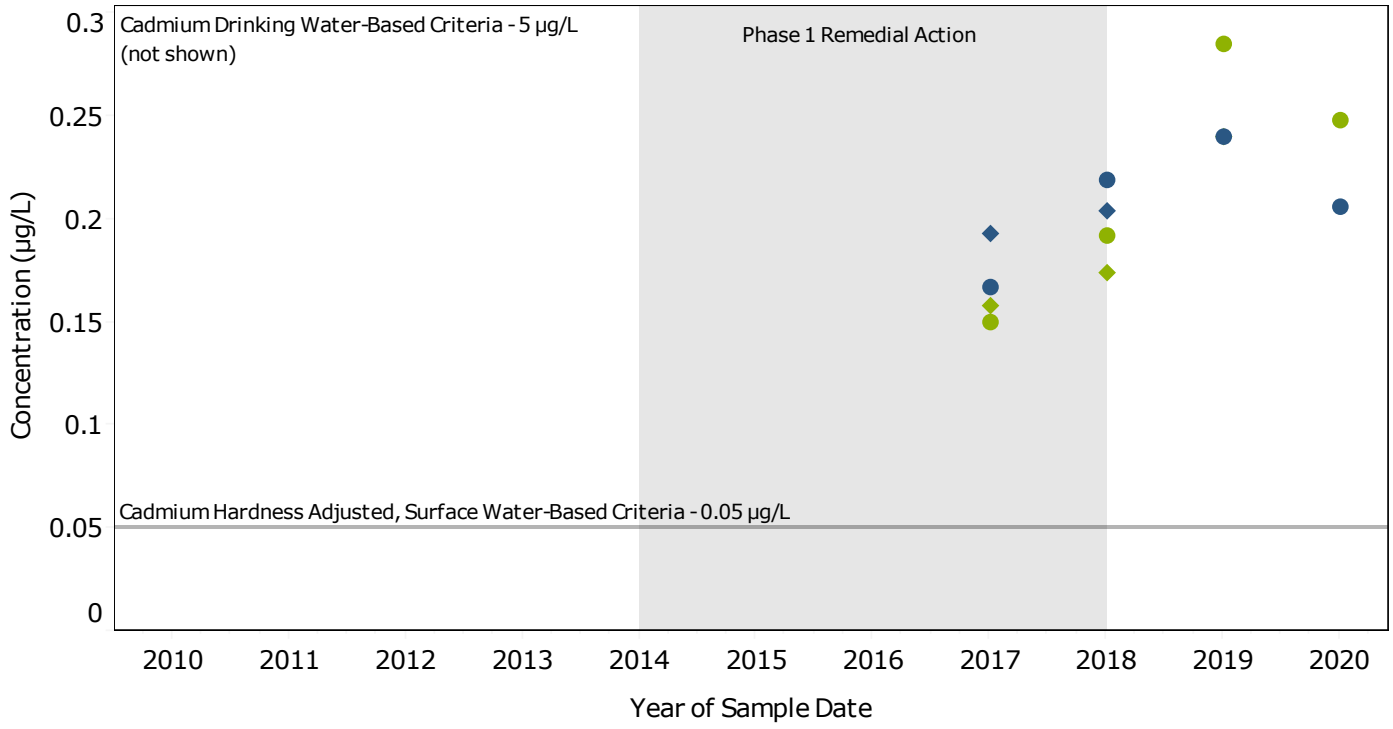
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

DS-13D, Aluminum



DS-13D, Cadmium



Legend

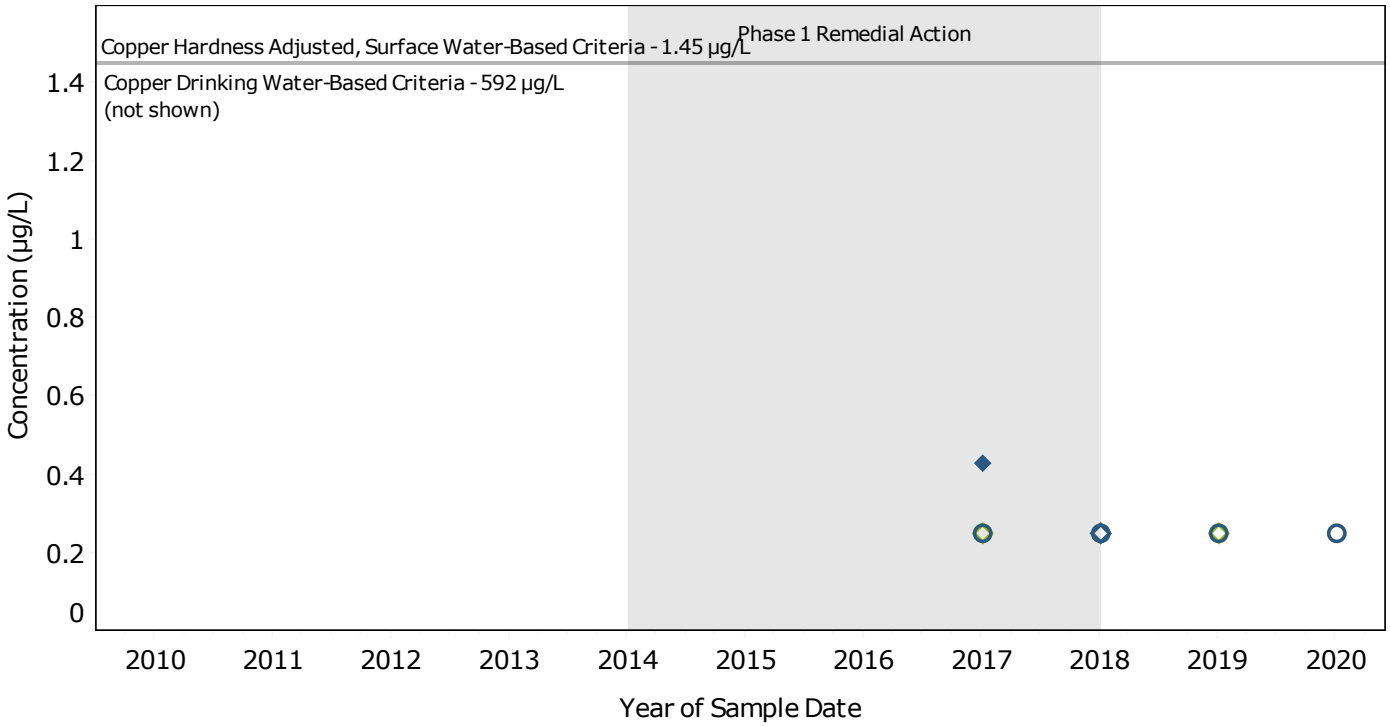
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

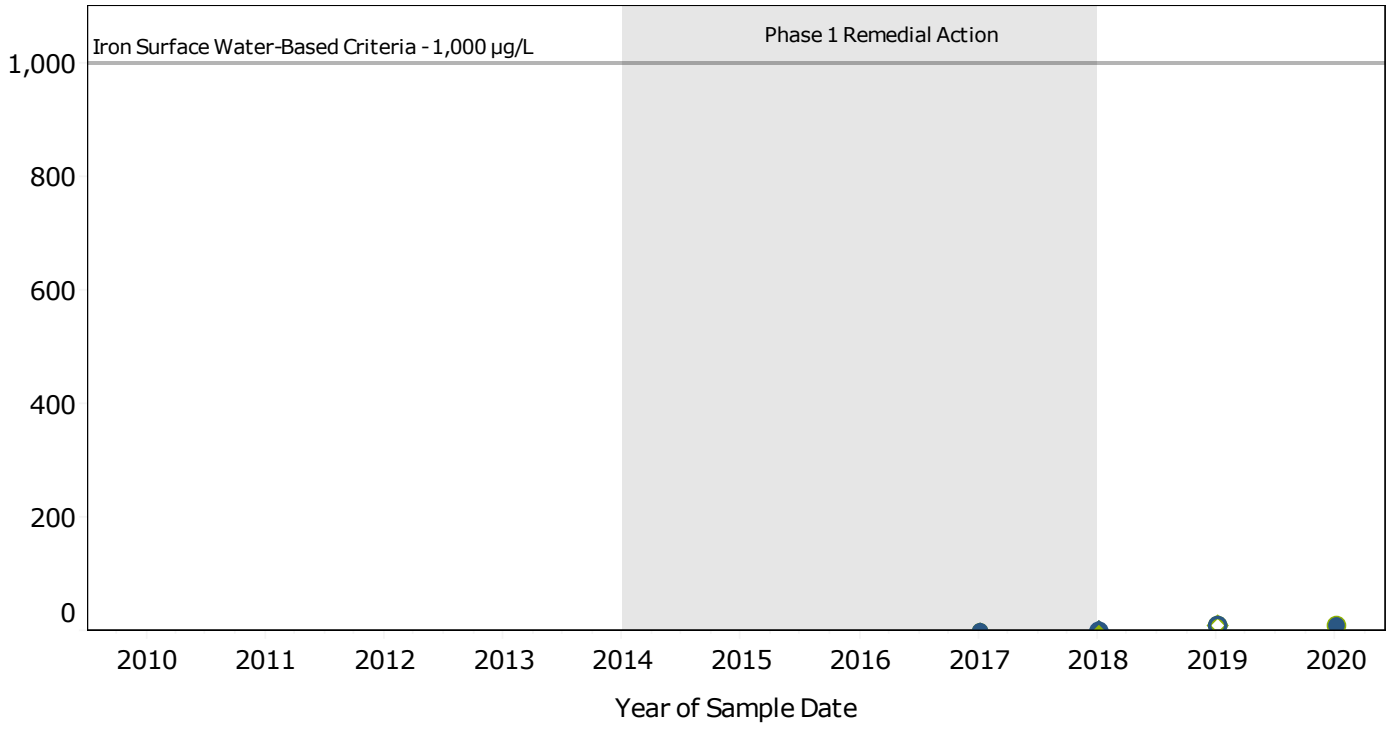
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

DS-13D, Copper



DS-13D, Iron



Legend

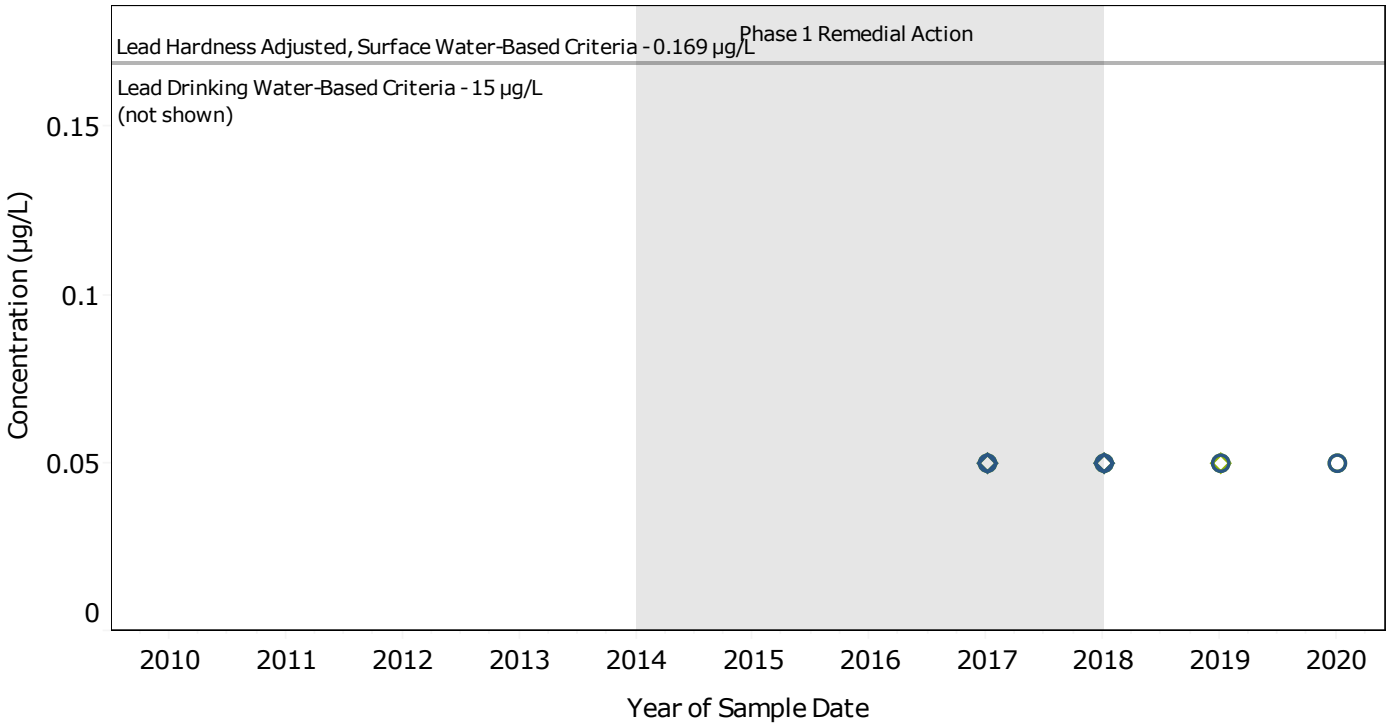
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

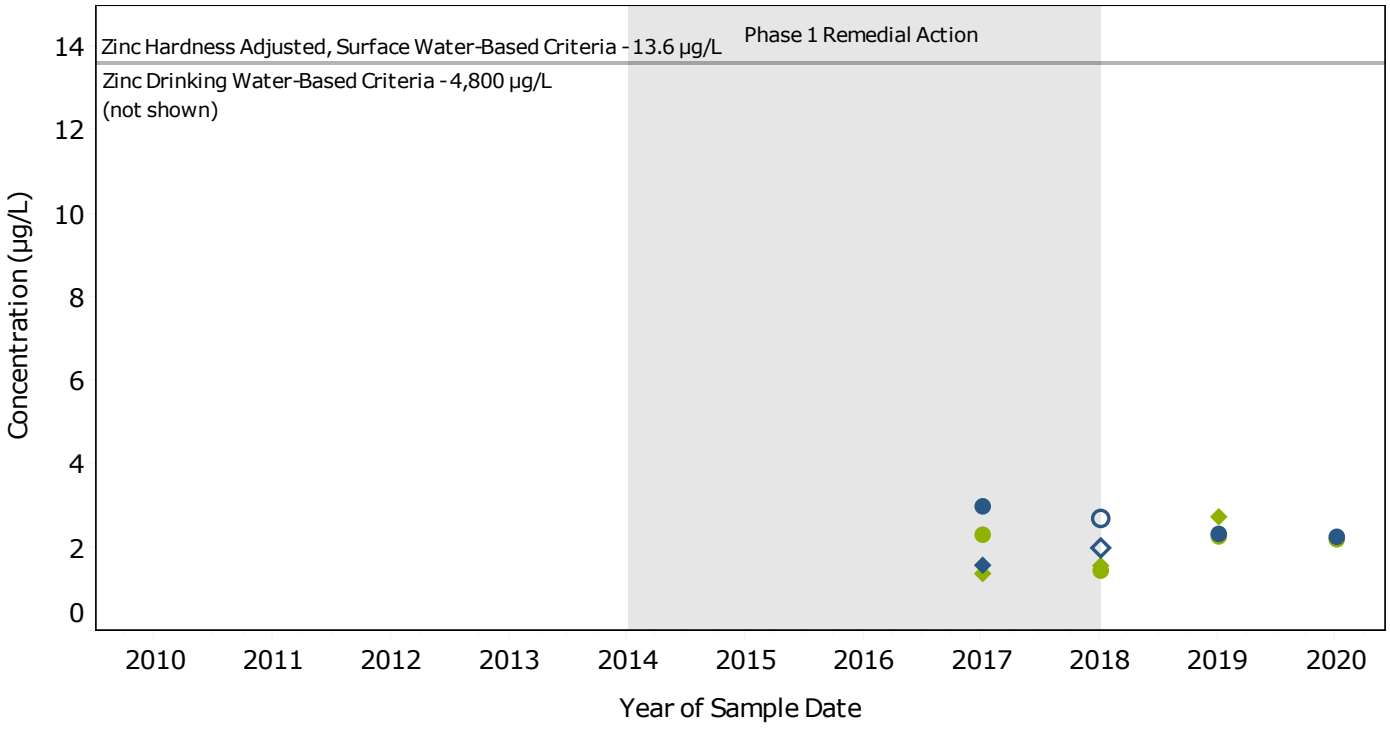
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

DS-13D, Lead



DS-13D, Zinc



Legend

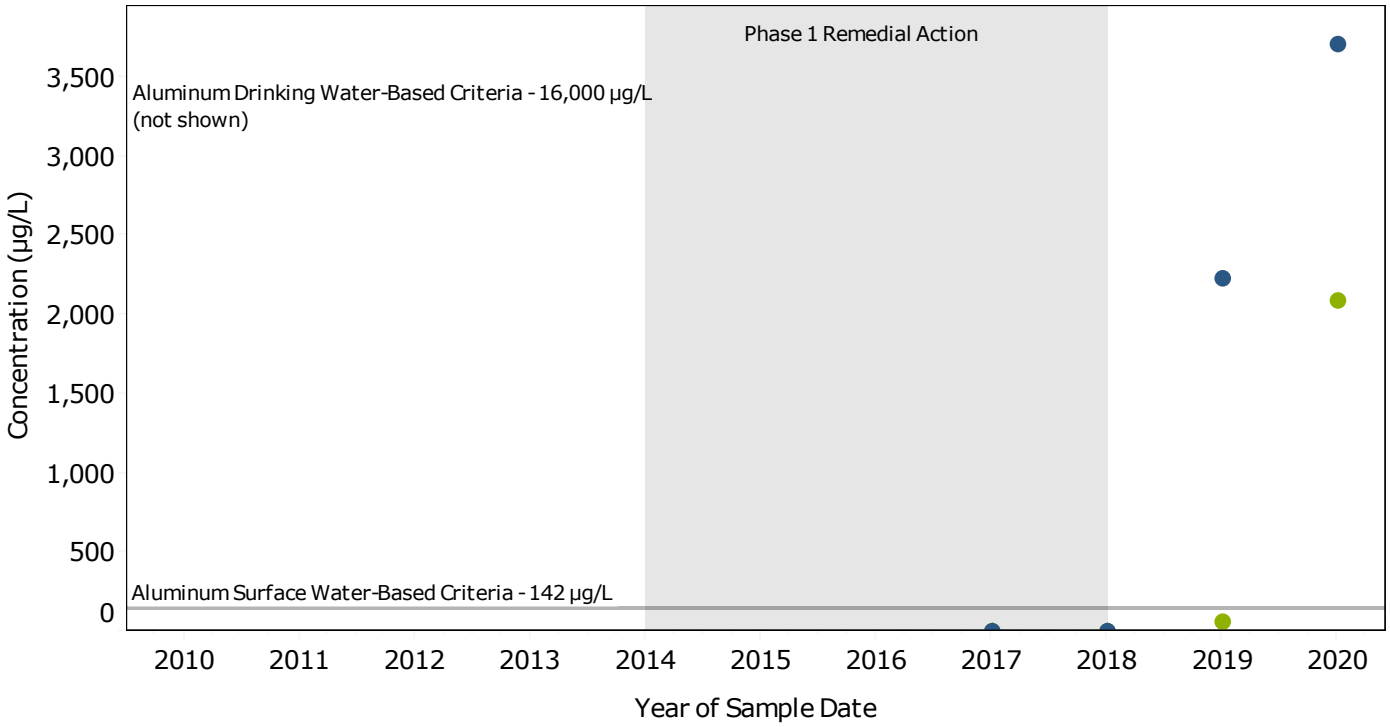
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

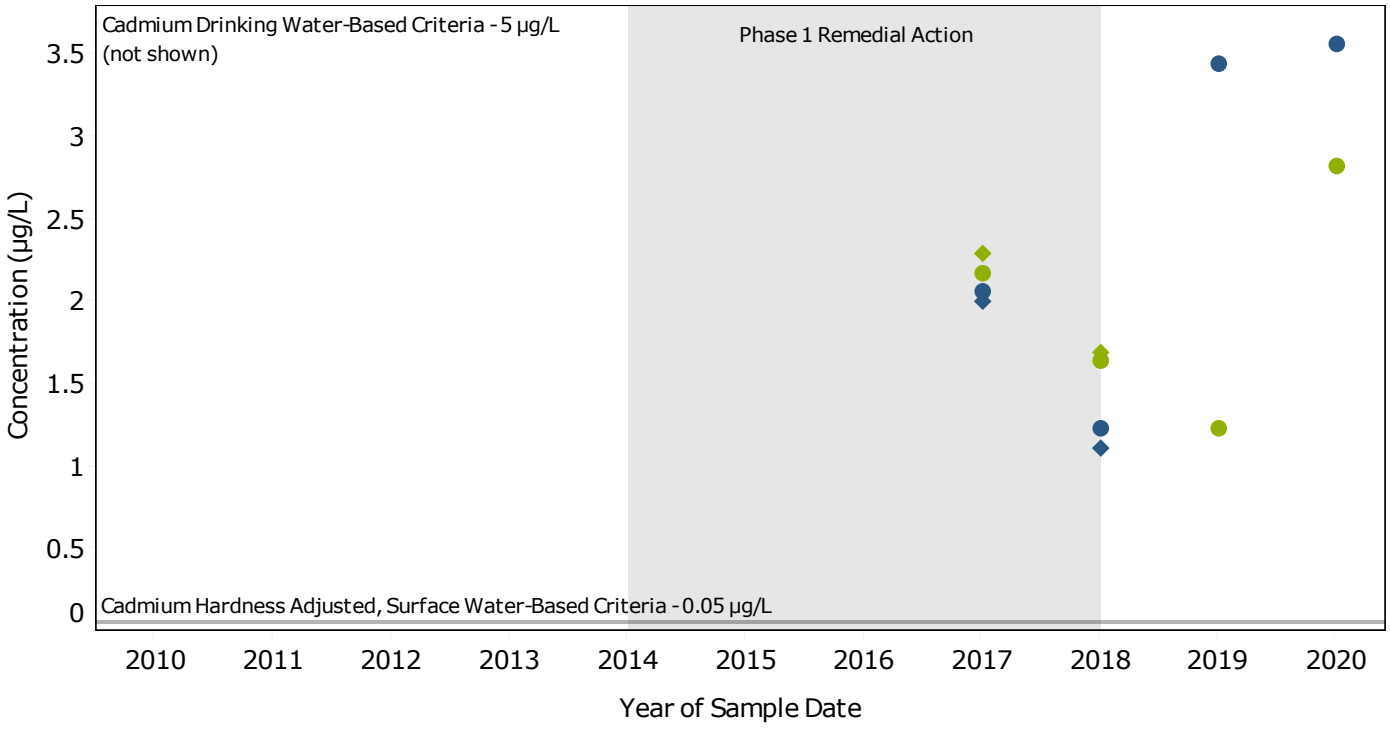
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

DS-13I, Aluminum



DS-13I, Cadmium



Legend

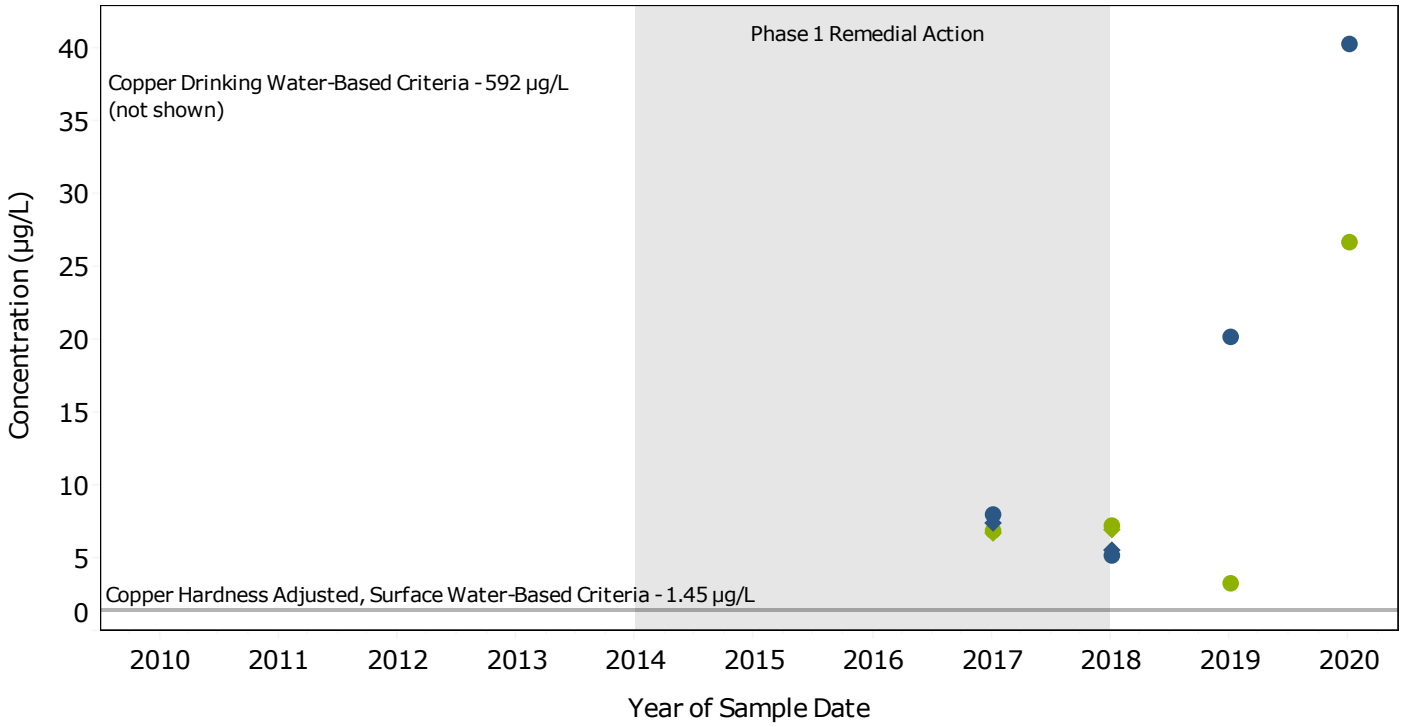
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

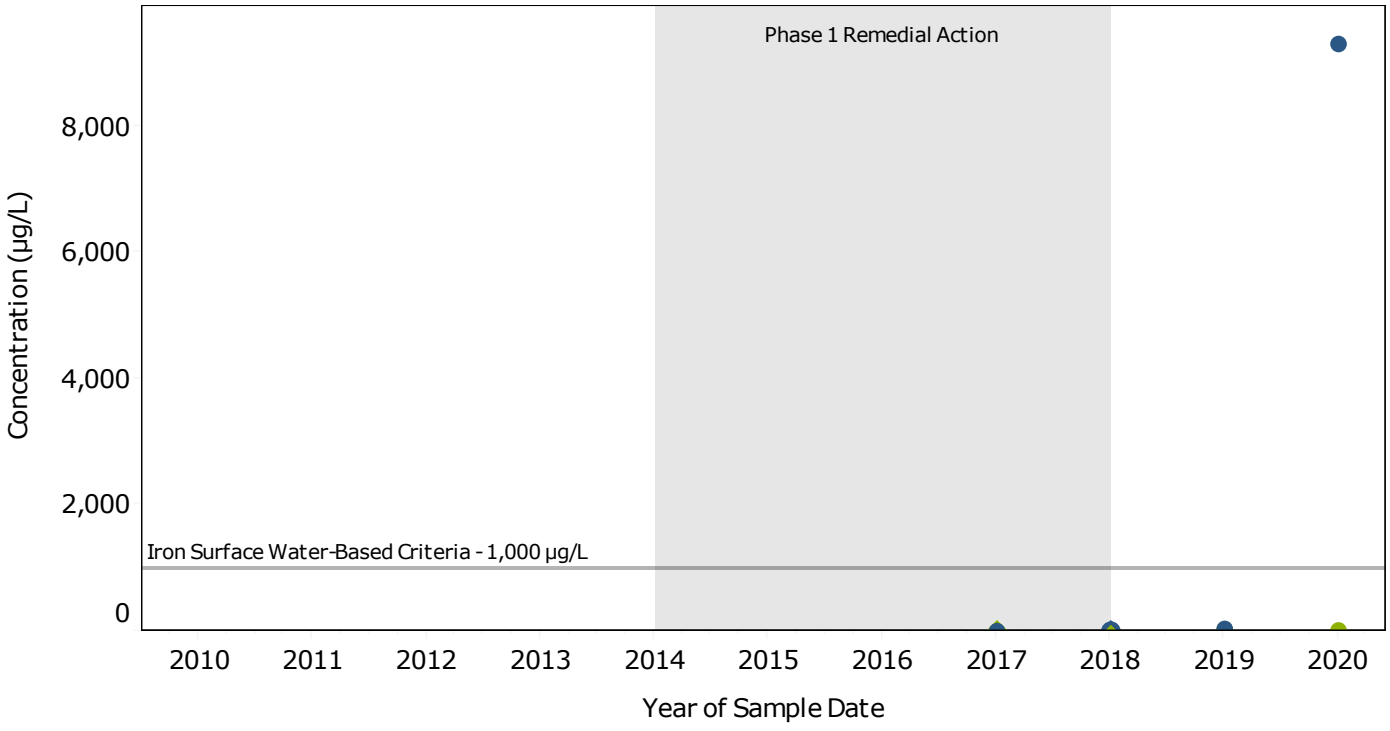
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

DS-13I, Copper



DS-13I, Iron



Legend

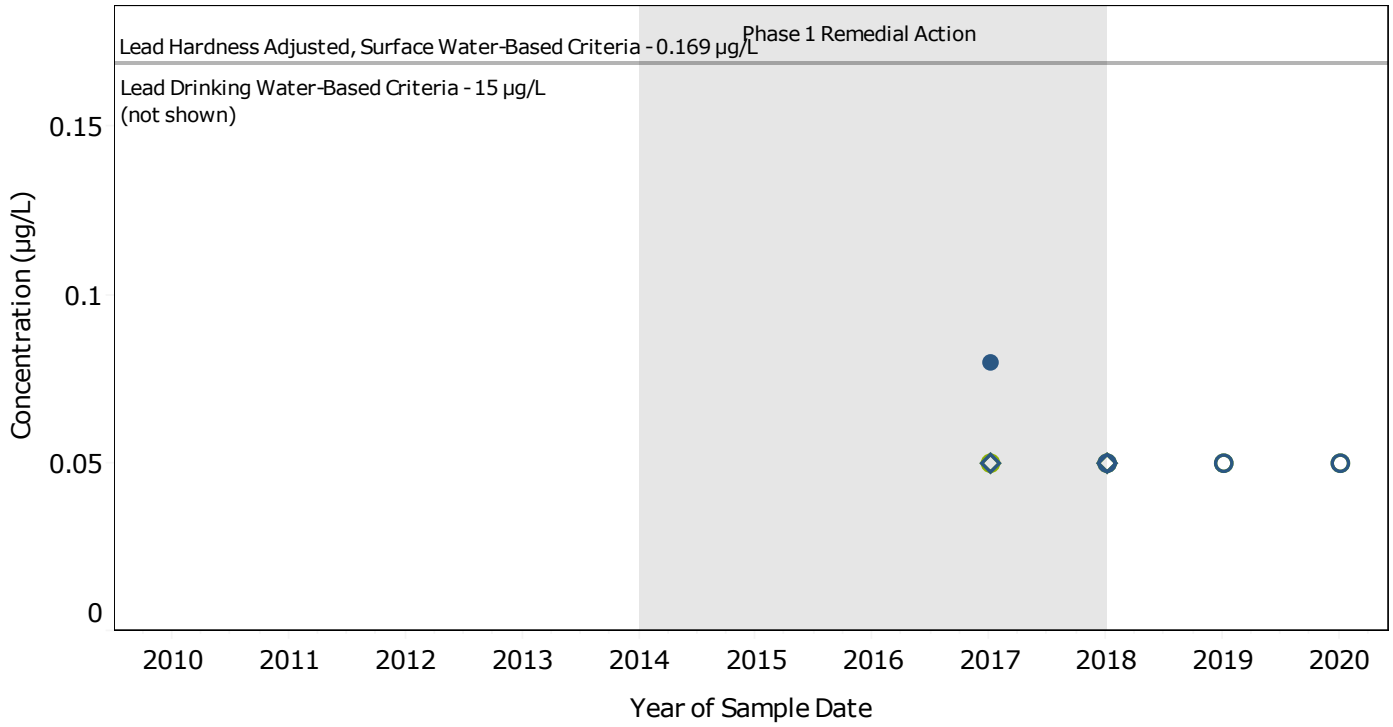
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

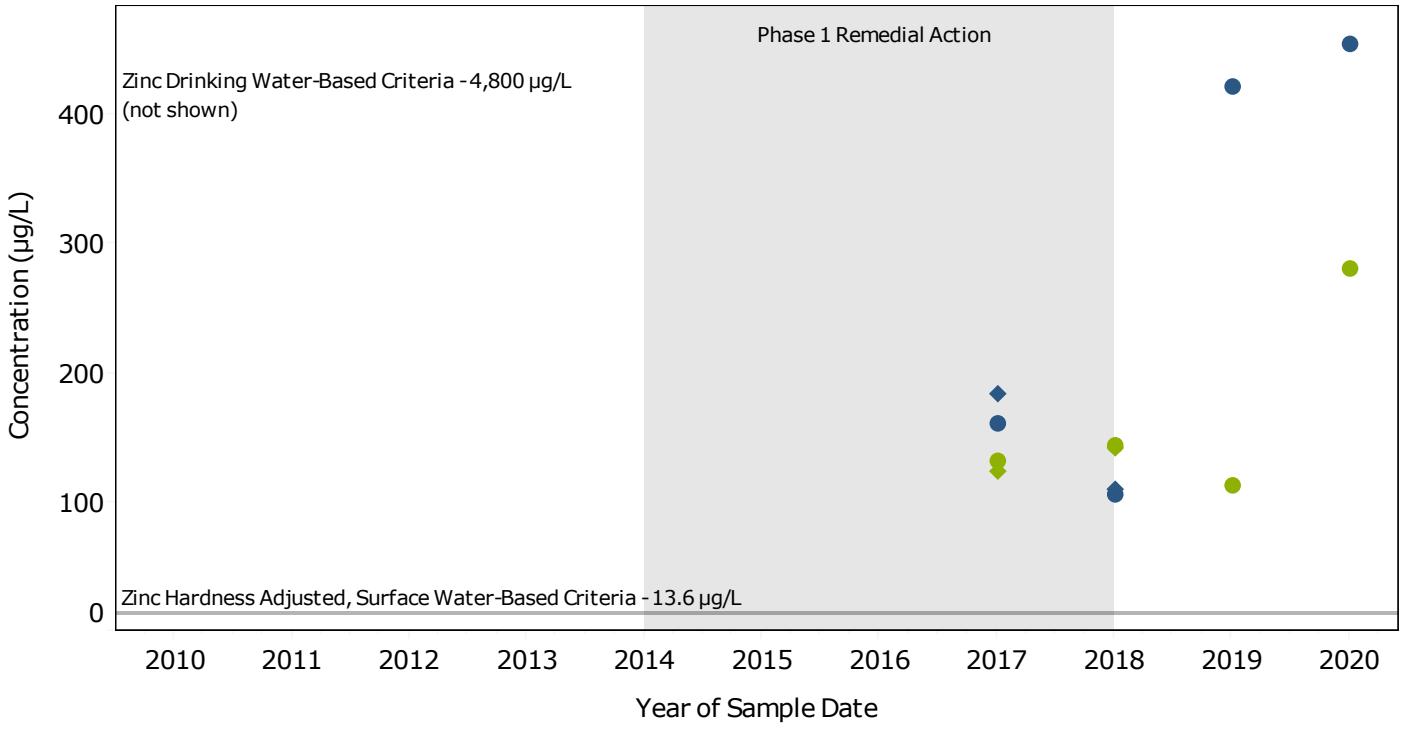
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

DS-13I, Lead



DS-13I, Zinc



Legend

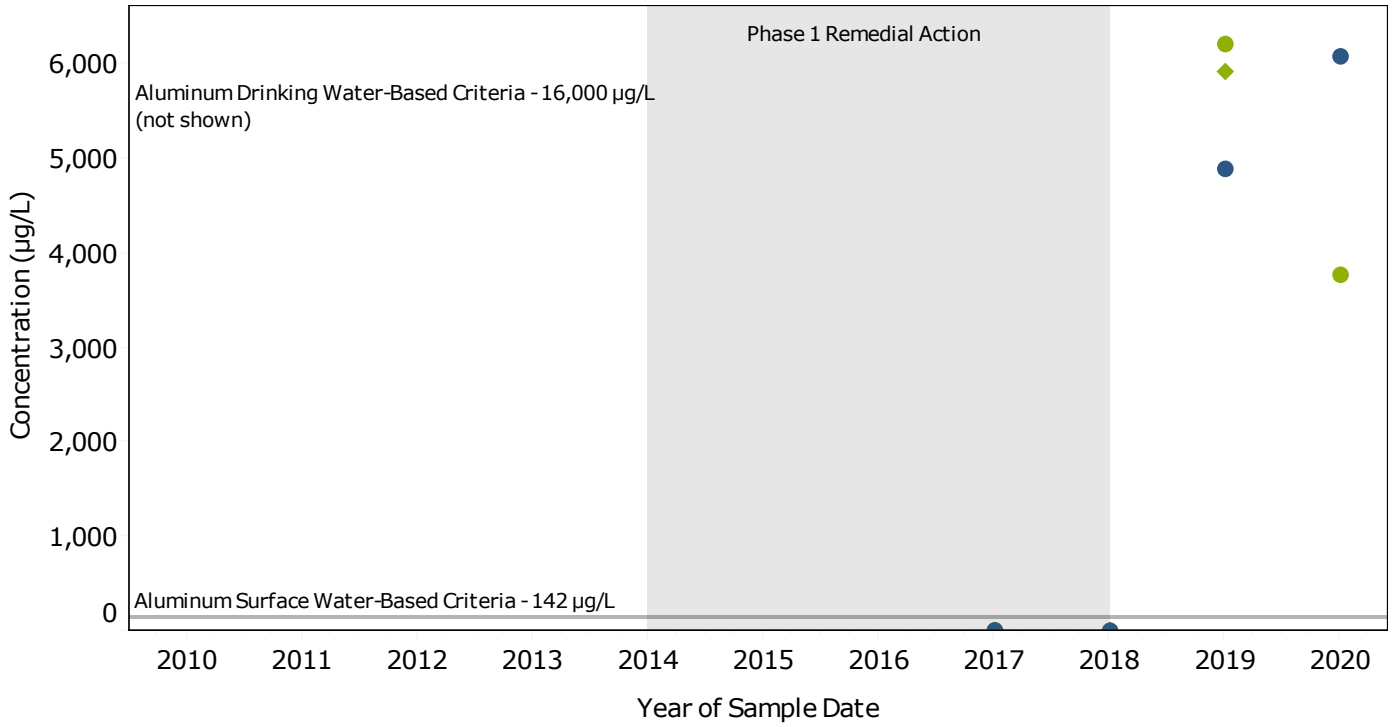
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

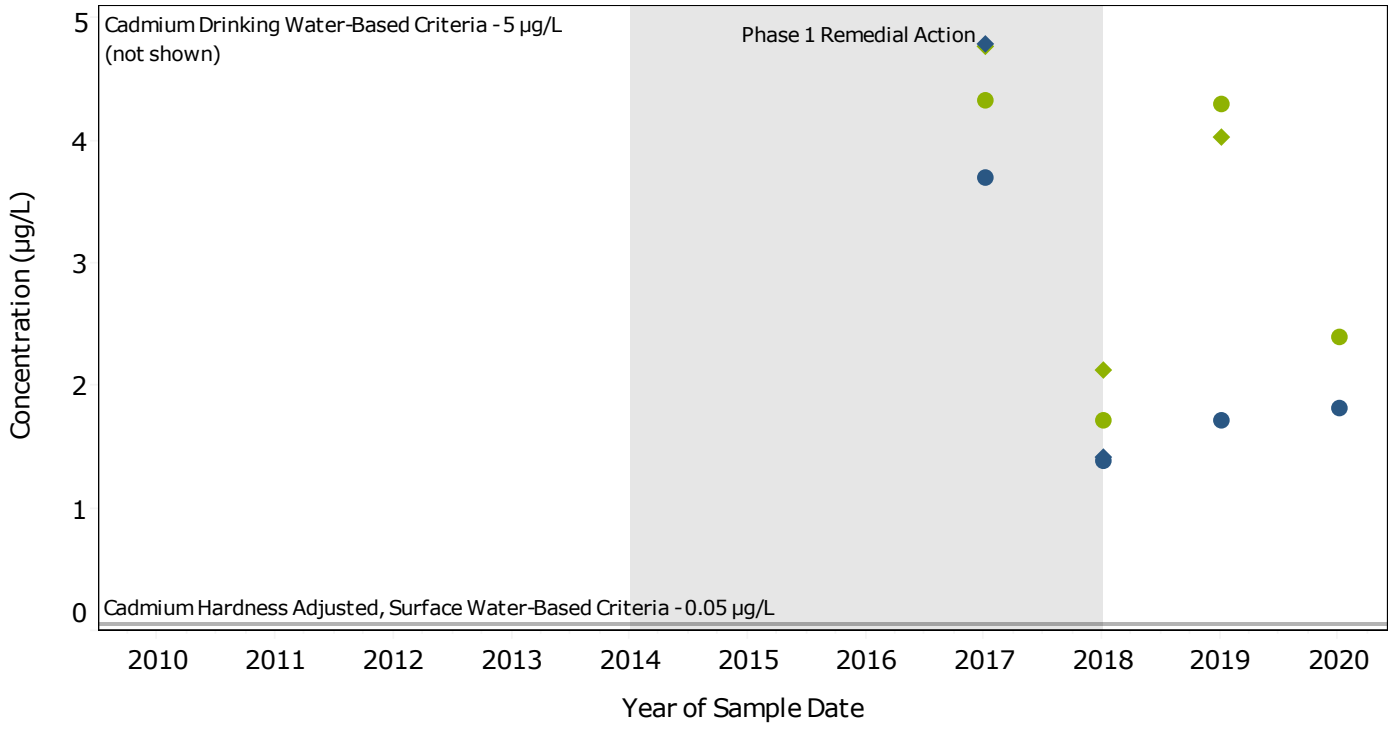
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

DS-13S, Aluminum



DS-13S, Cadmium



Legend

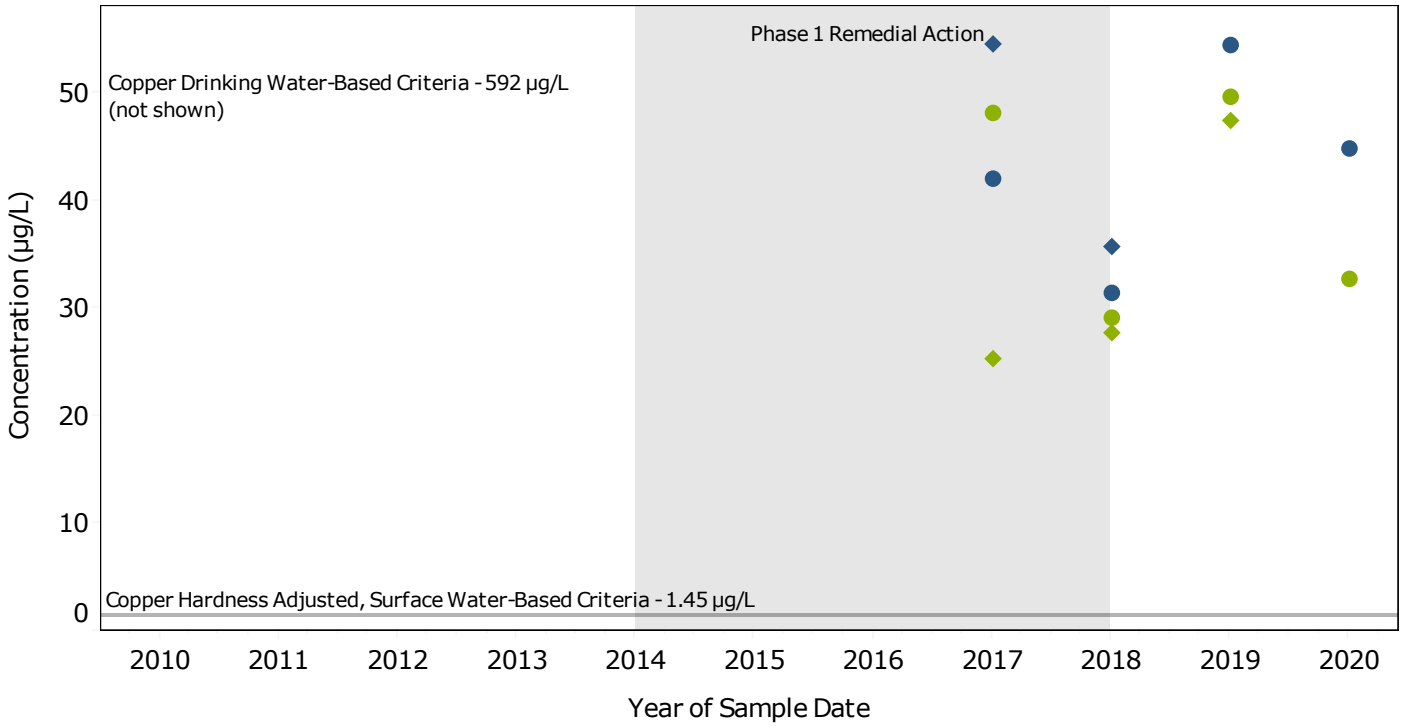
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

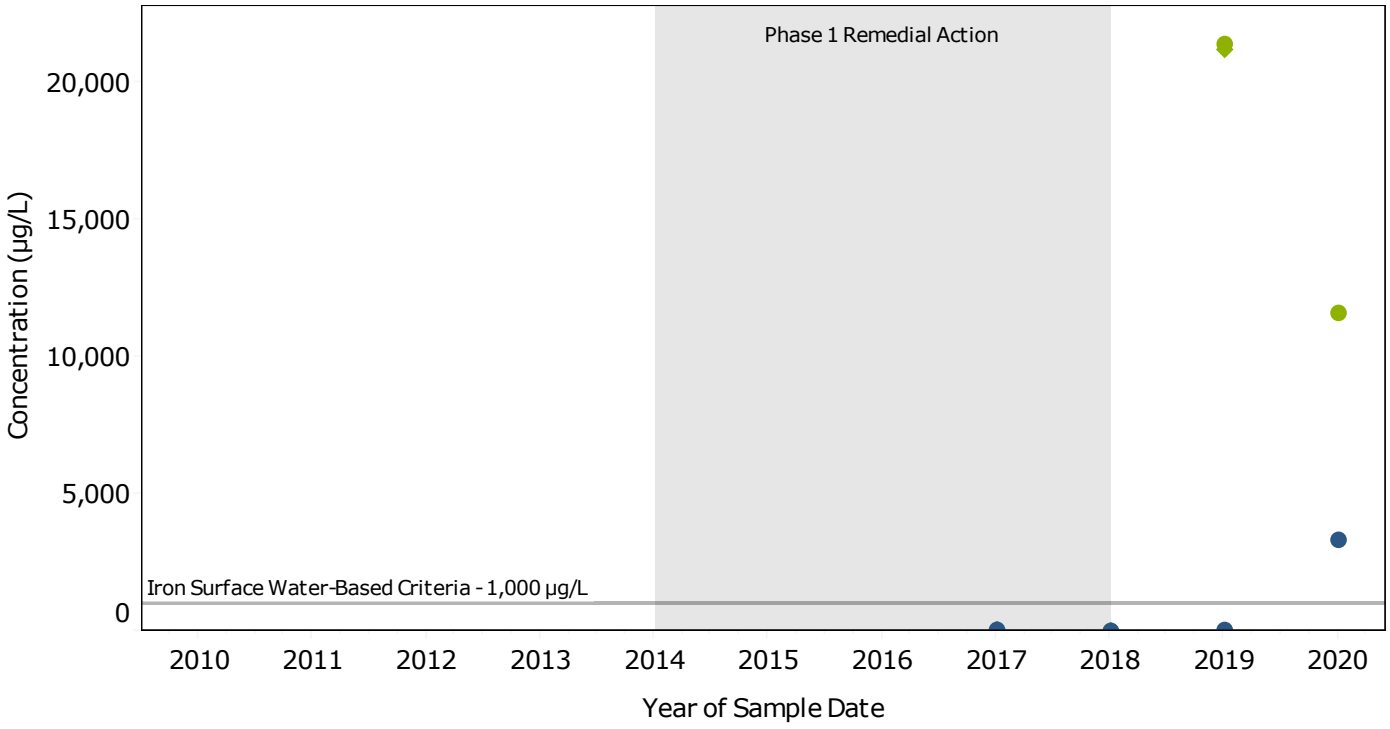
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

DS-13S, Copper



DS-13S, Iron



Legend

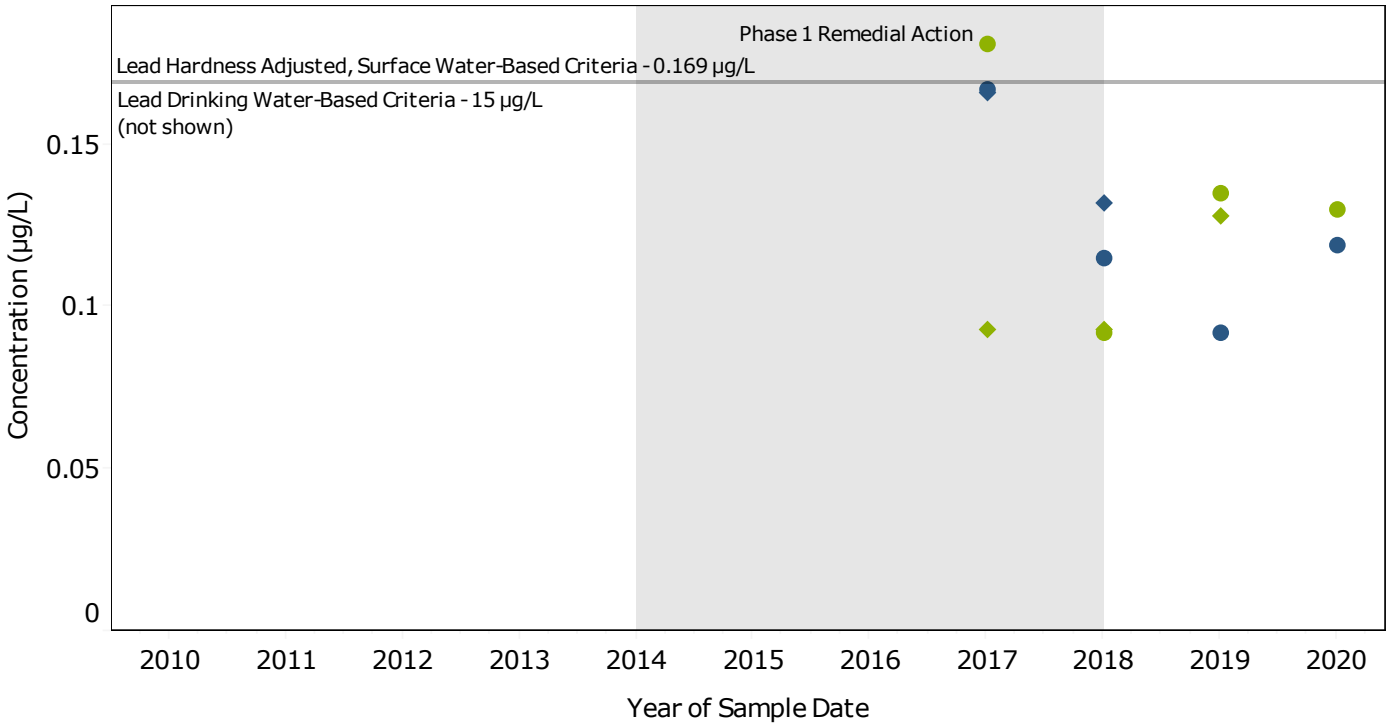
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

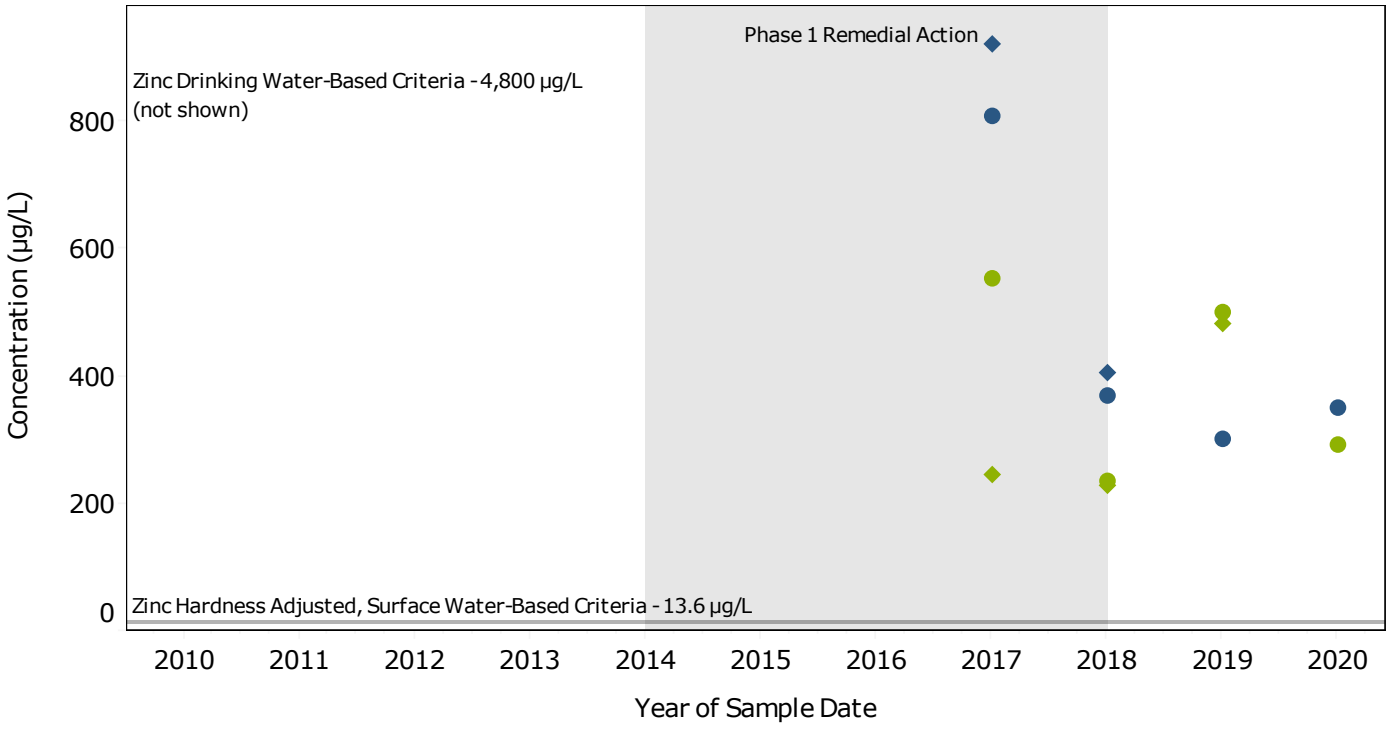
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

DS-13S, Lead



DS-13S, Zinc



Legend

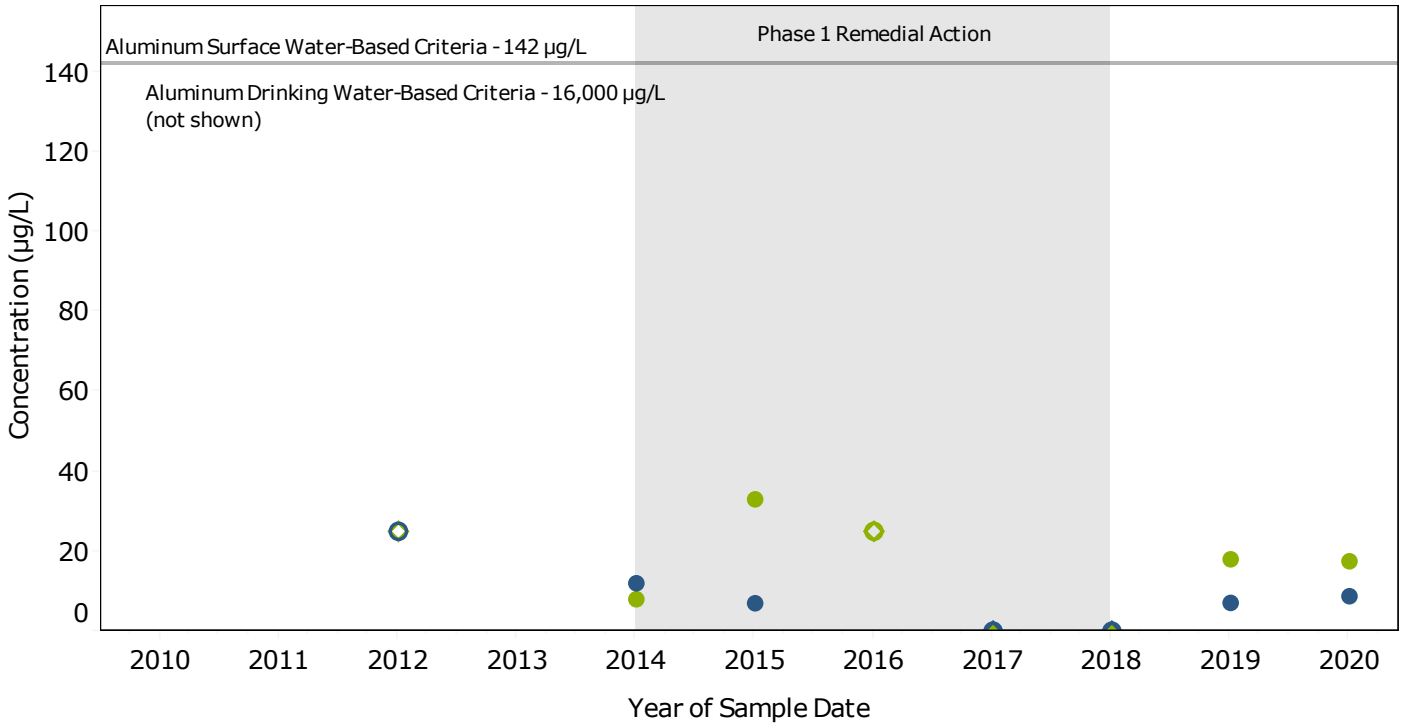
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

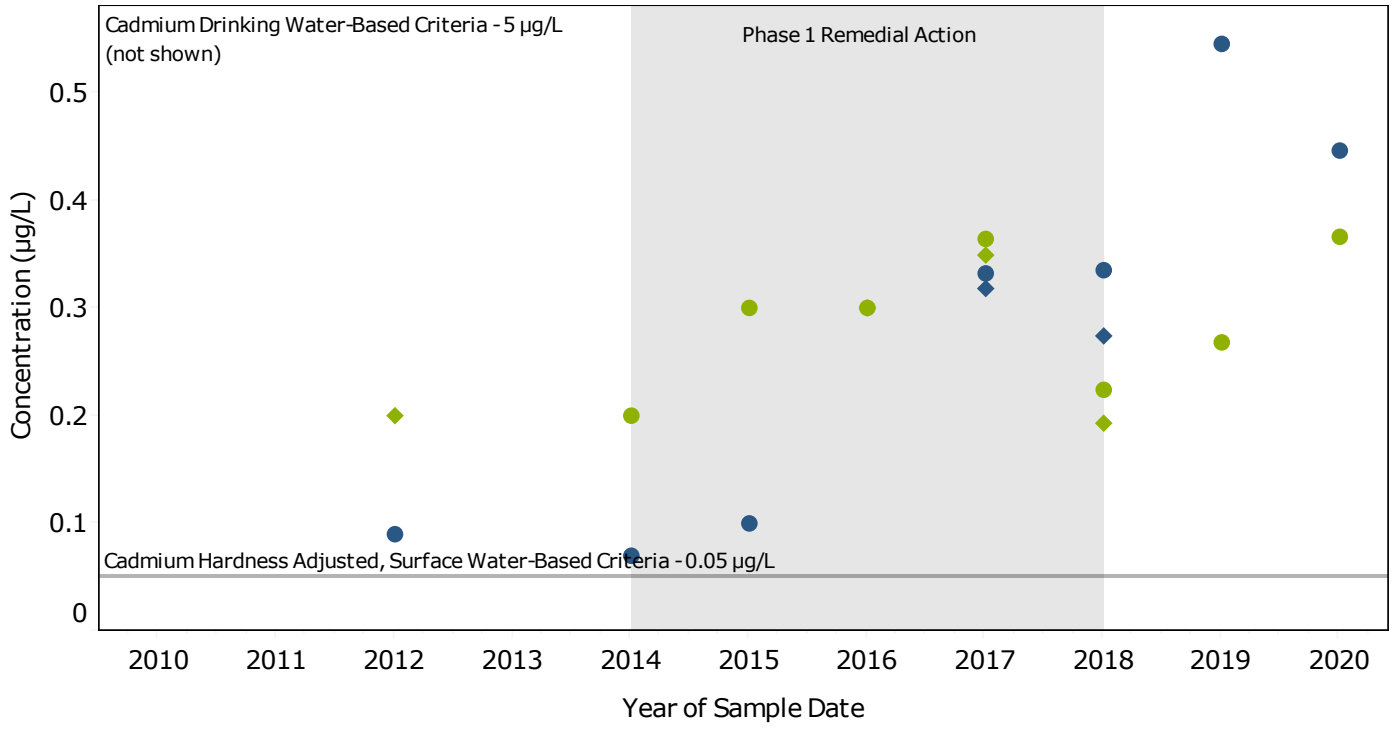
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

MW-1, Aluminum



MW-1, Cadmium



Legend

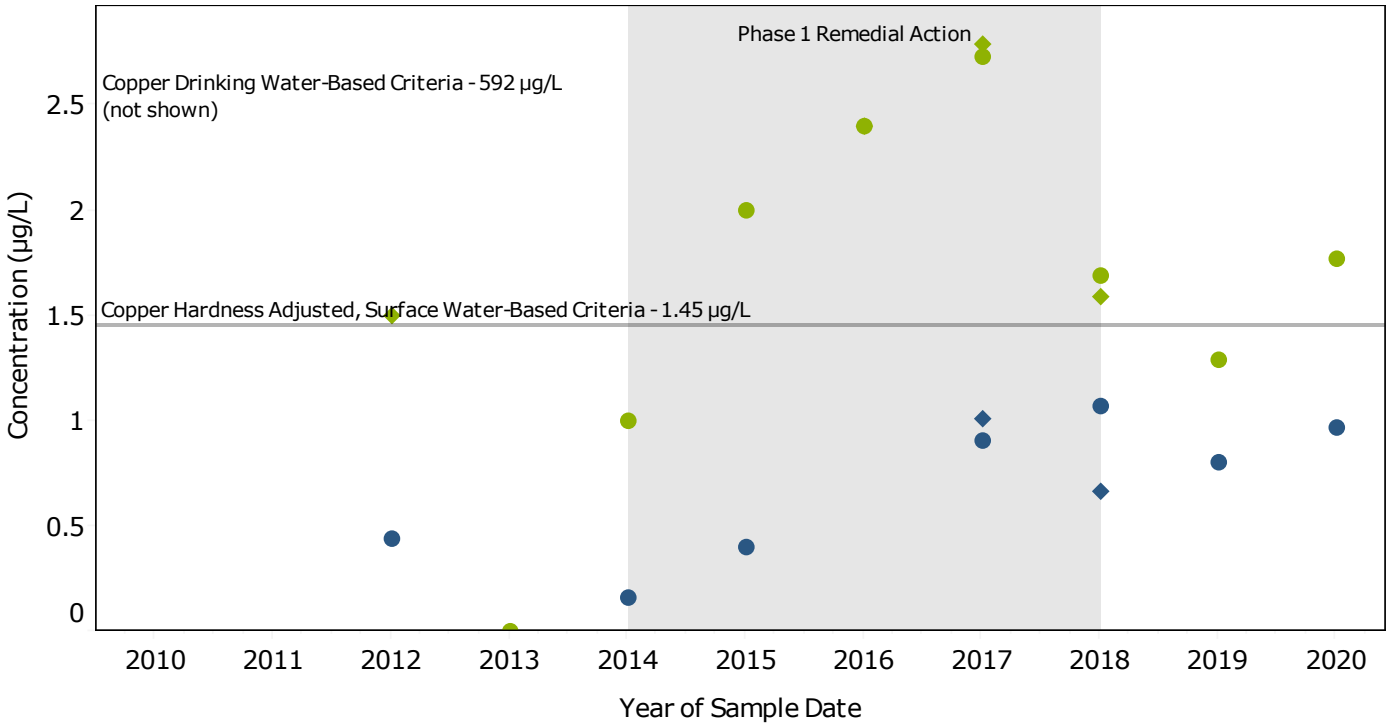
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

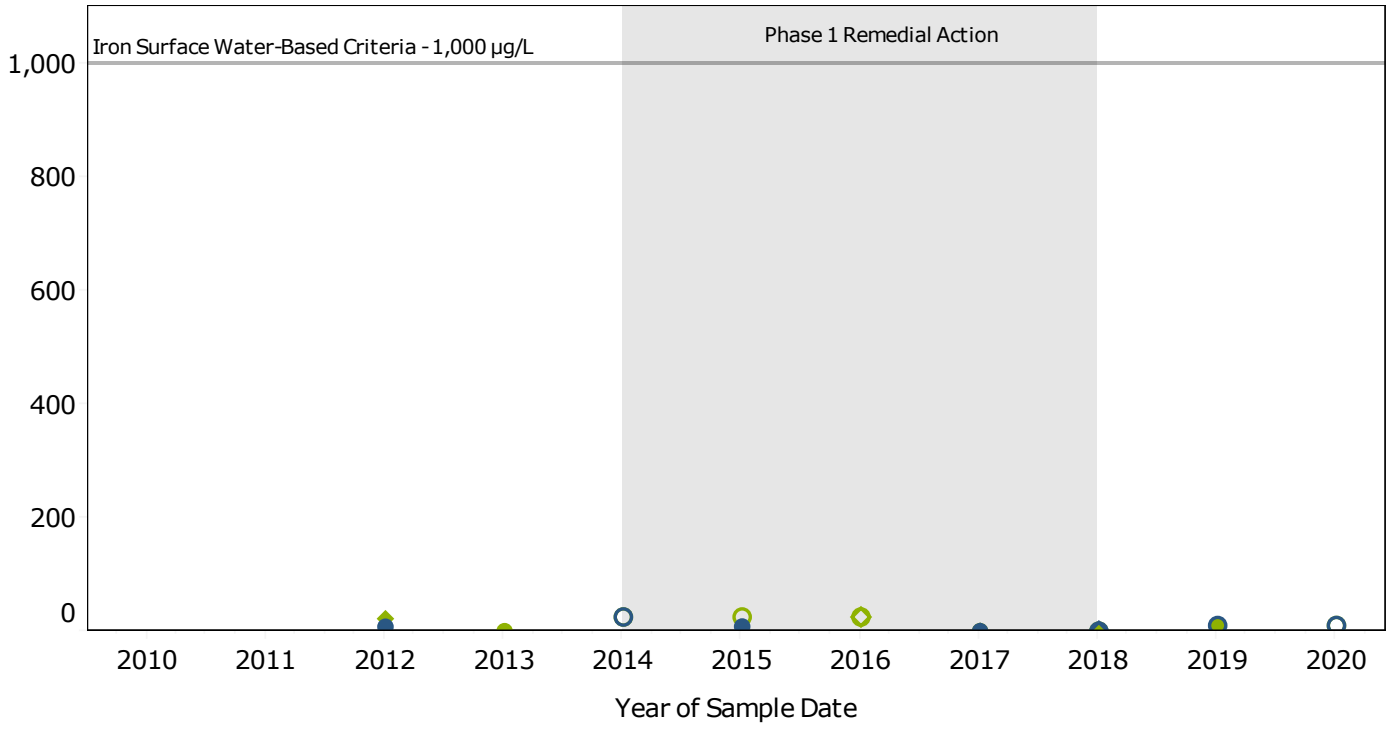
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

MW-1, Copper



MW-1, Iron



Legend

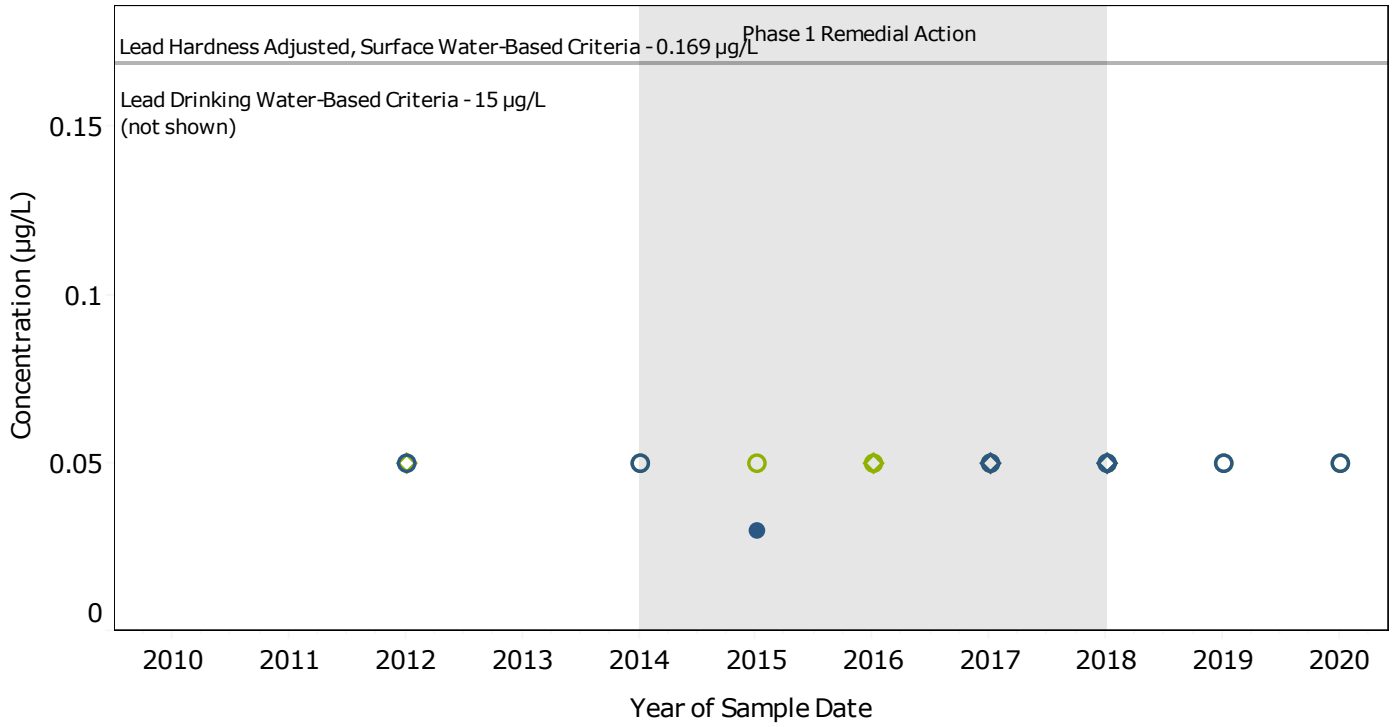
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

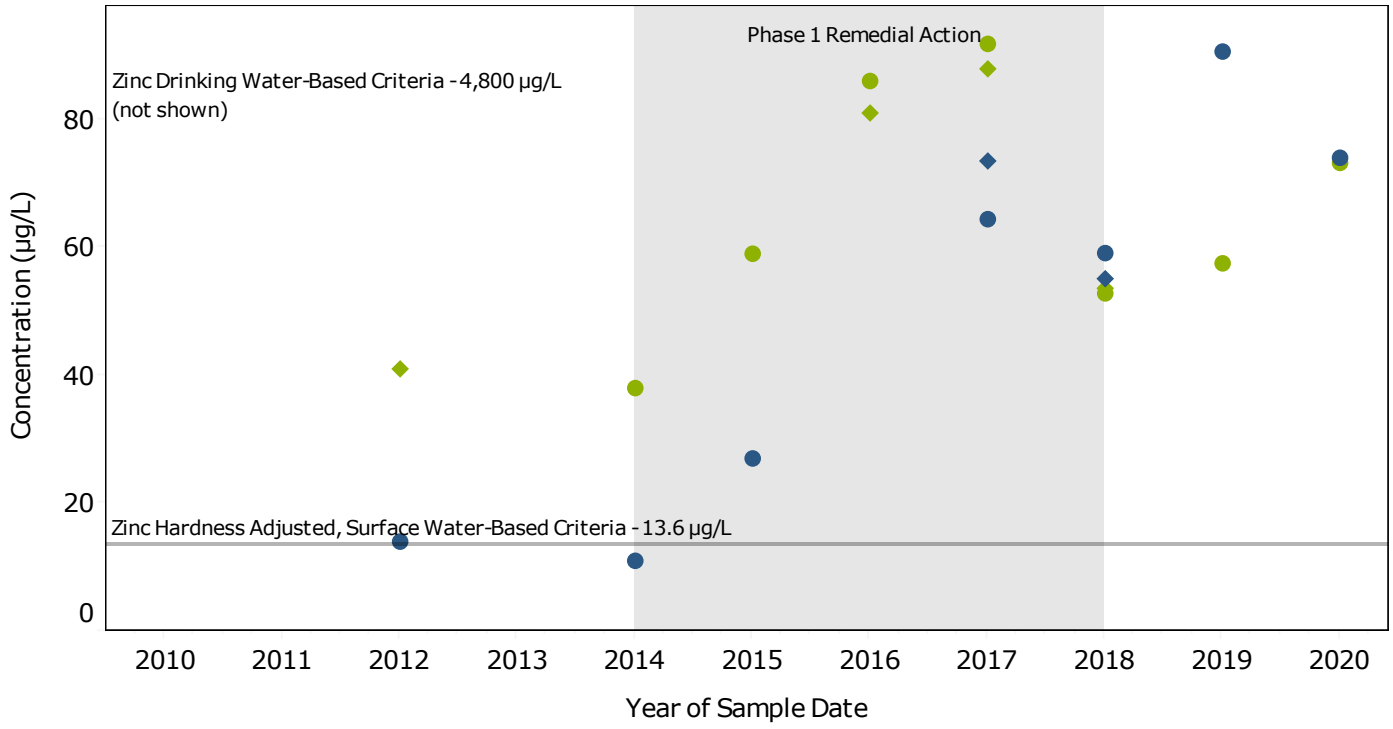
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

MW-1, Lead



MW-1, Zinc



Legend

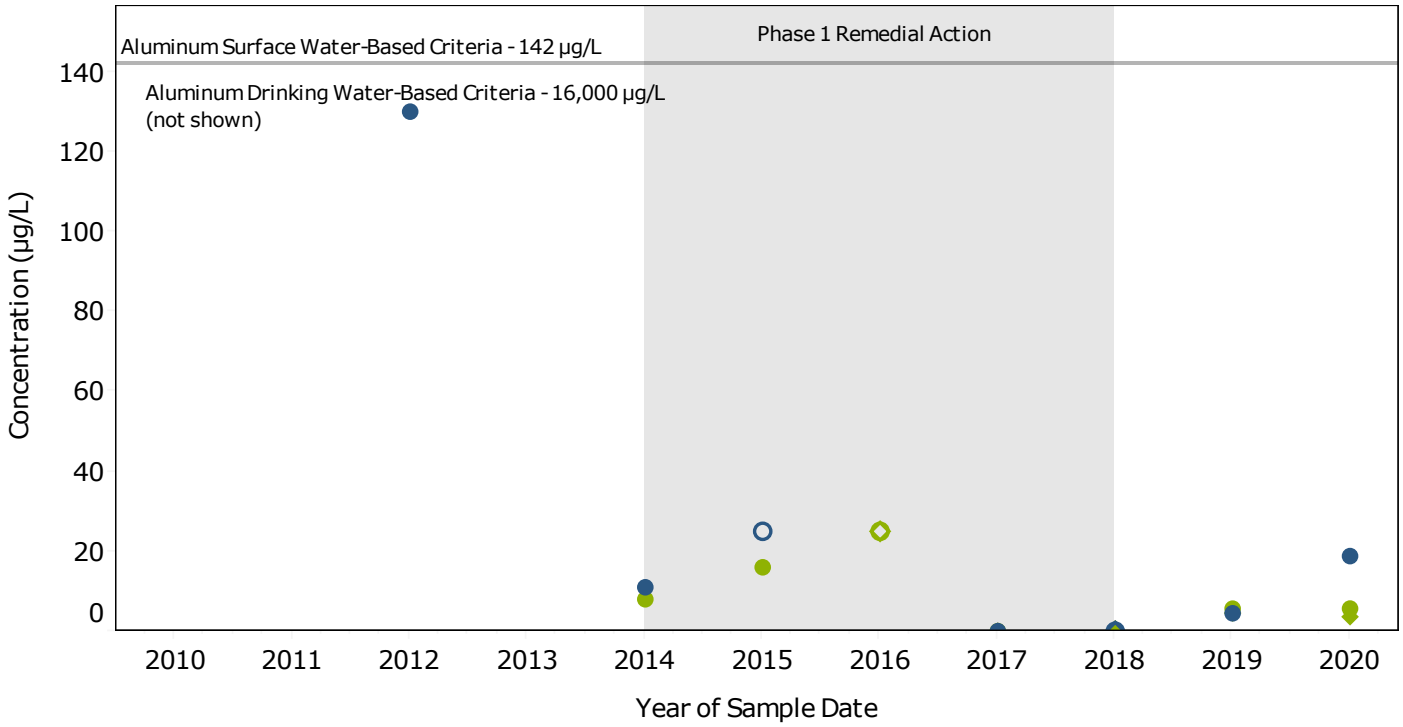
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

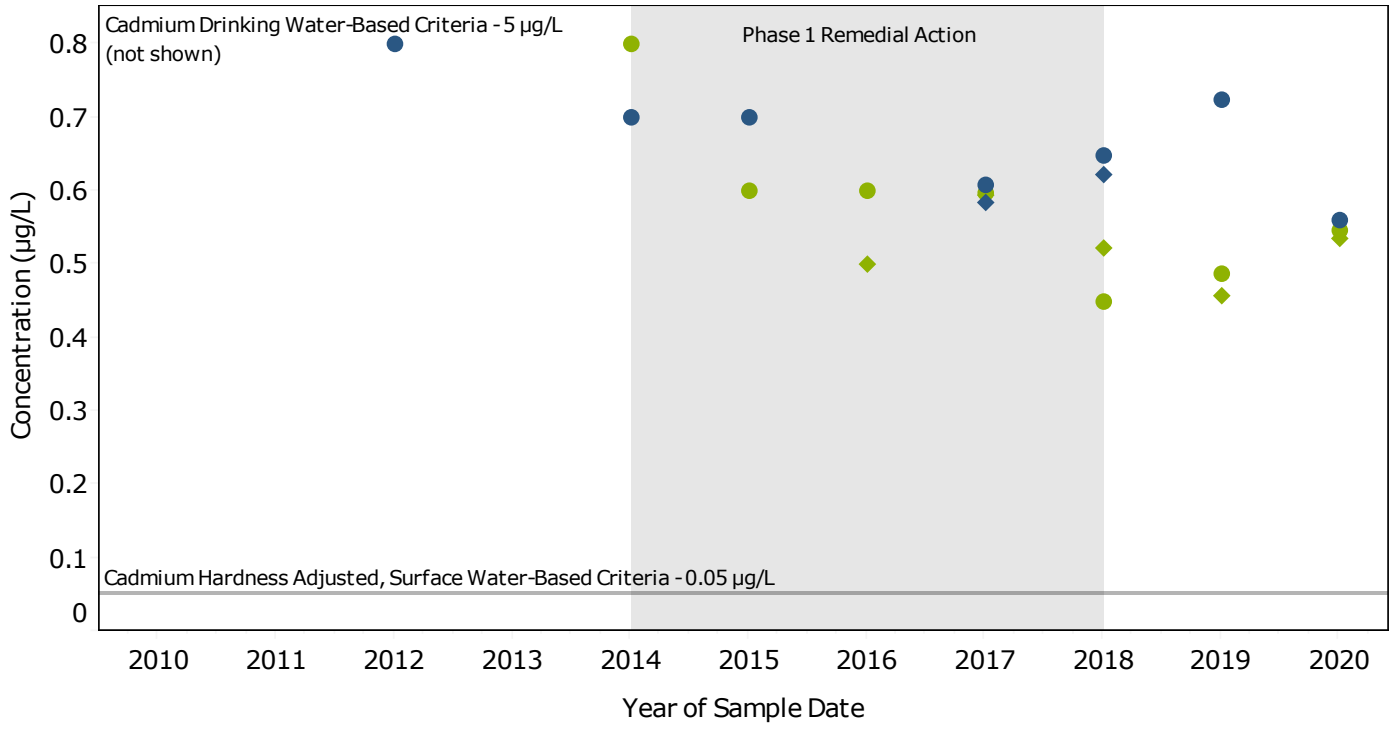
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

MW-2, Aluminum



MW-2, Cadmium



Legend

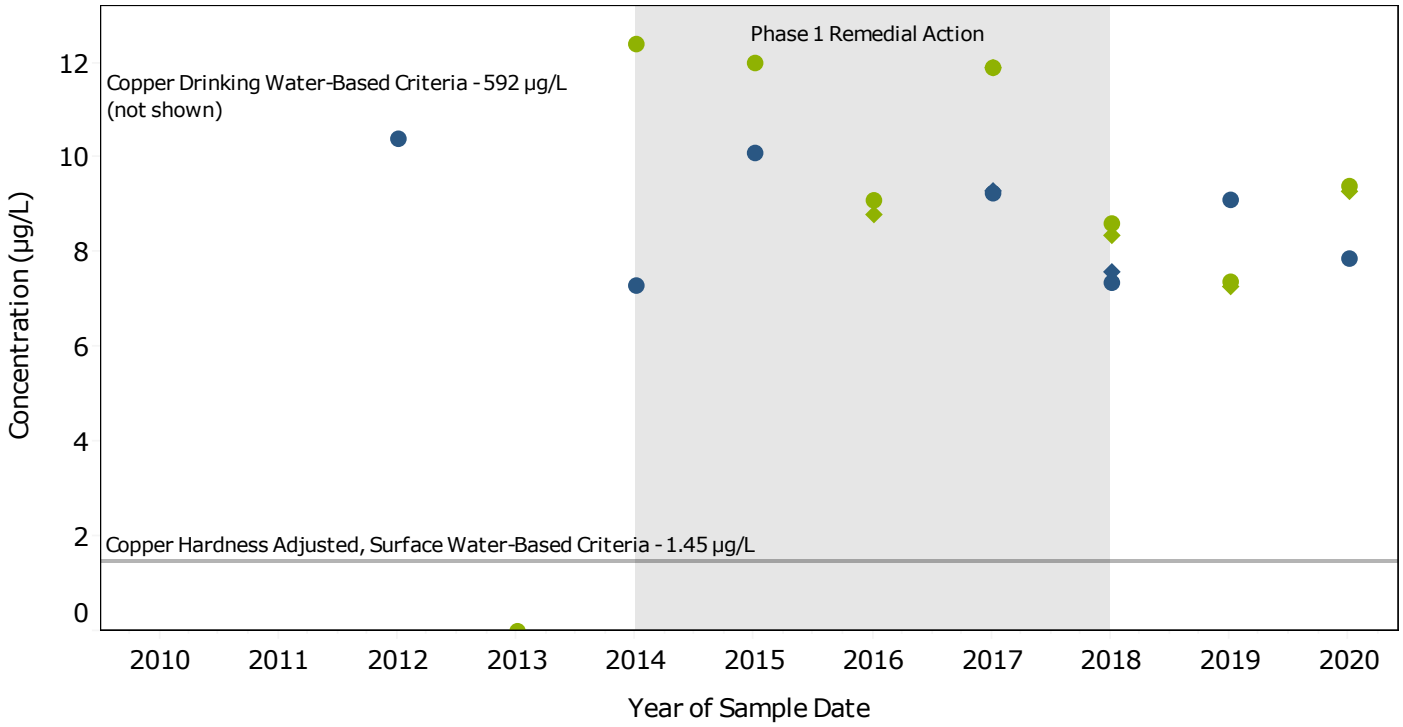
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

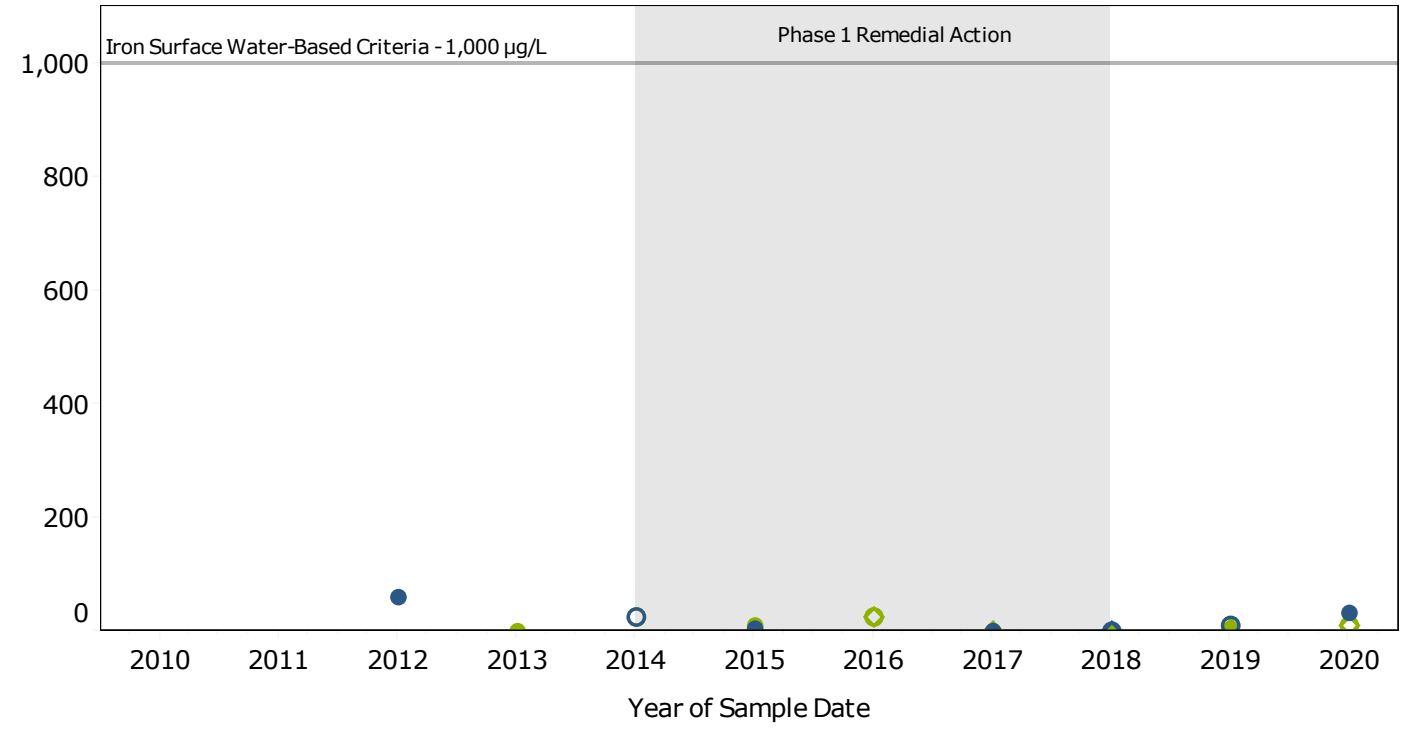
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

MW-2, Copper



MW-2, Iron



Legend

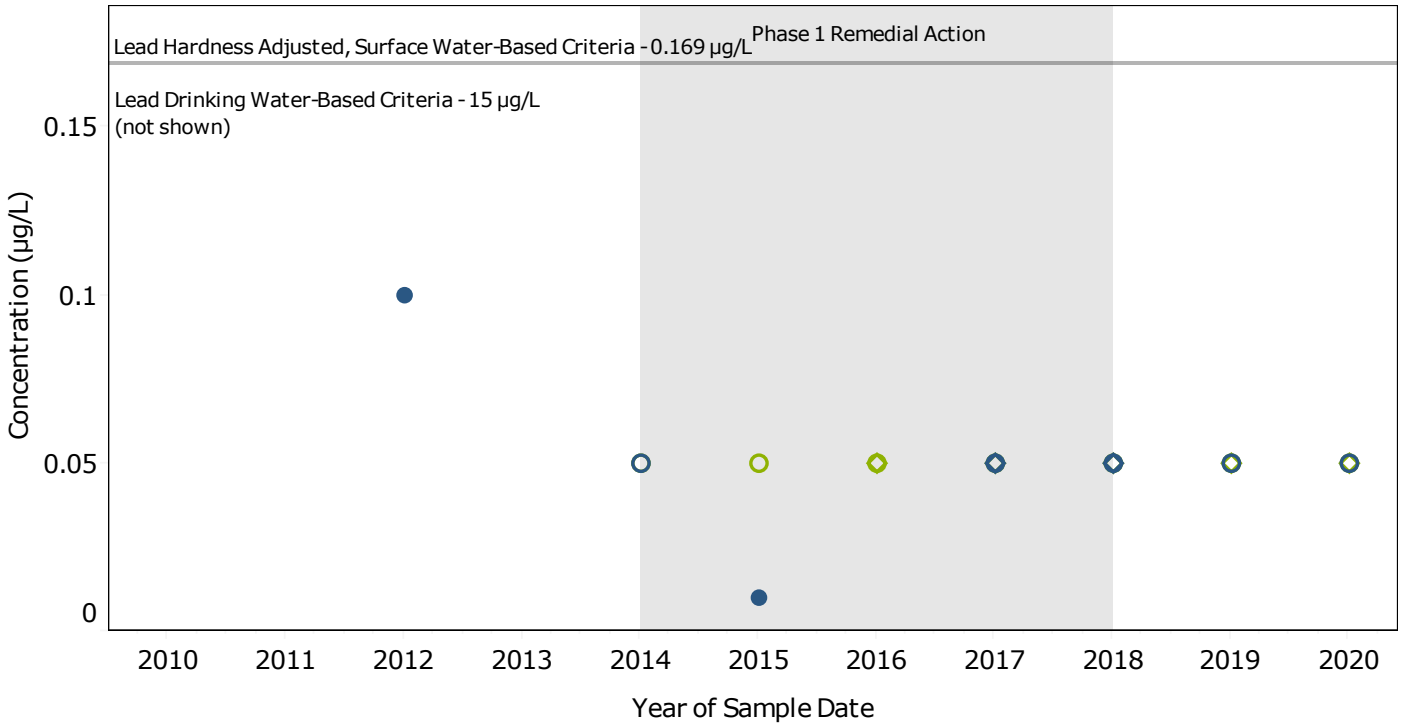
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

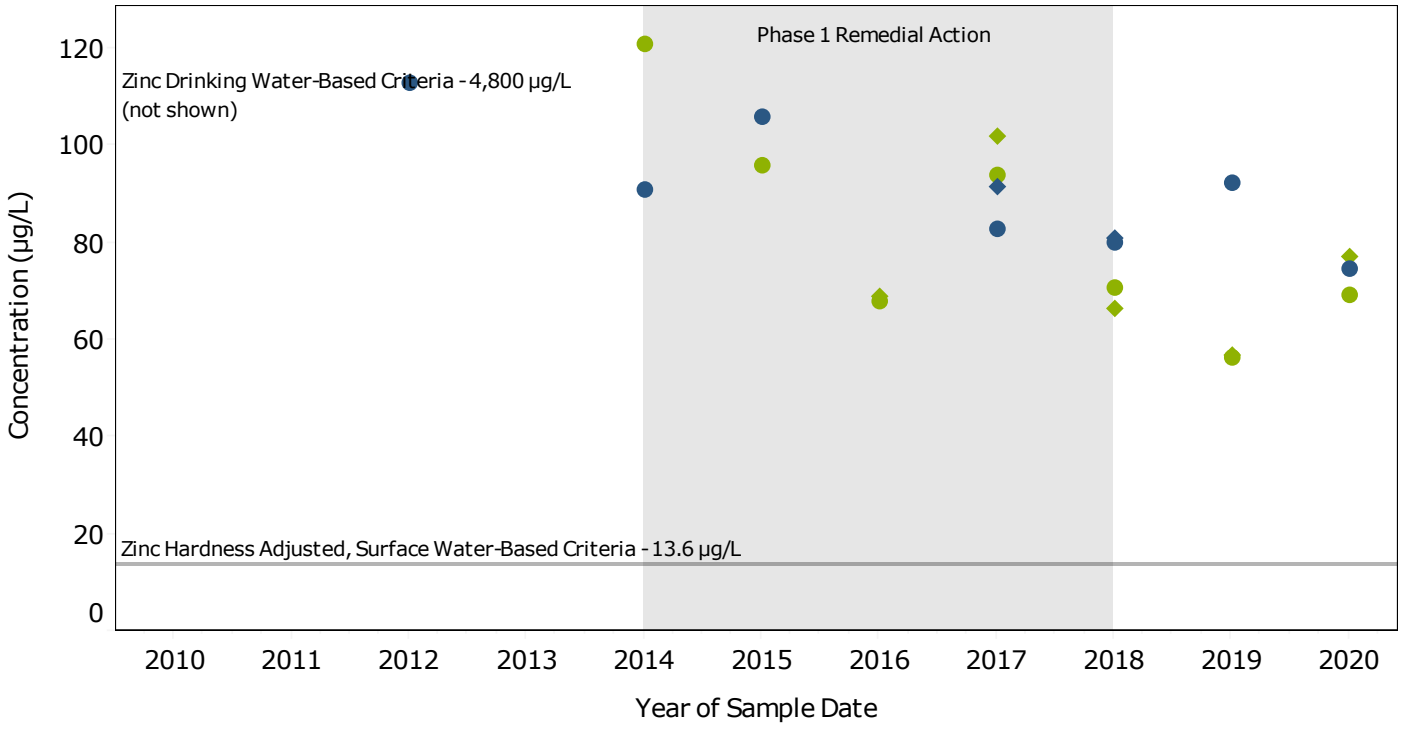
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

MW-2, Lead



MW-2, Zinc



Legend

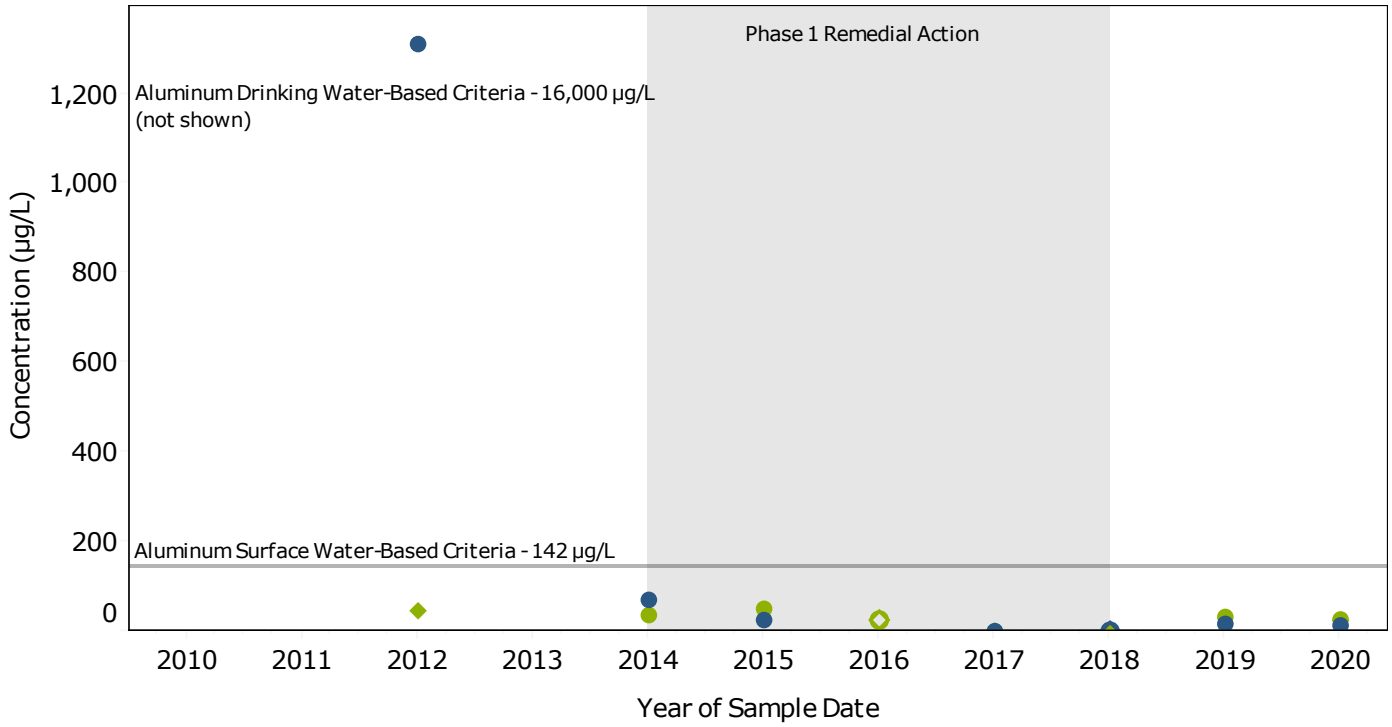
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

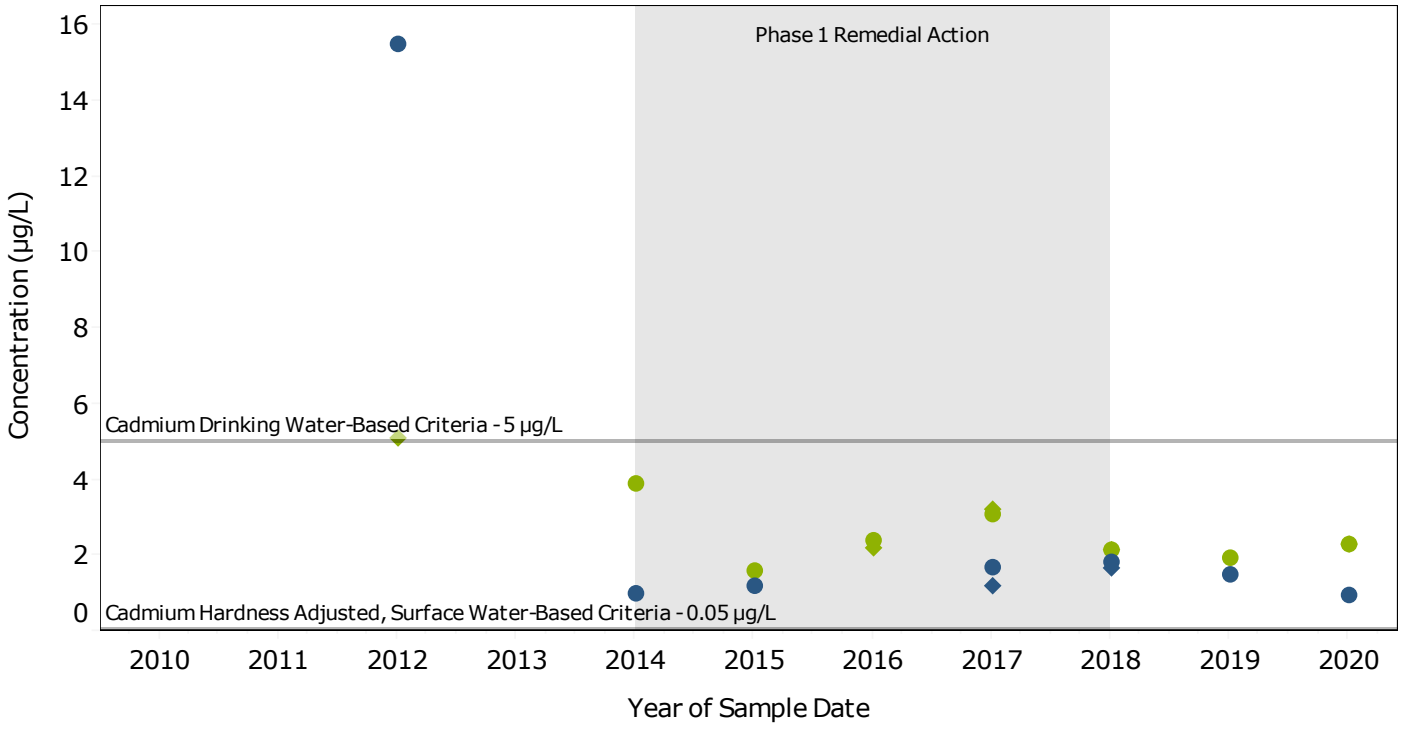
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

MW-3, Aluminum



MW-3, Cadmium



Legend

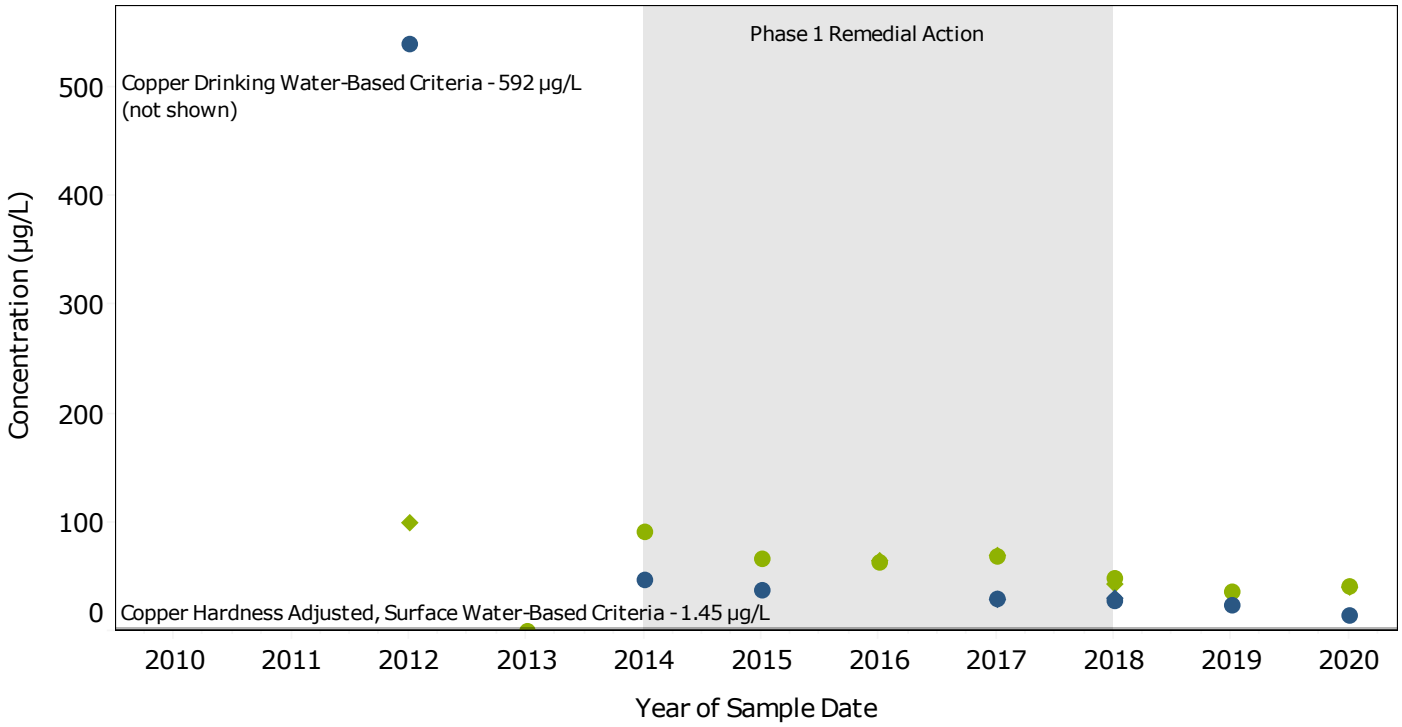
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

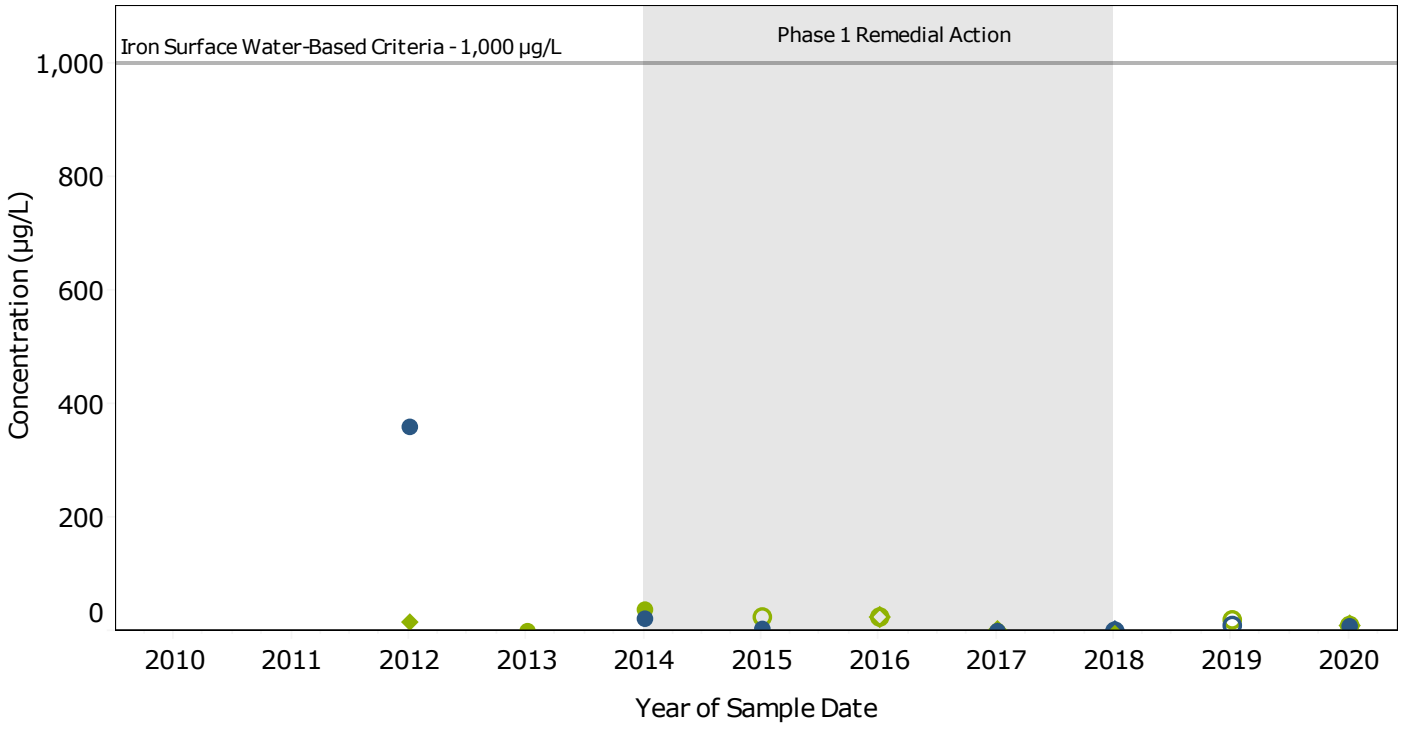
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

MW-3, Copper



MW-3, Iron



Legend

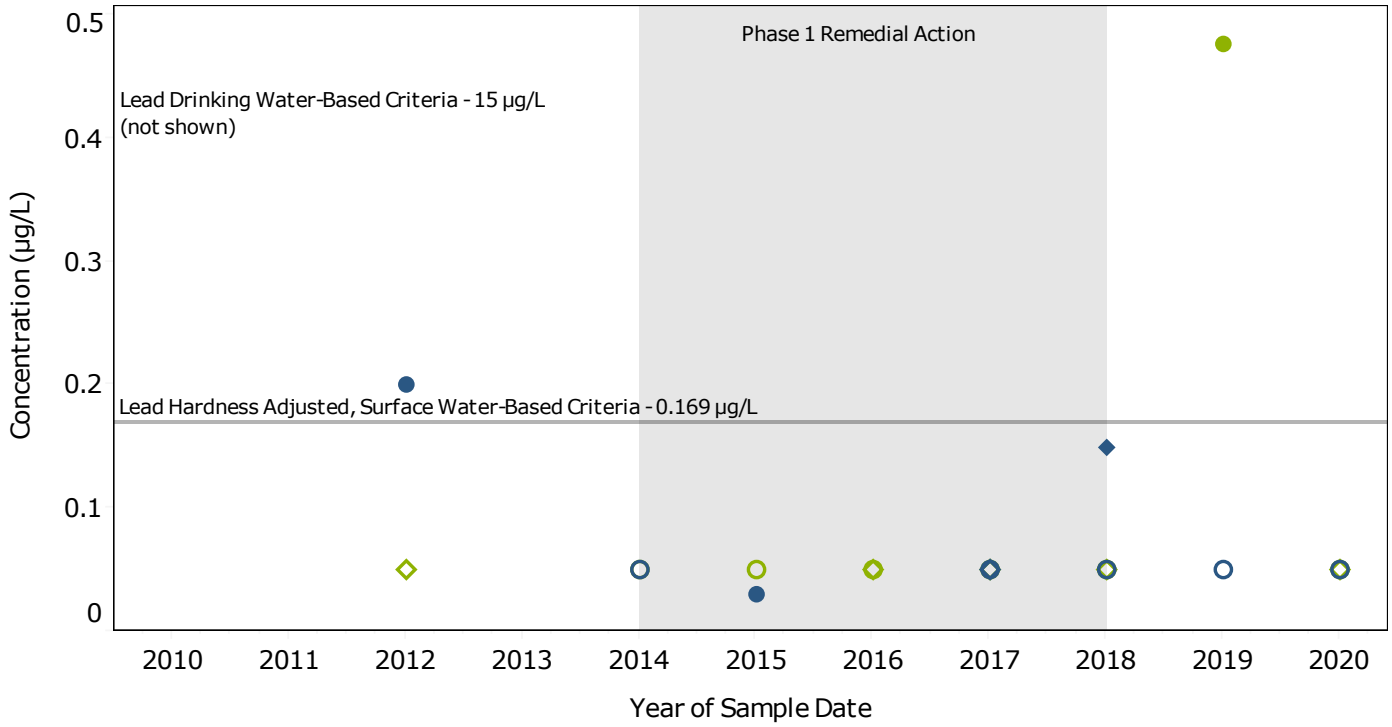
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

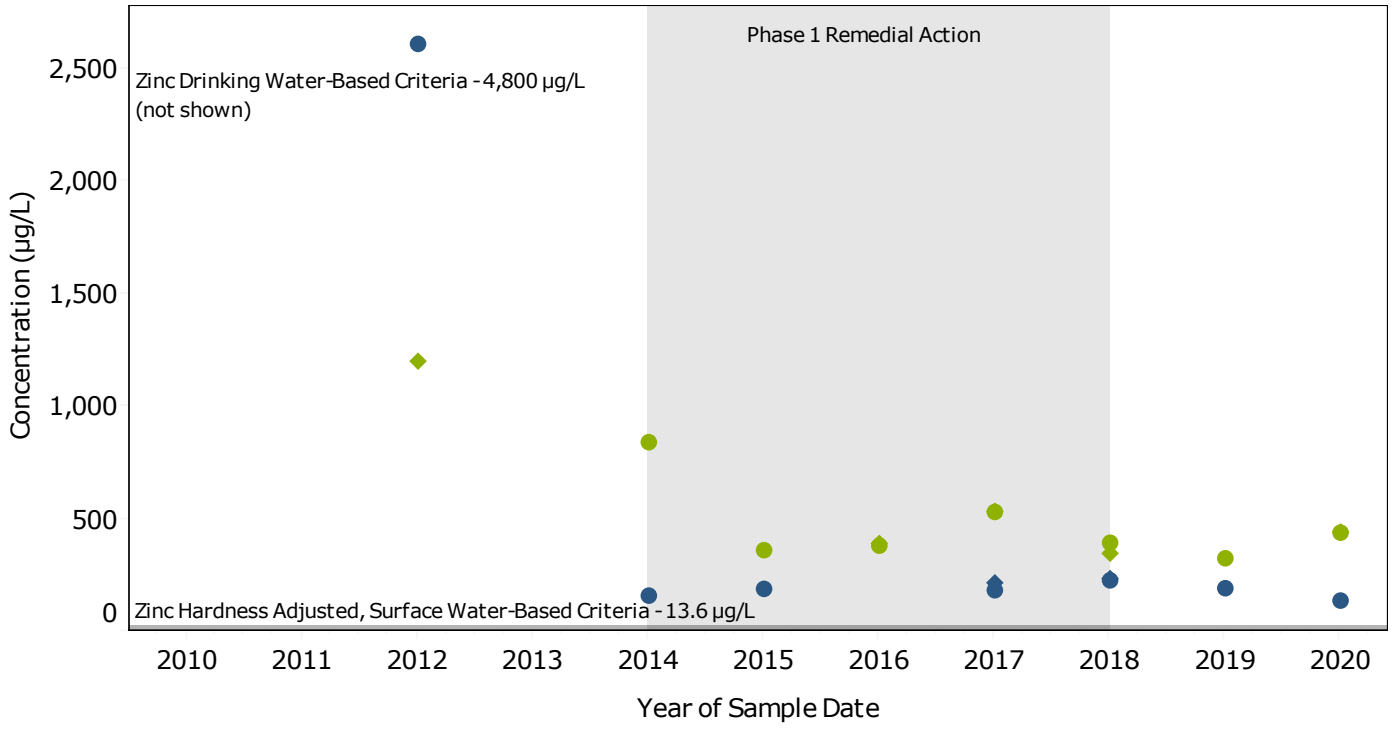
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

MW-3, Lead



MW-3, Zinc



Legend

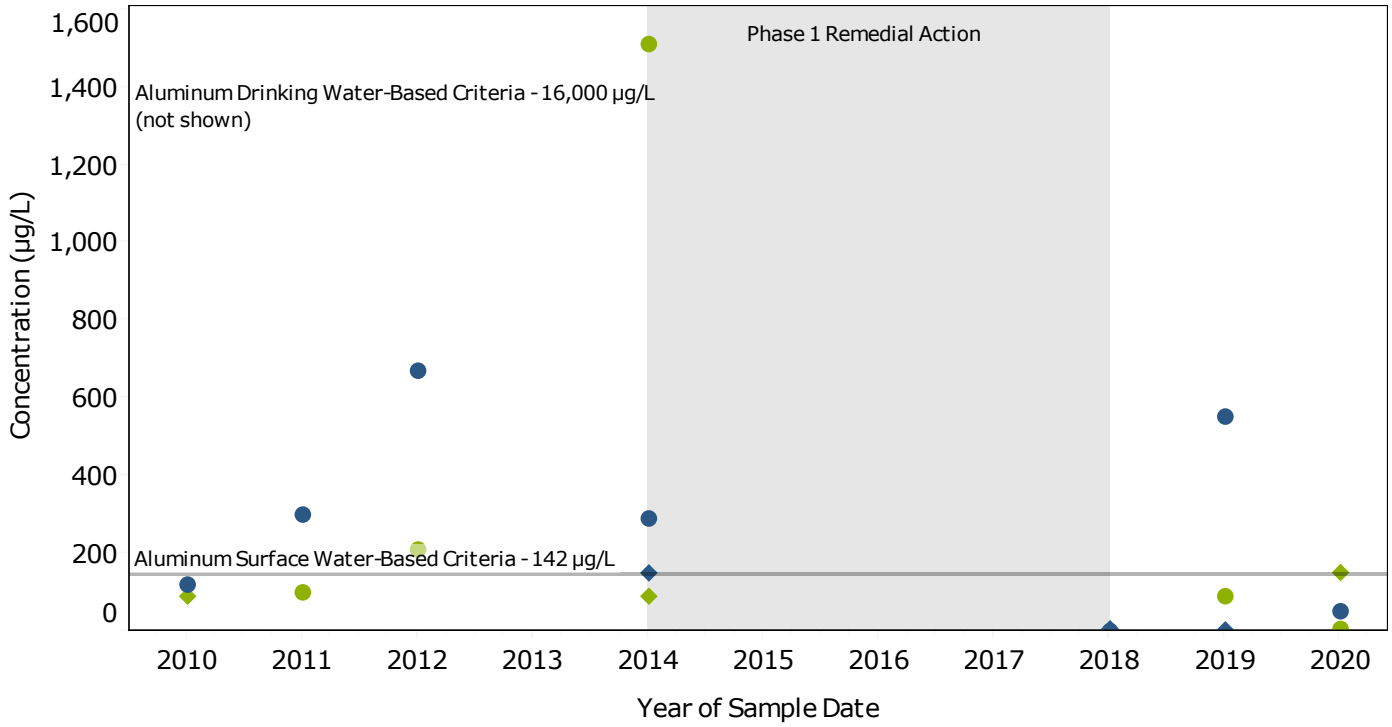
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

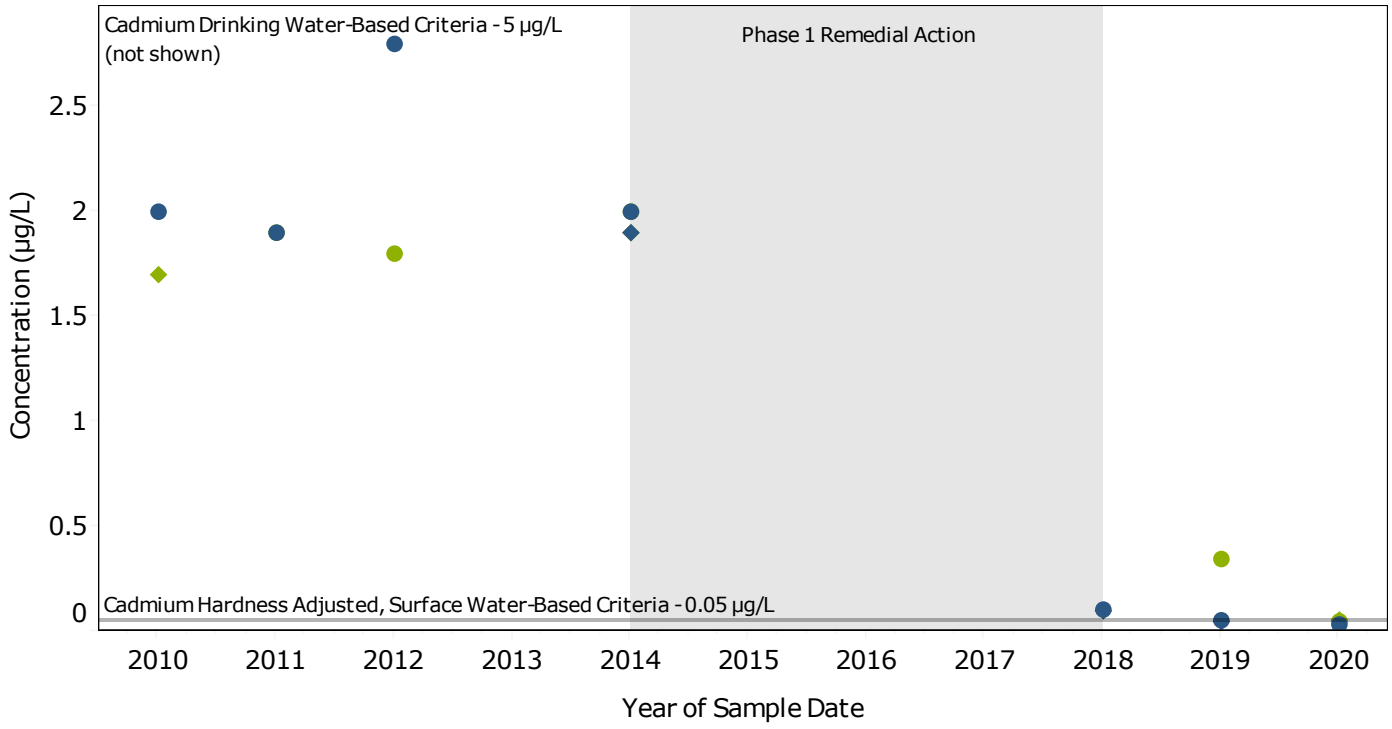
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

NRC-3D & NRC-3DR, Aluminum



NRC-3D & NRC-3DR, Cadmium



Legend

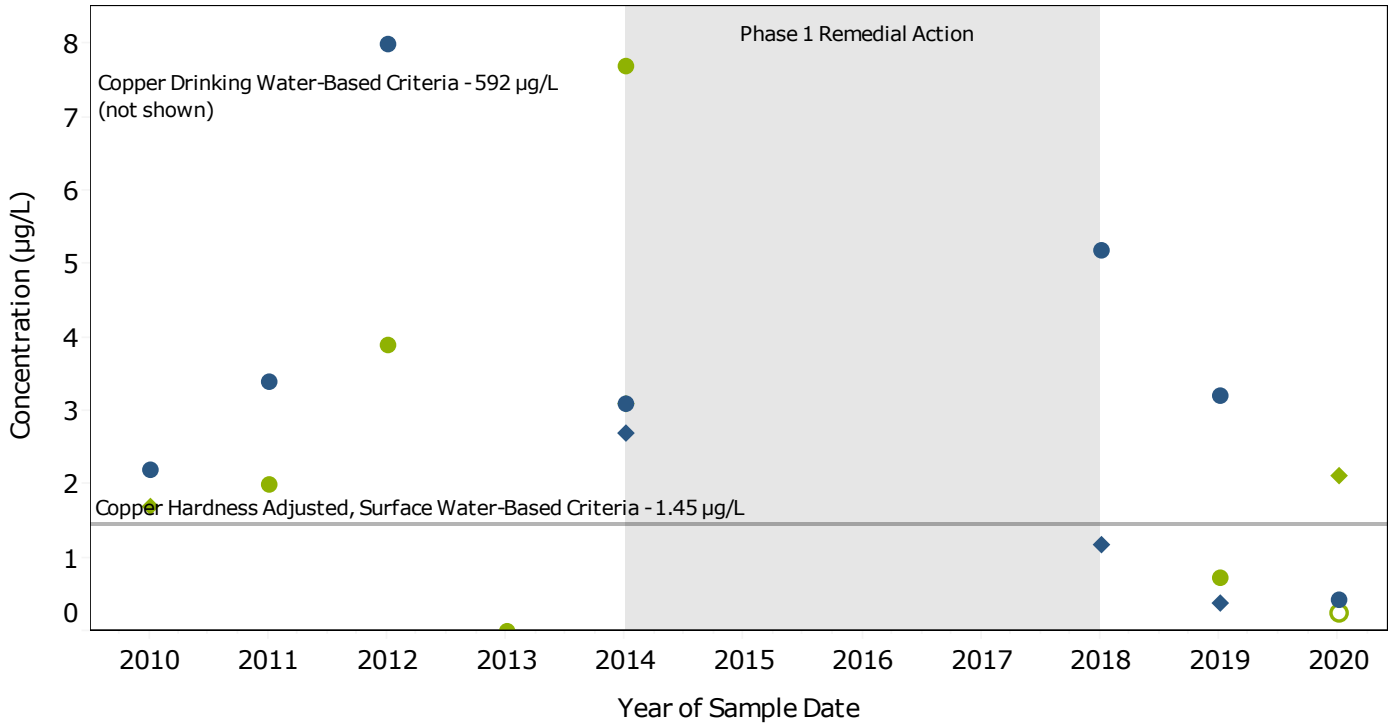
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

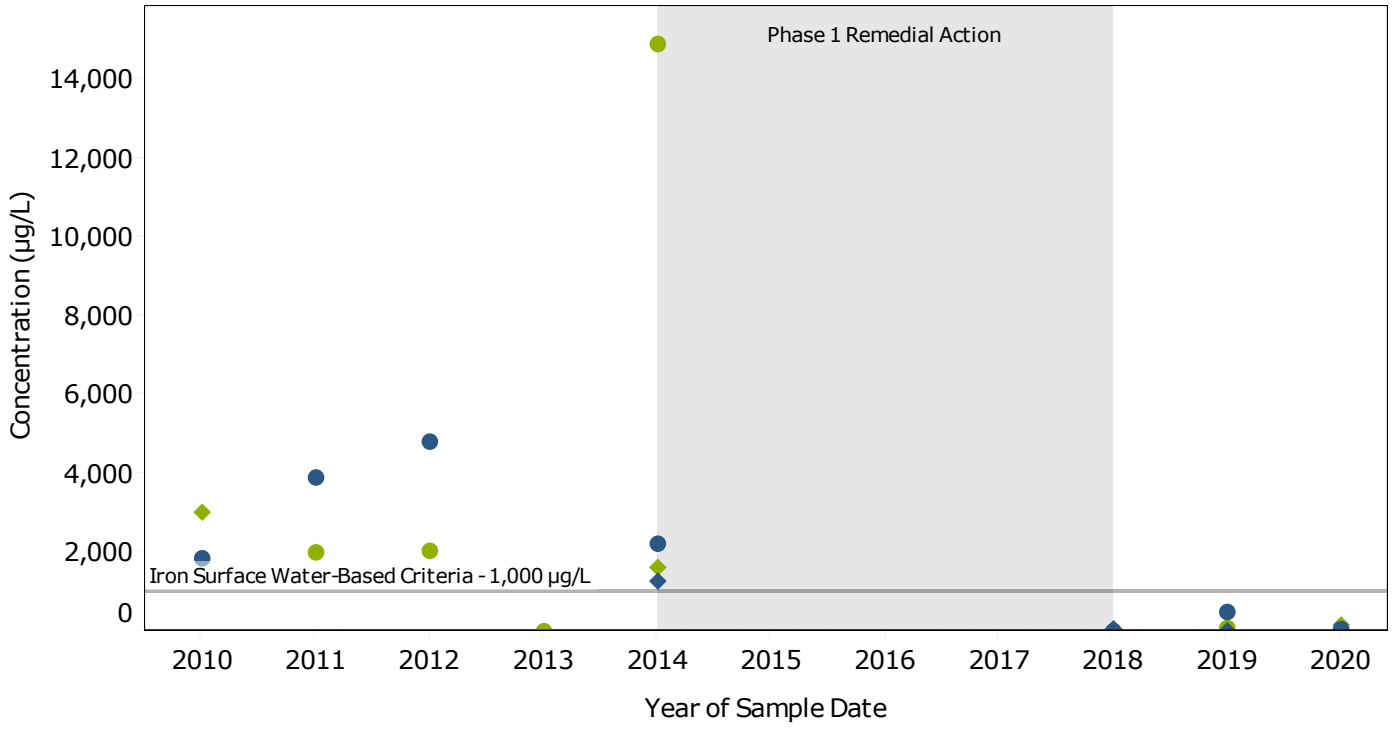
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

NRC-3D & NRC-3DR, Copper



NRC-3D & NRC-3DR, Iron



Legend

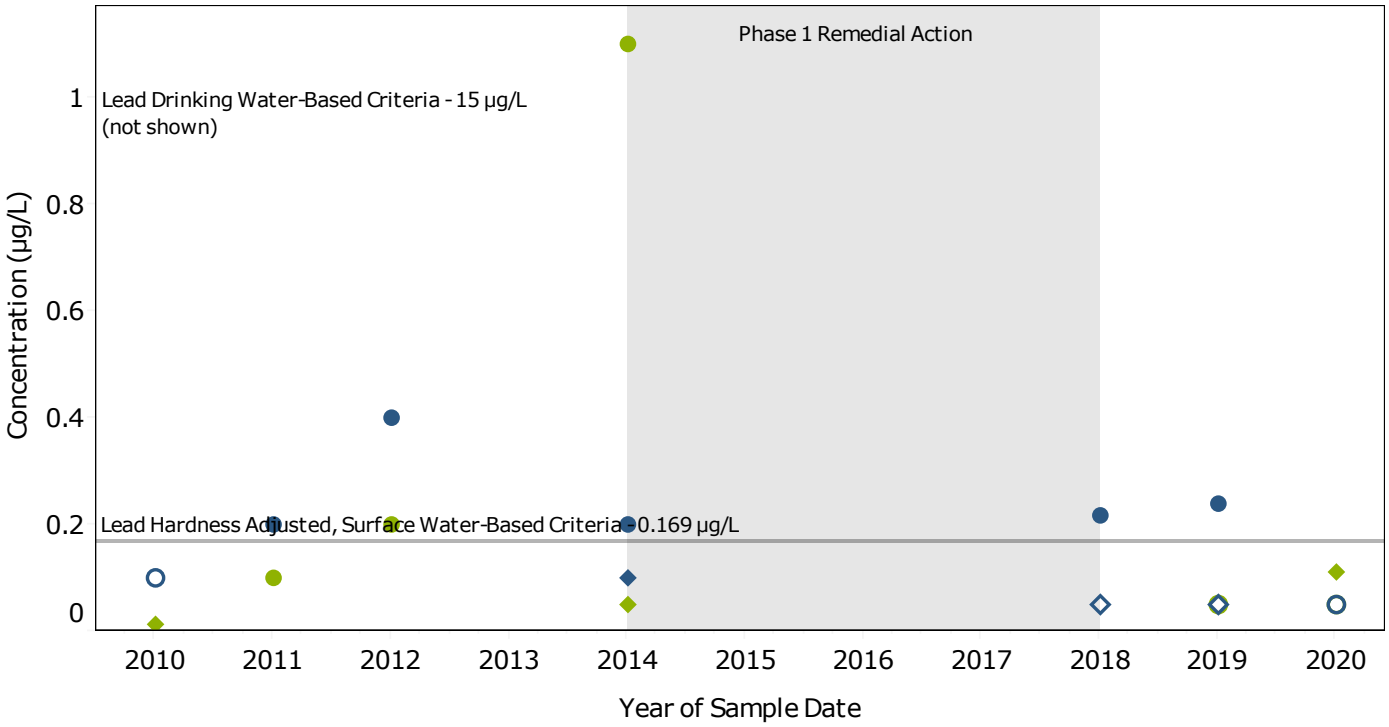
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

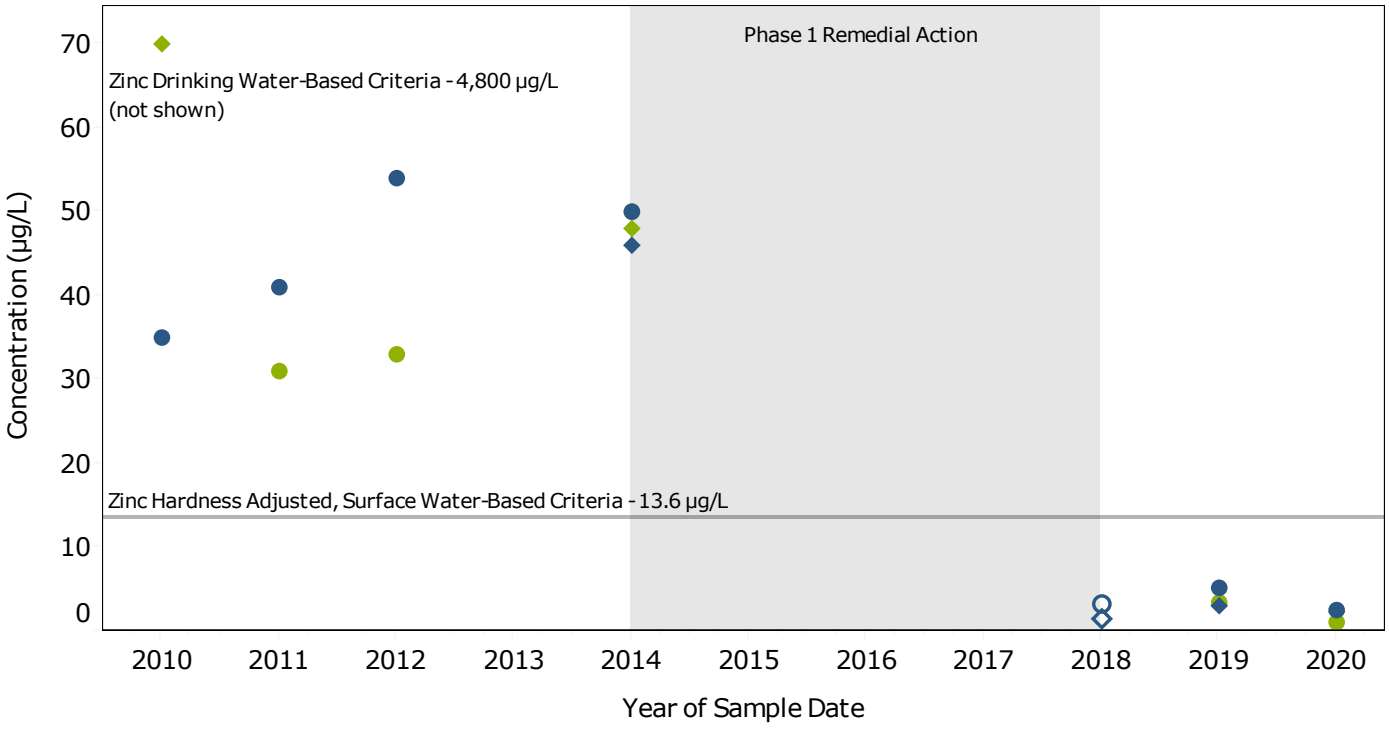
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

NRC-3D & NRC-3DR, Lead



NRC-3D & NRC-3DR, Zinc



Legend

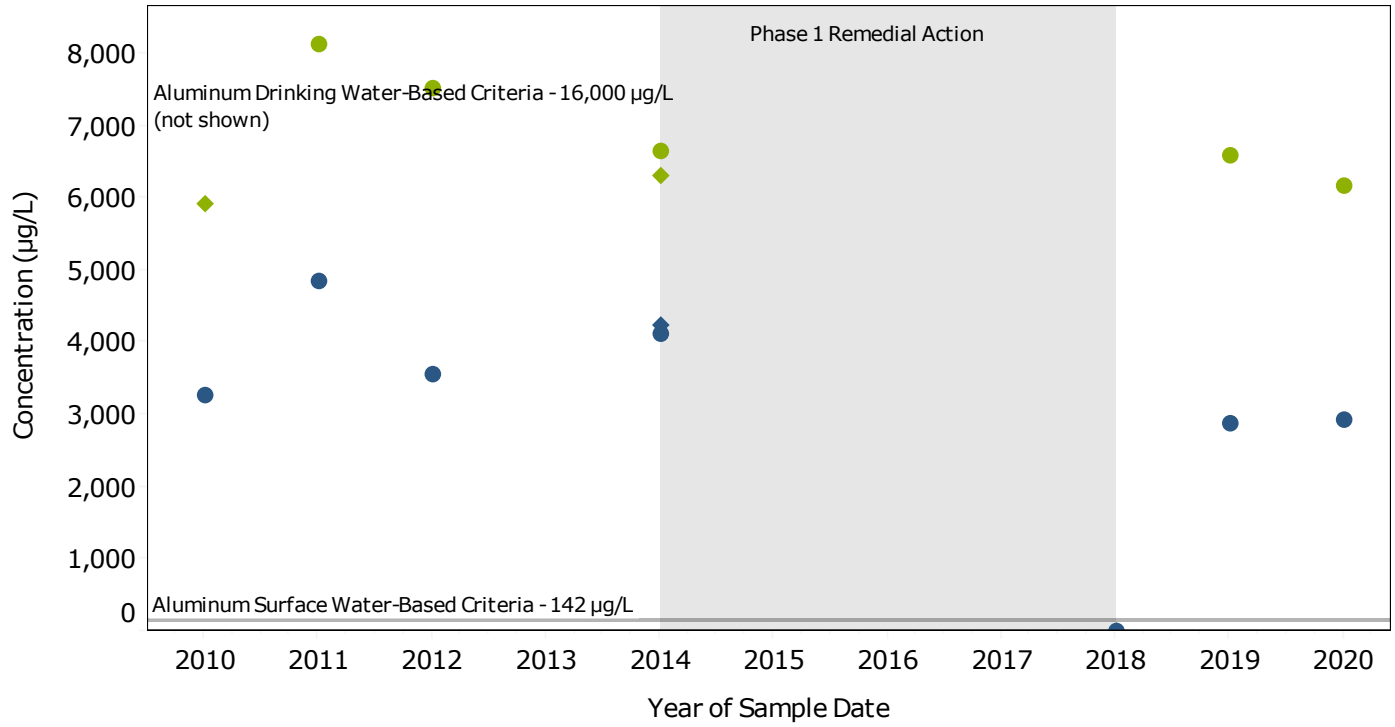
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

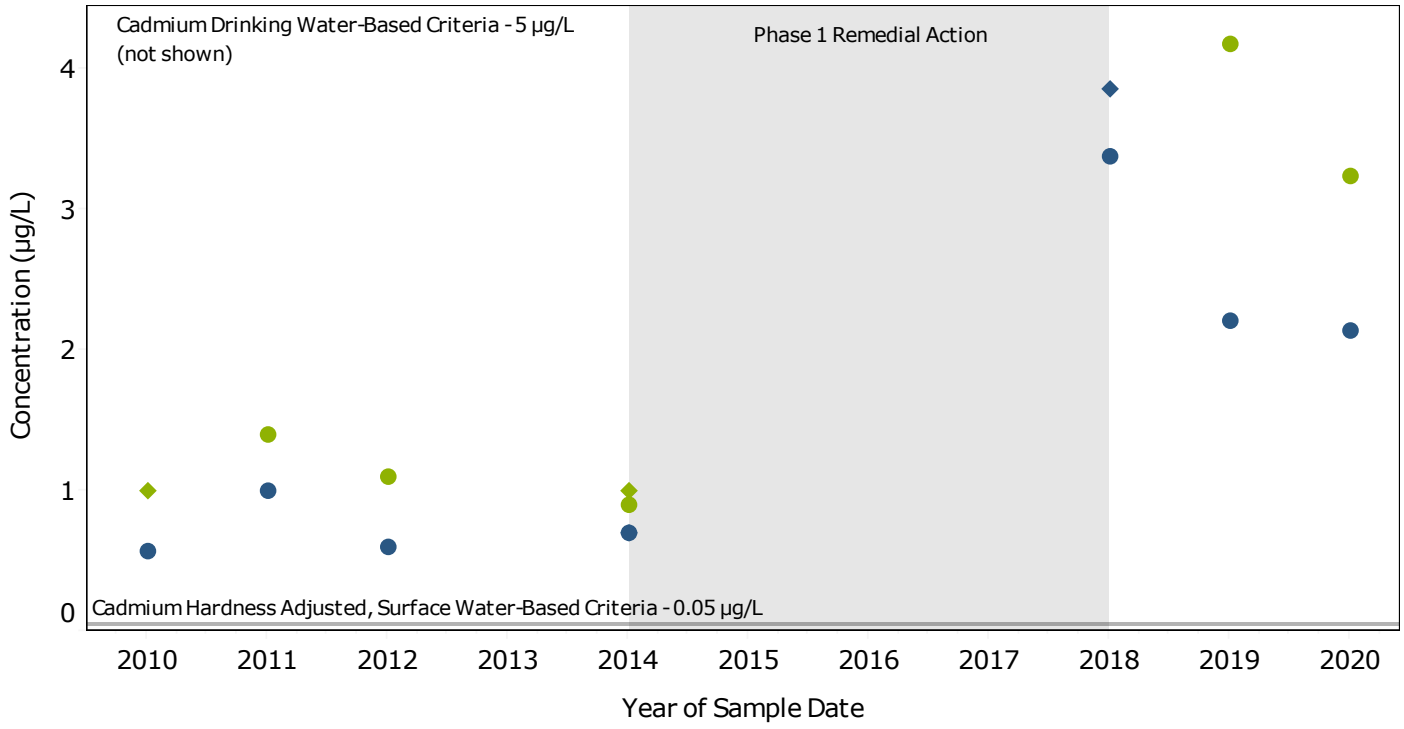
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

NRC-3I & NRC-3IR, Aluminum



NRC-3I & NRC-3IR, Cadmium



Legend

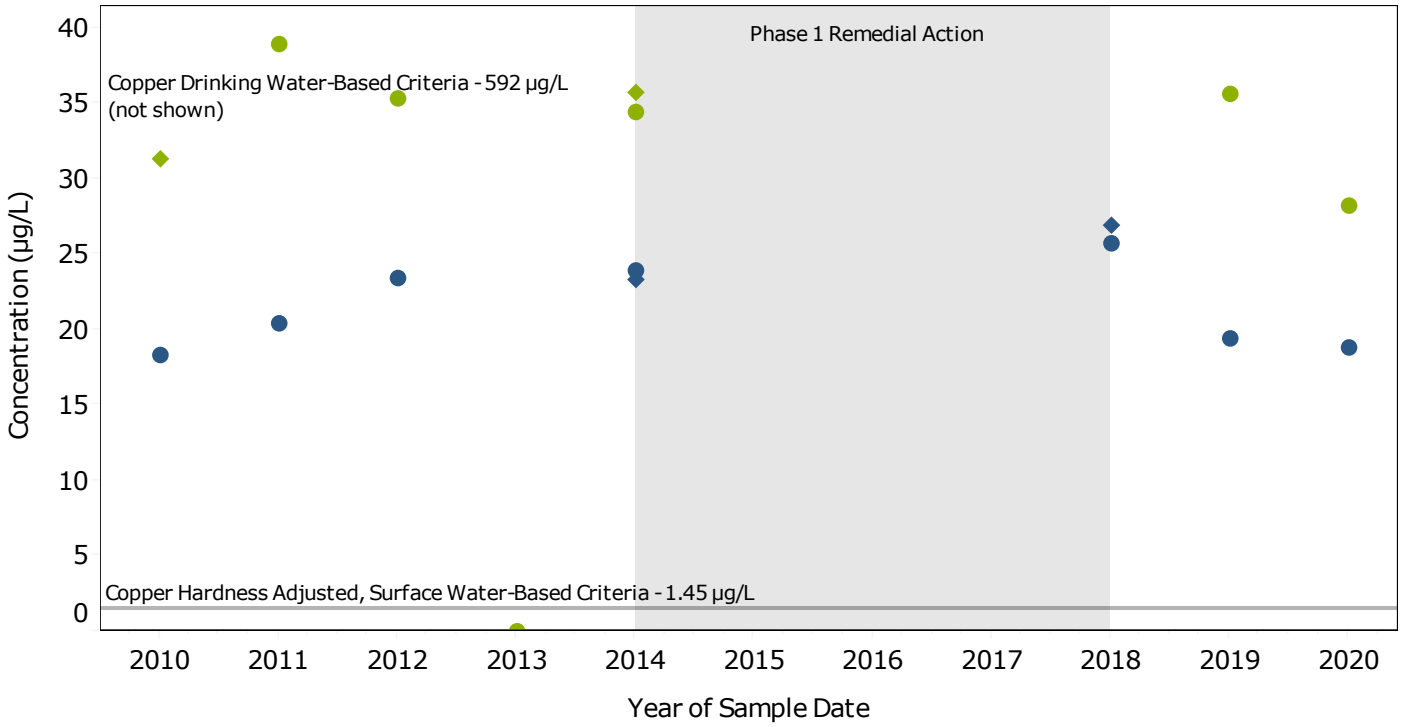
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

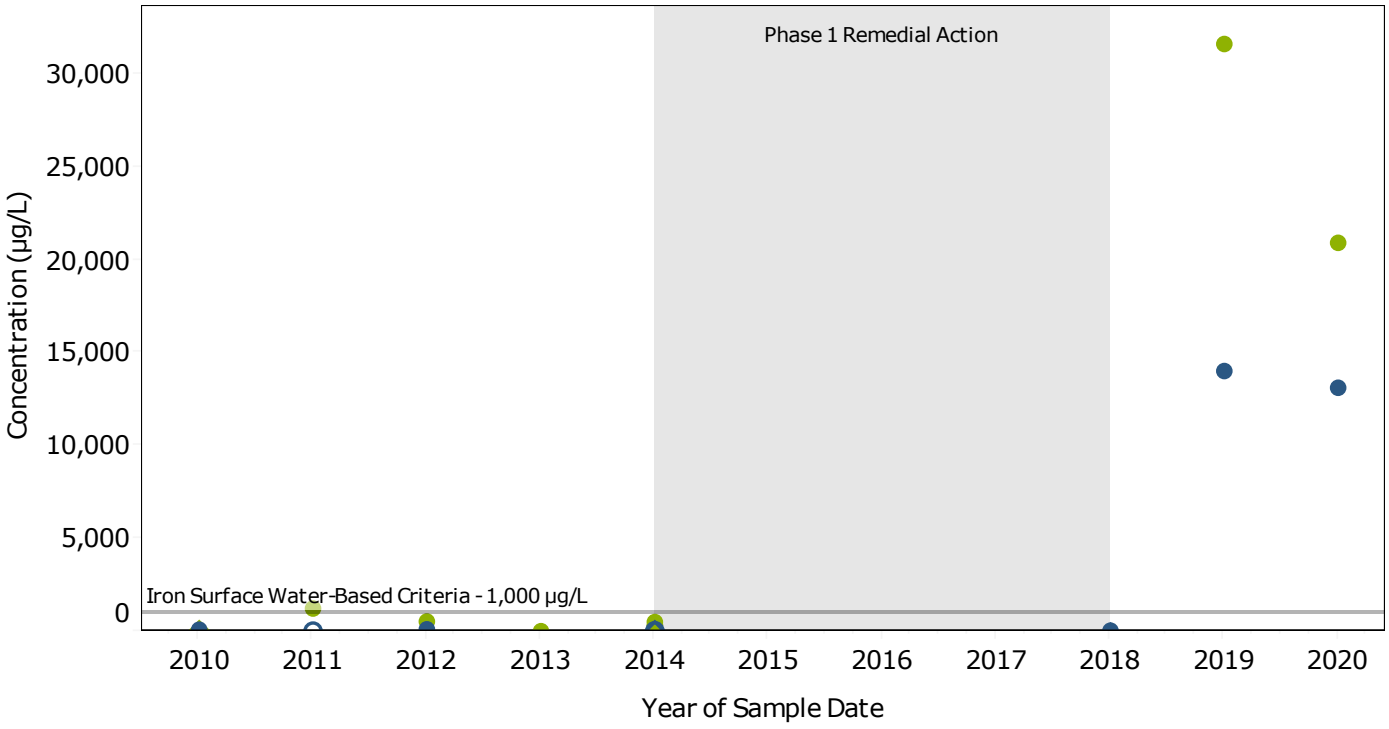
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

NRC-3I & NRC-3IR, Copper



NRC-3I & NRC-3IR, Iron



Legend

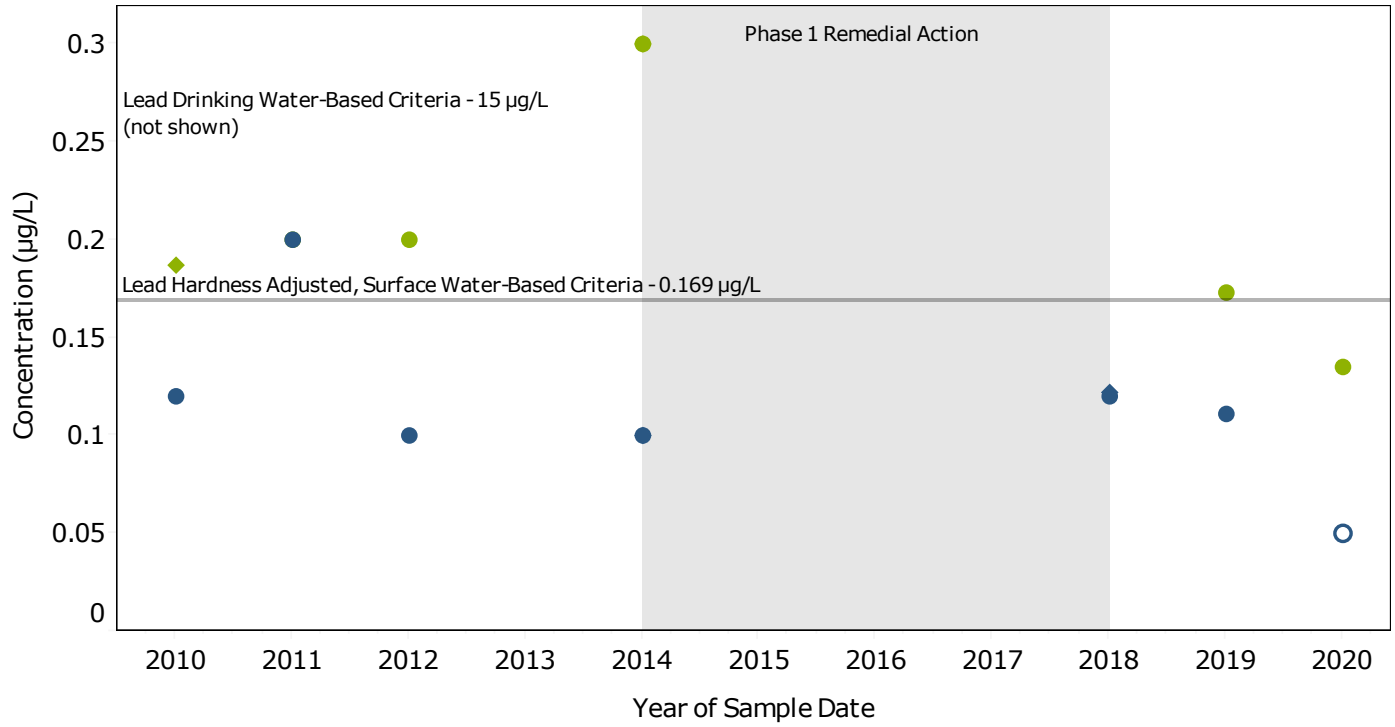
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

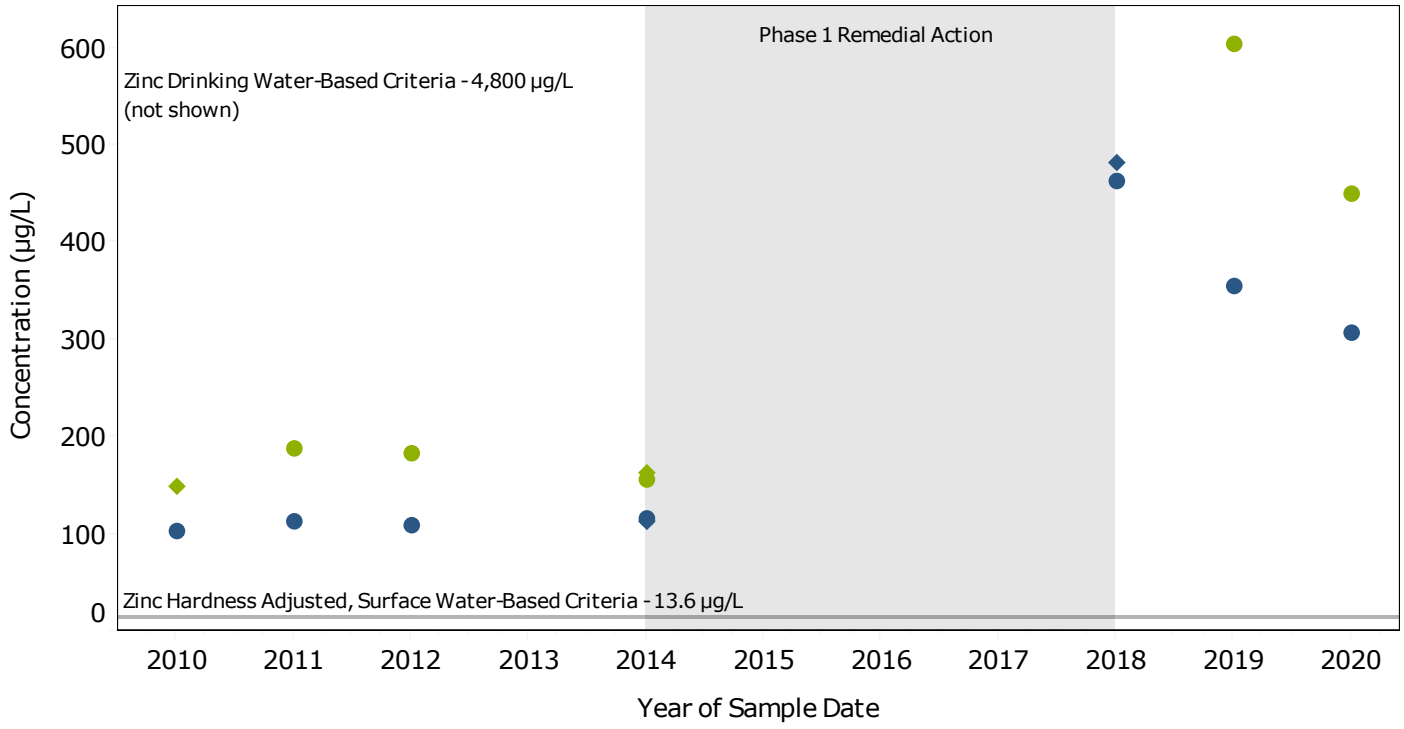
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

NRC-3I & NRC-3IR, Lead



NRC-3I & NRC-3IR, Zinc



Legend

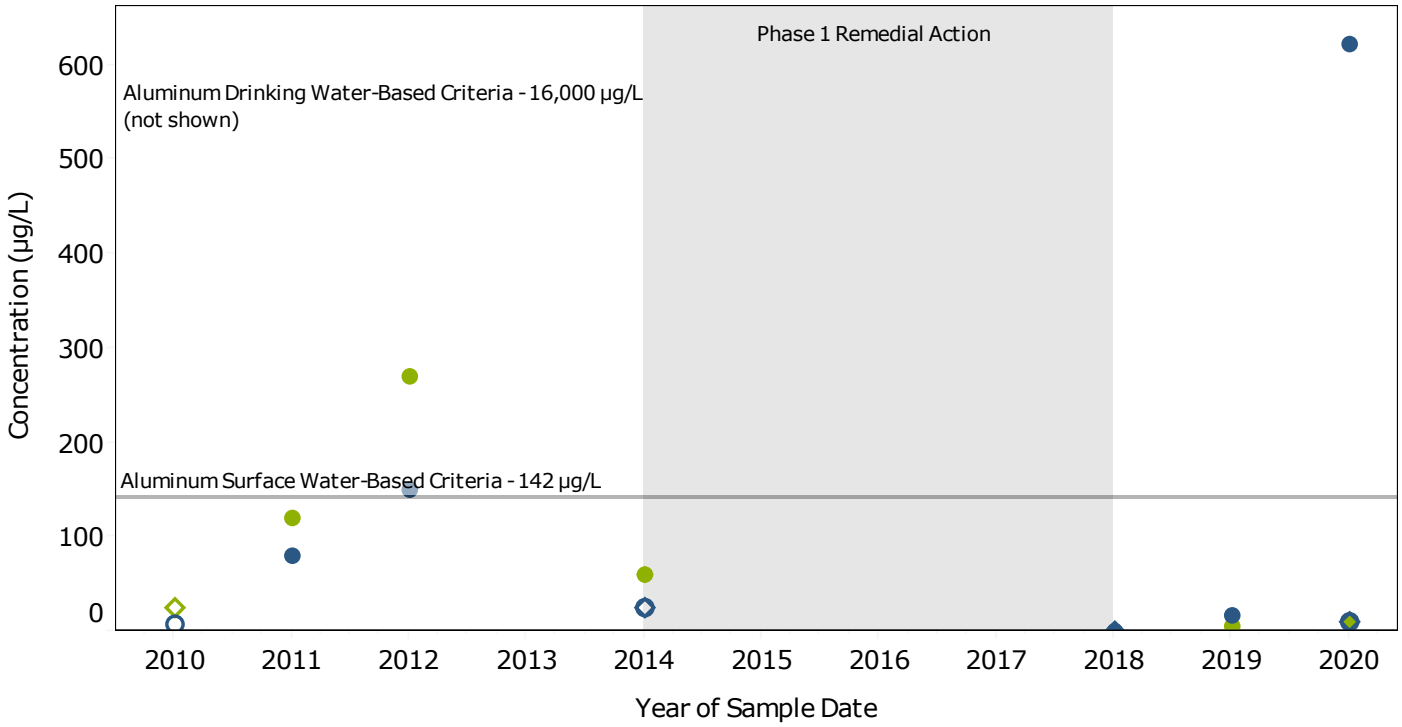
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

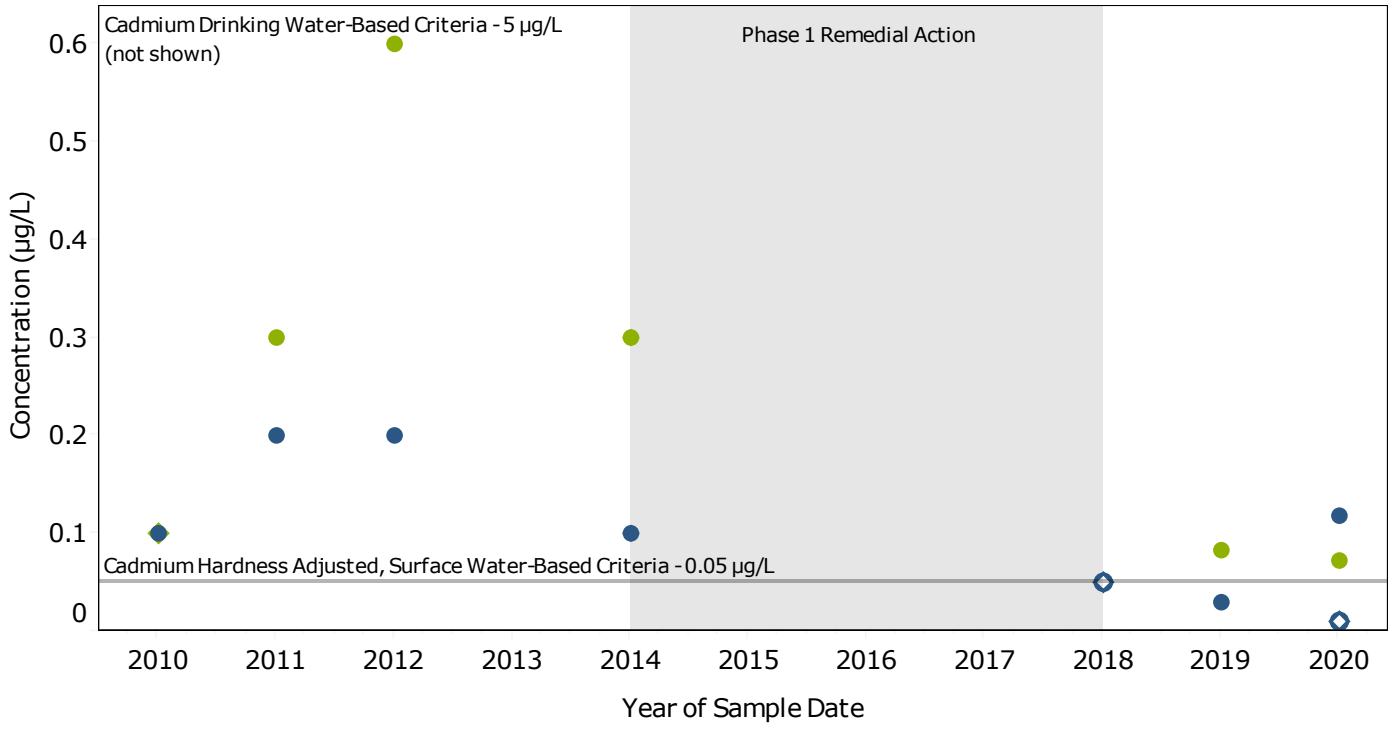
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

NRC-3S & NRC-3SR, Aluminum



NRC-3S & NRC-3SR, Cadmium



Legend

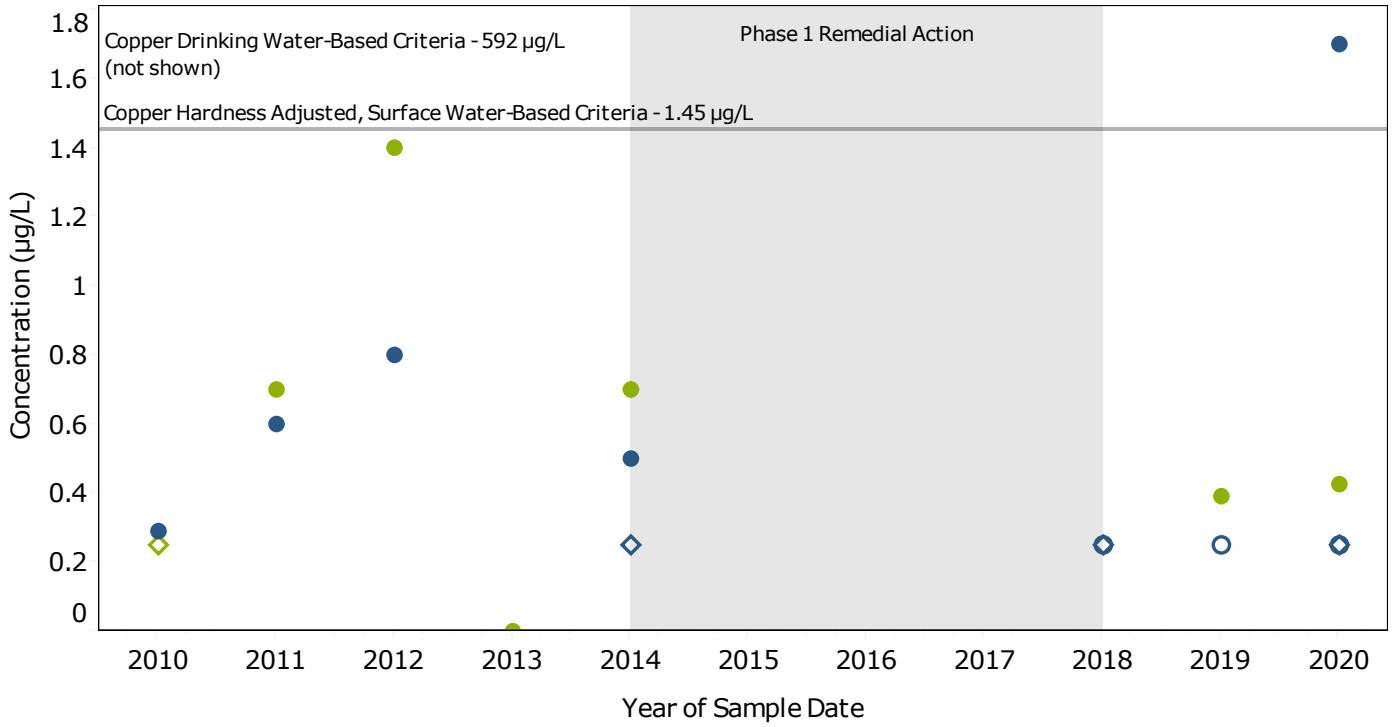
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

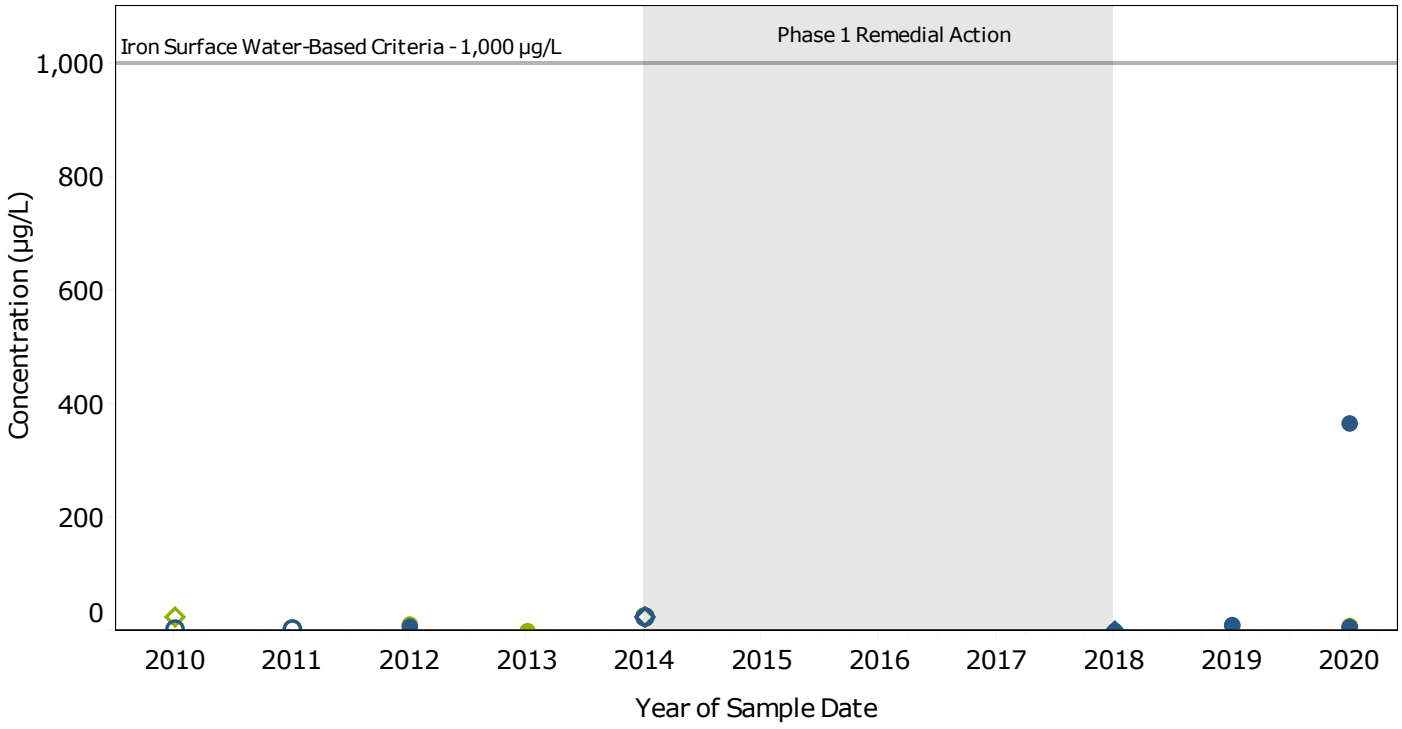
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

NRC-3S & NRC-3SR, Copper



NRC-3S & NRC-3SR, Iron



Legend

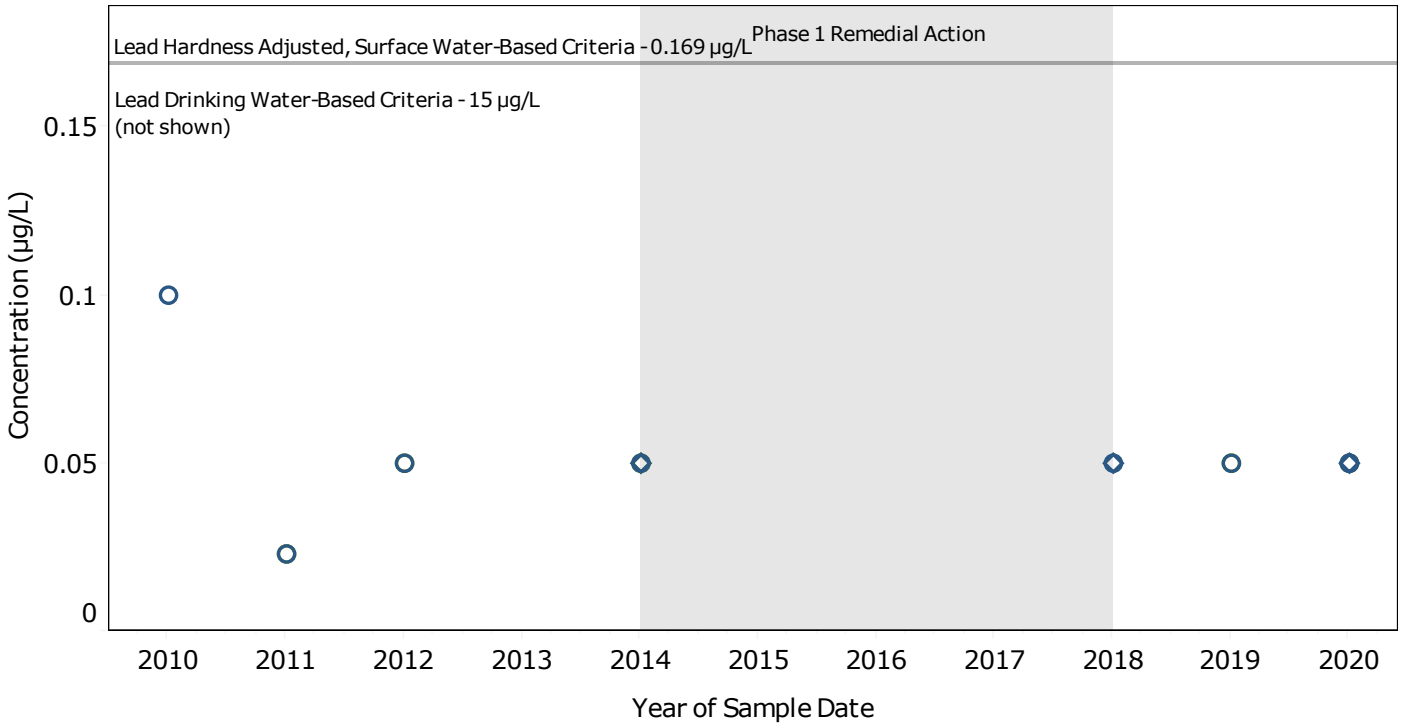
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

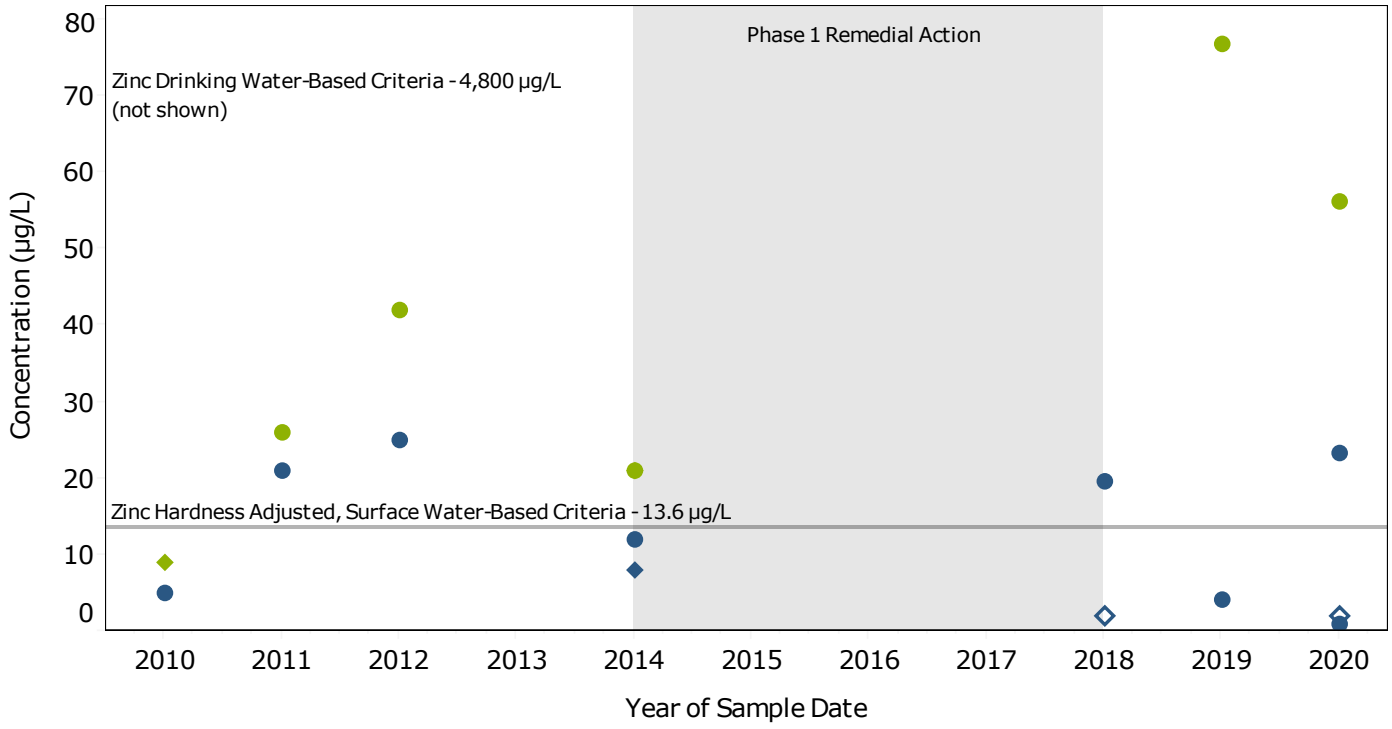
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

NRC-3S & NRC-3SR, Lead



NRC-3S & NRC-3SR, Zinc



Legend

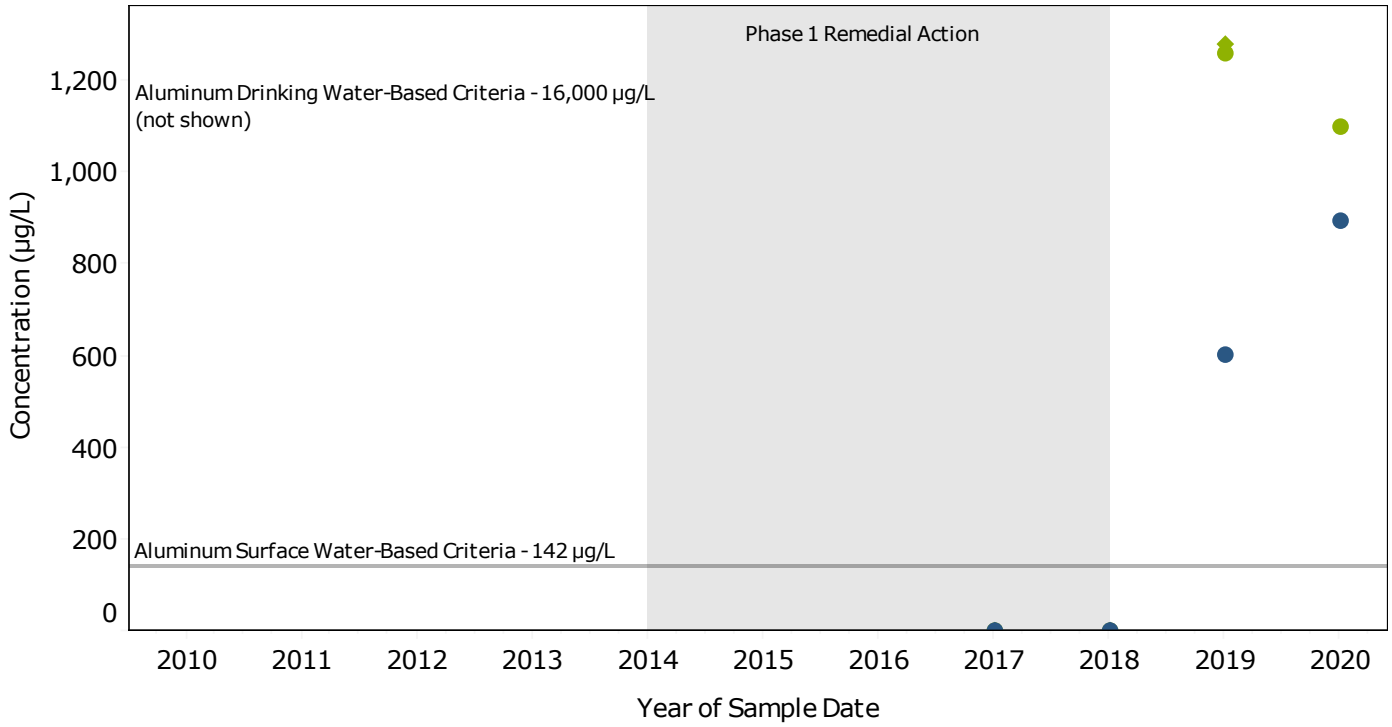
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

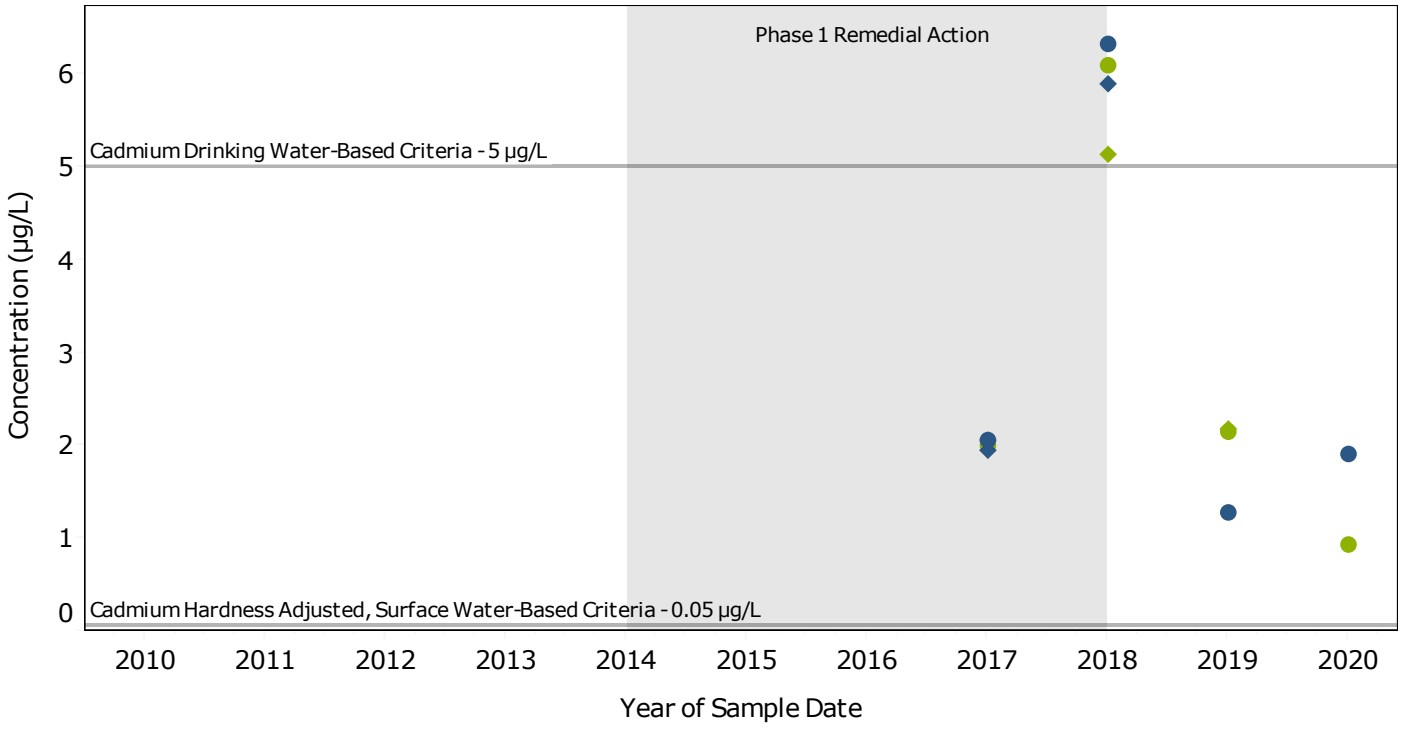
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

TP2-12D, Aluminum



TP2-12D, Cadmium



Legend

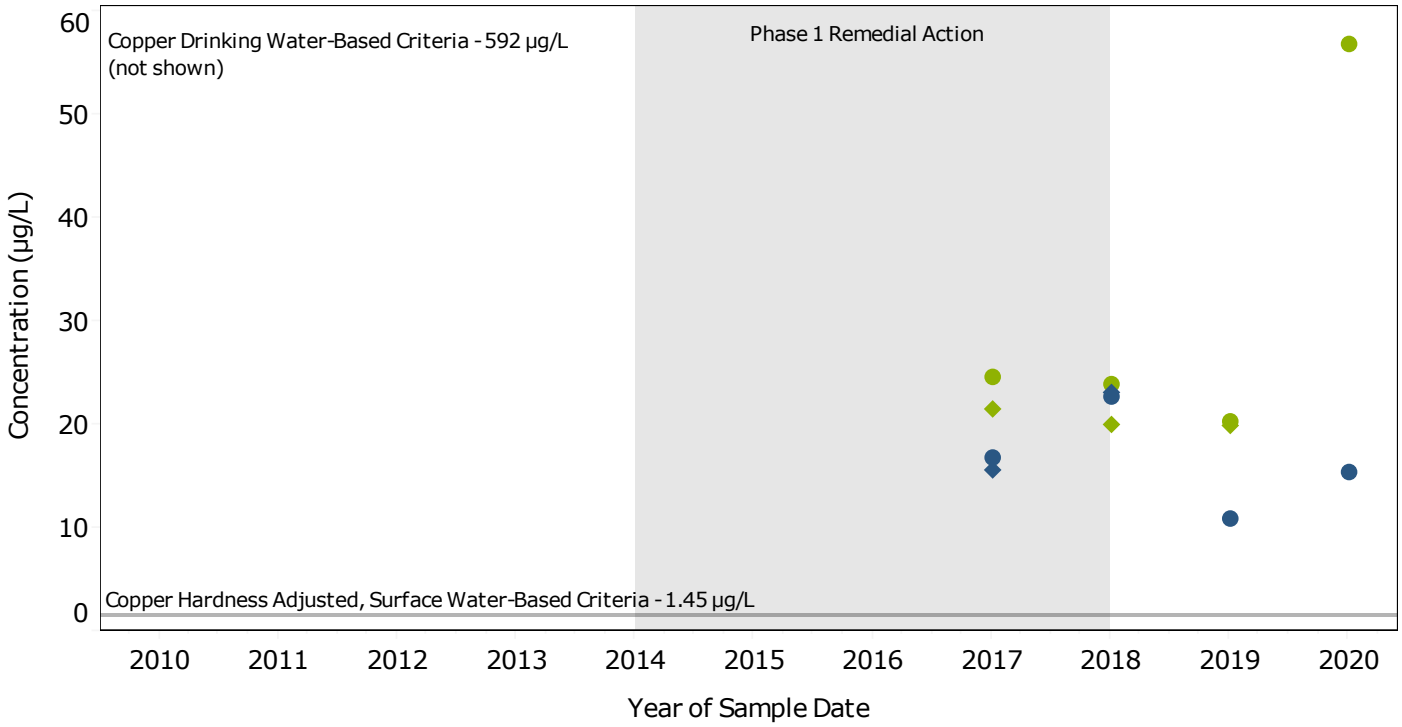
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

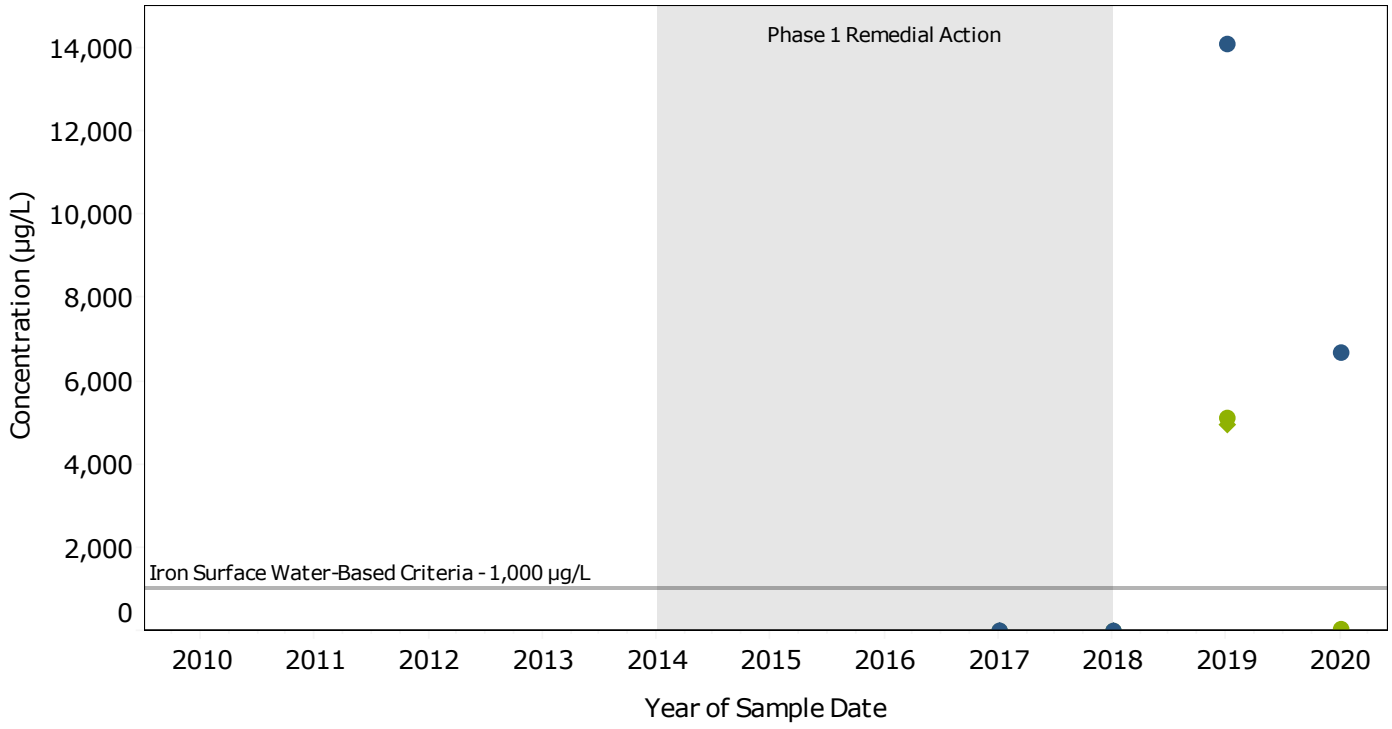
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

TP2-12D, Copper



TP2-12D, Iron



Legend

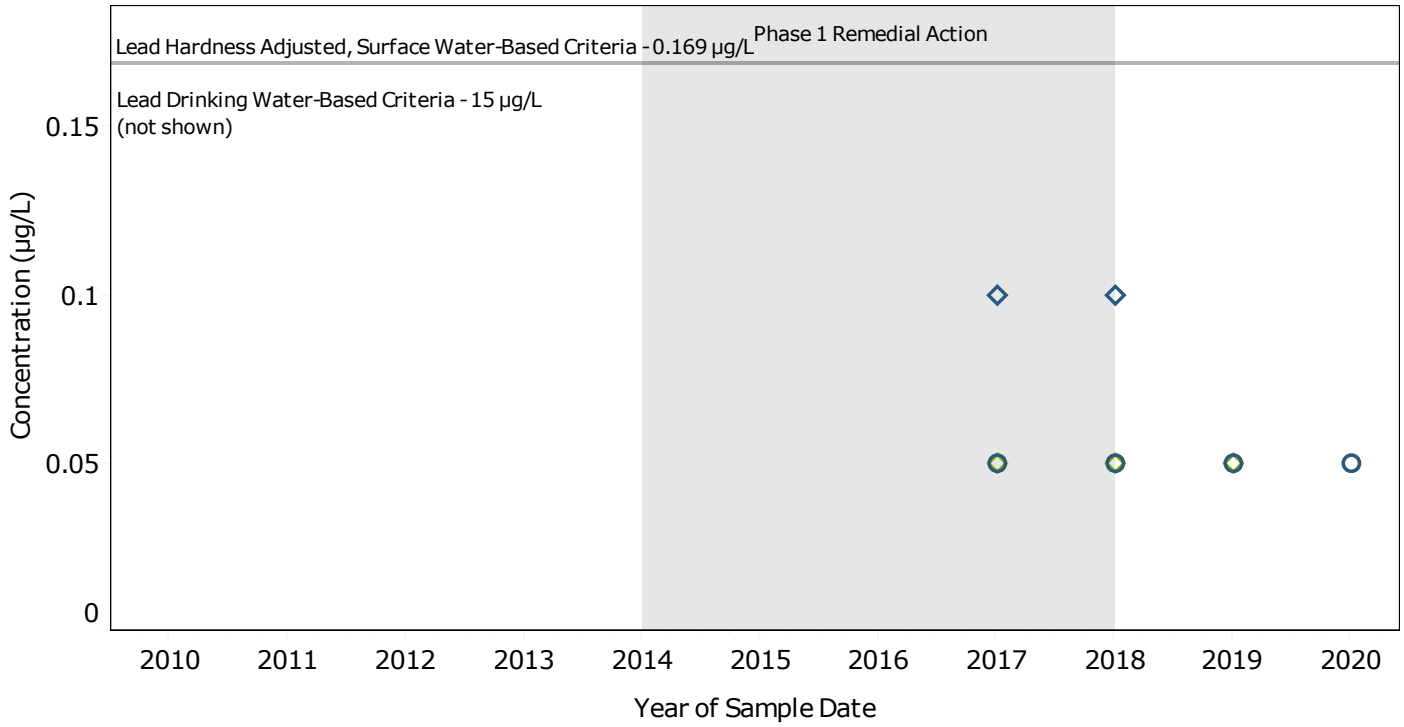
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

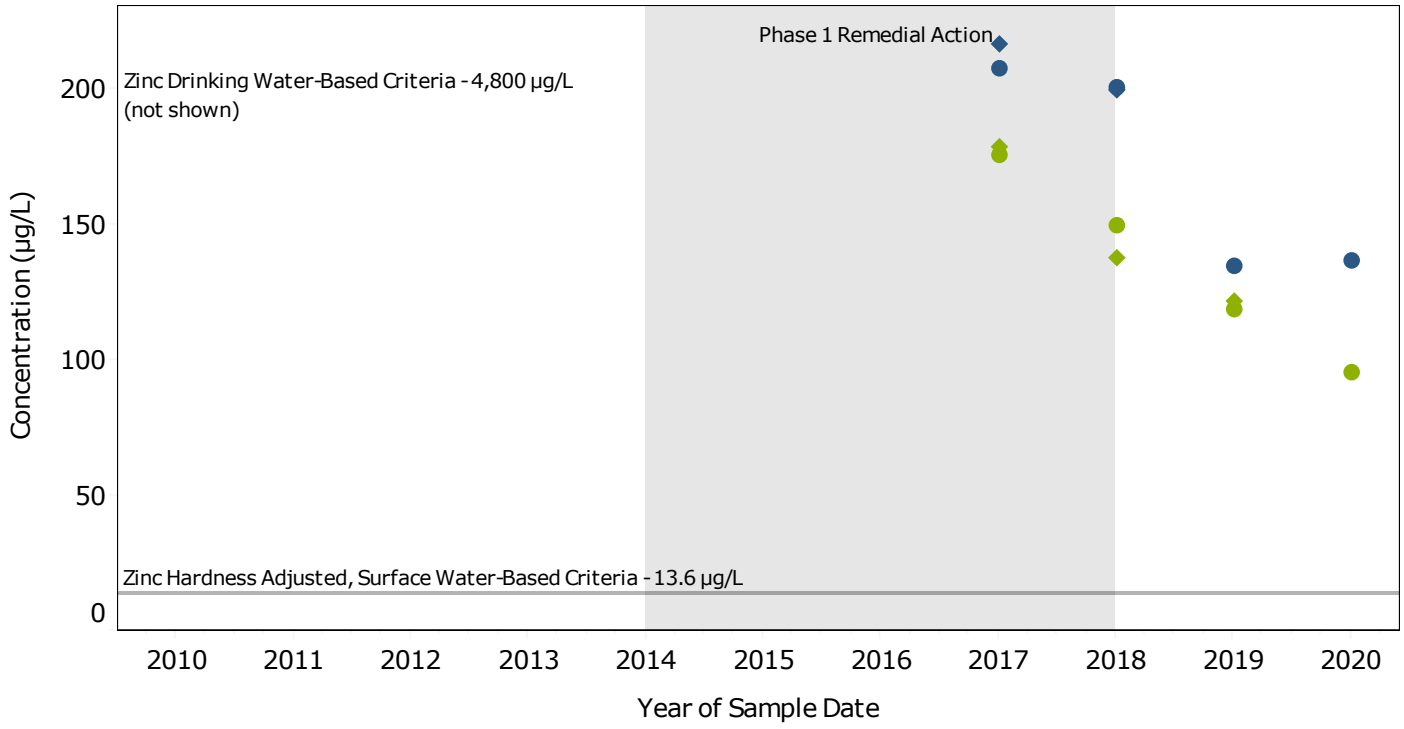
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

TP2-12D, Lead



TP2-12D, Zinc



Legend

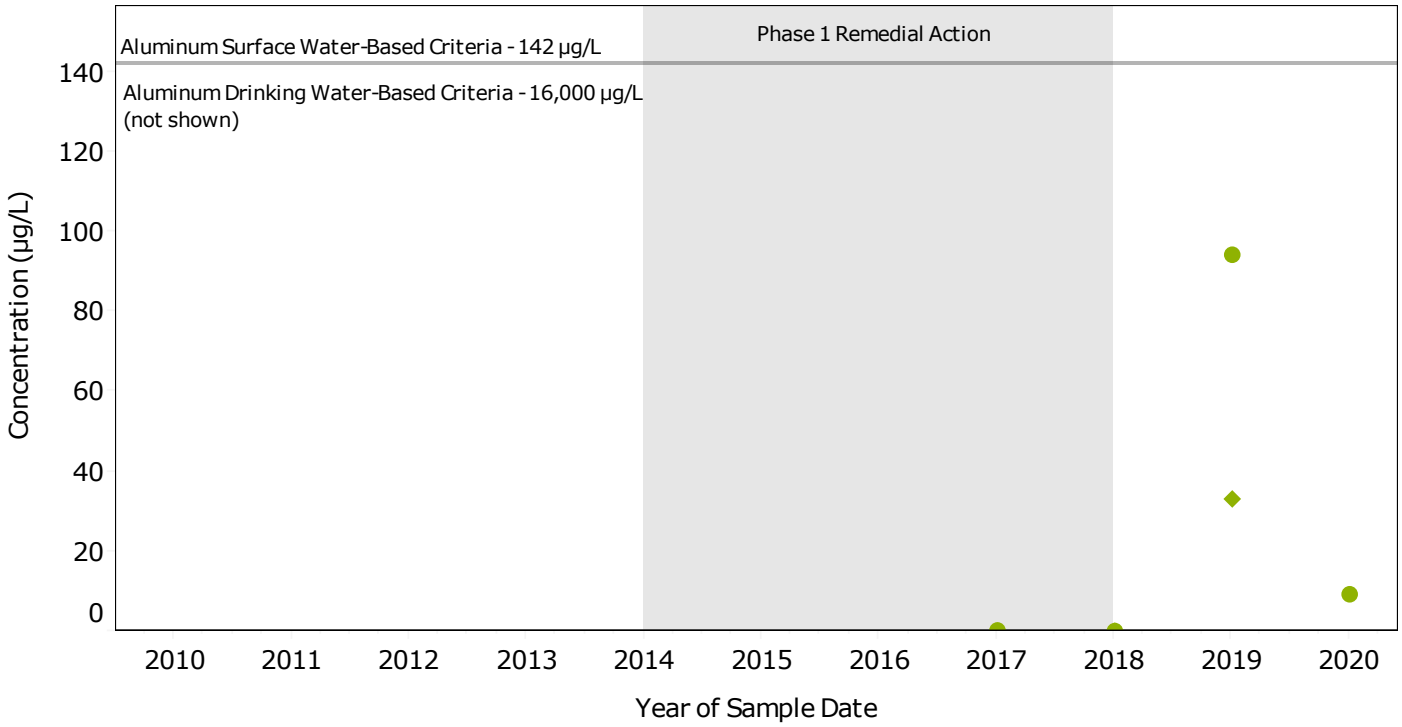
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

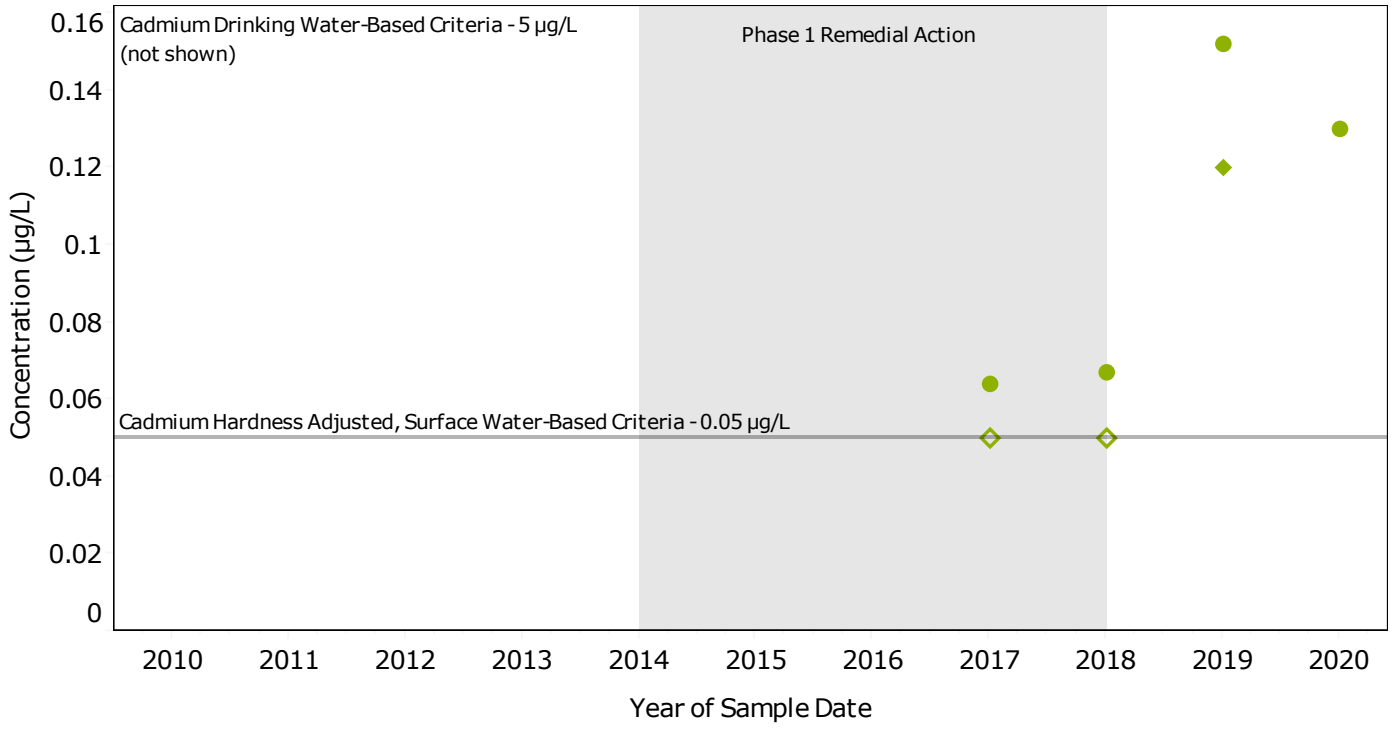
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

TP2-12S, Aluminum



TP2-12S, Cadmium



Legend

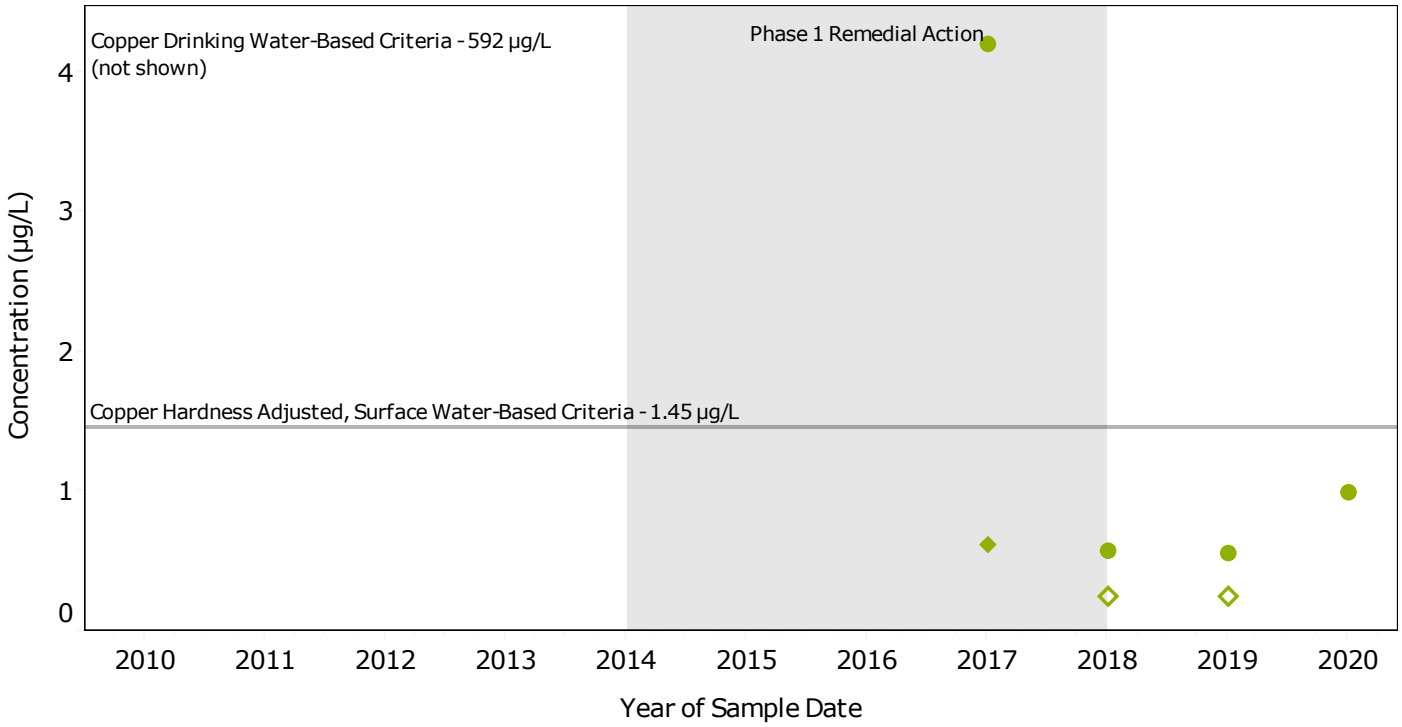
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

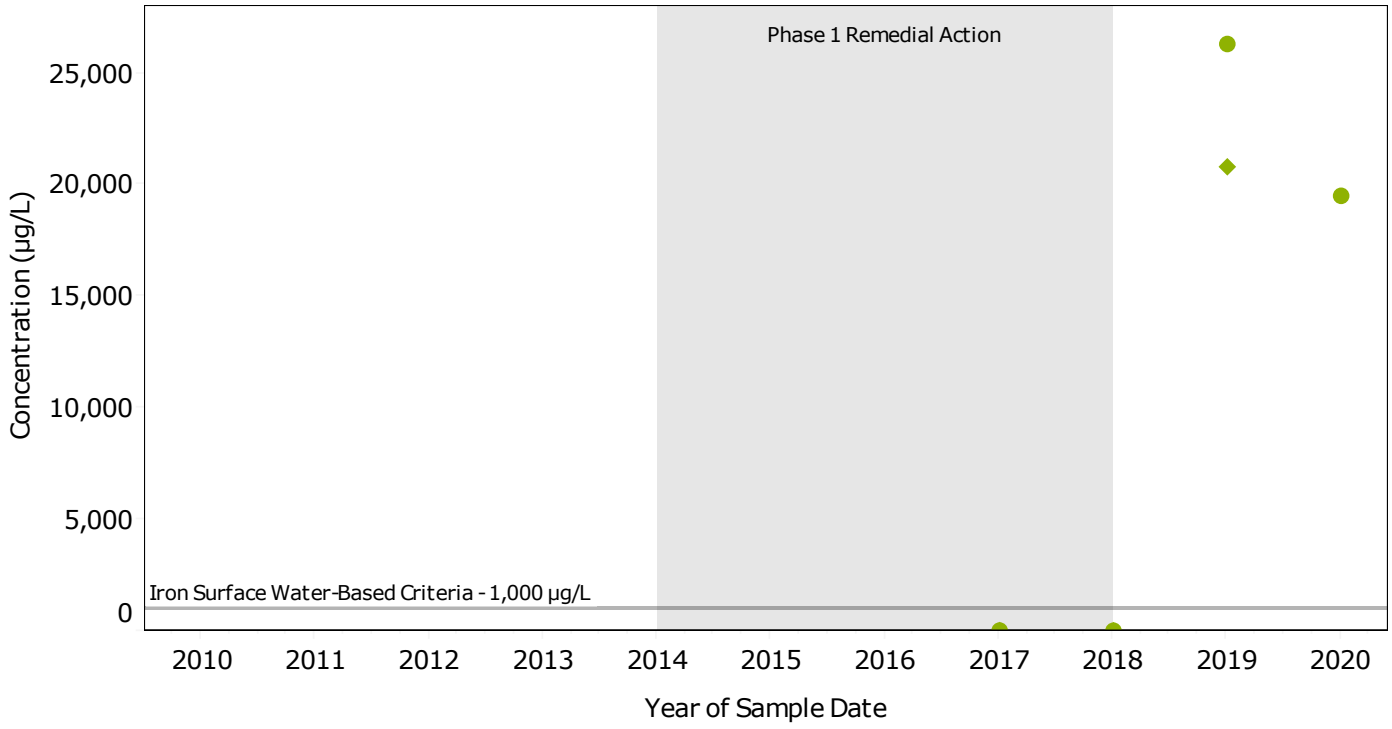
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

TP2-12S, Copper



TP2-12S, Iron



Legend

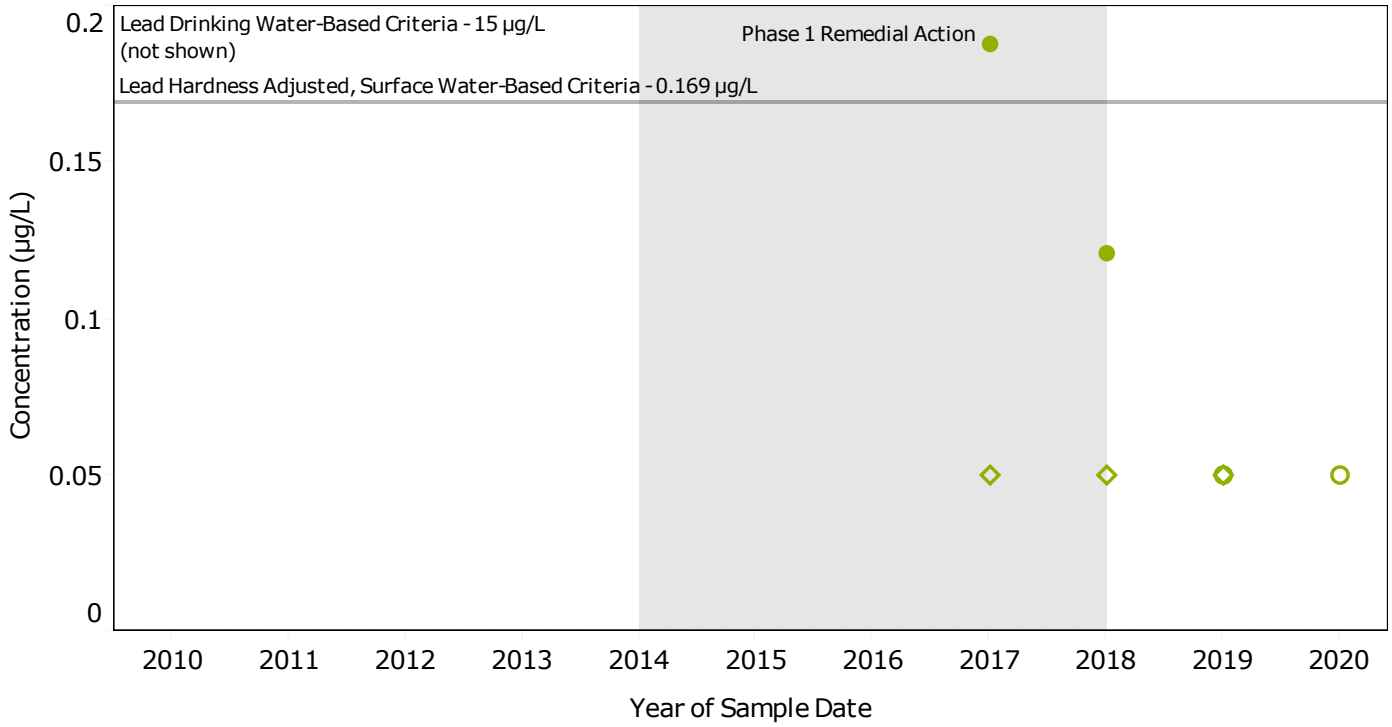
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

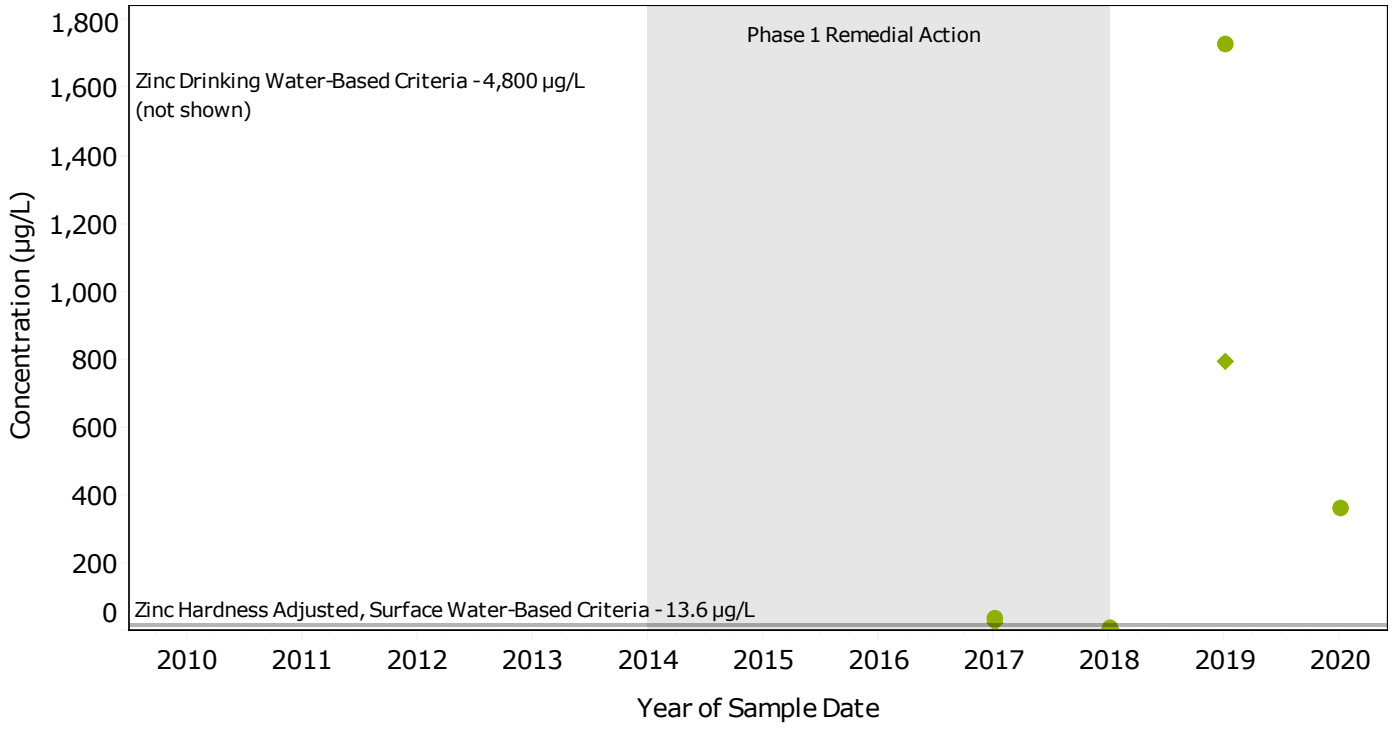
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

TP2-12S, Lead



TP2-12S, Zinc



Legend

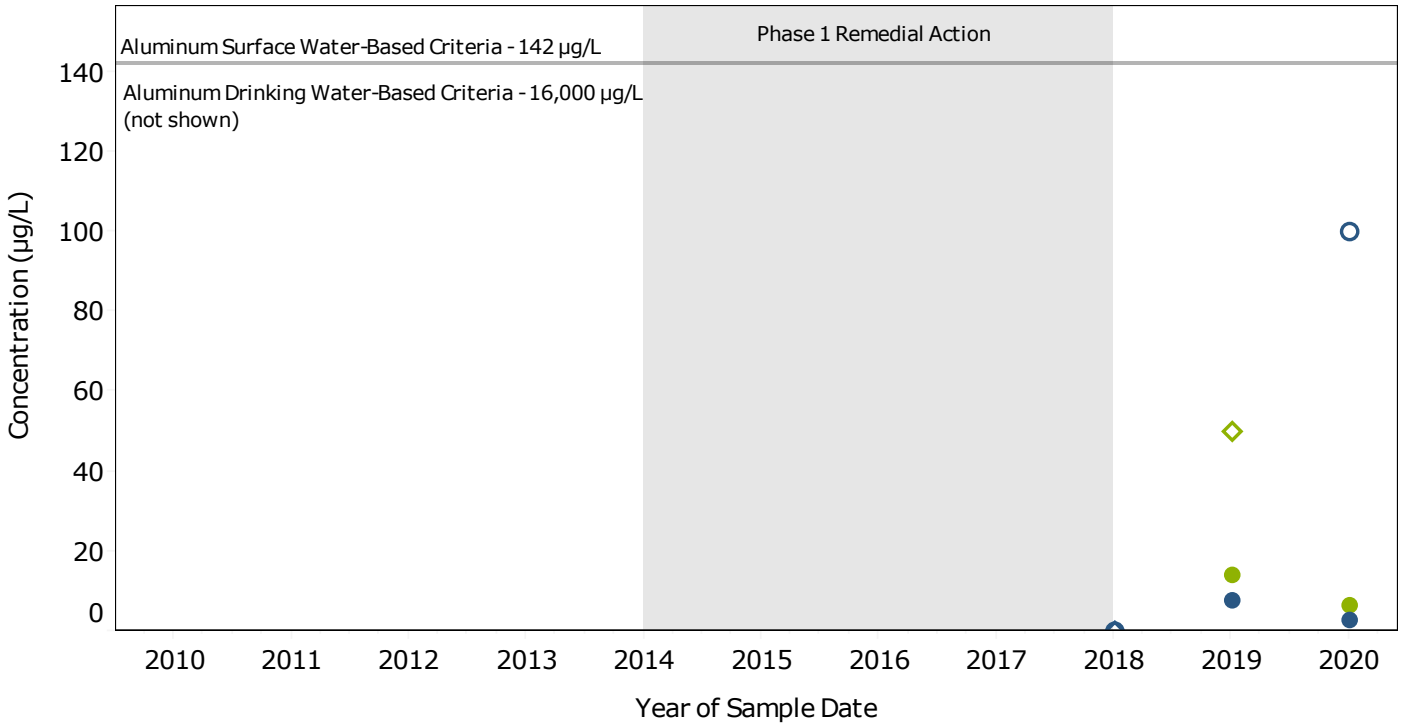
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

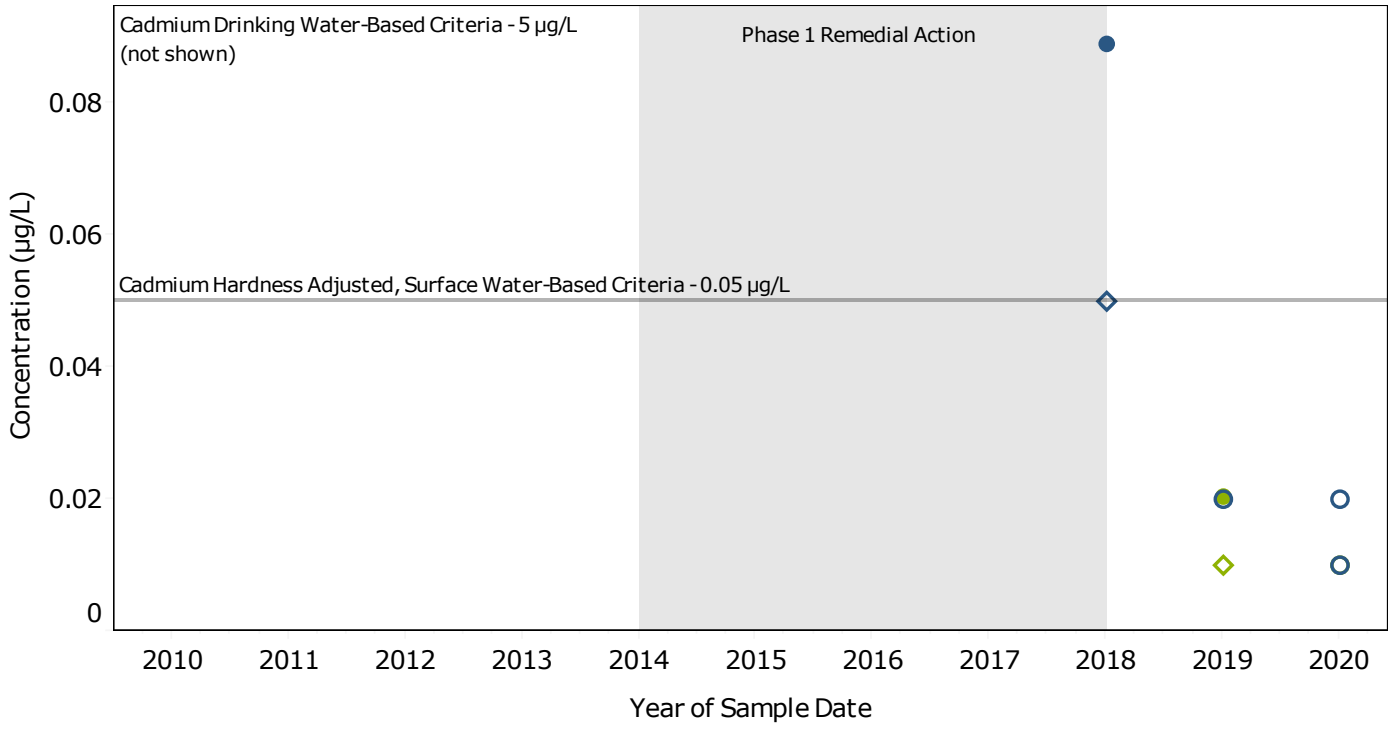
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

TP2-13D, Aluminum



TP2-13D, Cadmium



Legend

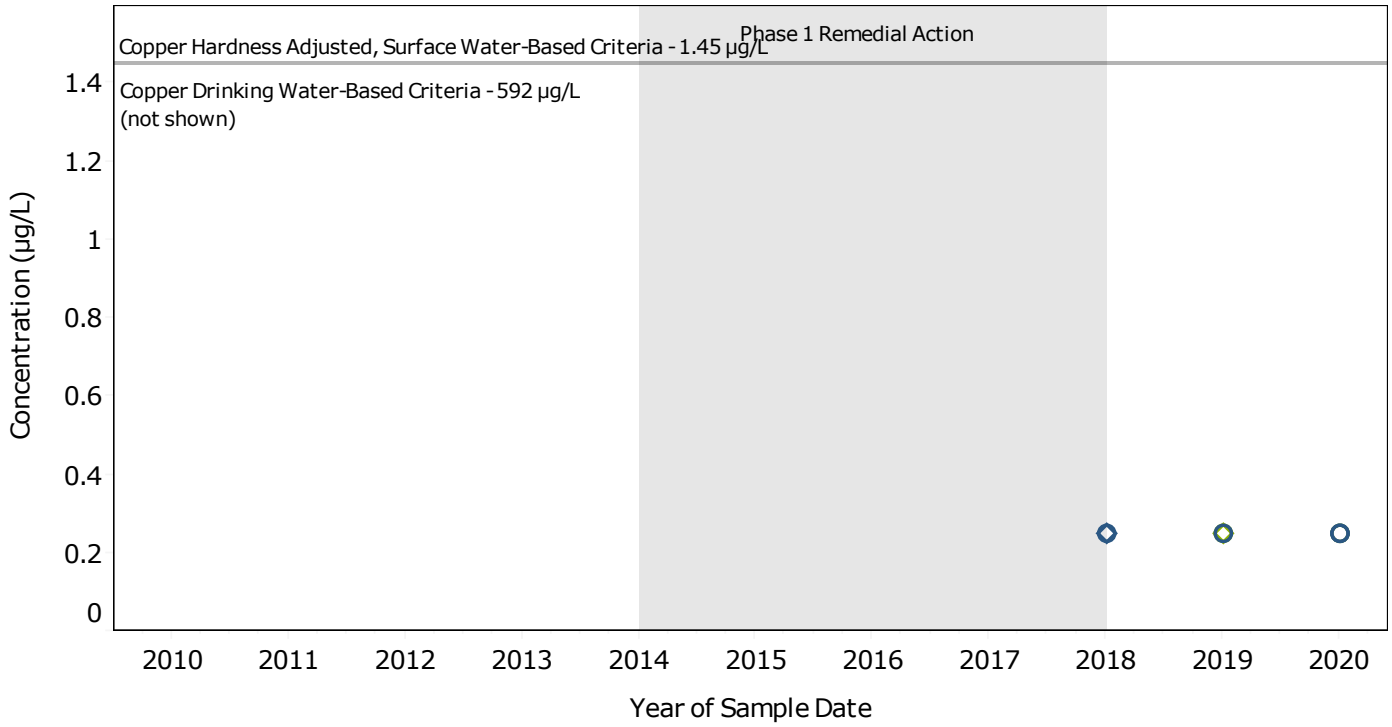
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

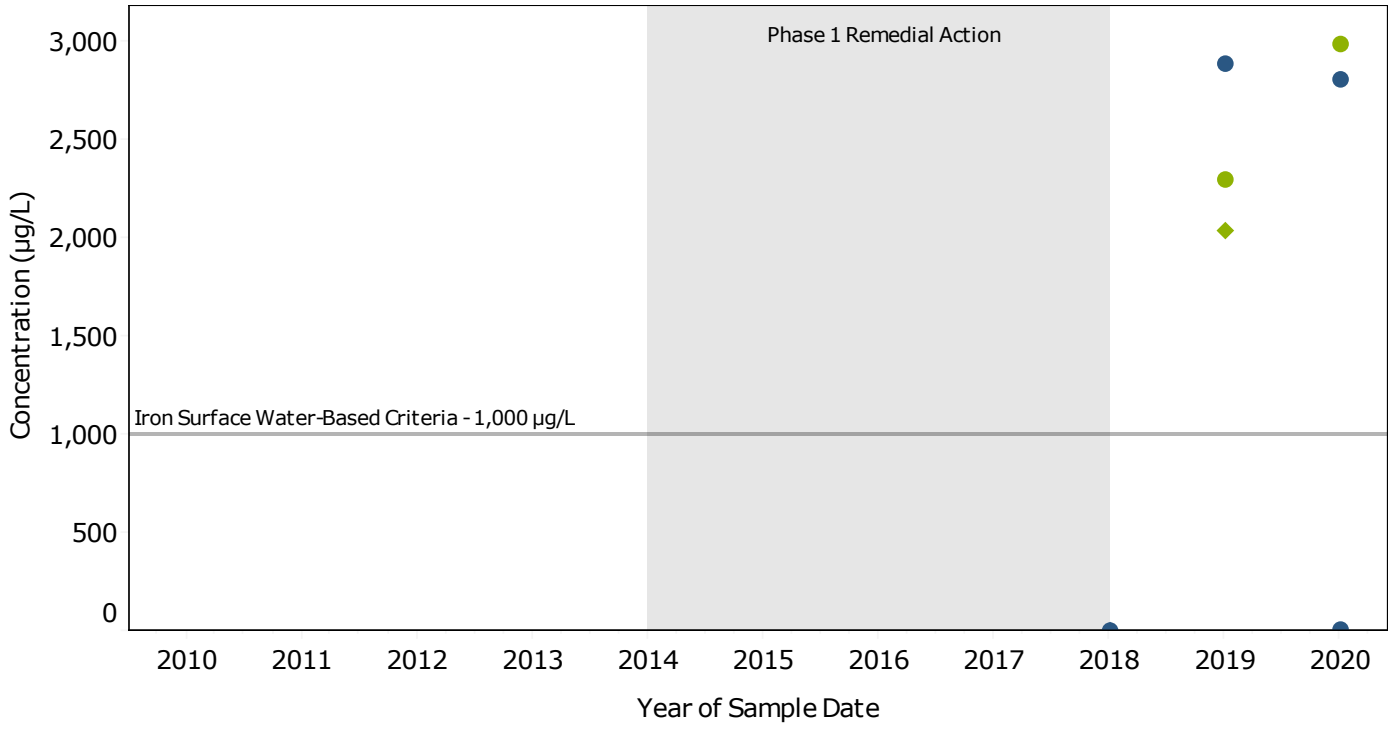
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

TP2-13D, Copper



TP2-13D, Iron



Legend

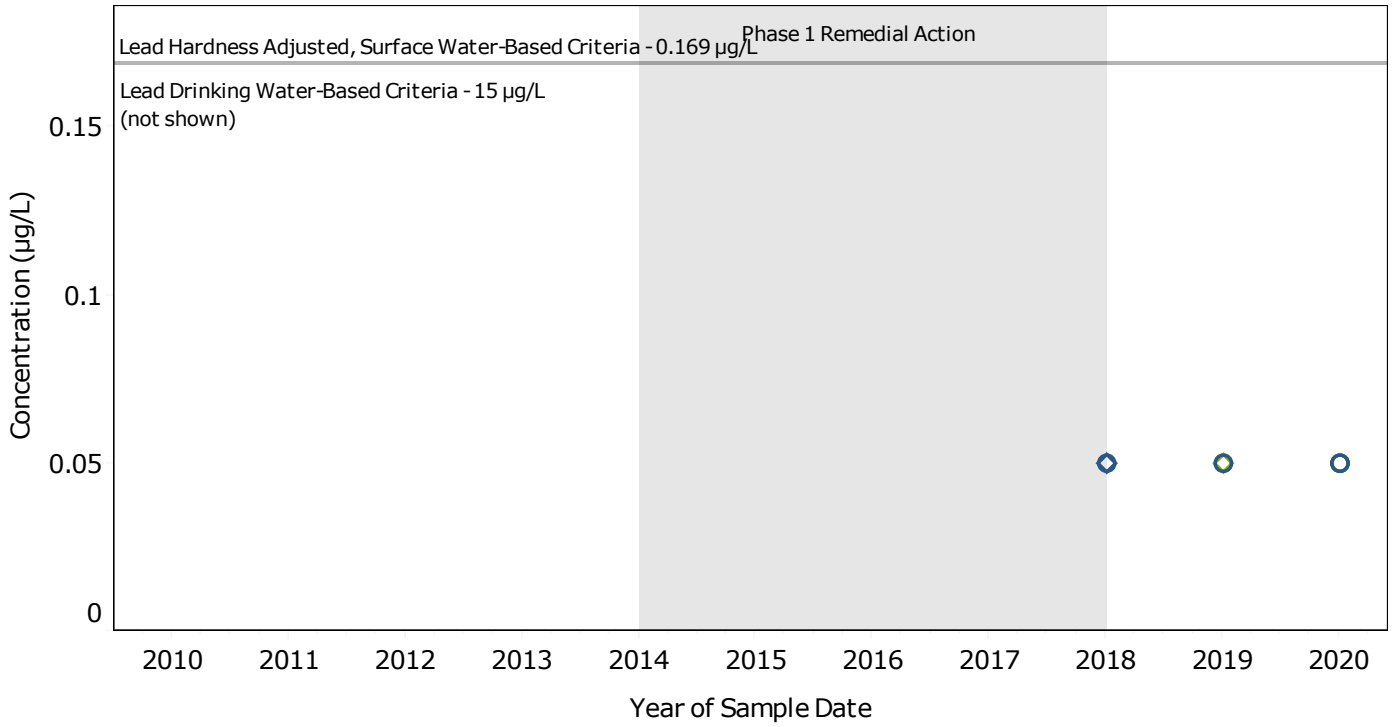
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

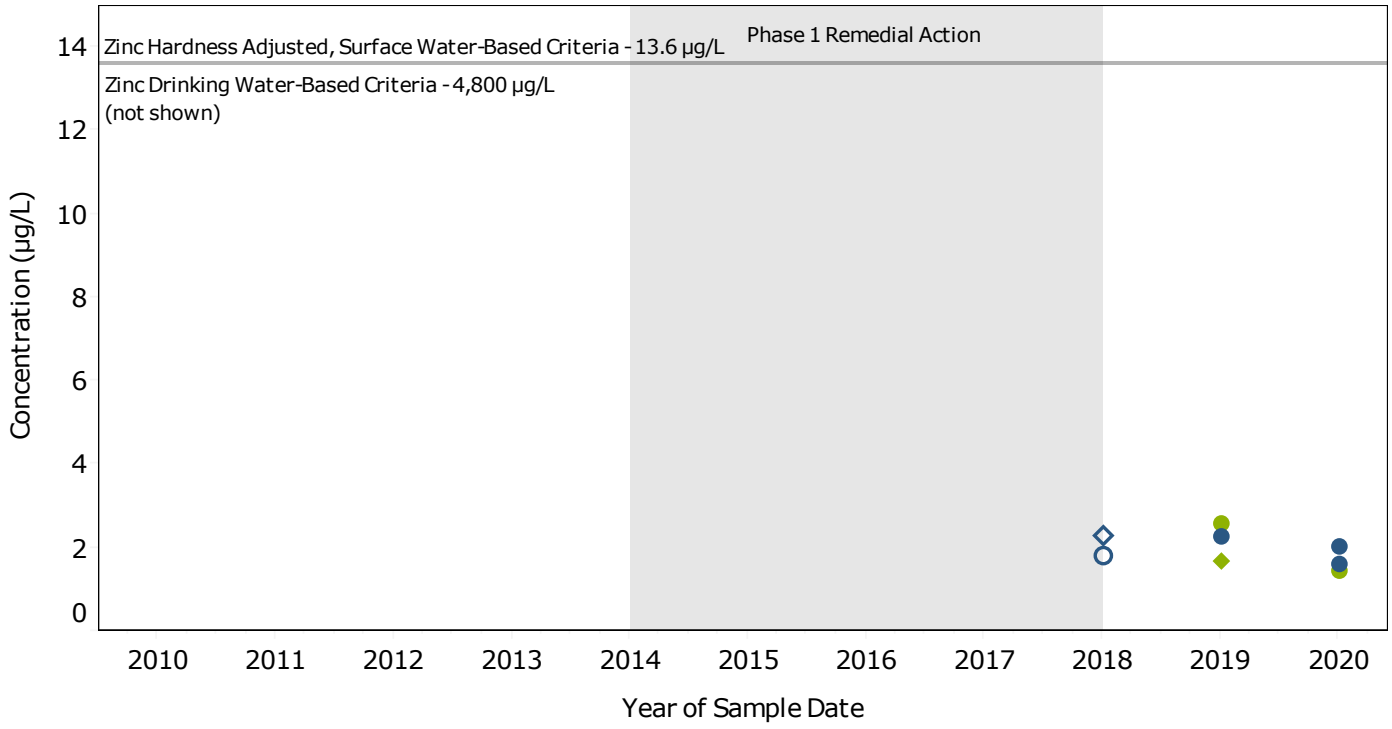
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

TP2-13D, Lead



TP2-13D, Zinc



Legend

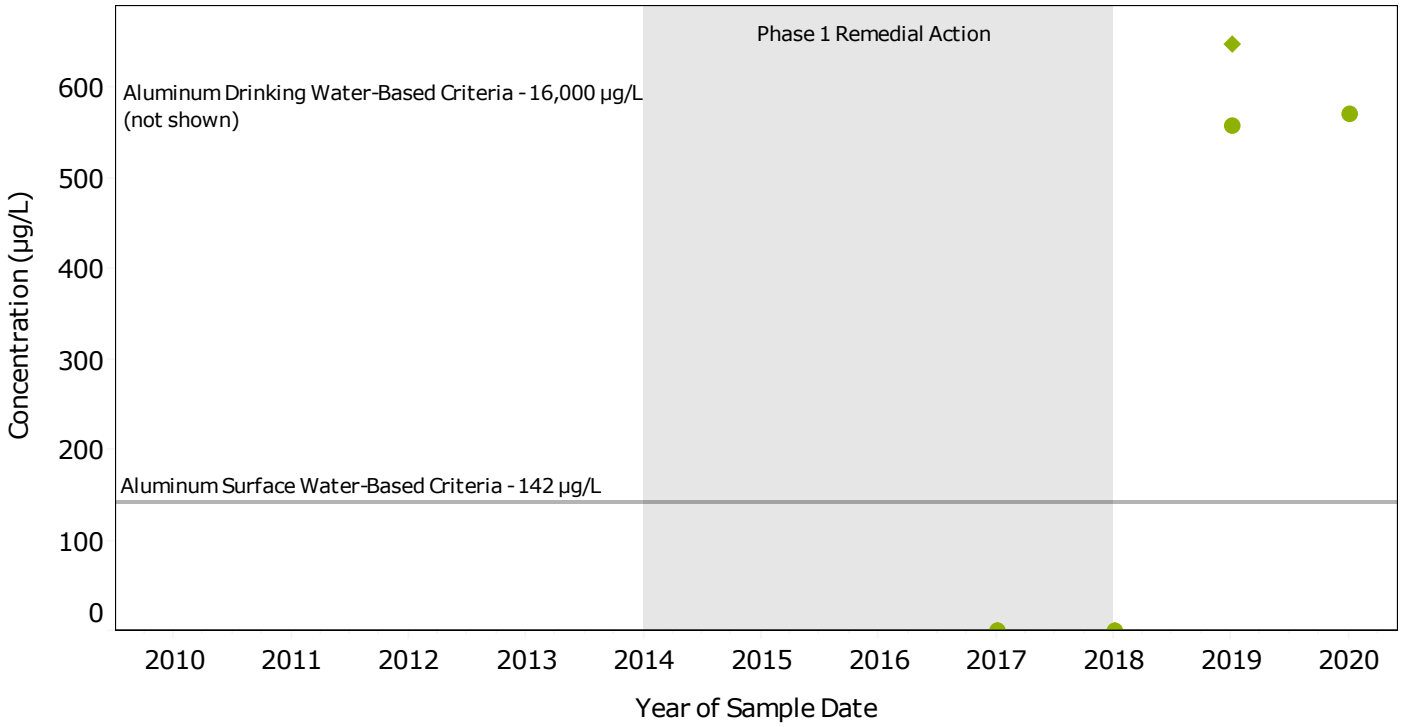
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

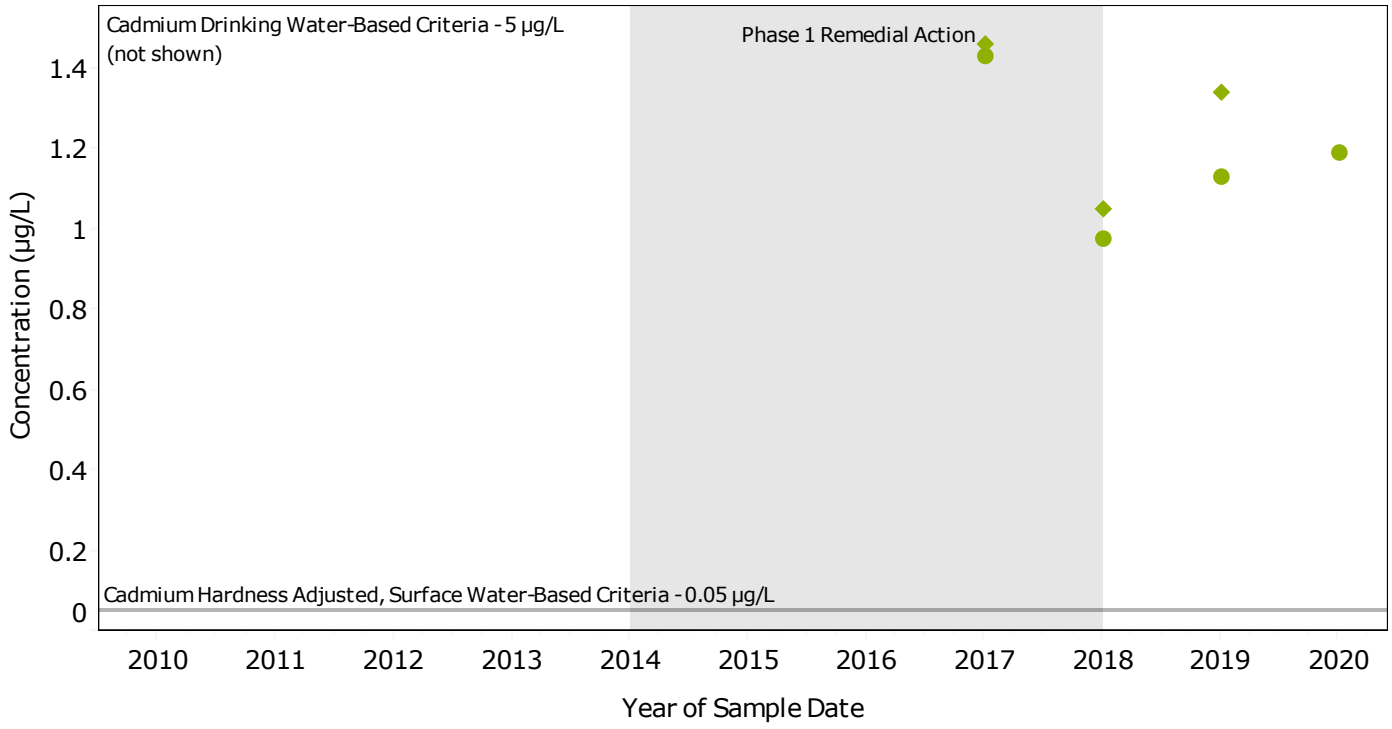
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

TP2-14, Aluminum



TP2-14, Cadmium



Legend

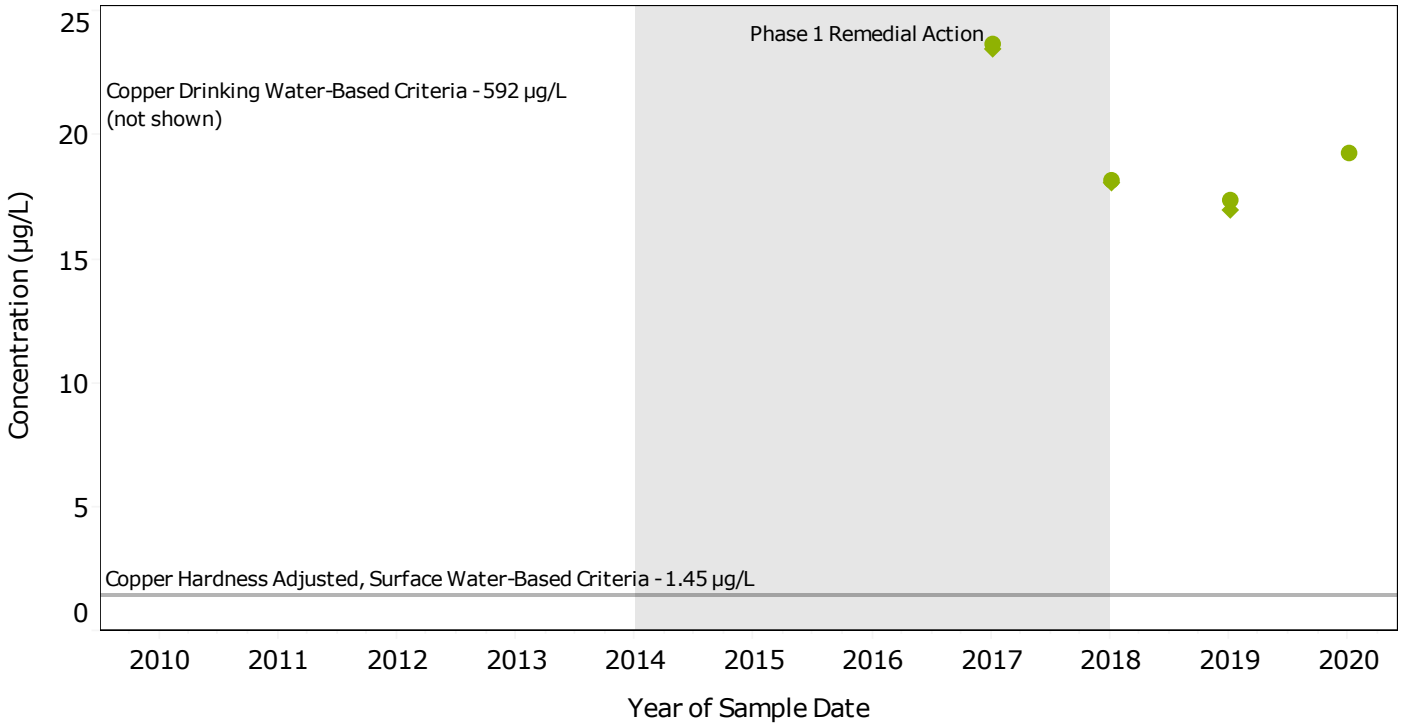
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

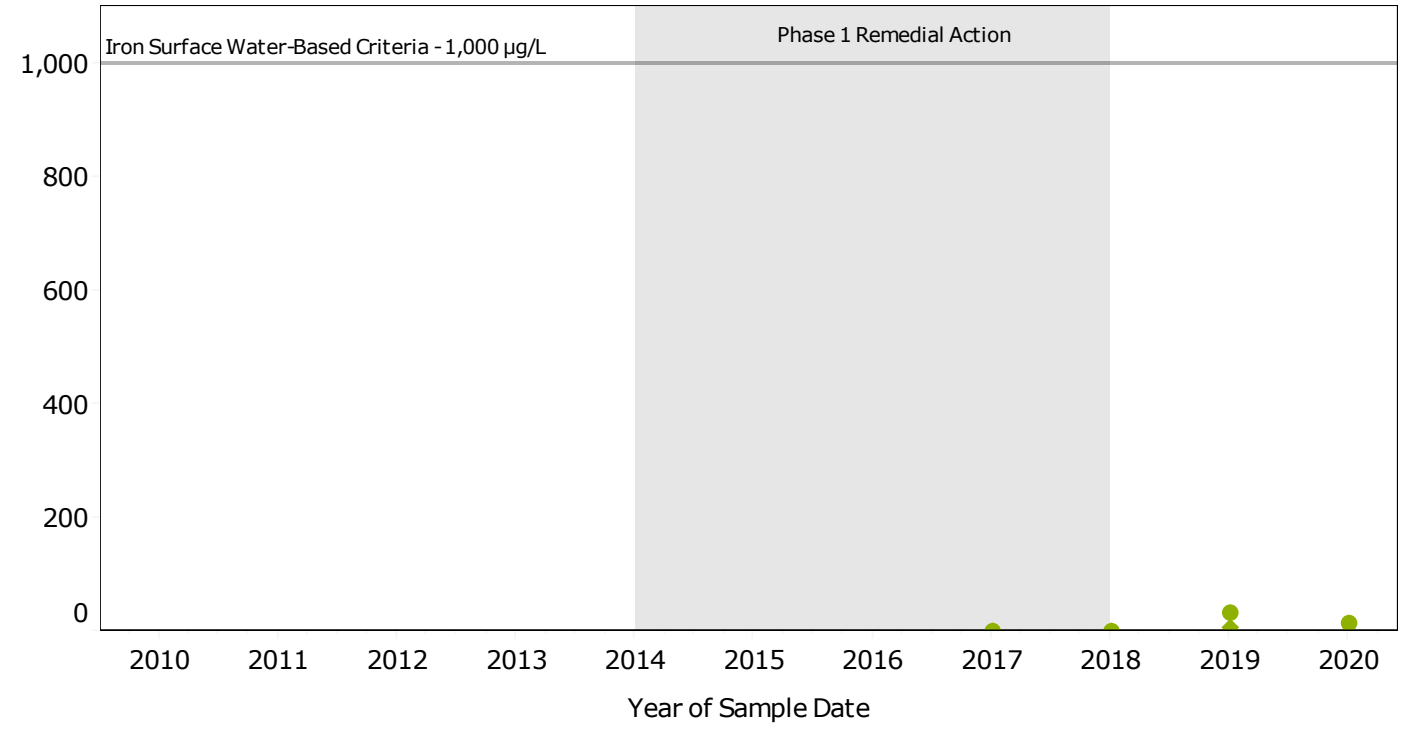
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

TP2-14, Copper



TP2-14, Iron



Legend

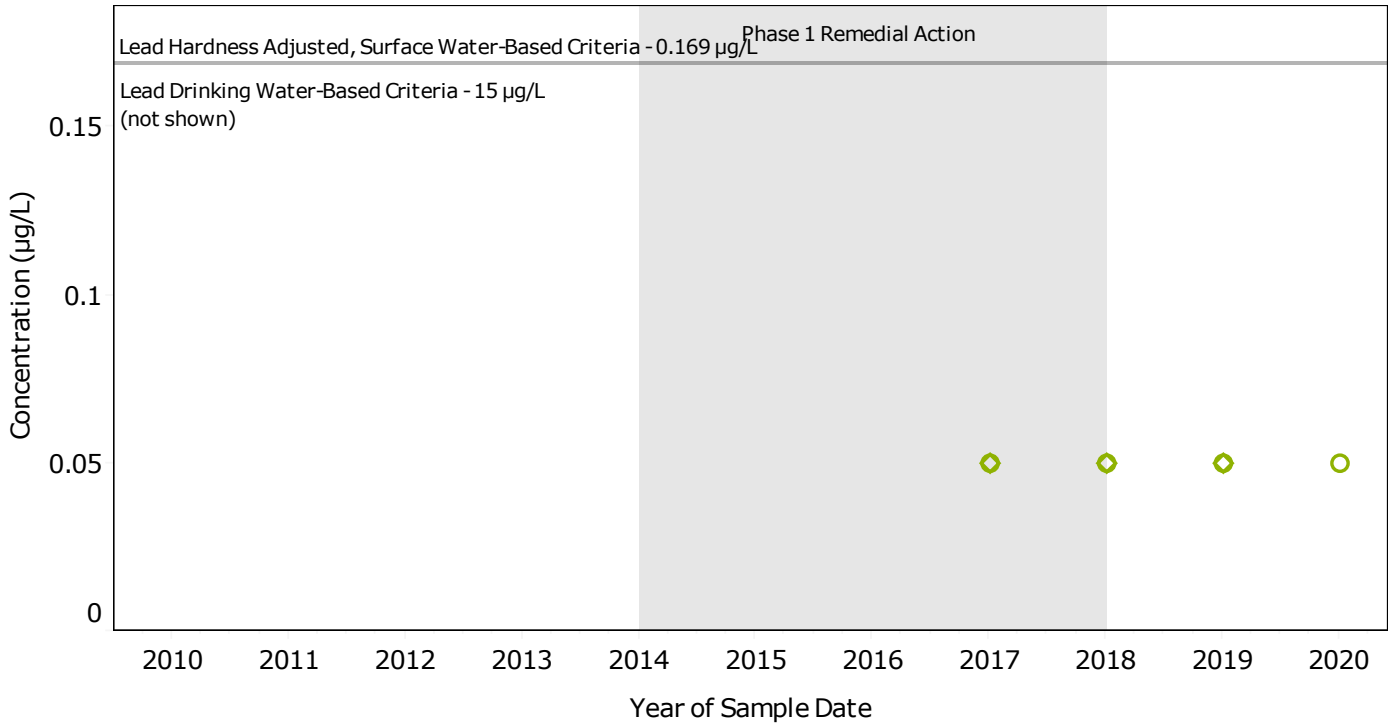
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

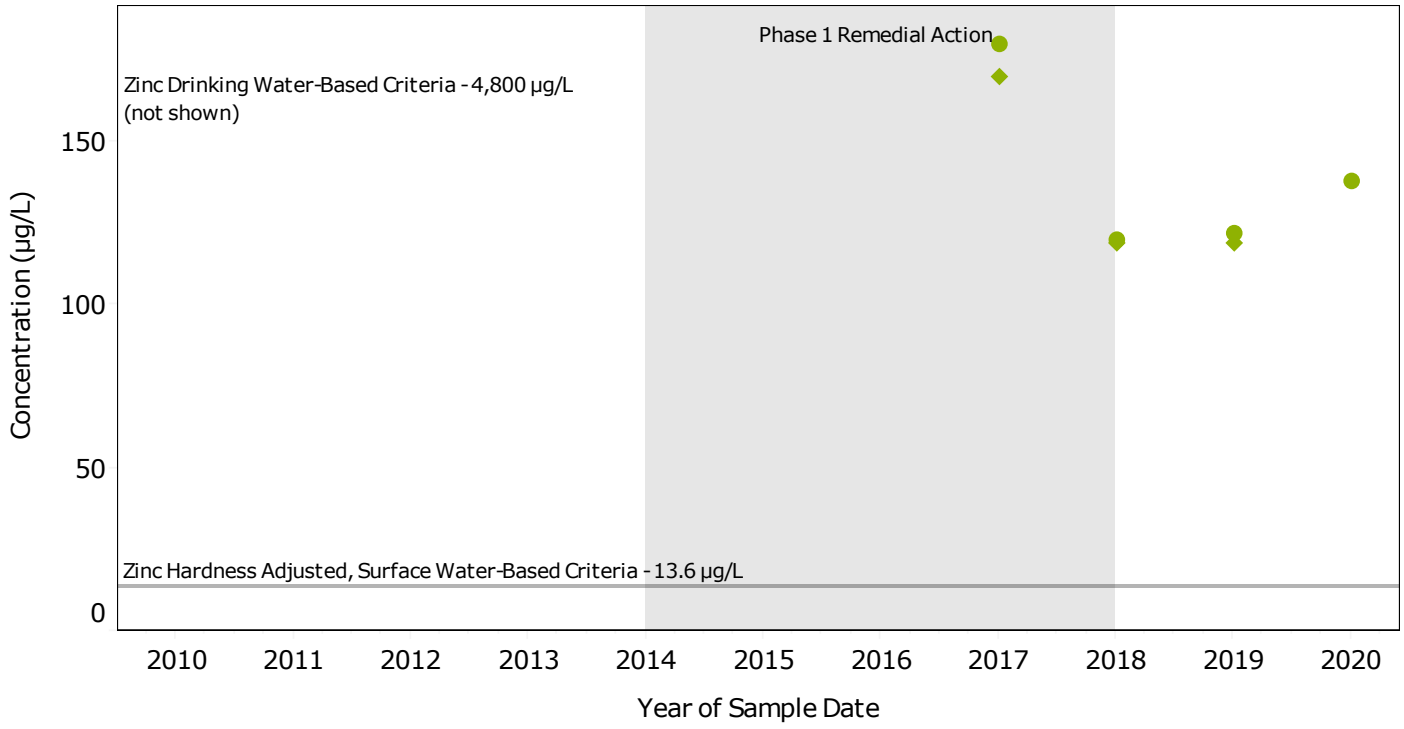
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

TP2-14, Lead



TP2-14, Zinc



Legend

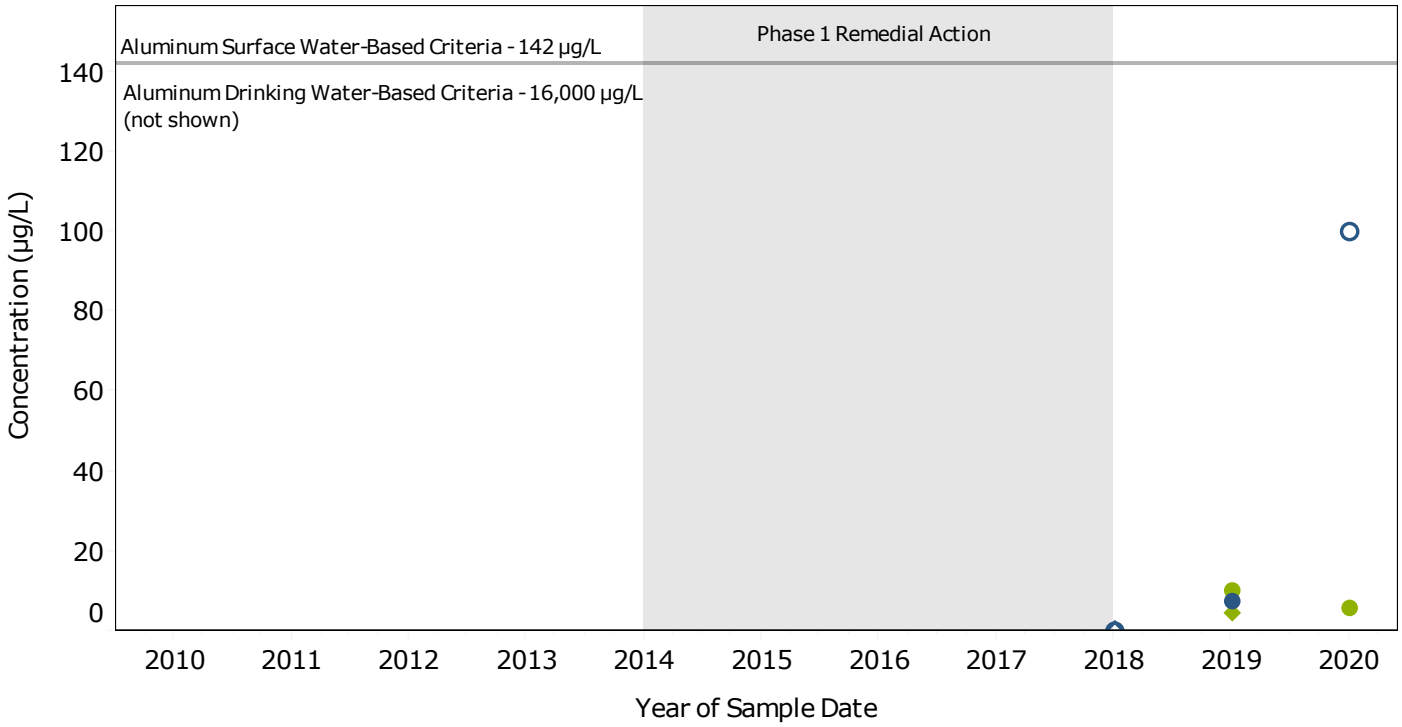
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

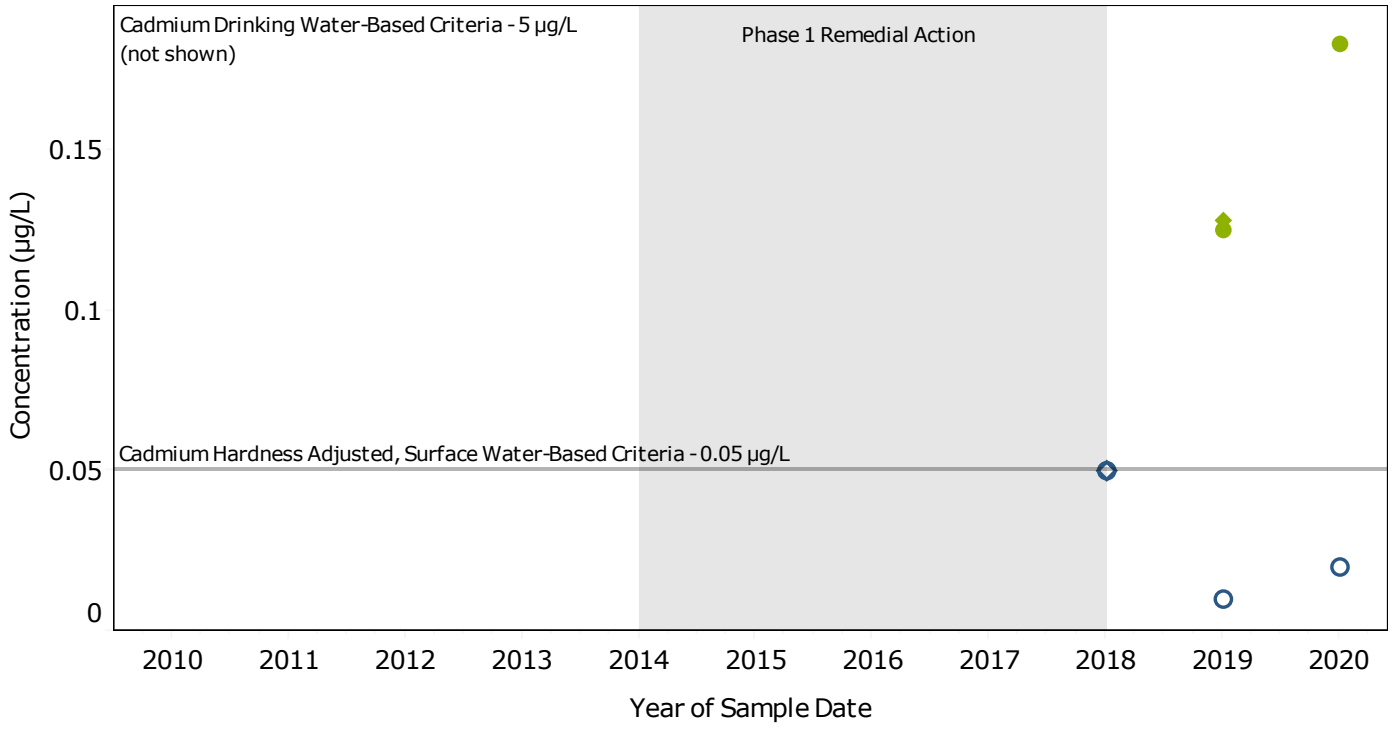
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

TP2-15, Aluminum



TP2-15, Cadmium



Legend

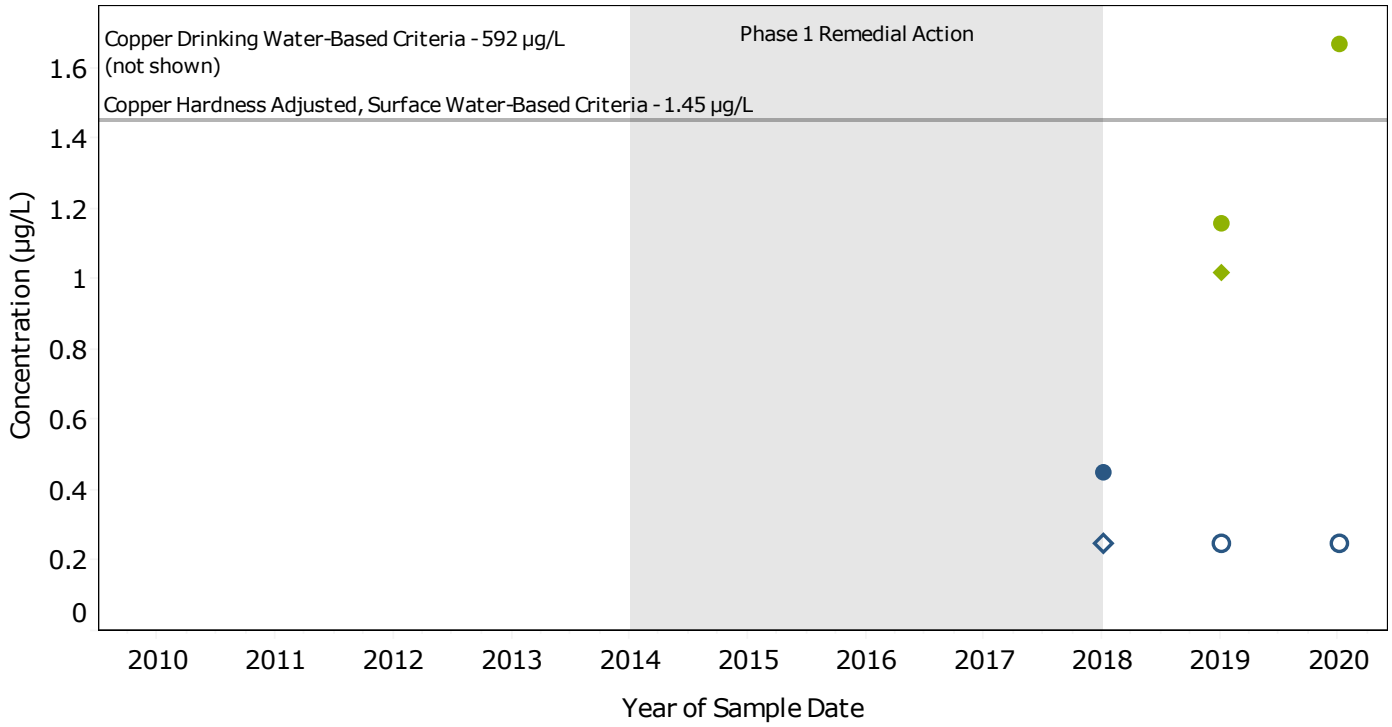
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

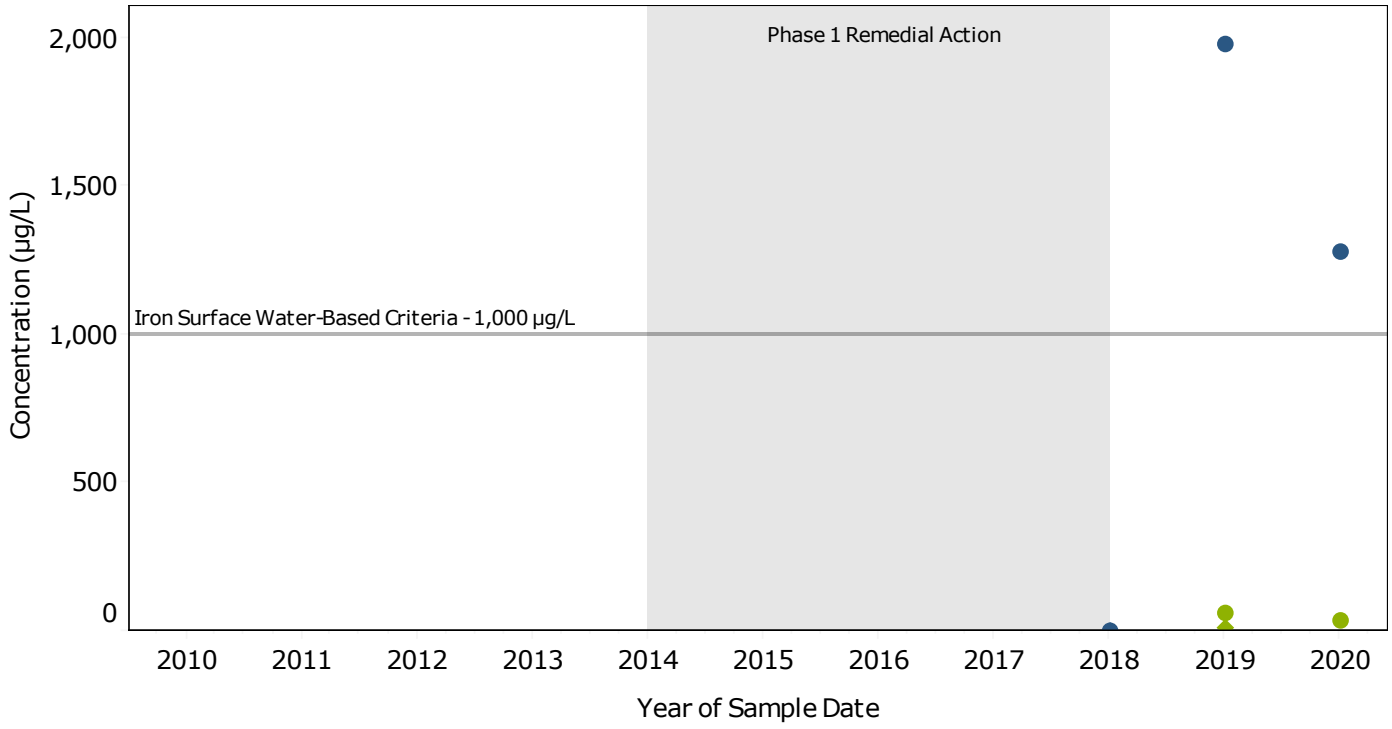
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

TP2-15, Copper



TP2-15, Iron



Legend

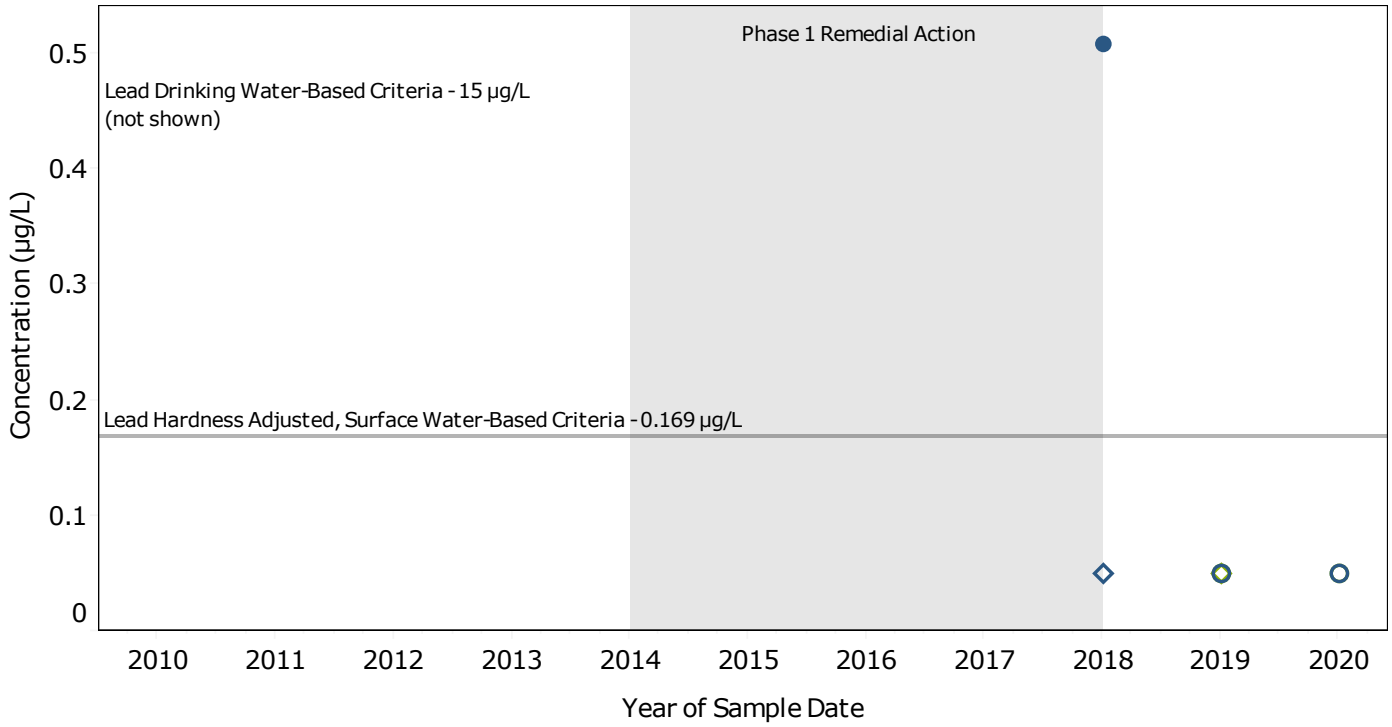
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

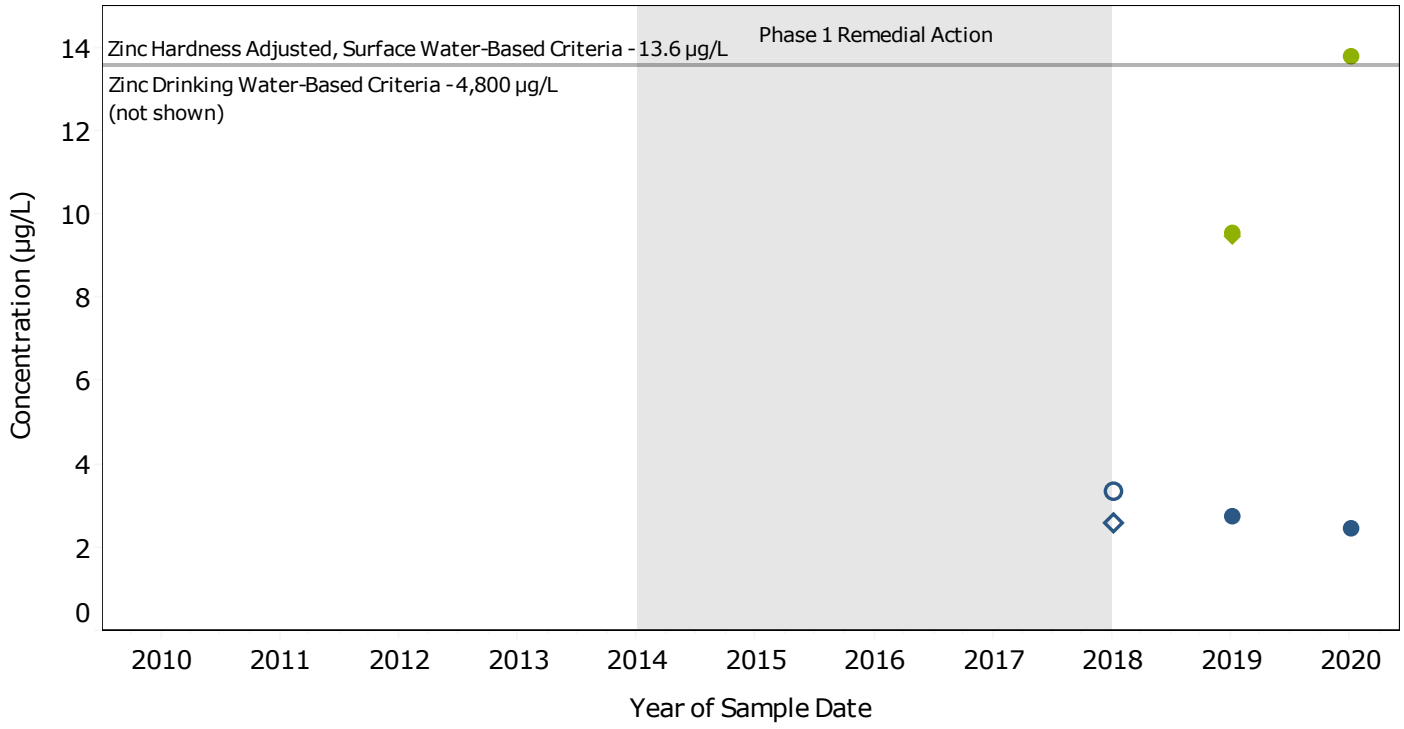
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

TP2-15, Lead



TP2-15, Zinc



Legend

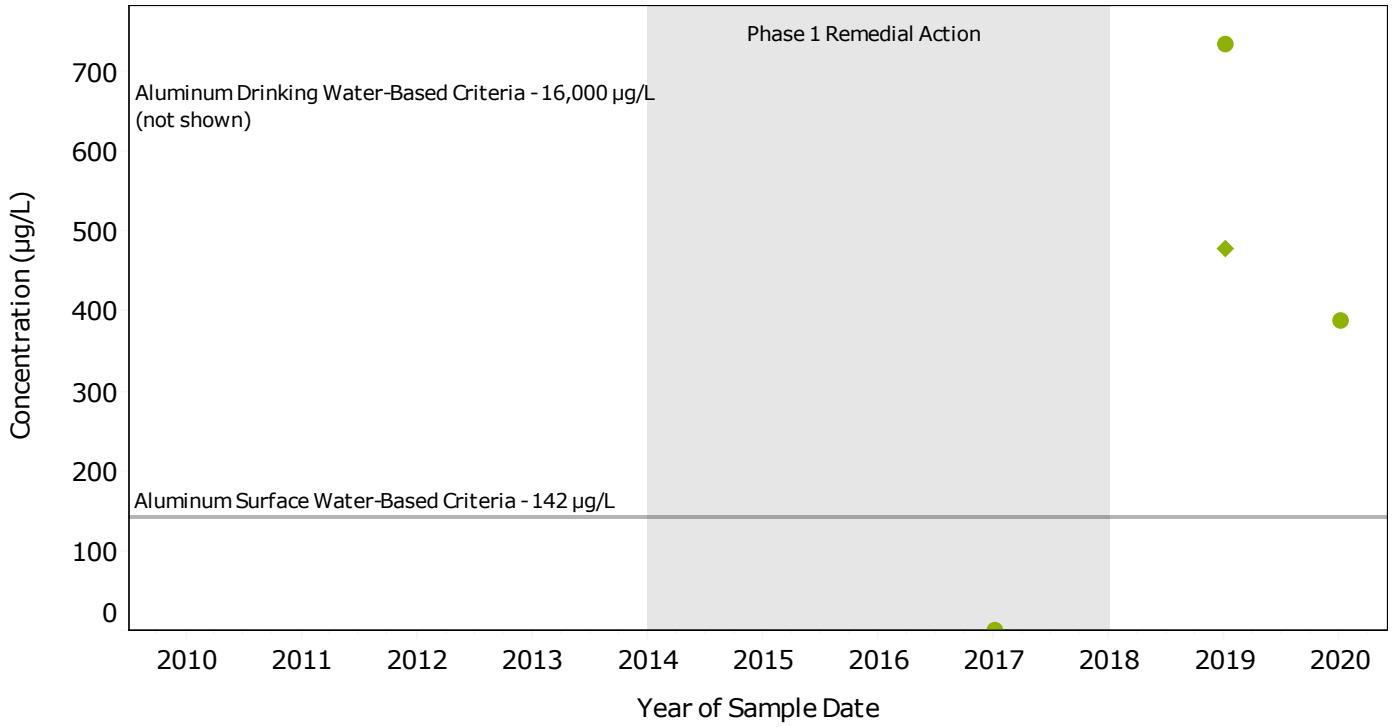
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

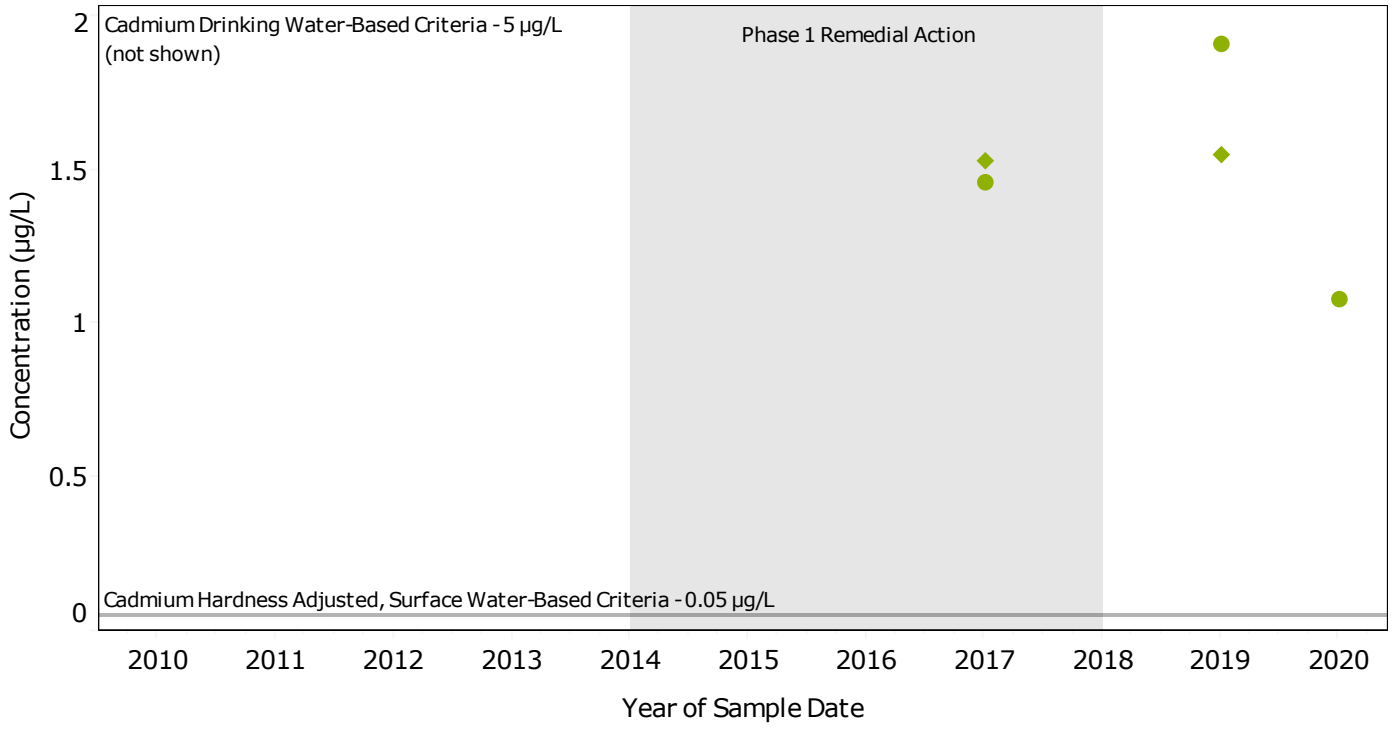
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

TP2-16D, Aluminum



TP2-16D, Cadmium



Legend

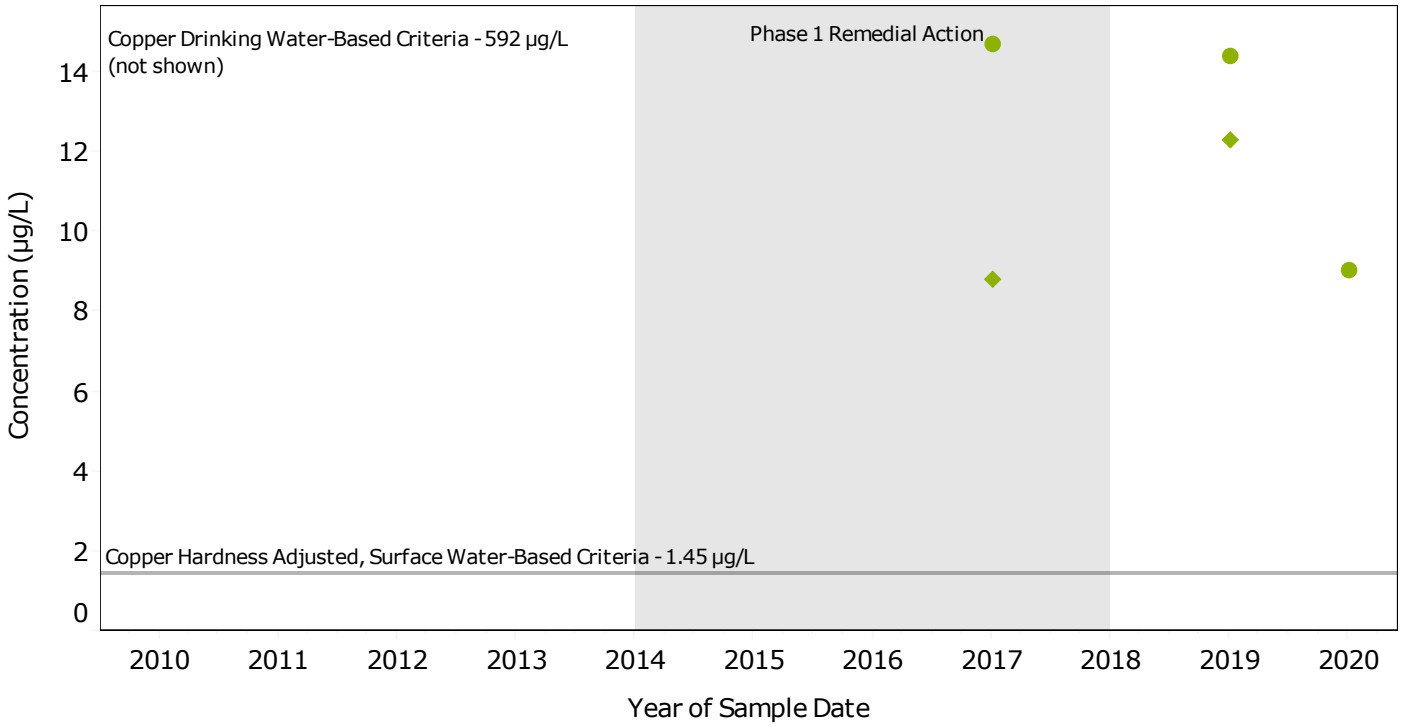
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

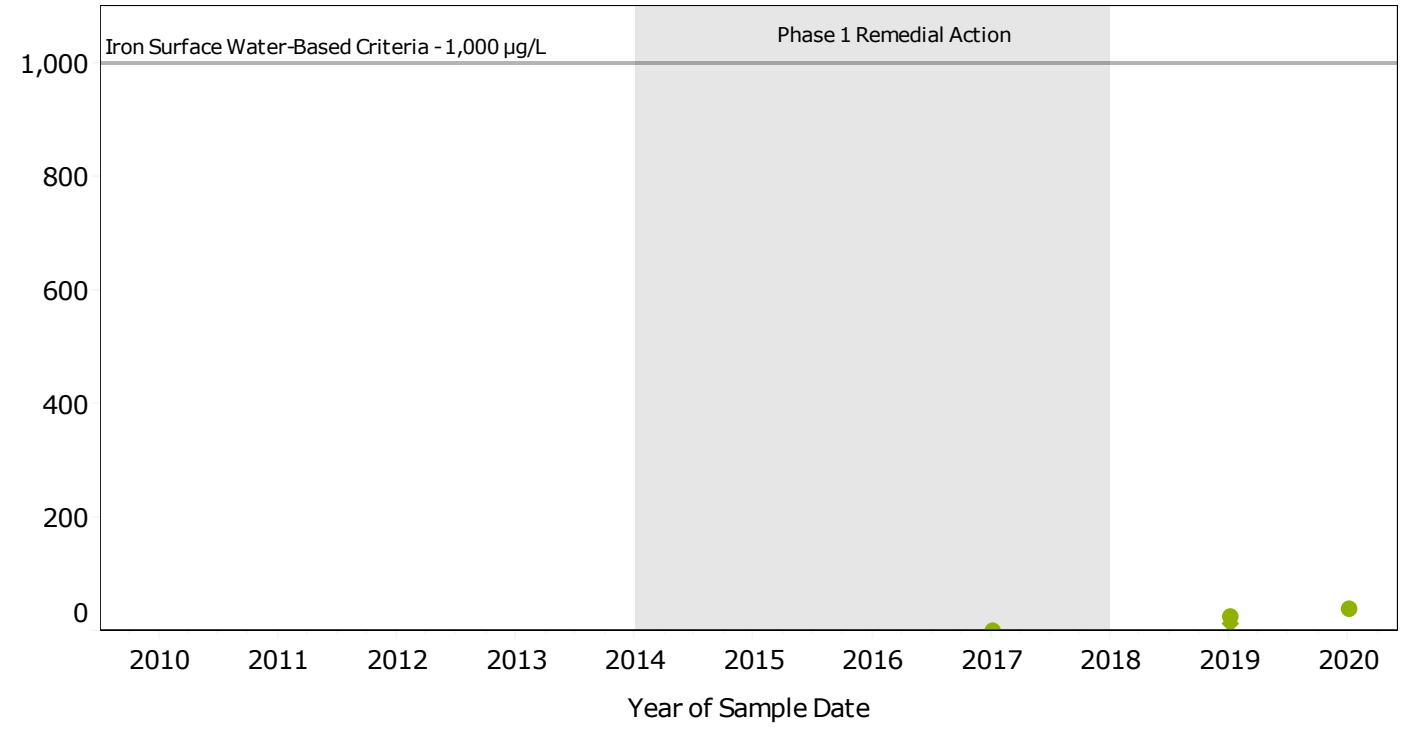
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

TP2-16D, Copper



TP2-16D, Iron



Legend

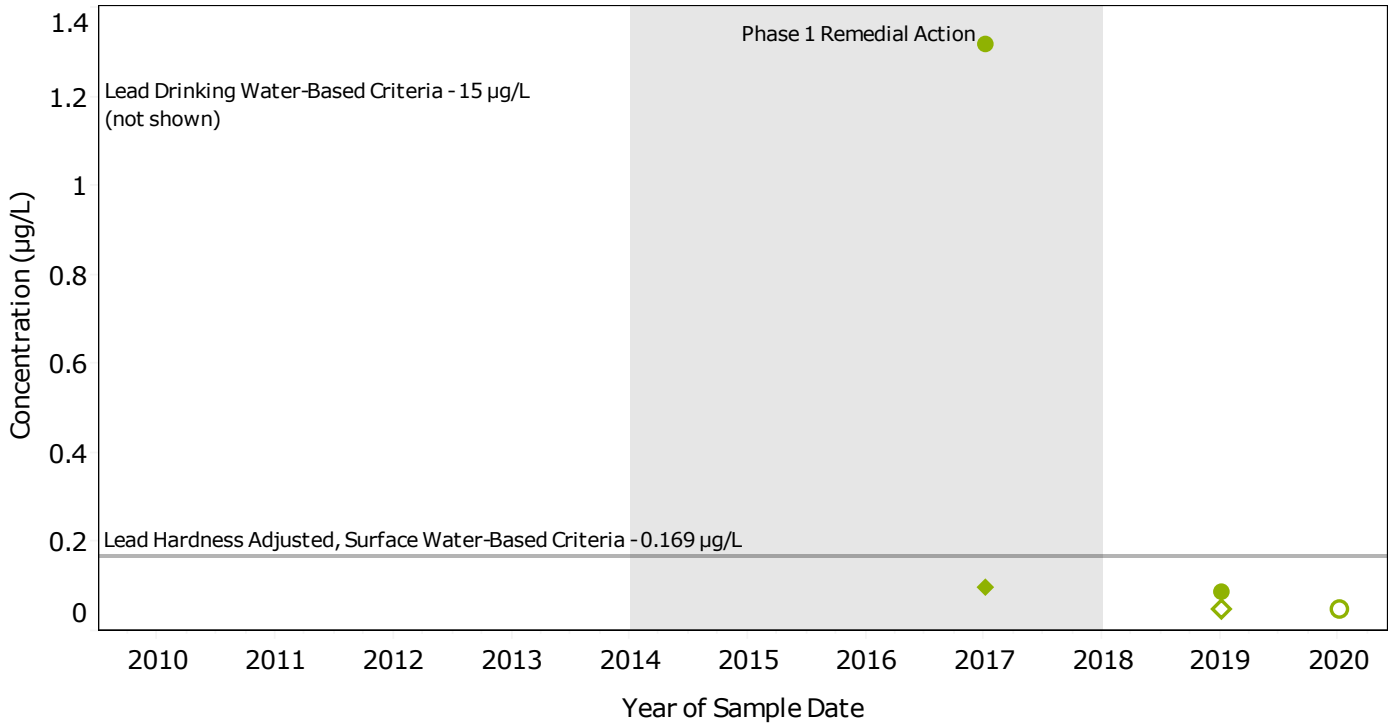
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

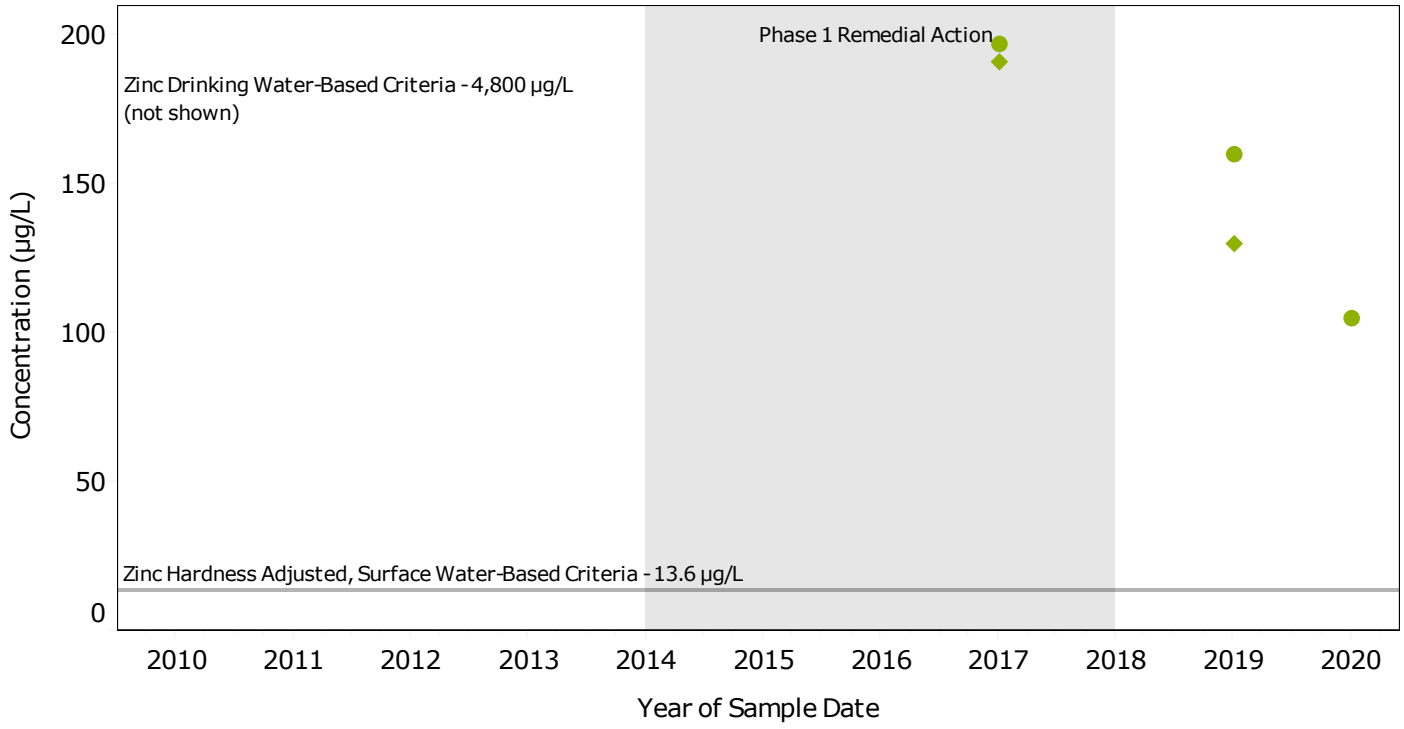
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

TP2-16D, Lead



TP2-16D, Zinc



Legend

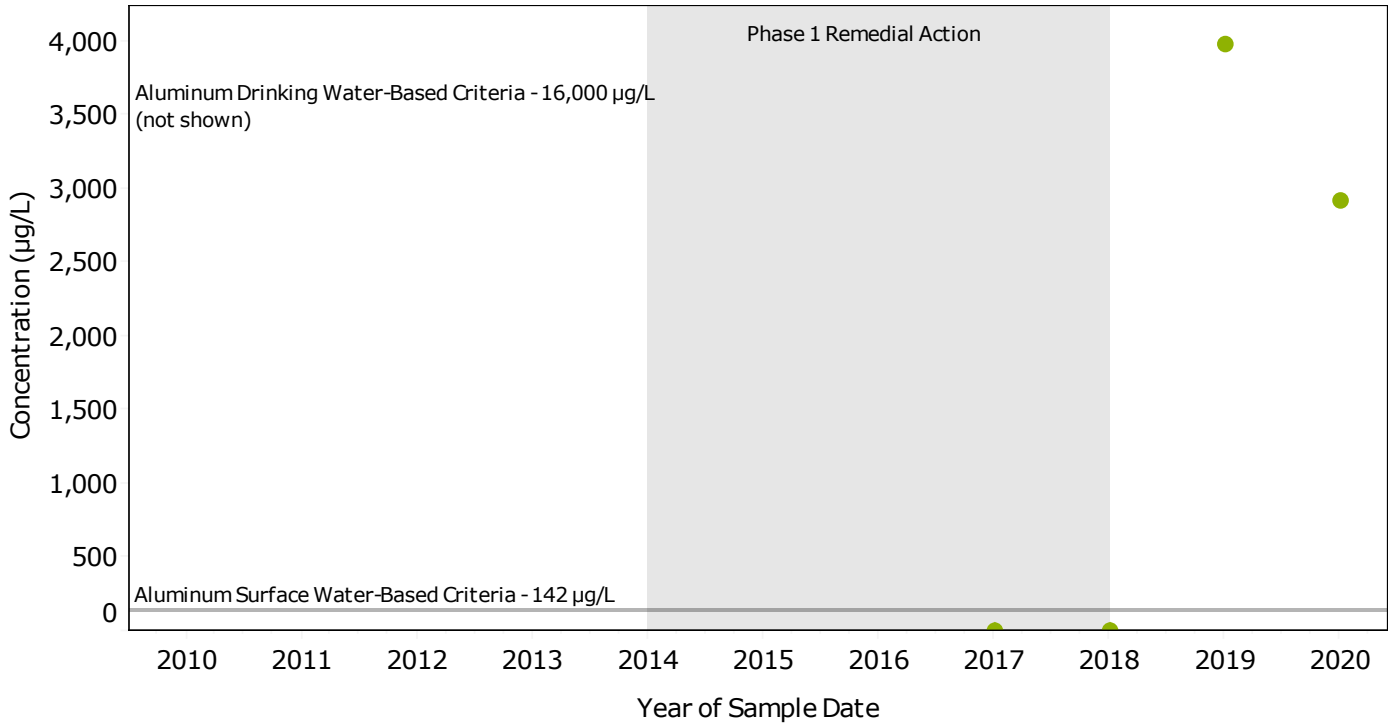
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

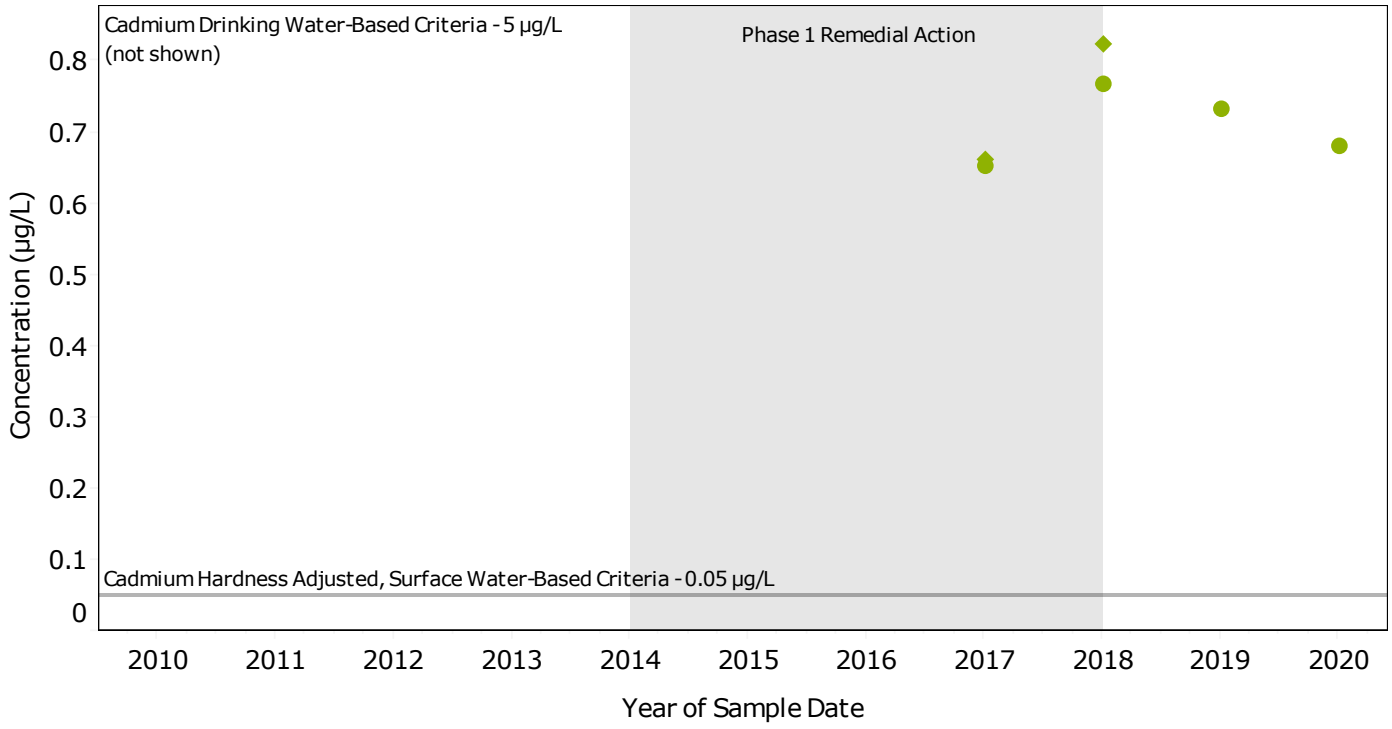
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

TP2-17, Aluminum



TP2-17, Cadmium



Legend

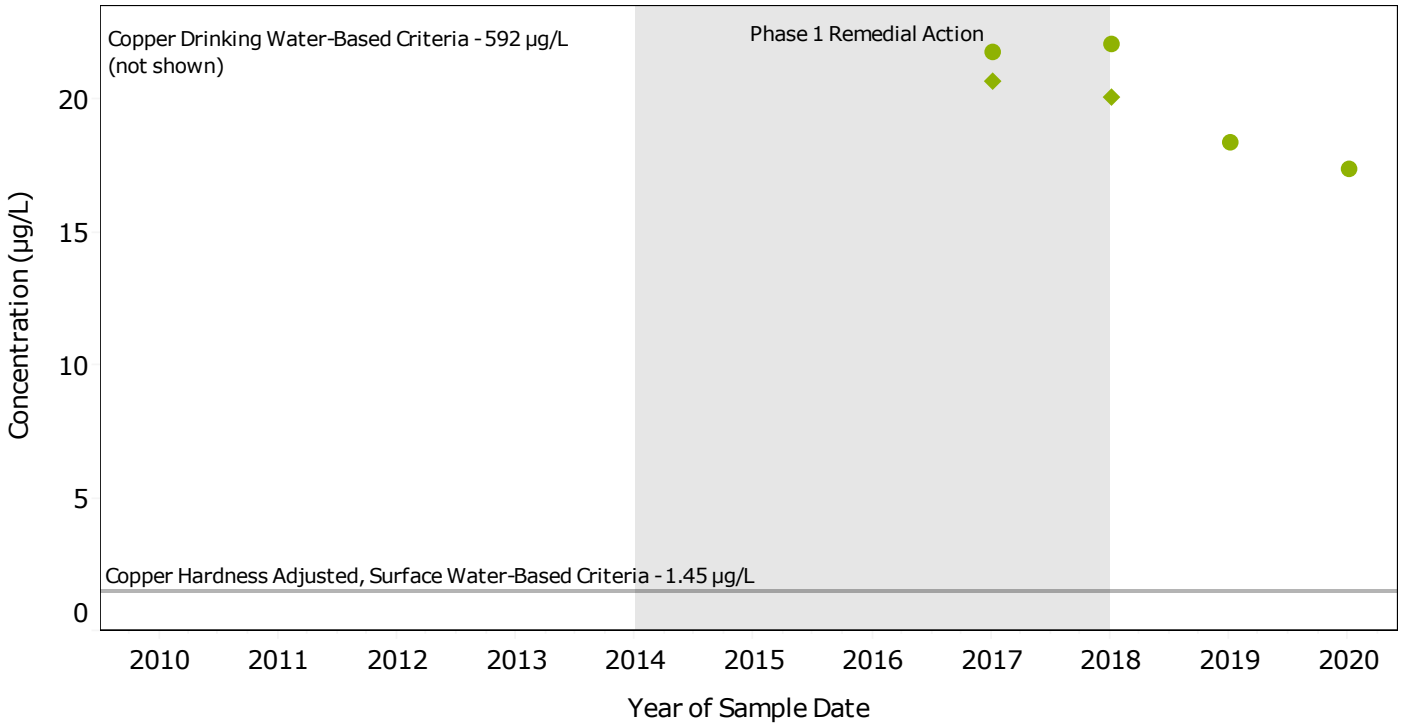
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

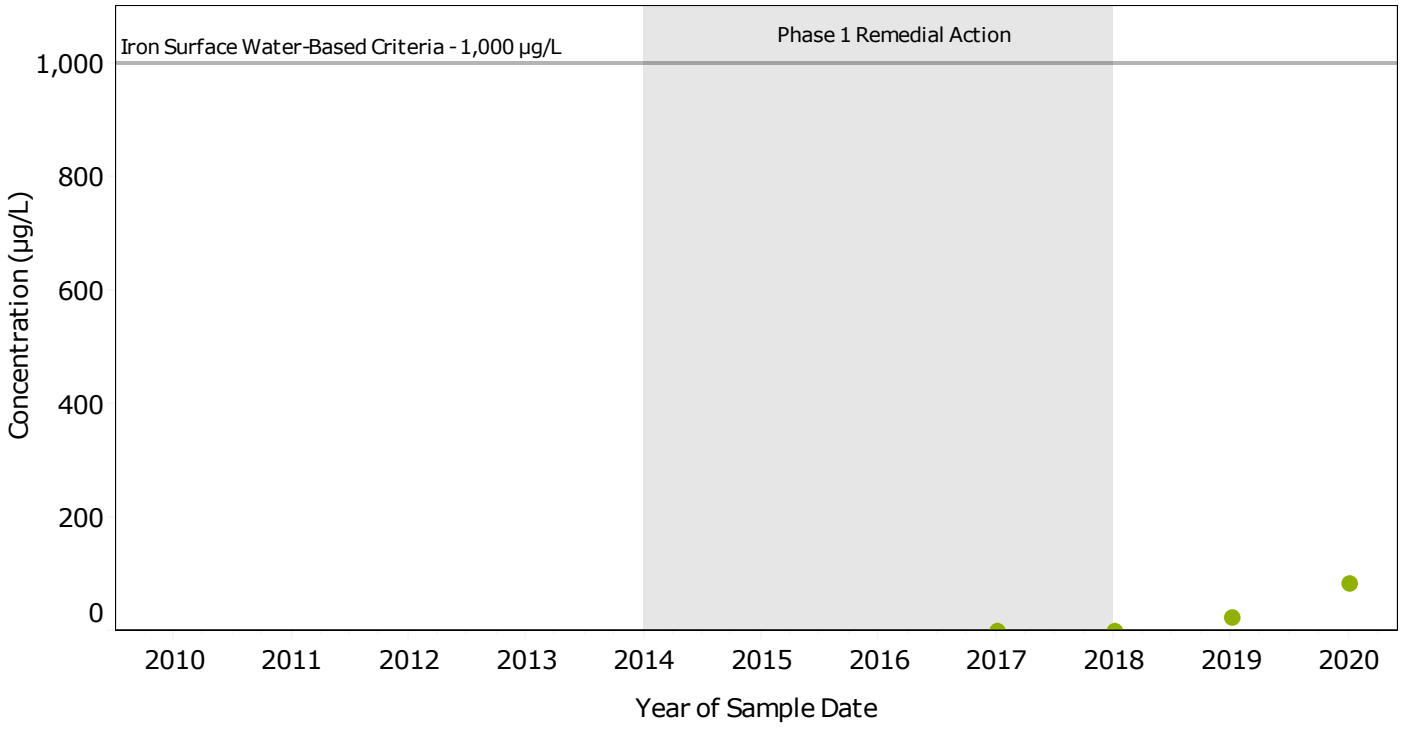
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

TP2-17, Copper



TP2-17, Iron



Legend

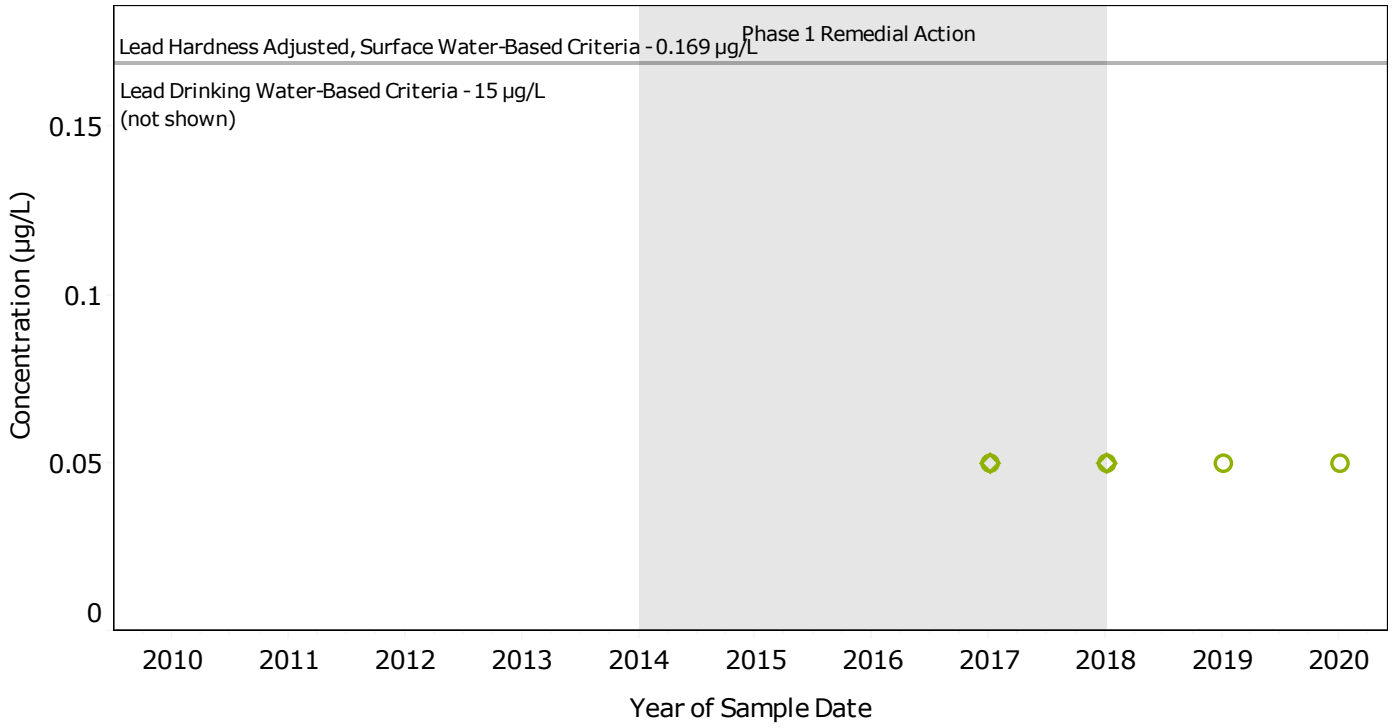
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

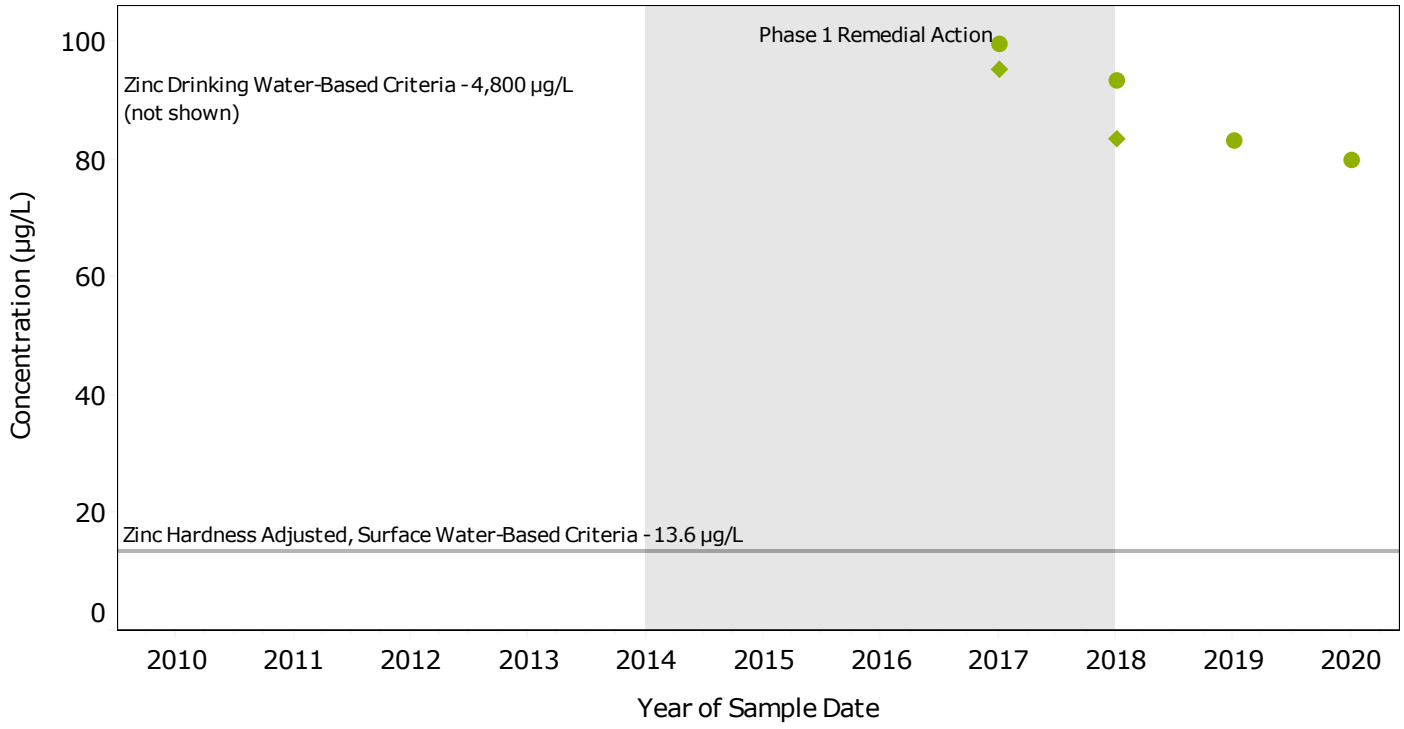
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

TP2-17, Lead



TP2-17, Zinc



Legend

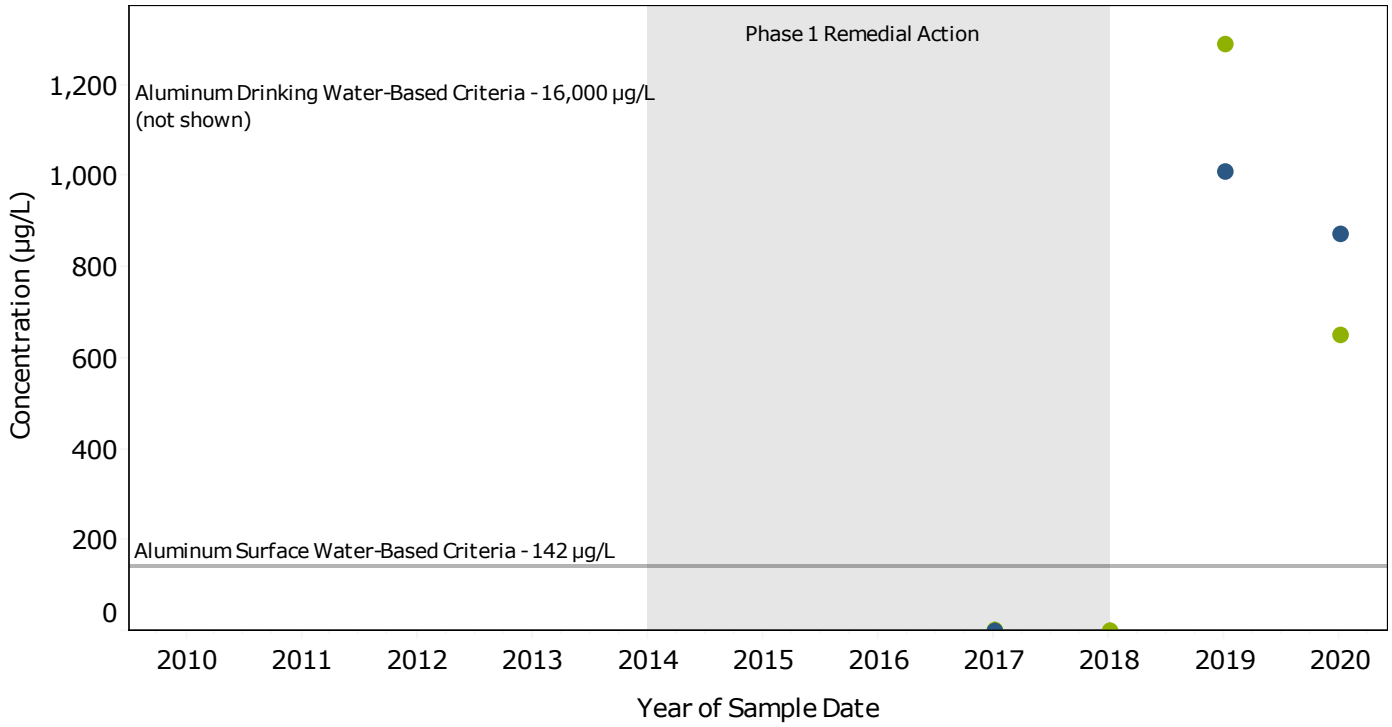
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

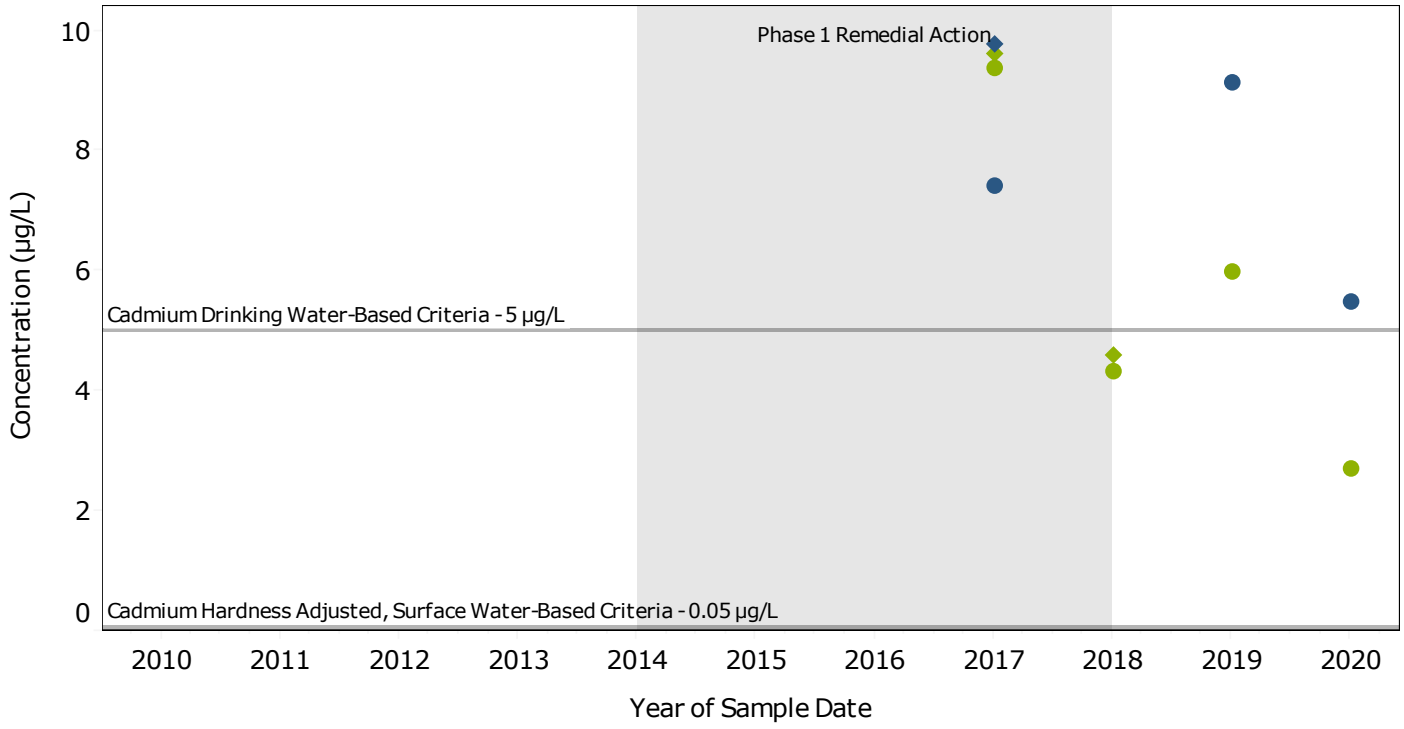
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

TP3-12D, Aluminum



TP3-12D, Cadmium



Legend

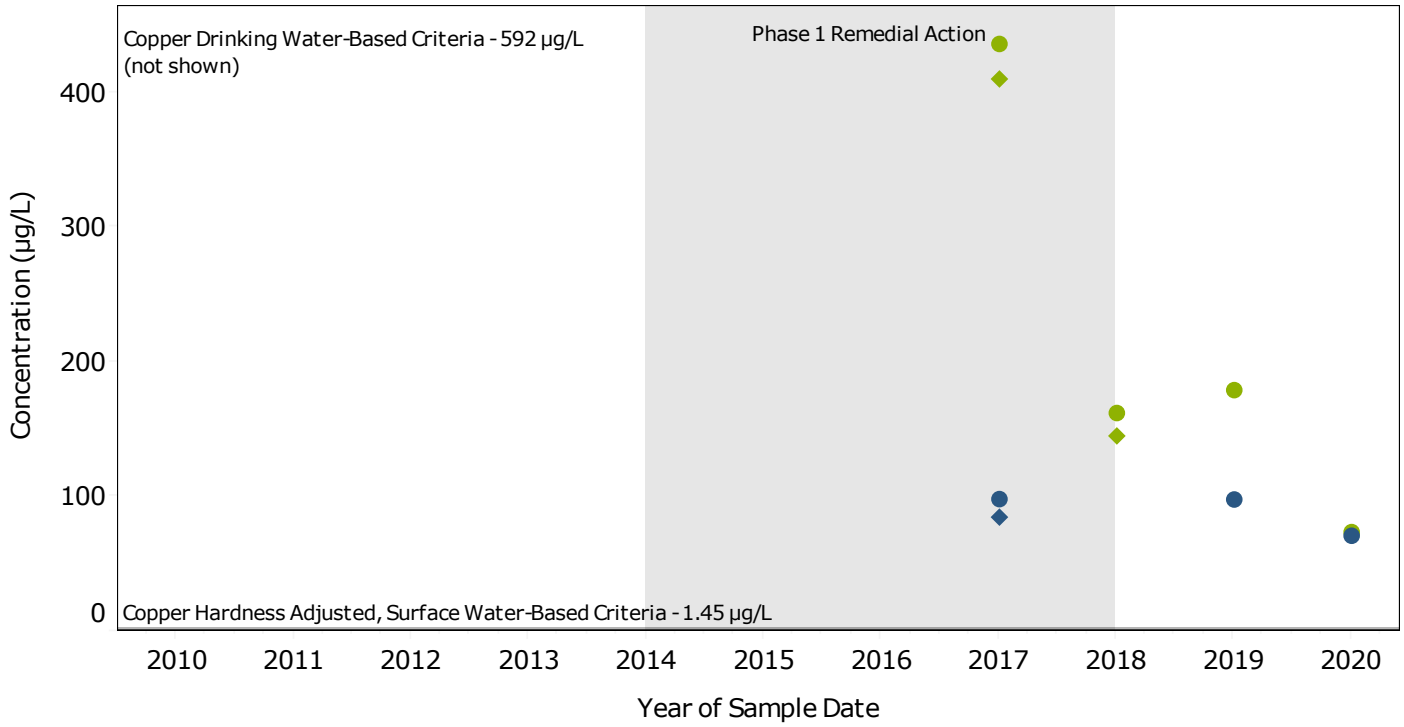
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

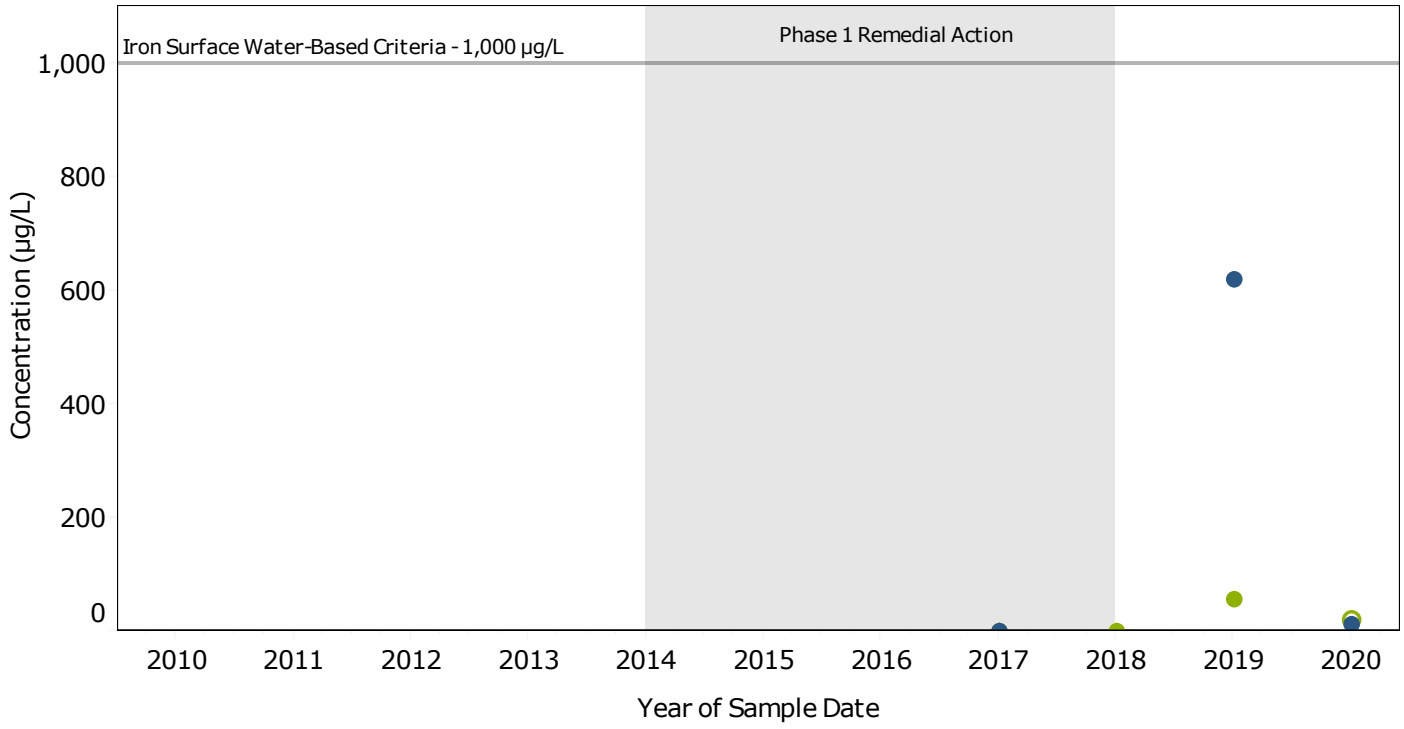
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

TP3-12D, Copper



TP3-12D, Iron



Legend

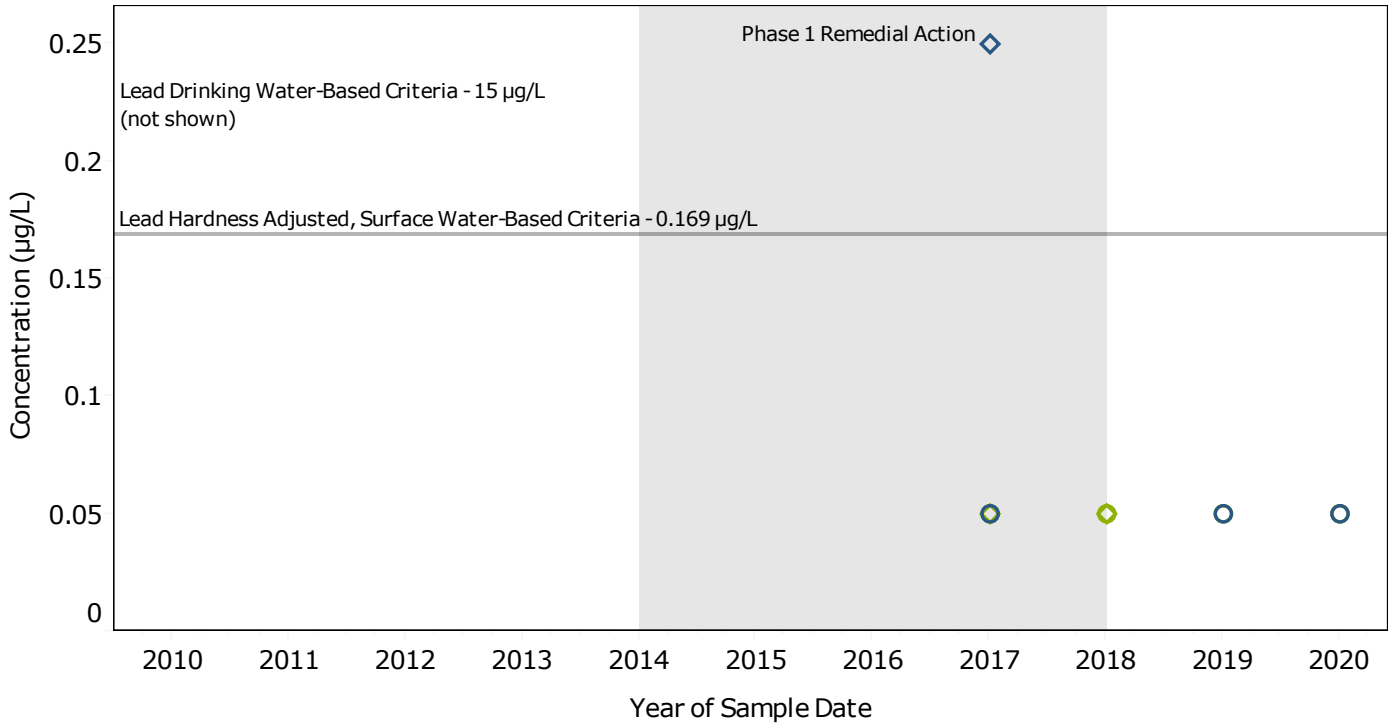
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

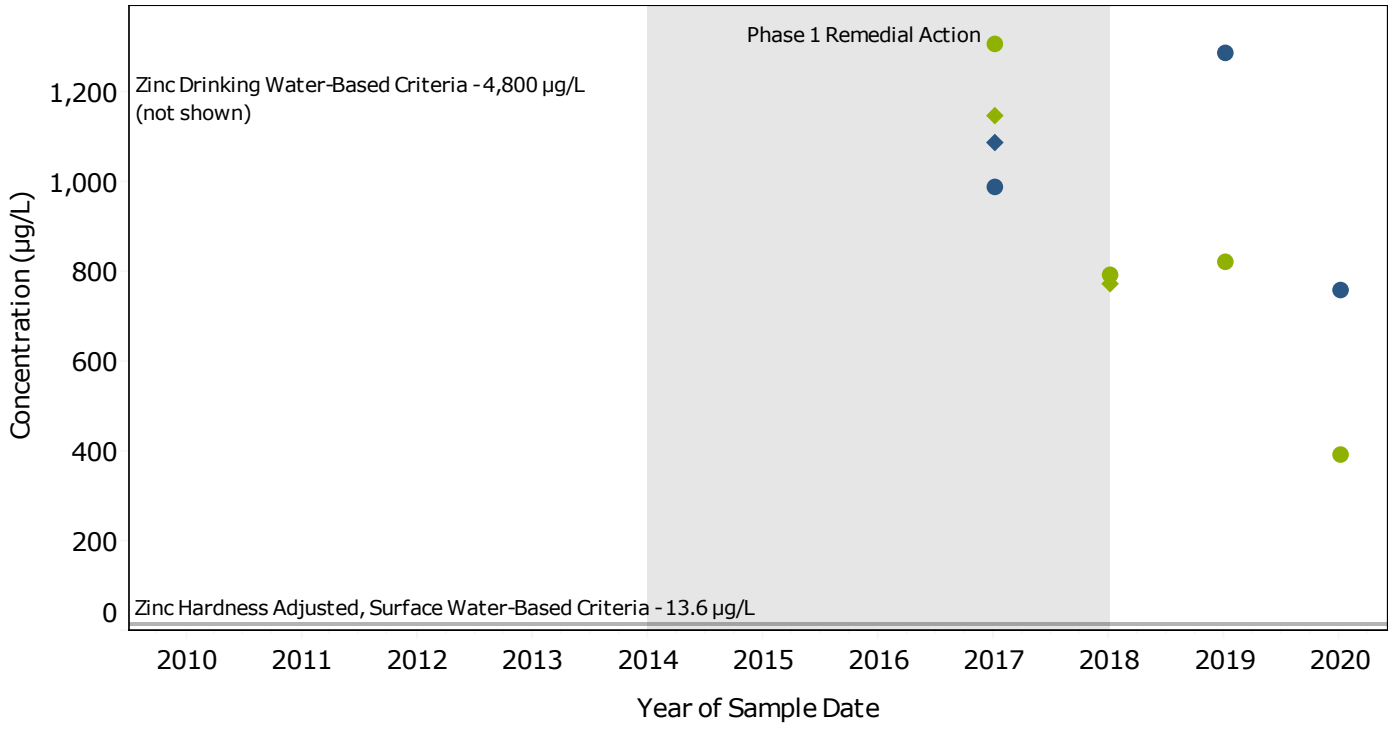
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

TP3-12D, Lead



TP3-12D, Zinc



Legend

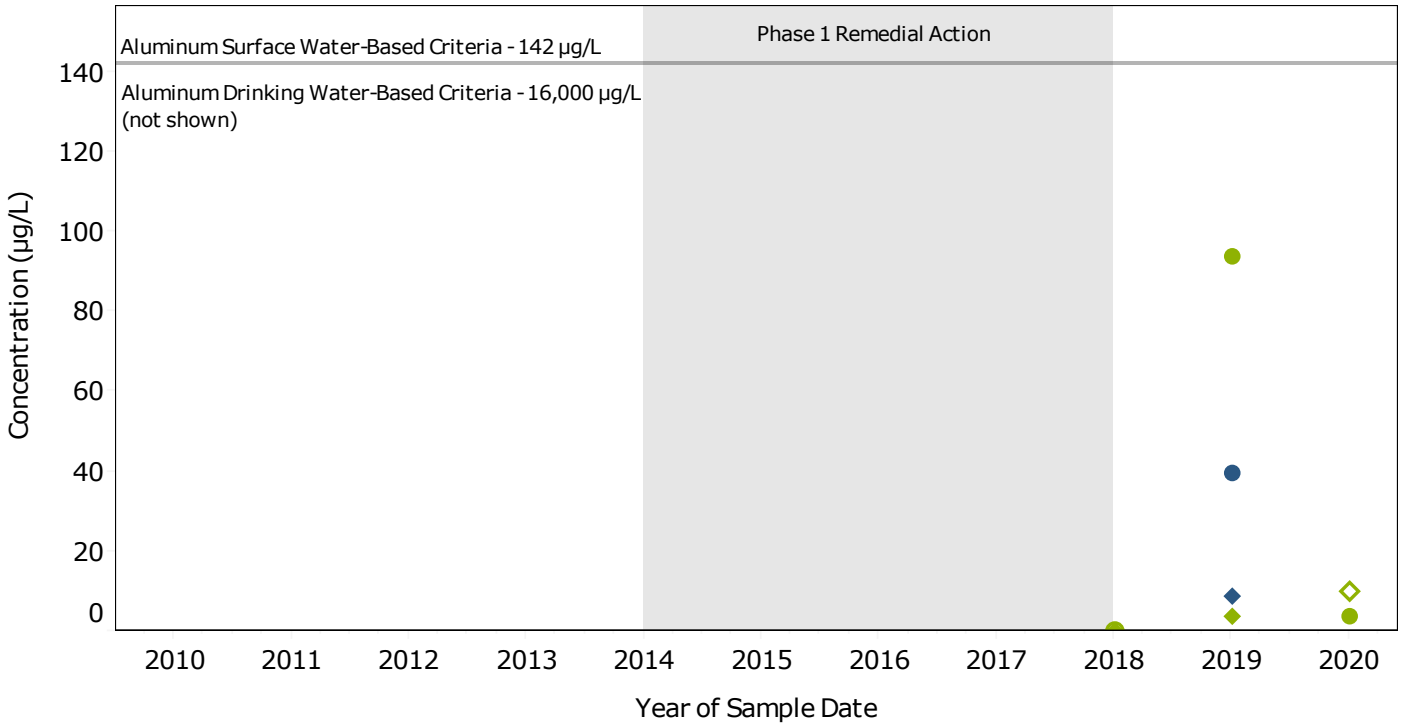
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

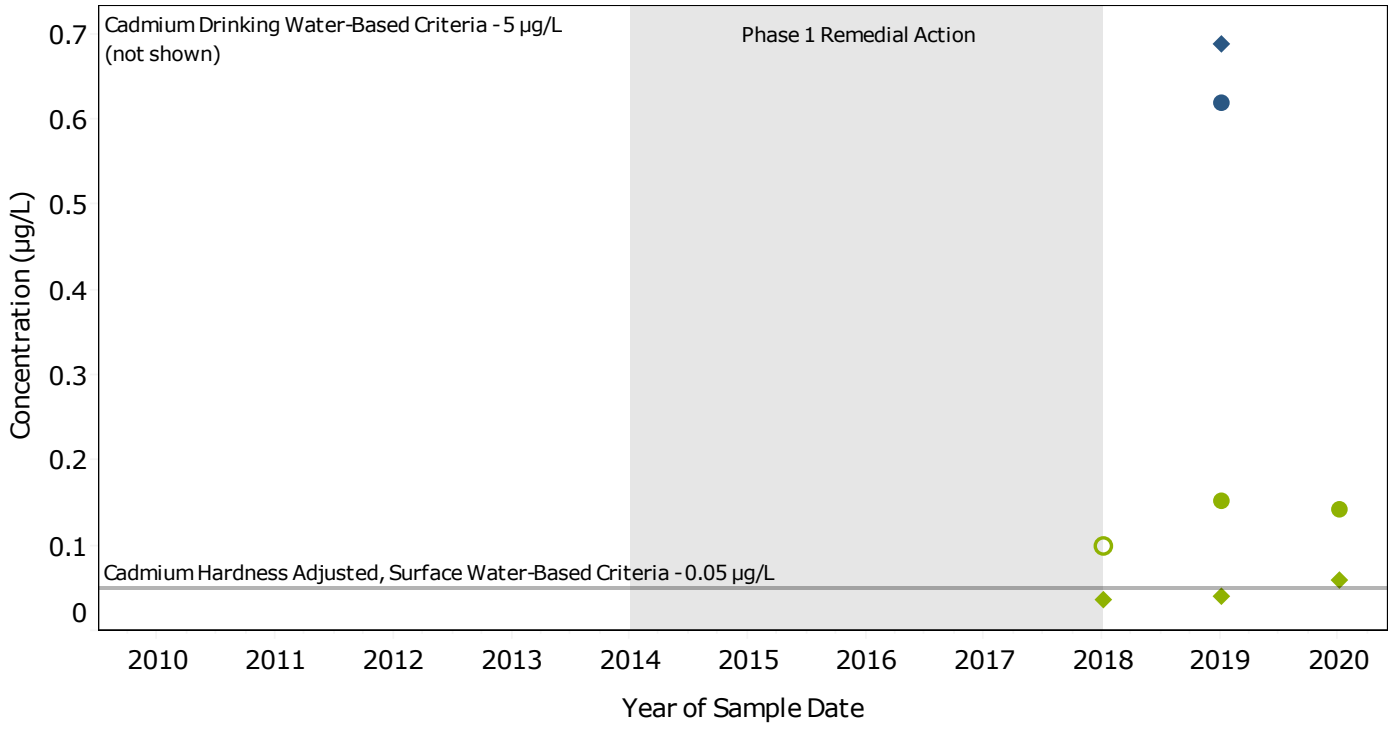
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

TP3-12S, Aluminum



TP3-12S, Cadmium



Legend

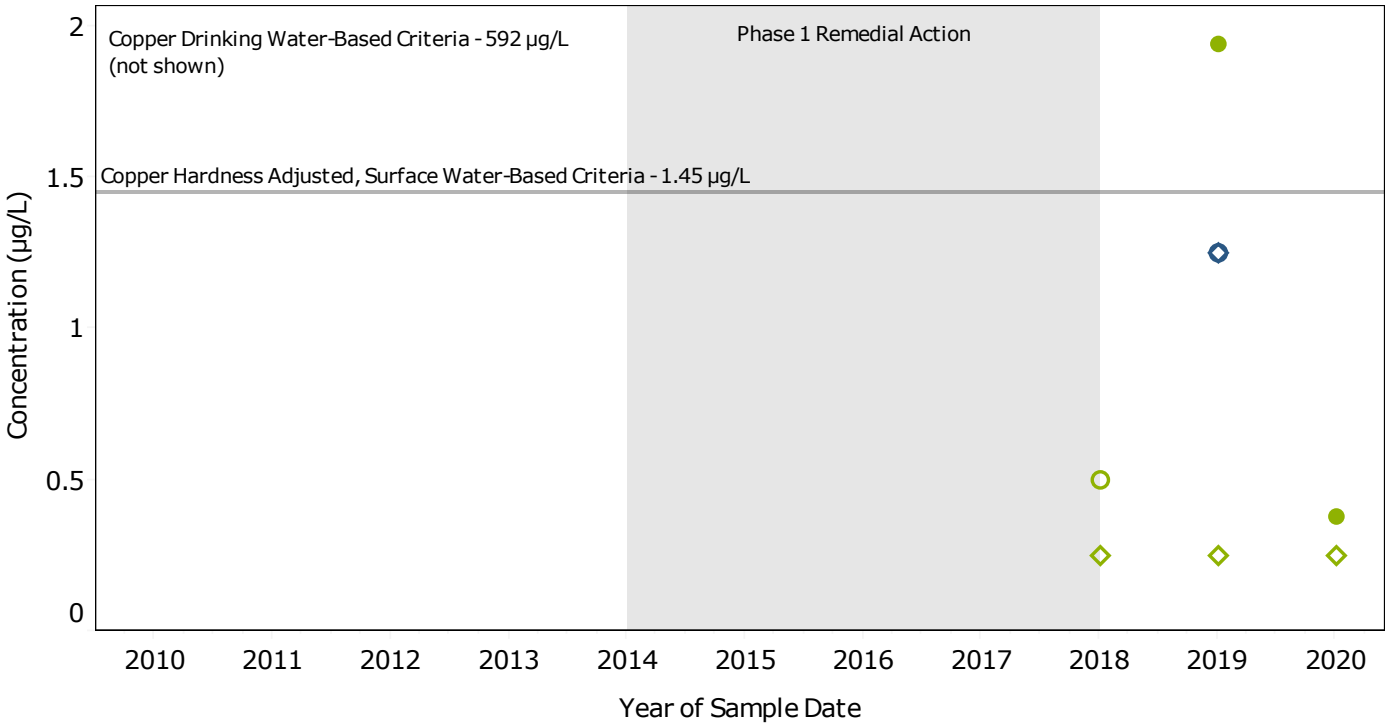
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

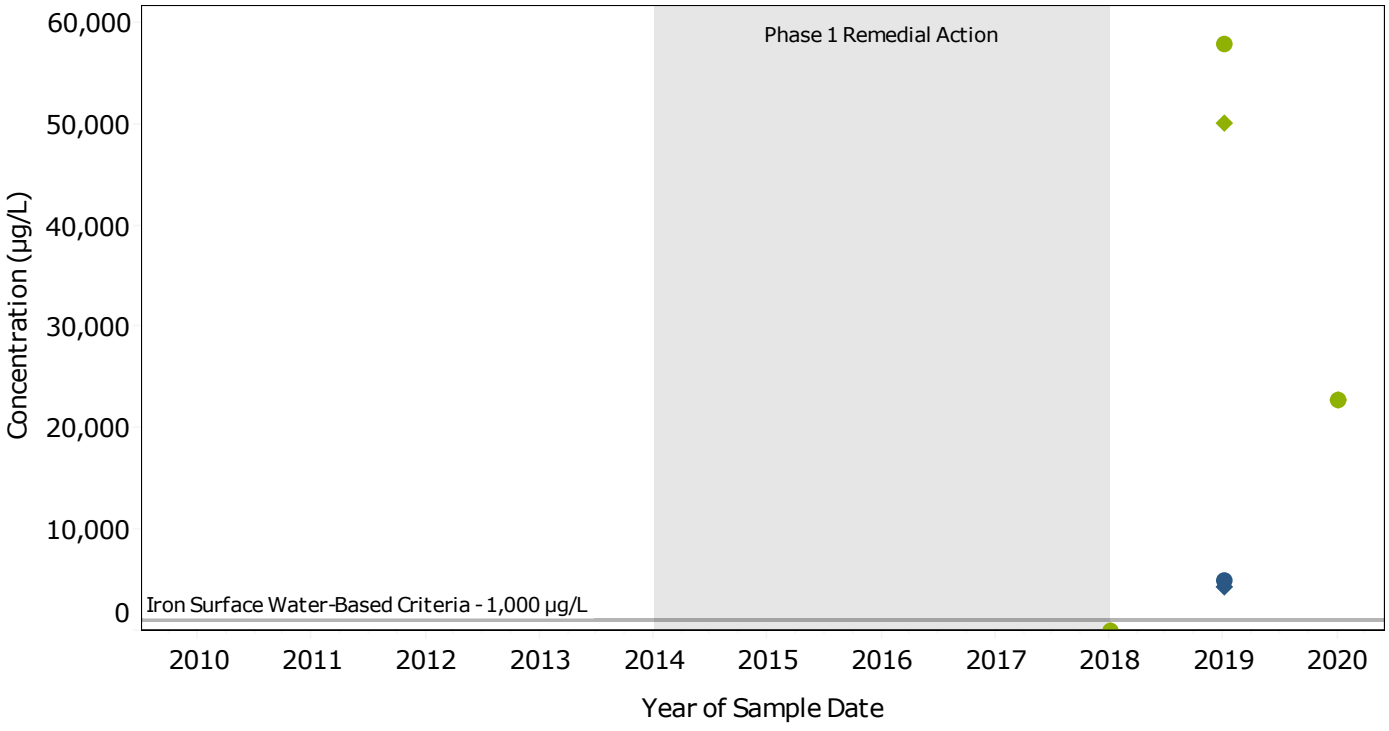
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

TP3-12S, Copper



TP3-12S, Iron



Legend

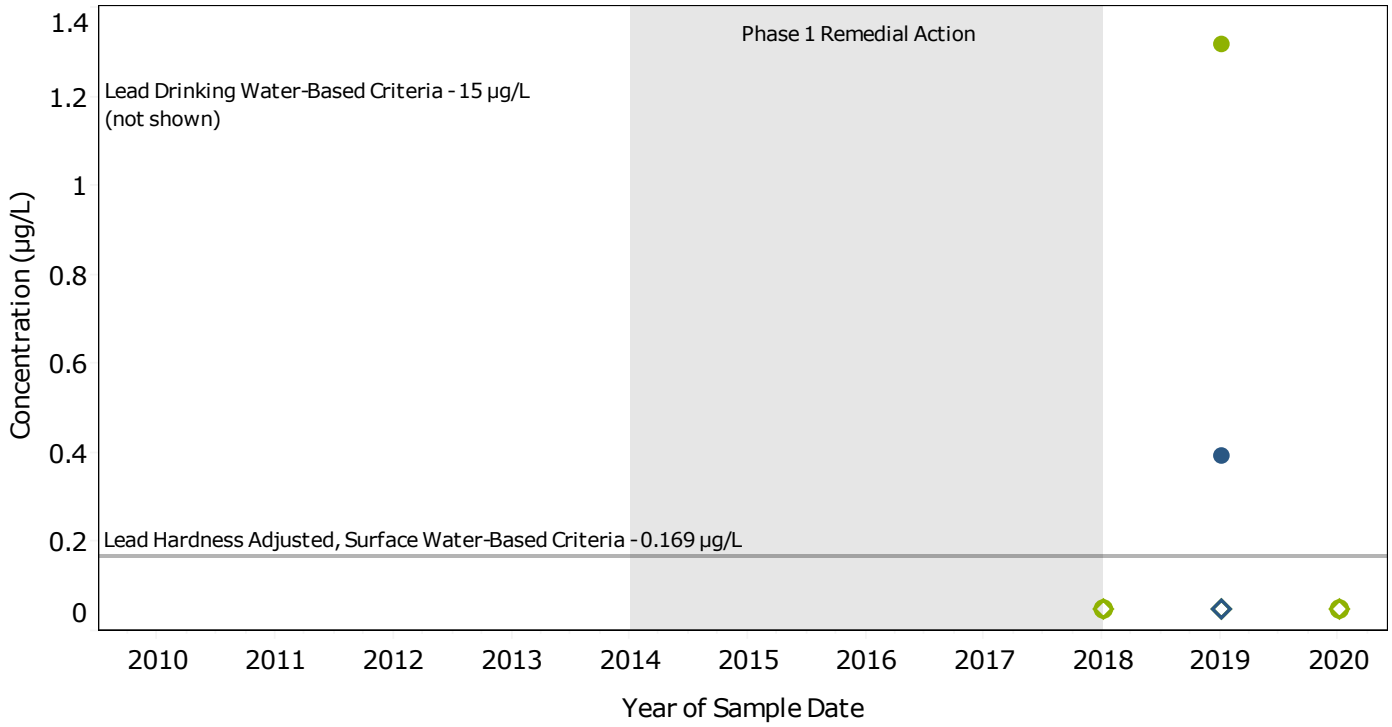
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

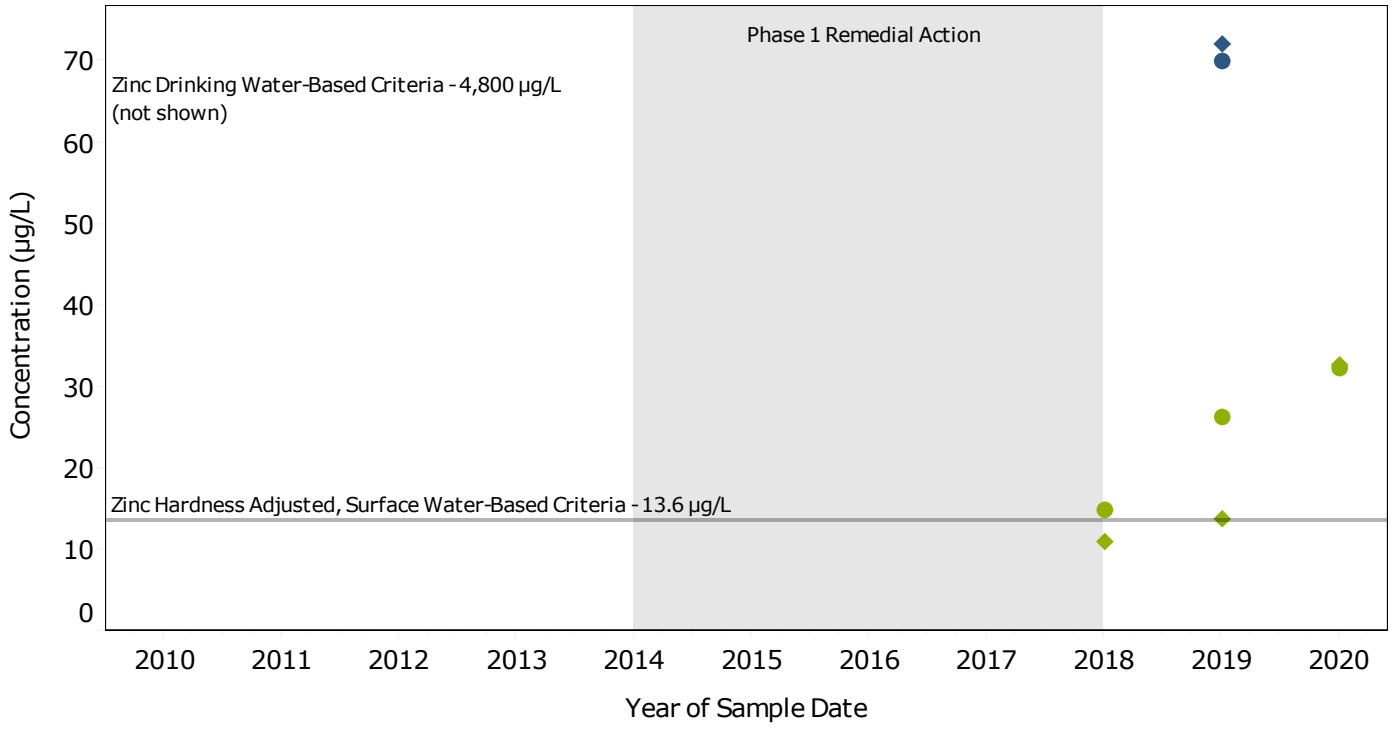
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

TP3-12S, Lead



TP3-12S, Zinc



Legend

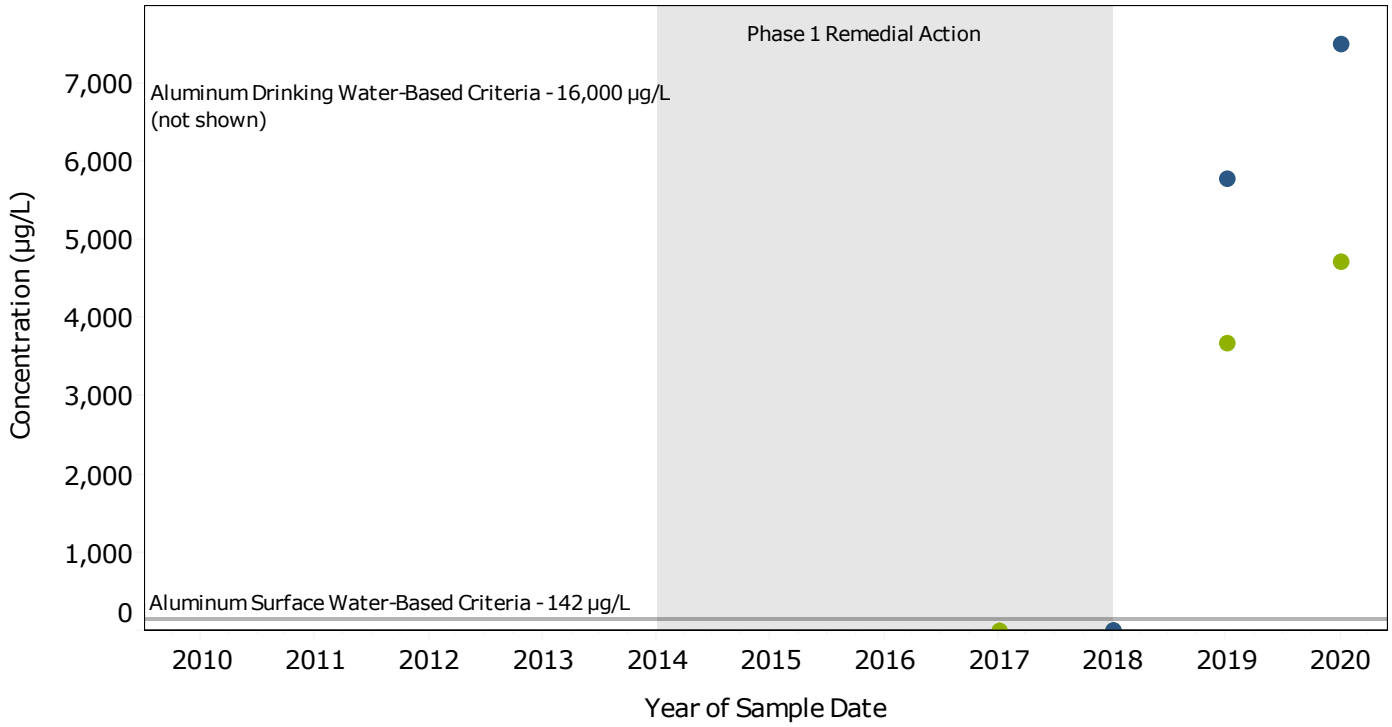
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

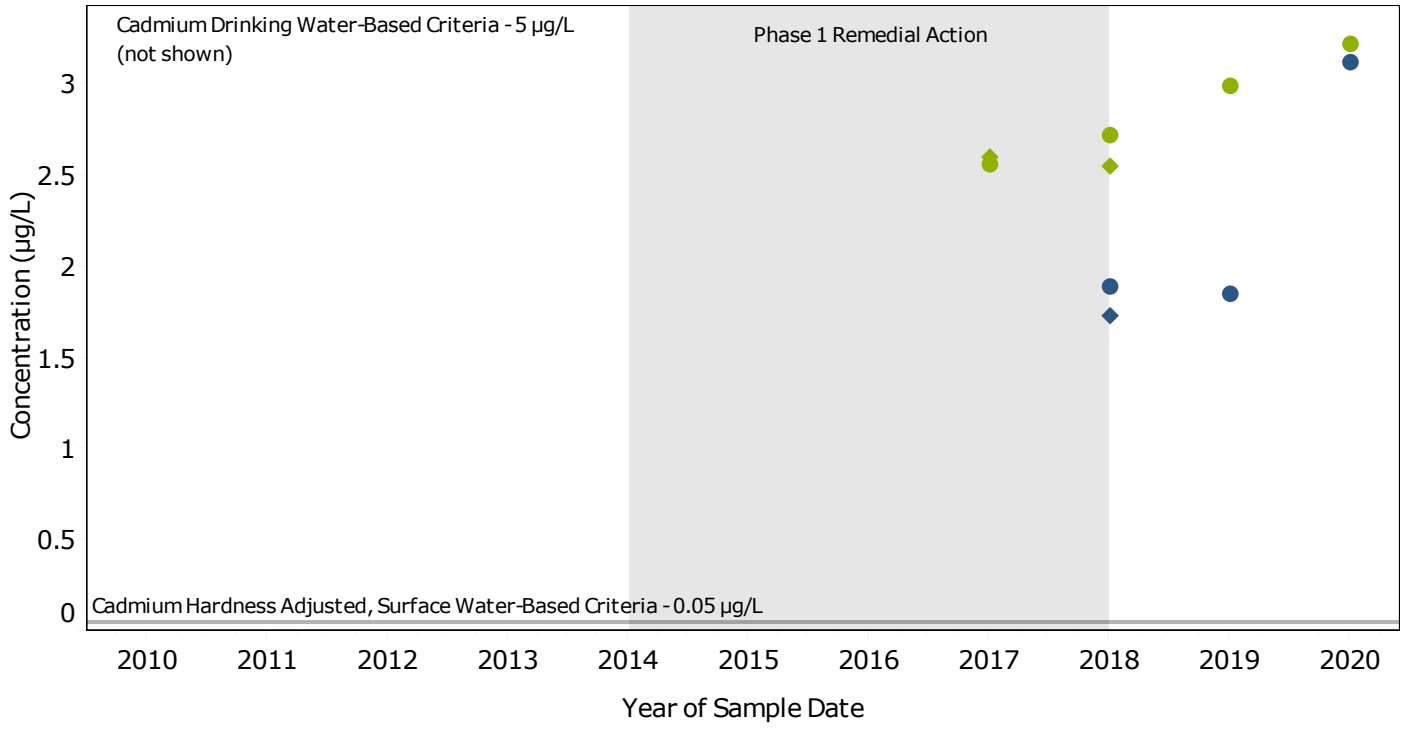
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

TP3-13, Aluminum



TP3-13, Cadmium



Legend

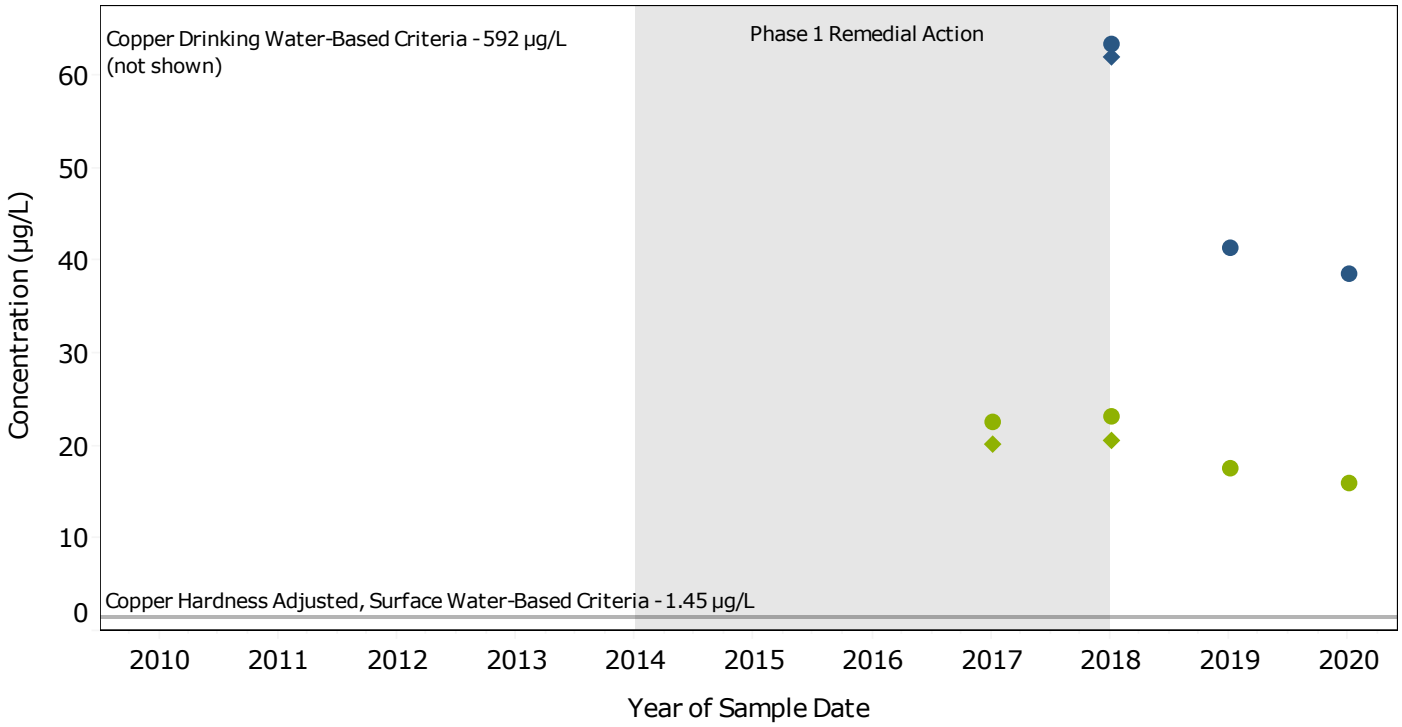
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

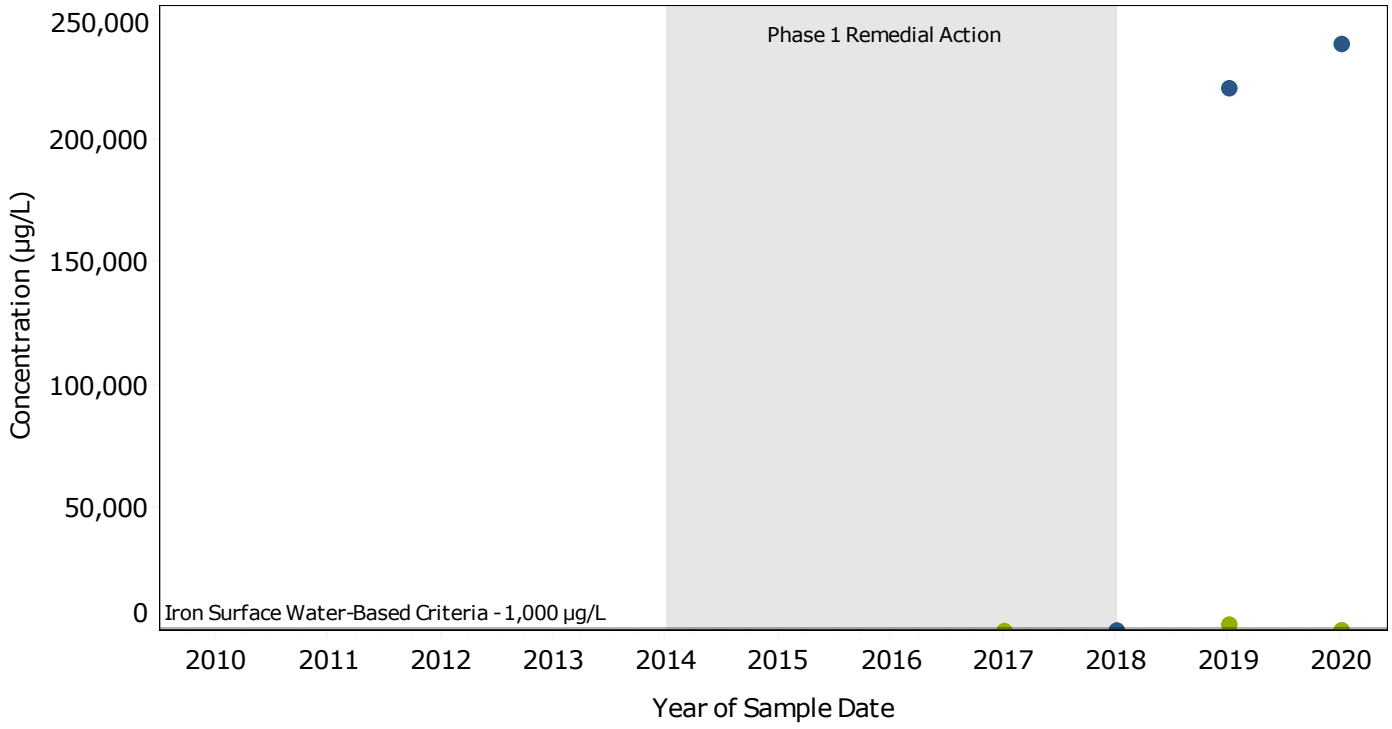
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

TP3-13, Copper



TP3-13, Iron



Legend

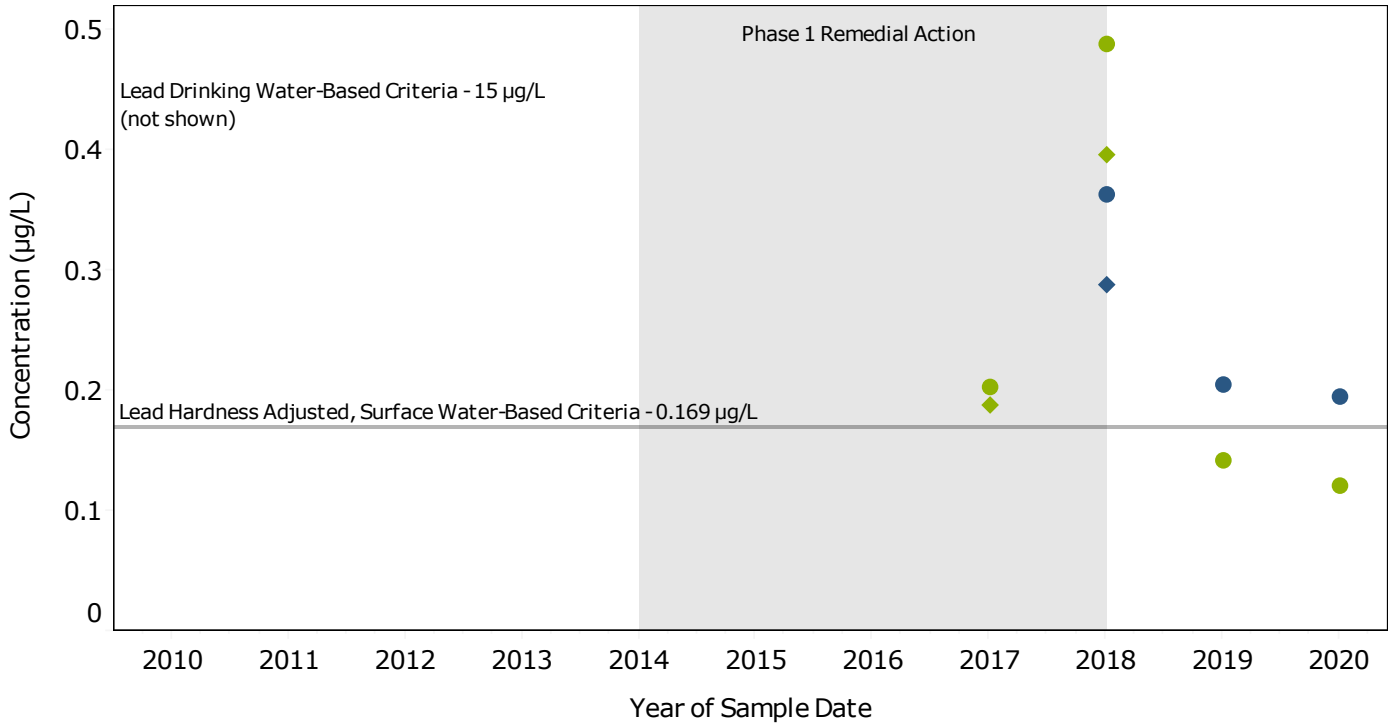
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

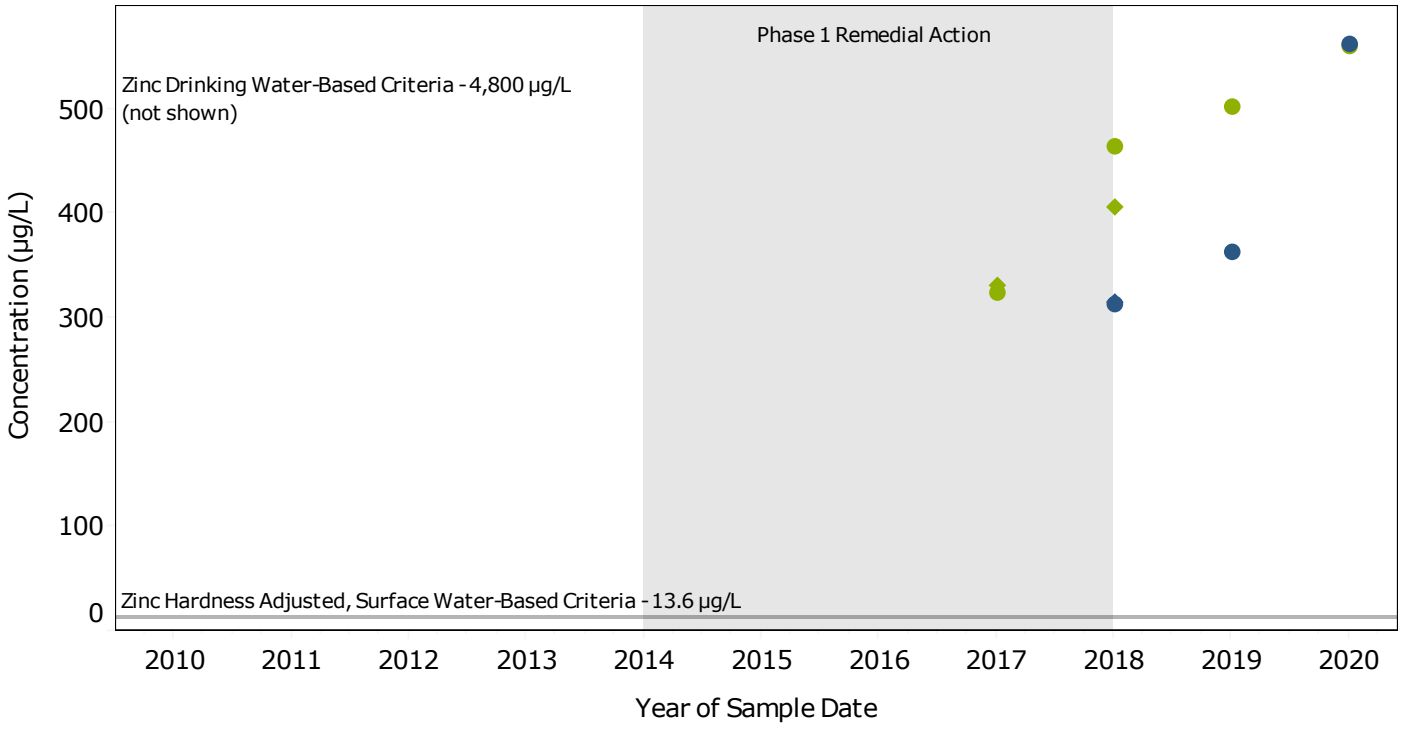
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

TP3-13, Lead



TP3-13, Zinc



Legend

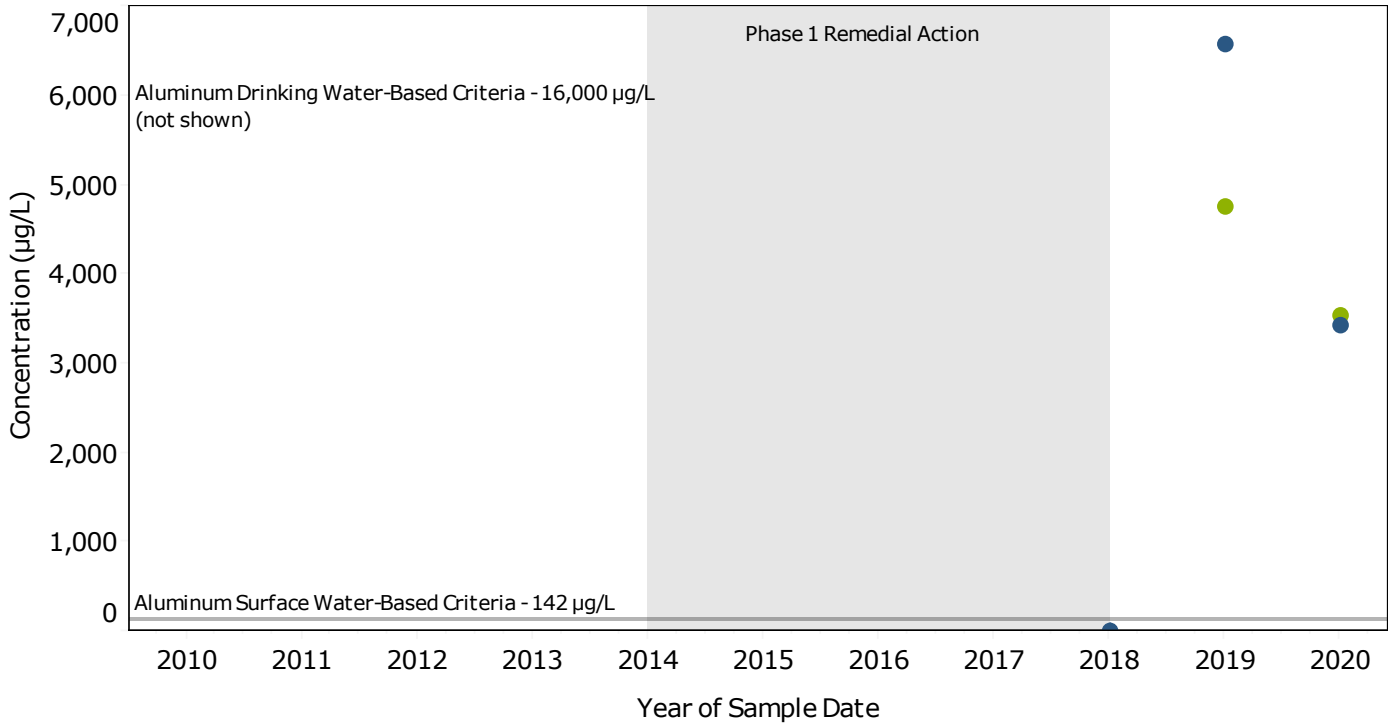
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

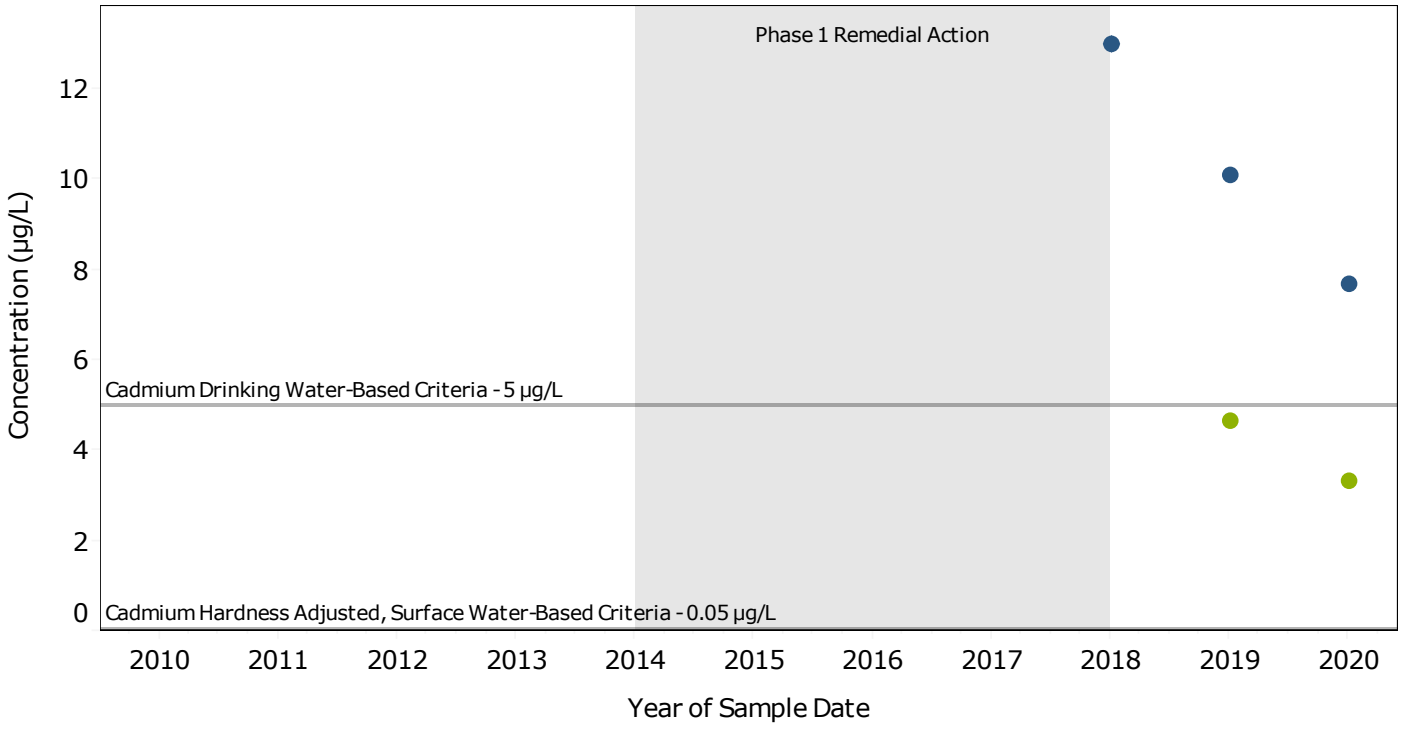
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

TP3-14D, Aluminum



TP3-14D, Cadmium



Legend

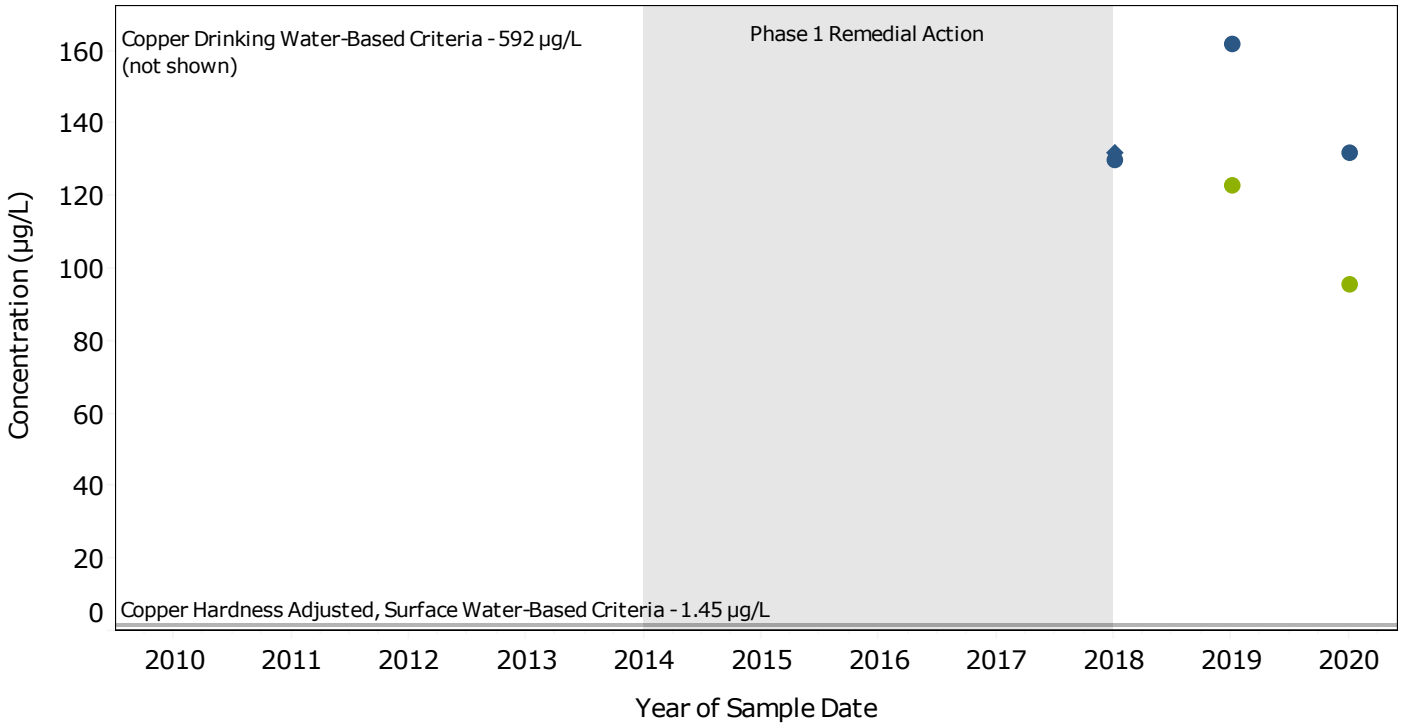
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

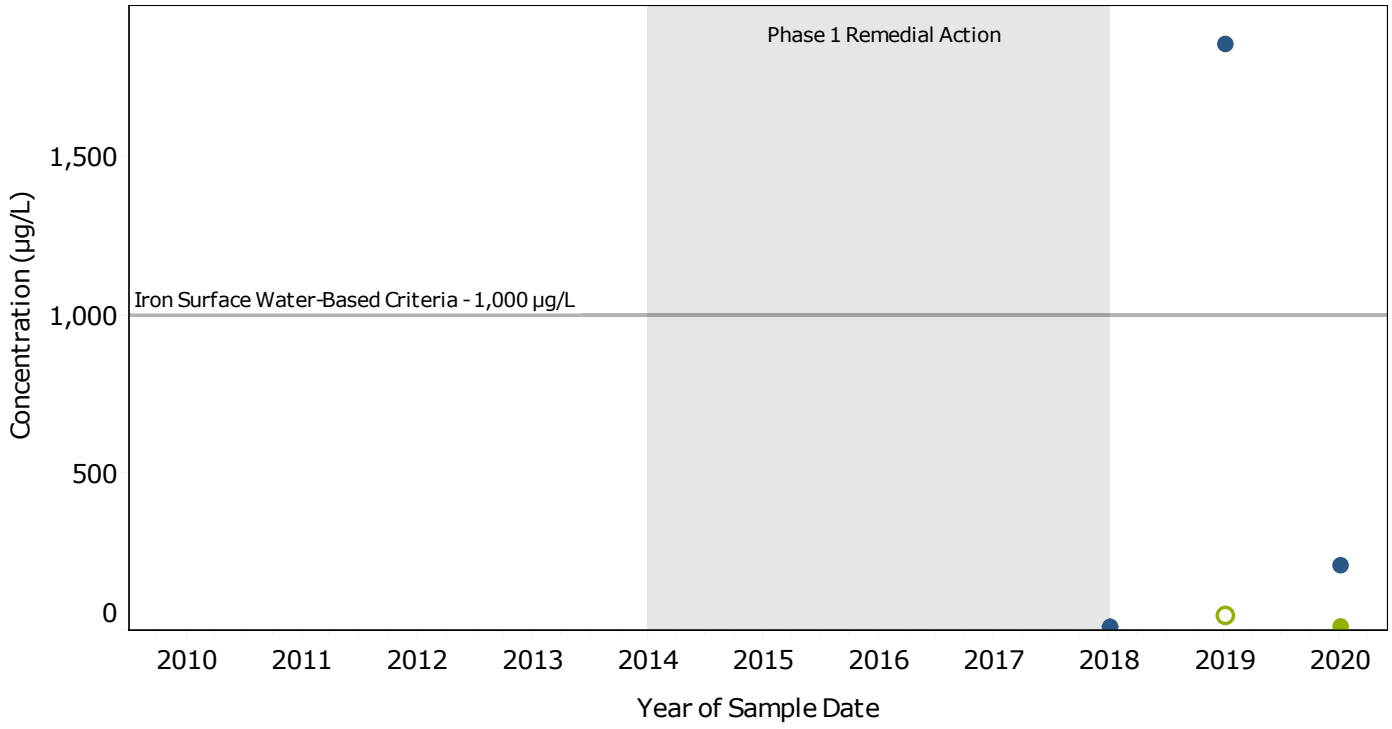
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

TP3-14D, Copper



TP3-14D, Iron



Legend

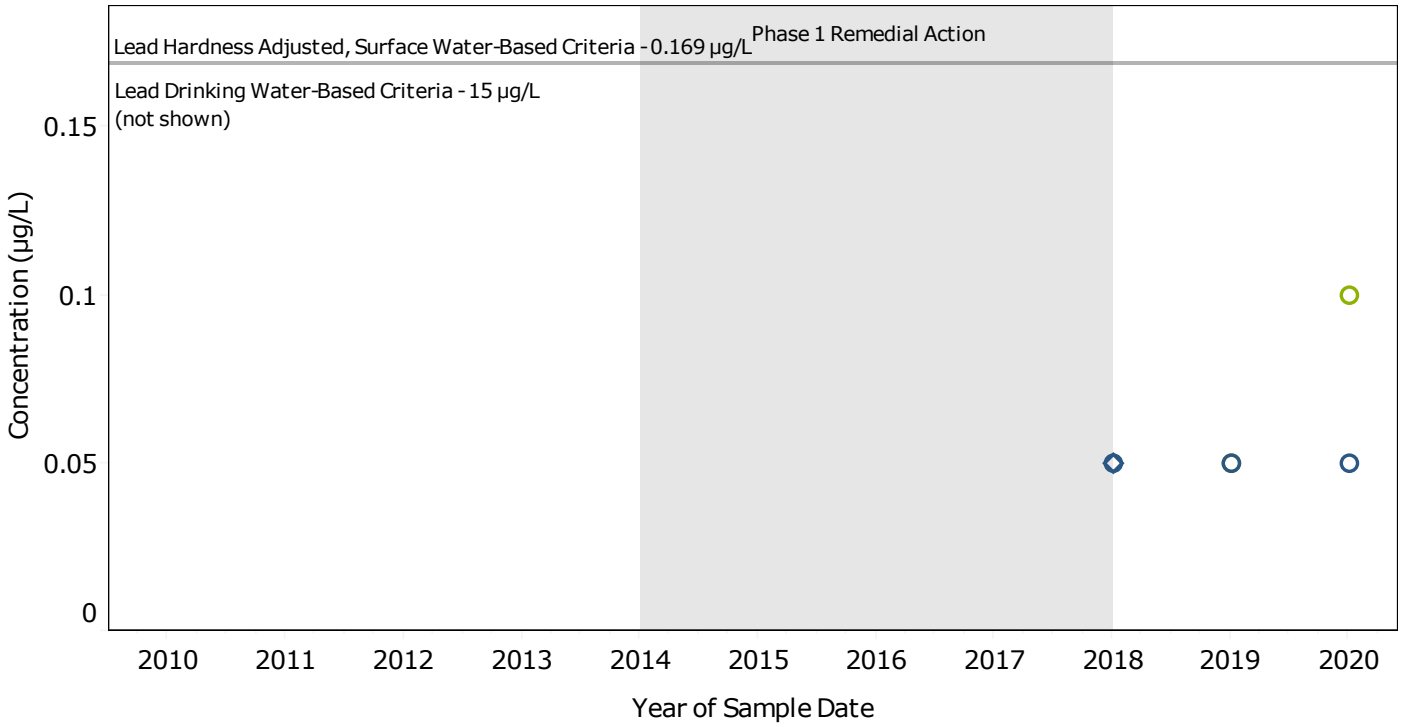
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

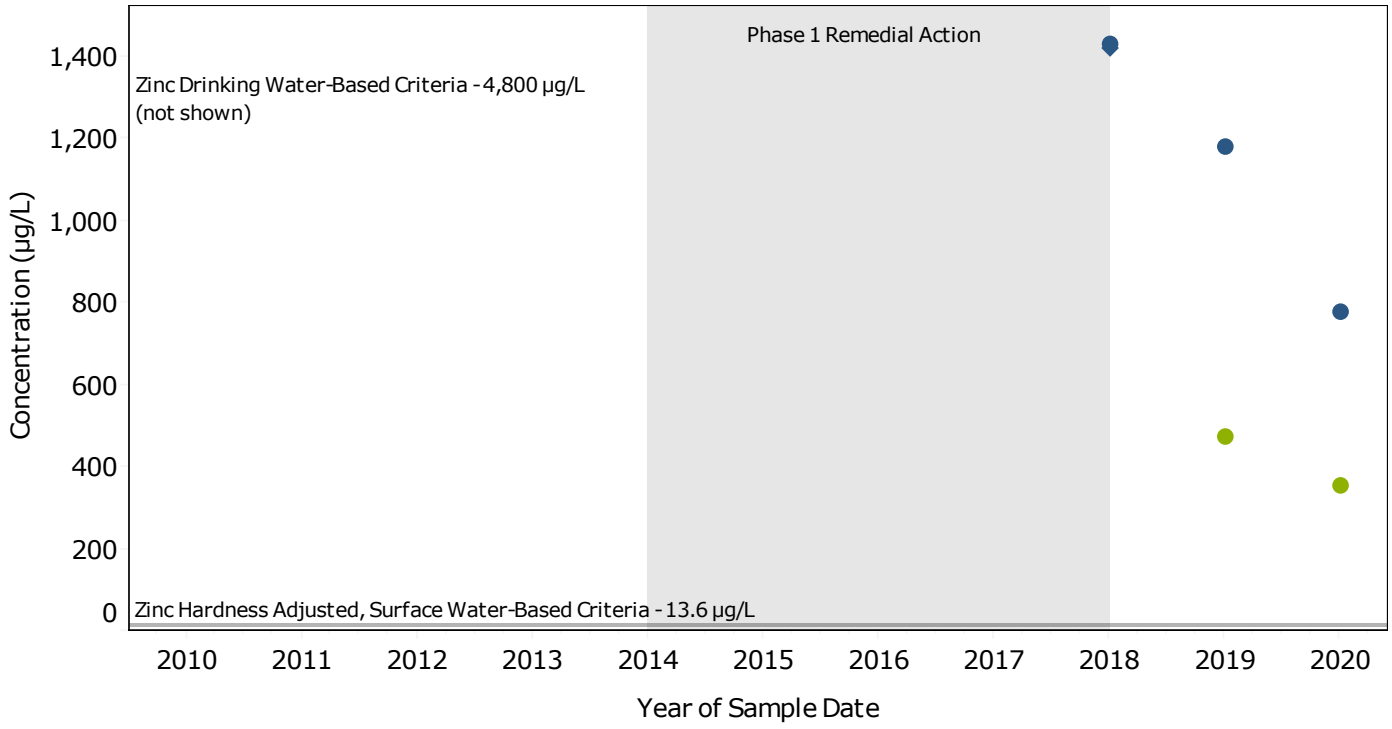
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

TP3-14D, Lead



TP3-14D, Zinc



Legend

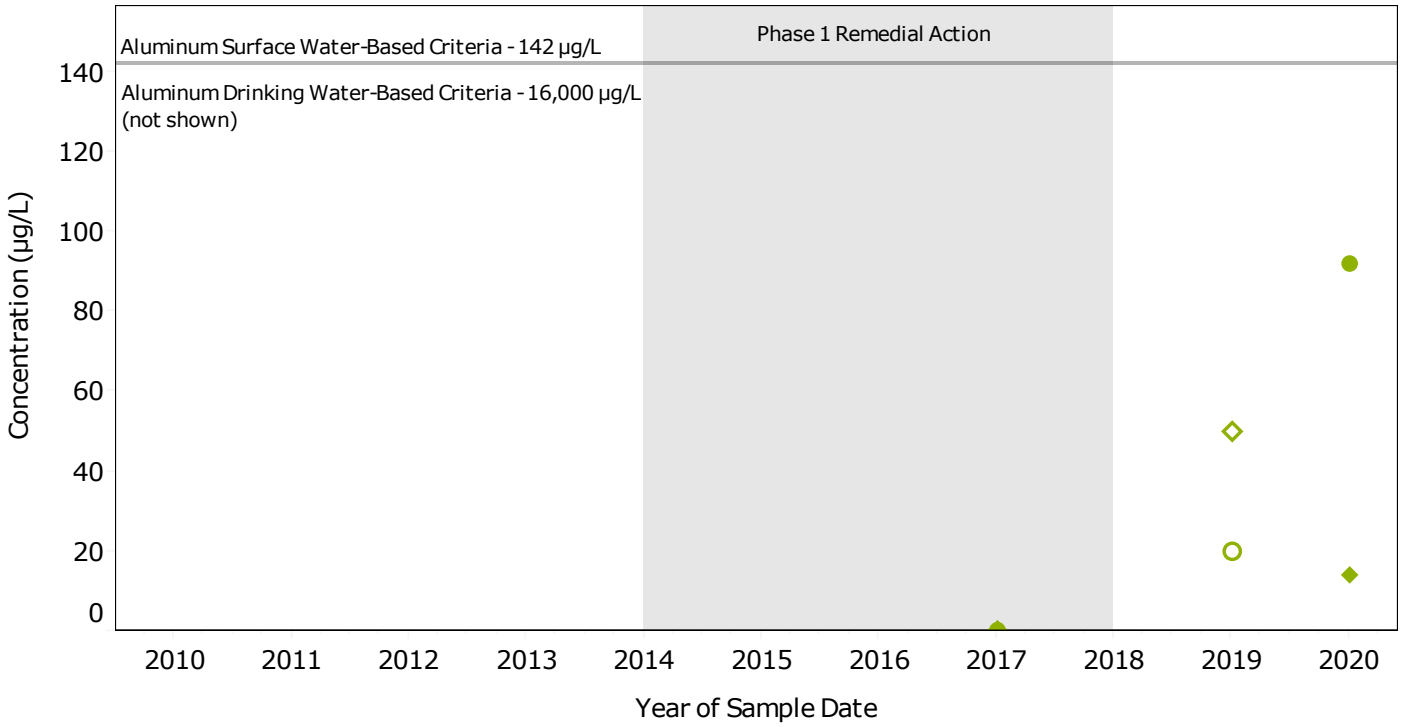
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

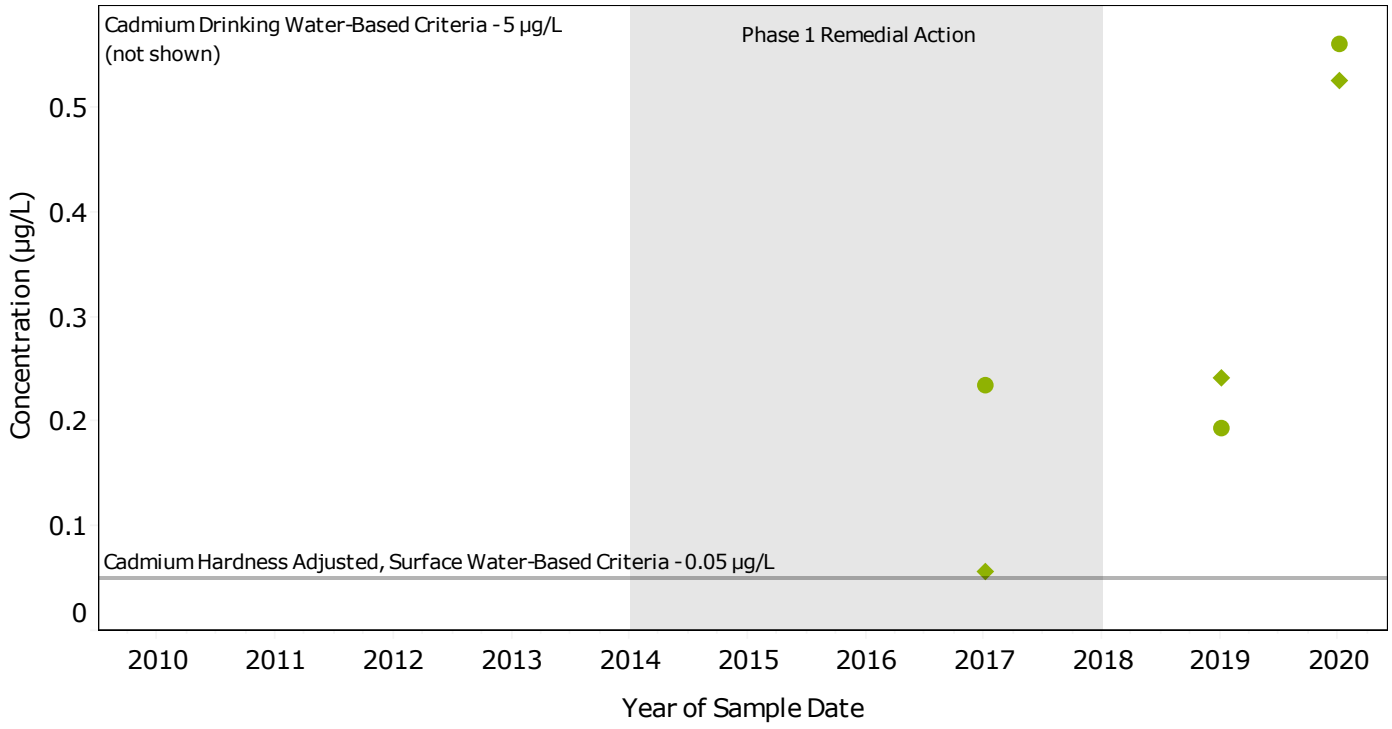
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

TP3-14S, Aluminum



TP3-14S, Cadmium



Legend

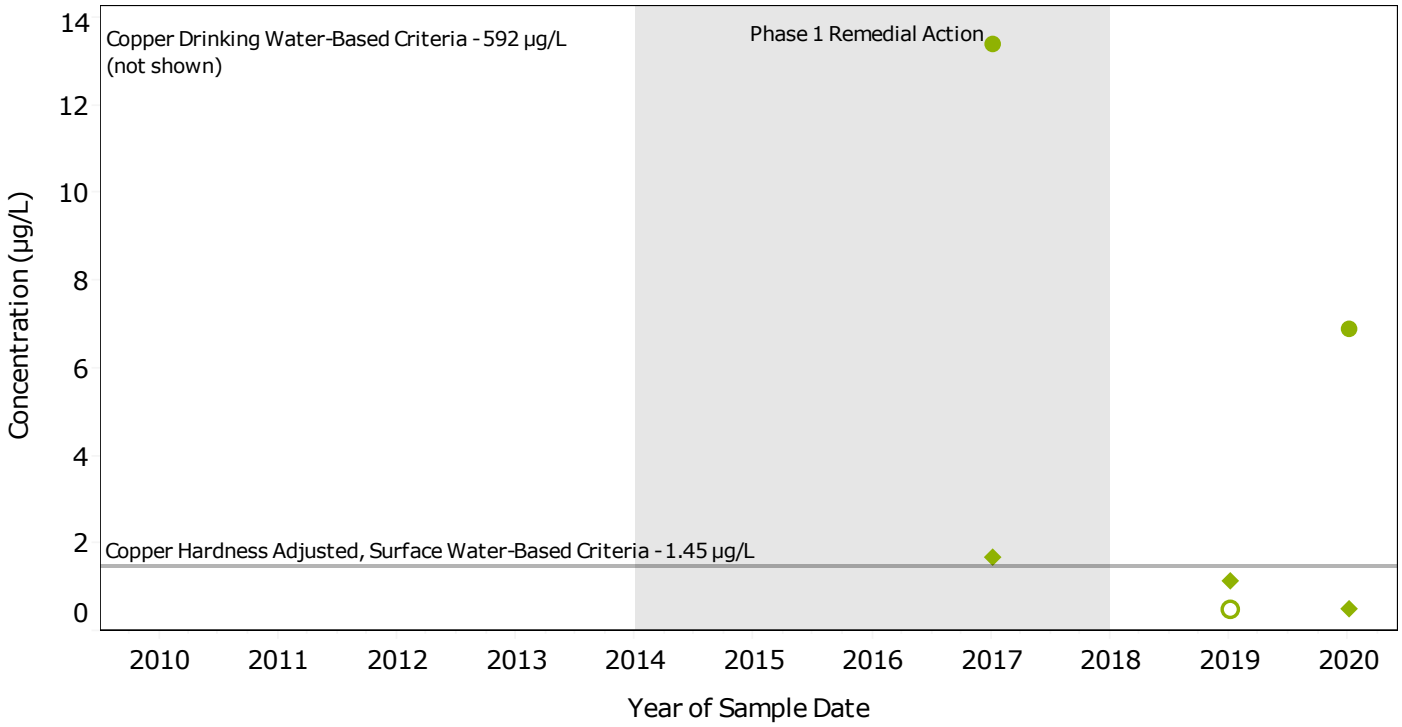
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

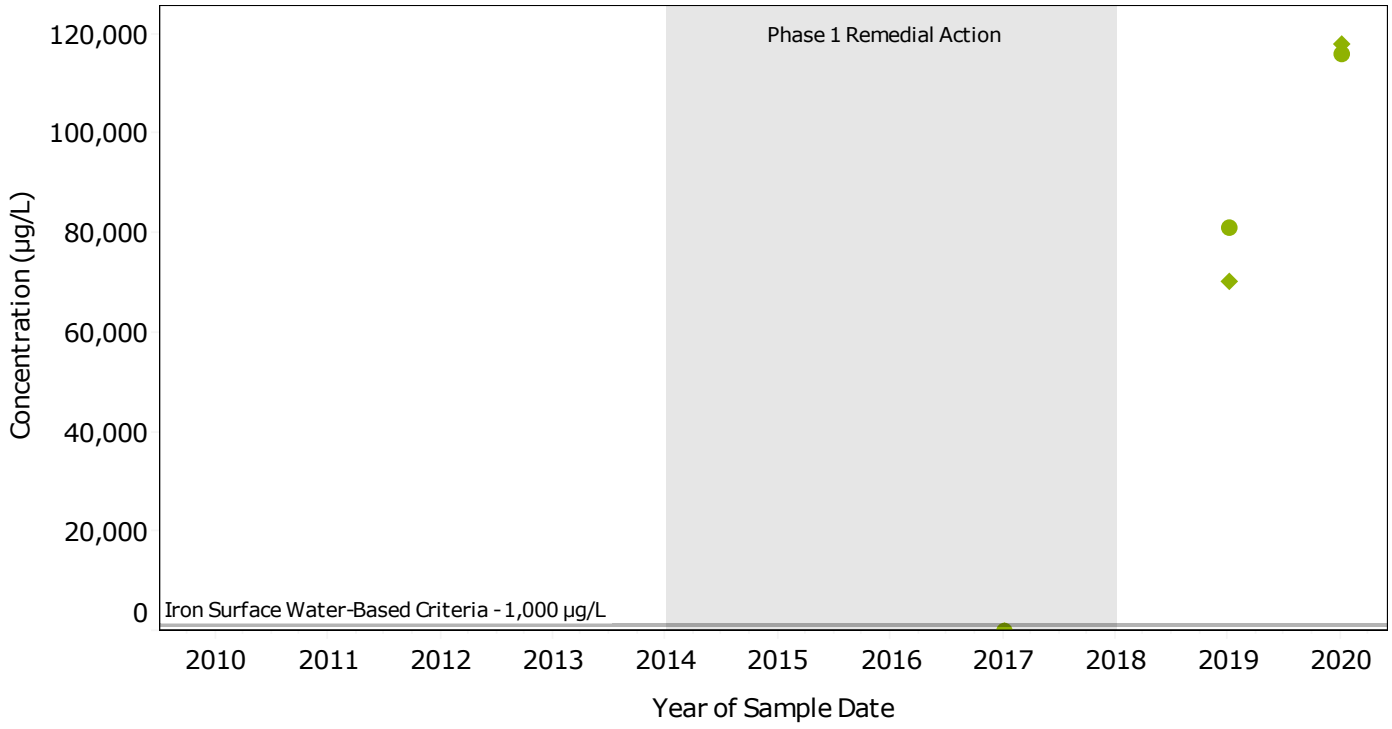
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

TP3-14S, Copper



TP3-14S, Iron



Legend

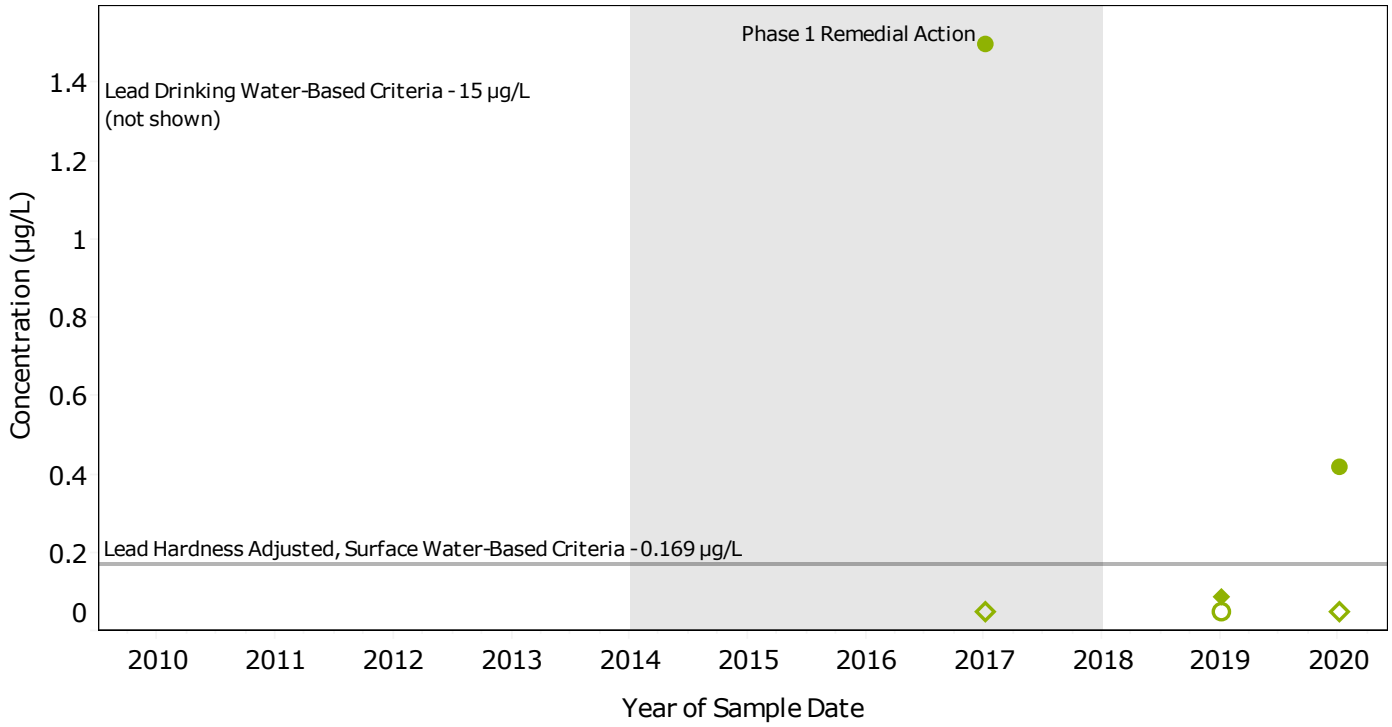
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

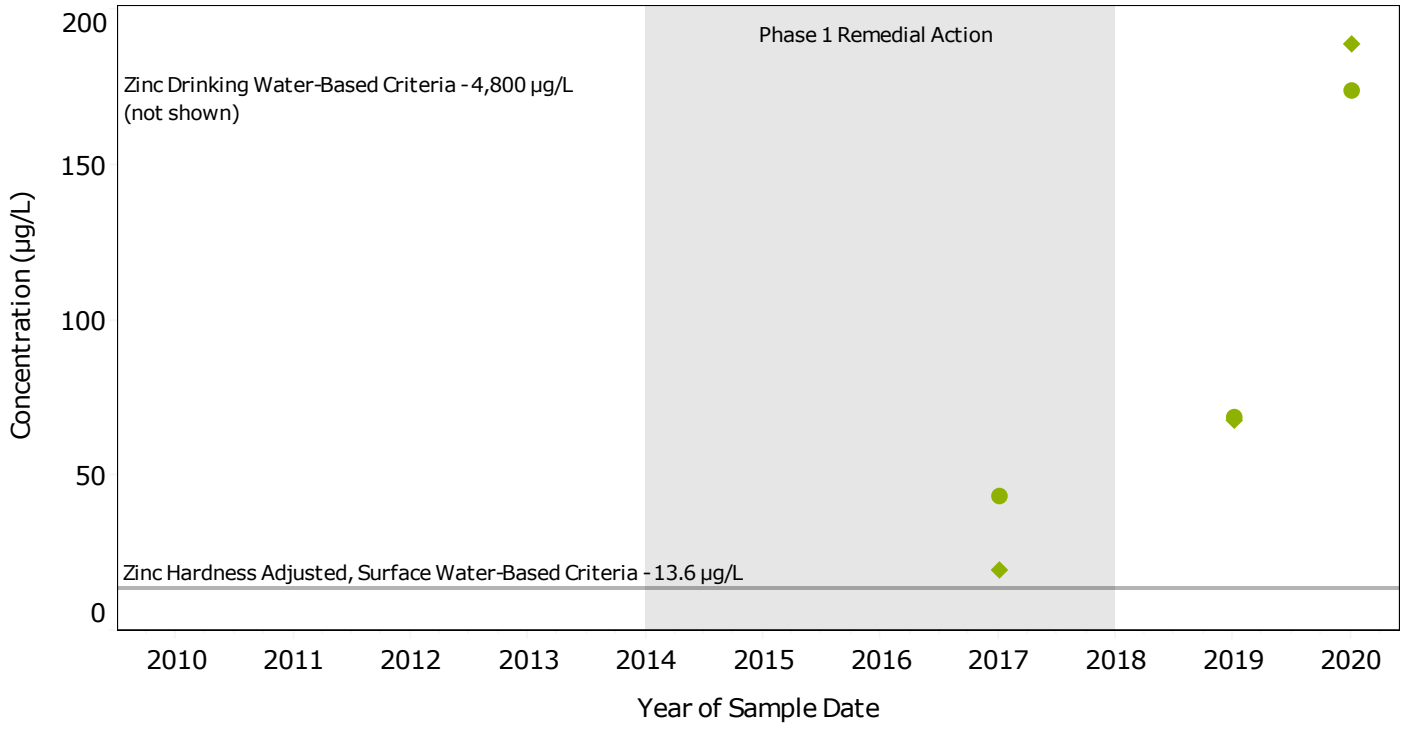
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

TP3-14S, Lead



TP3-14S, Zinc



Legend

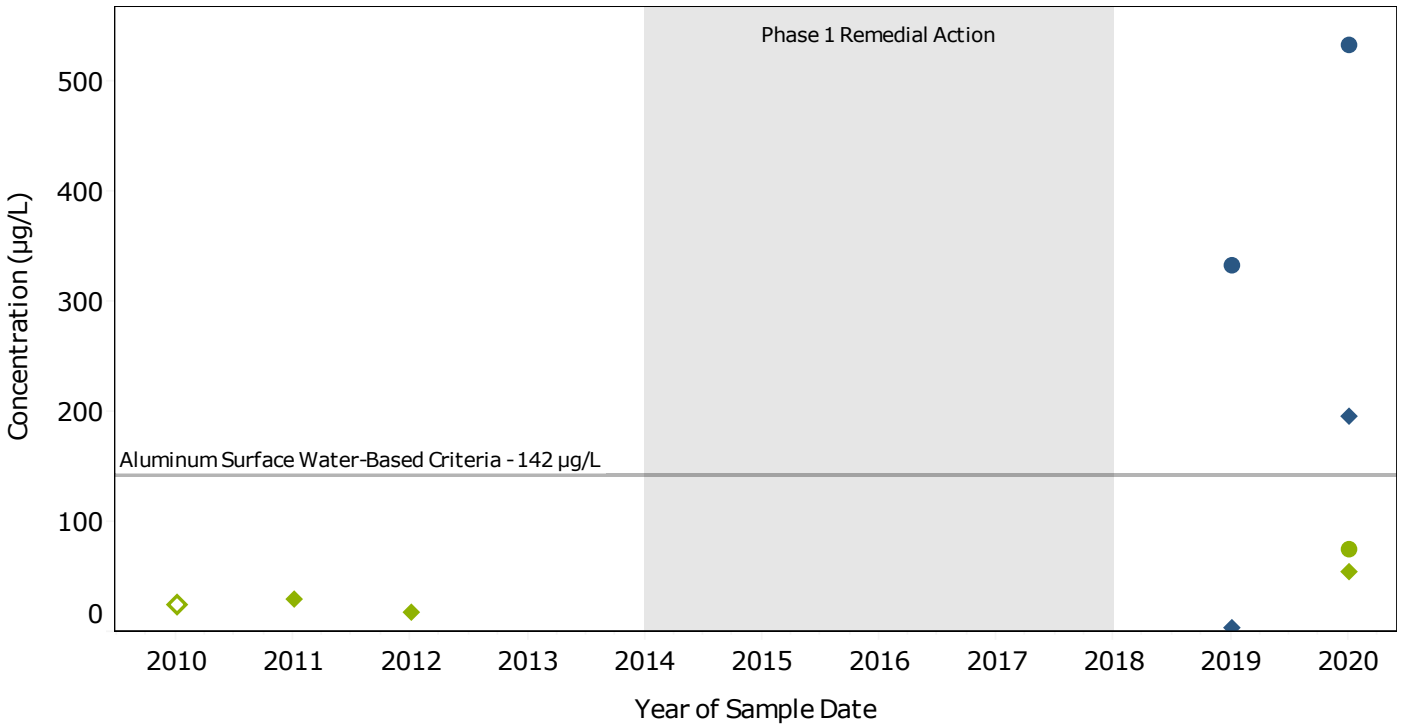
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

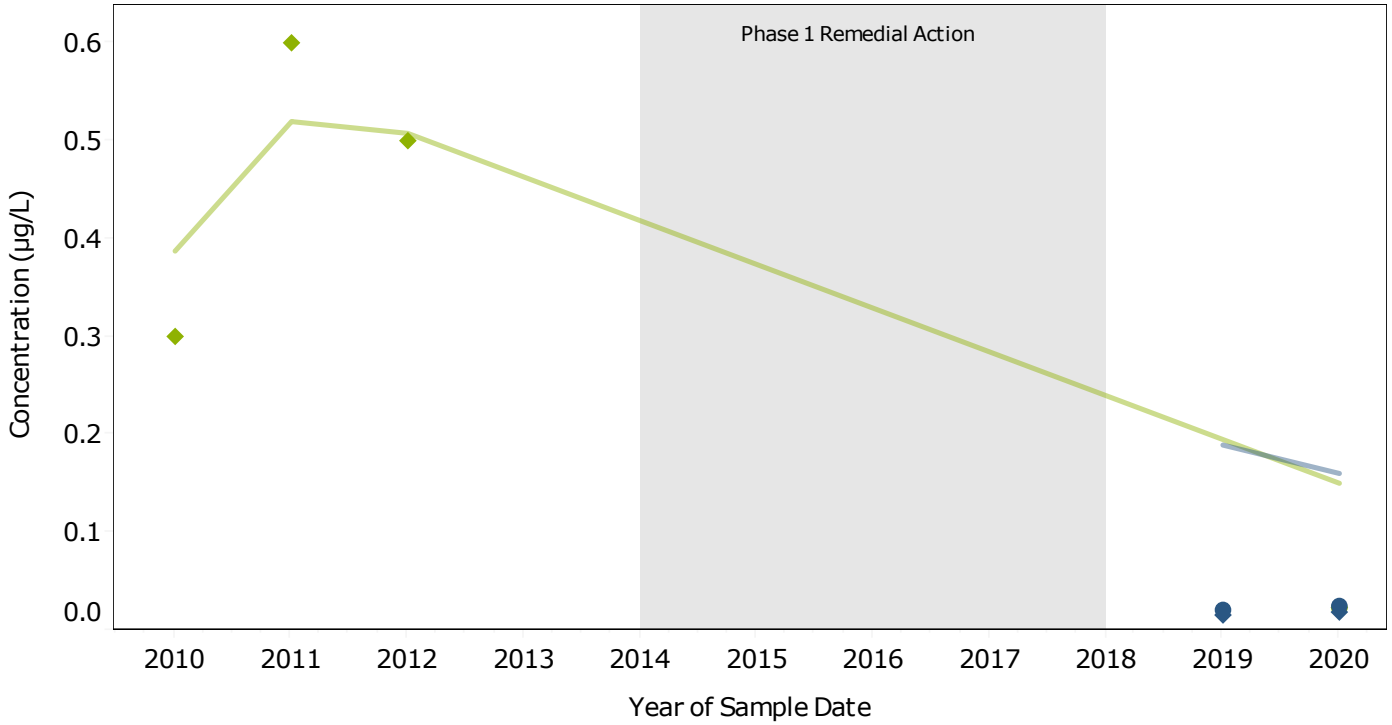
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

SG-7-WP & SG-7R-WP, Aluminum



SG-7-WP & SG-7R-WP, Cadmium



Legend

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

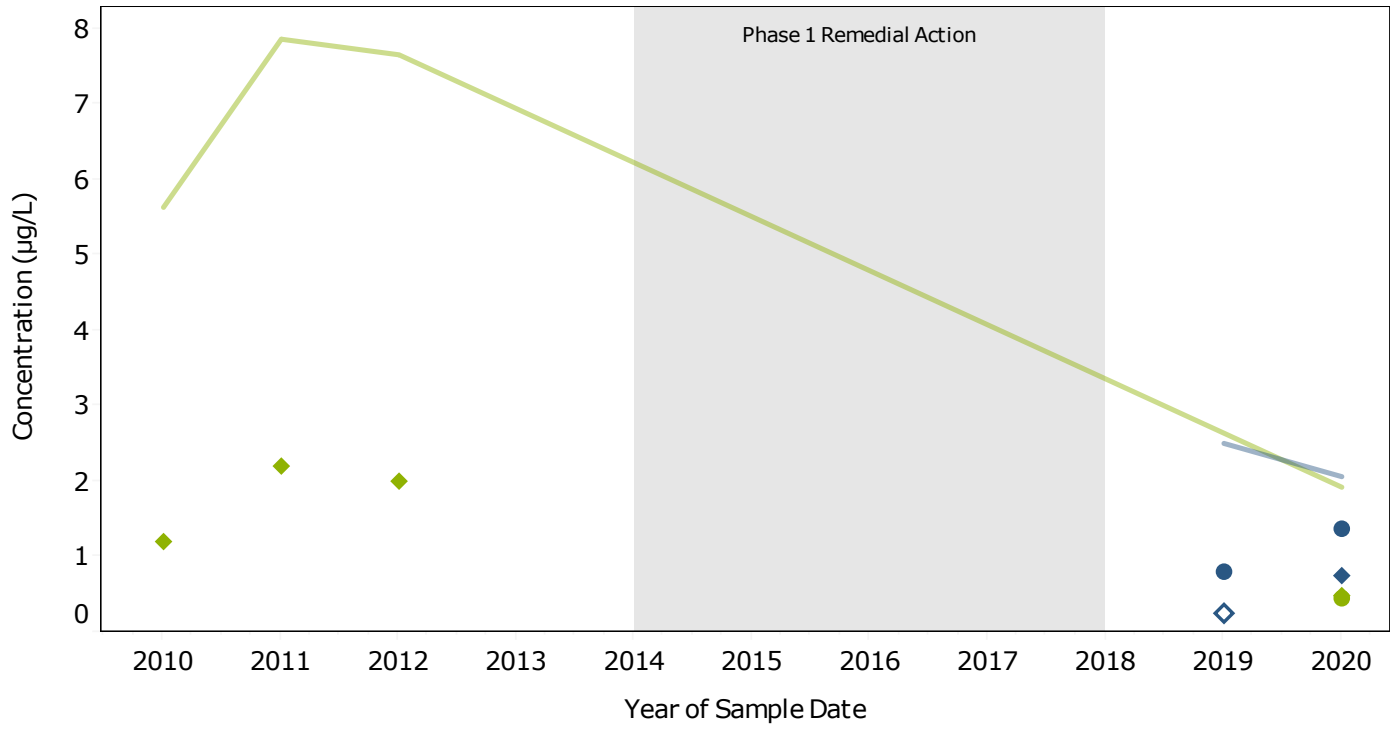
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

- Hardness-adjusted surface water criteria based on spring data
- Hardness-adjusted surface water criteria based on fall data

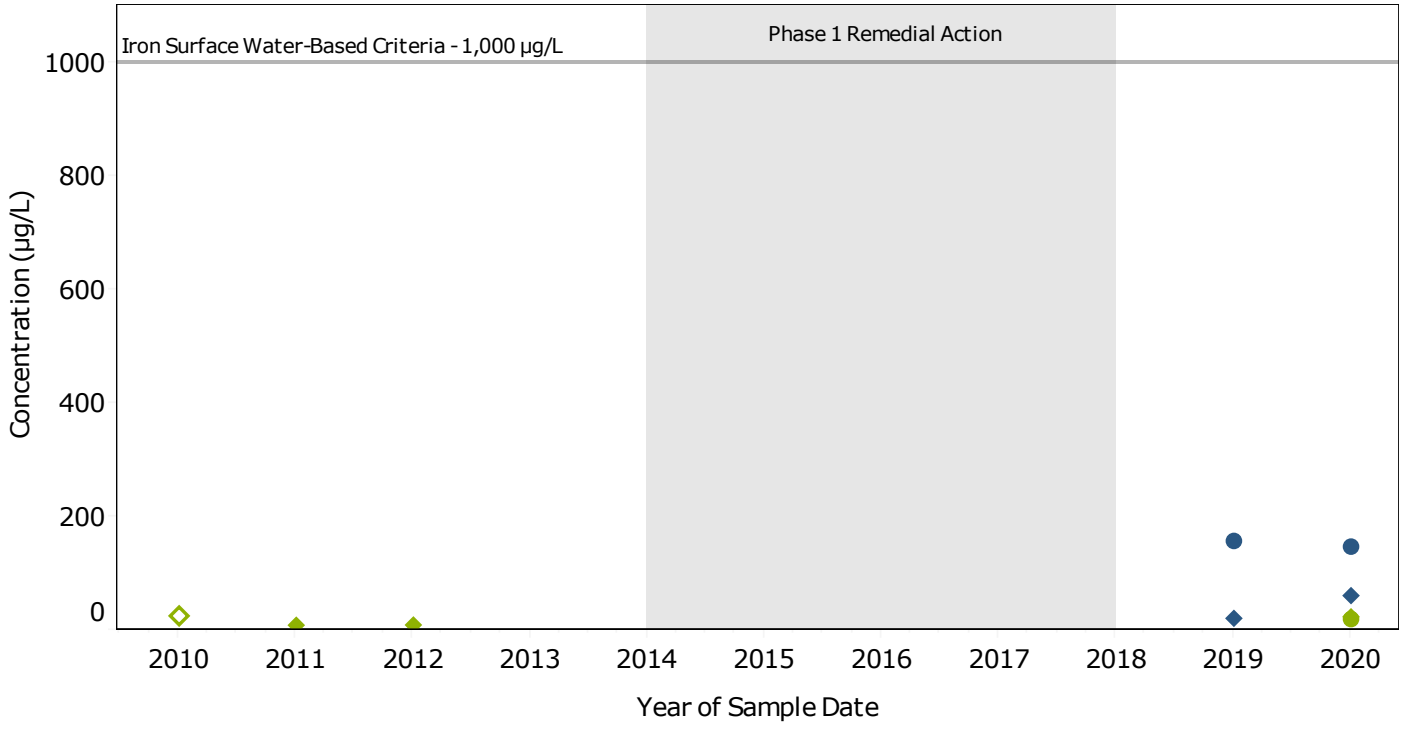
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

SG-7-WP & SG-7R-WP, Copper



SG-7-WP & SG-7R-WP, Iron



Legend

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

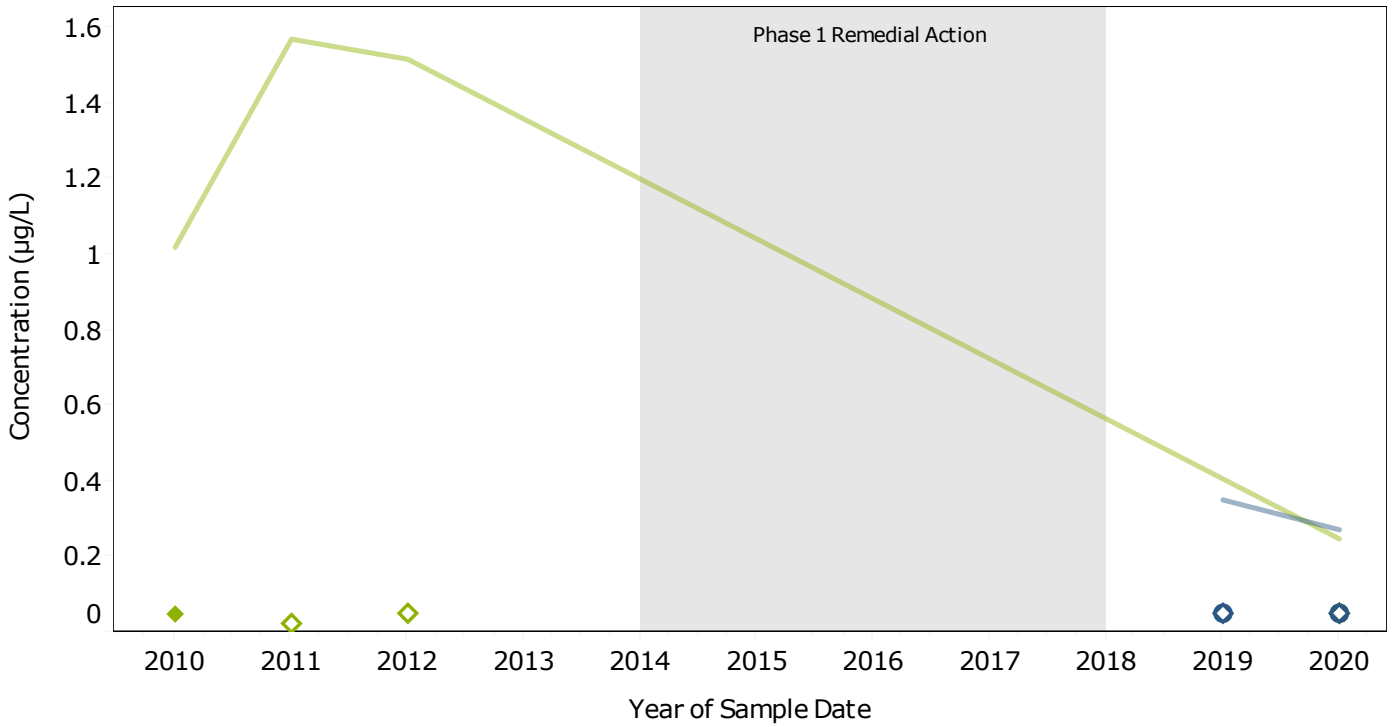
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

- Hardness-adjusted surface water criteria based on spring data
- Hardness-adjusted surface water criteria based on fall data

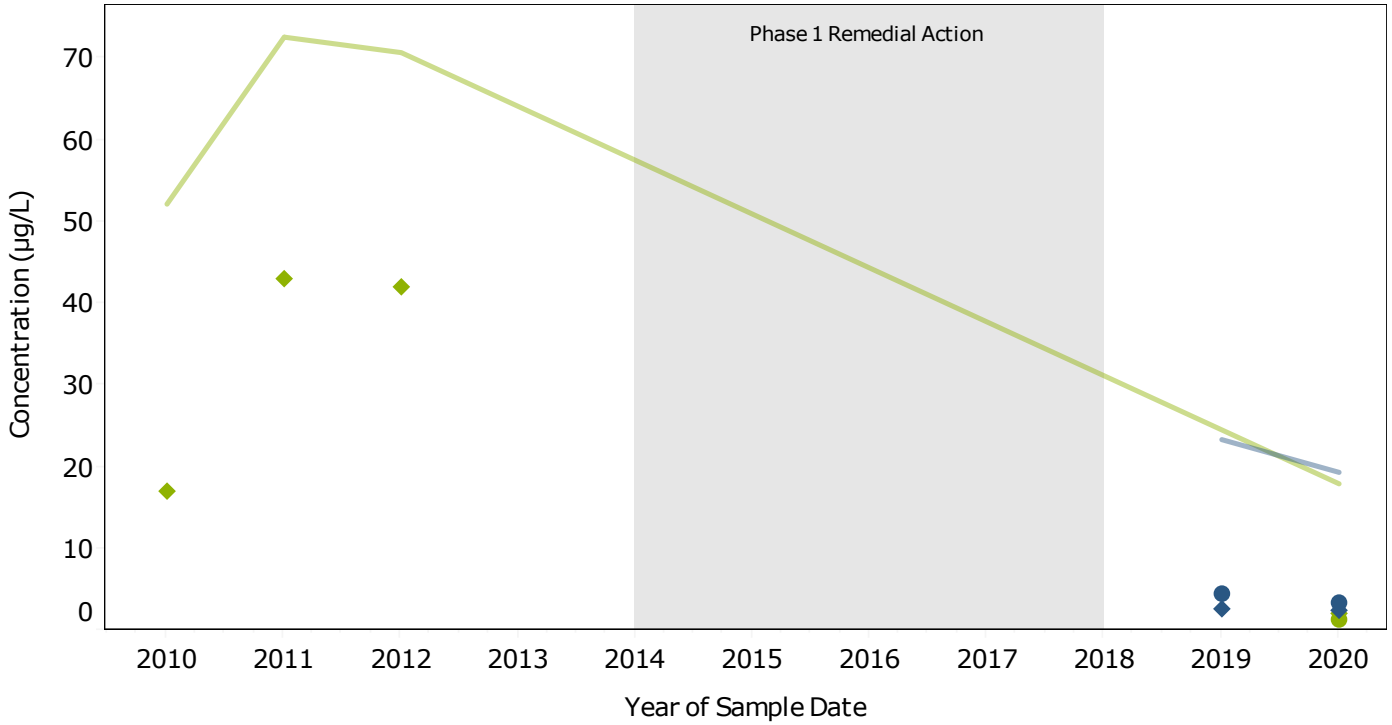
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

SG-7-WP & SG-7R-WP, Lead



SG-7-WP & SG-7R-WP, Zinc



Legend

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

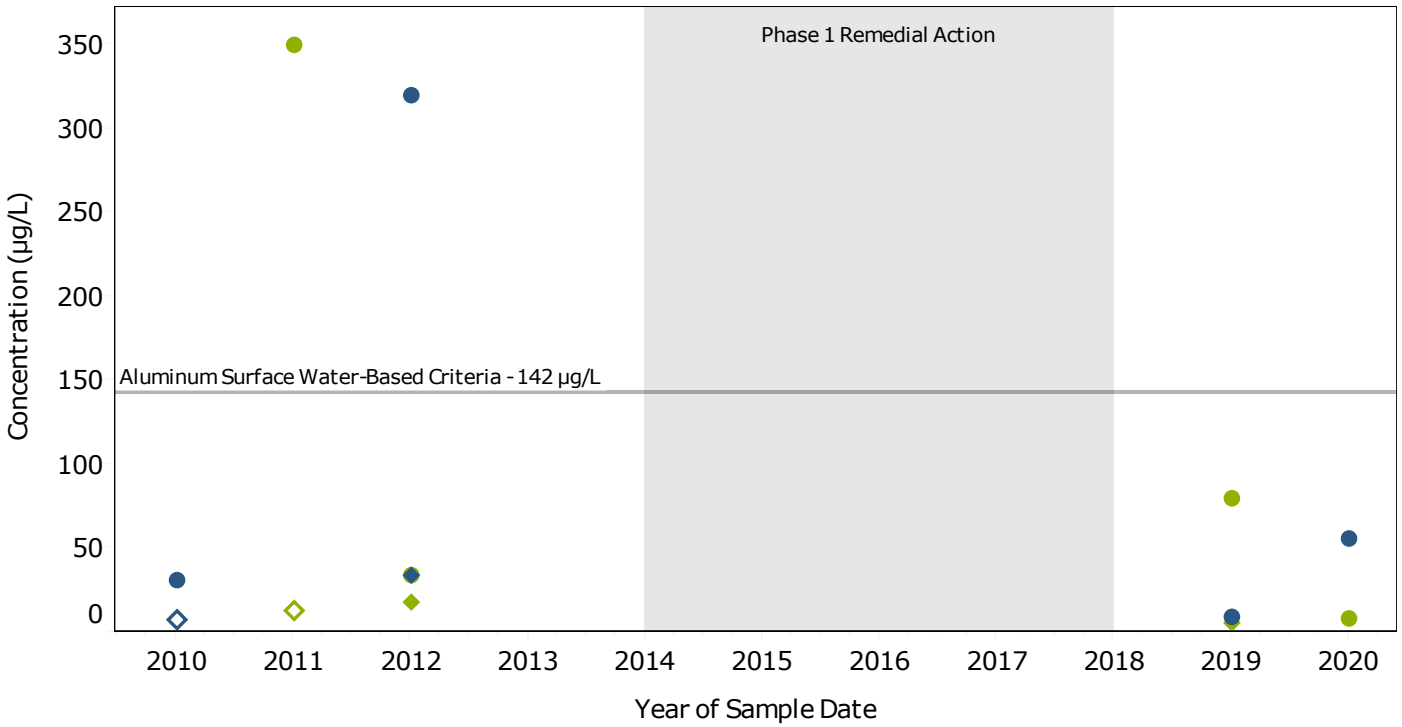
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

- Hardness-adjusted surface water criteria based on spring data
- Hardness-adjusted surface water criteria based on fall data

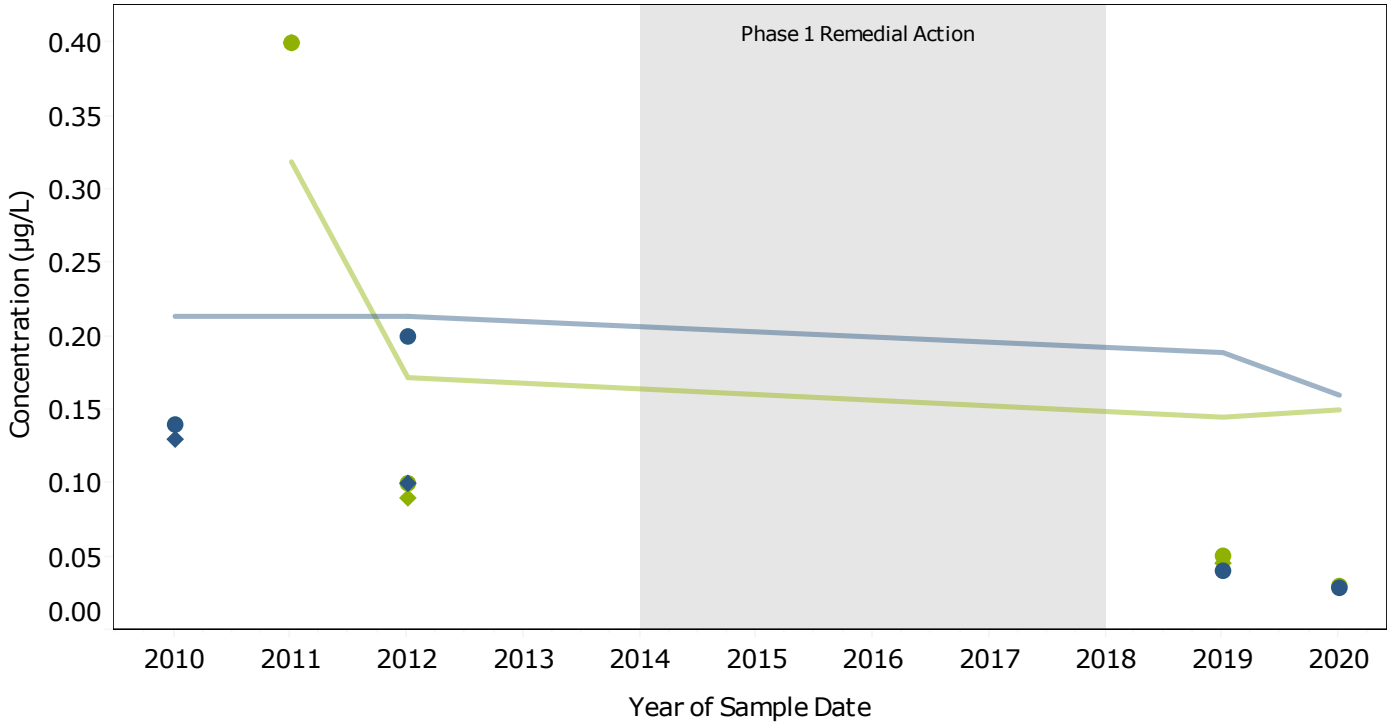
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

SG-7-PW-6, Aluminum



SG-7-PW-6, Cadmium



Legend

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

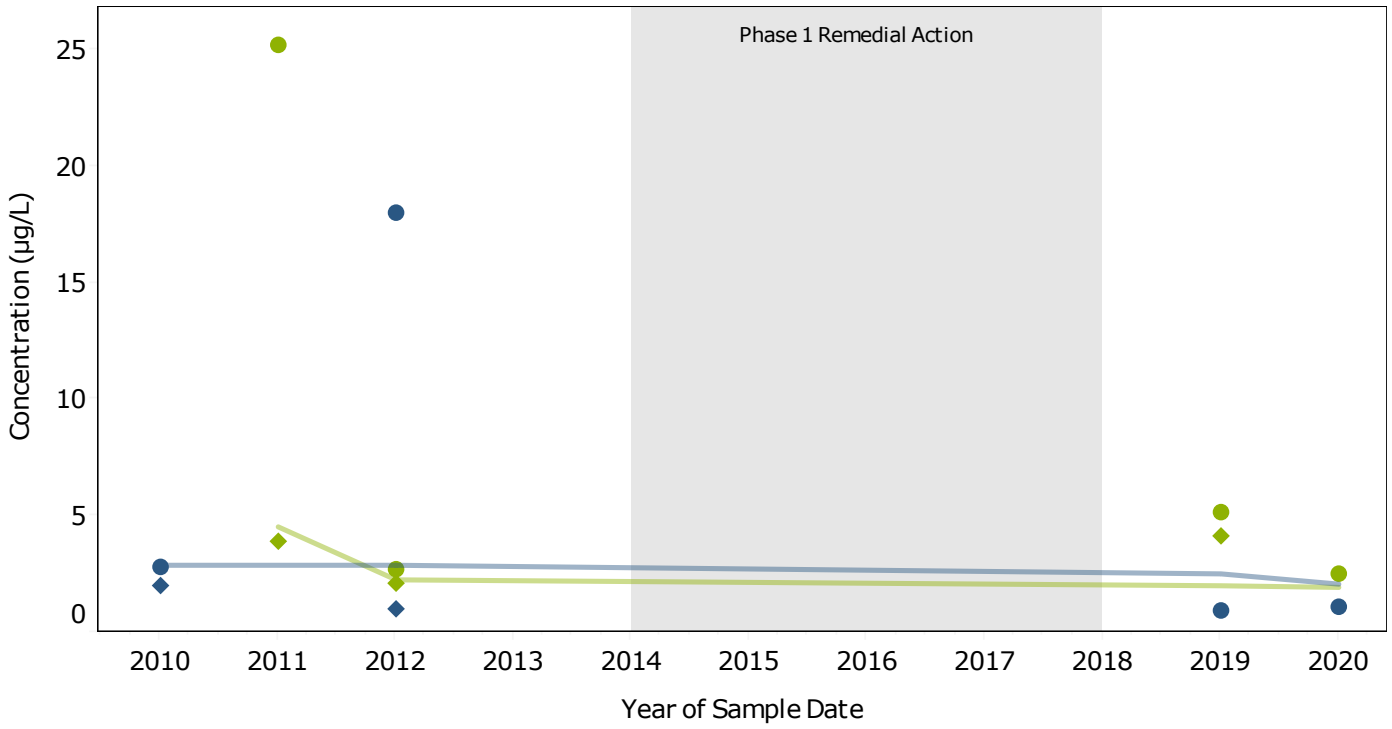
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

- Hardness-adjusted surface water criteria based on spring data
- Hardness-adjusted surface water criteria based on fall data

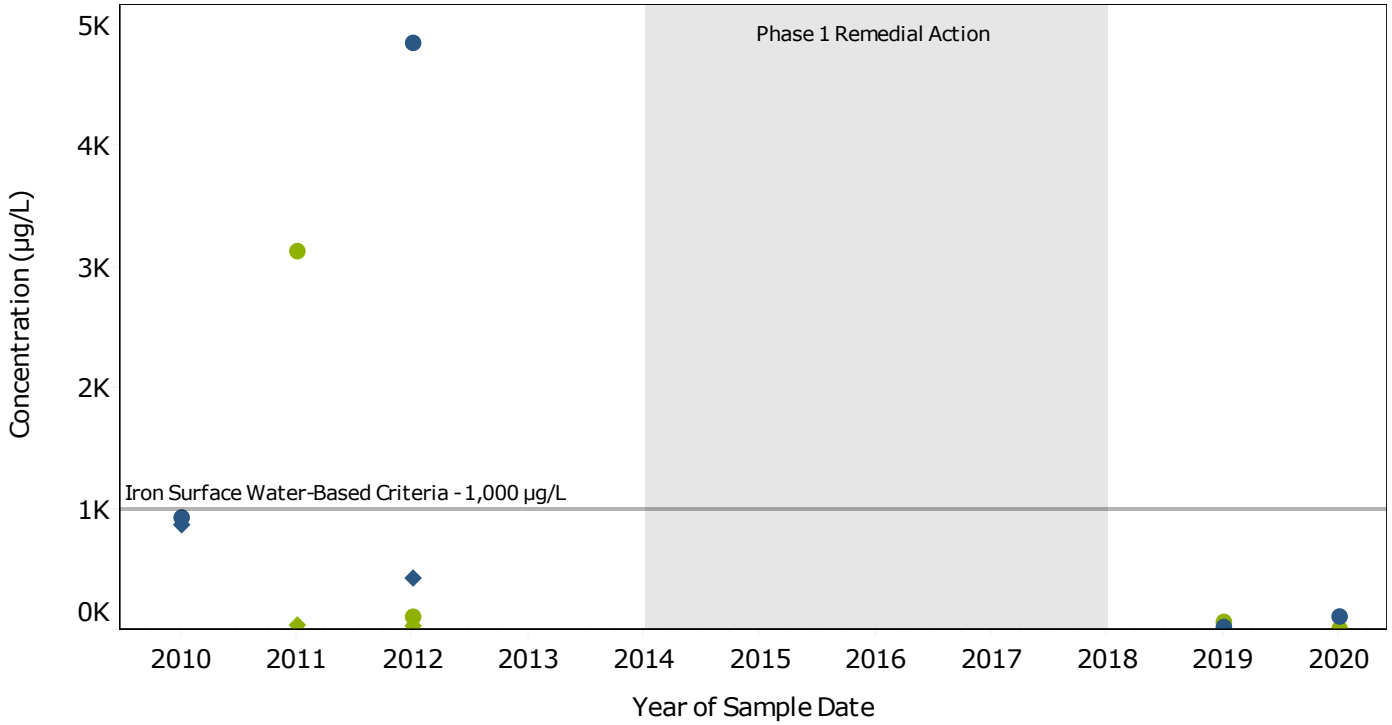
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

SG-7-PW-6, Copper



SG-7-PW-6, Iron



Legend

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

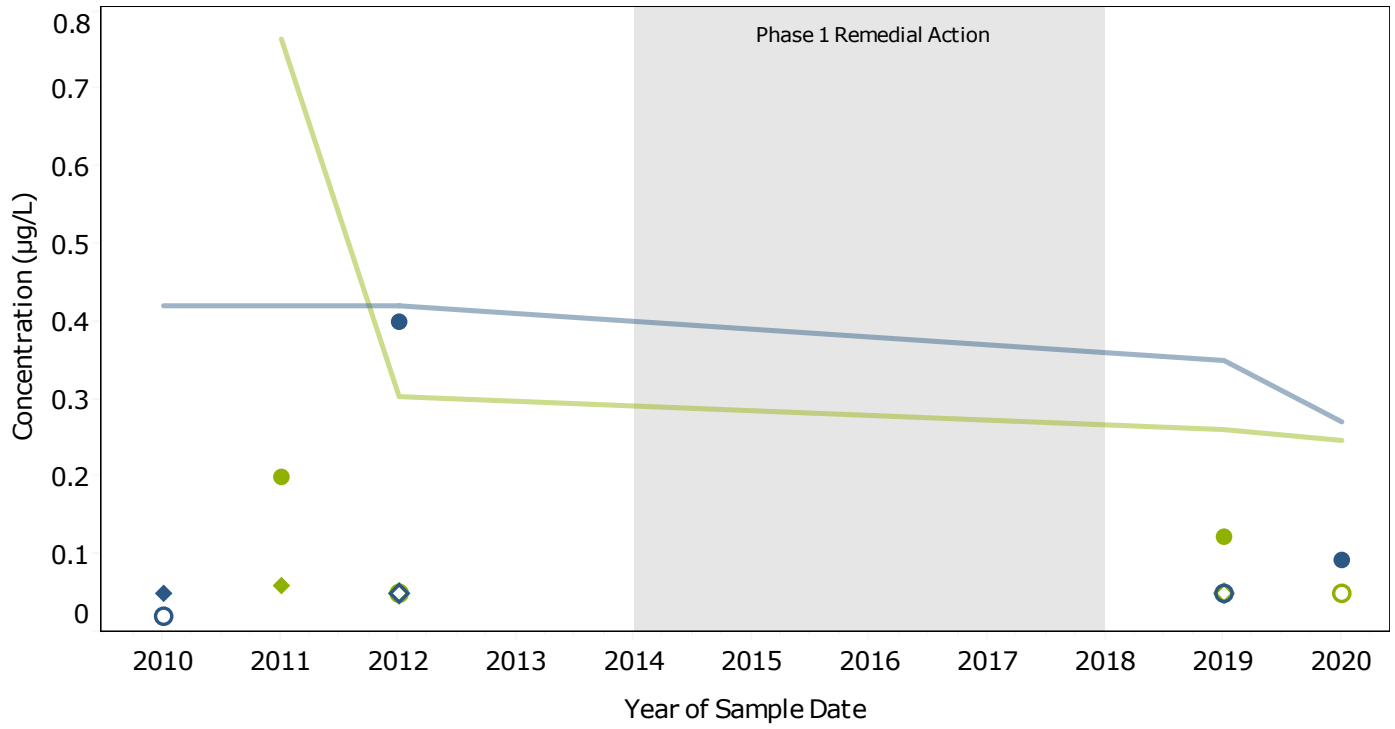
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

- Hardness-adjusted surface water criteria based on spring data
- Hardness-adjusted surface water criteria based on fall data

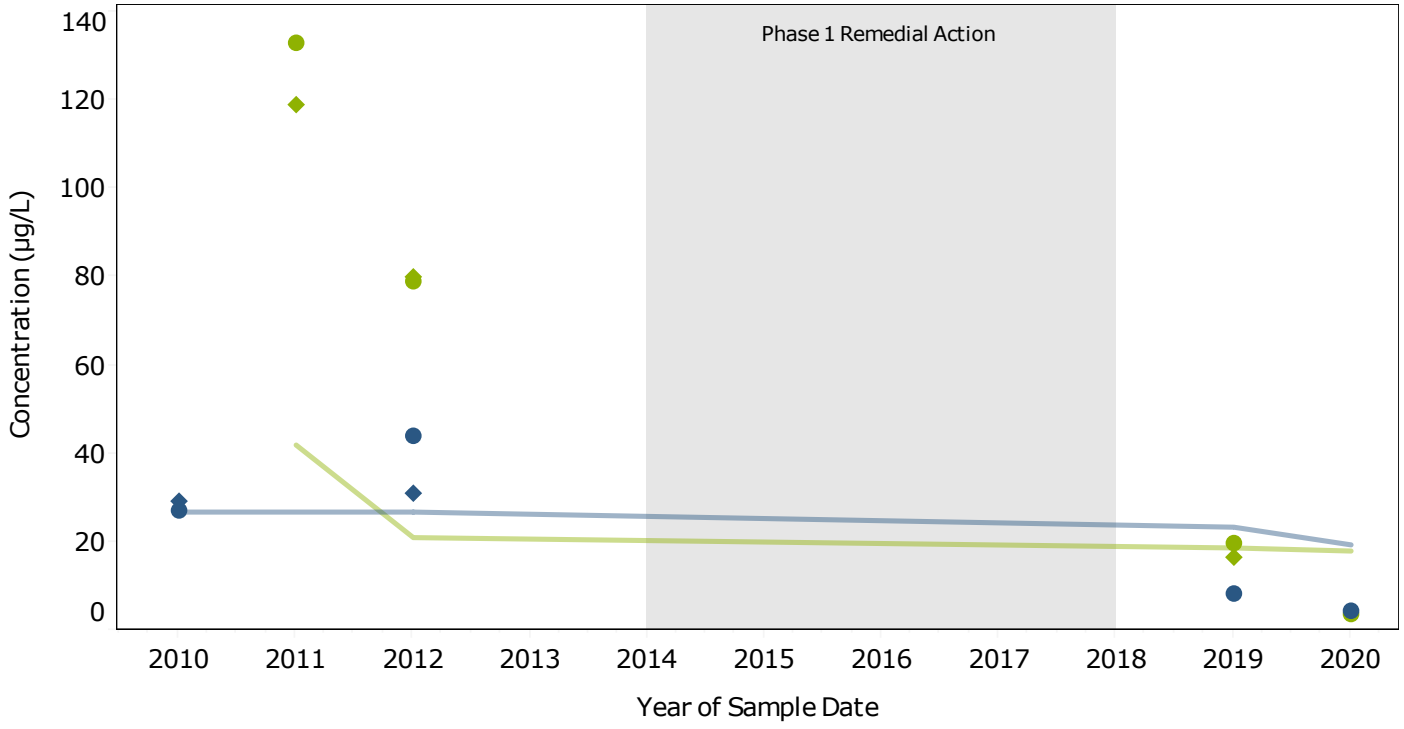
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

SG-7-PW-6, Lead



SG-7-PW-6, Zinc



Legend

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

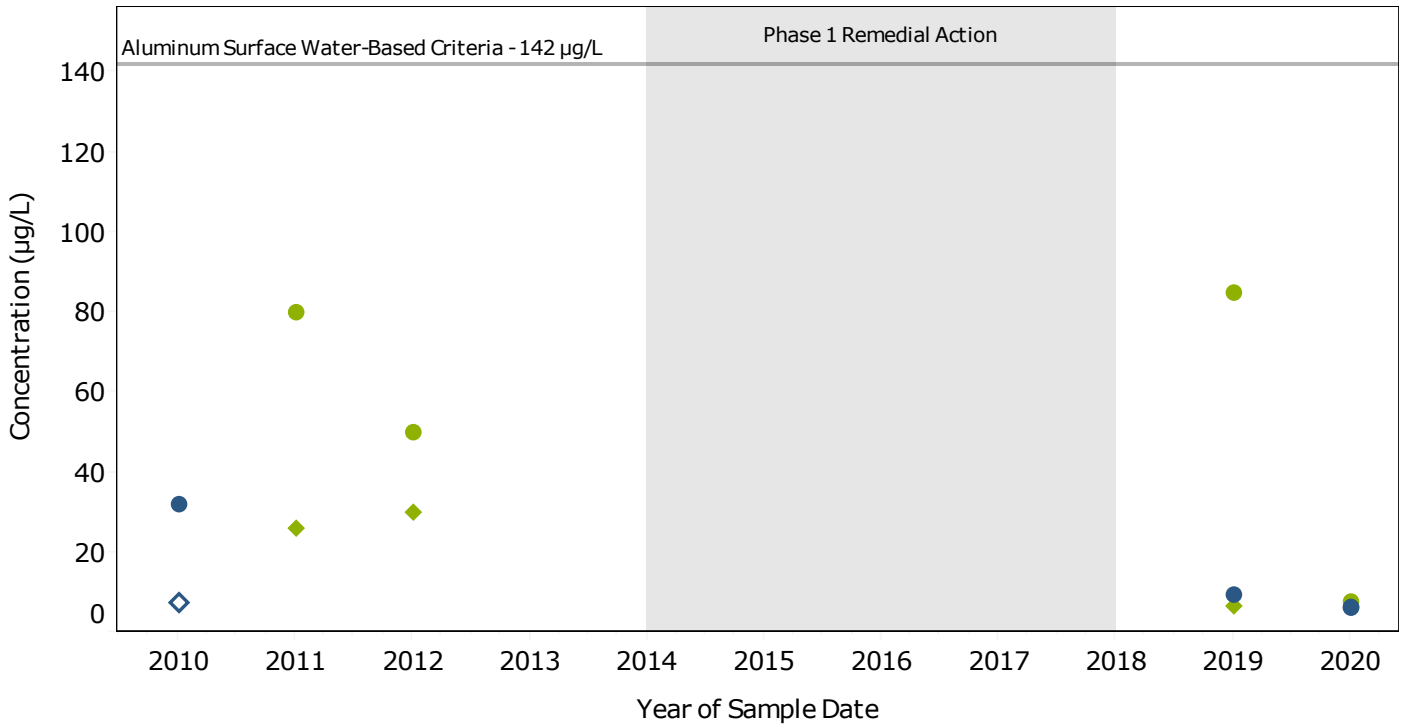
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

- Hardness-adjusted surface water criteria based on spring data
- Hardness-adjusted surface water criteria based on fall data

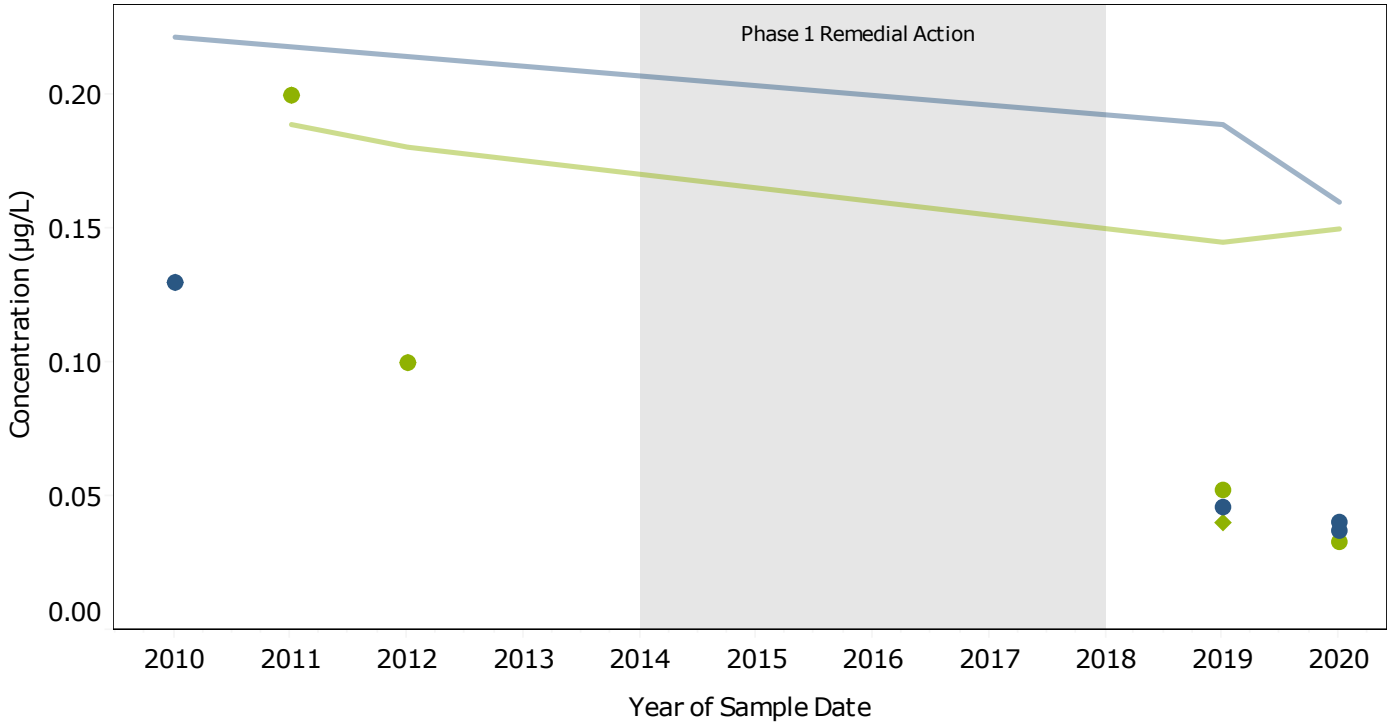
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

SG-7-PW-12, Aluminum



SG-7-PW-12, Cadmium



Legend

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

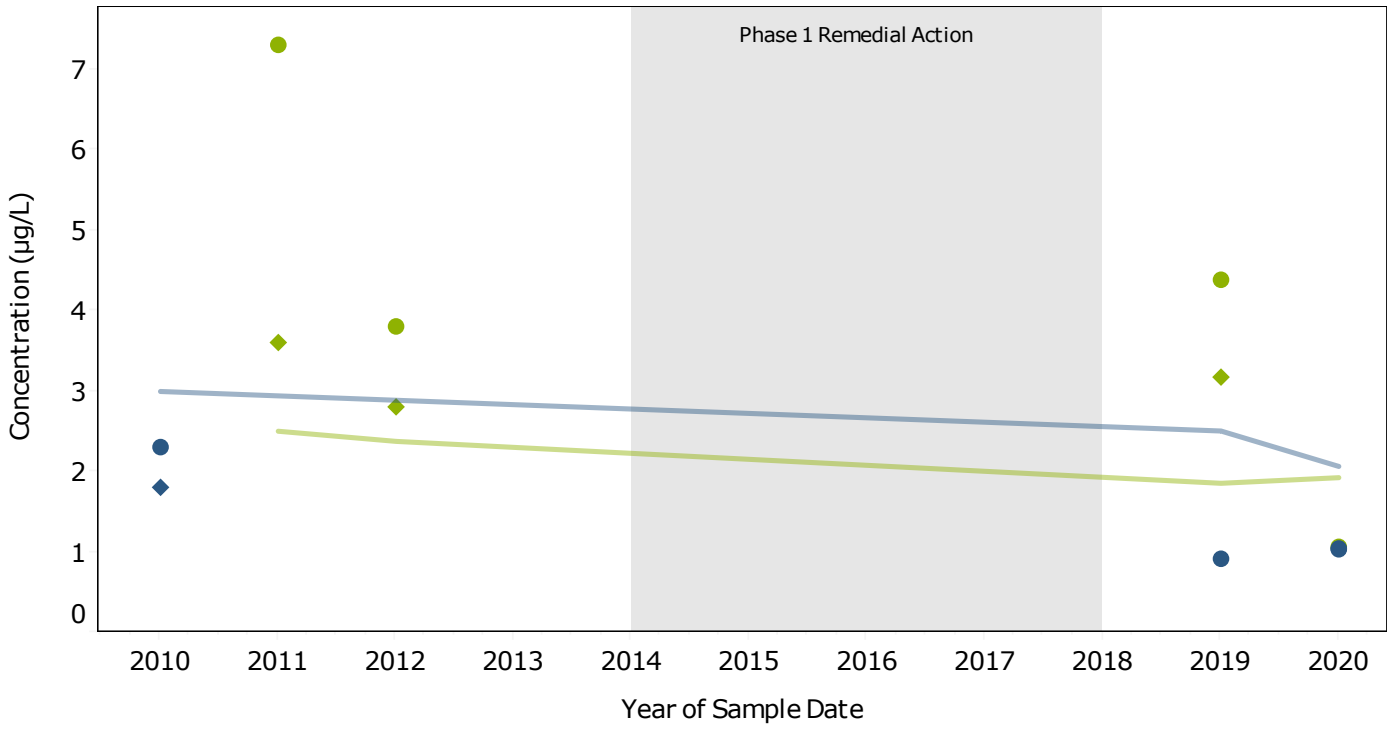
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

- Hardness-adjusted surface water criteria based on spring data
- Hardness-adjusted surface water criteria based on fall data

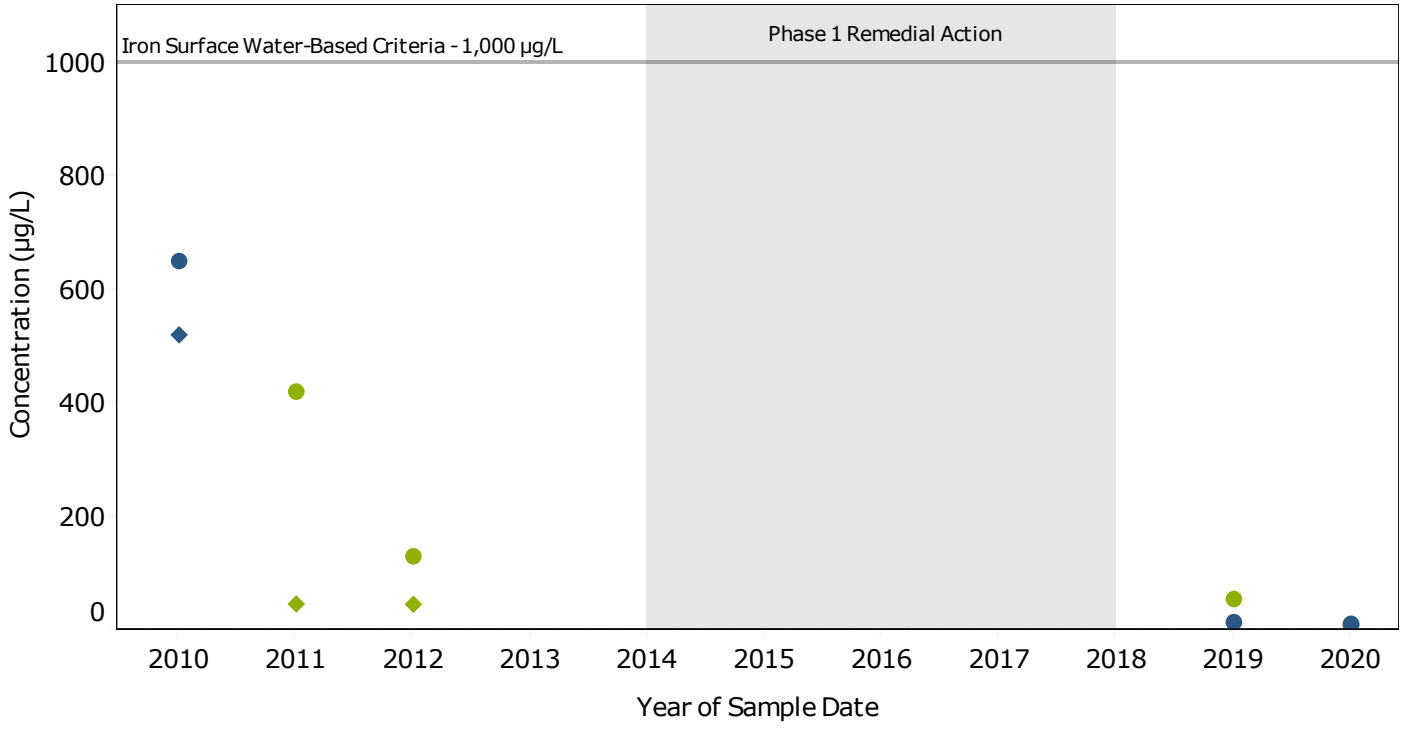
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

SG-7-PW-12, Copper



SG-7-PW-12, Iron



Legend

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

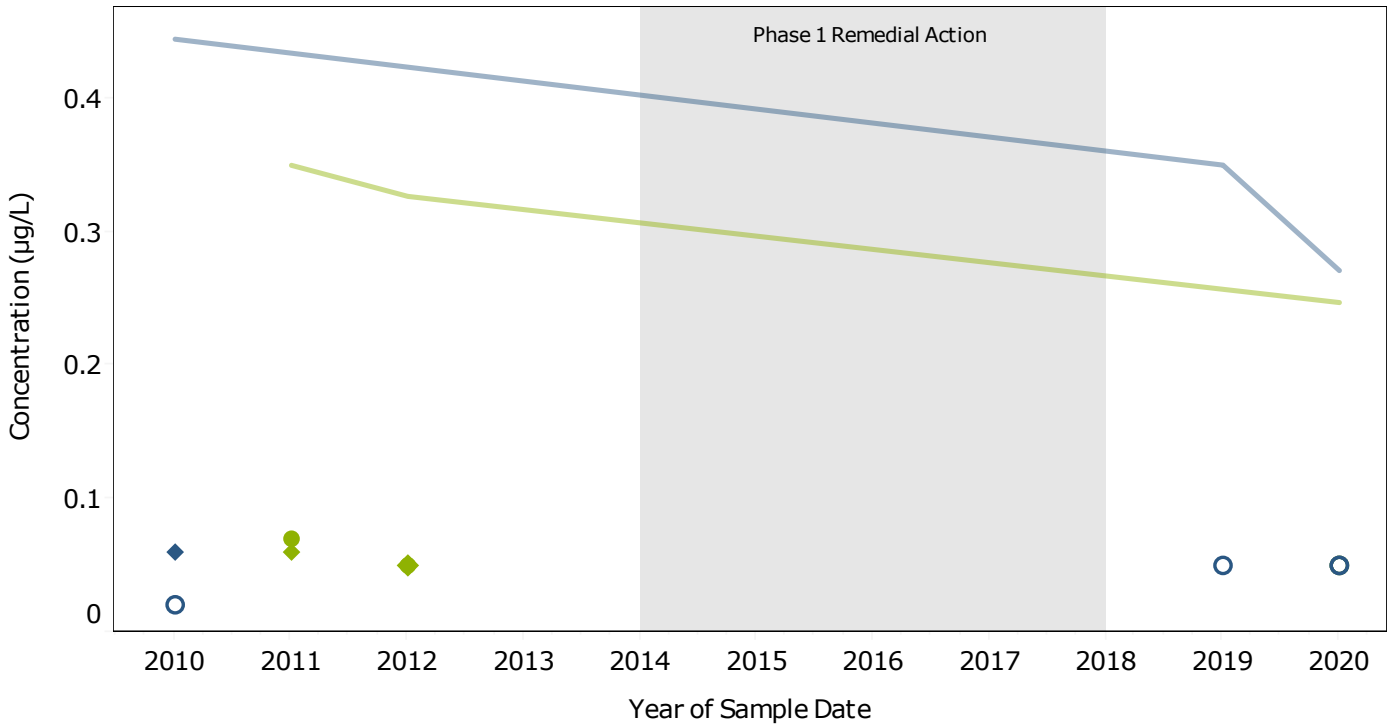
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

- Hardness-adjusted surface water criteria based on spring data
- Hardness-adjusted surface water criteria based on fall data

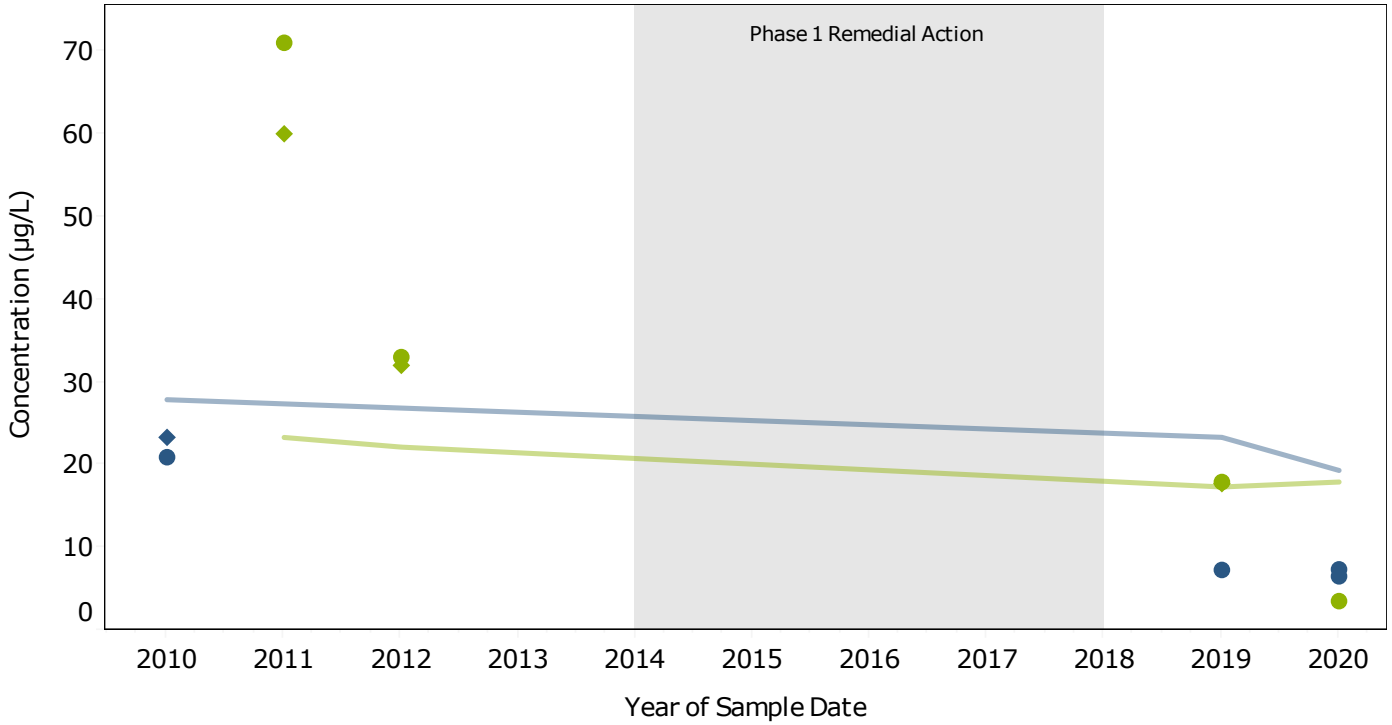
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

SG-7-PW-12, Lead



SG-7-PW-12, Zinc



Legend

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

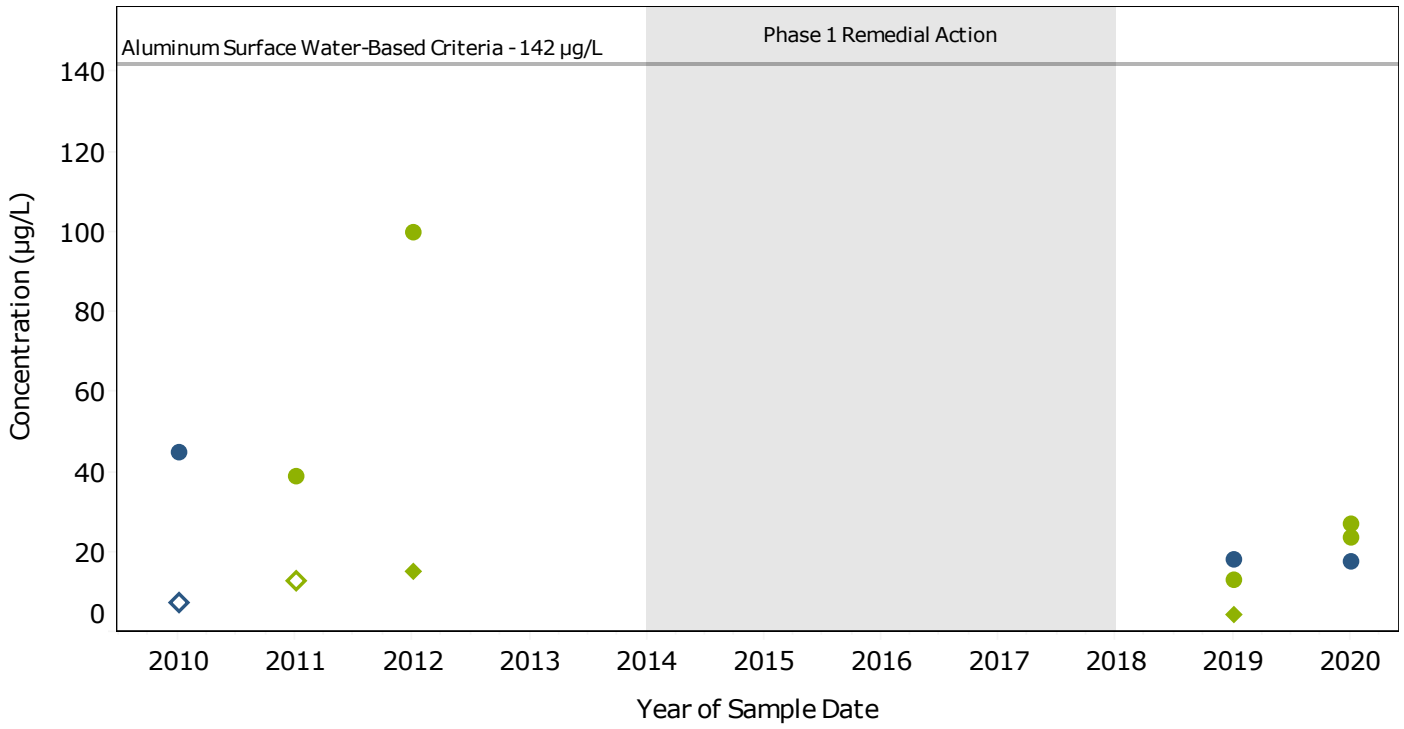
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

- Hardness-adjusted surface water criteria based on spring data
- Hardness-adjusted surface water criteria based on fall data

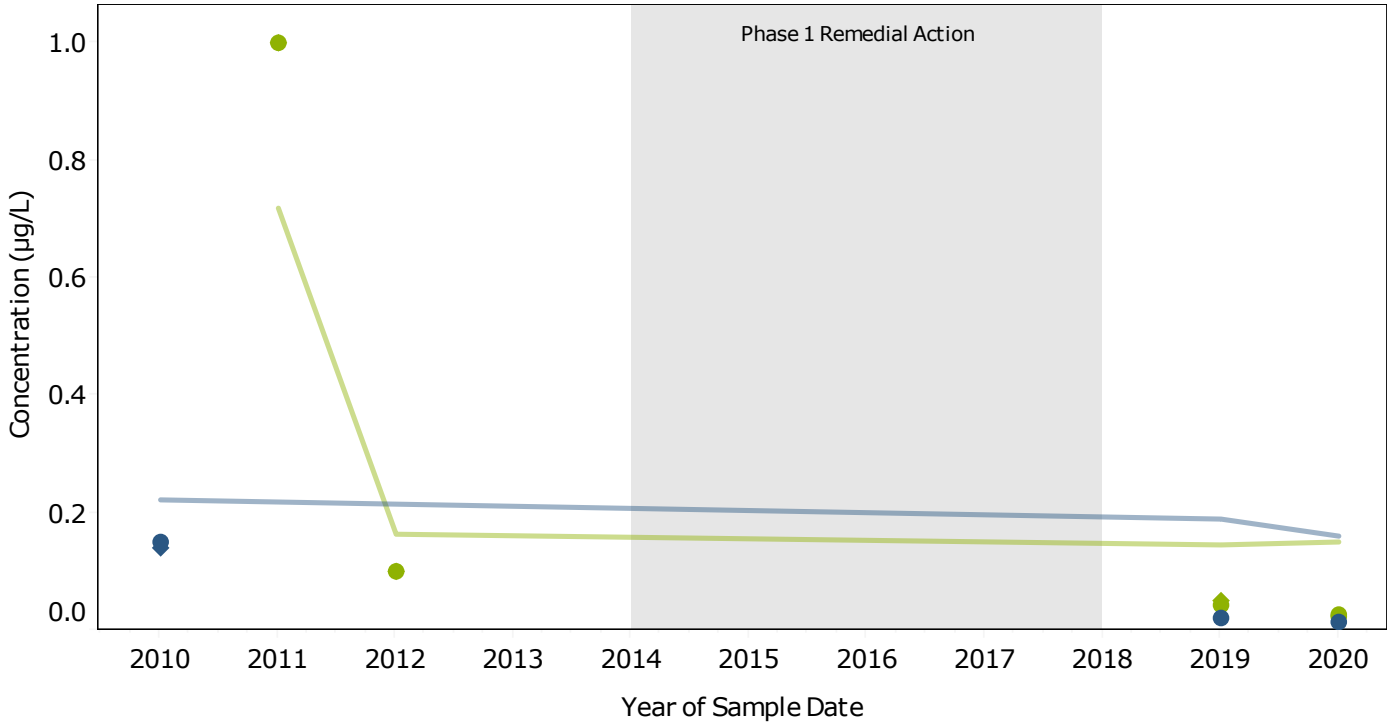
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

SG-7-WP-36, Aluminum



SG-7-WP-36, Cadmium



Legend

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

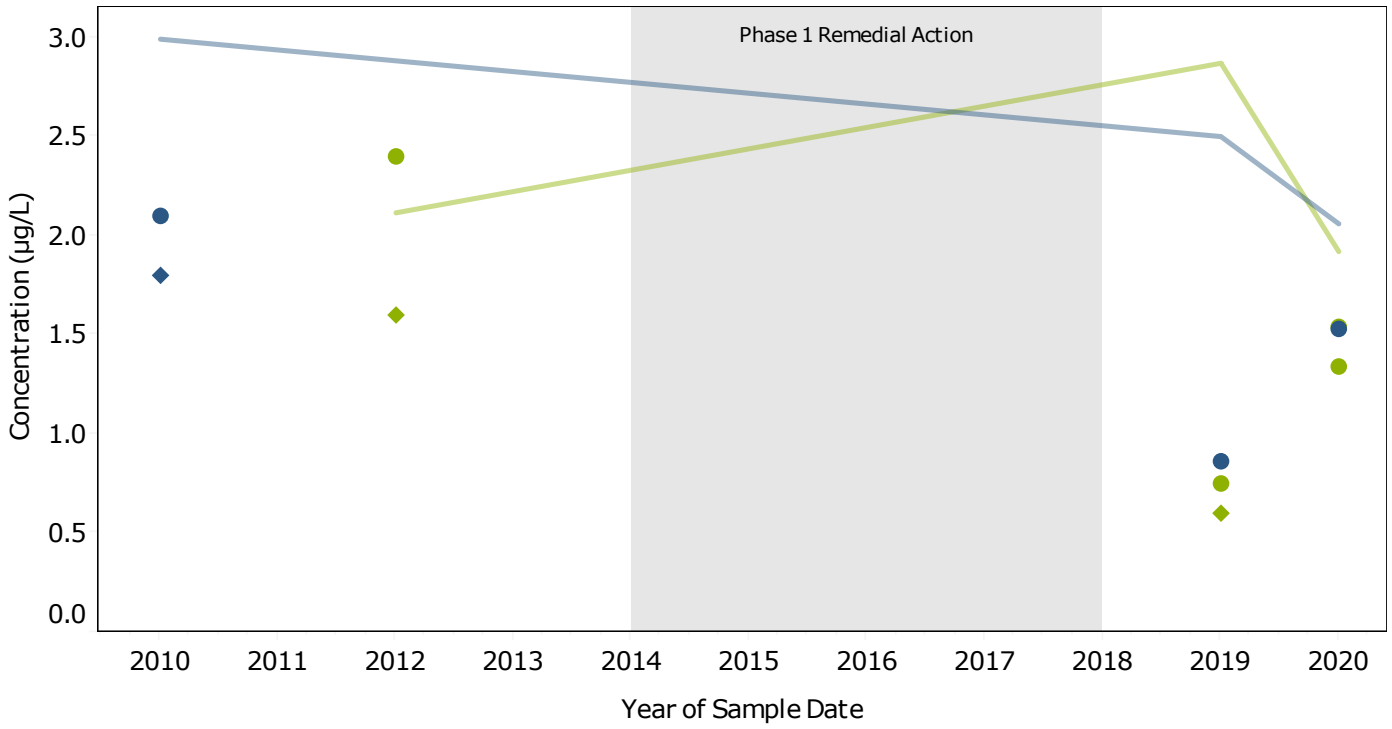
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

- Hardness-adjusted surface water criteria based on spring data
- Hardness-adjusted surface water criteria based on fall data

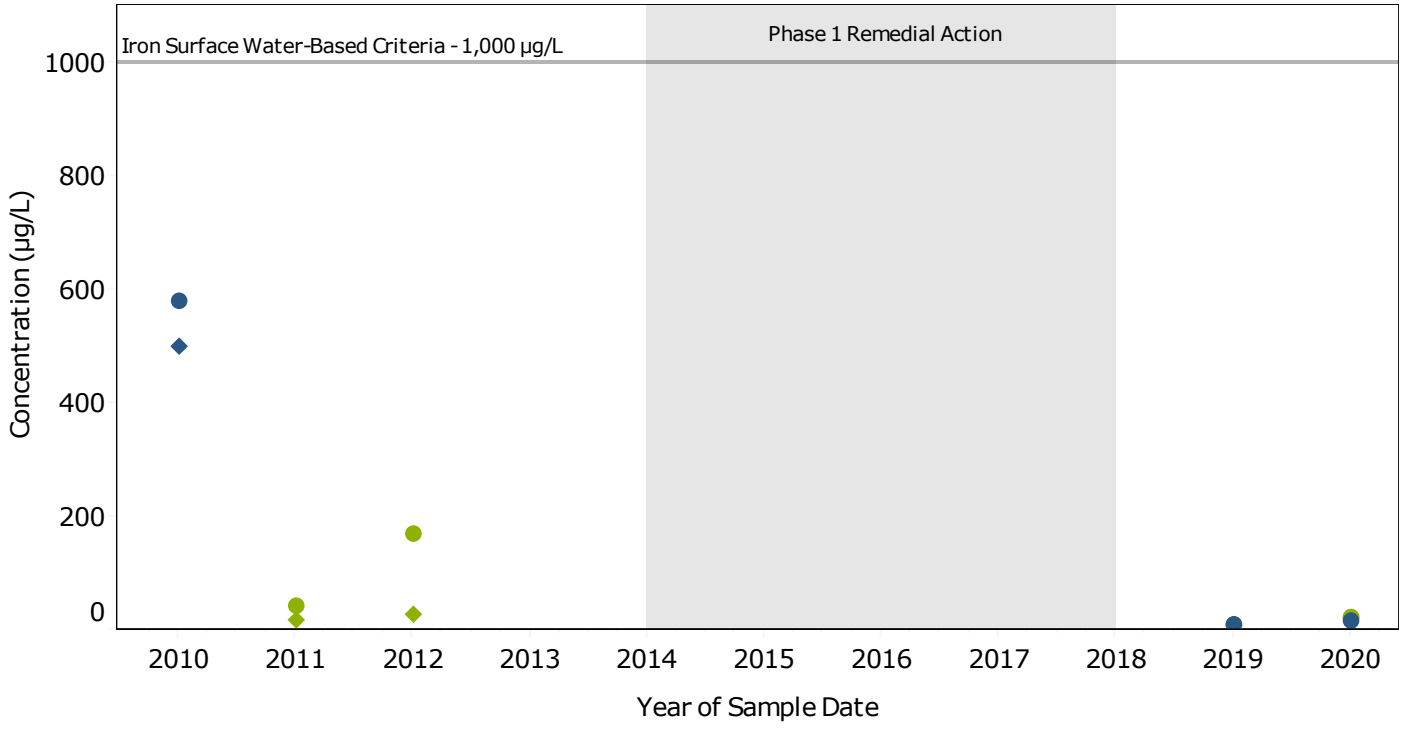
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

SG-7-WP-36, Copper



SG-7-WP-36, Iron



Legend

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

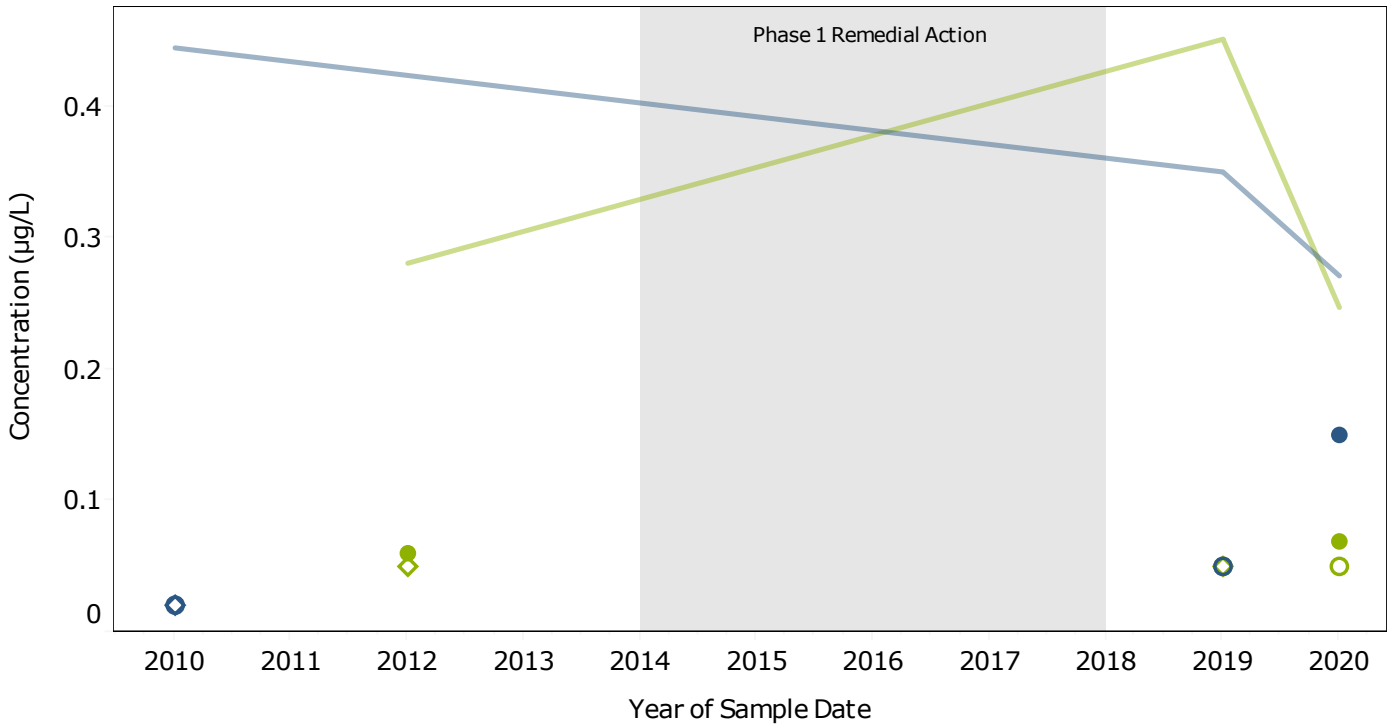
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

- Hardness-adjusted surface water criteria based on spring data
- Hardness-adjusted surface water criteria based on fall data

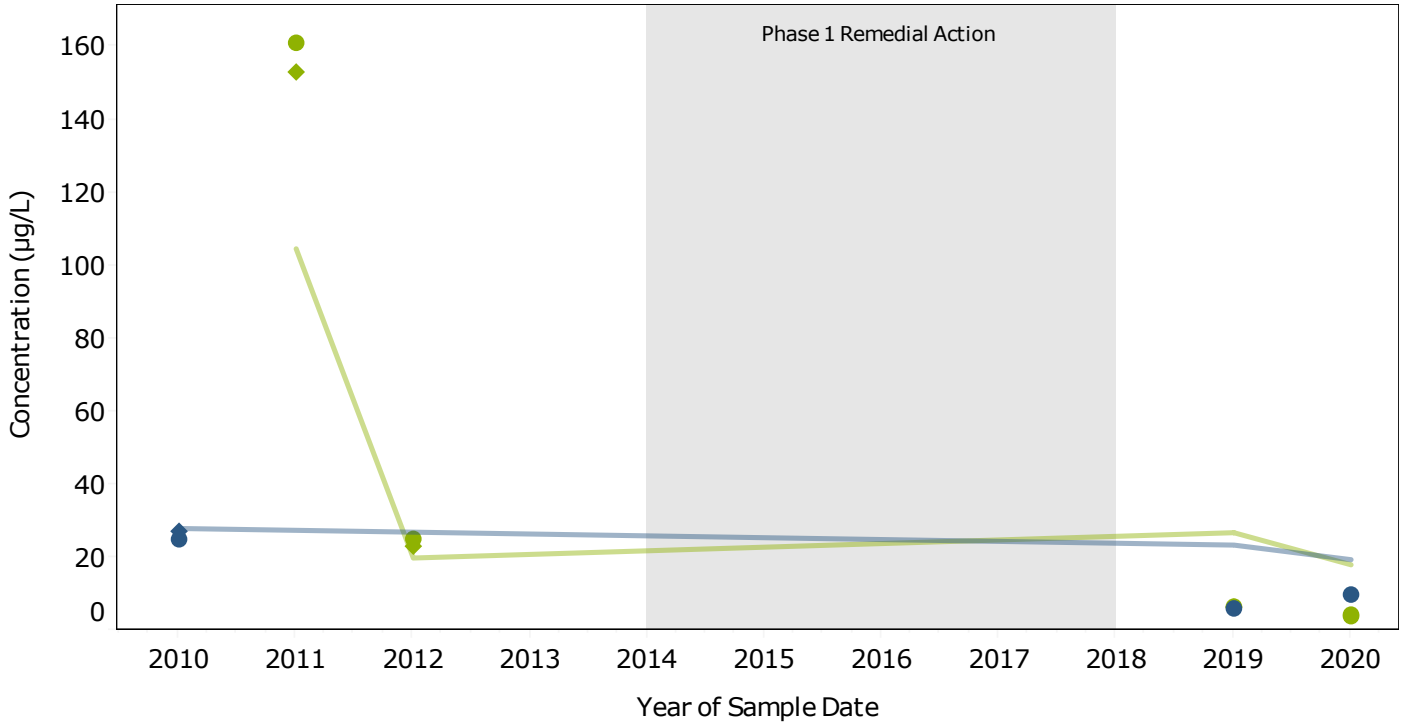
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

SG-7-WP-36, Lead



SG-7-WP-36, Zinc



Legend

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

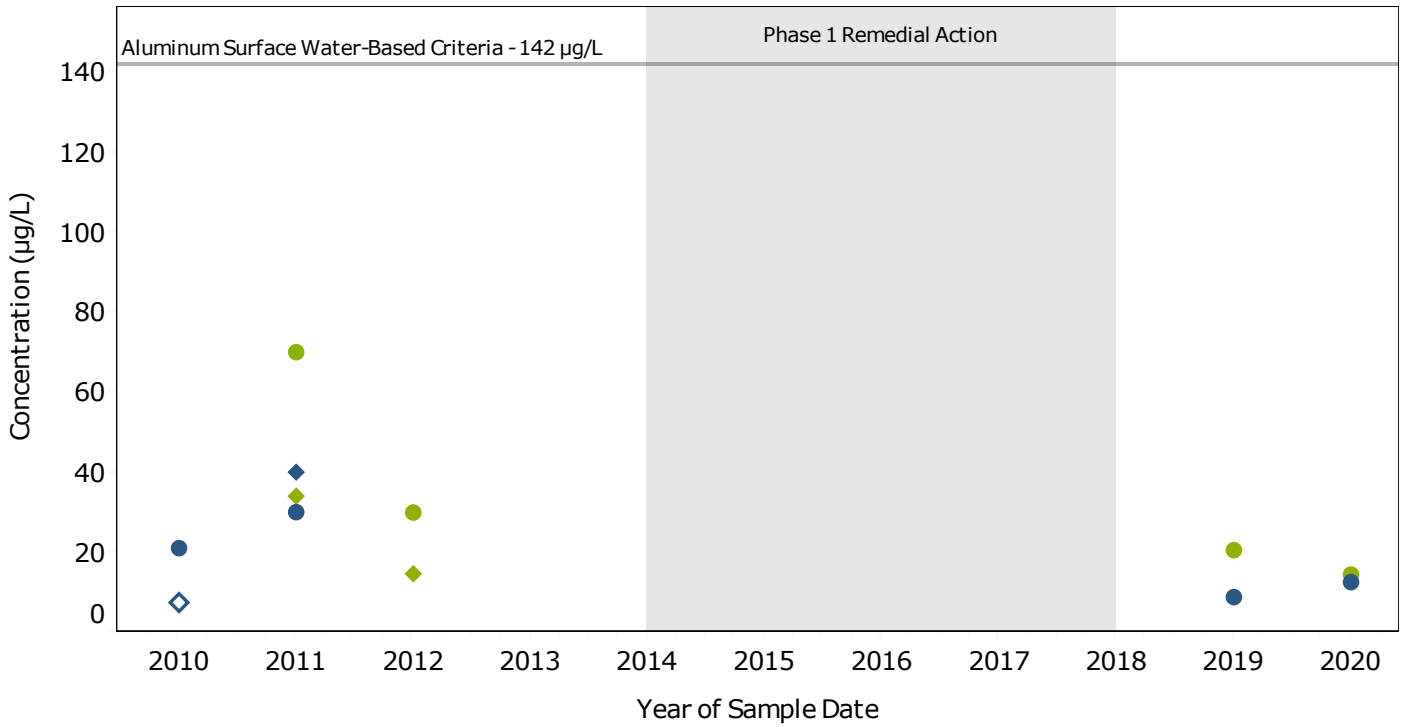
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

- Hardness-adjusted surface water criteria based on spring data
- Hardness-adjusted surface water criteria based on fall data

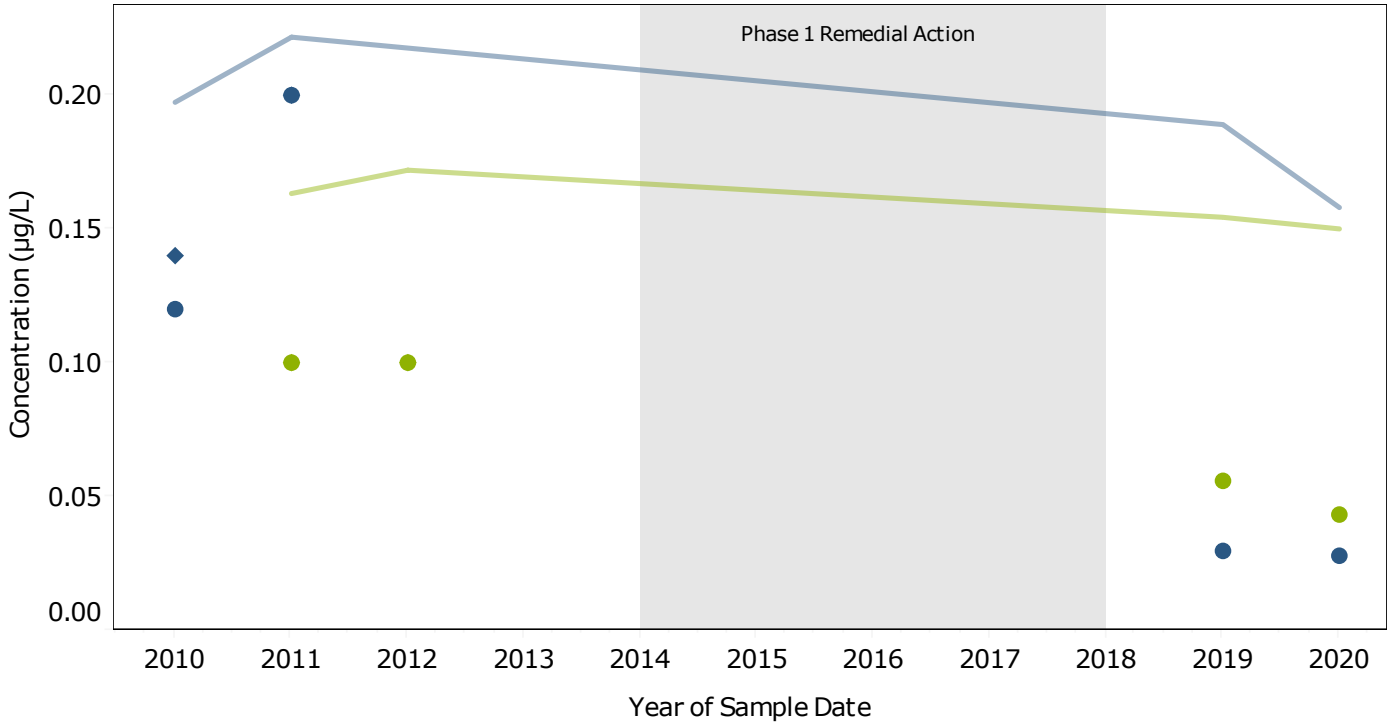
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

SG-8-PW-6, Aluminum



SG-8-PW-6, Cadmium



Legend

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

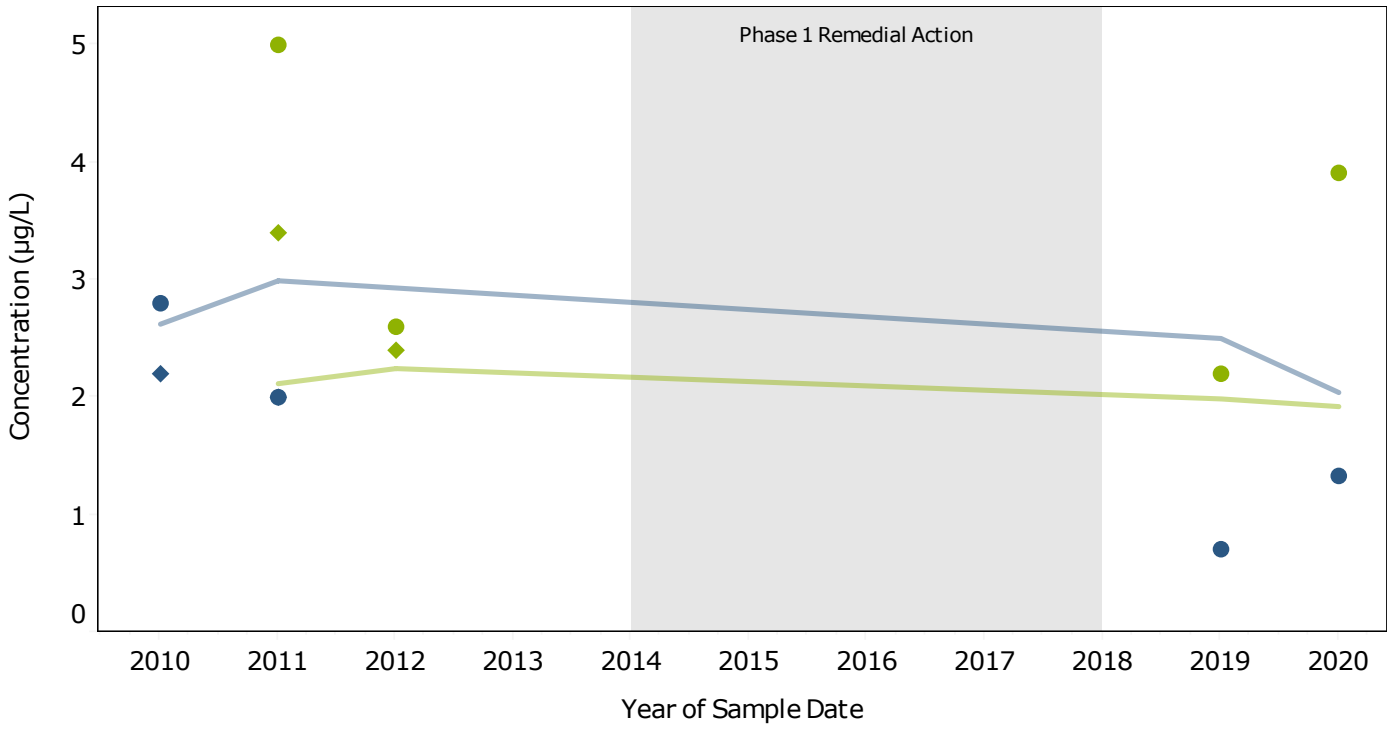
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

- Hardness-adjusted surface water criteria based on spring data
- Hardness-adjusted surface water criteria based on fall data

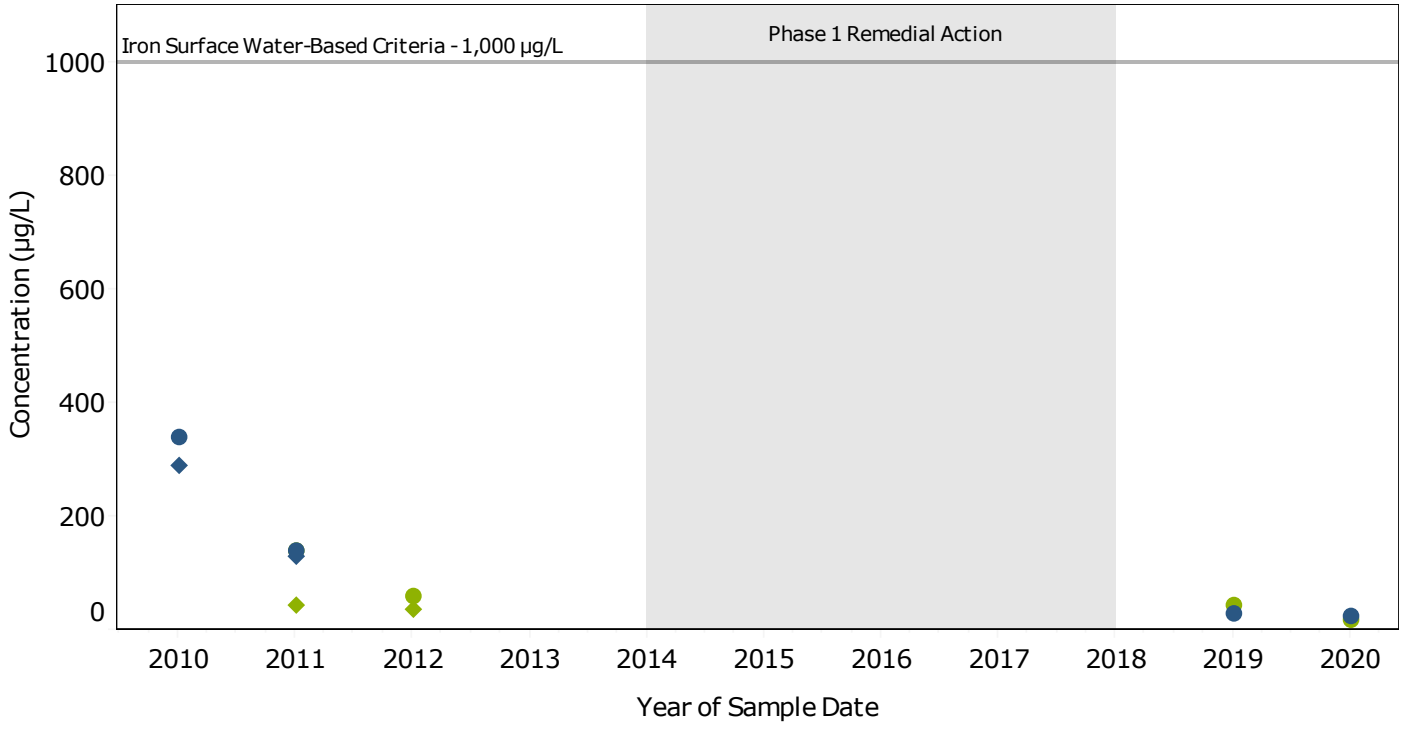
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

SG-8-PW-6, Copper



SG-8-PW-6, Iron



Legend

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

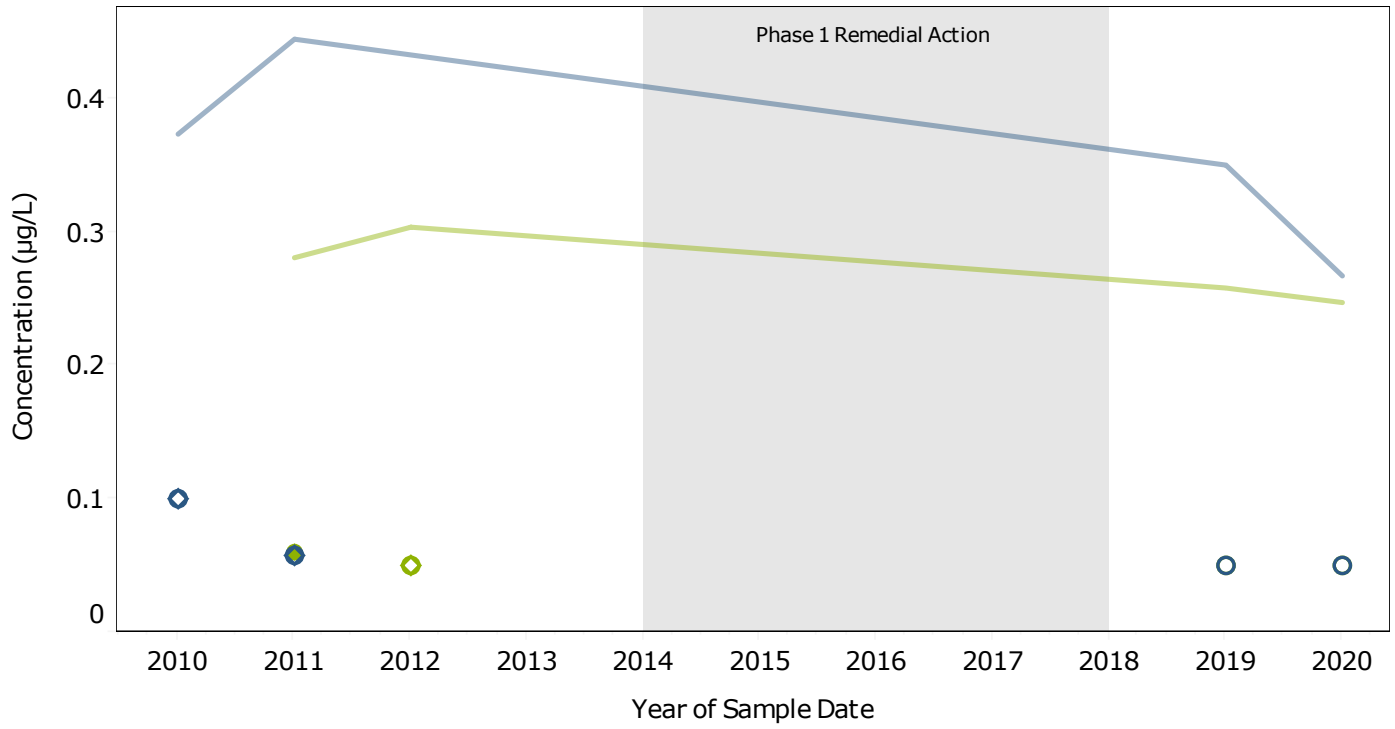
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

- Hardness-adjusted surface water criteria based on spring data
- Hardness-adjusted surface water criteria based on fall data

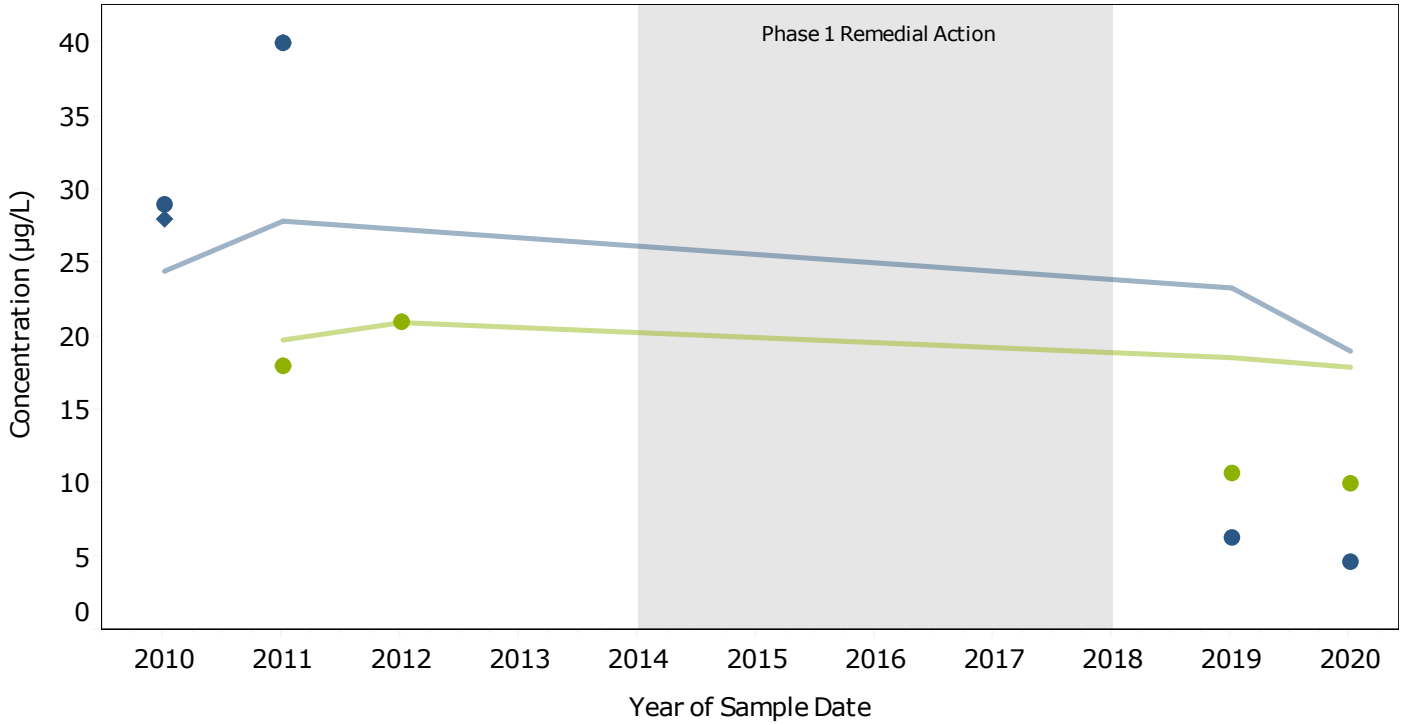
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

SG-8-PW-6, Lead



SG-8-PW-6, Zinc



Legend

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

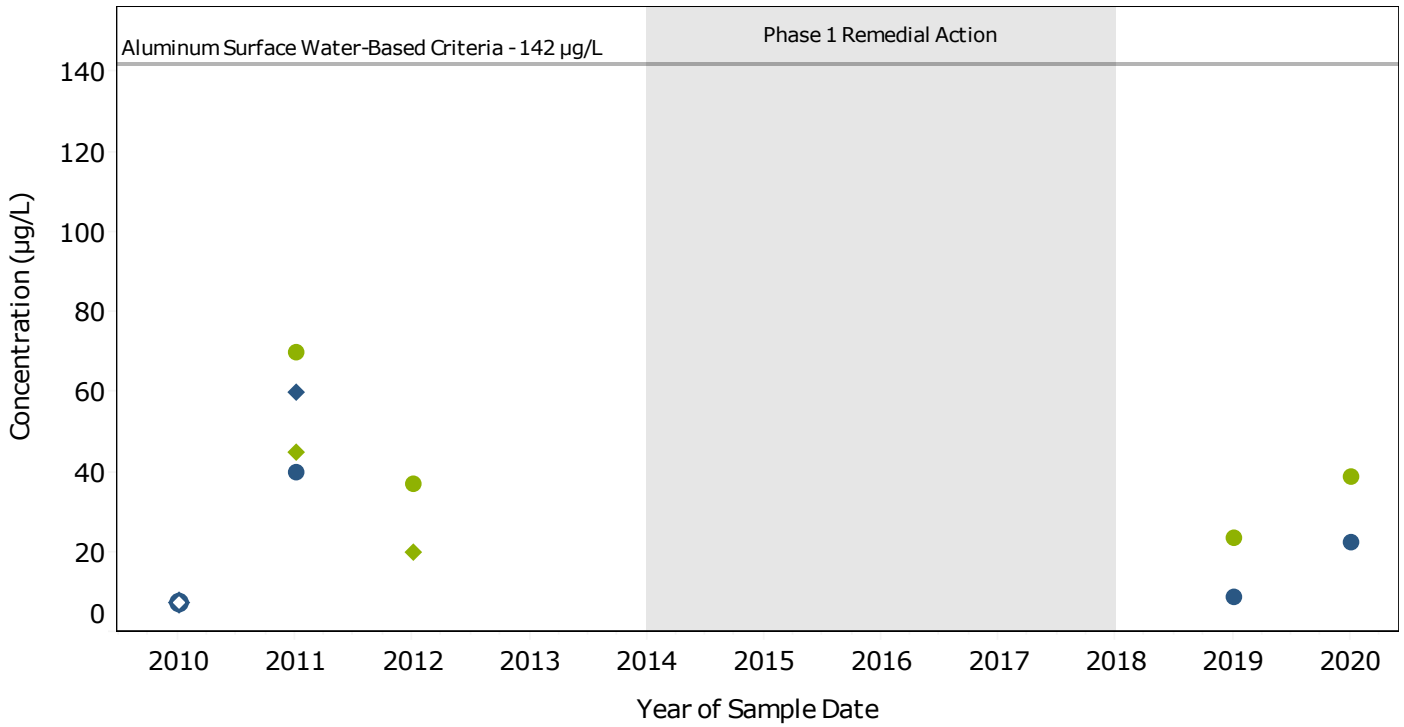
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

- Hardness-adjusted surface water criteria based on spring data
- Hardness-adjusted surface water criteria based on fall data

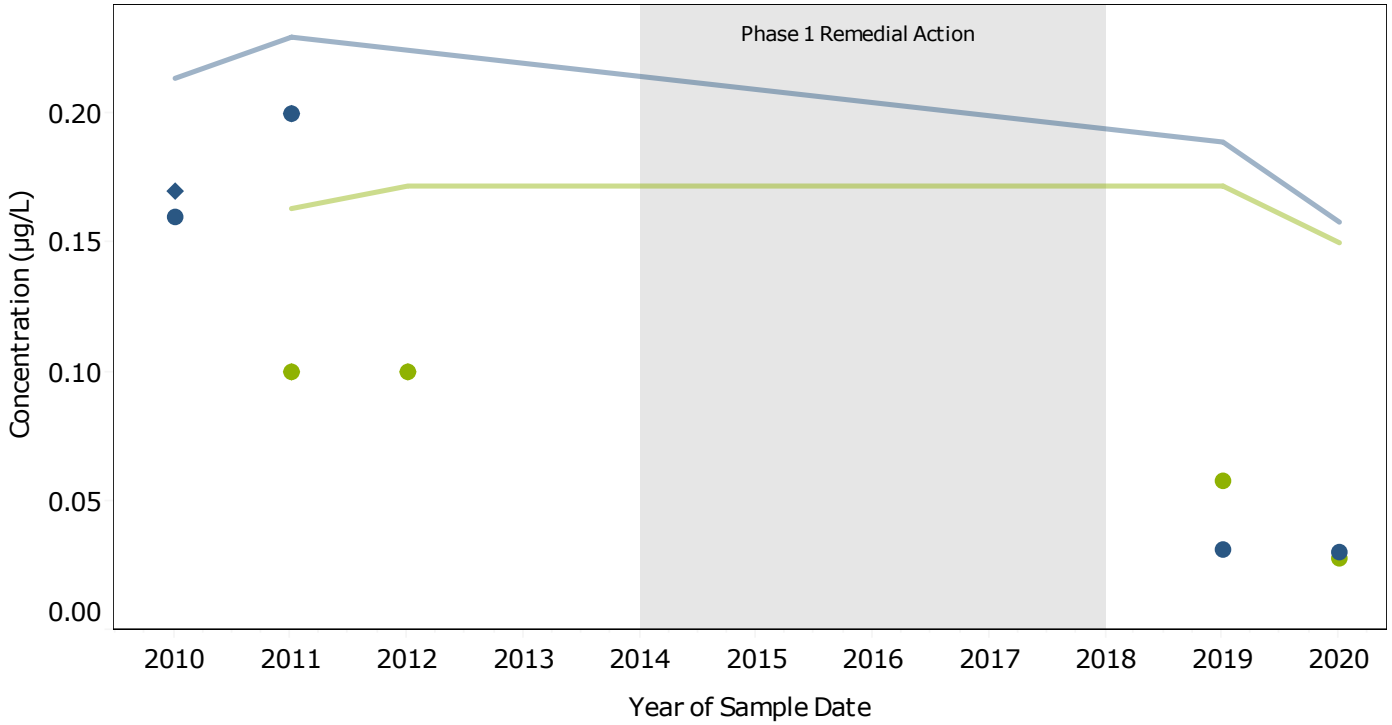
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

SG-8-PW-12, Aluminum



SG-8-PW-12, Cadmium



Legend

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

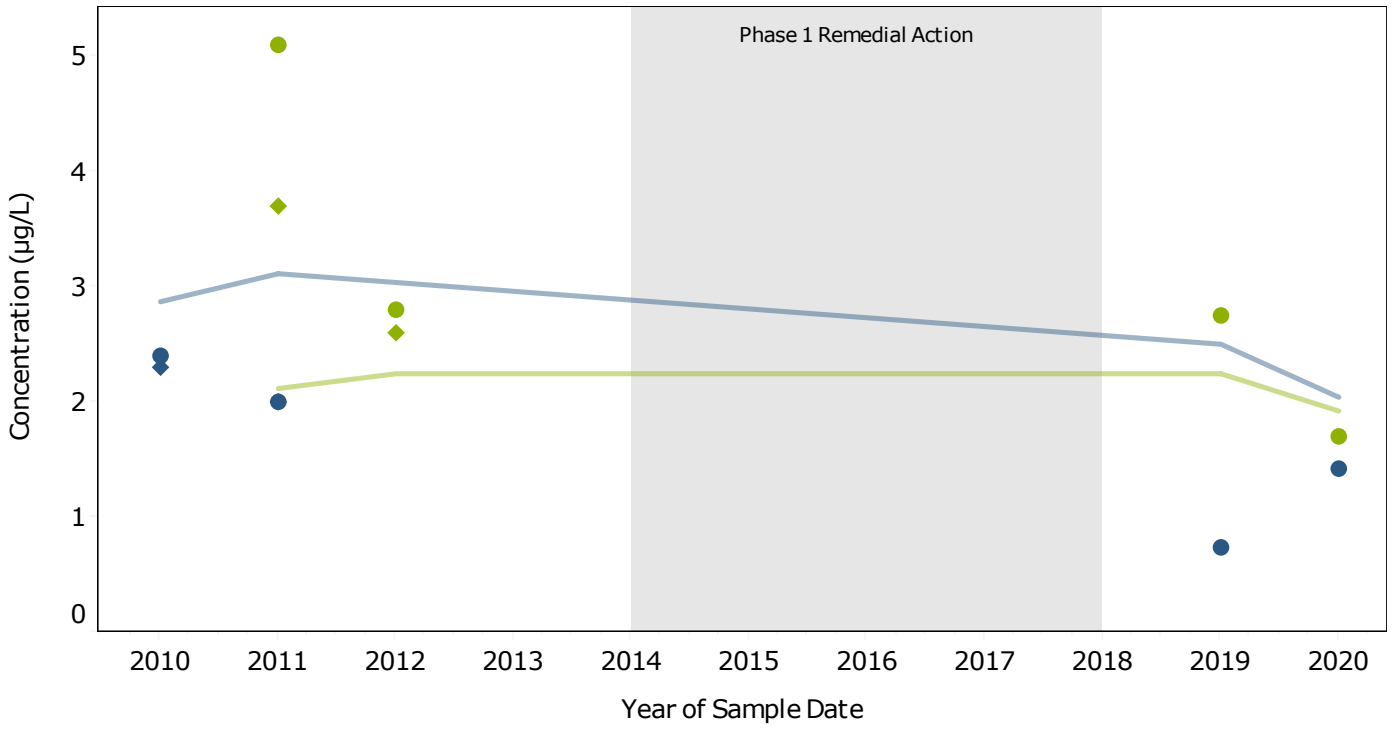
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

- Hardness-adjusted surface water criteria based on spring data
- Hardness-adjusted surface water criteria based on fall data

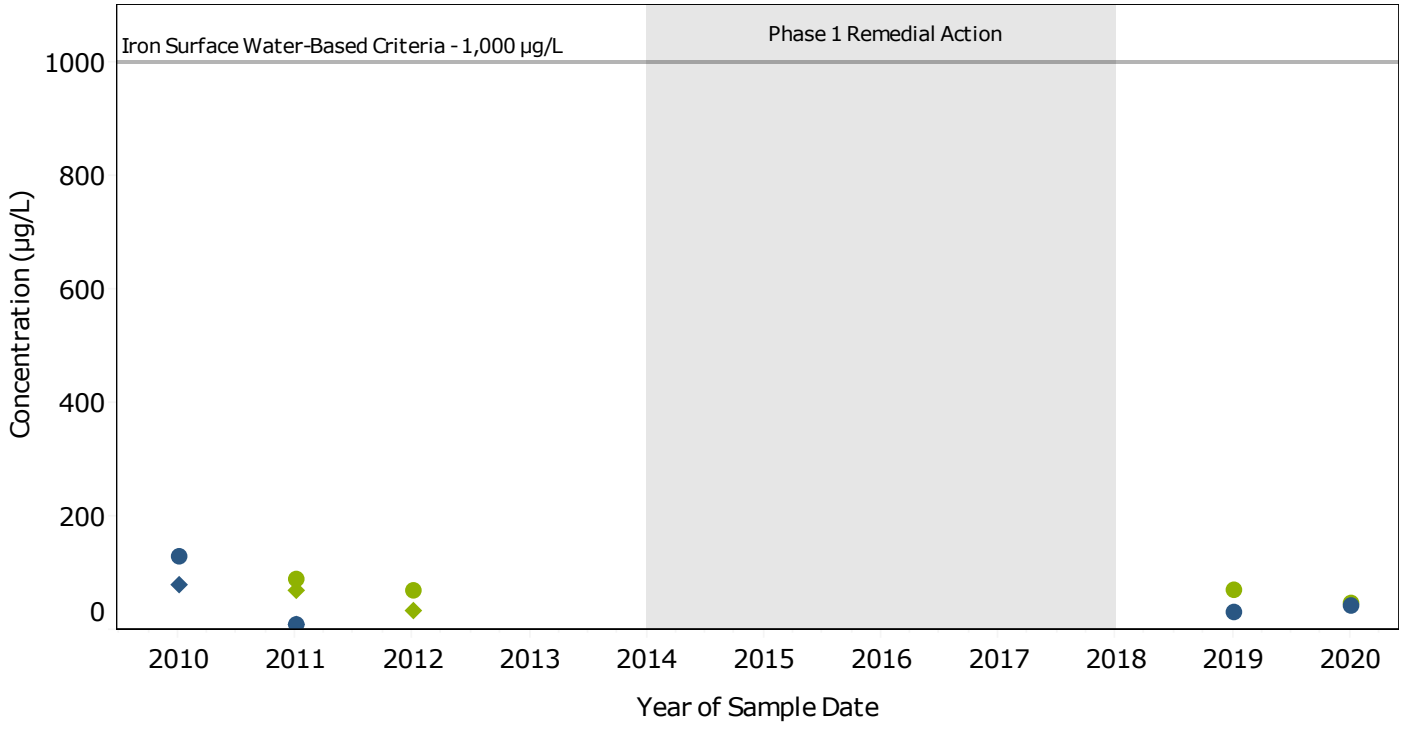
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

SG-8-PW-12, Copper



SG-8-PW-12, Iron



Legend

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

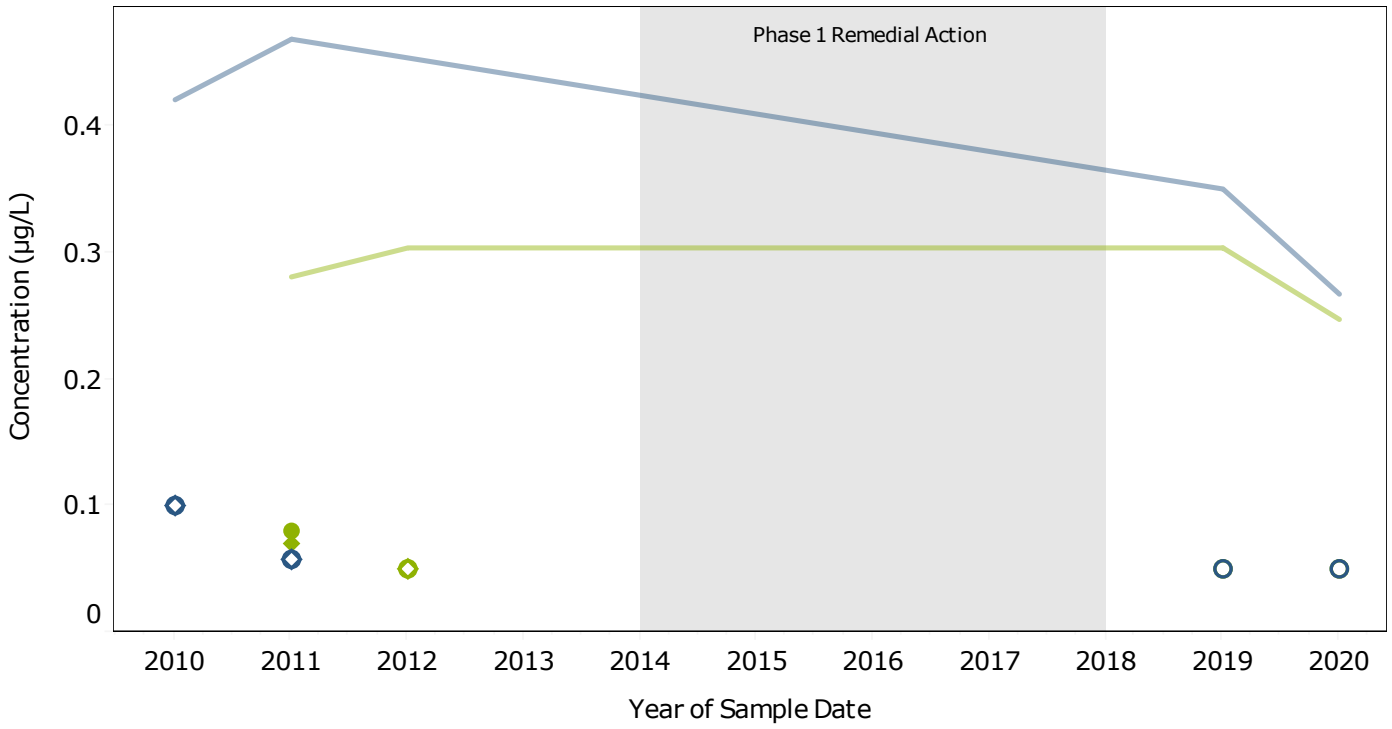
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

- Hardness-adjusted surface water criteria based on spring data
- Hardness-adjusted surface water criteria based on fall data

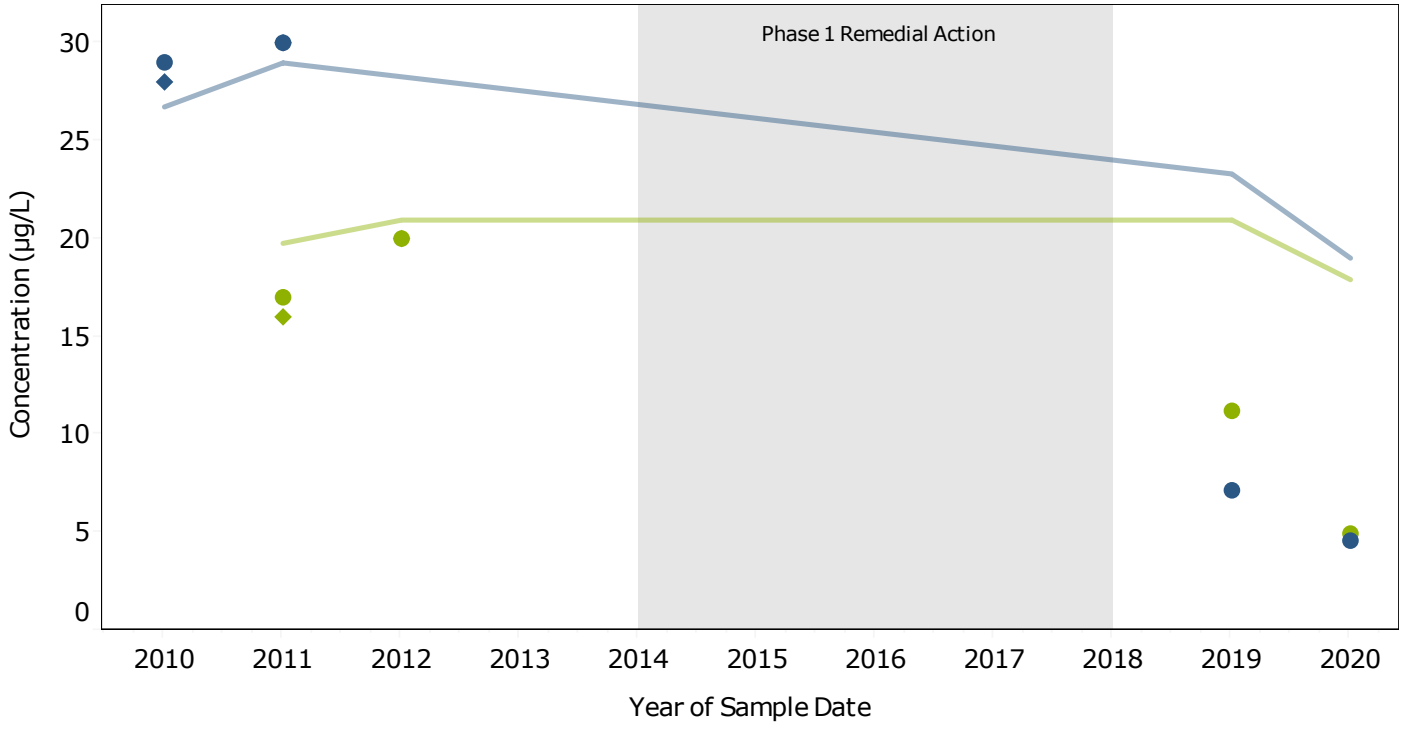
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

SG-8-PW-12, Lead



SG-8-PW-12, Zinc



Legend

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

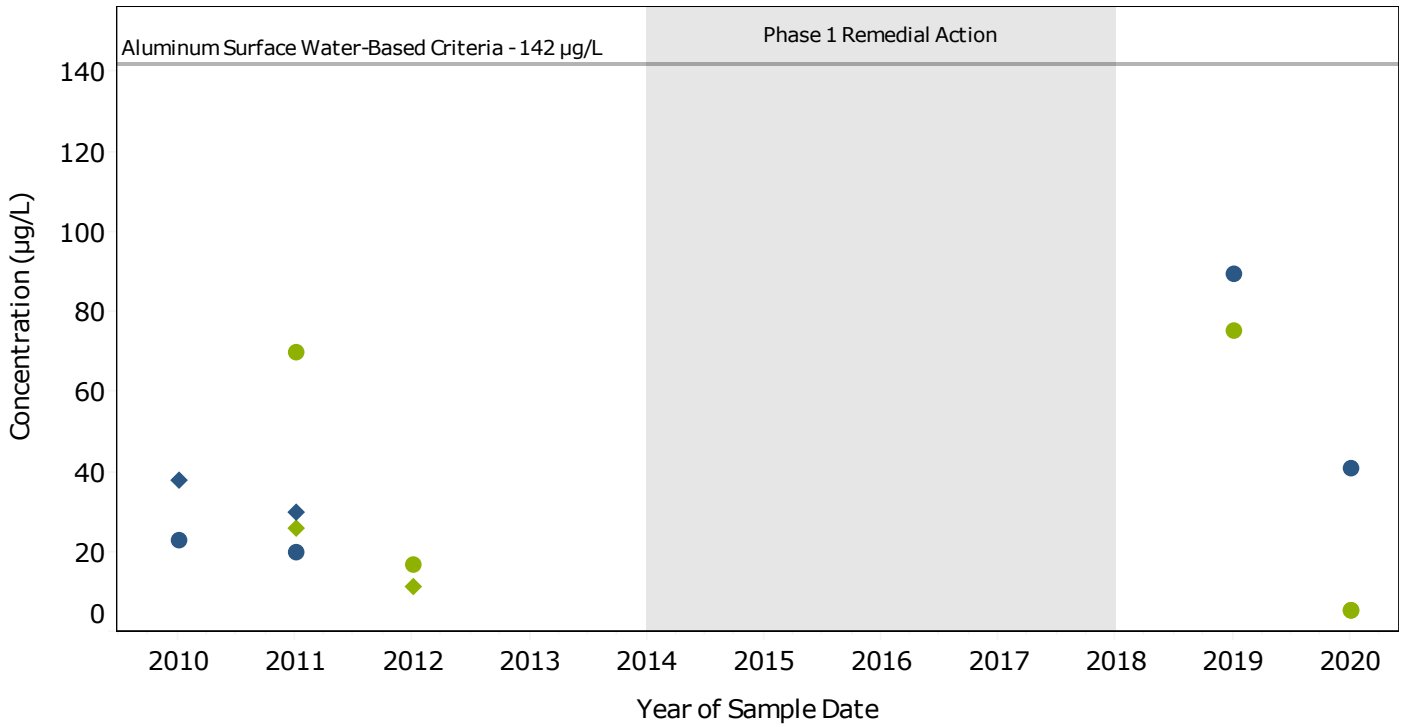
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

- Hardness-adjusted surface water criteria based on spring data
- Hardness-adjusted surface water criteria based on fall data

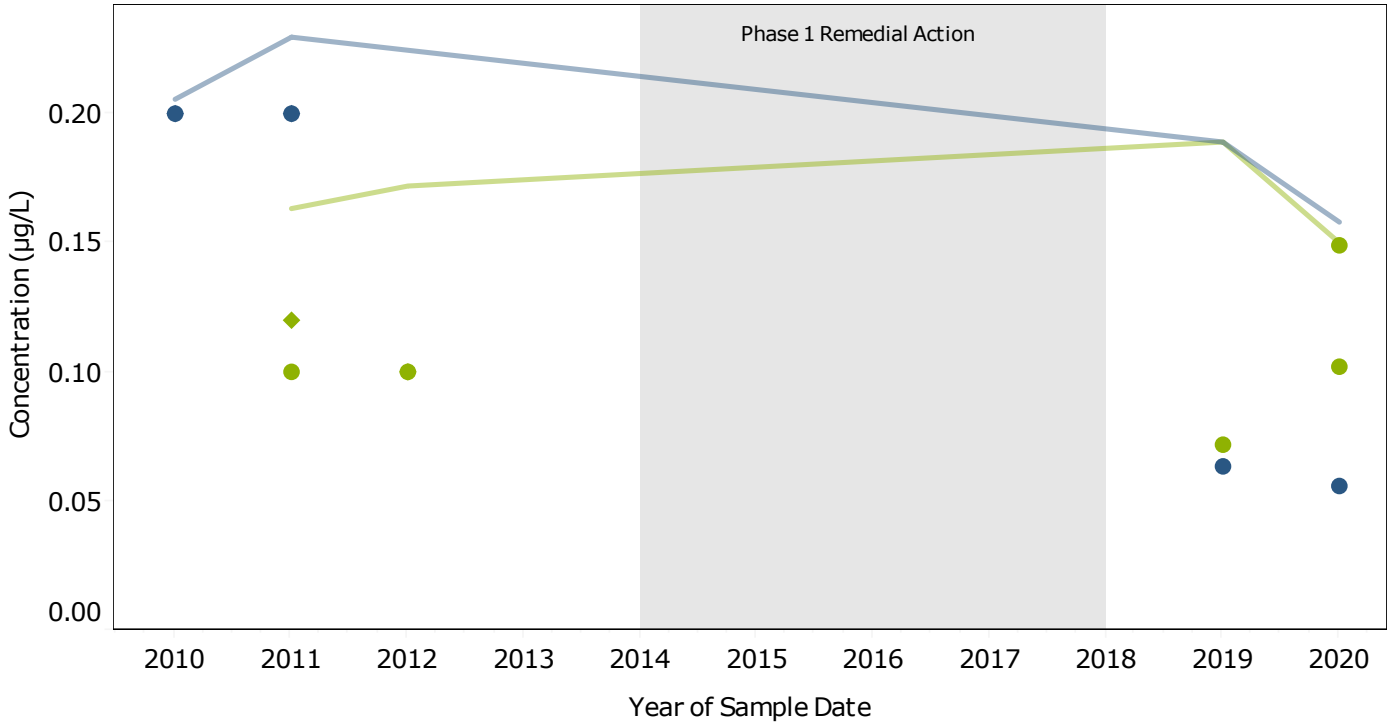
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

SG-8-WP-36, Aluminum



SG-8-WP-36, Cadmium



Legend

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

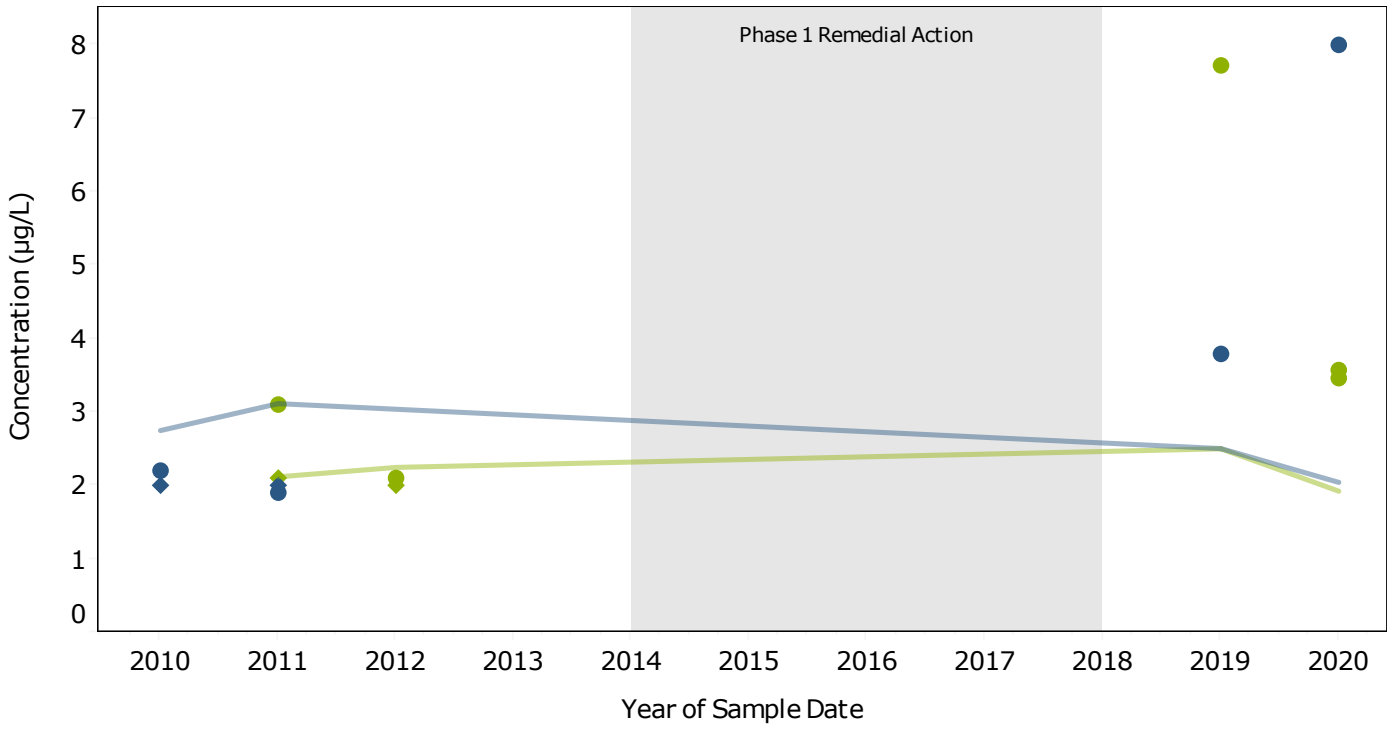
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

- Hardness-adjusted surface water criteria based on spring data
- Hardness-adjusted surface water criteria based on fall data

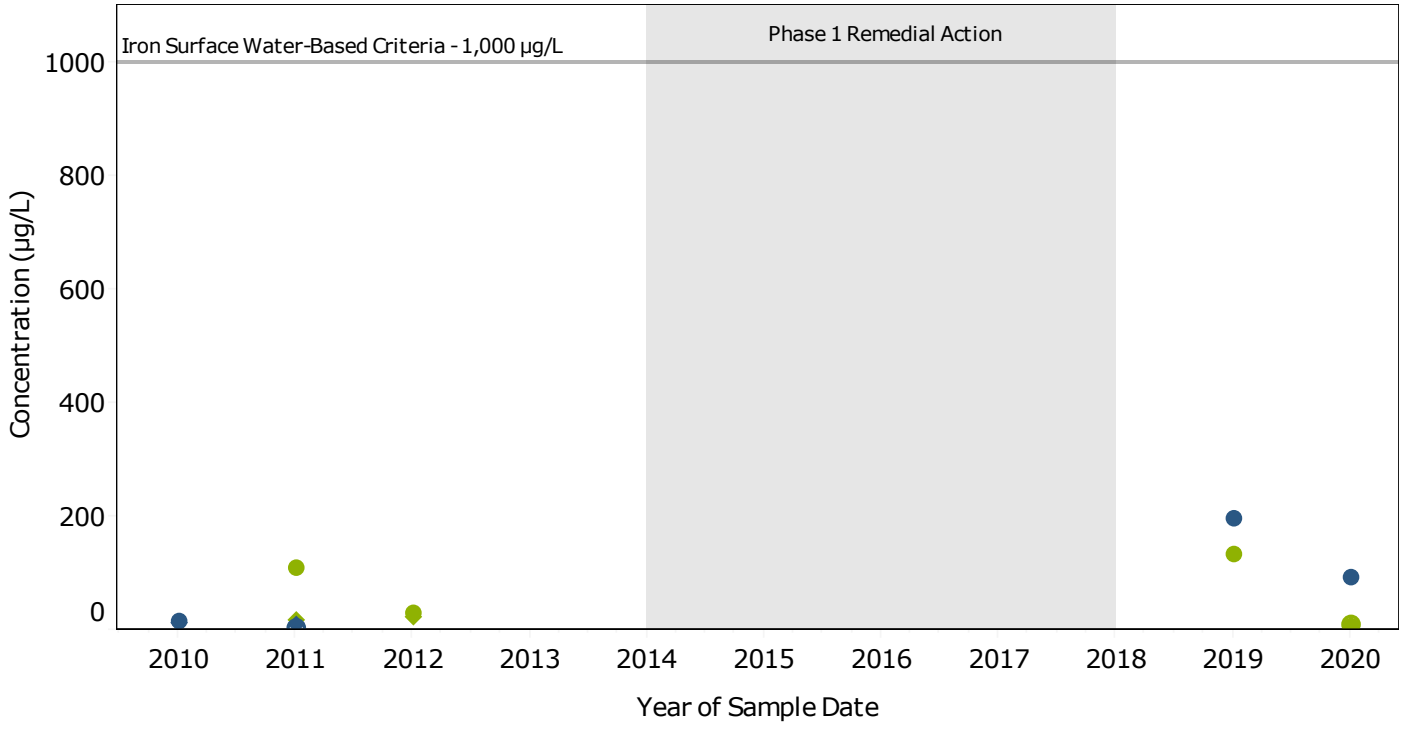
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

SG-8-WP-36, Copper



SG-8-WP-36, Iron



Legend

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

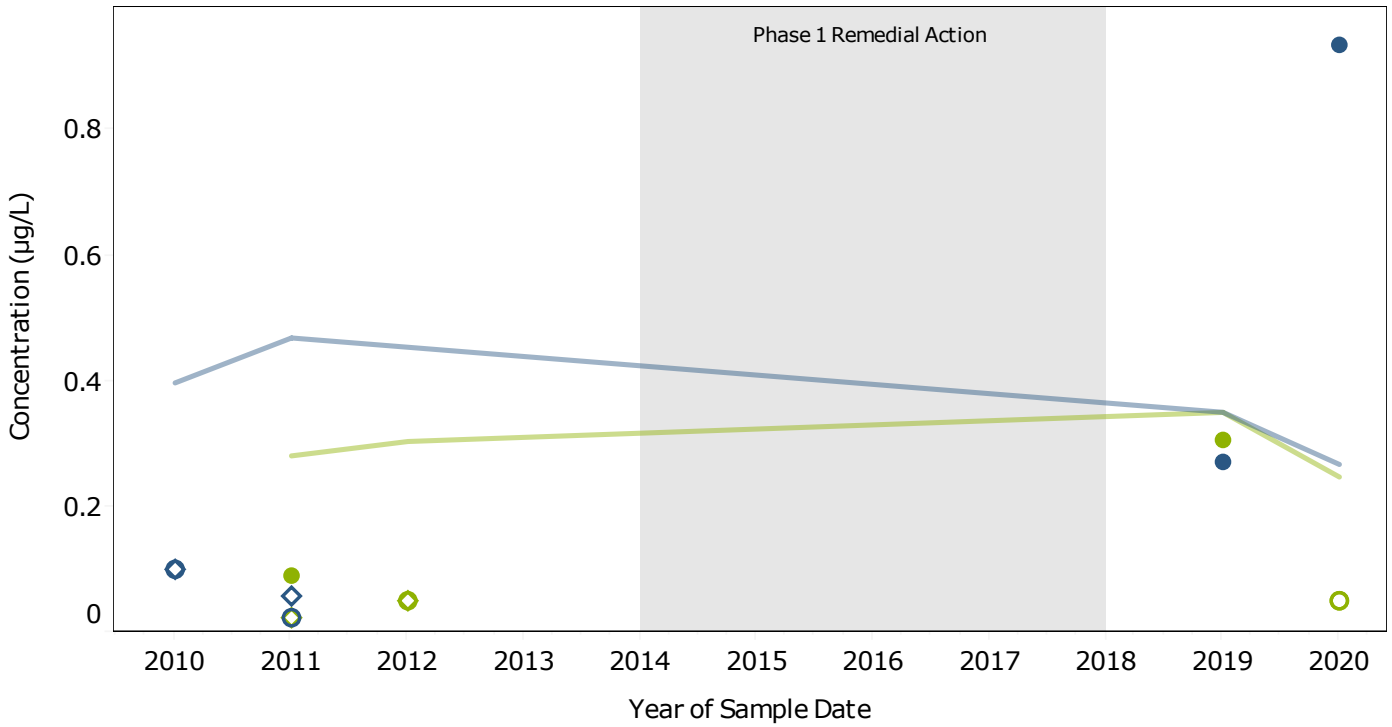
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

- Hardness-adjusted surface water criteria based on spring data
- Hardness-adjusted surface water criteria based on fall data

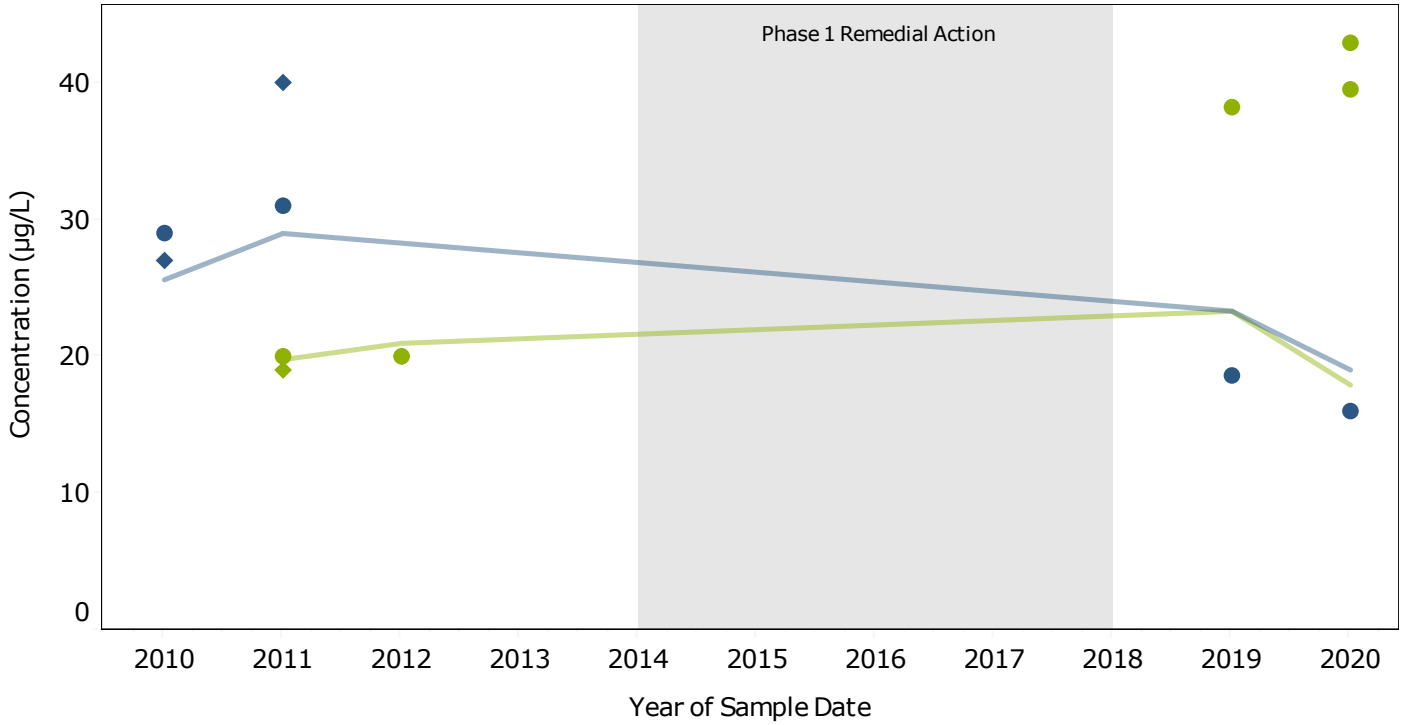
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

SG-8-WP-36, Lead



SG-8-WP-36, Zinc



Legend

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

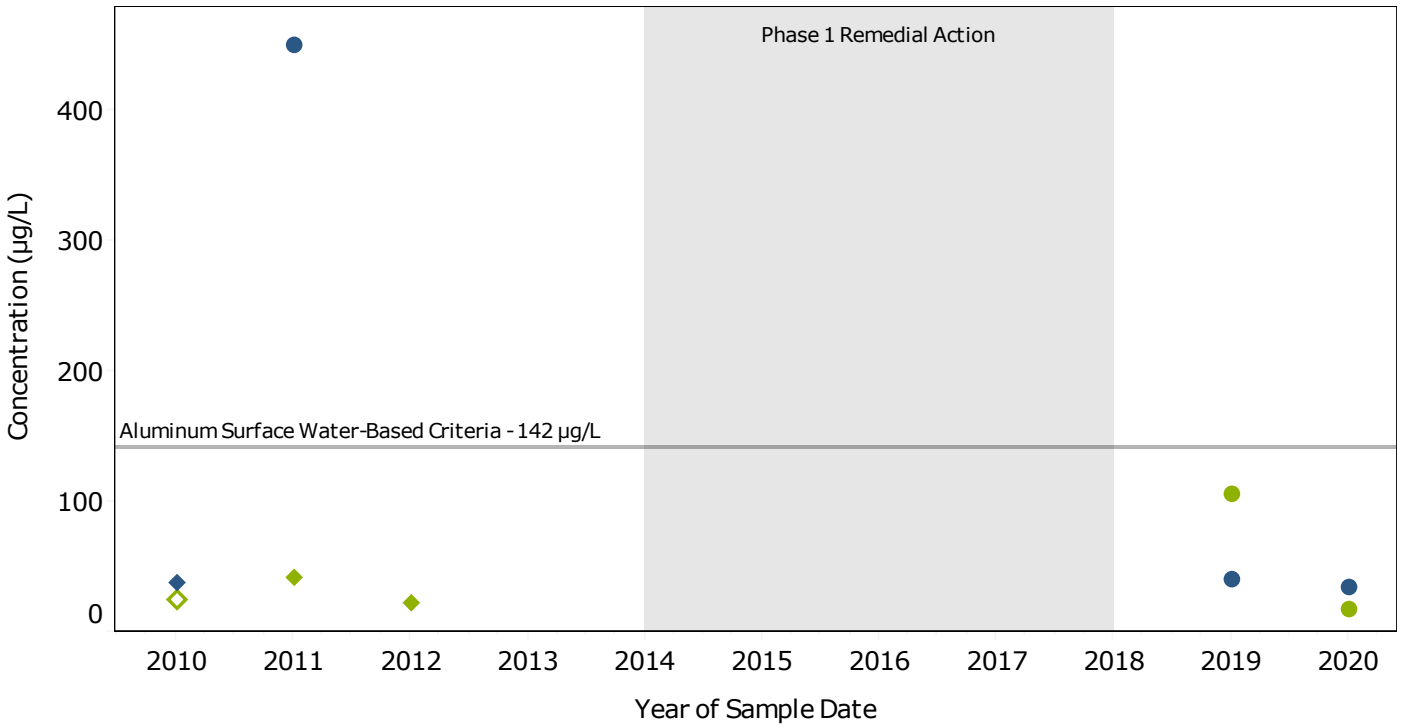
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

- Hardness-adjusted surface water criteria based on spring data
- Hardness-adjusted surface water criteria based on fall data

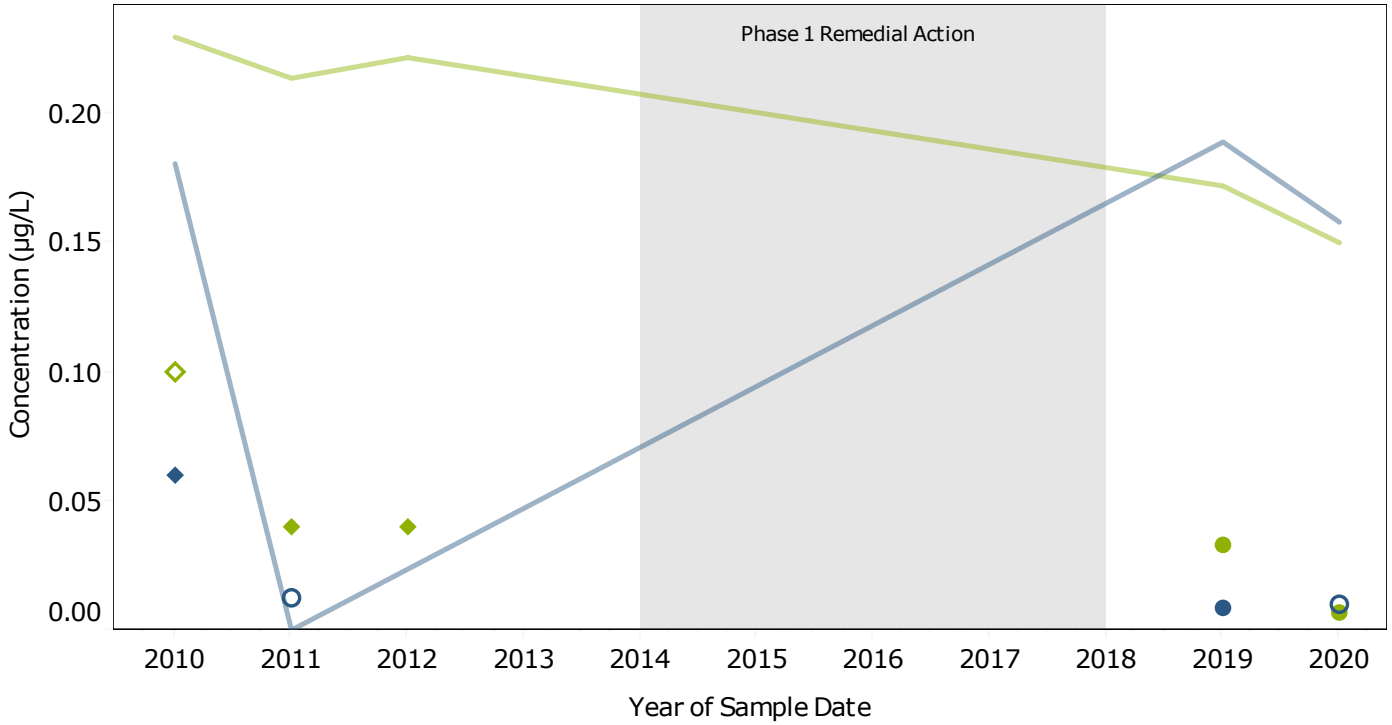
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

SG-8-WP, Aluminum



SG-8-WP, Cadmium



Legend

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

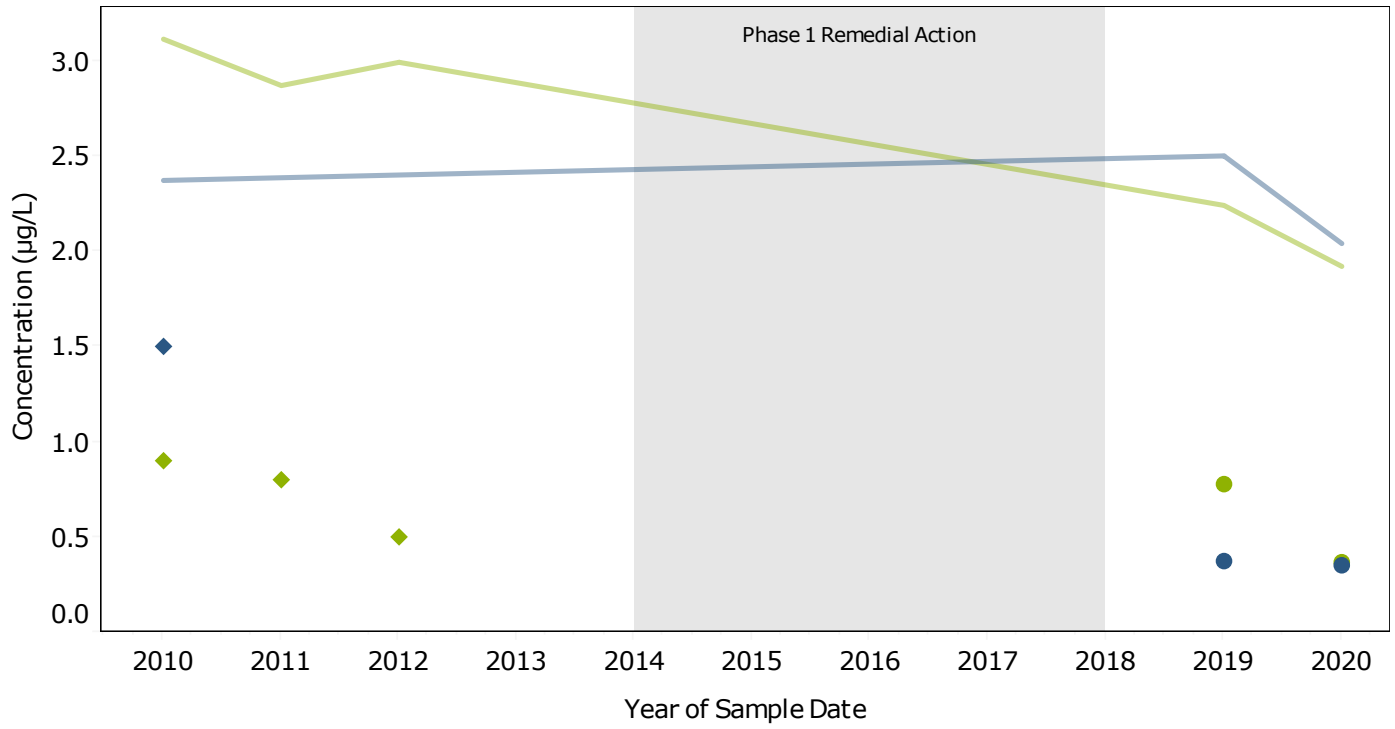
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

- Hardness-adjusted surface water criteria based on spring data
- Hardness-adjusted surface water criteria based on fall data

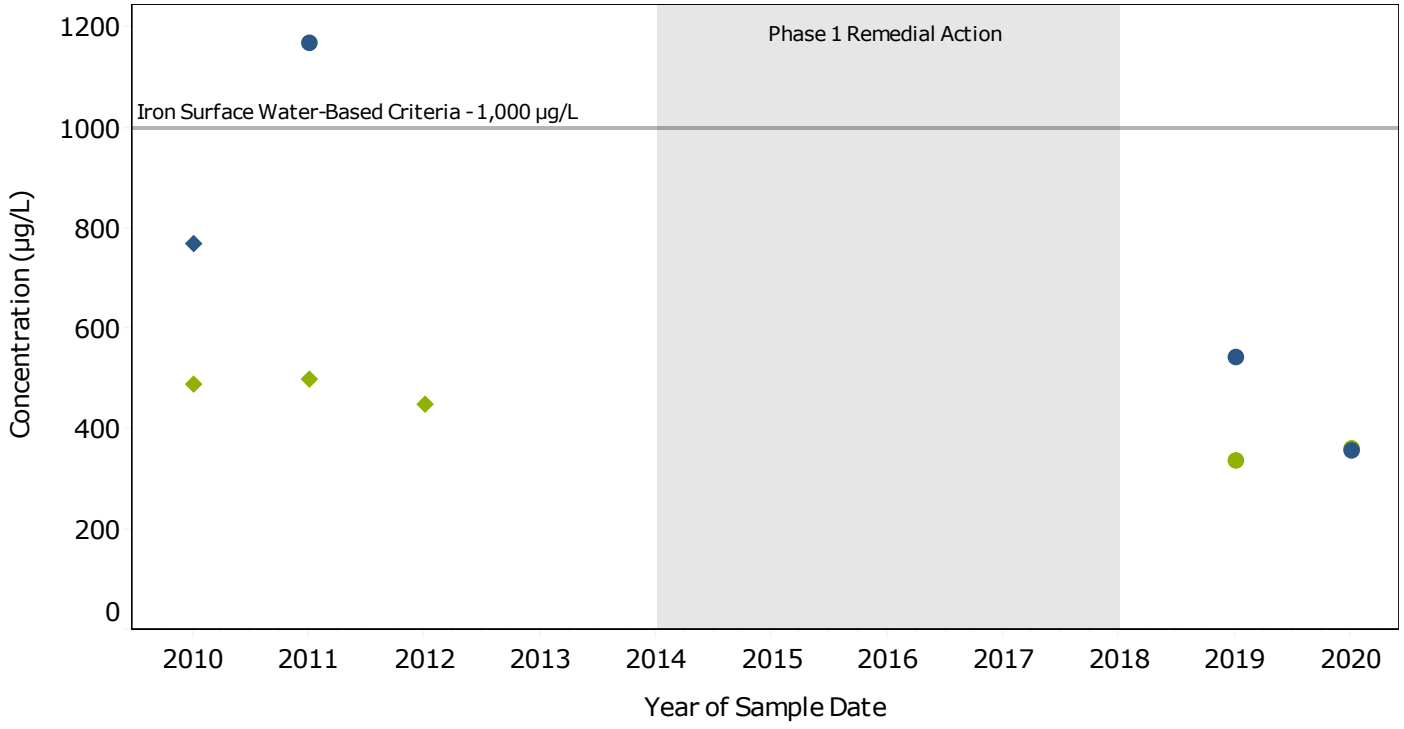
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

SG-8-WP, Copper



SG-8-WP, Iron



Legend

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

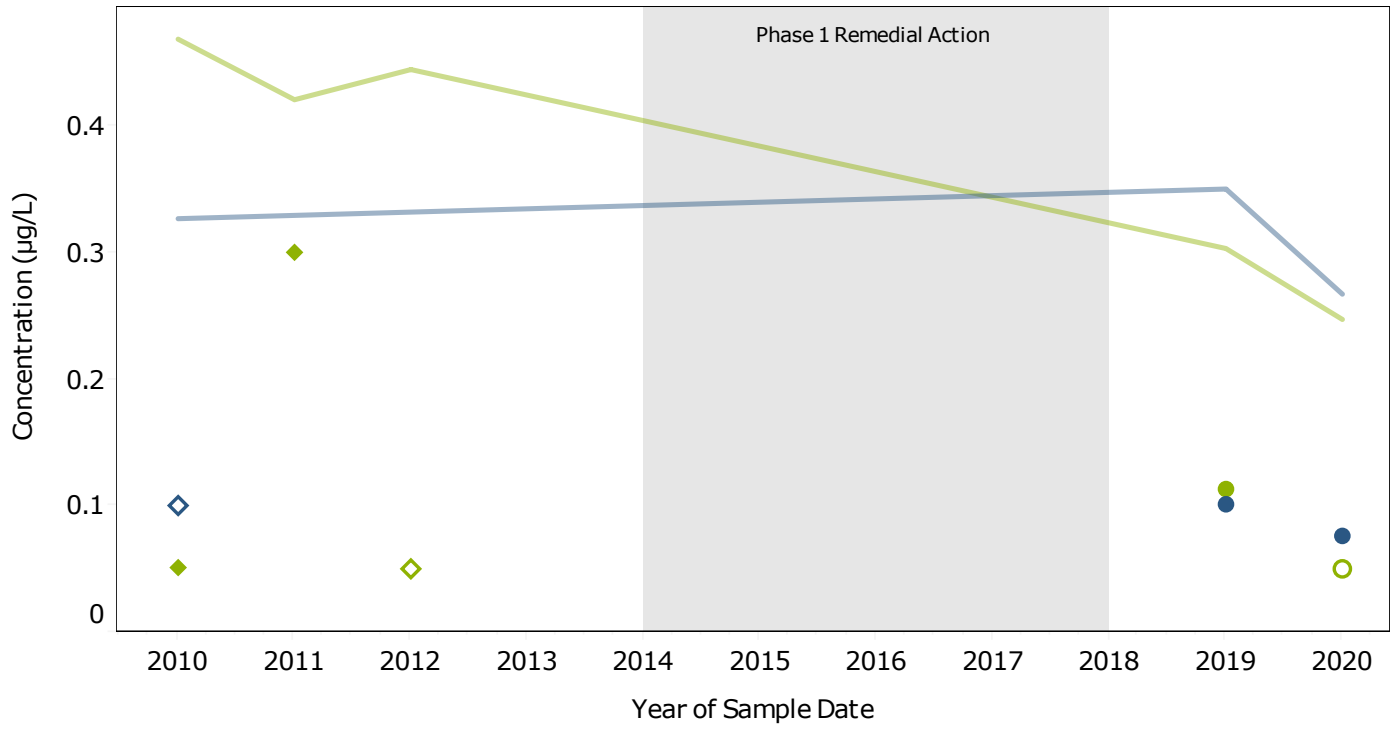
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

- Hardness-adjusted surface water criteria based on spring data
- Hardness-adjusted surface water criteria based on fall data

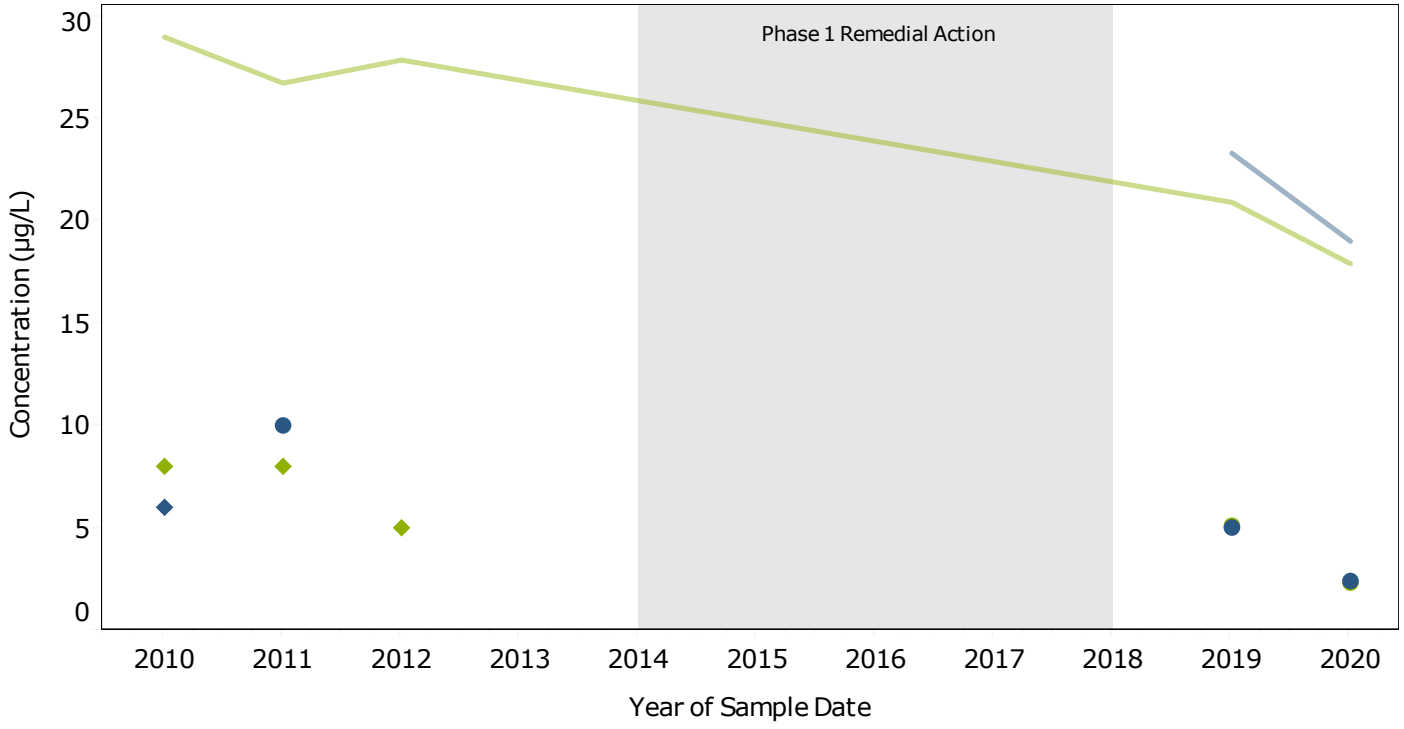
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

SG-8-WP, Lead



SG-8-WP, Zinc



Legend

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

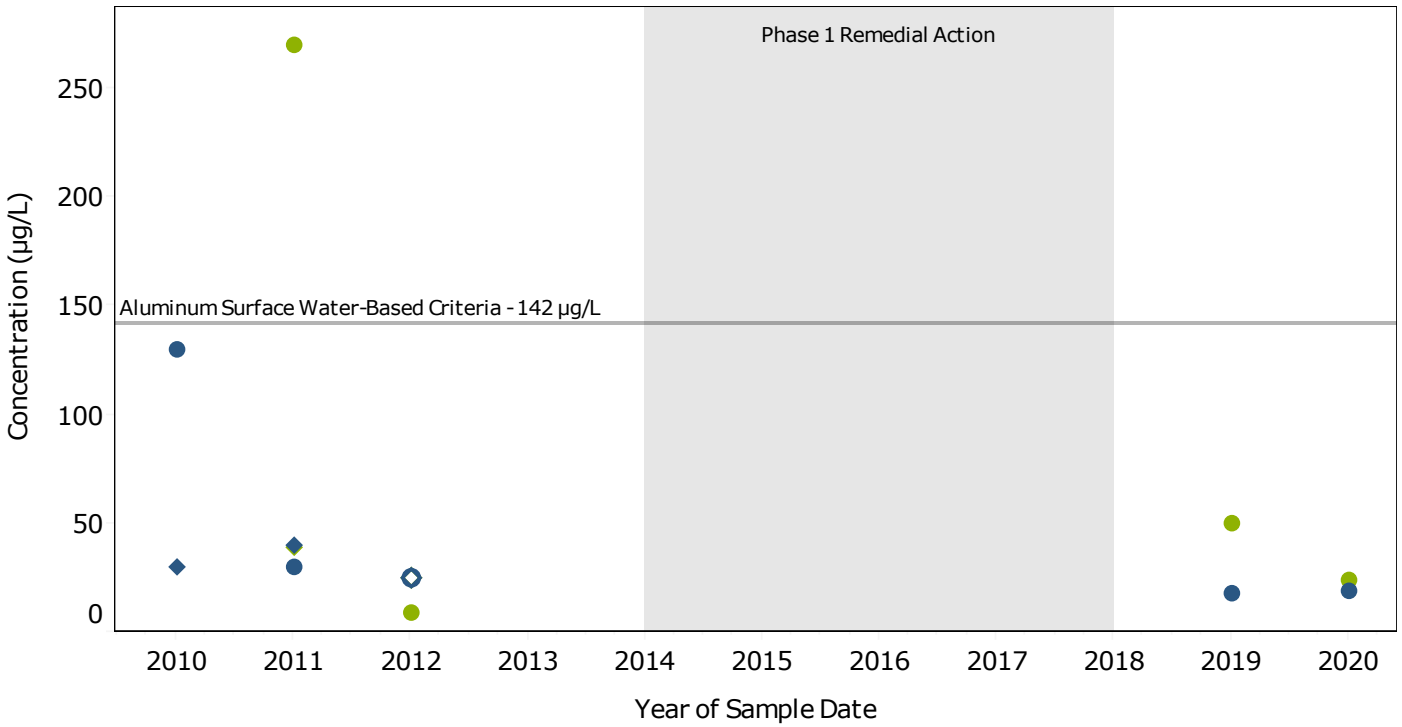
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

- Hardness-adjusted surface water criteria based on spring data
- Hardness-adjusted surface water criteria based on fall data

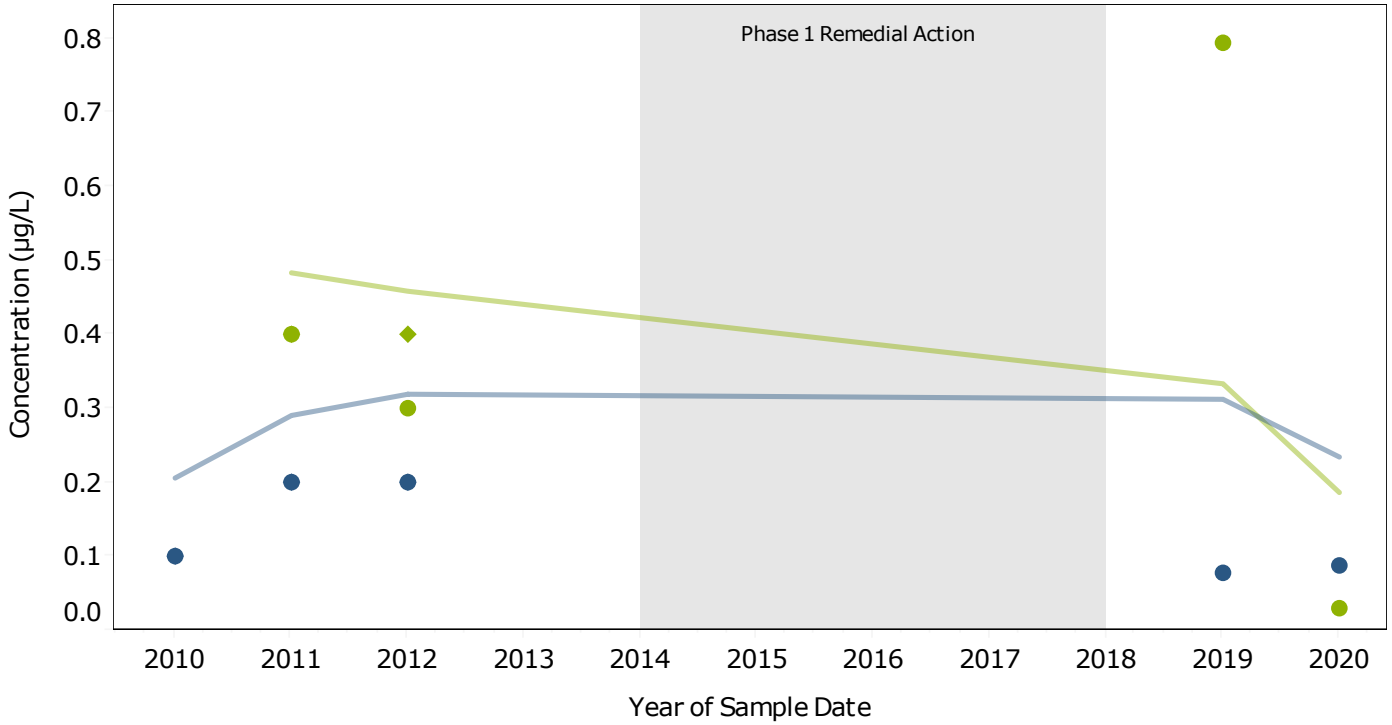
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

SG-9-PW-6, Aluminum



SG-9-PW-6, Cadmium



Legend

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

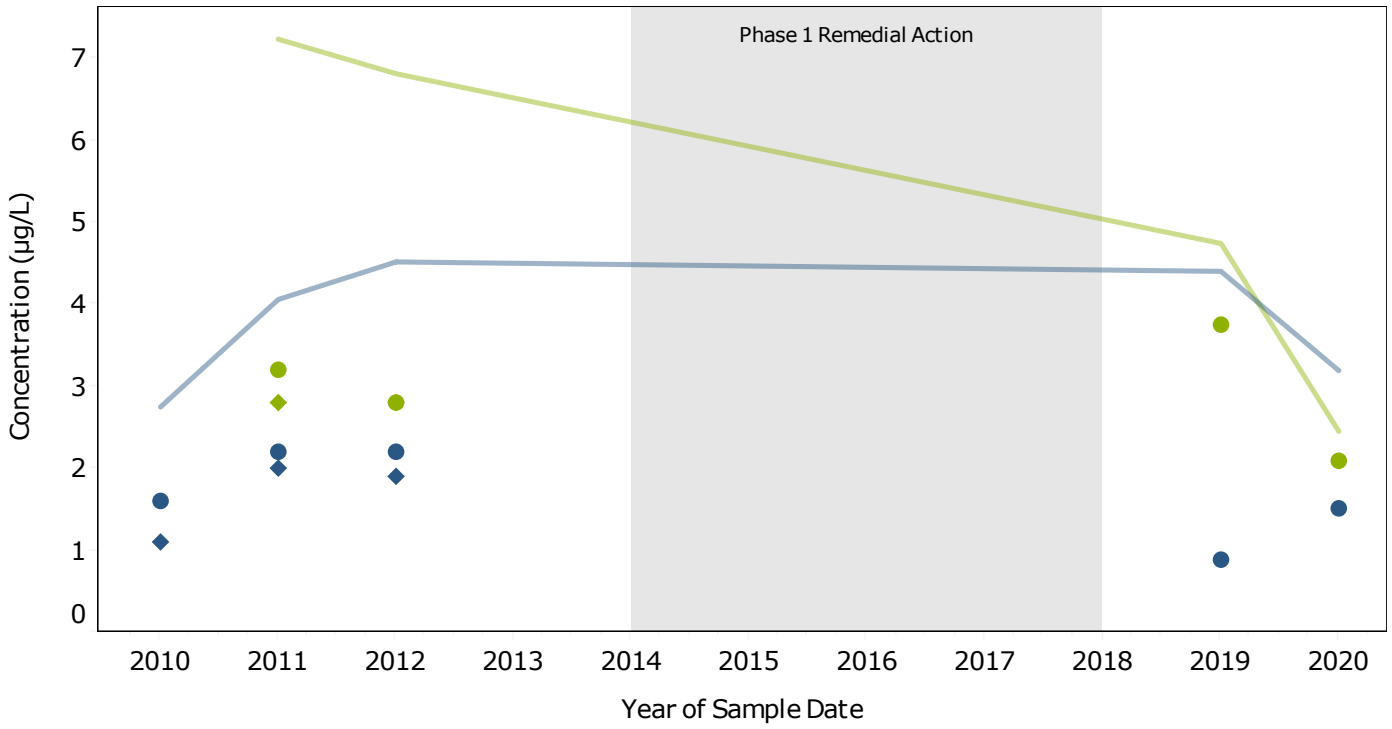
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

- Hardness-adjusted surface water criteria based on spring data
- Hardness-adjusted surface water criteria based on fall data

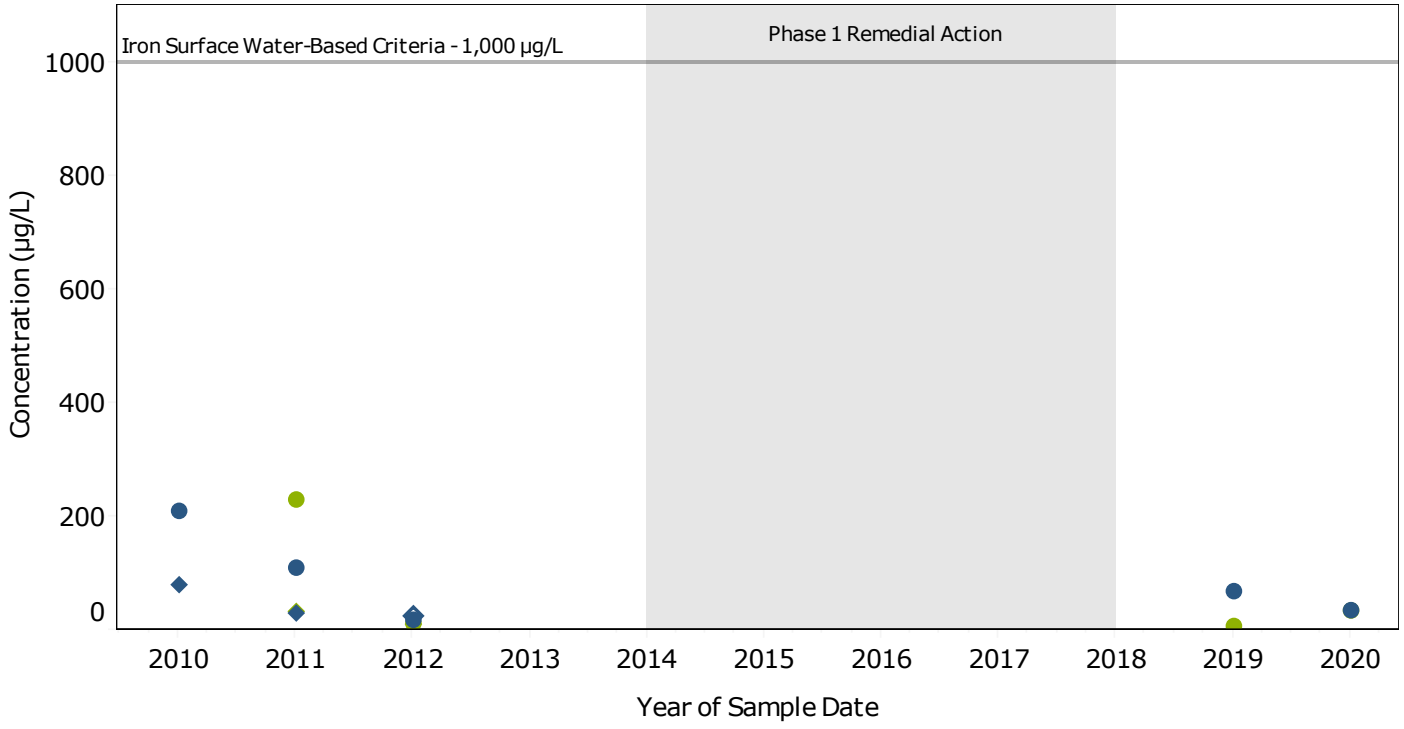
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

SG-9-PW-6, Copper



SG-9-PW-6, Iron



Legend

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

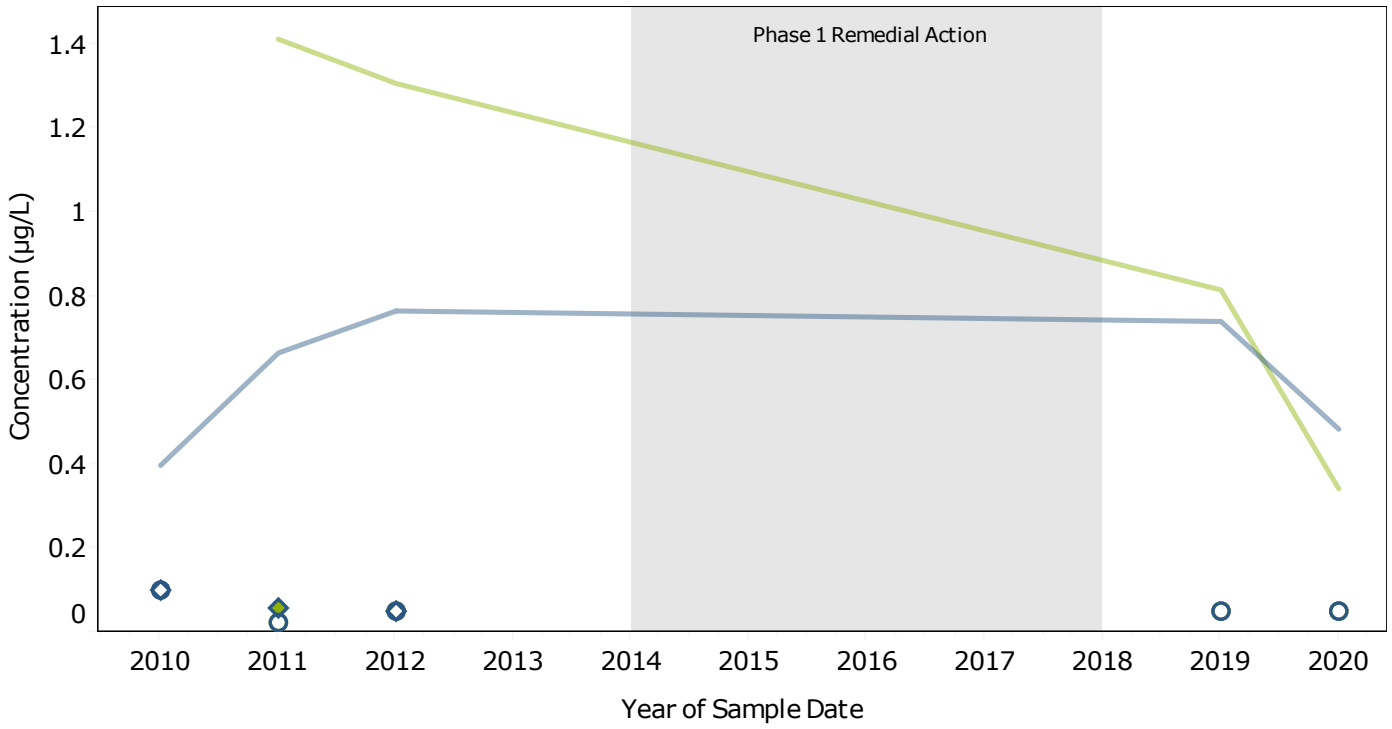
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

- Hardness-adjusted surface water criteria based on spring data
- Hardness-adjusted surface water criteria based on fall data

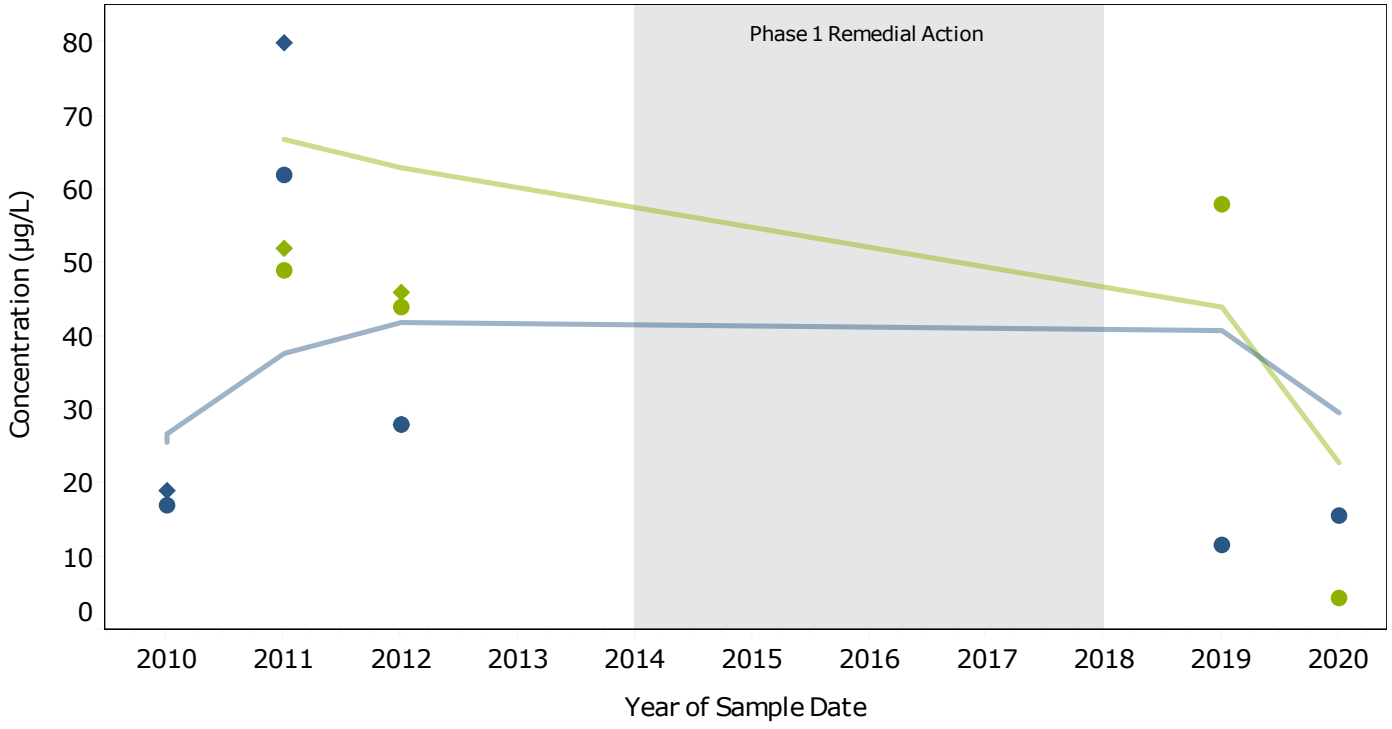
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

SG-9-PW-6, Lead



SG-9-PW-6, Zinc



Legend

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

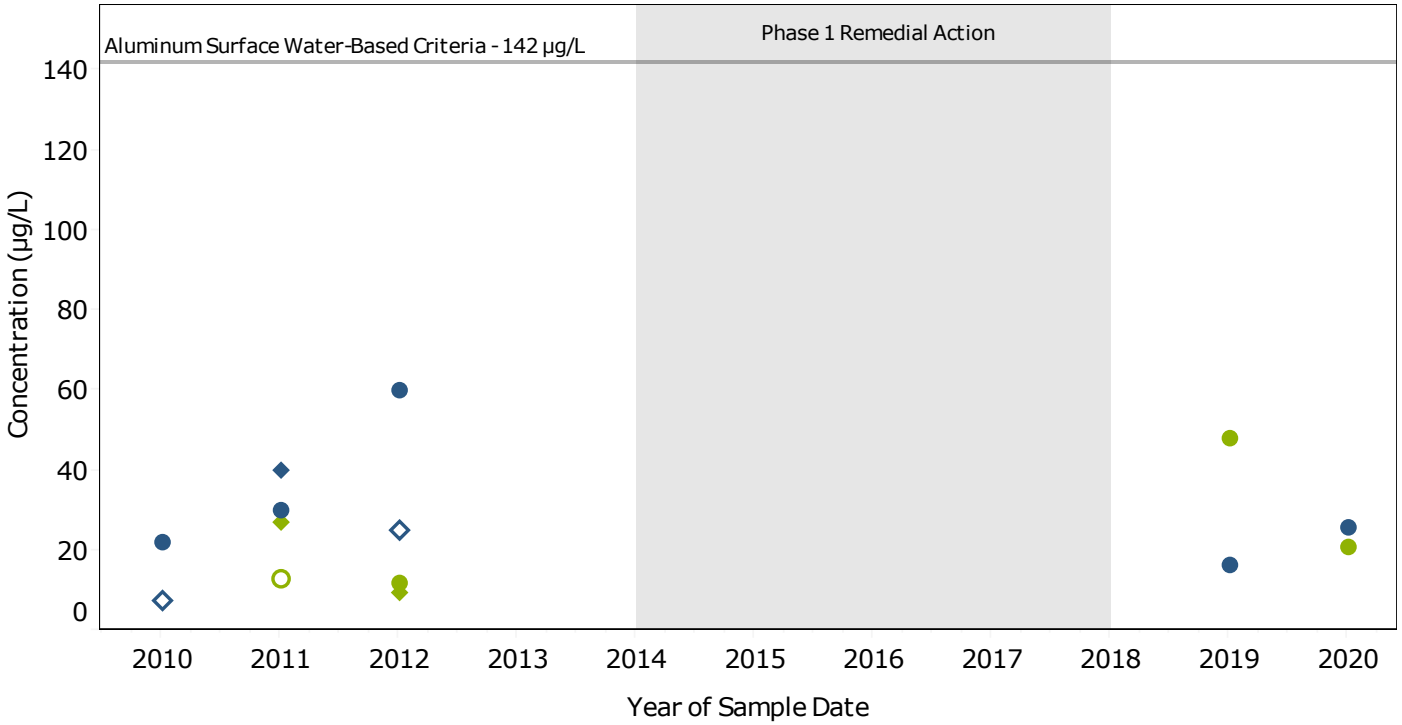
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

- Hardness-adjusted surface water criteria based on spring data
- Hardness-adjusted surface water criteria based on fall data

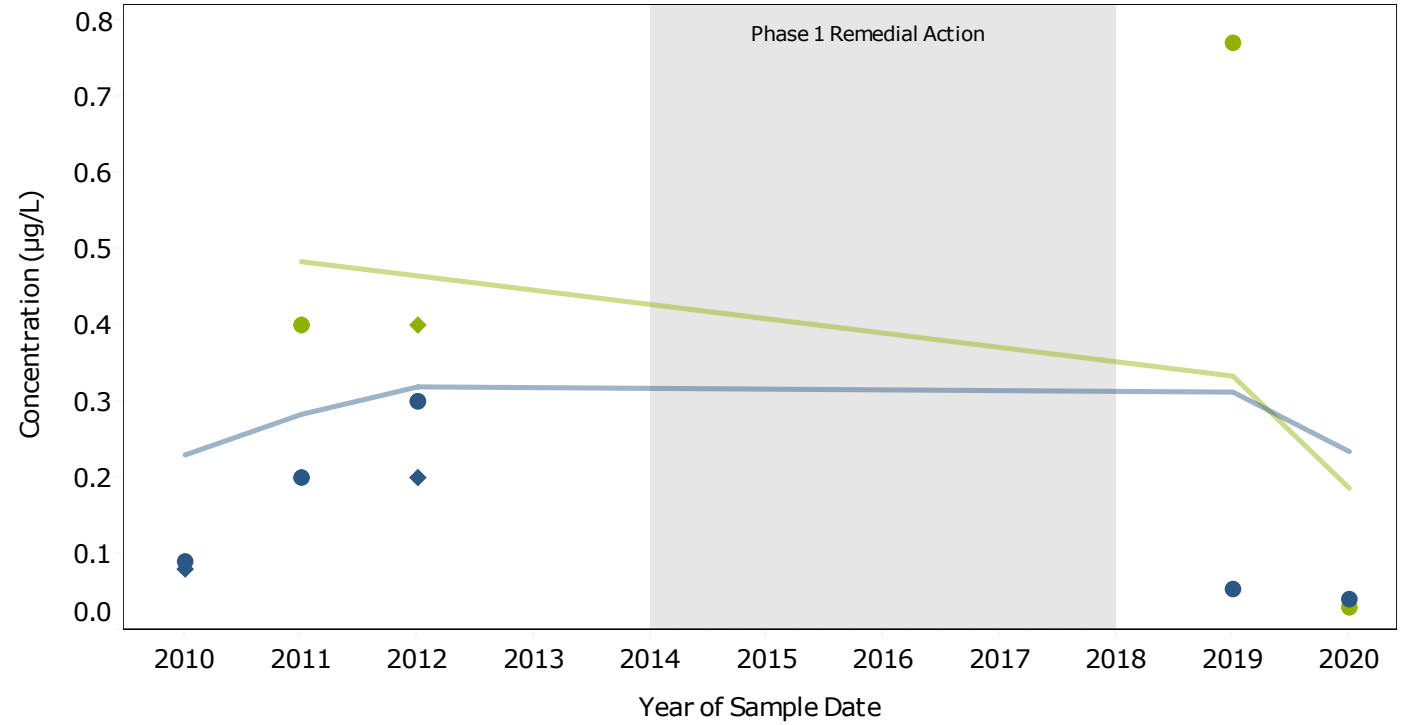
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

SG-9-PW-12, Aluminum



SG-9-PW-12, Cadmium



Legend

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

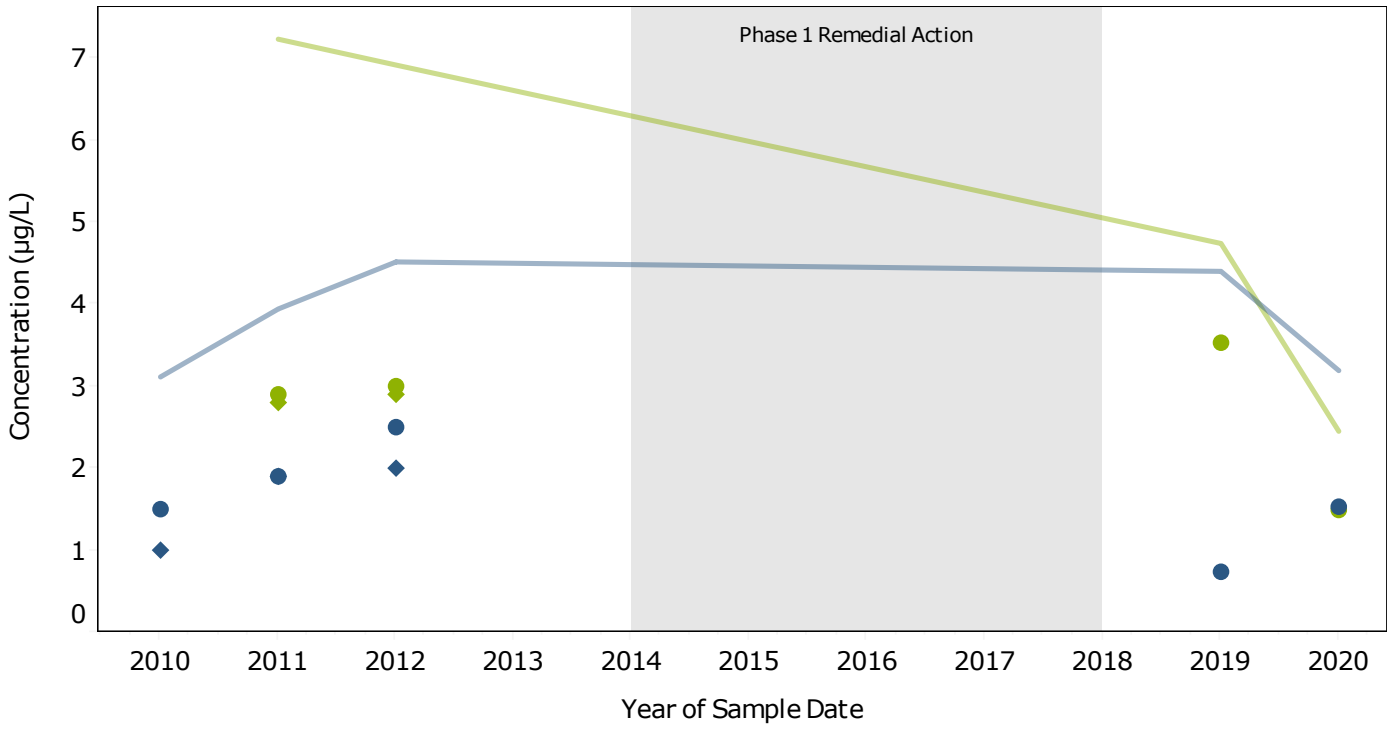
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

- Hardness-adjusted surface water criteria based on spring data
- Hardness-adjusted surface water criteria based on fall data

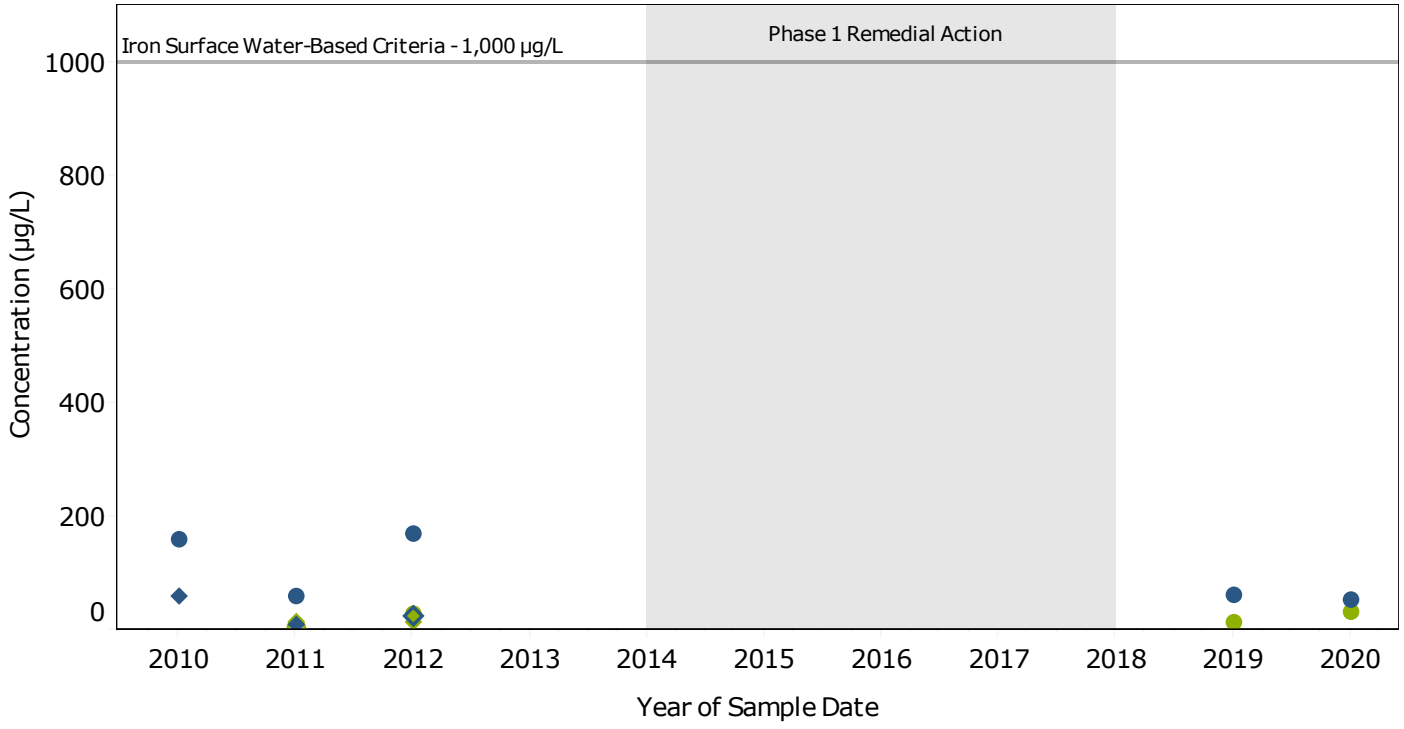
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

SG-9-PW-12, Copper



SG-9-PW-12, Iron



Legend

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

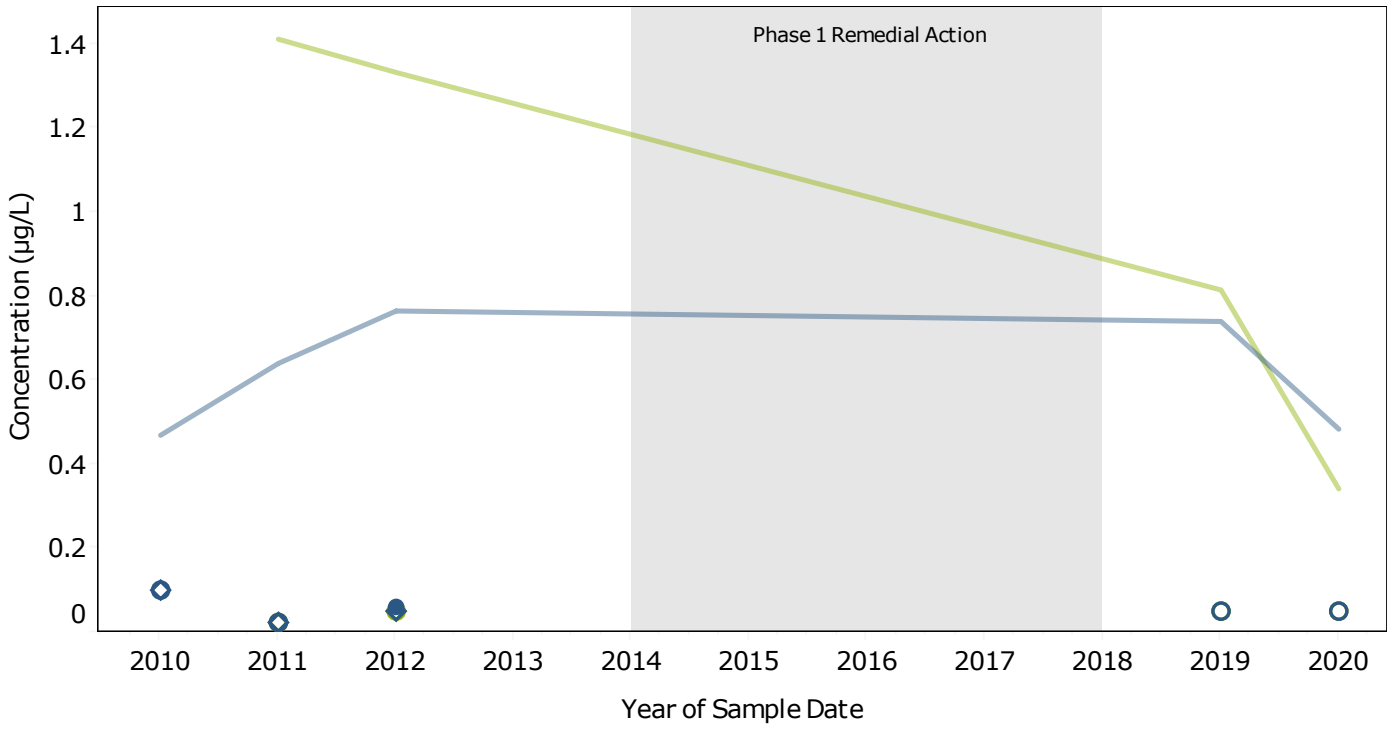
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

- Hardness-adjusted surface water criteria based on spring data
- Hardness-adjusted surface water criteria based on fall data

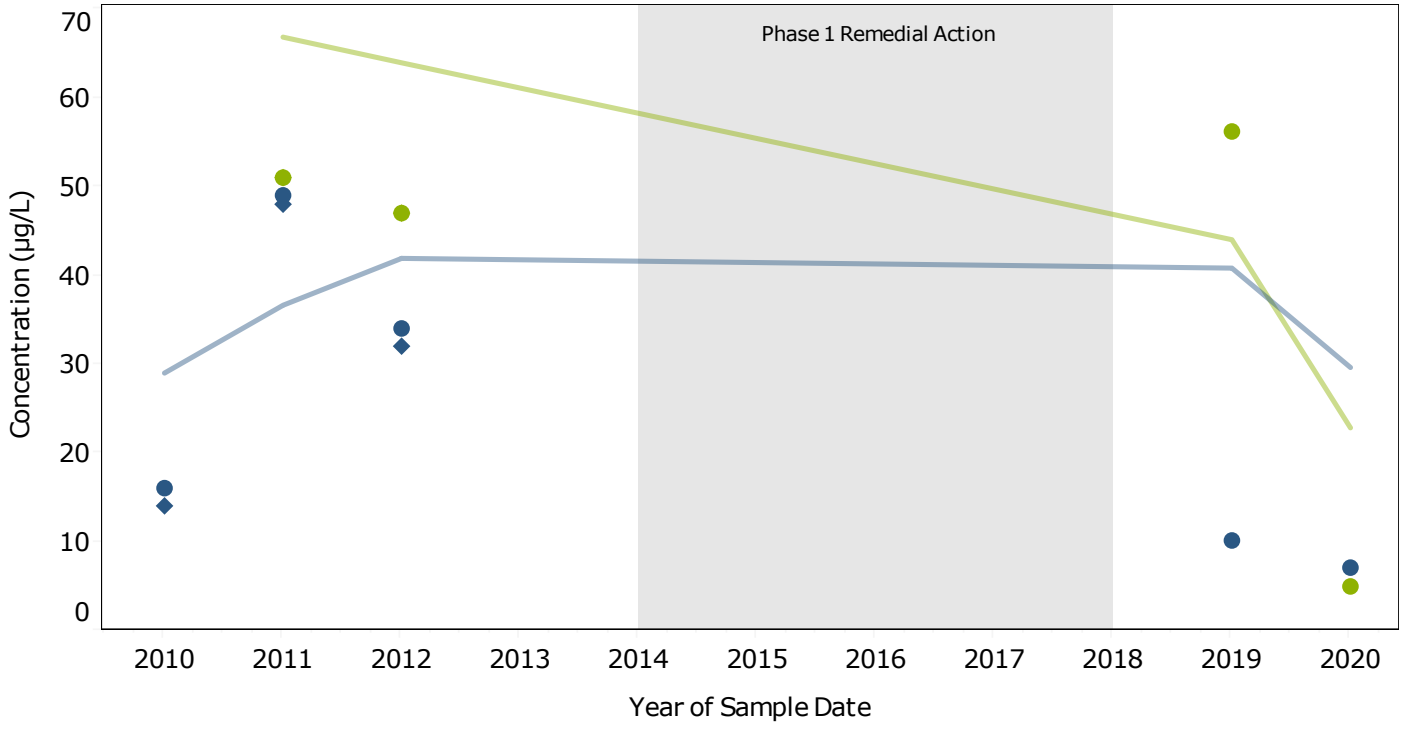
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

SG-9-PW-12, Lead



SG-9-PW-12, Zinc



Legend

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

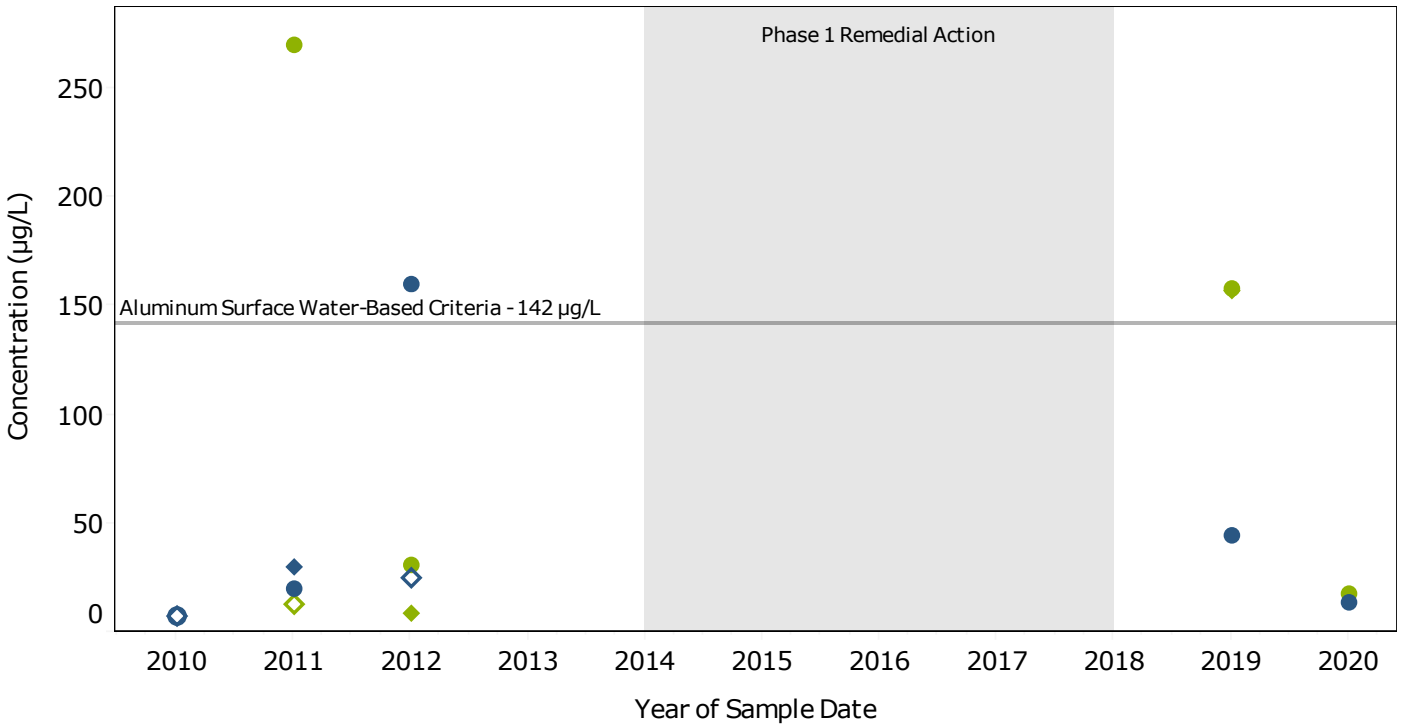
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

- Hardness-adjusted surface water criteria based on spring data
- Hardness-adjusted surface water criteria based on fall data

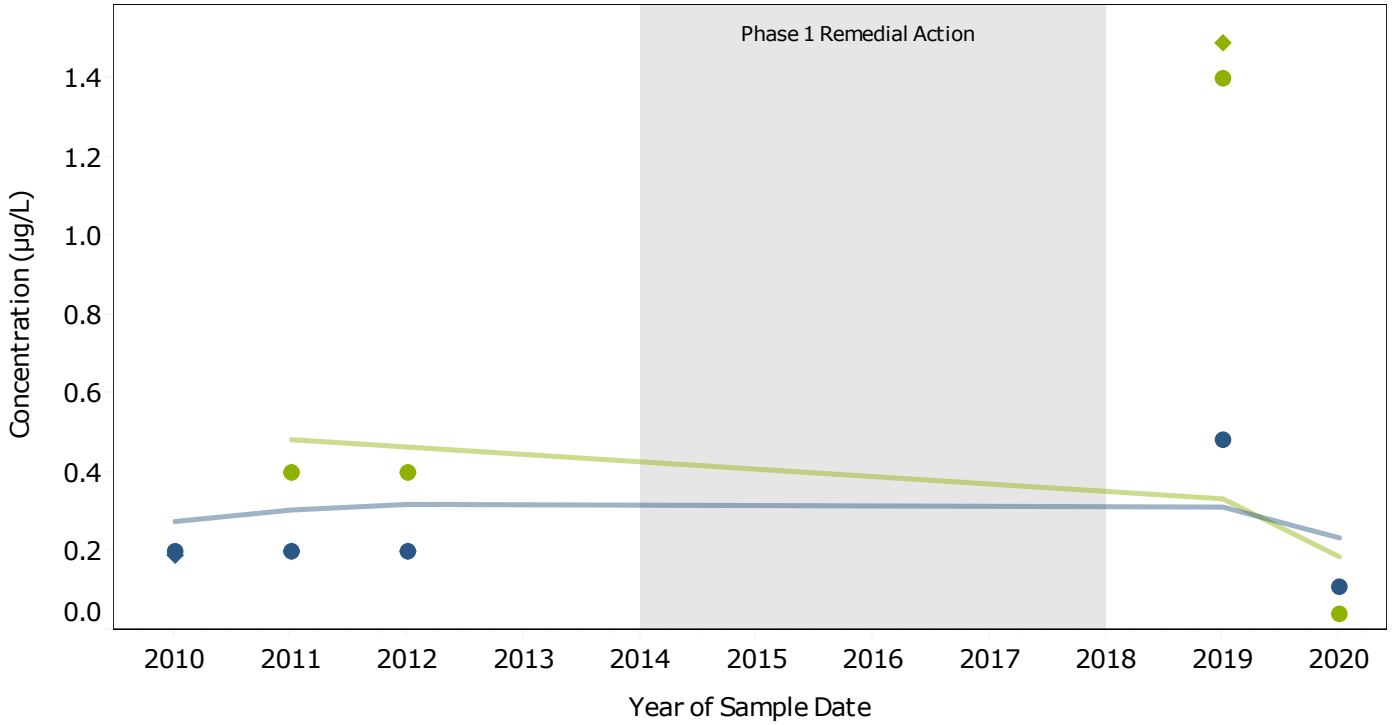
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

SG-9-WP-36, Aluminum



SG-9-WP-36, Cadmium



Legend

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

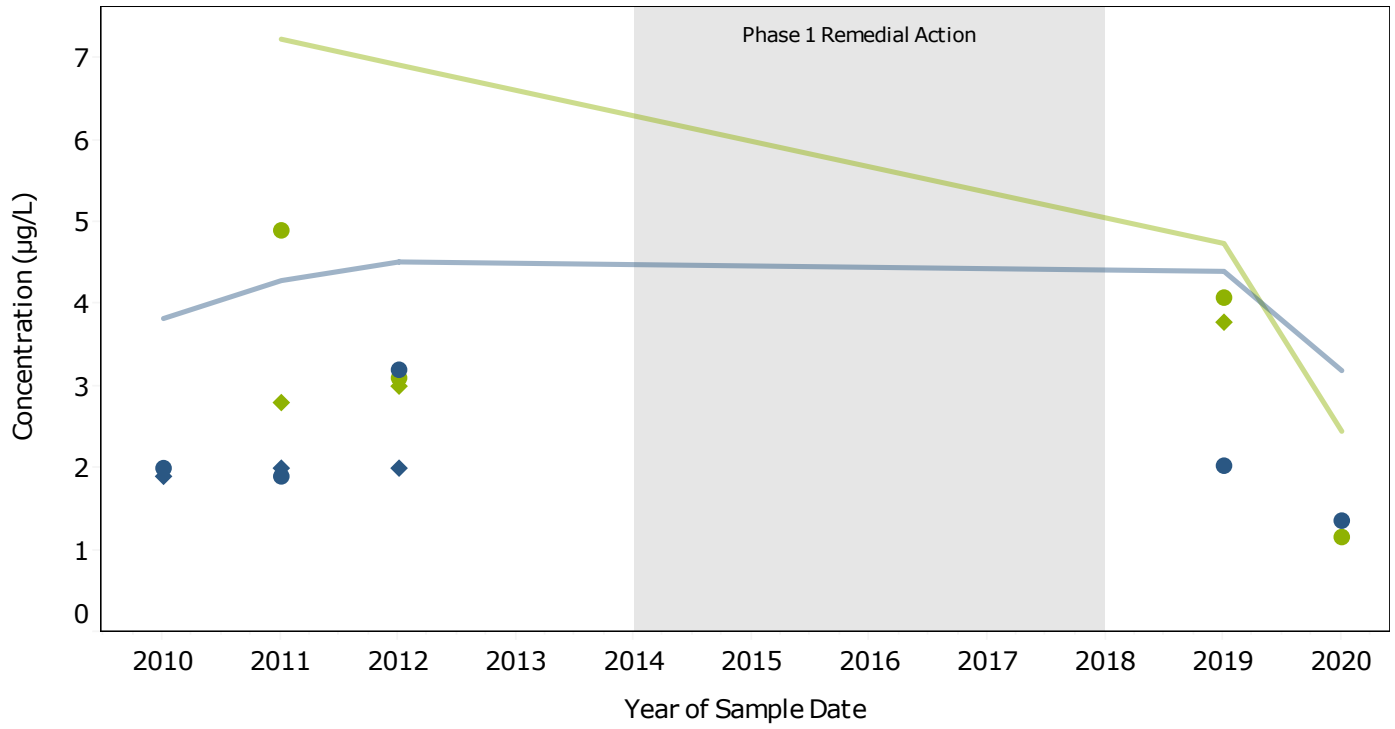
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

- Hardness-adjusted surface water criteria based on spring data
- Hardness-adjusted surface water criteria based on fall data

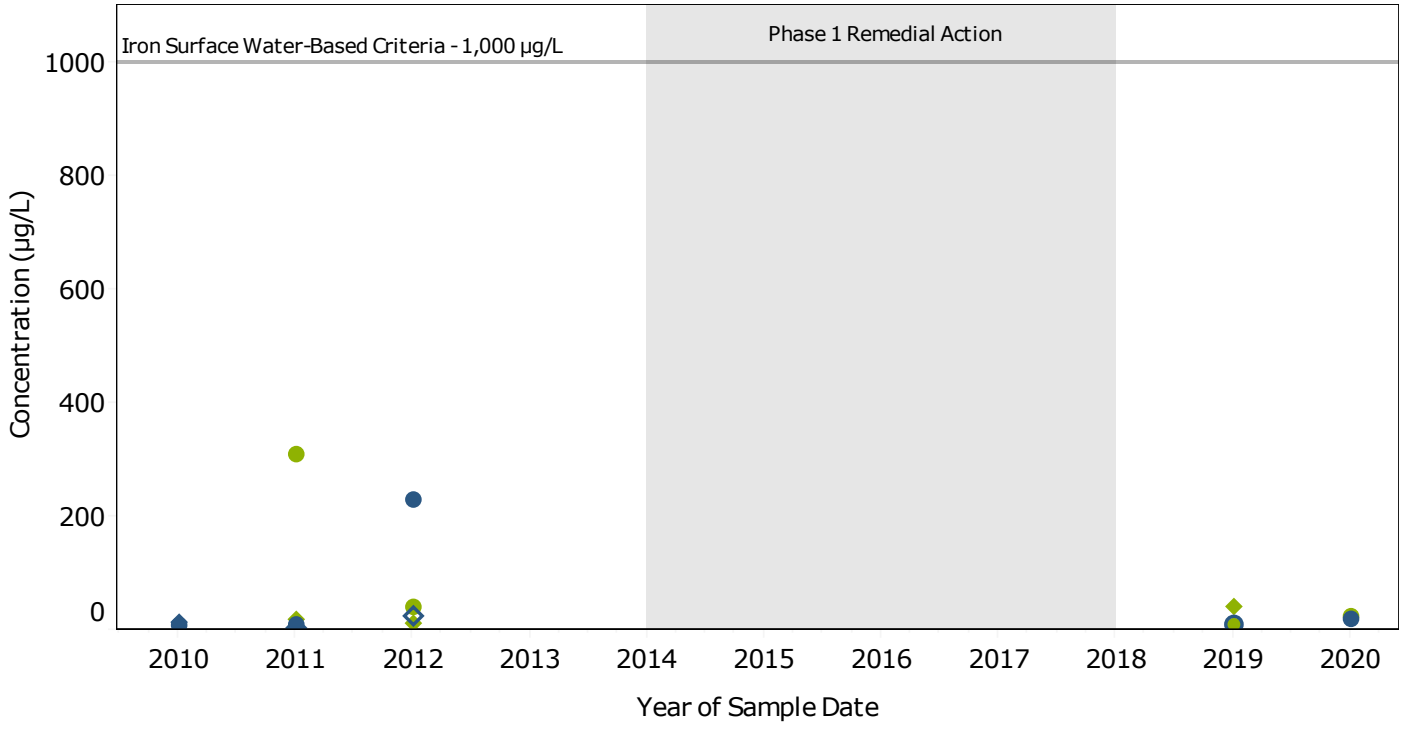
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

SG-9-WP-36, Copper



SG-9-WP-36, Iron



Legend

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

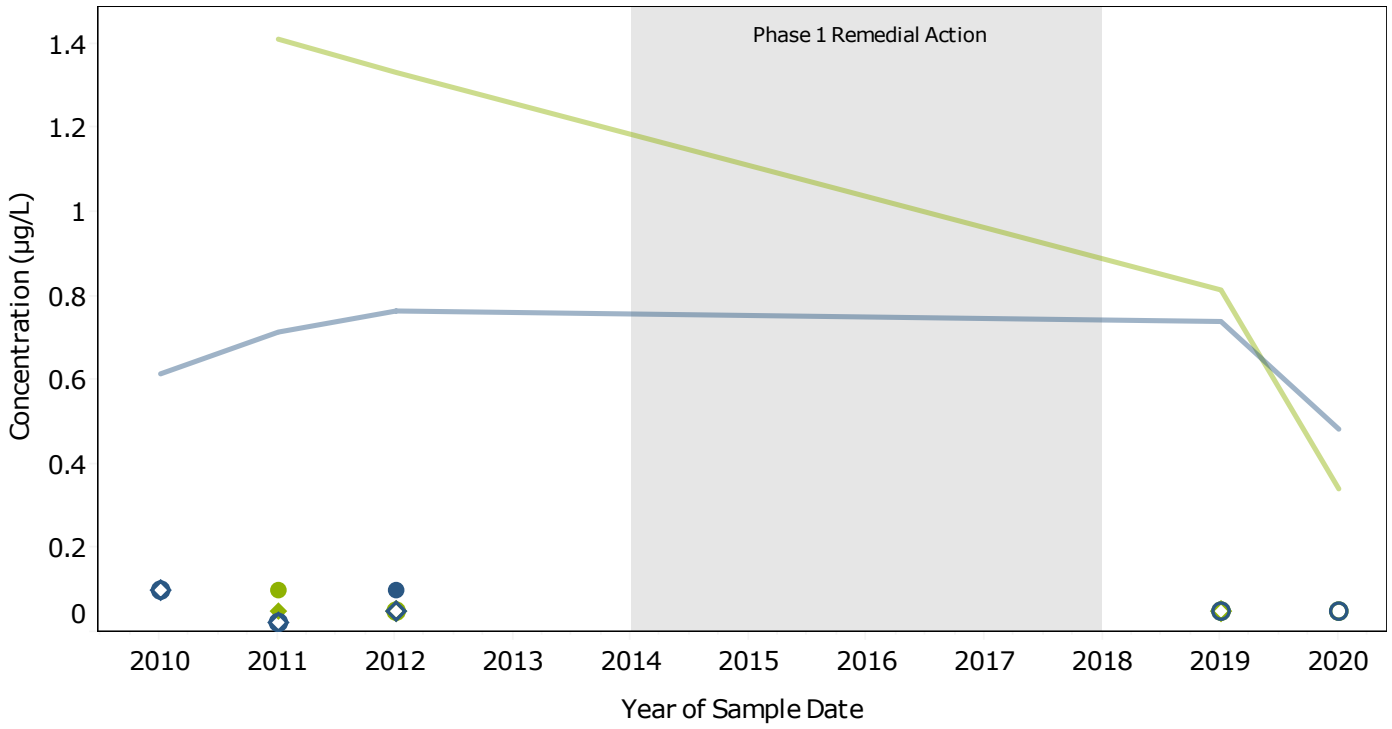
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

- Hardness-adjusted surface water criteria based on spring data
- Hardness-adjusted surface water criteria based on fall data

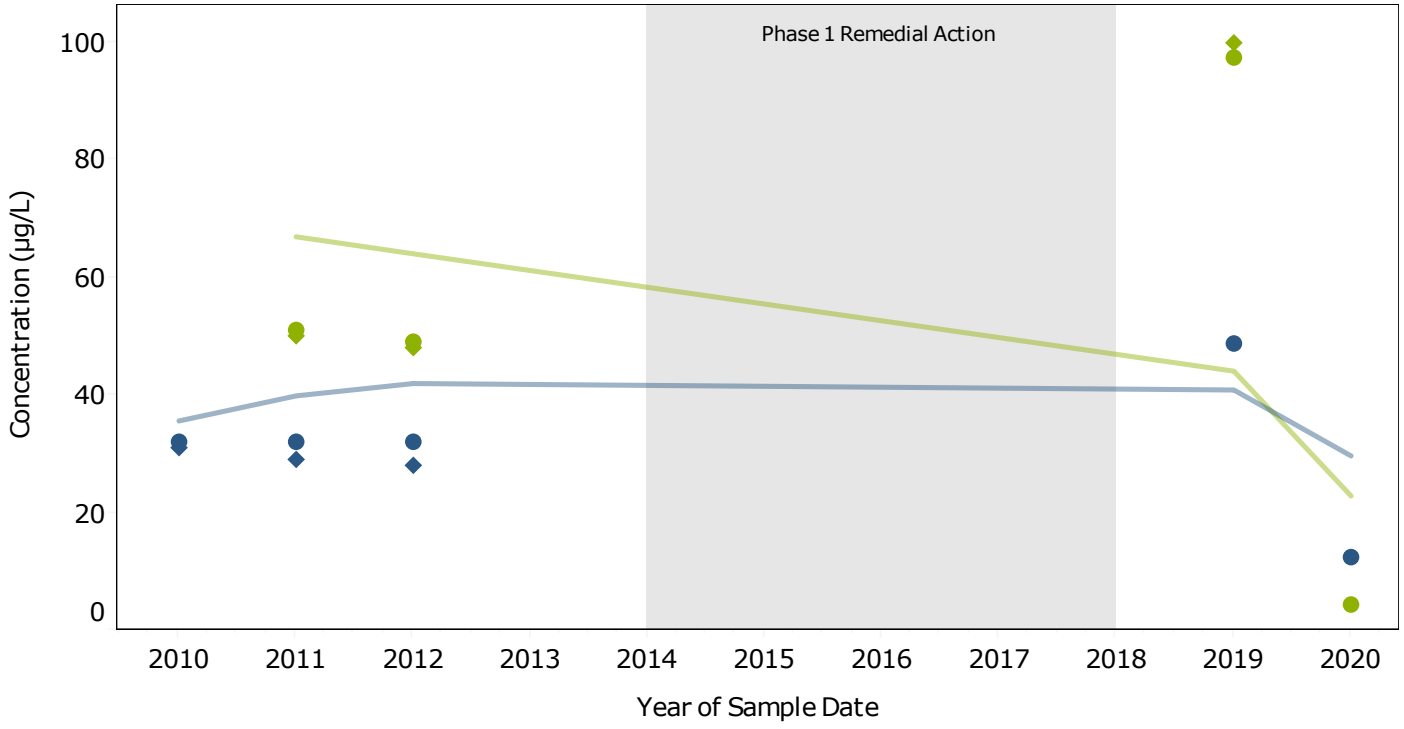
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

SG-9-WP-36, Lead



SG-9-WP-36, Zinc



Legend

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

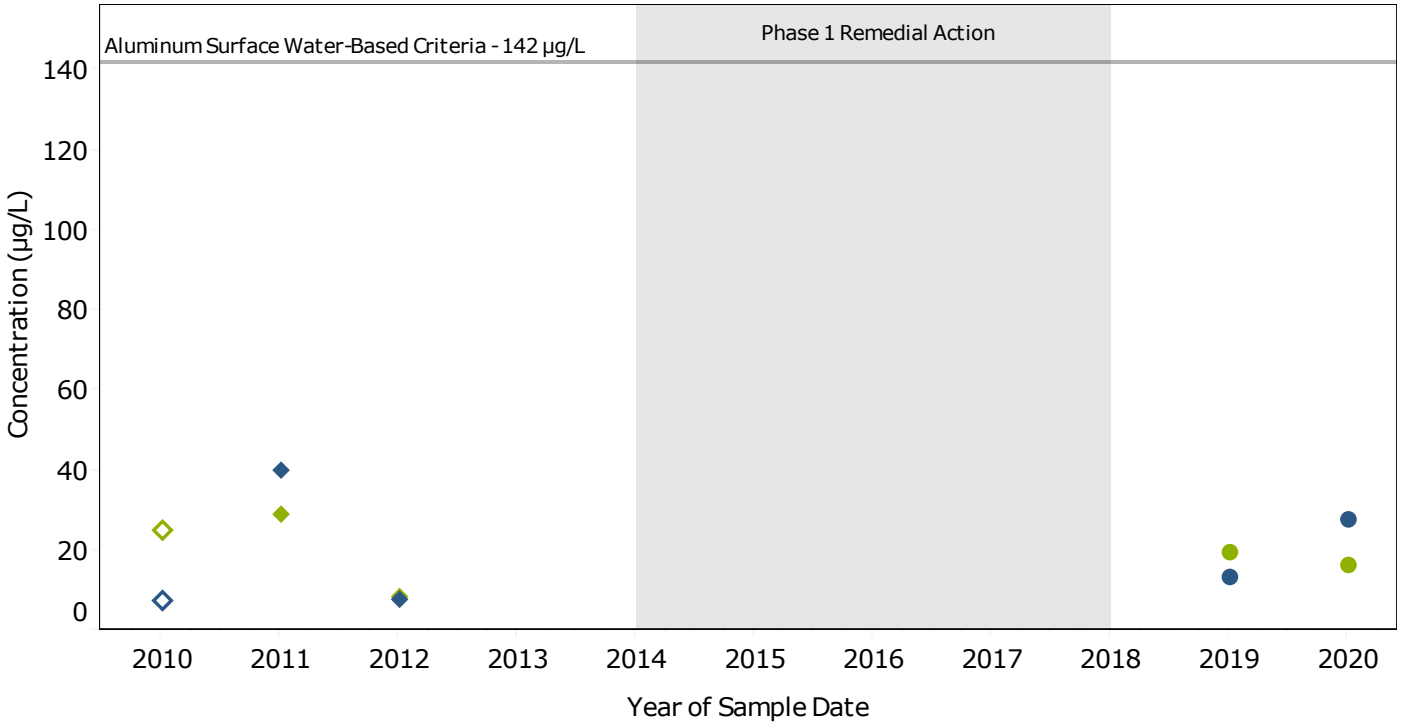
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

- Hardness-adjusted surface water criteria based on spring data
- Hardness-adjusted surface water criteria based on fall data

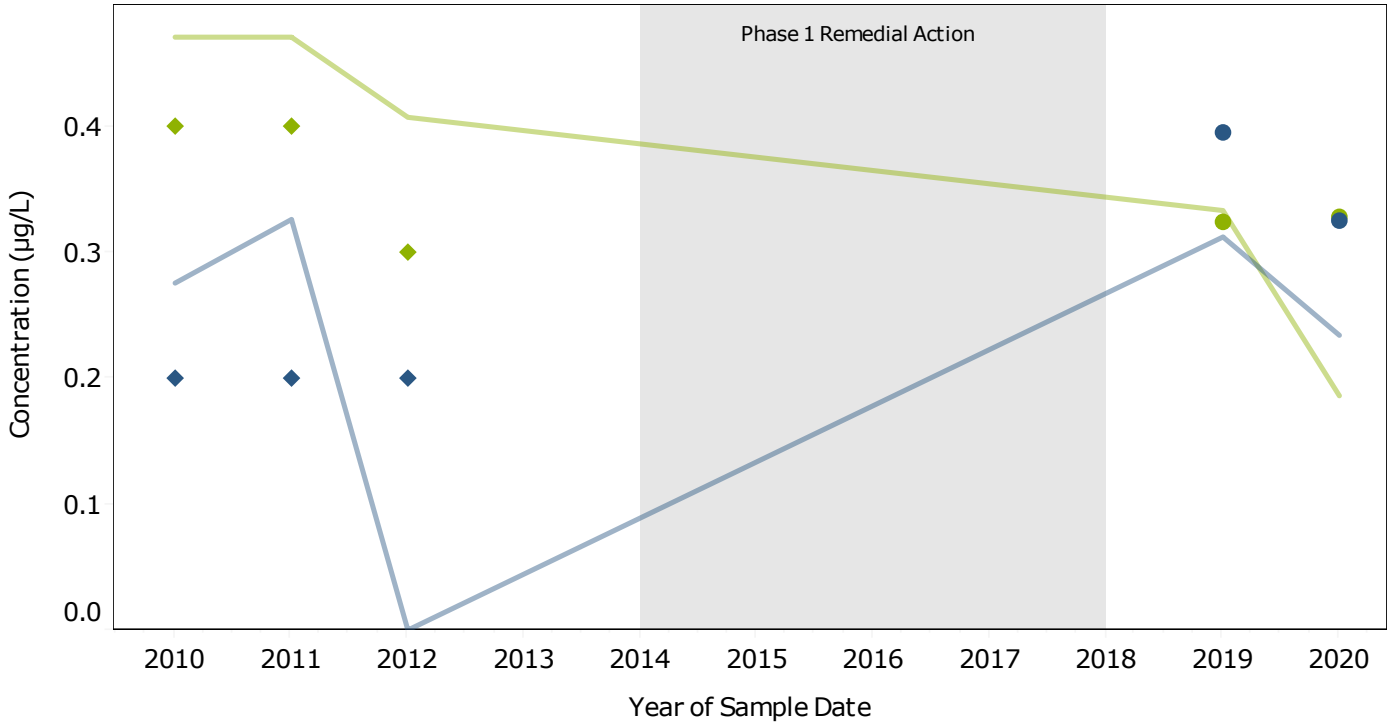
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

SG-9-WP, Aluminum



SG-9-WP, Cadmium



Legend

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

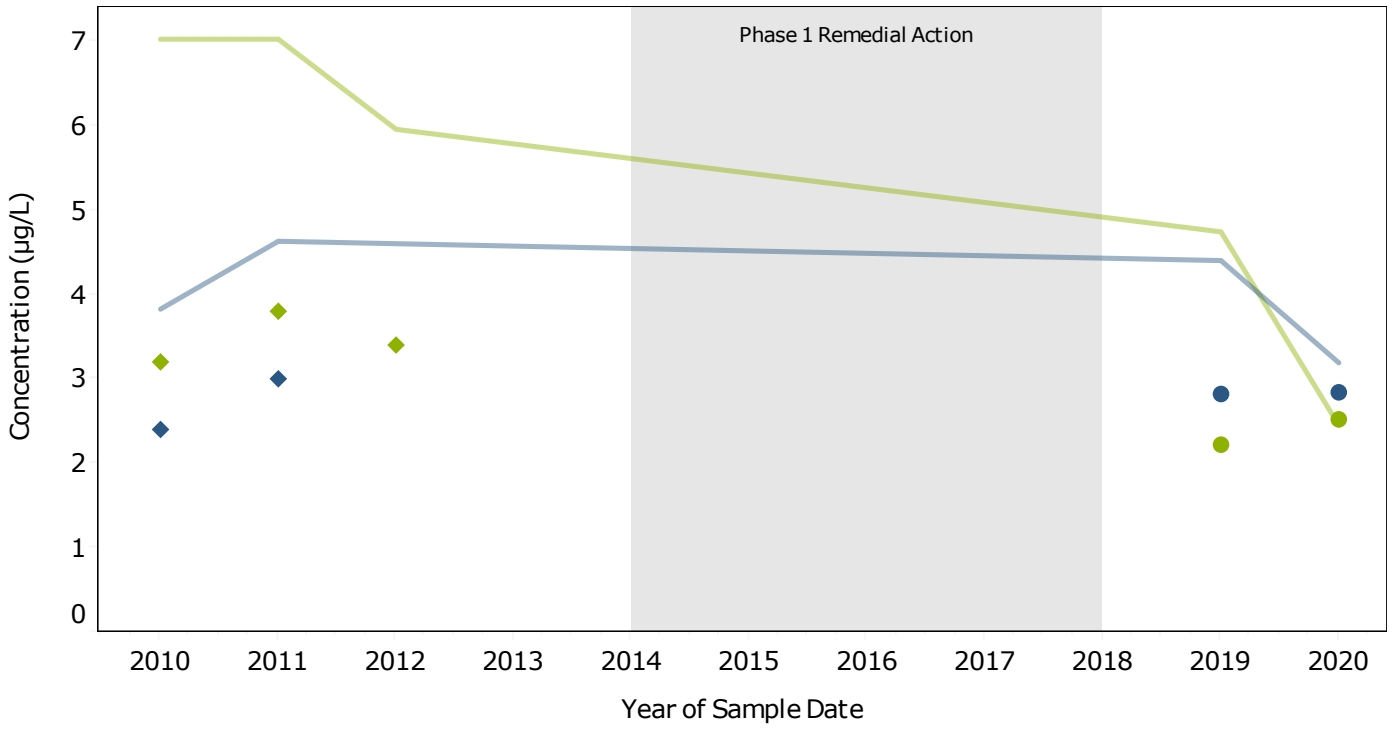
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

- Hardness-adjusted surface water criteria based on spring data
- Hardness-adjusted surface water criteria based on fall data

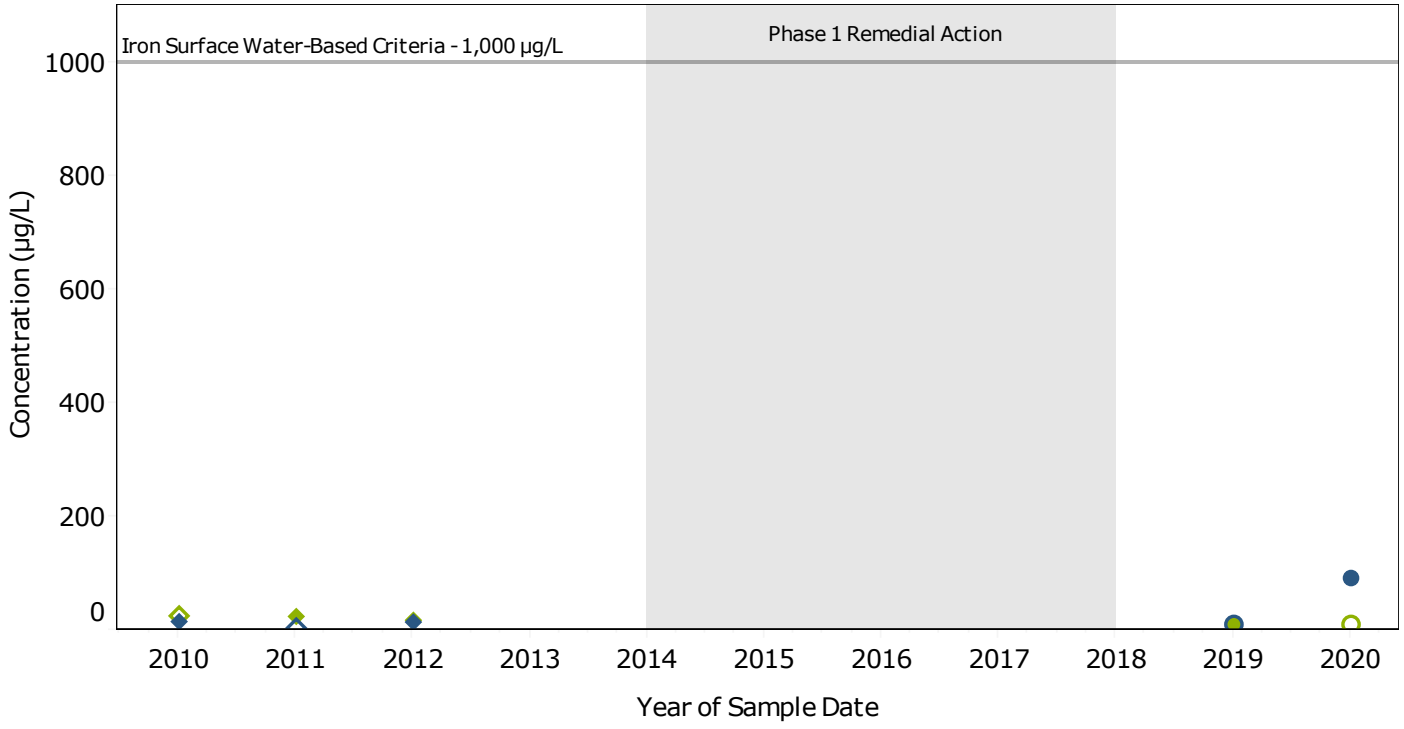
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

SG-9-WP, Copper



SG-9-WP, Iron



Legend

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

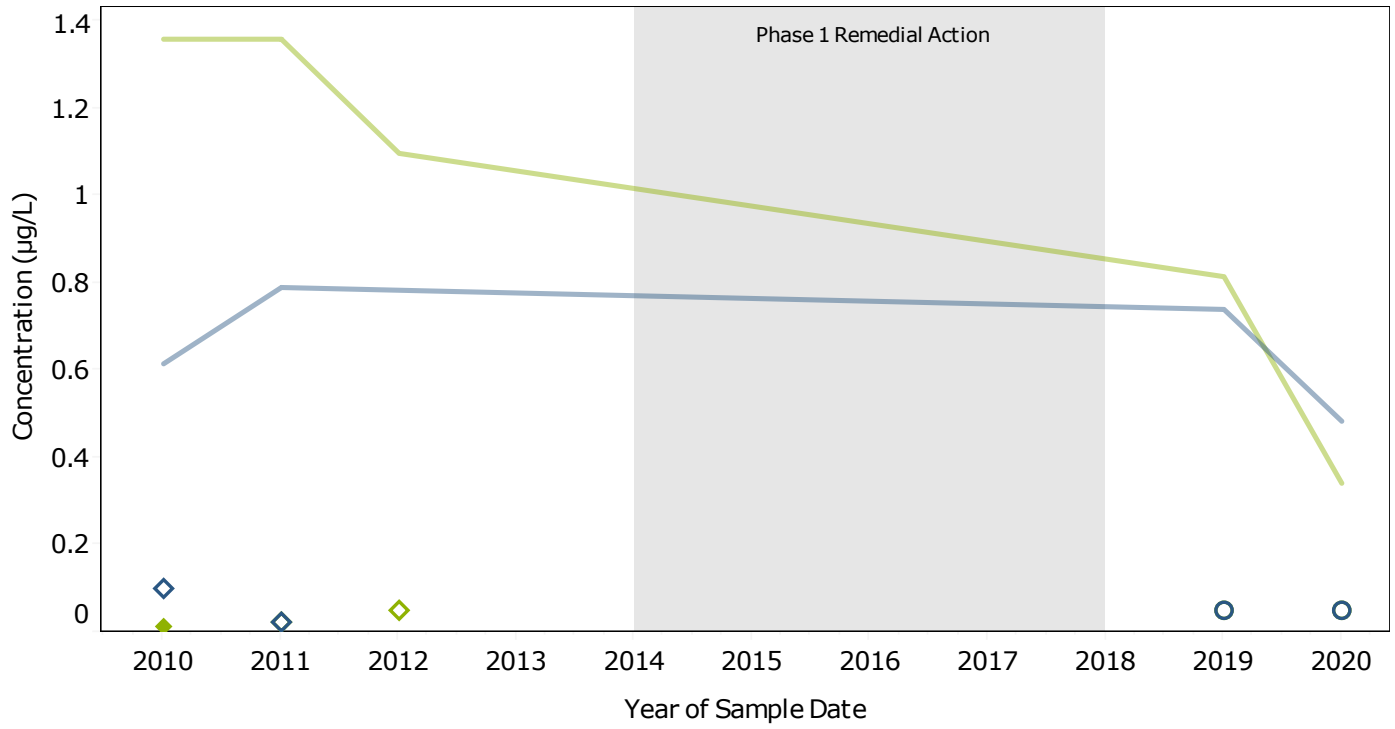
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

- Hardness-adjusted surface water criteria based on spring data
- Hardness-adjusted surface water criteria based on fall data

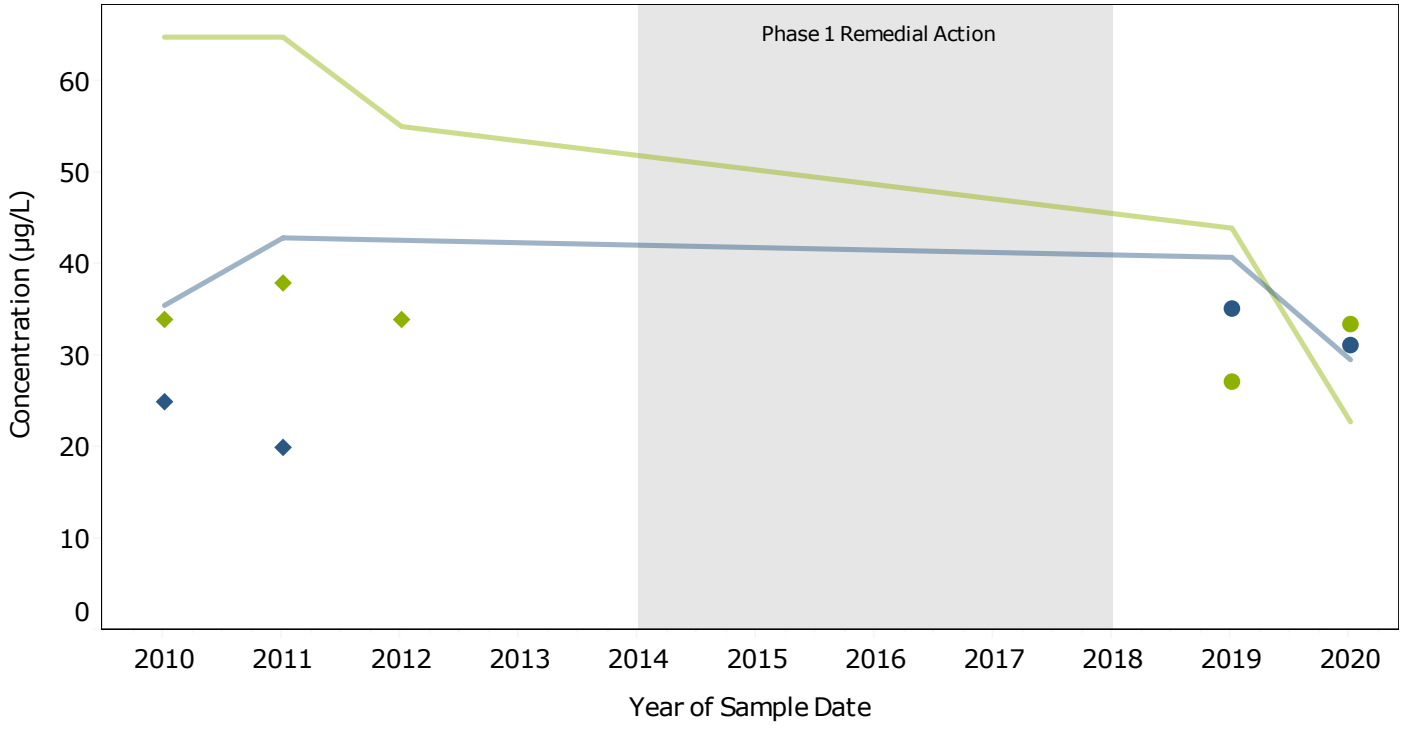
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

SG-9-WP, Lead



SG-9-WP, Zinc



Legend

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

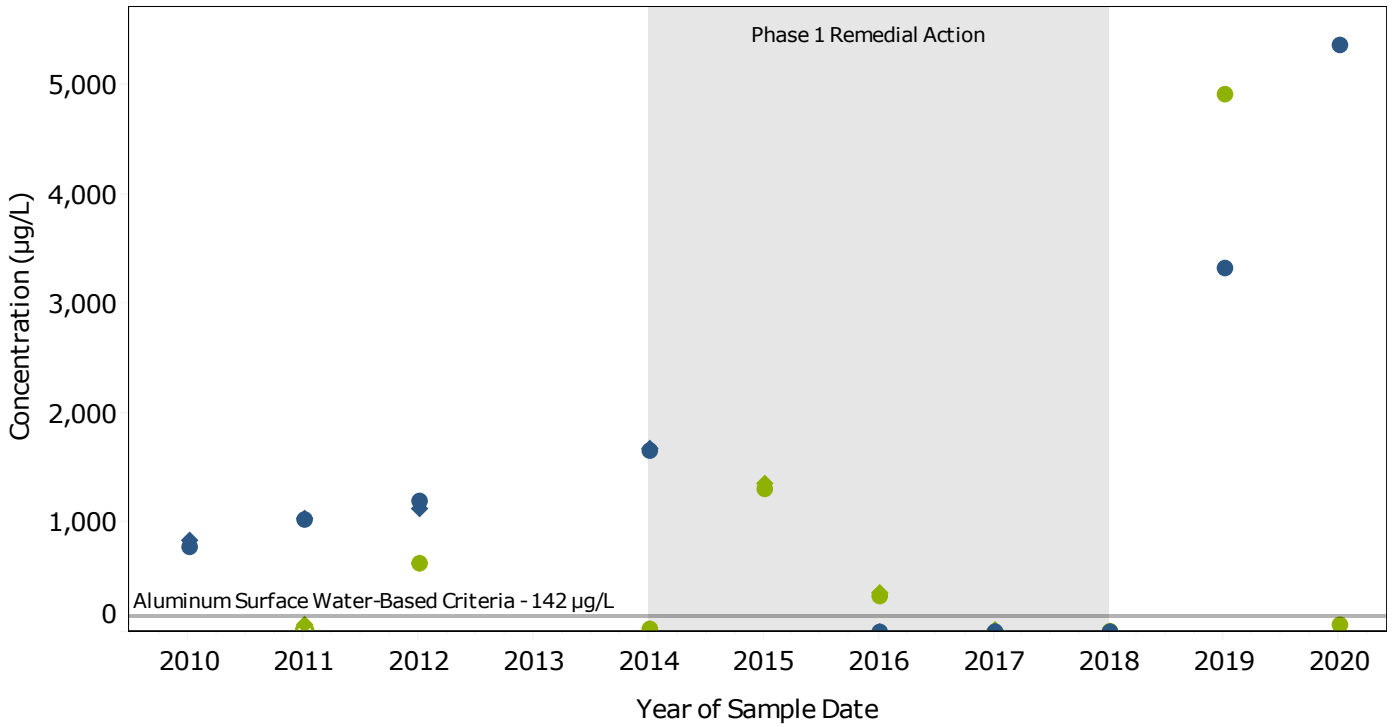
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

- Hardness-adjusted surface water criteria based on spring data
- Hardness-adjusted surface water criteria based on fall data

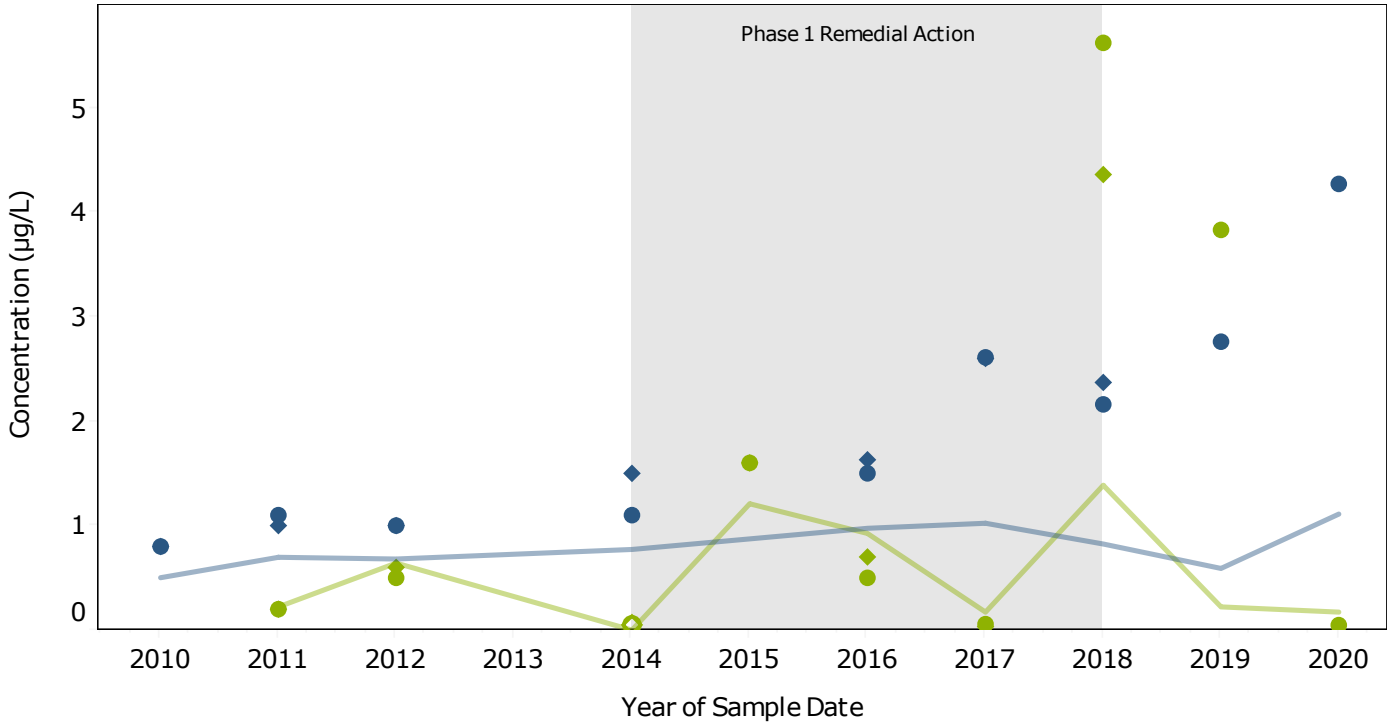
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

SG-10-PW-6, Aluminum



SG-10-PW-6, Cadmium



Legend

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

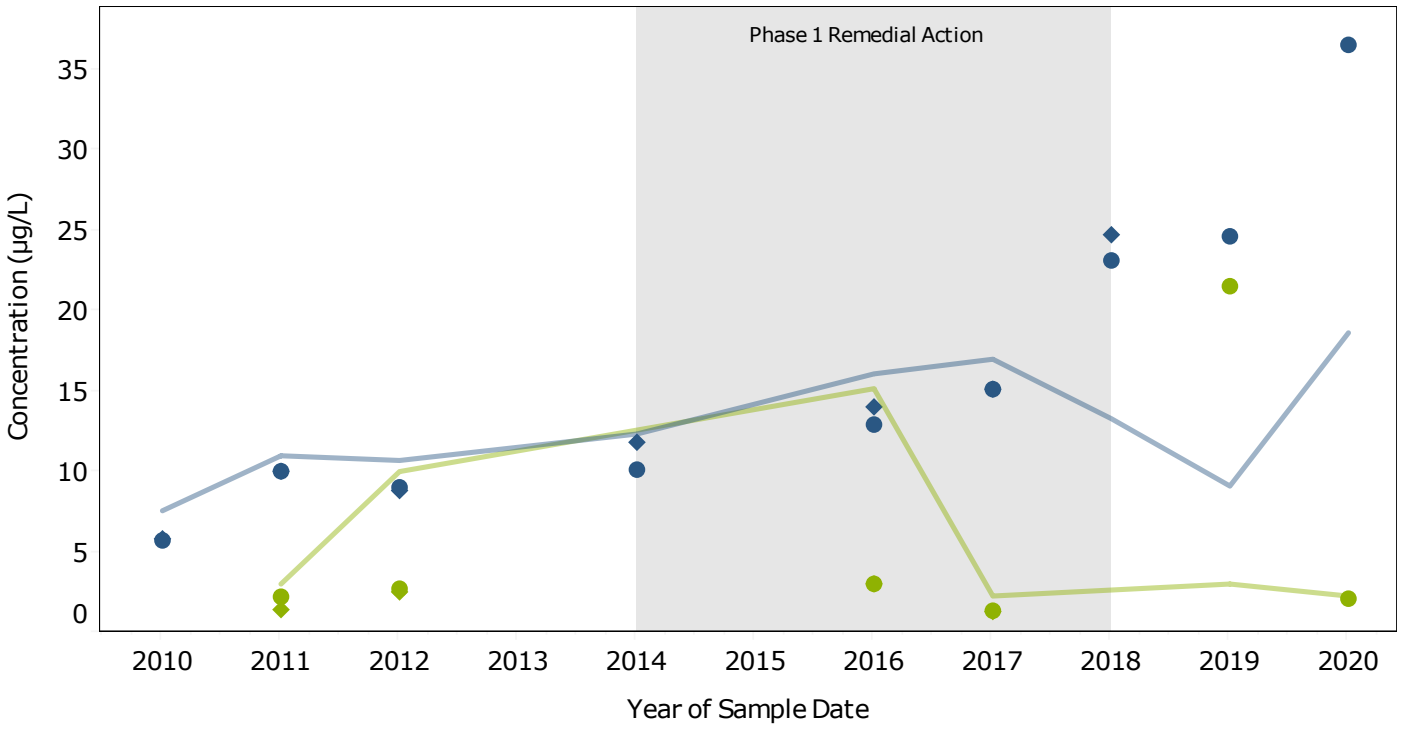
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

- Hardness-adjusted surface water criteria based on spring data
- Hardness-adjusted surface water criteria based on fall data

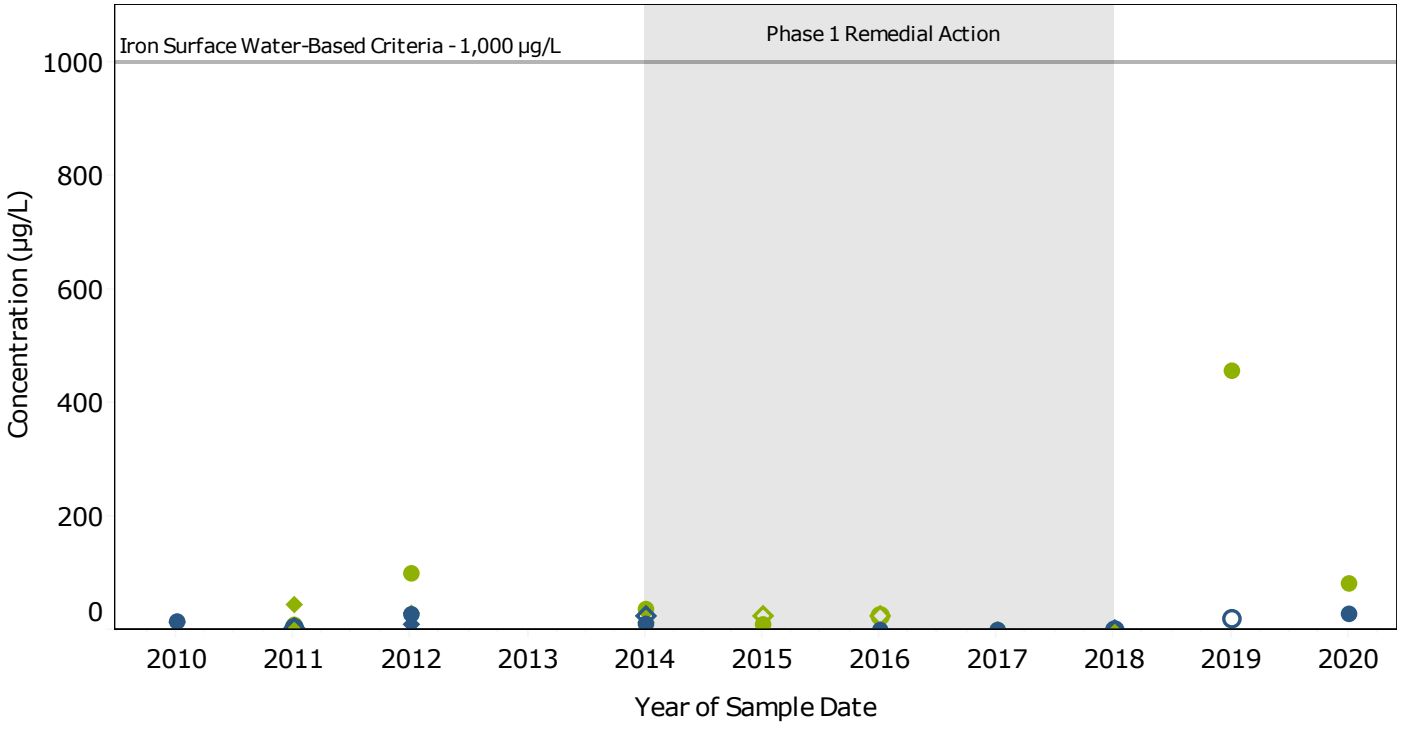
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

SG-10-PW-6, Copper



SG-10-PW-6, Iron



Legend

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

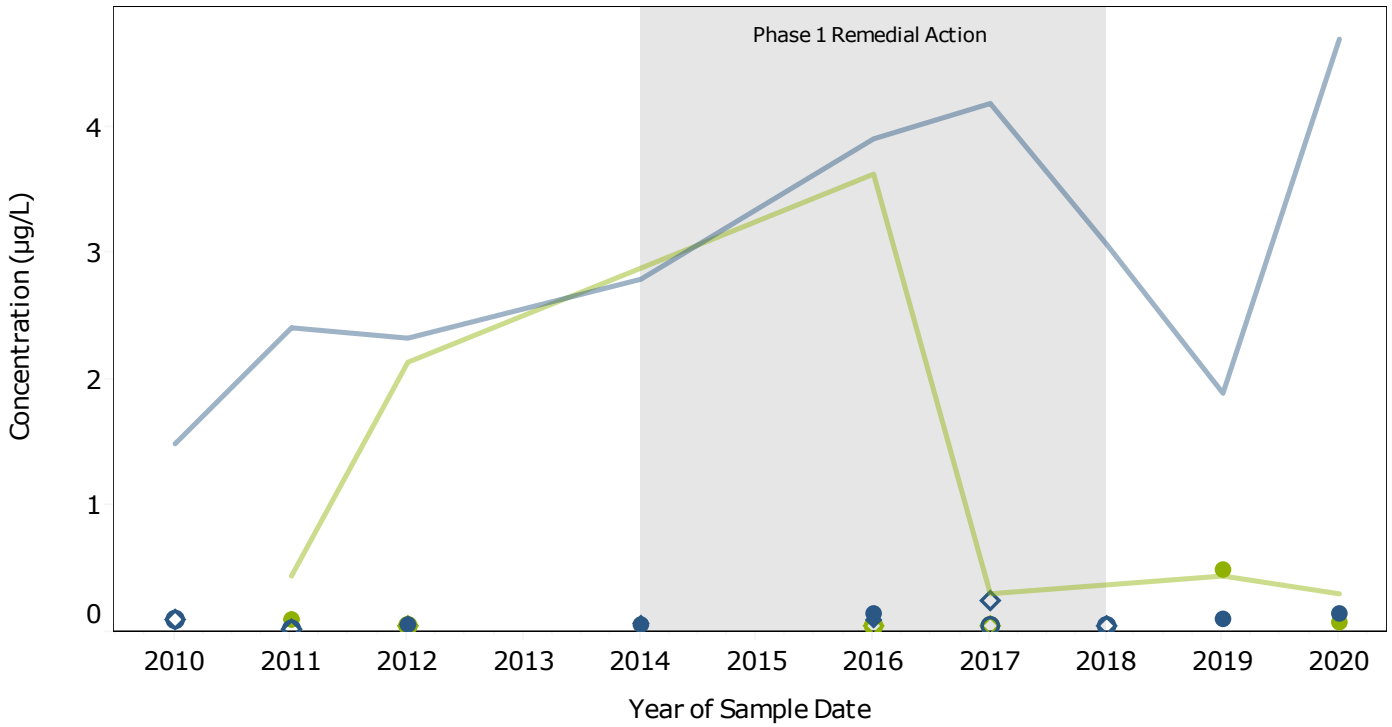
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

- Hardness-adjusted surface water criteria based on spring data
- Hardness-adjusted surface water criteria based on fall data

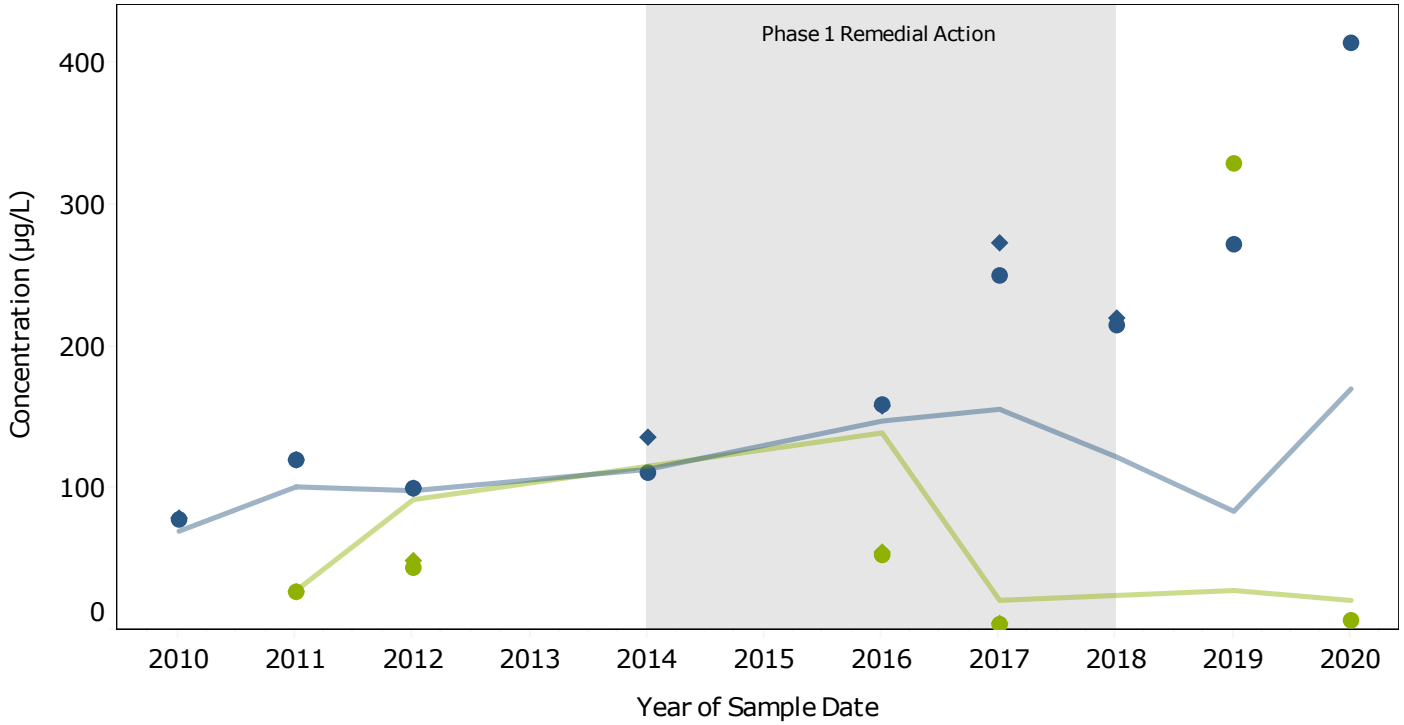
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

SG-10-PW-6, Lead



SG-10-PW-6, Zinc



Legend

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

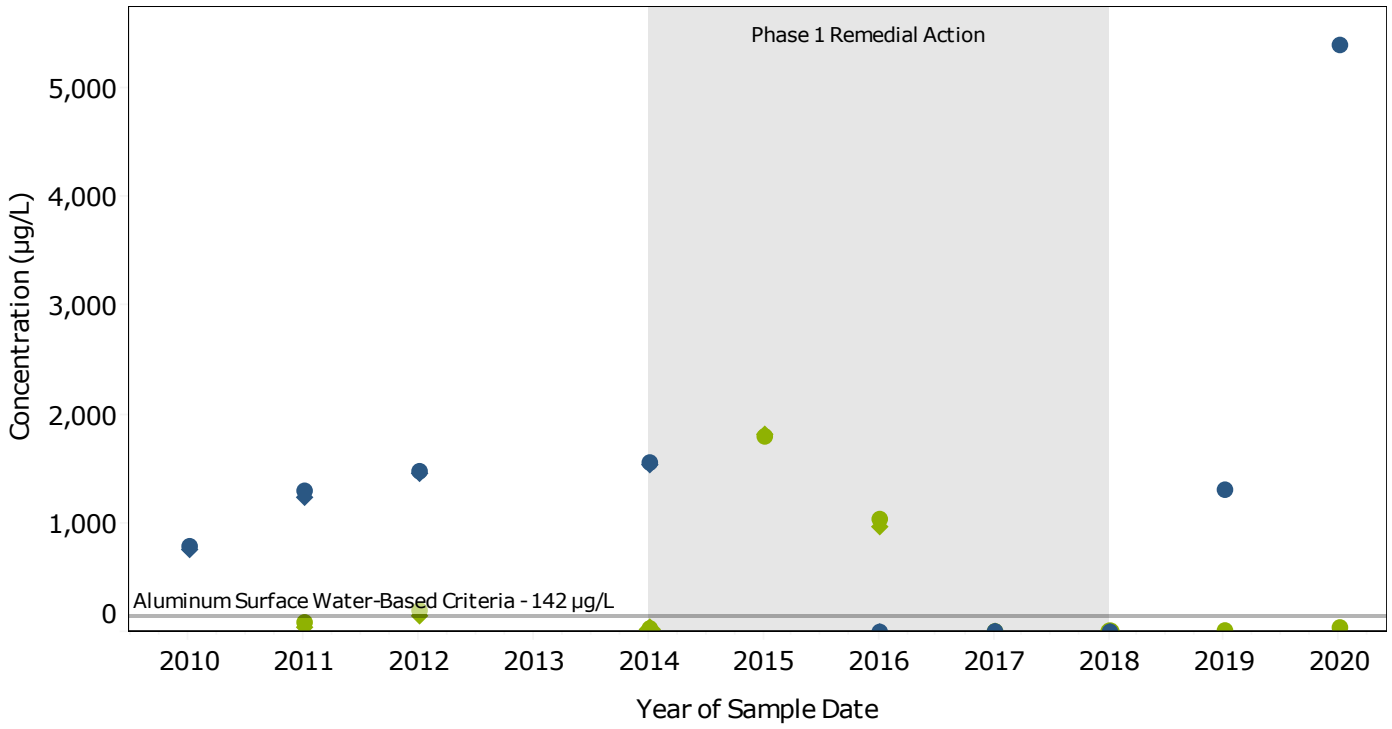
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

- Hardness-adjusted surface water criteria based on spring data
- Hardness-adjusted surface water criteria based on fall data

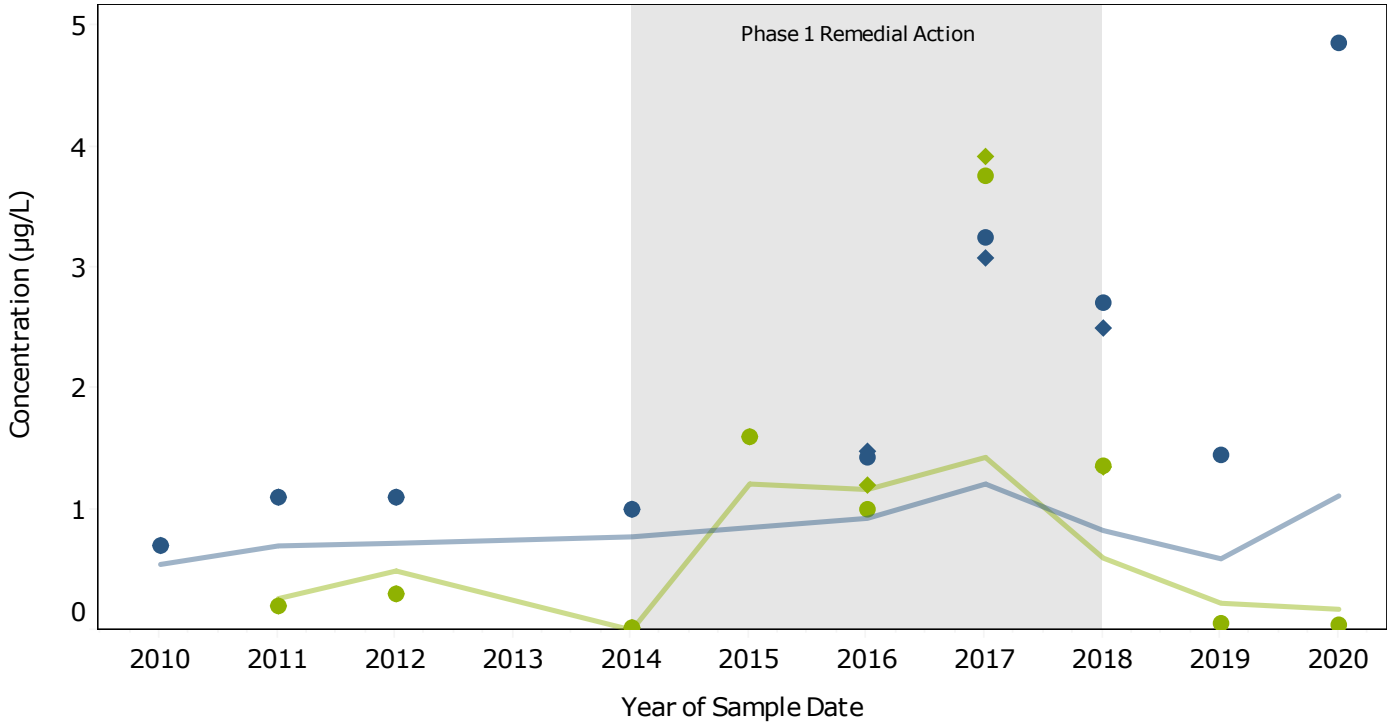
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

SG-10-PW-12, Aluminum



SG-10-PW-12, Cadmium



Legend

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

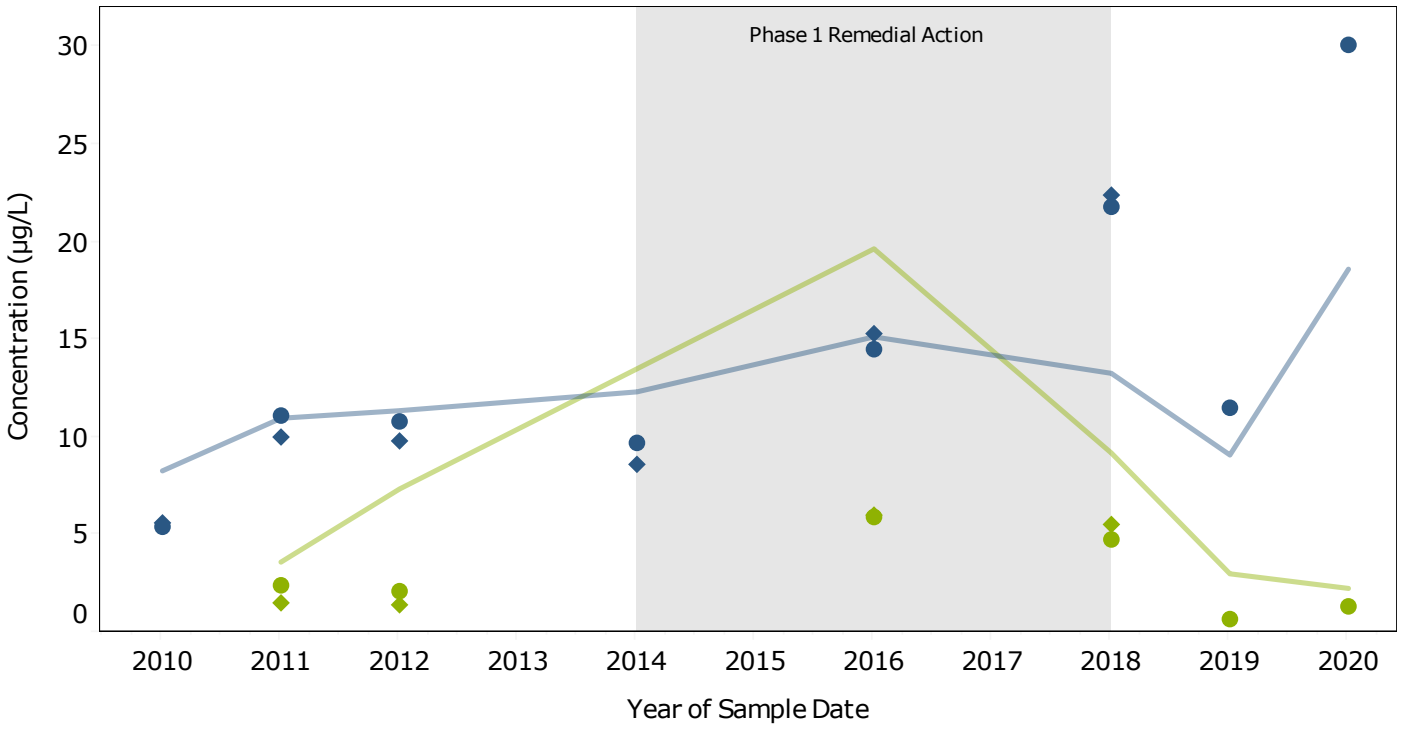
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

- Hardness-adjusted surface water criteria based on spring data
- Hardness-adjusted surface water criteria based on fall data

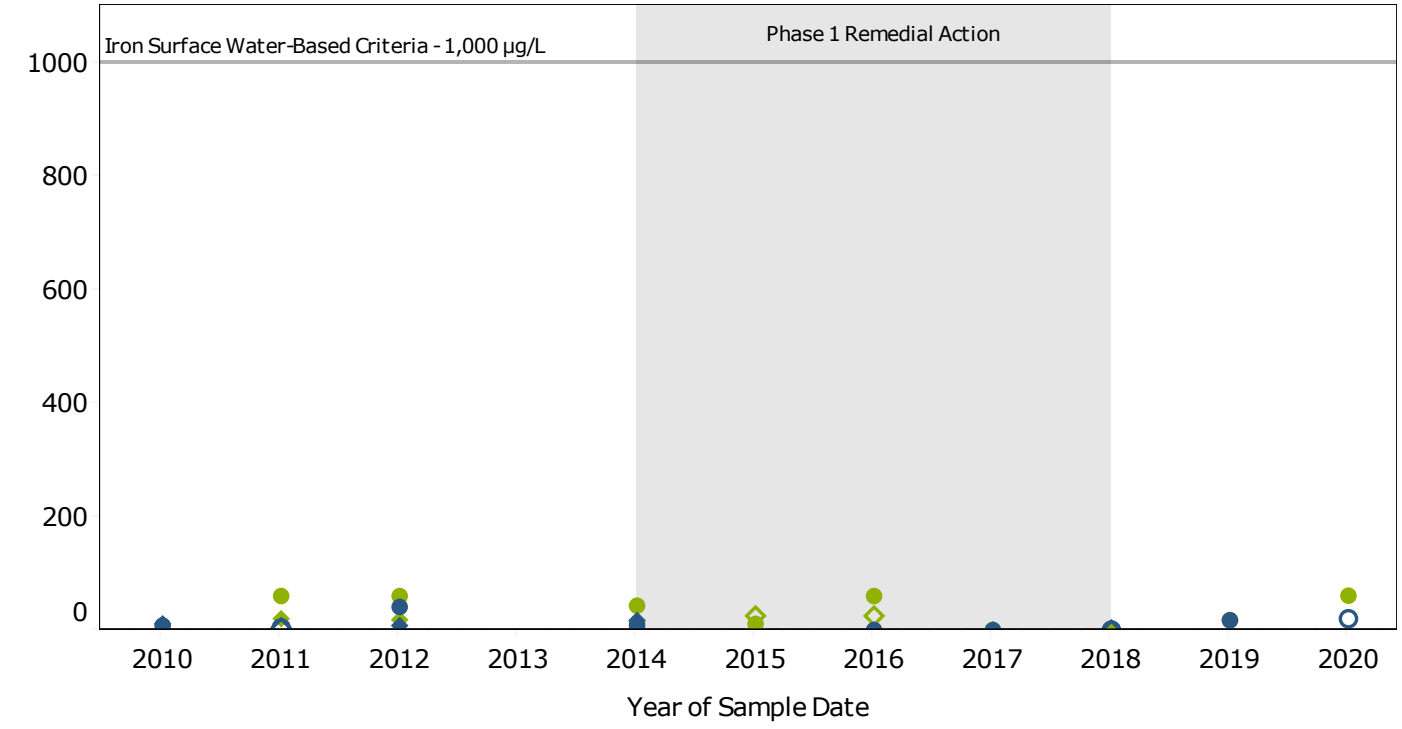
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

SG-10-PW-12, Copper



SG-10-PW-12, Iron



Legend

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

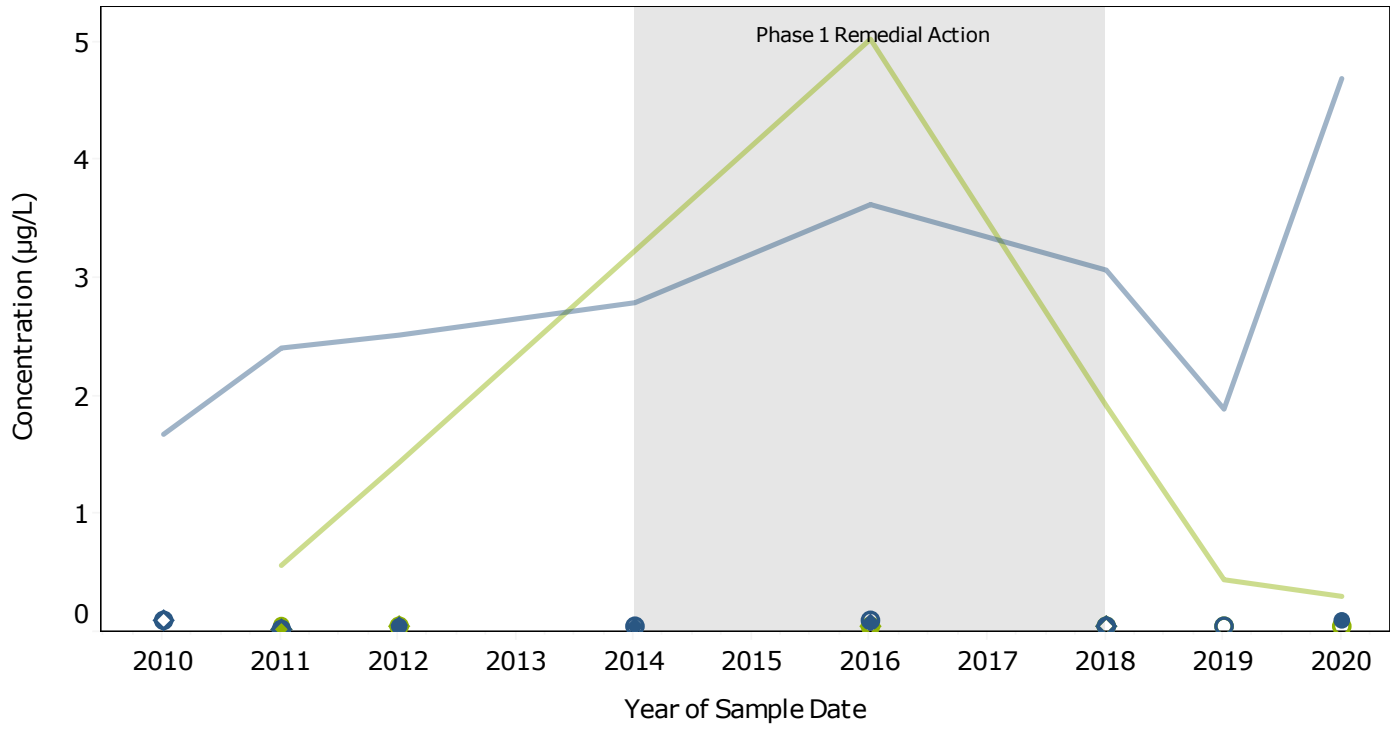
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

- Hardness-adjusted surface water criteria based on spring data
- Hardness-adjusted surface water criteria based on fall data

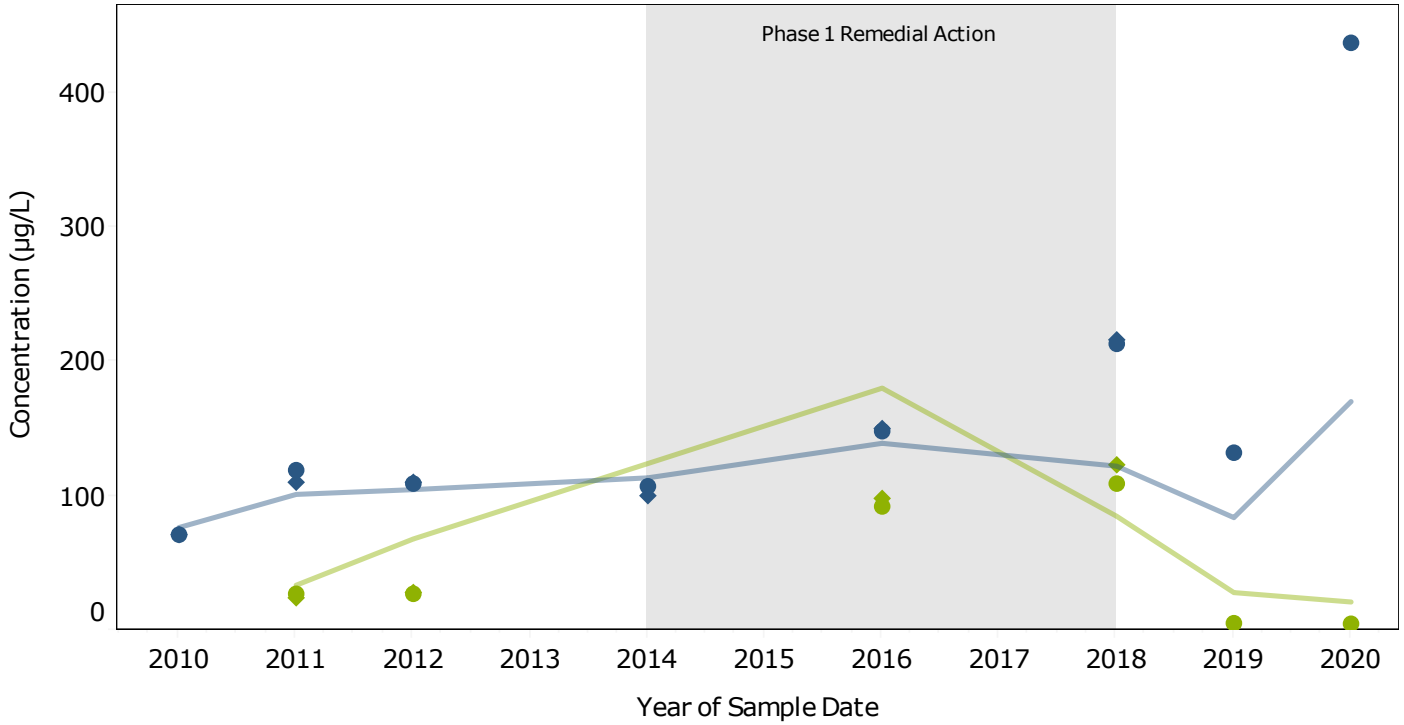
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

SG-10-PW-12, Lead



SG-10-PW-12, Zinc



Legend

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

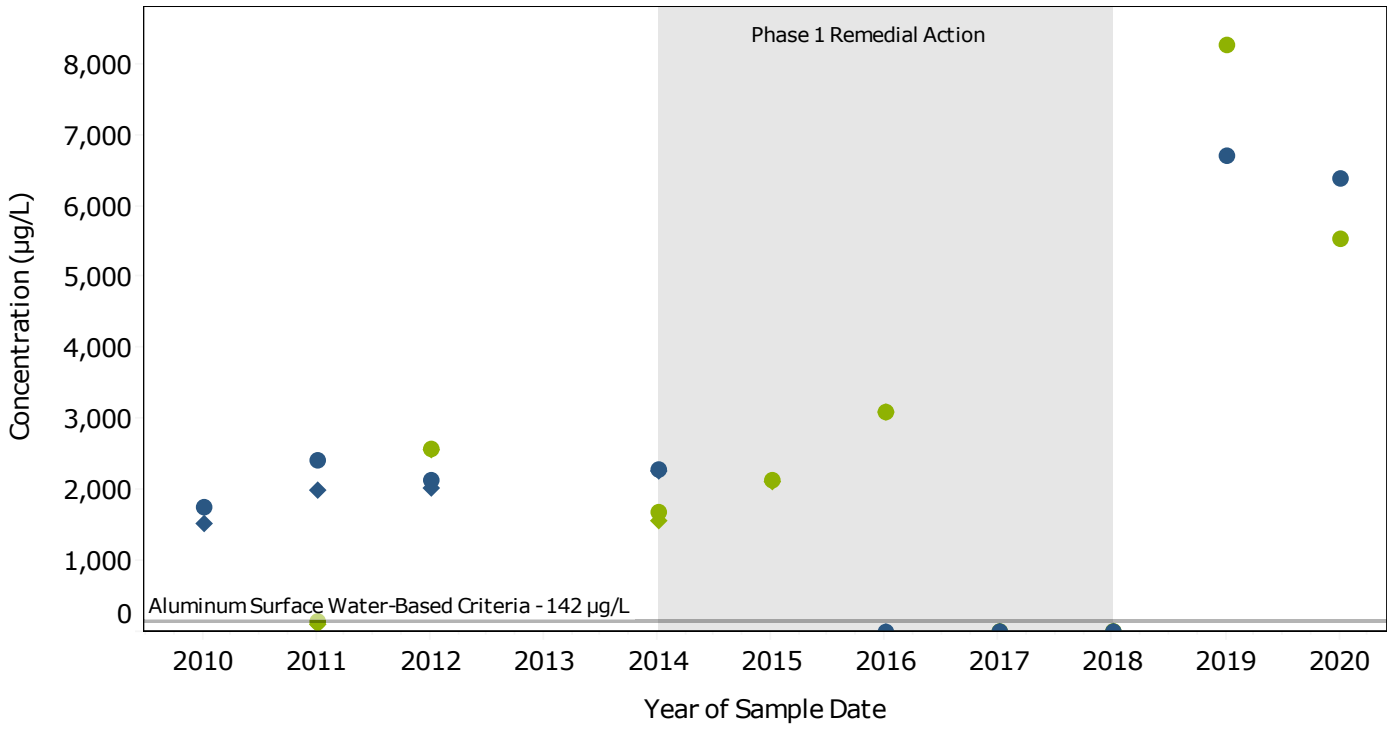
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

- Hardness-adjusted surface water criteria based on spring data
- Hardness-adjusted surface water criteria based on fall data

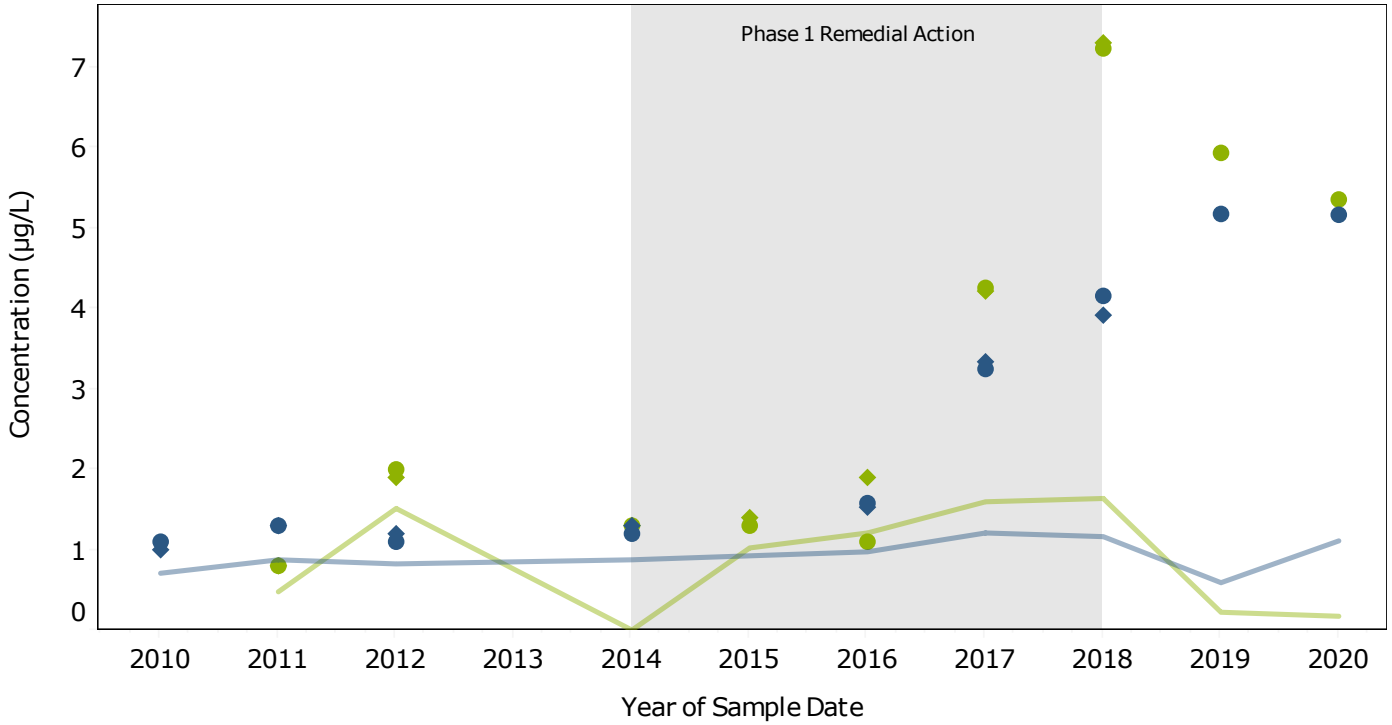
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

SG-10-WP-36, Aluminum



SG-10-WP-36, Cadmium



Legend

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

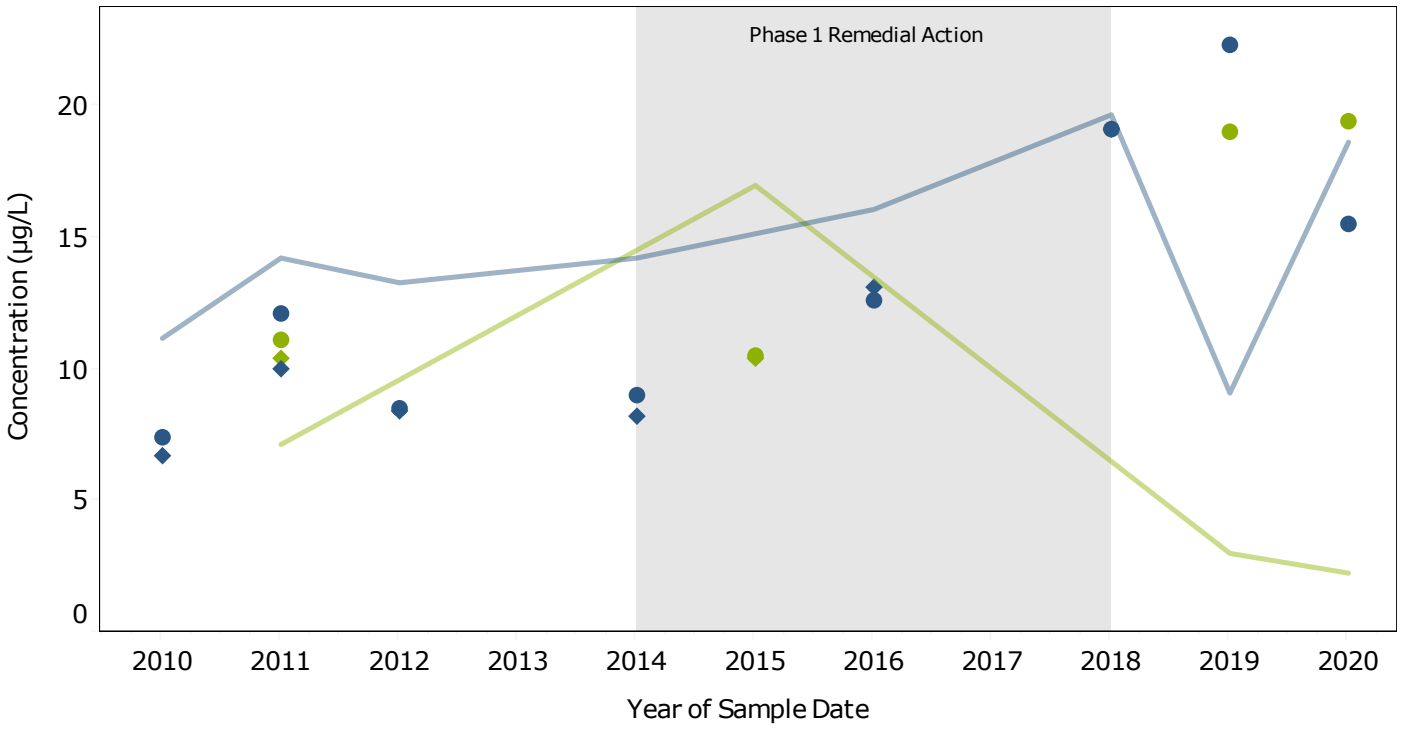
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

- Hardness-adjusted surface water criteria based on spring data
- Hardness-adjusted surface water criteria based on fall data

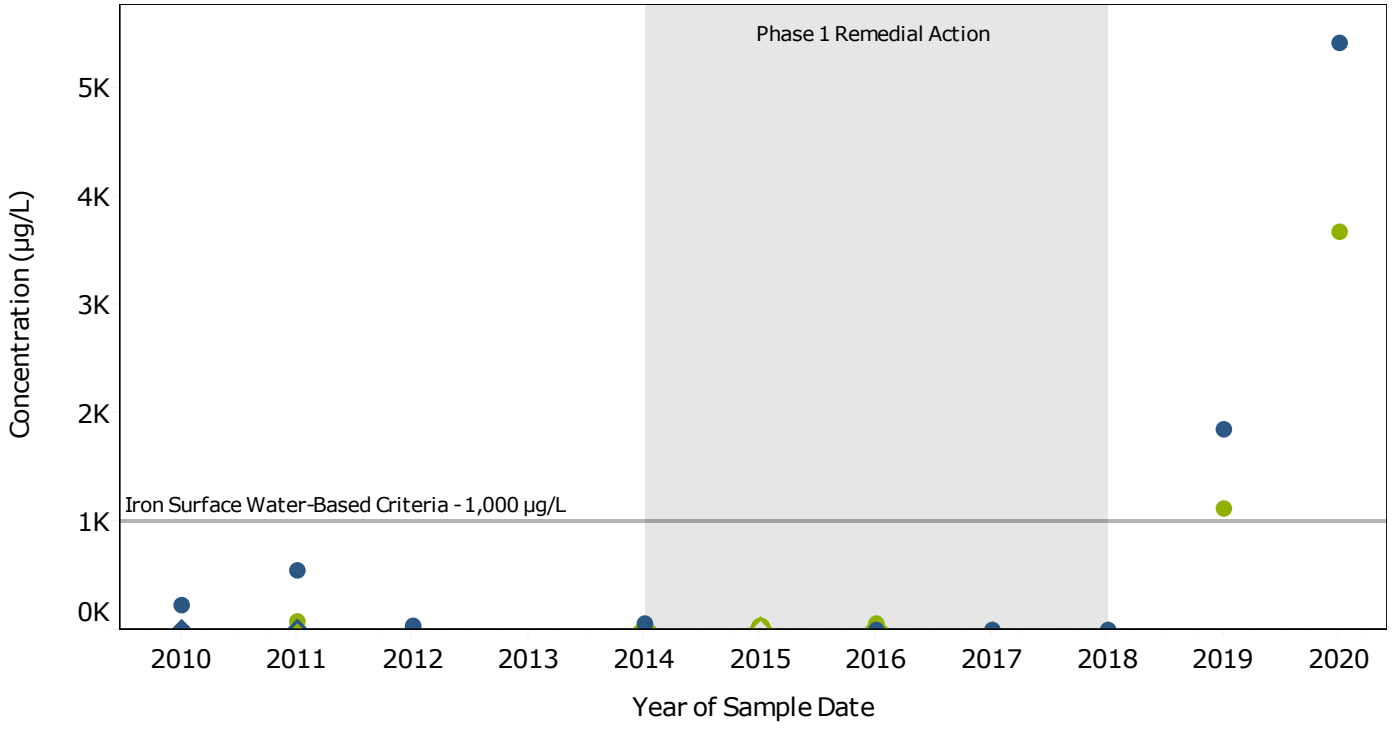
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

SG-10-WP-36, Copper



SG-10-WP-36, Iron



Legend

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

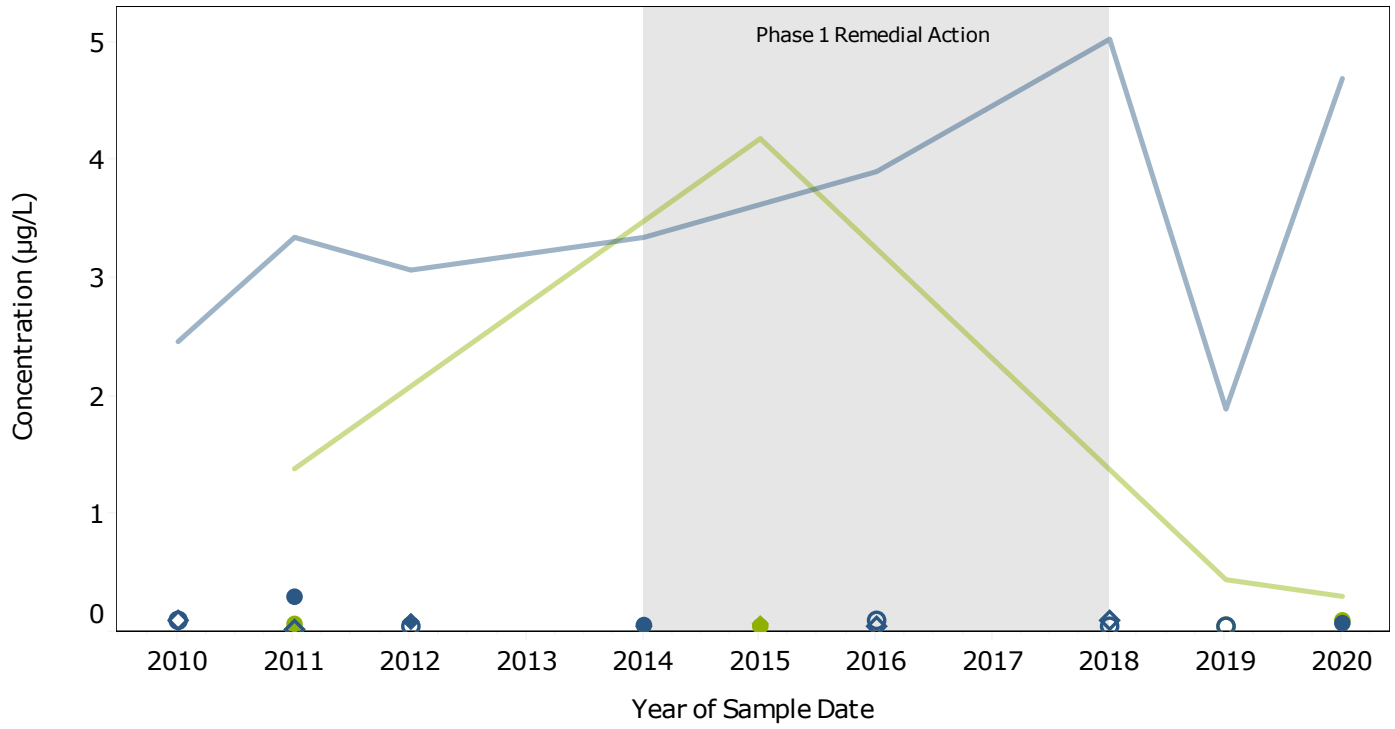
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

- Hardness-adjusted surface water criteria based on spring data
- Hardness-adjusted surface water criteria based on fall data

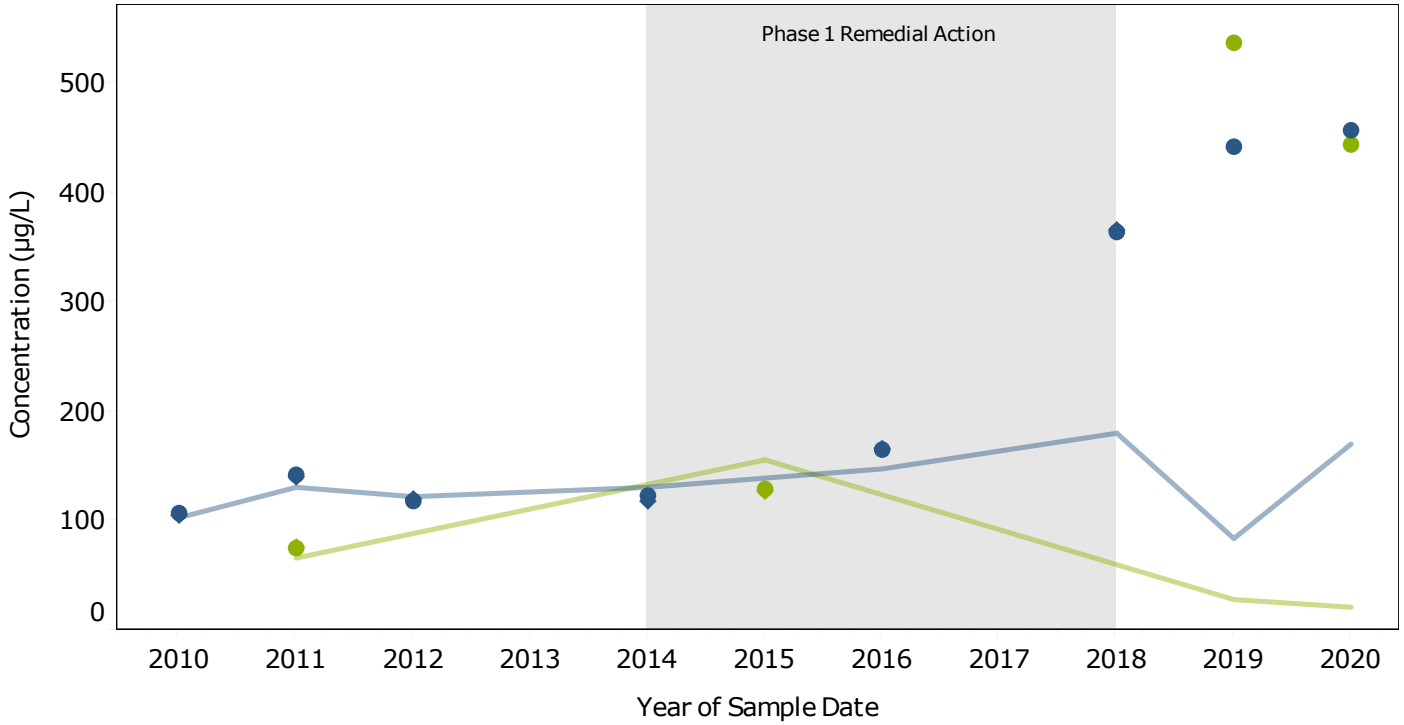
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

SG-10-WP-36, Lead



SG-10-WP-36, Zinc



Legend

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

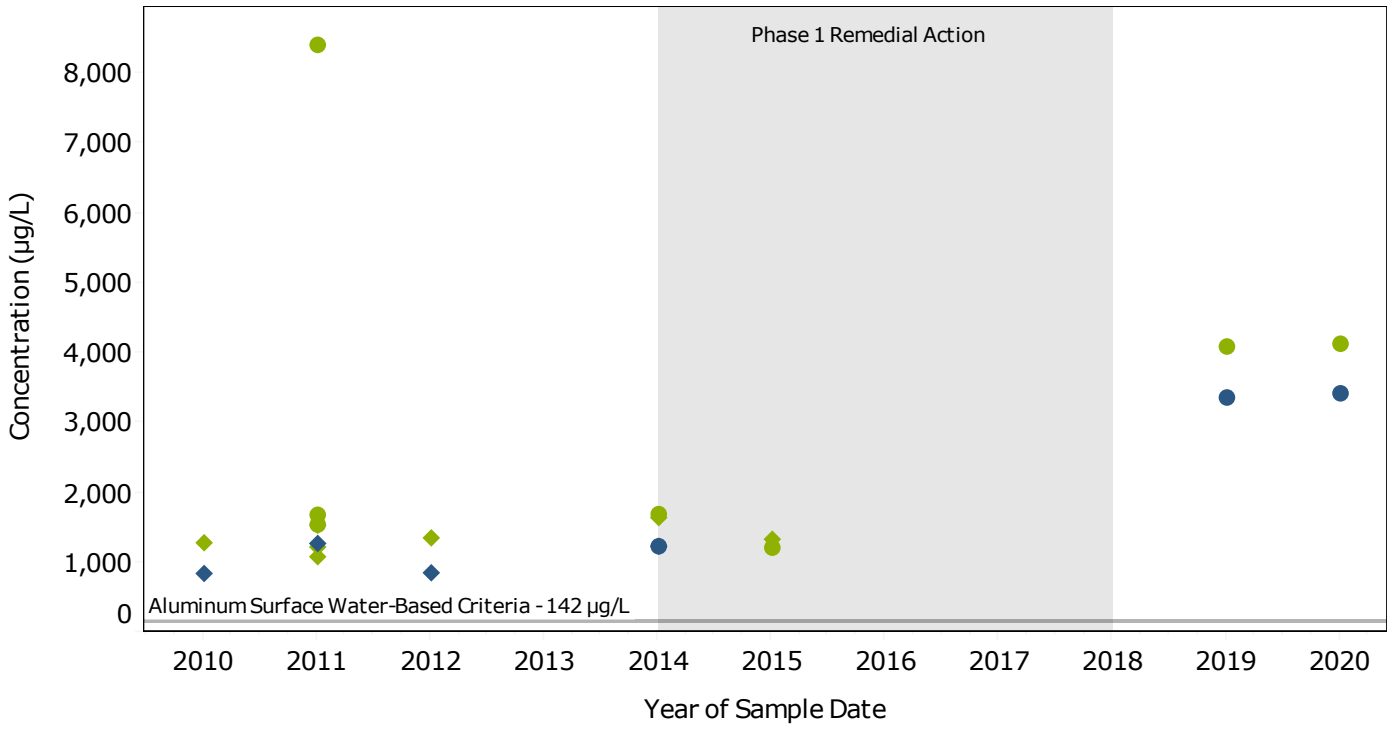
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

- Hardness-adjusted surface water criteria based on spring data
- Hardness-adjusted surface water criteria based on fall data

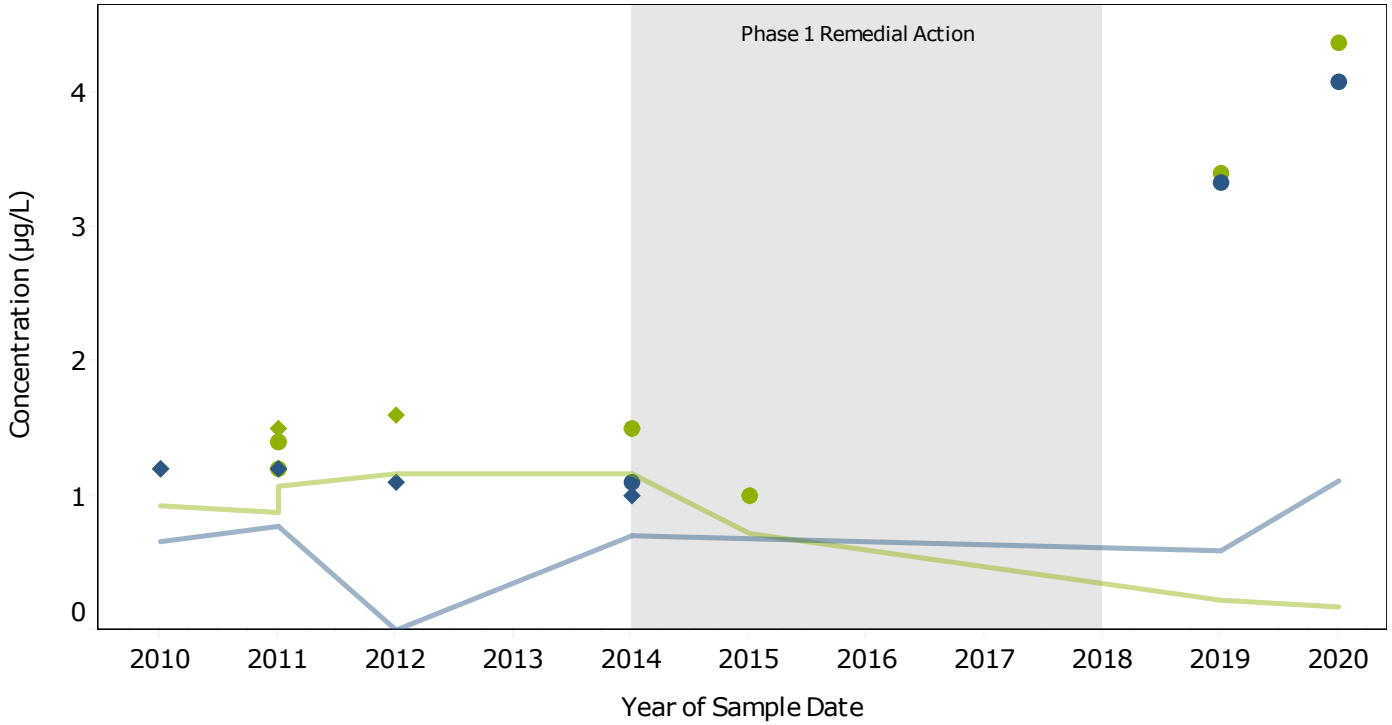
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

SG-10-WP, Aluminum



SG-10-WP, Cadmium



Legend

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

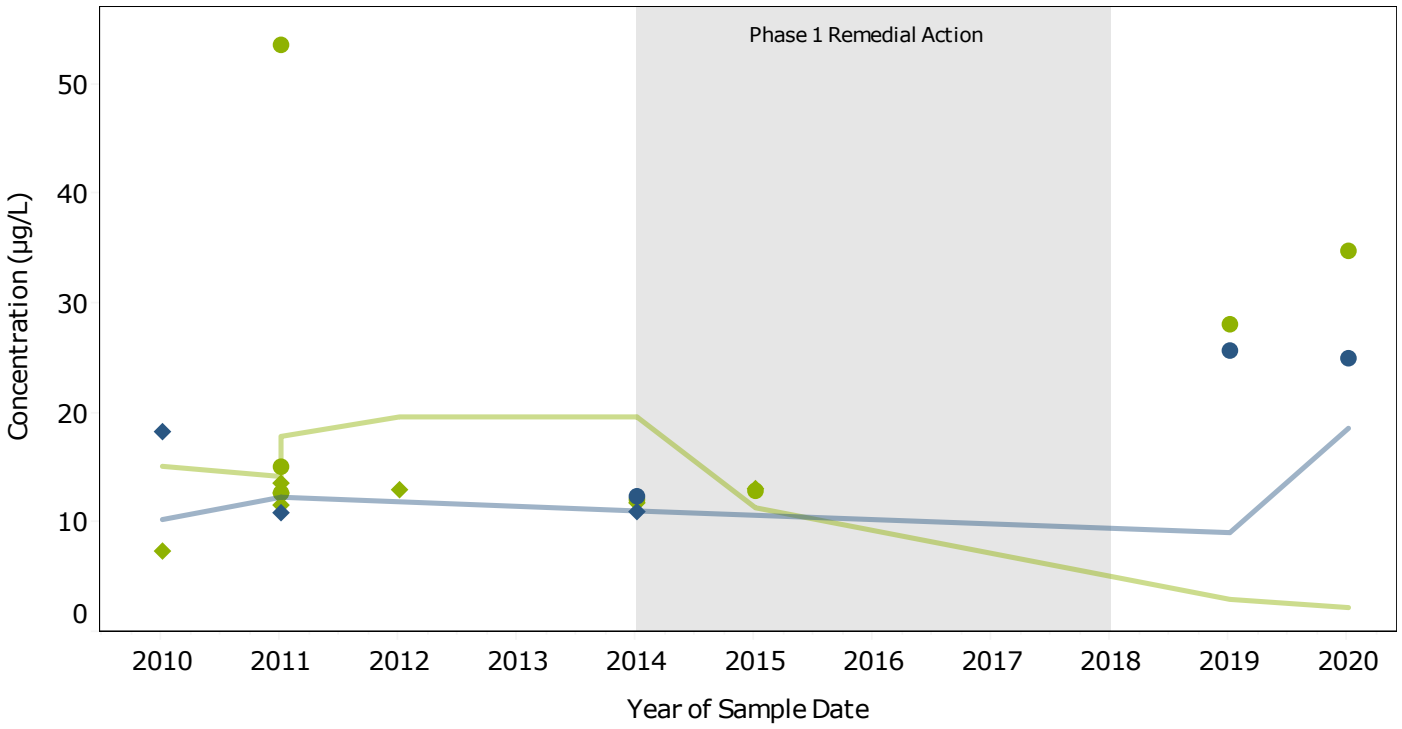
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

- Hardness-adjusted surface water criteria based on spring data
- Hardness-adjusted surface water criteria based on fall data

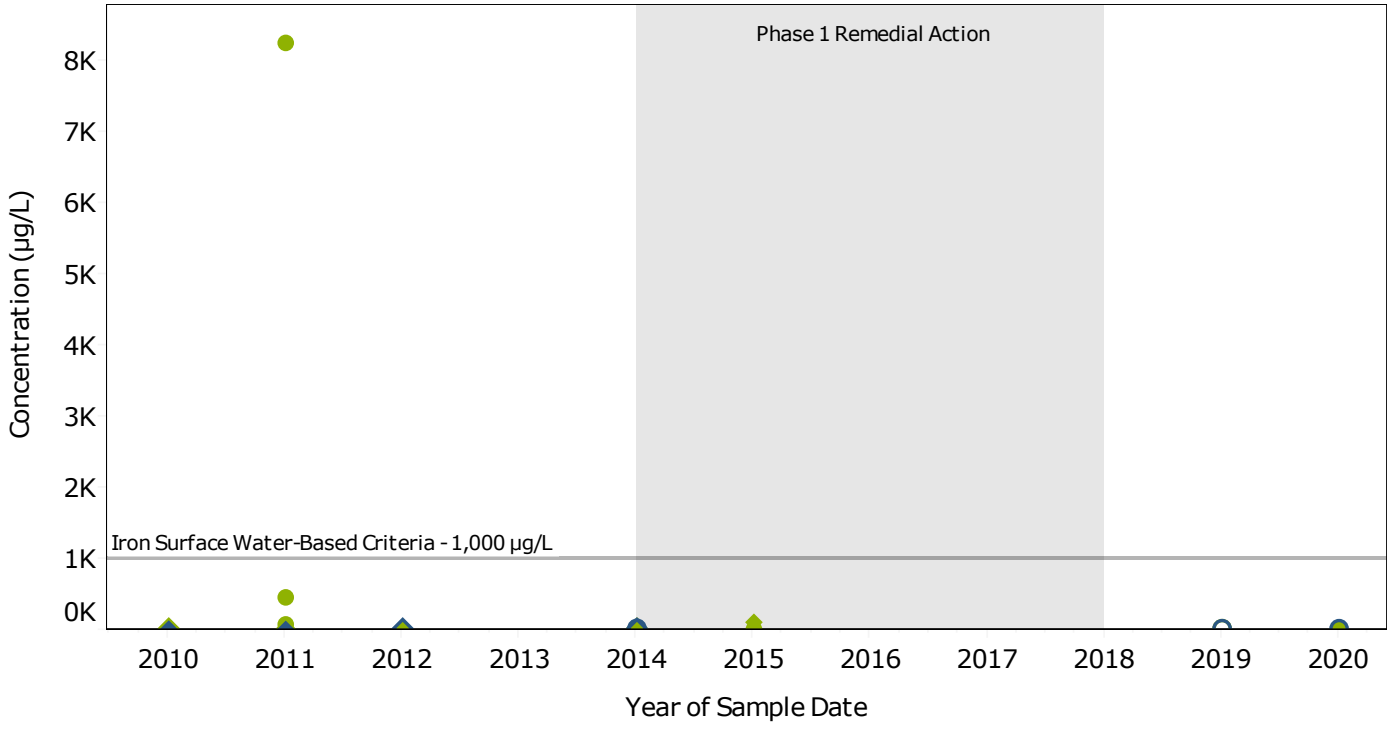
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

SG-10-WP, Copper



SG-10-WP, Iron



Legend

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

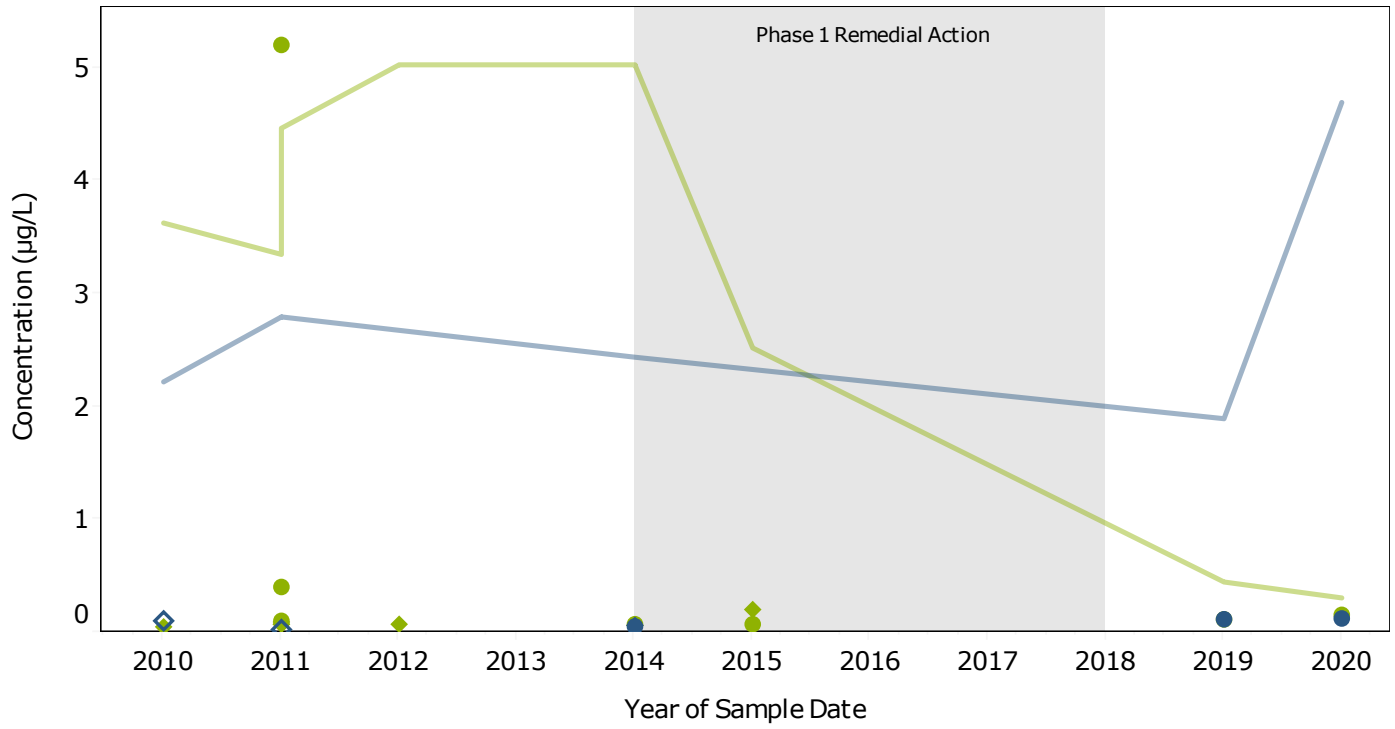
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

- Hardness-adjusted surface water criteria based on spring data
- Hardness-adjusted surface water criteria based on fall data

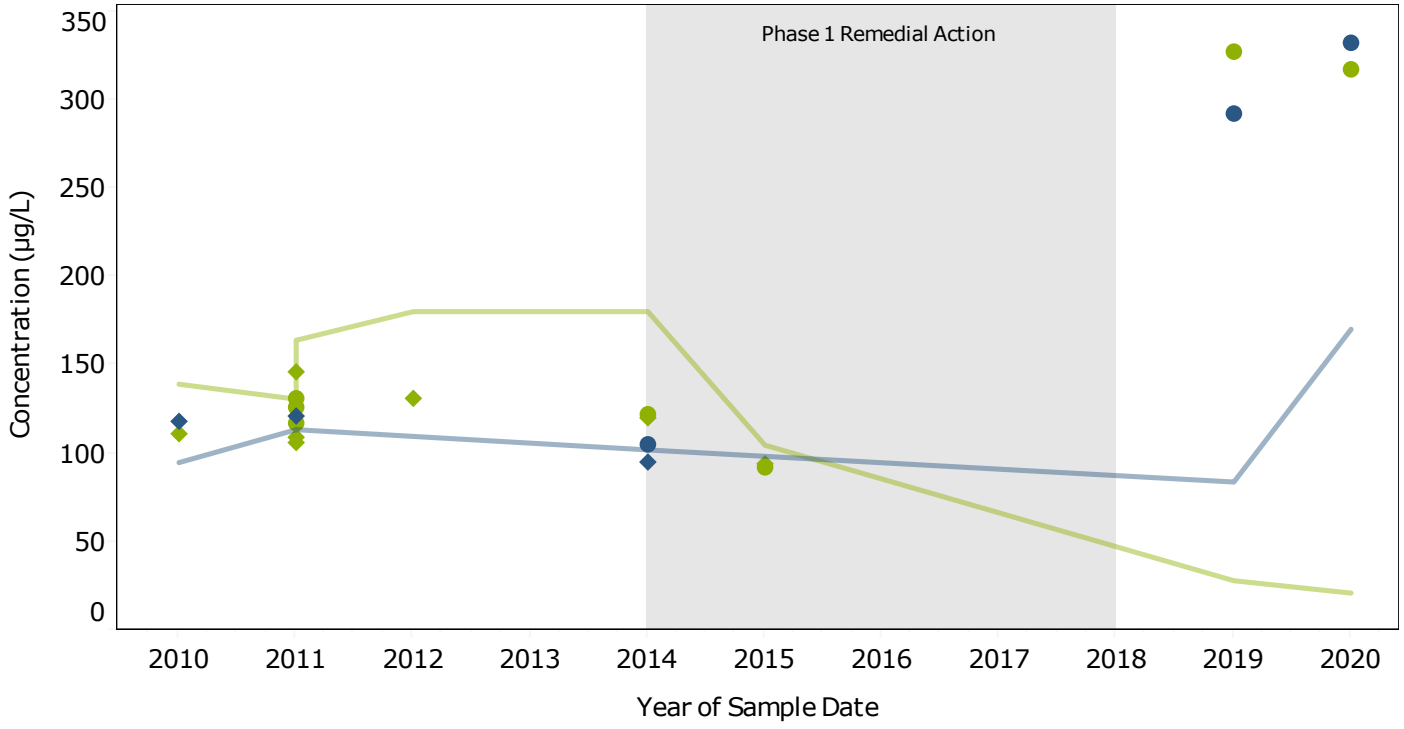
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

SG-10-WP, Lead



SG-10-WP, Zinc



Legend

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

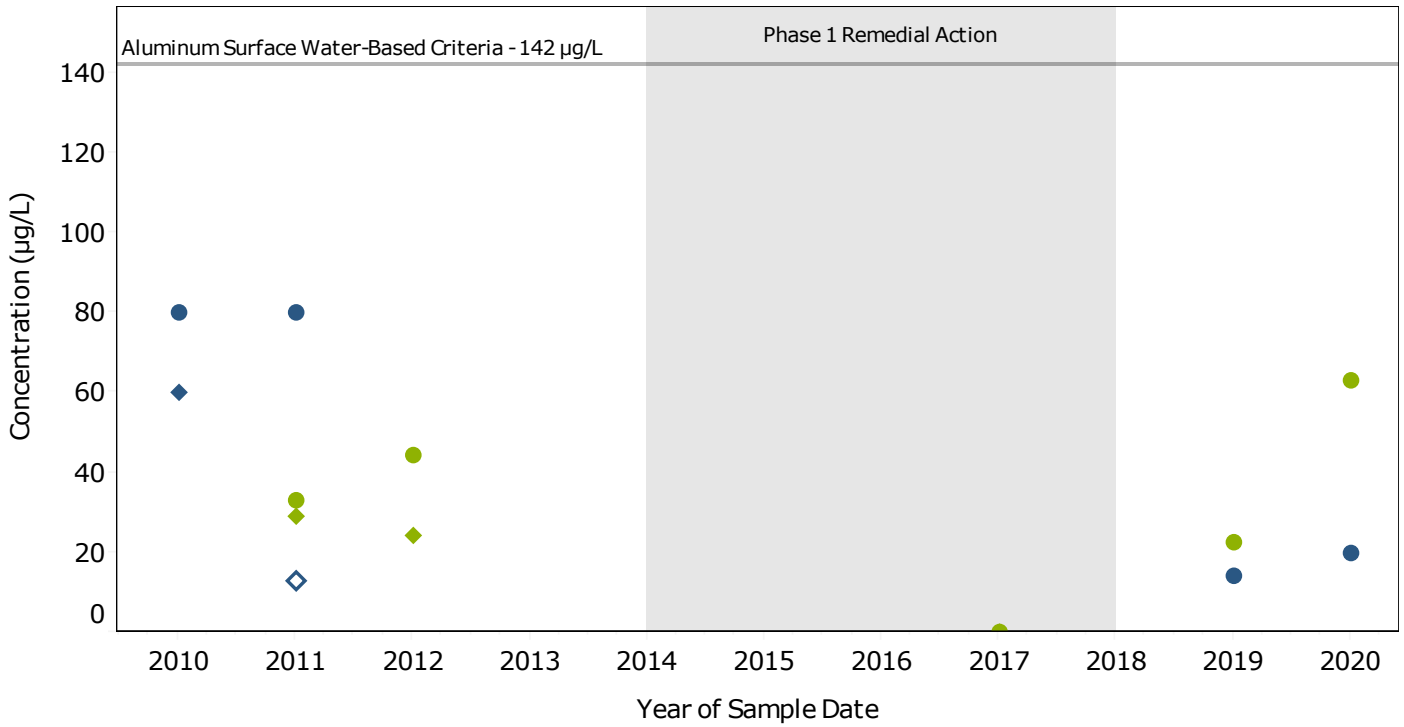
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

- Hardness-adjusted surface water criteria based on spring data
- Hardness-adjusted surface water criteria based on fall data

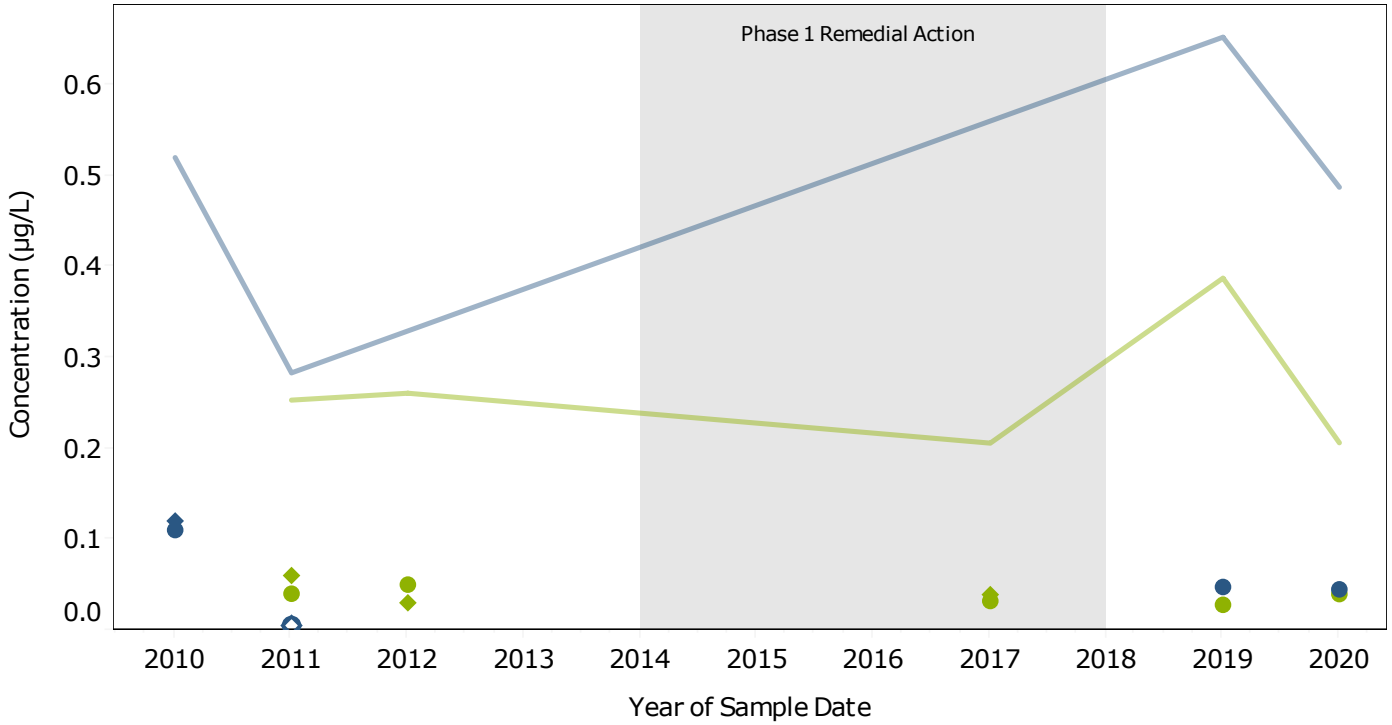
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

SG-11-PW-6, Aluminum



SG-11-PW-6, Cadmium



Legend

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

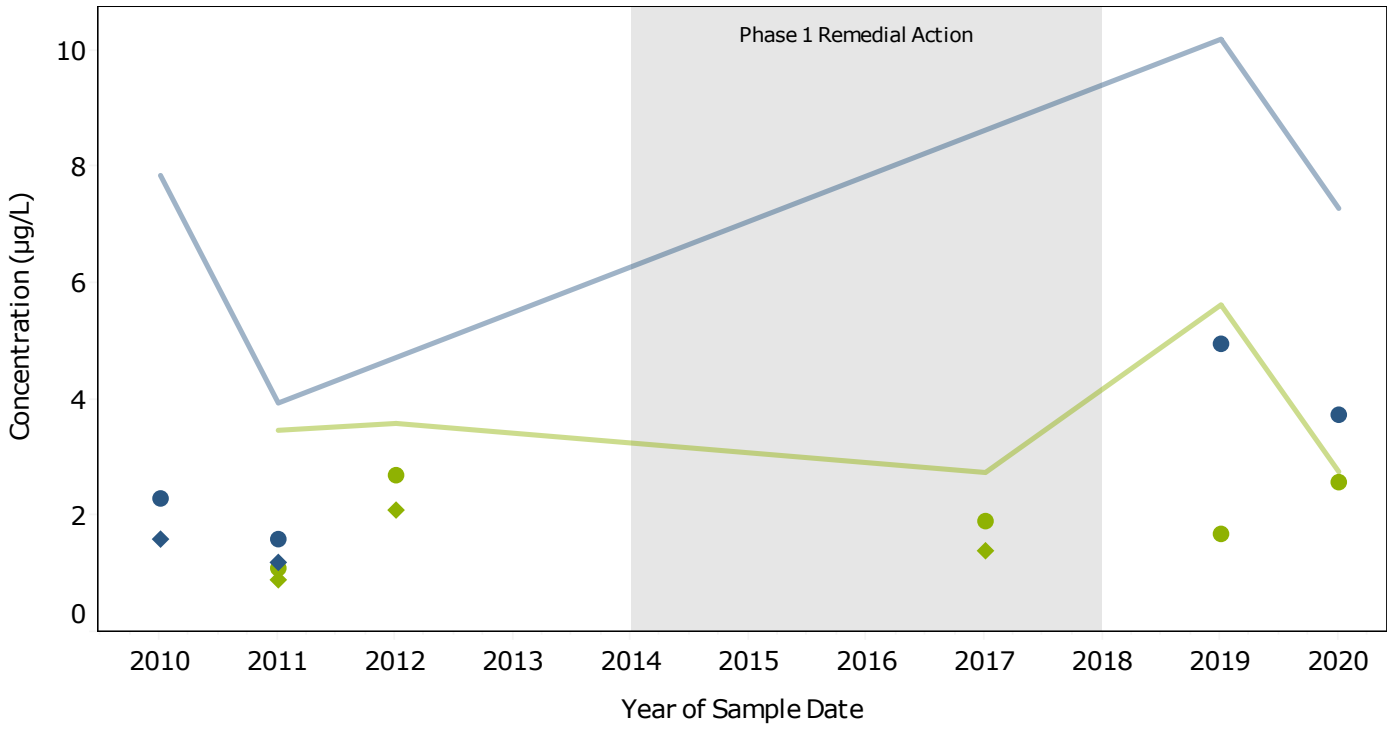
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

- Hardness-adjusted surface water criteria based on spring data
- Hardness-adjusted surface water criteria based on fall data

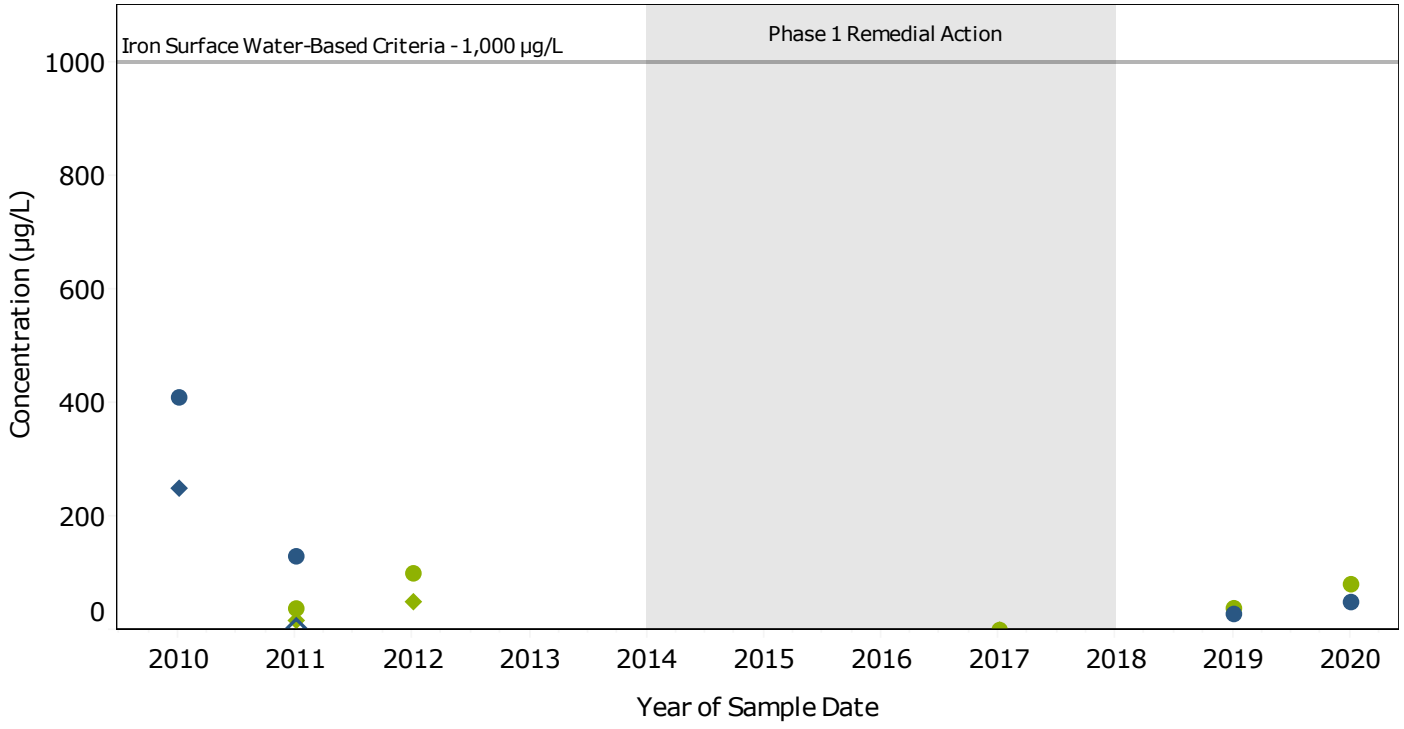
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

SG-11-PW-6, Copper



SG-11-PW-6, Iron



Legend

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

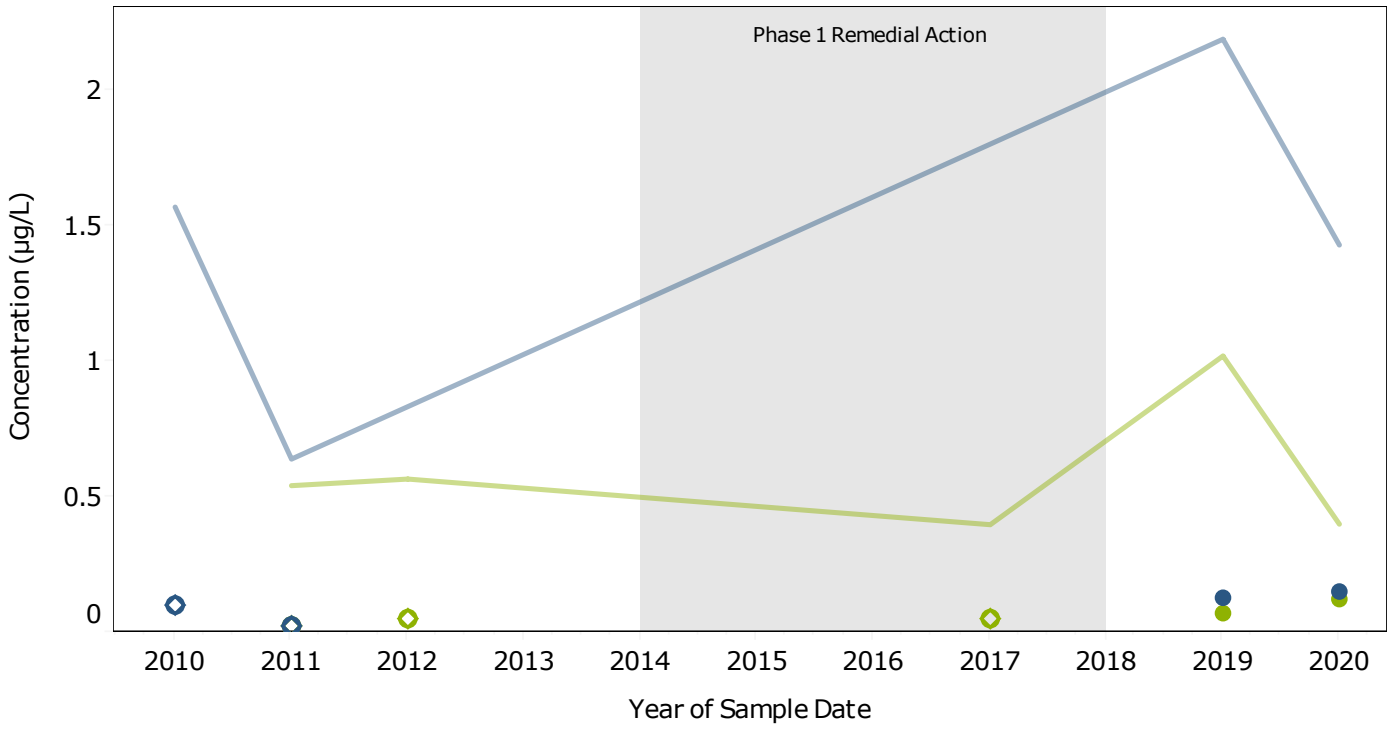
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

- Hardness-adjusted surface water criteria based on spring data
- Hardness-adjusted surface water criteria based on fall data

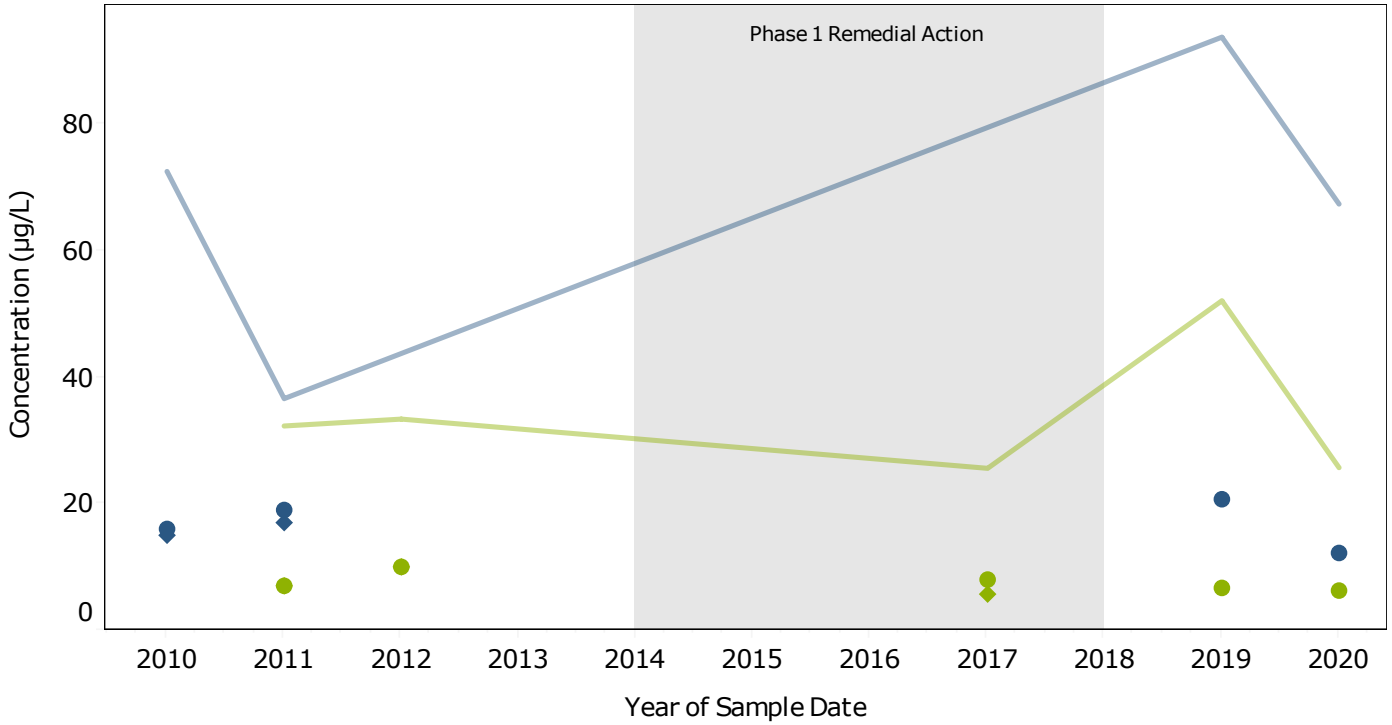
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

SG-11-PW-6, Lead



SG-11-PW-6, Zinc



Legend

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

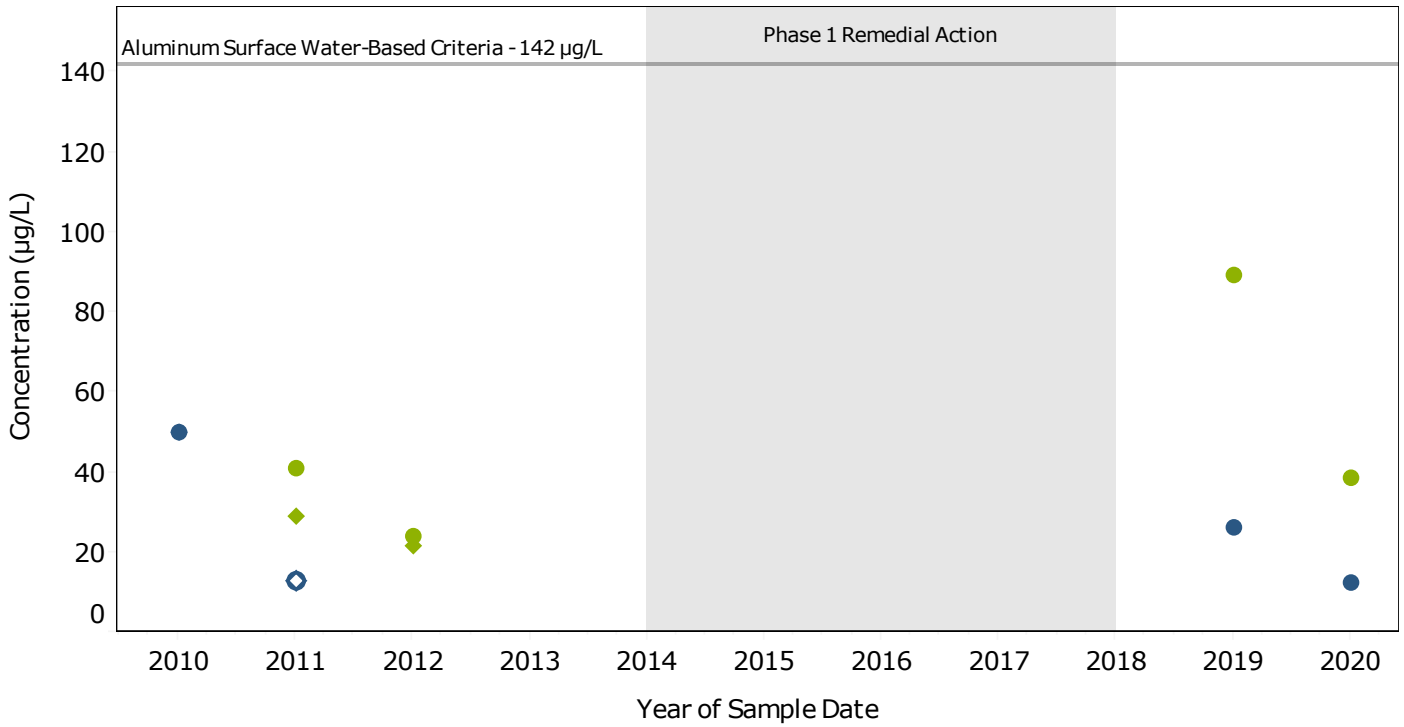
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

- Hardness-adjusted surface water criteria based on spring data
- Hardness-adjusted surface water criteria based on fall data

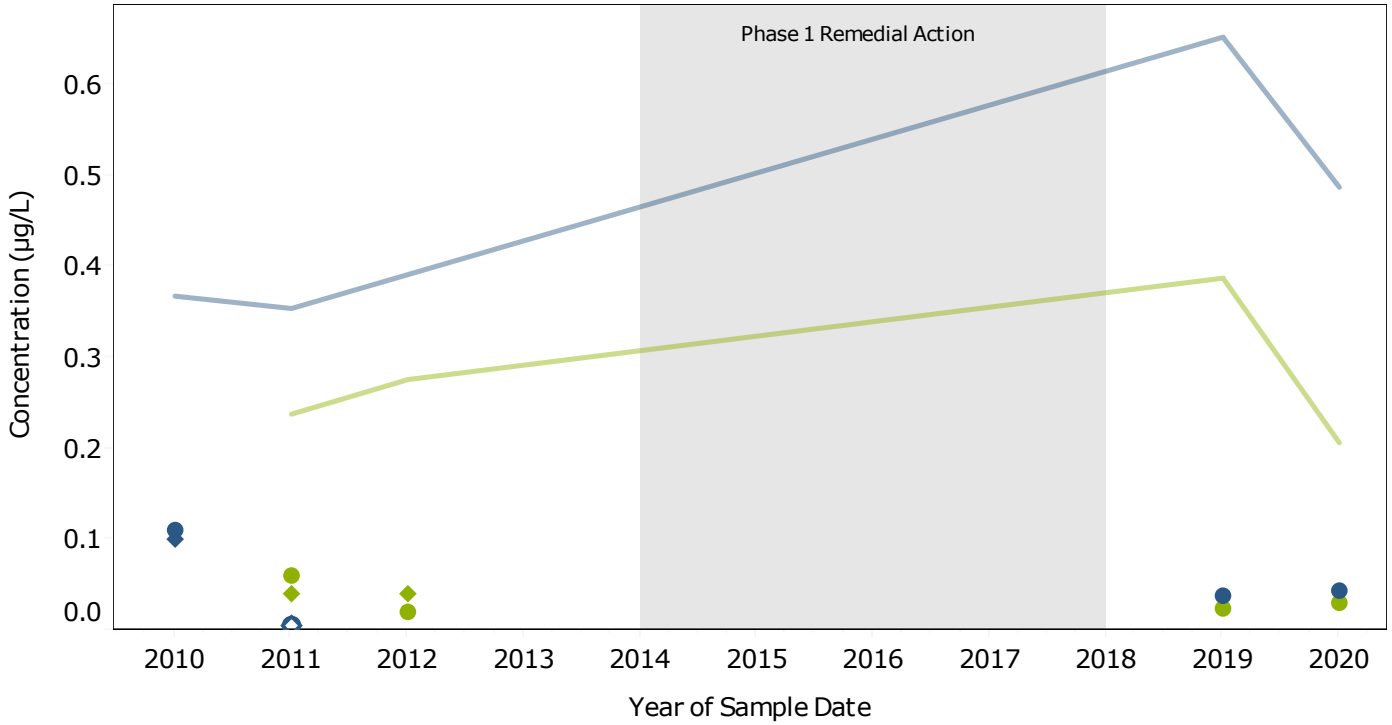
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

SG-11-PW-12, Aluminum



SG-11-PW-12, Cadmium



Legend

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

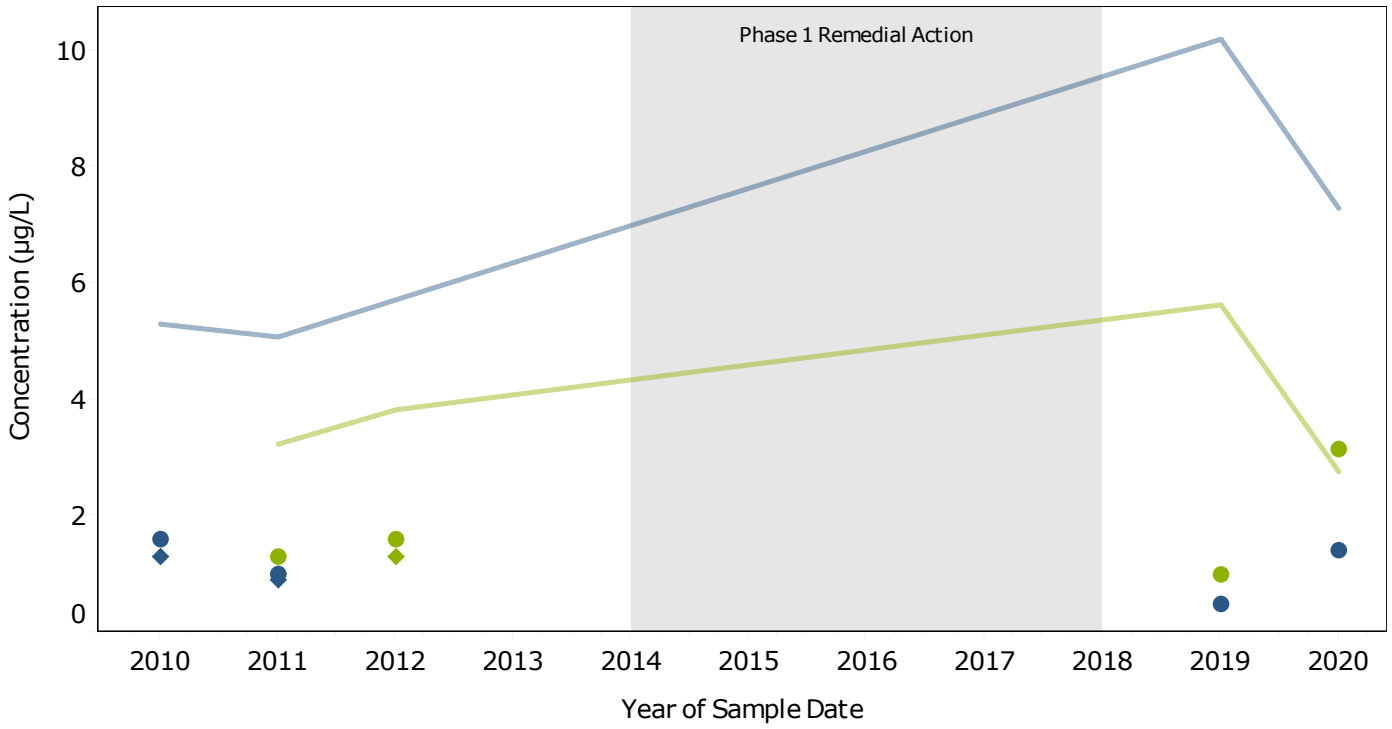
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

- Hardness-adjusted surface water criteria based on spring data
- Hardness-adjusted surface water criteria based on fall data

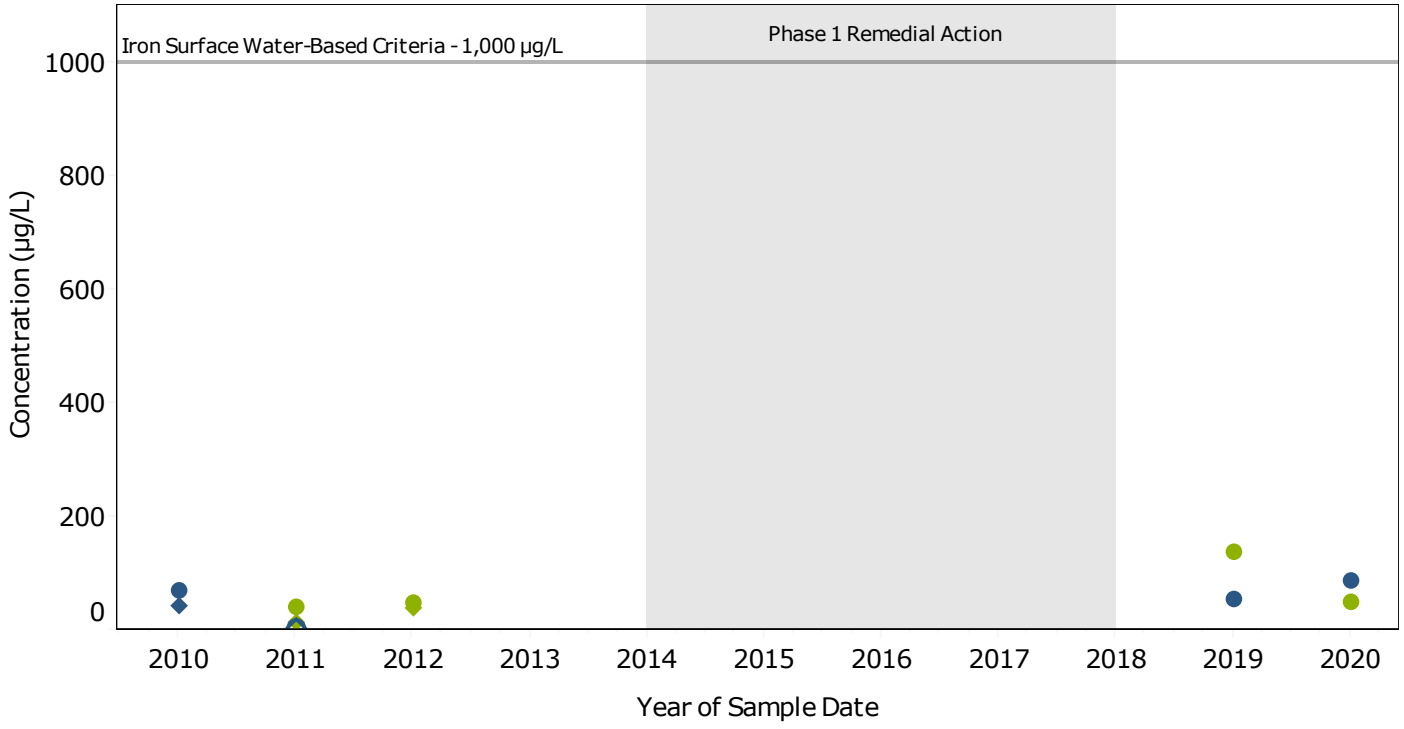
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

SG-11-PW-12, Copper



SG-11-PW-12, Iron



Legend

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

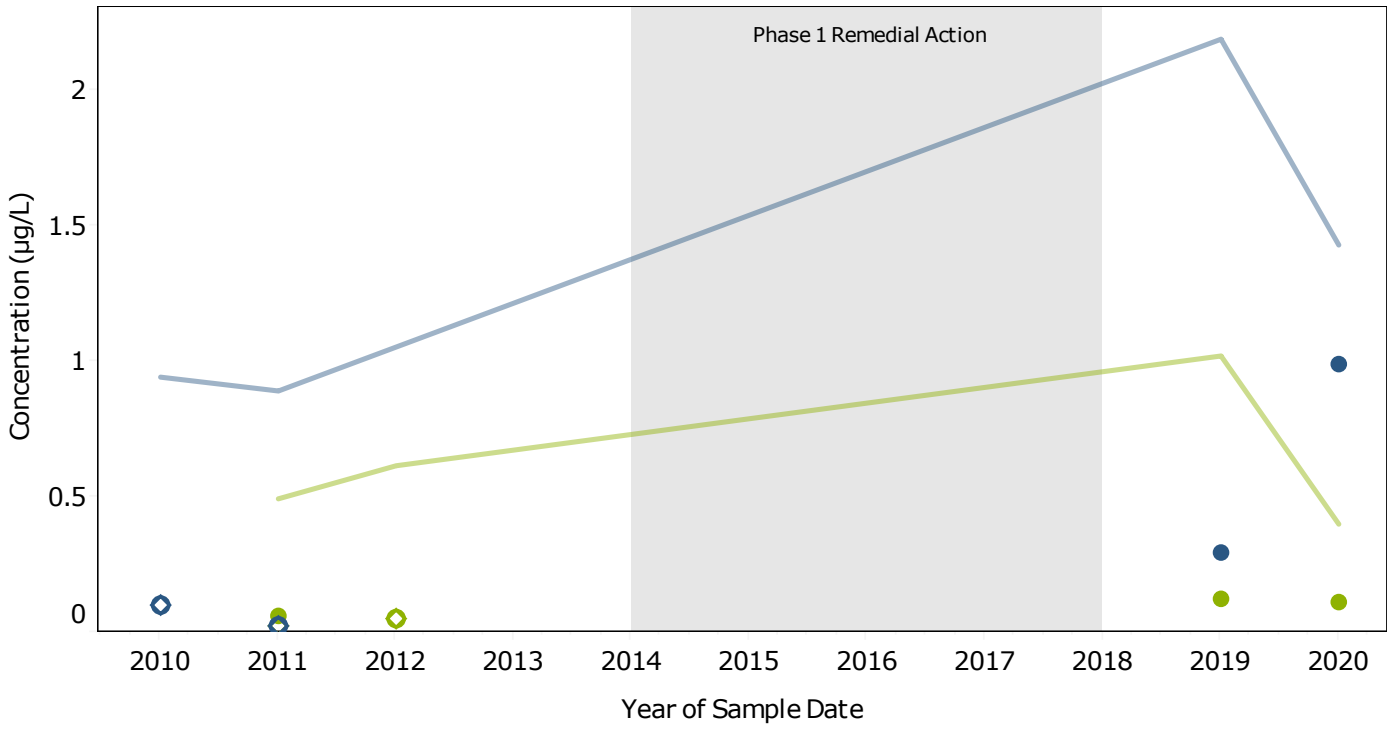
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

- Hardness-adjusted surface water criteria based on spring data
- Hardness-adjusted surface water criteria based on fall data

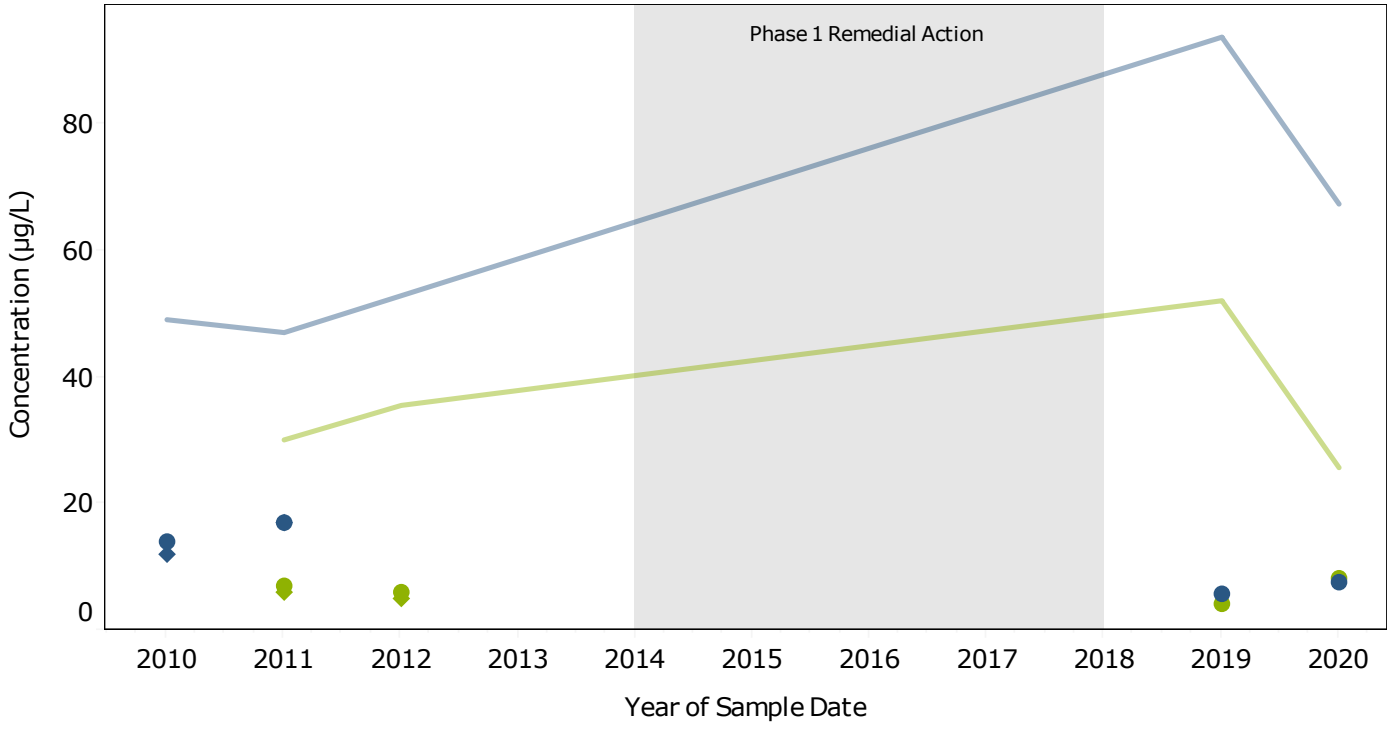
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

SG-11-PW-12, Lead



SG-11-PW-12, Zinc



Legend

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

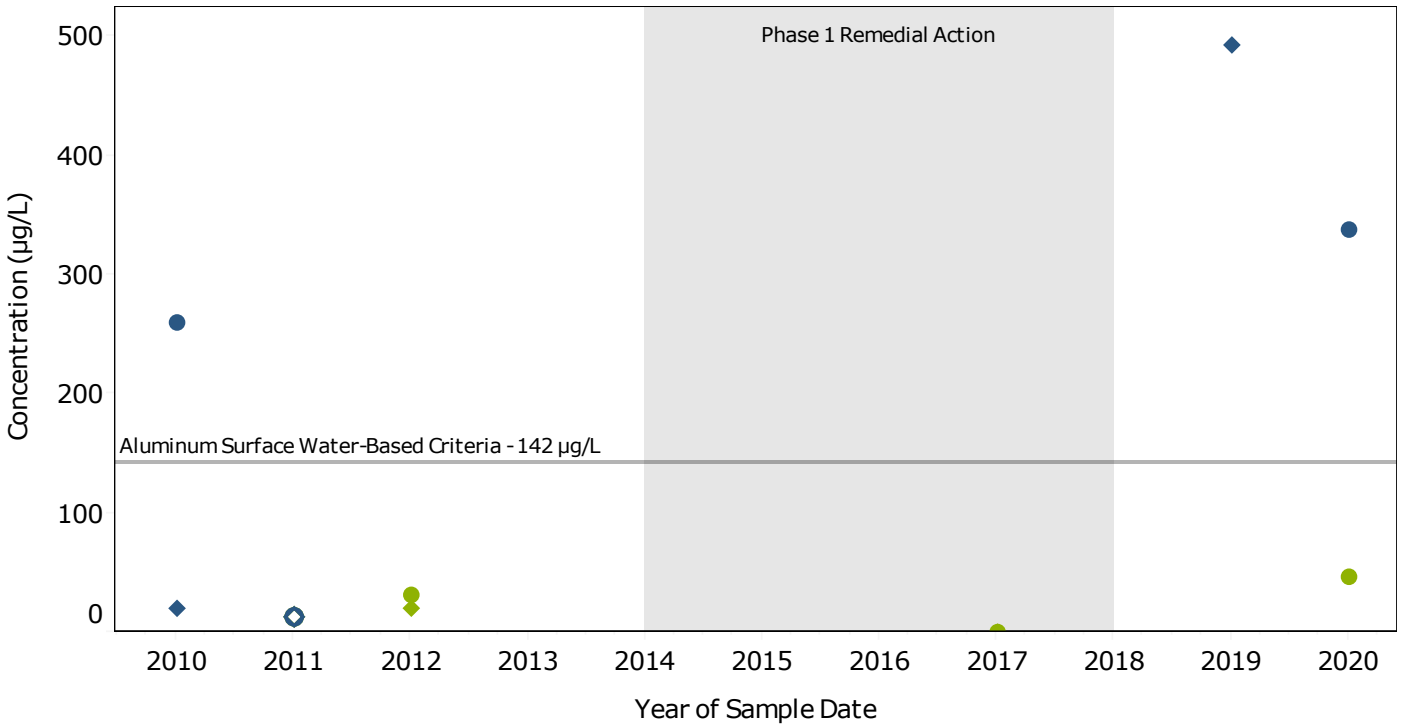
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

- Hardness-adjusted surface water criteria based on spring data
- Hardness-adjusted surface water criteria based on fall data

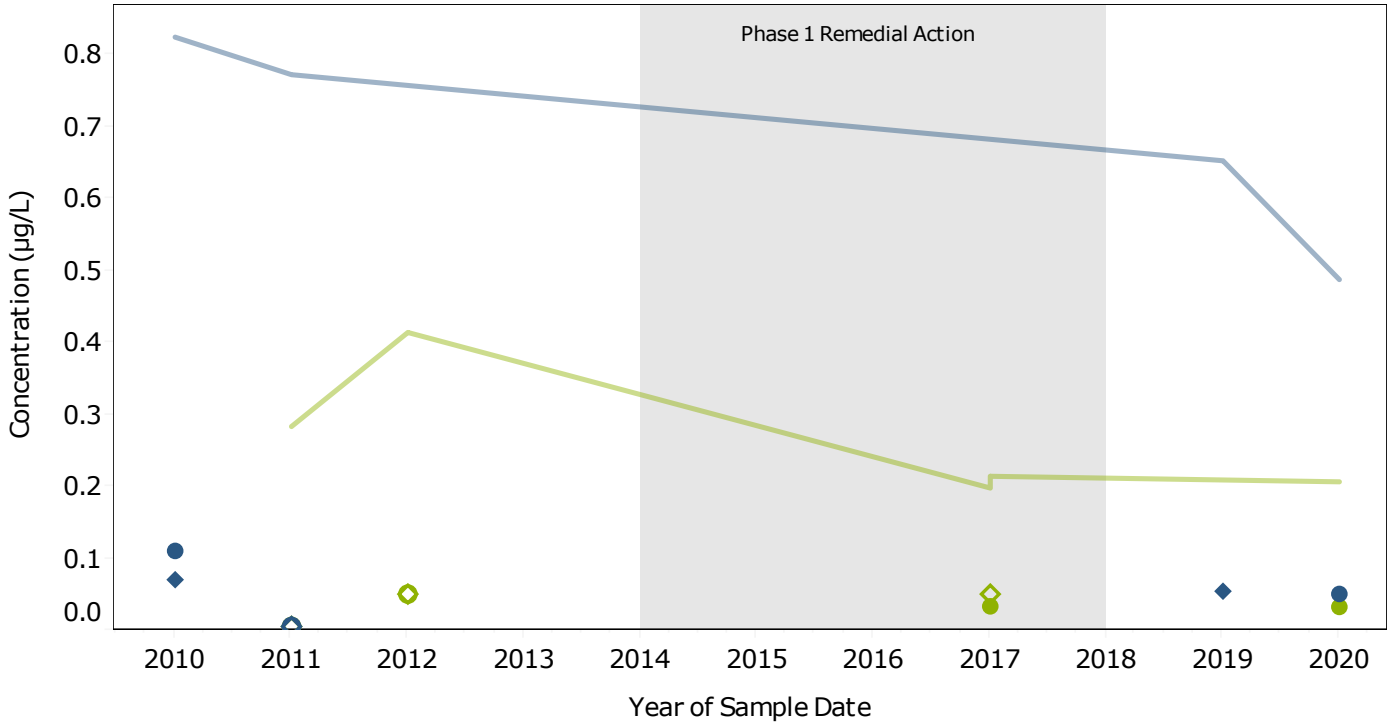
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

SG-11-WP-36, Aluminum



SG-11-WP-36, Cadmium



Legend

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

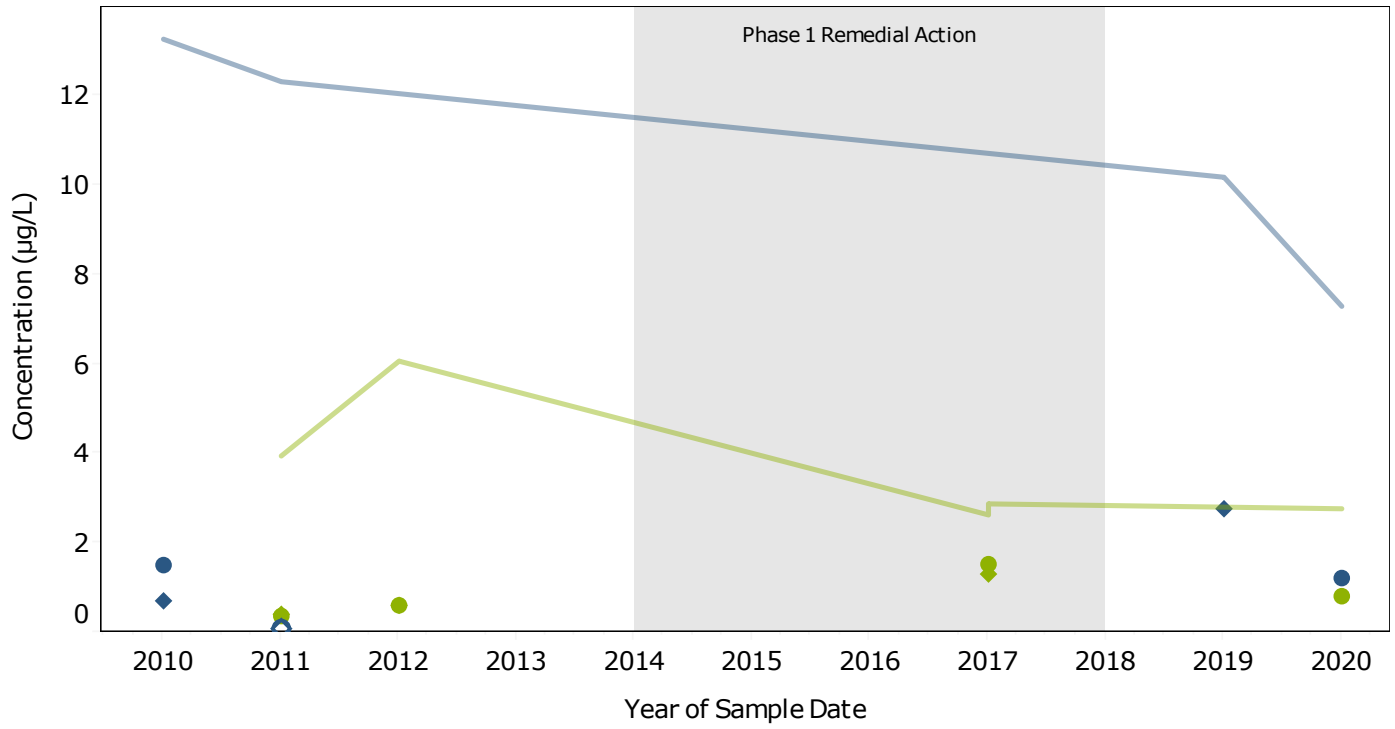
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

- Hardness-adjusted surface water criteria based on spring data
- Hardness-adjusted surface water criteria based on fall data

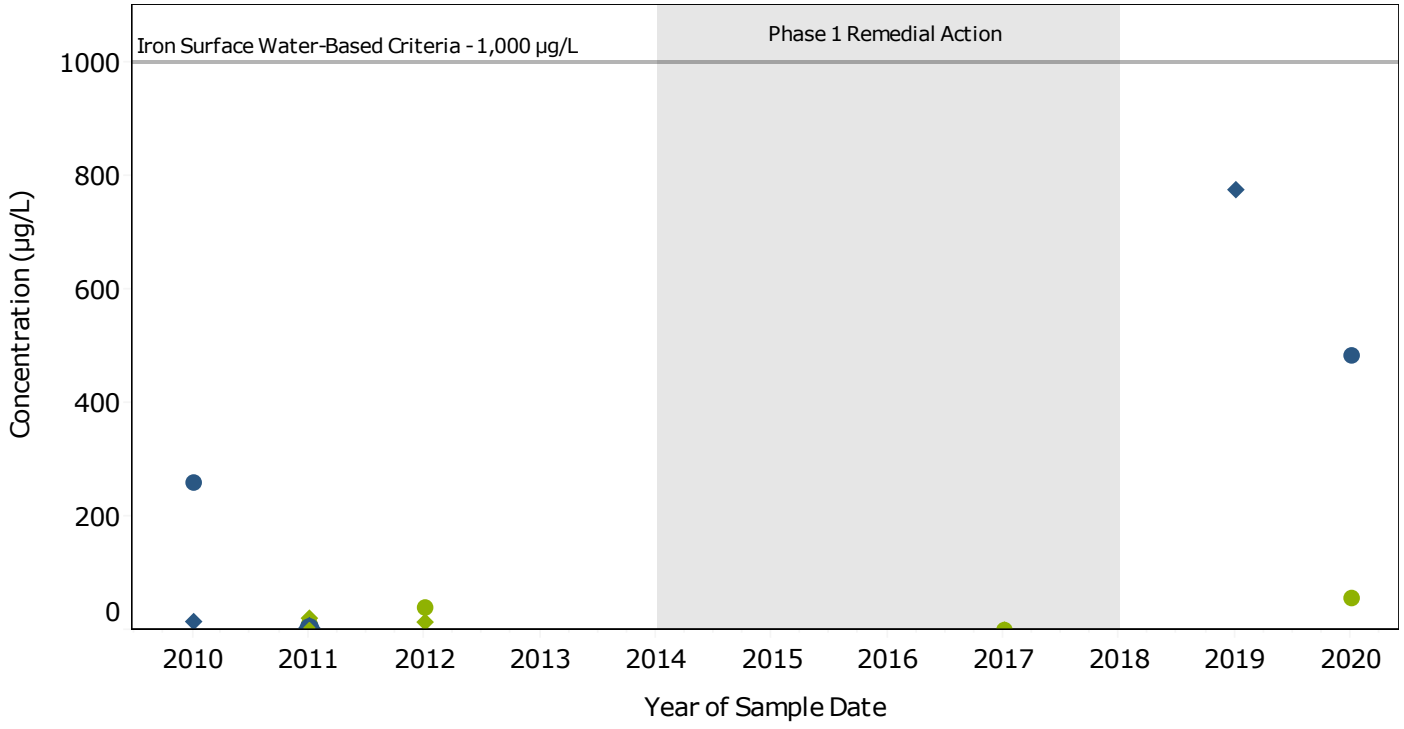
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

SG-11-WP-36, Copper



SG-11-WP-36, Iron



Legend

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

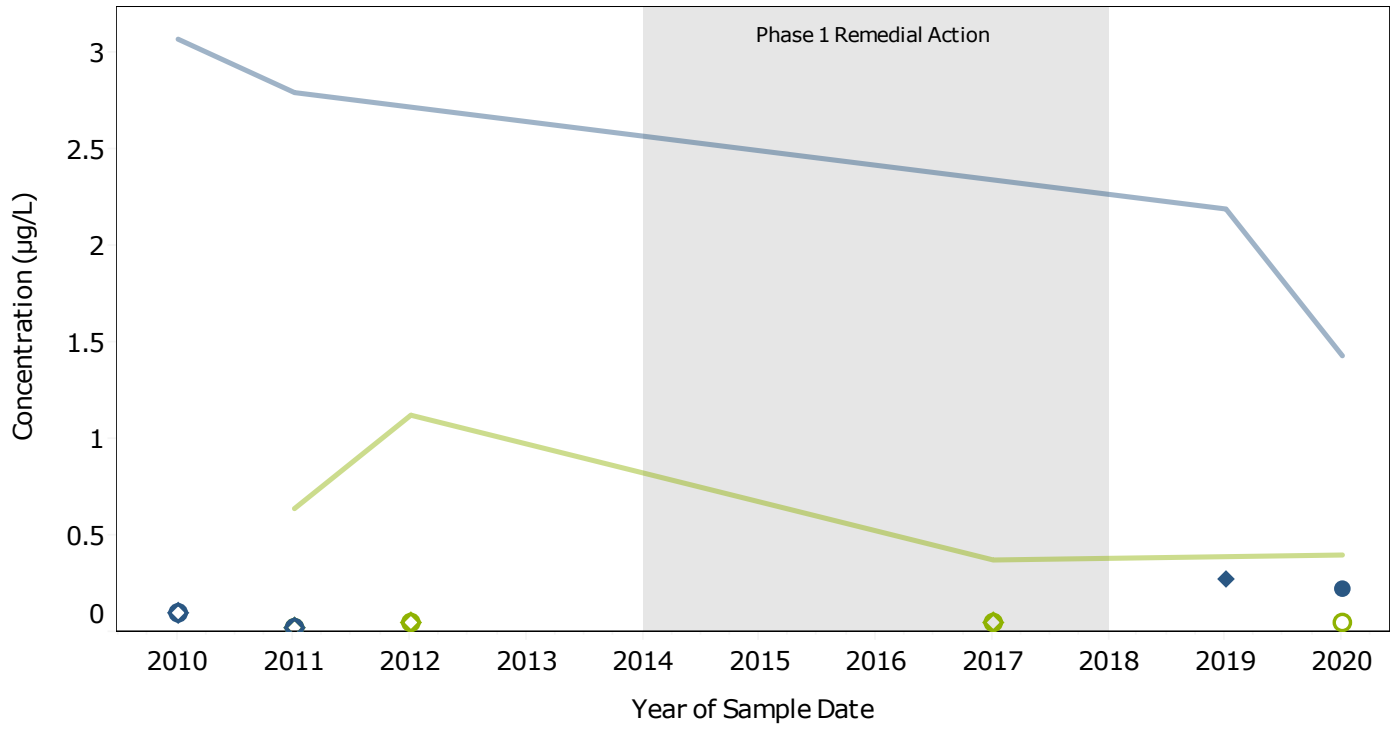
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

- Hardness-adjusted surface water criteria based on spring data
- Hardness-adjusted surface water criteria based on fall data

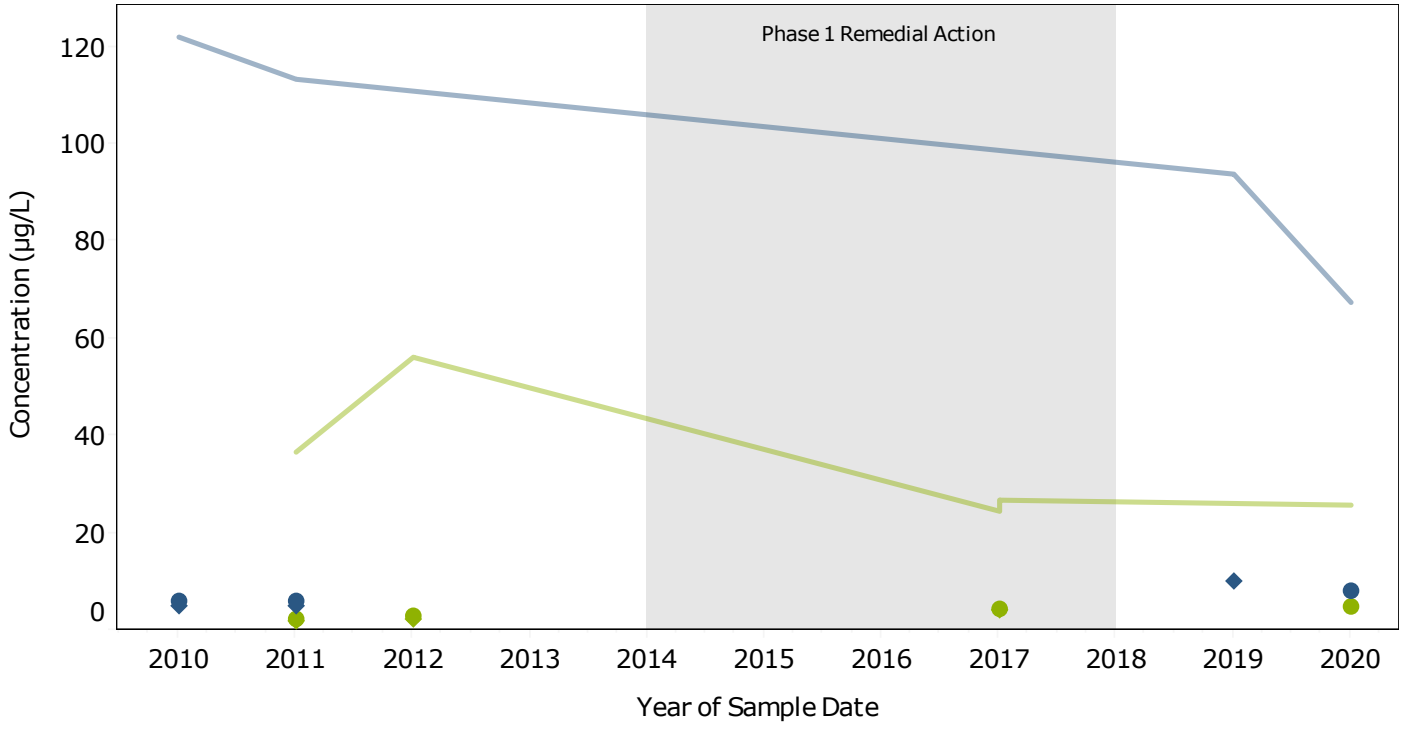
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

SG-11-WP-36, Lead



SG-11-WP-36, Zinc



Legend

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

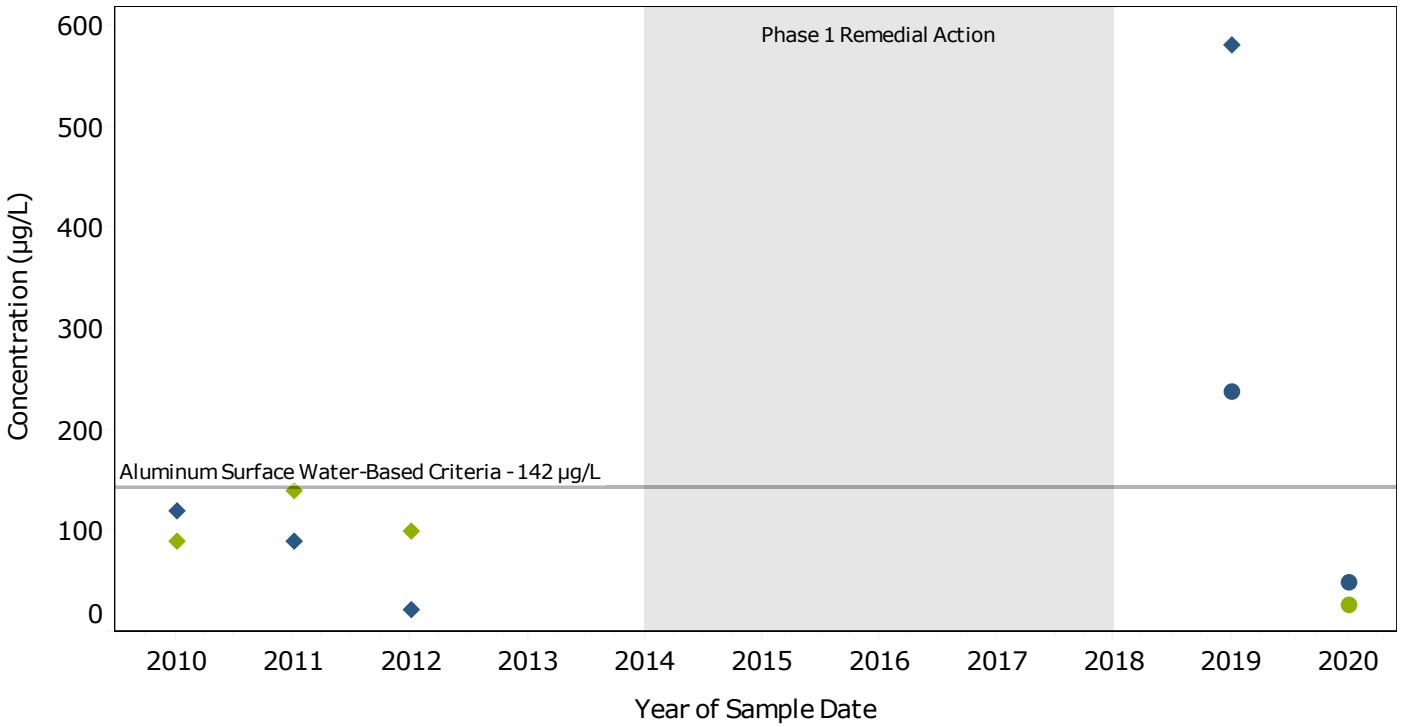
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

- Hardness-adjusted surface water criteria based on spring data
- Hardness-adjusted surface water criteria based on fall data

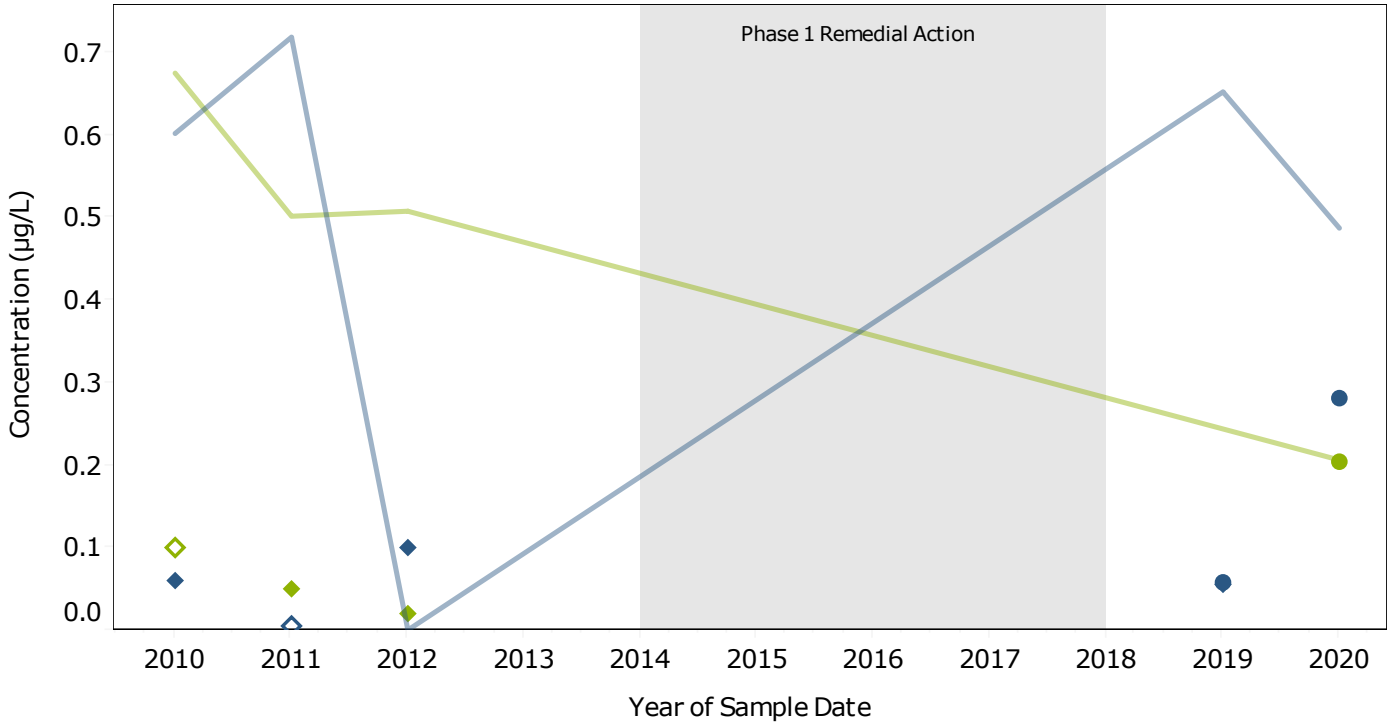
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

SG-11-WP, Aluminum



SG-11-WP, Cadmium



Legend

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

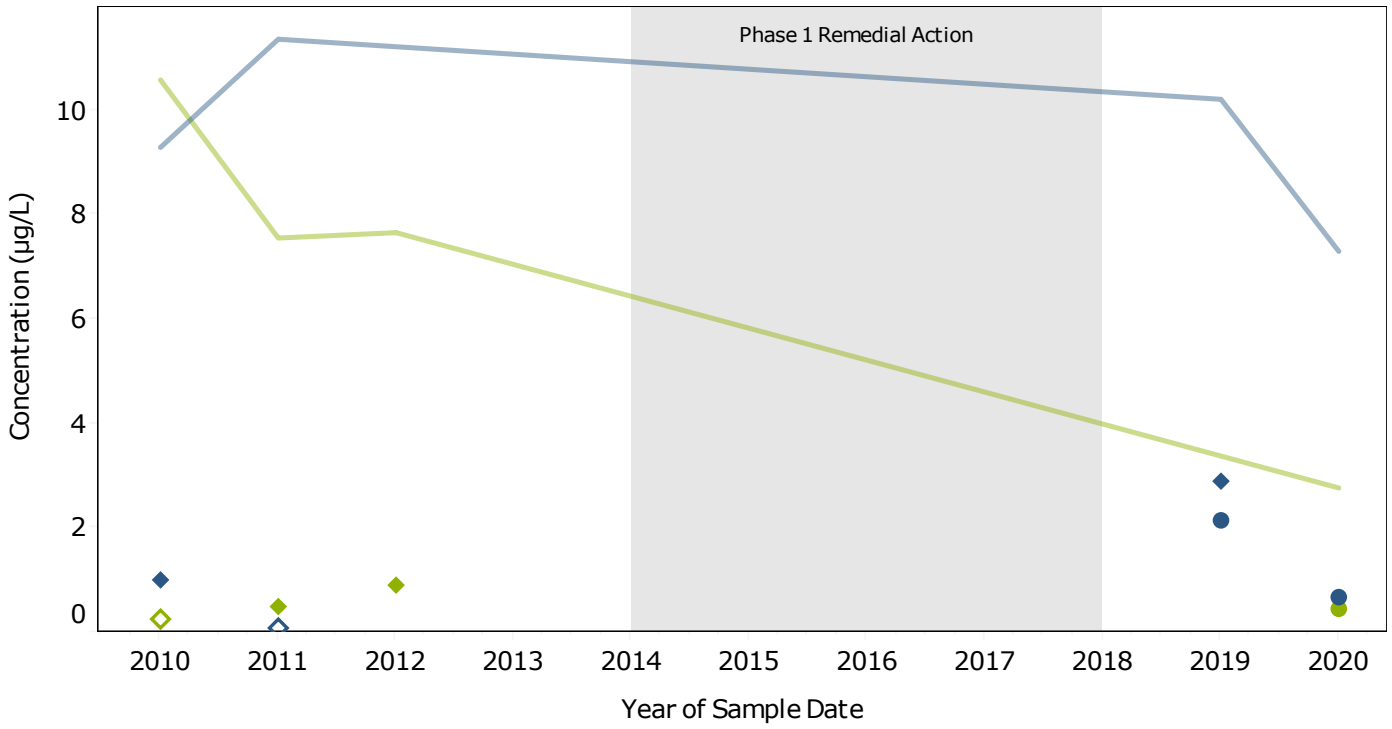
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

- Hardness-adjusted surface water criteria based on spring data
- Hardness-adjusted surface water criteria based on fall data

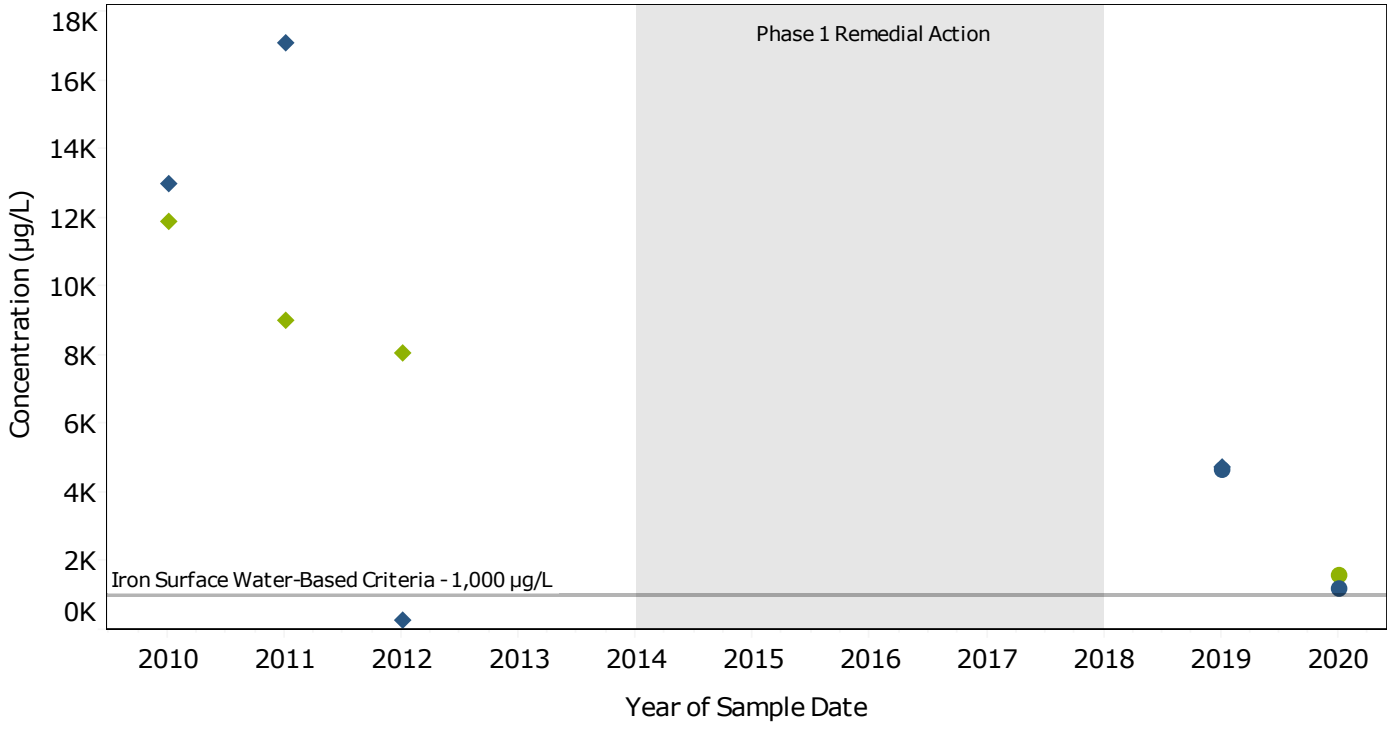
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

SG-11-WP, Copper



SG-11-WP, Iron



Legend

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

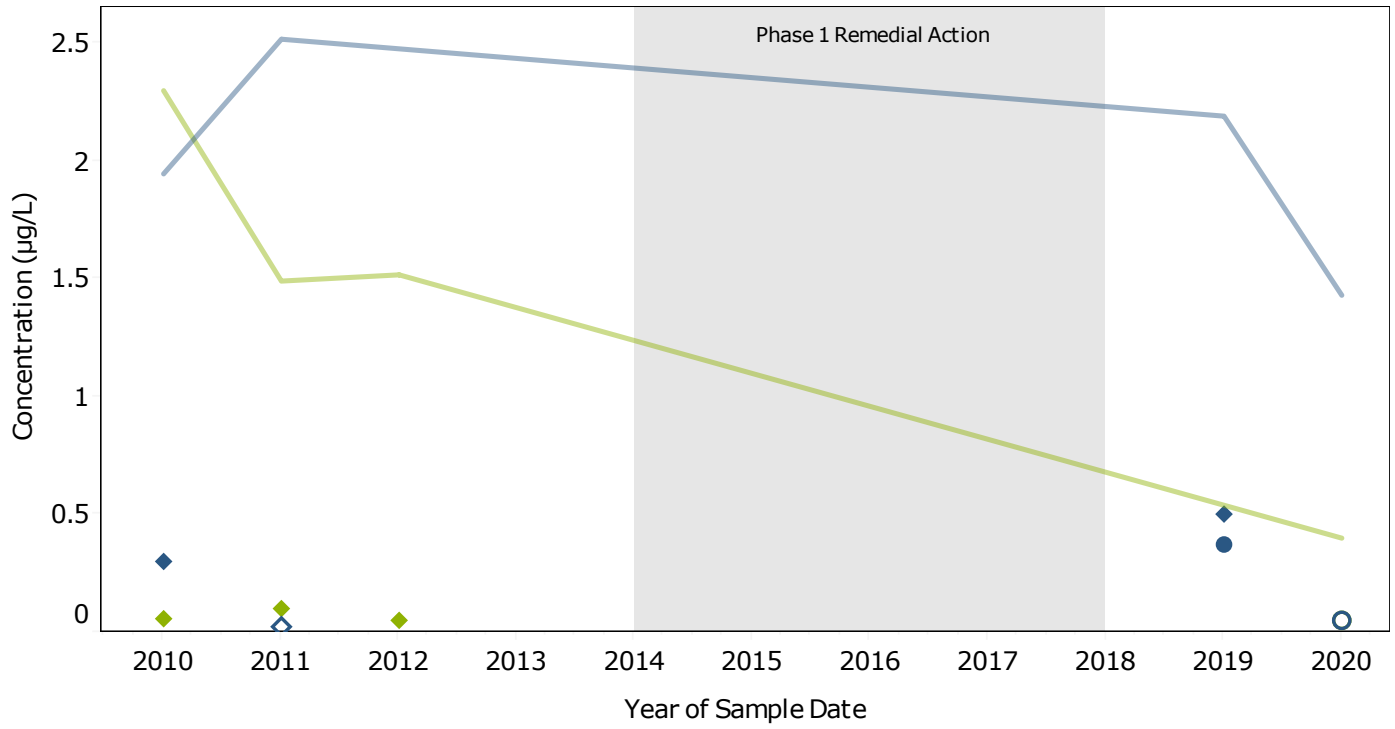
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

- Hardness-adjusted surface water criteria based on spring data
- Hardness-adjusted surface water criteria based on fall data

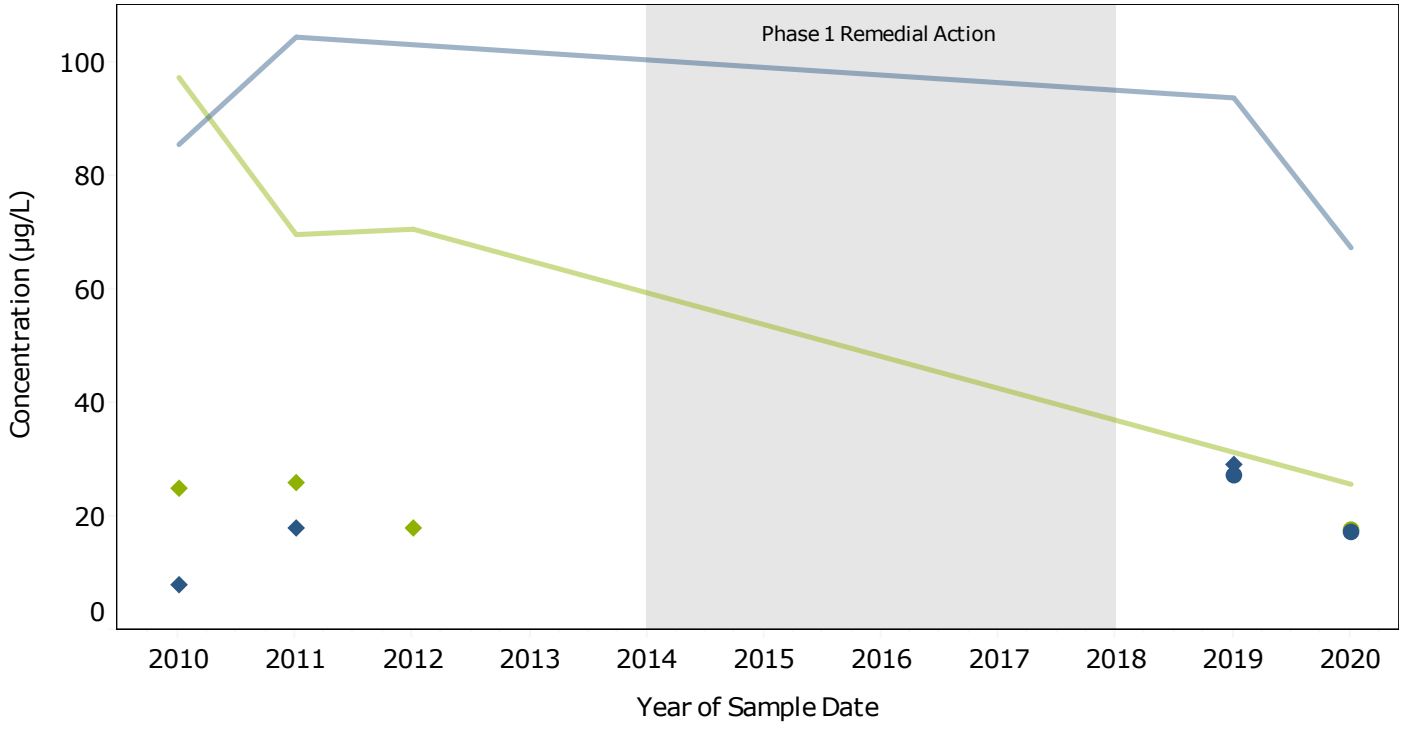
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

SG-11-WP, Lead



SG-11-WP, Zinc



Legend

Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

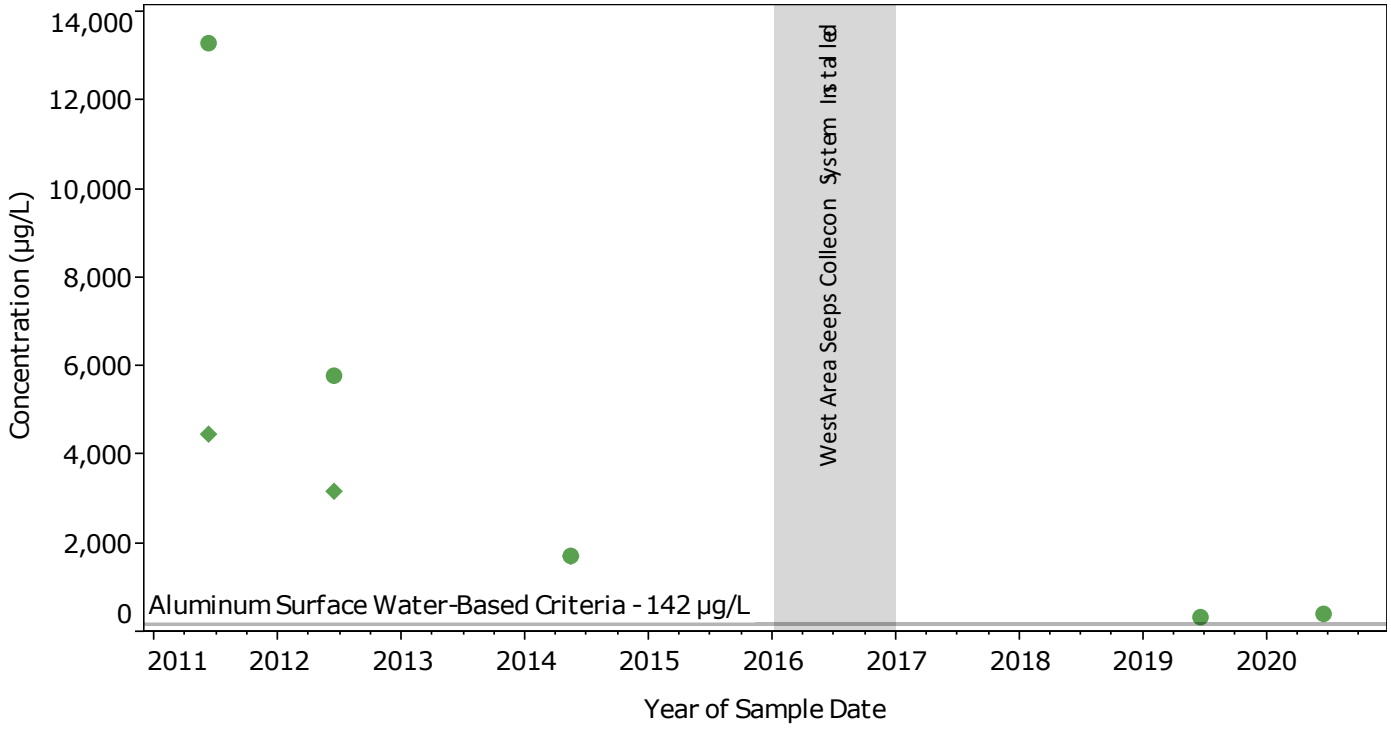
Non-Detect Results
- Spring Sample, Total
- Spring Sample, Dissolved
- Fall Sample, Total
- Fall Sample, Dissolved

- Hardness-adjusted surface water criteria based on spring data
- Hardness-adjusted surface water criteria based on fall data

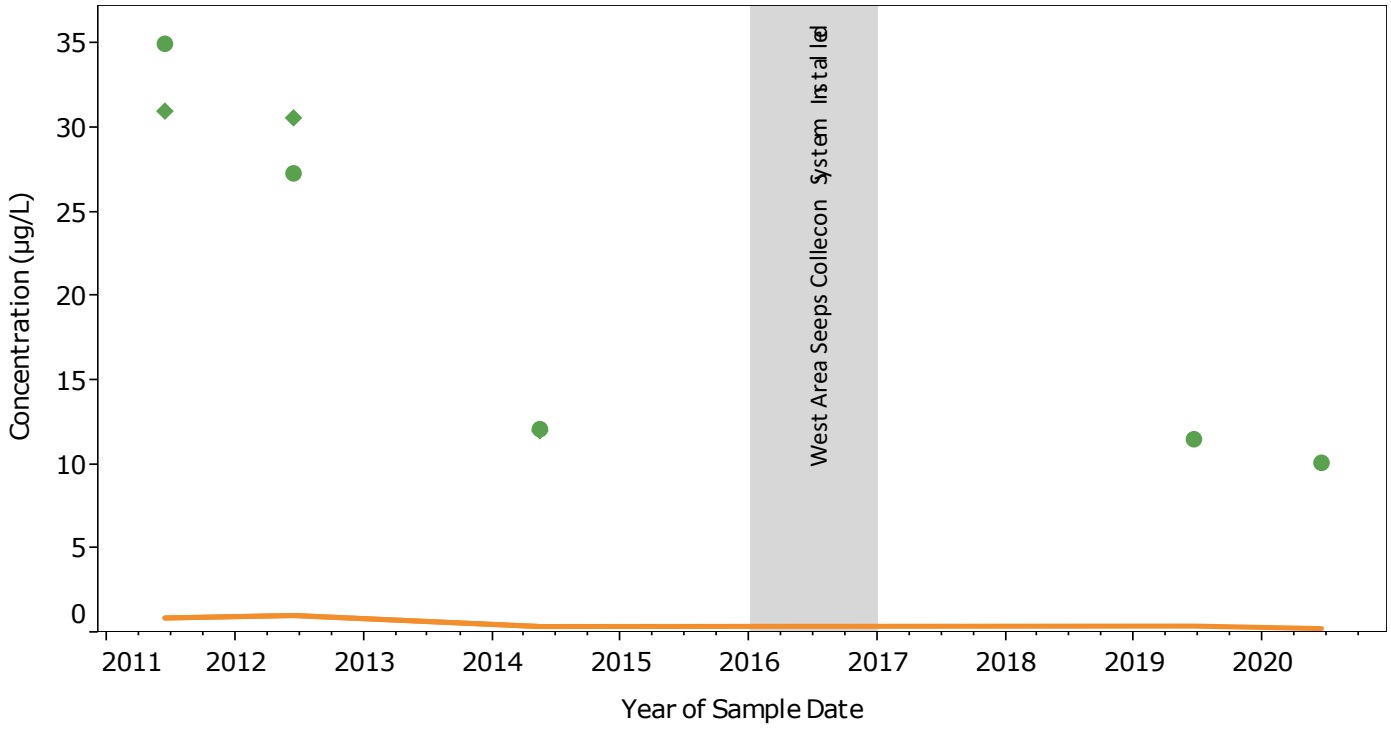
Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

SP-12 East, Aluminum



SP-12 East, Cadmium



Legend

Detect Results

- Spring Sample, Total
- Spring Sample, Dissolved
- Hardness Adjusted Criteria

Notes:

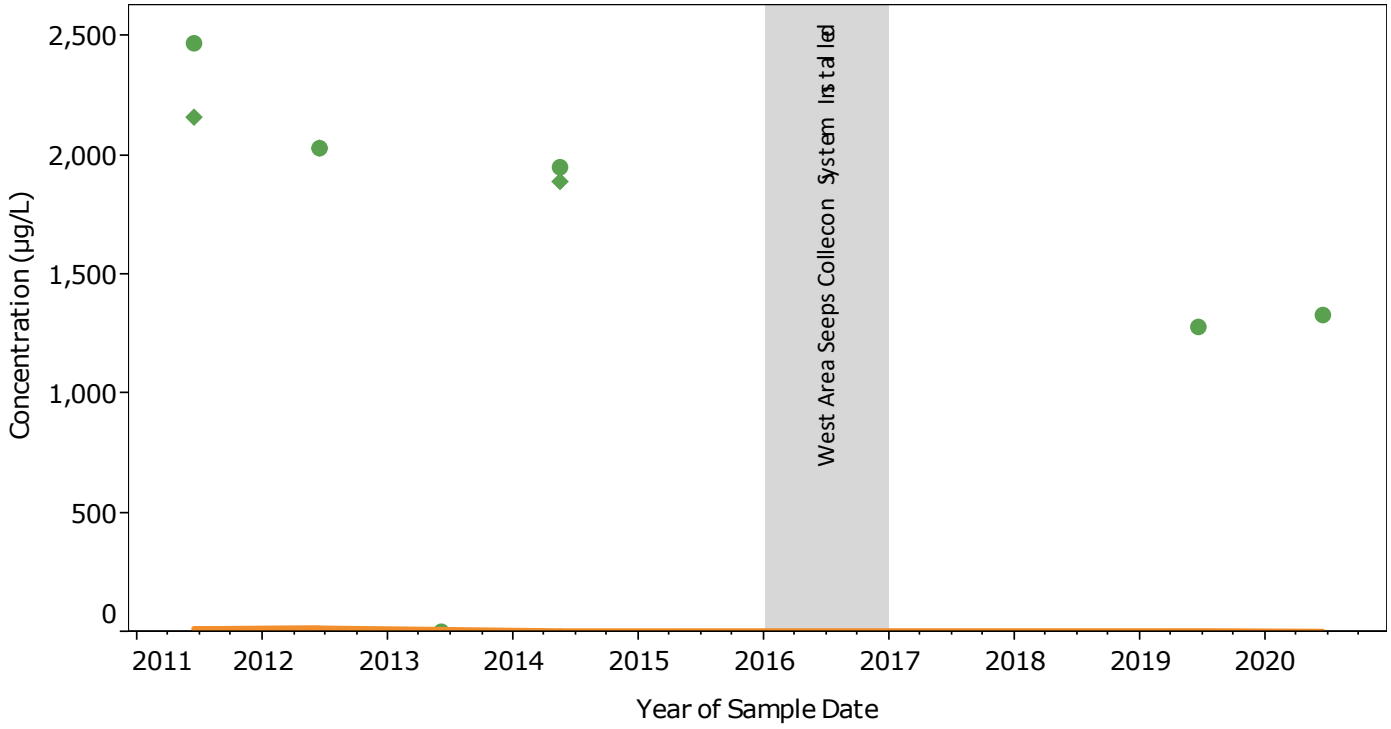
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.

-Non-detect results are shown at half the reporting limit.

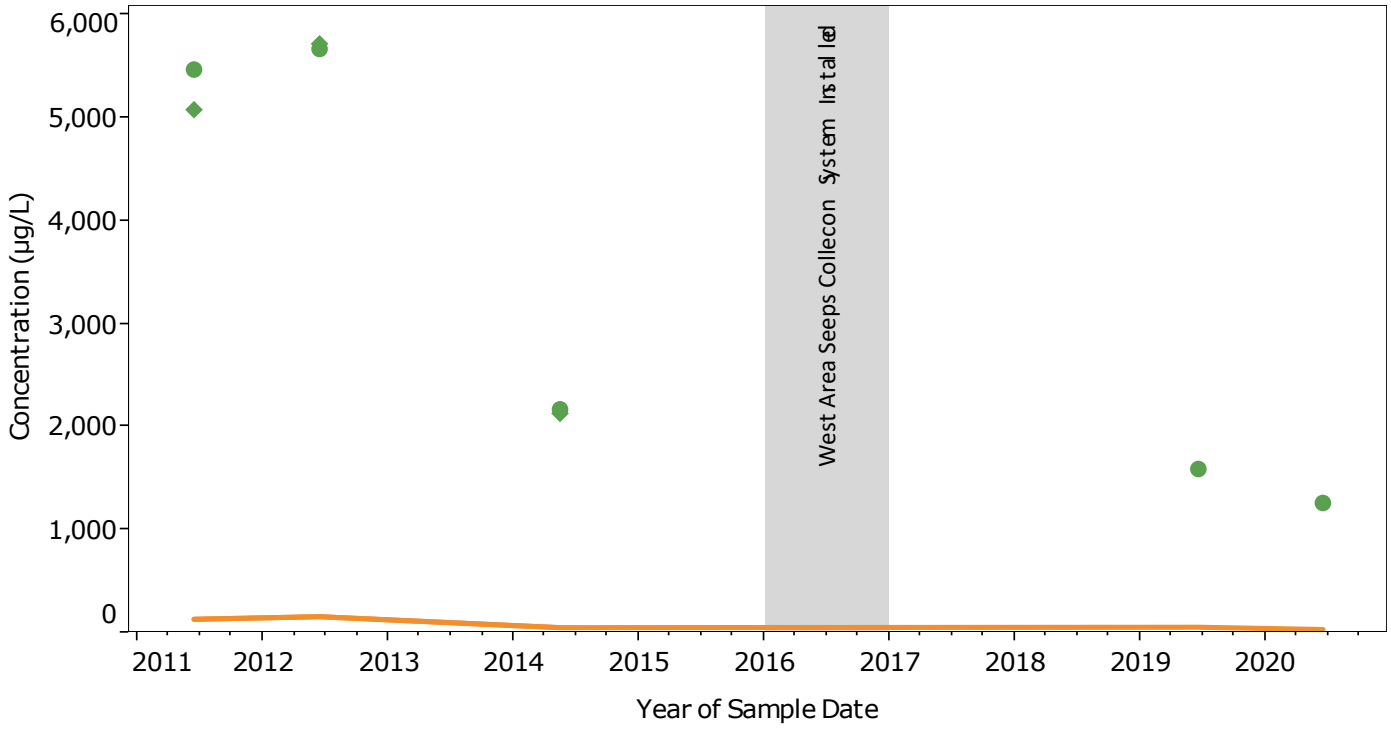
Abbreviation:

µg/L = Micrograms per liter

SP-12 East, Copper



SP-12 East, Zinc



Legend

Detect Results

- Spring Sample, Total
- Spring Sample, Dissolved
- Hardness Adjusted Criteria

Notes:

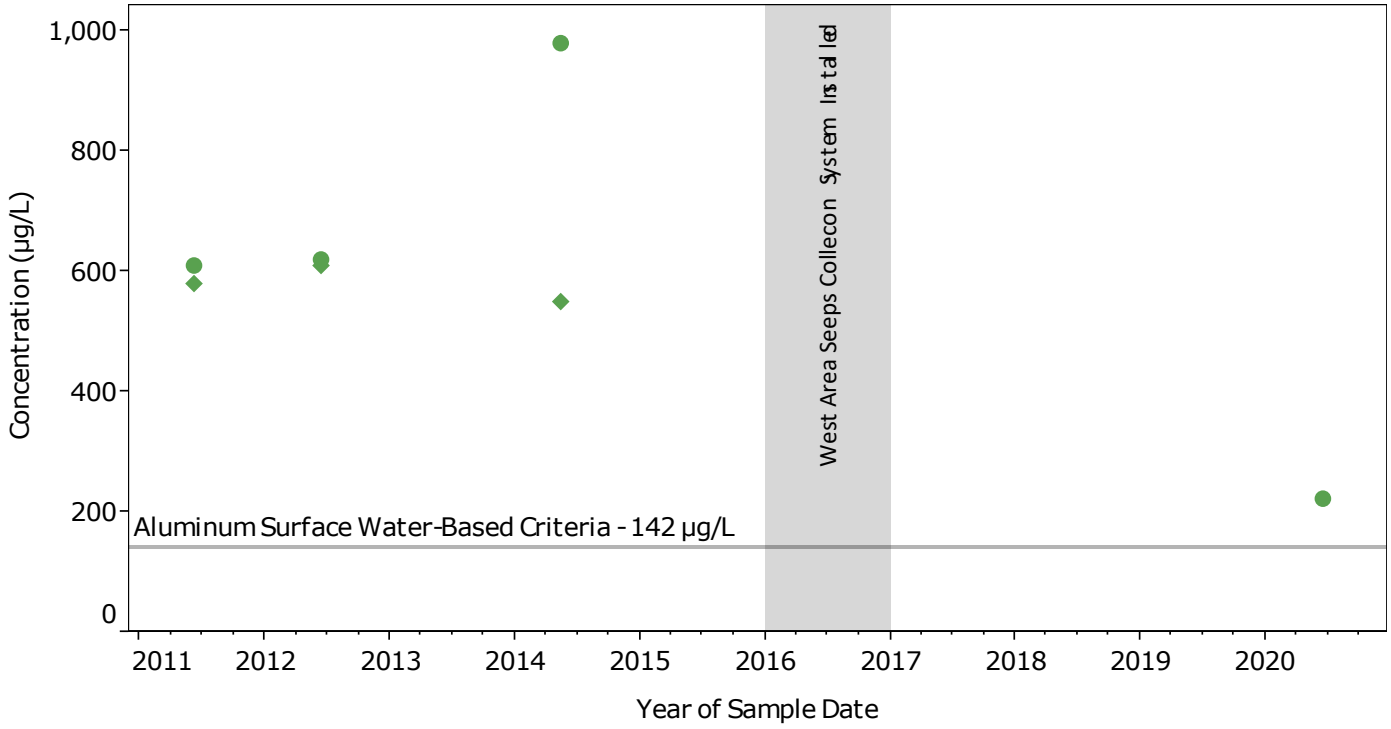
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.

-Non-detect results are shown at half the reporting limit.

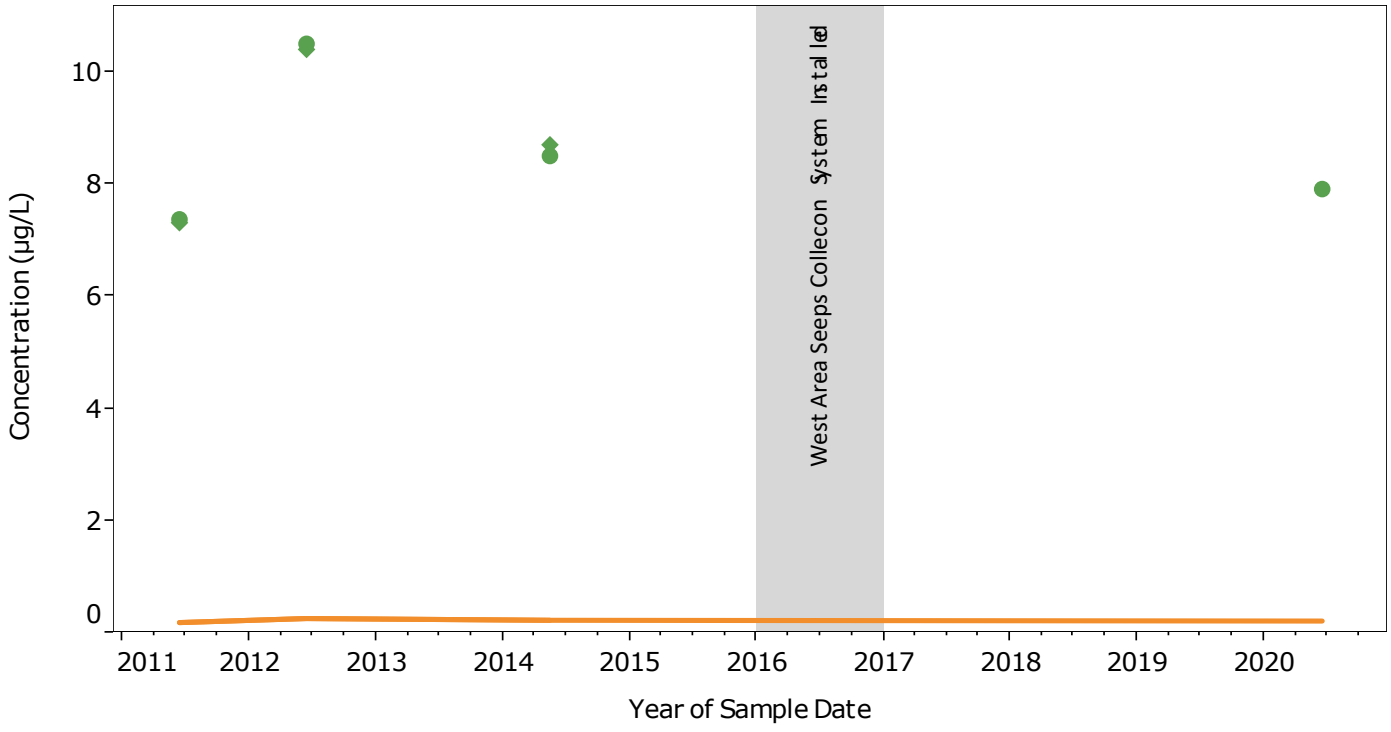
Abbreviation:

µg/L = Micrograms per liter

SP-12 West, Aluminum



SP-12 West, Cadmium



Legend

Detect Results

- Spring Sample, Total
- Spring Sample, Dissolved
- Hardness Adjusted Criteria

Notes:

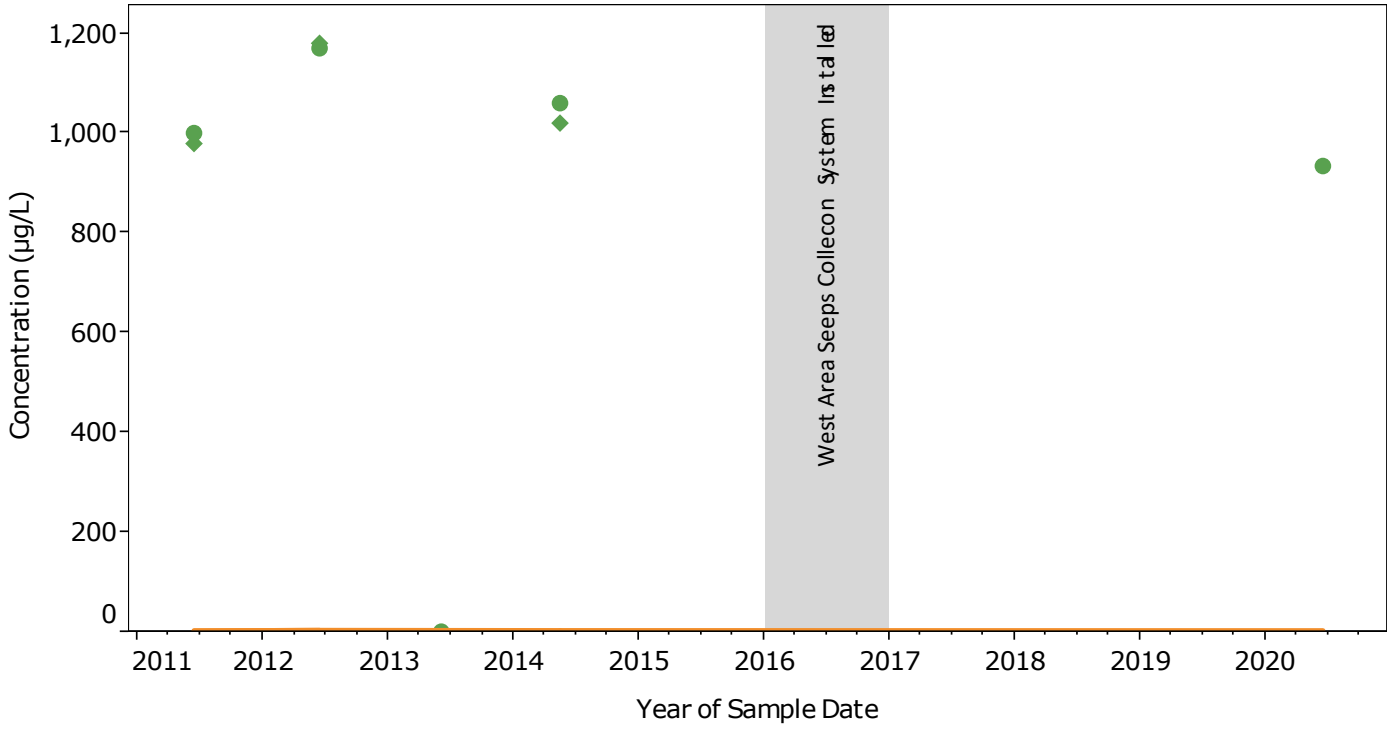
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.

-Non-detect results are shown at half the reporting limit.

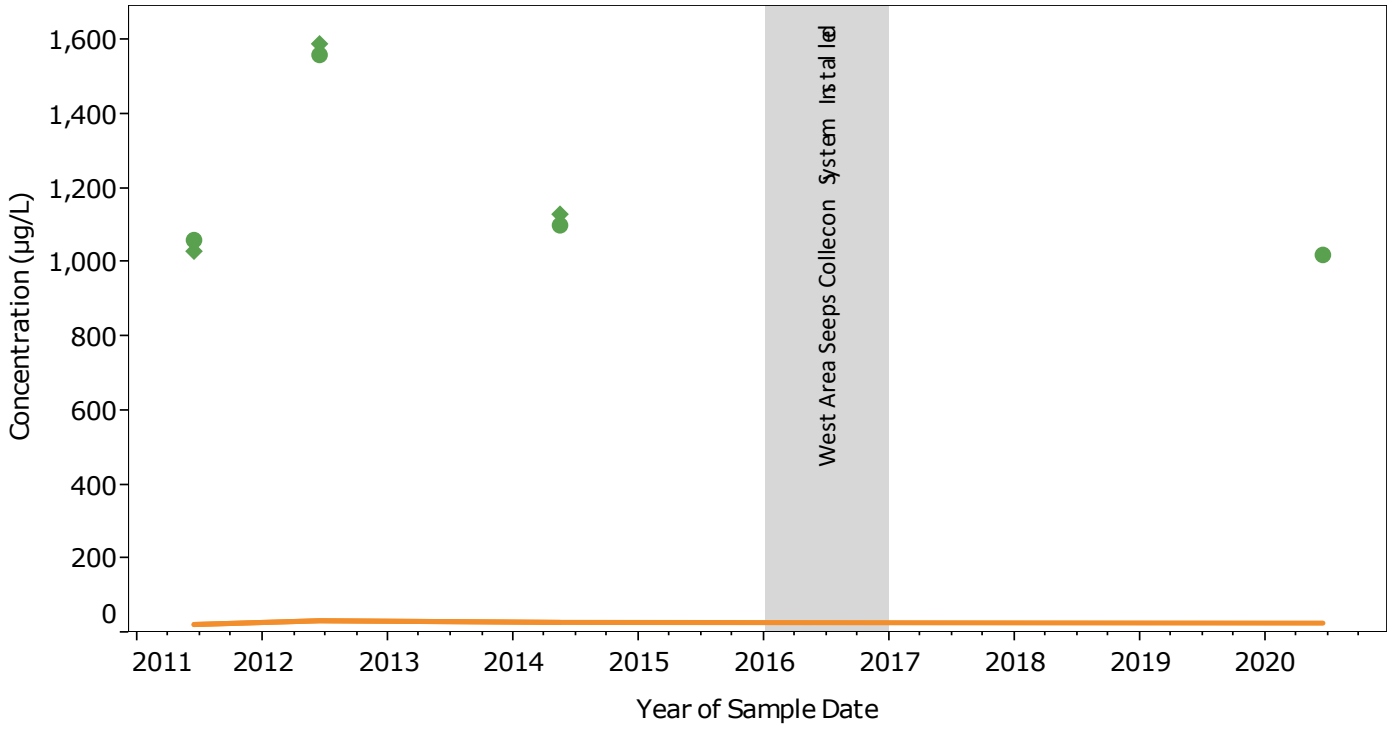
Abbreviation:

µg/L = Micrograms per liter

SP-12 West, Copper



SP-12 West, Zinc



Legend

Detect Results

- Spring Sample, Total
- Spring Sample, Dissolved
- Hardness Adjusted Criteria

Notes:

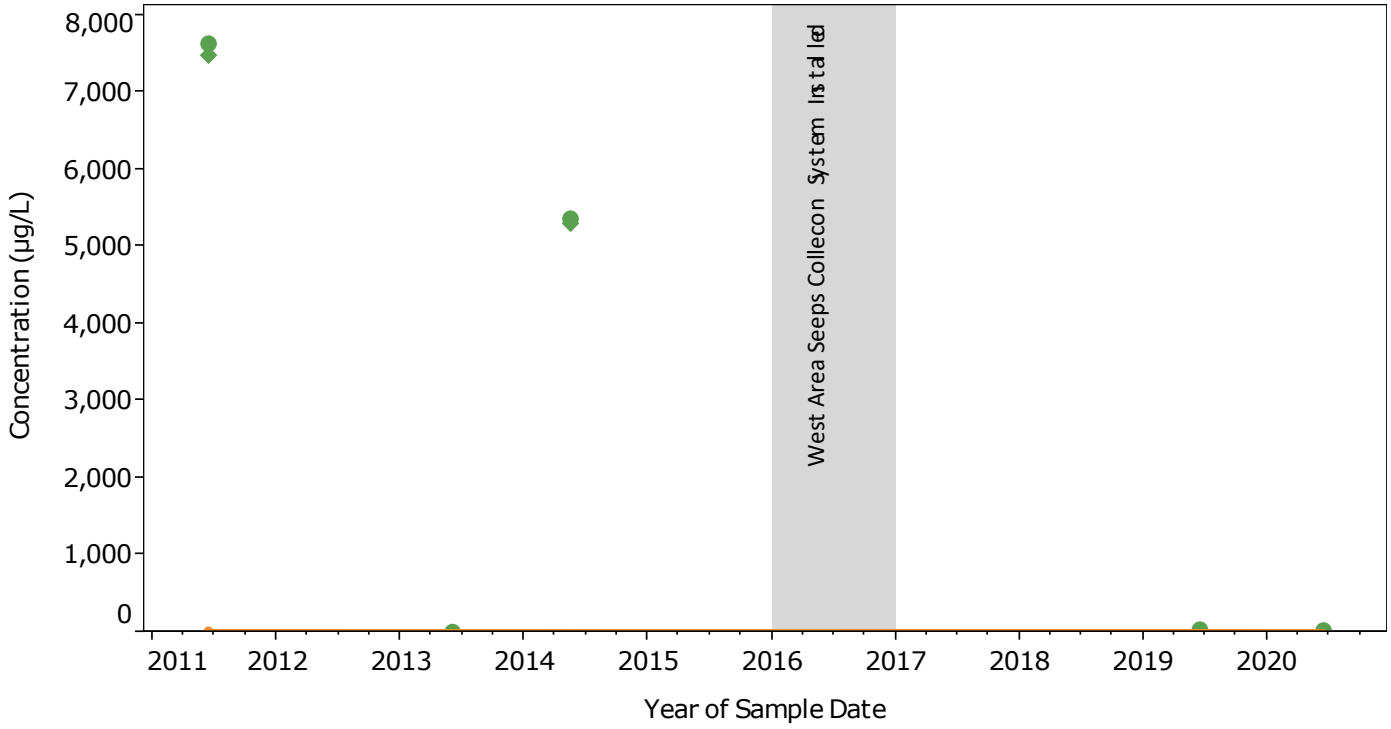
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.

-Non-detect results are shown at half the reporting limit.

Abbreviation:

µg/L = Micrograms per liter

SP-23, Copper



Legend

Detect Results

- Spring Sample, Total
- Spring Sample, Dissolved
- Hardness Adjusted Criteria

Notes:
-For locations where field duplicates were collected, the maximum concentration between the parent and duplicate sample is shown as the result.
-Non-detect results are shown at half the reporting limit.

Abbreviation:
µg/L = Micrograms per liter

Holden Mine Site

Performance Standards Verification
2020 Annual Compliance Assessment Report

Appendix F
2020 Biomonitoring Report

DRAFT

CONFLUENCE
ENVIRONMENTAL COMPANY

Rio Tinto Holden Mine Remediation Project
BIOMONITORING REPORT 2020

Prepared for:

Rio Tinto
January 2021





146 N Canal St, Suite 111 • Seattle, WA 98103 • www.confenv.com

Rio Tinto Holden Mine Remediation Project
BIOMONITORING REPORT 2020

Prepared for:

Rio Tinto
4700 Daybreak Parkway
South Jordan, UT 84095
Attn: Craig Stevens

Authored by:

Alexandra Karpoff, Kelly Muething, and Natalie White
Confluence Environmental Company

January 2021

This report should be cited as:

Confluence (Confluence Environmental Company). 2021. Holden Mine Biomonitoring Report 2020. Prepared for Rio Tinto, South Jordan, Utah, by Confluence, Seattle, Washington.

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ACRONYMS AND ABBREVIATIONS

Acronym/Abbreviation	Definition
Agencies	U.S. Forest Service, U.S. Environmental Protection Agency, Washington State Department of Ecology, and the Yakama Nation (the natural resource trustees agencies)
ABA	Aquatic Biology Associates
COC	chain of custody
Ecology	Washington State Department of Ecology
EPT	Ephemeroptera, Plecoptera, Trichoptera
EPT/EPT+C	Ratio of EPT and EPT + Chironomidae
ft^2	square feet
HBI	Hilsenhoff Biotic Index
HUC	Hydrologic Unit Code
µm	micrometer
µS/cm	microsiemens/centimeter
mg/L	milligrams per liter
mm	millimeter
MTI	Metals Tolerance Index
mV	millivolt
MWH	MWH Americas, Inc.
ORP	oxidation/reduction potential
SE	standard error
Site	Holden Mine Remediation Project site
SOP	standard operating procedure
USFS	U.S. Forest Service
YOY	young of the year

EXECUTIVE SUMMARY

This Biomonitoring Report discusses the results of fall 2020 benthic macroinvertebrate, fish, and habitat surveys on Railroad Creek at Holden Mine located in Chelan County, Washington. The Holden Mine Remediation Project site (Site) is a former underground copper mine, located on the eastern slope of the Cascade Mountains in Chelan County, Washington. Baseline sampling of fish and benthic macroinvertebrate communities in Railroad Creek occurred in 2010 and 2011, prior to the start of remediation activities in 2013. The 2020 biomonitoring data represent the third year of biomonitoring following remedy implementation.

Benthic macroinvertebrate and fish sampling occurred between August 20 and 28, 2020, following standard operating procedures (SOPs) detailed in the Draft Final Performance Standards Verification Plan (Floyd|Snider 2020). In previous years, sampling was conducted at the following 7 stations: RC-6, RC-1, RC-4, RC-2, RC-5A, RC-10, and RC-15. In 2020, the stream was too deep to safely conduct benthic macroinvertebrate and fish sampling at RC-5A and RC-15. Following an evaluation of alternatives, the surface water, porewater, and well point stations SG-9 and SG-12R were selected as alternative biomonitoring stations to RC-5A and RC-15. These stations were selected based on their habitat characteristics, which were similar to the habitat characteristics of other stations, the ability to safely access the stations, and co-location with established water sampling points. Although the primary channel was unsafe for sampling at RC-15, benthic macroinvertebrate sampling was conducted in the side channel of RC-15 to support a comparison to previous years. These changes resulted in collecting data at 8 stations for the benthic macroinvertebrates and 7 stations for fish population.

Out of the 8 total stations sampled, 2 are reference locations (RC-6 and RC-1) that are indicative of the effects of natural environmental variability on the fish and benthic macroinvertebrate community structure in Railroad Creek. These stations are located upstream of the Site and have not been influenced by mining or remediation. These stations are referred to as "reference stations." The remaining 6 stations are distributed downstream from the reference stations. These stations that are adjacent to, and downstream of, the Site are referred to as "Site stations." The Site stations are further characterized as occurring in a habitat disturbance zone (RC-4), a metals impact zone (RC-2 and SG-9), and a recovery zone (SG-12R, RC-10, and RC-15).

Habitat data were collected concurrent with the benthic macroinvertebrate and fish sampling to characterize relevant water quality and physical habitat parameters, and to provide context for the benthic macroinvertebrate and fish population results. Water quality parameters, including temperature, dissolved oxygen, and pH, showed no clear trends between the reference and Site stations. Observed variation was likely related to station-specific and temporal factors, such as ambient temperature, solar exposure, and influence from tributary inputs. Physical data, including substrate, depth, and flow velocity, were similar within and between stations with the expected level of variability for typical of mountain stream environments.

The benthic macroinvertebrate community was sampled at each of the 8 stations by collecting 15 replicate samples distributed as evenly as possible throughout the 100-meter station length. Each replicate was collected by agitating the substrate within a 1-square-foot quadrat for 2 minutes. The replicate samples were then pooled for laboratory analysis. Sixteen biological metrics were used to assess the health of the benthic macroinvertebrate community at each station. The 2020 data from the Site stations were then compared to the data from the reference stations. The 2020 data were also compared to the same biological metrics calculated for prior years. The metrics are grouped into the following categories: (1) productivity, (2) richness, (3) trophic/habit, (4) composition, and (5) tolerance.

Overall, the 2020 benthic macroinvertebrate metrics are similar between the Site and reference stations and indicate an improvement compared to the baseline conditions. The main conclusions of the 2020 evaluation of the benthic macroinvertebrate community include:

- Overall, most Site stations met reference station target thresholds for richness metrics and did not significantly differ from reference stations for the productivity, trophic/habit, composition, and tolerance metrics. Temporal trends for metrics considered to be relatively more sensitive to metals pollution, total taxa, EPT taxa richness, clinger richness, and percent Ephemeroptera, have shown clear signs of improvement at the most impaired stations (RC-2, RC-5A, and RC-10) sampled at baseline.
- Productivity Metric: There were no statistically significant differences in total abundance between the Site and reference stations in 2020.
- Richness Metrics: The 2020 total richness metric was relatively similar across stations. Plecoptera richness at RC-15 and Trichoptera richness at RC-2 differed significantly from reference stations and did not meet the 80% target threshold; however, the values at all stations showed improvement compared to the 2010 baseline values, and 2019 values (except at RC-15). Only the side channel at RC-15 was sampled in 2020 due to safety concerns with sampling in the mainstem, which could represent an environmental variable for the benthic macroinvertebrate results at this station. The Plecoptera and Trichoptera richness results are likely indicators of natural variability, particularly when considered with other metrics suggestive of good- to high-quality stream conditions.
- Trophic/Habit Metrics: There were no significant differences between the refence and Site stations for the trophic/habit metrics. The overall community composition and distribution of trophic strategies and habits in the benthic macroinvertebrate community aligns with expectations for cold-water mountain stream systems.
- Composition Metrics: There were no significant differences between the refence and Site stations for the percent dominant taxon and percent Ephemeroptera metrics. Values for the EPT/EPT+C ratio in 2020 decreased from 2019 values across all stations, and RC-15 differed significantly from reference stations. This result is likely due to natural variability and is not considered to indicate a reduction in habitat quality within

Railroad Creek, particularly when considered with other metrics suggestive of good- to high-quality stream conditions.

- Tolerance Metrics: There were no significant differences between the refence and Site stations for the tolerance metrics. These metrics generally indicate good to excellent stream quality across all stations.

Benthic macroinvertebrate metric variability was most strongly correlated with elevated fine sediment and embeddedness levels, consistent with observations from previous years and predicted responses based on known tolerance levels for different taxa groups. Many benthic taxa can be adversely affected by inputs of fine sediments that fill voids between gravels and cobbles, which reduces benthic habitat complexity. The 2015 Wolverine fire likely continues to influence watershed processes that generate and transport fine sediments through the Railroad Creek, indicating that stream substrate conditions are likely to vary over time as a result of factors independent of Site remediation.

Fish were sampled at 7 stations using a backpack electroshocker protocol outlined in the SOPs detailed in the Performance Standards Verification Plan (Floyd|Snider 2020). As noted above, SG-9 and SG-12R were selected as alternative fish sampling stations to replace 2020 sampling at RC-5A and RC-15. The field team isolated a 100-meter station with block nets and made up to 3 complete electrofishing passes covering the entire station. Each fish collected was identified to species where possible, and fork length and weight measurements were recorded for each specimen.

A total of 289 fish were collected and measured across the 7 sampling stations during the 2020 biomonitoring event. Approximately half of all collected fish were cutthroat trout (*Oncorhynchus clarkii*). Of the remaining fish collected, approximately half (25% of the total) were cutthroat–rainbow trout hybrids and half (23% of the total) were classified as young of the year (YOY), with no physical characteristics enabling visual identification to species. A total of 8 rainbow trout (*O. mykiss*) were collected from 4 stations, with the majority collected from the reference station (RC-6). Rainbow trout composed 3% of the total number of fish observed during 2020 biomonitoring. Fish abundance was lower at the reference stations and at RC-4 in 2020 compared to baseline values, and fish abundance was higher than baseline and similar to the previous years of sampling at RC-2 and RC-10. Fish abundance at SG-9 and SG-12R was higher in 2020 compared to all previous years of sampling at RC-5A and RC-15, respectively, although these results are not directly comparable. The lower fish counts and estimated abundance at the reference stations suggest that the 2020 results represent natural variability in the Railroad Creek fish population and are unrelated to potential mining effects.

The broad distribution of individuals ranging from YOY to mature individuals generally aligned with previous monitoring years and is indicative of a healthy reproducing population.

Overall, the results of the 2020 biomonitoring, particularly the aggregate of benthic macroinvertebrate metric trends, indicate an improvement of downstream conditions in Railroad Creek following site remediation.

1.0 INTRODUCTION

The Holden Mine Remediation Project site (Site) is a former underground copper mine, located on the eastern slope of the Cascade Mountains in Chelan County, Washington. Railroad Creek is a mid-sized mountain stream originating near the Lyman Glacier, located at approximately 6,500 feet in elevation, and flows west to east 21.8 miles to Lake Chelan, at 1,100 feet in elevation (USFWS 2004). The Site is near the midpoint of the watershed approximately 11 miles upstream of Lake Chelan. Contaminant leaching from tailings piles left from past mining activities adversely impacted water quality in the vicinity of the Site, including in Railroad Creek.

The Record of Decision issued in 2012 outlined a remedy with the following action objectives: (1) prevent releases of contaminants from the Site into surface water by containing, collecting, and treating impacted groundwater, and (2) prevent future releases of tailings into Railroad Creek (USFS 2012). A full description of the Site and the selected remedy are provided in the Record of Decision (USFS 2012). The components of the selected remedy designed to achieve these action objectives include:

- Containment, collection, and treatment of groundwater;
- Consolidation and capping of tailings, waste rock, and some impacted soils;
- *In situ* soil remediation in selected areas;
- Surface water and sediment cleanup actions (including modification of the Railroad Creek channel); and
- Institutional controls.

The remediation actions are divided into 2 phases. Phase 1 began in 2013 and was determined by the natural resource trustee agencies—consisting of the U.S. Forest Service (USFS), U.S. Environmental Protection Agency, Washington State Department of Ecology (Ecology), and the Confederated Tribes and Bands of the Yakama Nation (collectively, the Agencies)—to be substantially complete as of December 31, 2018. Phase 1 is still being monitored to measure the success of the remediation actions. Phase 2 construction, which may include an additional section of groundwater barrier wall and corresponding collection system upgradient of the barrier, may be implemented following the findings of Phase 1 monitoring.

This report summarizes the results of benthic macroinvertebrate, fish population, and habitat monitoring surveys conducted in Railroad Creek in August 2020, which is the third year of biomonitoring following implementation of the Phase 1 remedial action. The macroinvertebrate and fish community in Railroad Creek were surveyed in 2010 and 2011 to establish a pre-implementation baseline and provide benchmarks against which to evaluate remediation success (MWH 2012a, 2012b). These surveys were repeated during Phase 1 remedy implementation in 2015 and 2016 (Table 1; Stantec 2016, 2017), and in 2018 and 2019 after Phase 1 implementation was completed (Arcadis 2019, Confluence 2020). Each of the post-

baseline monitoring events occurred after the 2015 Wolverine fire (Section 1.1.2), meaning that fire effects on instream habitat conditions must also be considered when interpreting results. Habitat alterations in Railroad Creek resulting from the remedial action and from the effects of the Wolverine fire are summarized in Sections 1.1 and 1.2, respectively, and are described in greater detail in the 2016 and 2018 biomonitoring reports (Stantec 2017, Arcadis 2019).

The sampling and analysis methods used in the 2020 biomonitoring event are described in Section 2.0; the results of 2020 benthic macroinvertebrate, fish population, and habitat monitoring, and a summary of findings are presented in Section 3.0. Tables and figures supporting the narrative are presented at the end of this report. Appendices A through F provide field data sheets, raw taxonomic date, photos, and supplemental information.

1.1 Remedial Alterations to Railroad Creek

The Phase 1 remedial action included channel and habitat alterations in Railroad Creek and the floodplain and riparian areas adjacent to the Holden Mine tailings piles. These alterations produced both temporary and permanent impacts on stream habitats within and between biomonitoring stations RC-2 and RC-4. A description of the station configuration is provided in more detail below (Section 2.0).

Habitat alterations during Phase 1 to Railroad Creek included:

- Realigning Railroad Creek to the north away from the toe of the tailings pile slope;
- Installing a riprap-protected barrier wall along the south bank of Railroad Creek to capture and redirect groundwater;
- Installing 2 boulder grade control structures perpendicular to the stream flow;
- Installing large woody debris in the stream to increase habitat diversity;
- Placing clean soil on the tailings piles, including within the riparian zone, to promote revegetation; and
- Planting native vegetation on tailings piles, to assist in revegetation and bank stabilization.

1.2 Wolverine Fire

The Wolverine fire started in July of 2015 and burned a substantial portion of the Railroad Creek watershed before it was brought under control in late August. Approximately one-half of the Lower Railroad Creek subwatershed (USGS Hydrologic Unit Code [HUC] 170200090204) was classified as moderate to high soil burn severity (BAER 2015). The Upper Railroad Creek subwatershed (HUC 1700200090203) was impacted to a lesser degree, with approximately 7% of total area classified as moderate or high soil burn severity. Habitat conditions at all biomonitoring stations were impacted by post-fire changes in hydrology and sediment delivery, with the effects increasing on a downstream gradient. Notably, the riparian zones adjacent to stations SG-9, SG-12R. RC-10 and RC-15 (see Figure 1) were burned and most large trees were

killed (Arcadis 2019). Station RC-15 was sampled at its original location directly after the fire in 2015, but in 2016 the sampling station was moved 85 meters upstream to limit crew exposure to hazard trees. The 2016 sampling station is referred as RC-15W (Stantec 2017) and the data from this location are not included in comparisons between years. Arcadis (2019) provides additional detail regarding the effects of the Wolverine fire on sampling activities in 2015, 2016, and 2018.

2.0 SAMPLING AND ANALYSIS METHODS

Benthic macroinvertebrate and fish population data were collected according to the standard operating procedures (SOPs) provided in the Draft Final Performance Standards Verification Plan (PSVP) (Floyd|Snider 2020). Macroinvertebrates, fish, and habitat attributes were surveyed over 100-meter reaches centered on each biomonitoring station from August 20 through August 28, 2020 (Figure 1).

In previous years, sampling was conducted at the following 7 stations: RC-6, RC-1, RC-4, RC-2, RC-5A, RC-10, and RC-15. In 2020, the stream was too deep and swift to safely conduct benthic macroinvertebrate and fish sampling at RC-5A and RC-15. Following an evaluation of alternatives, the surface water, porewater, and well point stations SG-9 and SG-12R were selected as alternative biomonitoring stations to RC-5A and RC-15. These stations were selected based on their habitat characteristics, which were similar to the habitat characteristics of other stations, the ability to safely access the stations, and co-location with established water sampling points. Although the primary channel was unsafe for sampling at RC-15, benthic macroinvertebrate sampling was conducted in the side channel of RC-15 to support a comparison to previous years. These changes resulted in collecting data at 8 stations for the benthic macroinvertebrates and 7 stations for fish population.

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Station SG-9, the 2020 alternative to RC-5A, is located adjacent to, and downstream, of the water treatment plant outfall, between the station RC-2 and station RC-5A. The station has a moderate gradient and also represents creek conditions that could have been affected by metals between the tailings piles to Tenmile Creek. Station SG-12R, the 2020 alternative to RC-10, is located between Tenmile Creek and Sevenmile Creek, similar to RC-10. This station has a relatively mild gradient and is located a few hundred meters downstream of RC-5A, just below the confluence of Tenmile Creek. Figure 1 provides the locations of the previous sampling stations and the 2020 biomonitoring stations.

The specific methods for conducting the benthic macroinvertebrate and fish sampling are summarized in the remainder of this section.

2.1 Habitat

Collection of habitat data helps to provide context for the benthic macroinvertebrate and fish results. Correlation between habitat parameters and biological data indicates that habitat characteristics may influence the structure of the community independent of potential contamination effects. Habitat parameters and water quality metrics were recorded for each of the benthic macroinvertebrate replicate locations. Water quality data were collected with a YSI ProDSS water quality meter. Flow information was collected with an OTT MF Pro flow meter and a top setting wading rod. Photographs of the substrate at each benthic macroinvertebrate sample replicate location were also taken. Specific data collected included:

- Water quality metrics
  - Temperature
  - Dissolved oxygen
  - pH
  - Conductivity
  - Turbidity
- Physical habitat metrics
  - Habitat type (cascade, riffle, or run)
  - Current velocity (at the bottom and at 60% water depth)
  - Water depth
  - Sediment staining
  - Embeddedness
  - Percent sand (0.06 to 2 mm)
  - Percent gravel (2 to 64 mm)
  - Percent cobble (64 to 256 mm)
  - Ferricrete accumulation

The substrate type (e.g., sand, gravel, cobble, and embeddedness) habitat metrics were correlated with benthic macroinvertebrate metrics, at the single station replicate level. Depending on the distribution of the metrics, either a Pearson (for a parametric distribution) or Spearman's (non-parametric distribution) correlation coefficient was calculated. Results of the habitat correlation are provided in Section 3.2.

2.2 Benthic Macroinvertebrates

Methods used to sample and analyze the benthic invertebrate community within Railroad Creek are described in the following sections.

2.2.1 Benthic Macroinvertebrate Collection

Benthic macroinvertebrate collection was conducted to characterize the ecological health of the Railroad Creek system to evaluate the remedy performance. Macroinvertebrate methods in the

SOPs are based on the protocols described by the Pacific Northwest Aquatic Monitoring Partnership as adopted in Ecology (2010) guidance. The macroinvertebrate sampling was conducted at each station prior to fish sampling to minimize substrate disturbance that could bias data collection. Fifteen replicate macroinvertebrate samples were collected in fast-water habitats (i.e., riffles and glides) distributed over a 100-meter-long station. Replicate sample locations were evenly distributed throughout the station as determined by fast-water habitat composition with suitable depths and adequate accessibility for the crew members collecting the sample (i.e., locations with deep or very fast water were avoided due to safety and feasibility considerations). Global positioning system coordinates were collected at each replicate sampling location.

Each sample was collected from the substrate within a 1-square-foot (ft^2) quadrat placed on the streambed with the upper right corner on the georeferenced replicate location, identified by a flagged lead sinker. One field crew member held the quadrat firmly on the bottom, while a second crew member held a D-frame kick net with 500-micrometer (μm) mesh perpendicular to the streamflow just downstream of the quadrat. The first crew member dislodged macroinvertebrates by manually agitating sediment within the quadrat down to a target depth of 15 centimeters for a timed period of 2 minutes. A small brush was used to release clinging specimens from larger stones and debris (Ecology 2010).

After collection, the kick net was taken to a suitable processing area outside of the stream and the sample was concentrated at the bottom of the net using rinse water from the stream. The sample was then transferred to a plastic tray with a partial sieve (500 μm) using rinse water. Large debris, such as stones or wood particles, were inspected for specimens and removed from the sample to the extent practicable. Once the sample was sufficiently rinsed, sorted, and concentrated in the corner of the tray, it was washed into a sample bottle using 95% ethanol. The kick net, brushes, and sieve tray were closely inspected, and remaining specimens were captured and transferred to the sample bottle with tweezers. The sample container was then filled to the brim with 95% ethanol to minimize air bubbles.

2.2.2 Sample Processing and Chain of Custody

Consistent with the SOPs, each sample bottle received a chain of custody (COC) label identifying the station, name, year, replicate number, and "BI" to indicate a benthic macroinvertebrate sample (e.g., RC-1-2020-08BI). Matching COC labels for each replicate location were included on the field form and in the accompanying substrate photos to identify the associated habitat data. At the end of each sampling event, the individual sample bottles were wrapped with plastic film and placed in individual zip-top bags to prevent leakage. The sample bottles were then placed together into large zip-top bags, 1 for each station, for transport to the Confluence Environmental Company office in Seattle, Washington.

The bagged samples and labeled field forms were packaged and delivered to Aquatic Biology Associates (ABA) in Corvallis, Oregon, for taxonomic identification. ABA used the Pacific Northwest Aquatic Monitoring Partnership, Level 2 standard for taxonomic effort and nomenclature. This is consistent with identification standards required by Ecology for biomonitoring projects. The only deviation from the identification standard was that segmented worms (Oligochaeta) were identified to Class, instead of the lowest practical level. This is consistent with the "merge rule" specified in Ecology (2010) guidance.

2.2.3 Data Analysis

Biological metric data were calculated from the raw benthic macroinvertebrate data and summarized by ABA as part of their standard processing output. The metrics were calculated in accordance with the SOPs (Floyd|Snider 2020), and consistent with prior years' metrics selected for evaluation. The results for these metrics are discussed in Section 3.0. A biological metric is an expression of a biological community attribute that responds to human disturbance in a predictable fashion. Each metric describes a different aspect or function of community structure. The metrics presented in this report are listed below by category:

- Productivity
  - Abundance
- Richness
  - Taxa richness
  - Ephemeroptera (E), Plecoptera (P), Trichoptera (T) index, or EPT index
  - Plecoptera richness
  - Trichoptera richness
  - Clinger richness
- Trophic/Habit
  - % Shredders
  - Ratio of scrapers to scrapers + filtering collectors
  - % Clingers
  - % Filterers
- Composition
  - Percent contribution of dominant taxon
  - % Ephemeroptera
  - Ratio of EPT to EPT + Chironomidae (EPT/ EPT+C)[1]
- Tolerance
  - Hilsenhoff Biotic Index (HBI)
  - Metals Tolerance Index (MTI)

1 The metric nomenclature for this ratio has been updated from EPTC to EPT/EPT+C to be consistent with the literature. The EPT/EPT+C ratio is calculated using the same equation as the EPTC ratio reported in the 2019 ACAR (Floyd|Snider 2020).

- % Tolerant taxa

All metrics, except for richness metrics, were evaluated for differences between reference and Site stations using an analysis of variance (ANOVA) test and post hoc pairwise comparisons. Prior to performing the ANOVA test, metrics were evaluated for normality using the Shapiro-Wilks and Brown-Forsythe tests. Normally distributed (parametric) metrics were evaluated using a standard 1-way ANOVA test. Non-parametric metric median values were evaluated using the Kruskal-Wallis Rank Sum test. Where differences were observed with 95% confidence (alpha = 0.05), pairwise tests between reference and Site stations were performed using the Tukey test (parametric) or Dunn's (non-parametric), with p-values adjusted to account for multiple comparisons. If a metric at a Site station differed from both reference stations with 95% confidence, the difference is discussed in Section 3.2. Site stations with metrics that did not differ, or differed from only 1 reference station, are not discussed in detail in this report.

Because richness metrics are calculated for the entire station rather than for each replicate, station means are not available and single-year data do not allow for an analysis of variance. These metrics were instead evaluated for differences between reference and Site stations by comparing richness downstream of Site stations to those of the reference stations. The target richness recovery goal for Site stations is 80% of the mean of the reference station richness, per guidance from Ecology (1997). Results from the benthic macroinvertebrate monitoring are discussed in Section 3.2.

2.3 Fish

Methods used to sample and analyze the fish population in Railroad Creek are described in the following sections.

2.3.1 Fish Sampling

Fish population sampling was conducted in Railroad Creek to provide another *in situ* biotic measure for evaluating performance of the remediation. Fish collection was completed in 7, 100-meter stations in Railroad Creek using 2 Smith-Root Model 12A backpack electroshockers, generally following the electroshocking protocol outlined in Thurow et al. (2004), Roni and Fayram (2000), and Peterson and Wollrab (1999). Block nets with ≤ 1/4-inch mesh were installed at the upstream and downstream ends of each 100-meter station after benthic macroinvertebrate sampling had been completed. The block nets were anchored to the substrate using a combination of metal T-posts and native substrate to ensure that fish were isolated in the sampling area during fish sampling.

The sample team consisted of 2 crews, each with 1 electroshocker and 2 to 3 netters. The team also included 1 fish handler, who placed the netted fish in a bucket. Together, the 2 crews conducted a complete survey of all aquatic habitat within the 100-meter station. The 2 crews began their survey at the downstream block net with 1 crew focusing on the right bank and the

other crew focusing on the left bank. From the downstream block net, the 2 crews proceeded upstream, electroshocking fish, netting them, and placing them into buckets fitted with aerators. Fish were netted and removed from the electrical field immediately upon galvanotaxis. The crews attempted to remain roughly in line with each other, while ensuring the full wetted width was sampled, as they maneuvered upstream to avoid missing fish that may pass between them.

The crews made 2 or 3 passes of the blocked stream station. A third pass was completed only if the number of fish collected in the second pass was greater than 40% of the total fish collected in the first 2 passes combined. The time spent completing each pass was recorded to provide an approximate measure of catch per unit effort.

Water quality data were also collected prior to fish sampling to select appropriate electroshocker settings. Measured parameters included temperature, conductivity, dissolved oxygen, and pH. Initial settings used were:

- Pulse Width: 500 microseconds
- Pulse Frequency: 40 Hertz
- Duty Cycle: 12%
- Volts: 800

Voltage was adjusted between 800 and 900 volts, depending on water conditions and the observed response of fish. Pulse width, pulse frequency, and duty cycle generally remained constant across all sampling stations.

During each pass, captured fish were held in aerated buckets until processing. Collected fish were periodically transferred from buckets carried by the fish handler to streamside coolers outfitted with aerators to keep the density of collected fish low. Young of the year (YOY) were kept segregated from other size classes to avoid predation on the smaller size classes.

2.3.2 Sample Processing

All fish were processed after the completion of each pass and released outside of the block nets to minimize time in captivity. Fish were lightly anesthetized for measurement by placing 2 or 3 fish into water with dissolved Alka-Seltzer © tablets until the fish could be safely handled. Each fish was identified to species, when possible; the YOY lack the necessary features for visual identification and are therefore grouped by size class for the remainder of this report. Fork length (to the nearest millimeter [mm]) and weight (to the nearest tenth of a gram) measurements were recorded for each specimen. Photographs were taken of representative individuals of each species. Following measurement, fish were placed in a separate cooler filled with clean stream water and at least 2 aerators for recovery prior to release back to the stream.

2.3.3 Data Analysis

The fish abundance estimate for each station was calculated using either the Seber-LeCren 2-pass removal method (Seber and Le Cren 1967) or the multi-pass method, with the special case for 3 passes (Seber and Whale 1970). The equations for both methods are provided below. An associated probability of capture (catchability; p) is also calculated for each station. If $p < 0.2$, catchability is low, indicating the data do not meet the assumptions of these tests, and associated population estimates are unreliable.

The Seber-LeCren 2-pass removal equation:

$$N = \frac{{C_1}^2}{C_1 - C_2}$$

Where:
N = abundance estimate
C_1 = number of fish caught on pass 1
C_2 = number of fish caught on pass 2

The multipass removal equation, for the special case of 3 passes:

$$N = \frac{6X^2 - 3XY - Y^2 + Y(Y^2 + 6XY - 3X^2)^{1/2}}{18(X - Y)}$$

Where:
N = abundance estimate
$X = 2C_1 + C_2$
$Y = C_1 + C_2 + C_3$
C_1 = number of fish caught on pass 1
C_2 = number of fish caught on pass 2
C_3 = number of fish caught on pass 3

The distribution of fork lengths of collected fish was also considered during analysis. Fork length can be used as a general proxy for fish age. Visualization of the measured fork lengths can aid in the understanding of the size or age classes that make up the broader fish population in Railroad Creek and how those age classes are distributed within and between stations.

3.0 INVESTIGATION RESULTS

This section summarizes biomonitoring data collected and analyzed in 2020. Benthic macroinvertebrate metrics were calculated and compared across the 8 stations sampled in 2020. Where differences from reference stations were identified, trends through time were assessed. Fish population data from the 7 stations sampled in 2020 are also summarized and compared with data from past monitoring years. Where appropriate, correlations with habitat data were calculated to evaluate relationships between habitat parameters and the metric results for benthic invertebrates. Any deviations from previously described methods or variations that impact direct comparisons through time are also discussed. Field forms and calibration logs are included in Appendix A and a photo log of representative habitat at the stations and benthic macroinvertebrate replicate locations is provided in Appendix B.

3.1 Habitat

Prior to benthic macroinvertebrate sampling at each station, habitat units were mapped consistent with the USFS Stream Inventory Handbook: Level I and II (USFS 2012, Appendix A). The habitat evaluation included identification of stream characteristics including station gradient, approximate wetted area, habitat type such as riffles, glides/runs, and pools, average water depth and velocity, instream woody debris, and riparian vegetation; collection of water quality data; and estimation of substrate conditions. Defining features of each station are detailed in Table 2, average water quality parameters measured at each station are provided in Table 3, and average physical habitat data are provided in Table 4.

In general, all stations were dominated by fast turbulent (i.e., riffle) and fast non-turbulent (i.e., glide/run) water, with scour pools of various sizes present along banks and occasionally mid-channel. Average water depths, velocity, and areas of available habitat, as approximated using wetted widths, measured in 2020 were similar to past years of post-remedial sampling, with minor fluctuations expected in a dynamic mountain stream. Large woody debris numbers were catalogued in each station and ranged from 3 measured in RC-2 to 65 measured in SG-9, which was 3 times greater than all other stations. Most stations included some overhanging riparian vegetation, though RC-2 had very little and overhanging vegetation at RC-4 was primarily limited to the left bank. In contrast, RC-10, SG-9, and SG-12R all included a combination of substantial overhanging vegetation, deeper pools, large woody debris, and side channels to provide habitat complexity.

Water quality parameters, including temperature, dissolved oxygen, pH, oxidation/reduction potential (ORP), conductivity, and turbidity were measured at each station alongside the benthic macroinvertebrate samples. In 2020, temperature ranged from 11.2 degrees Celsius (°C) at SG-12R to 13.5 °C at RC-6; dissolved oxygen ranged from 9.3 milligrams per liter (mg/L) to 10.0 mg/L at RC-2 and RC-10; pH ranged from 6.7 at SG-12R to 7.3 at 3 stations, RC-4, RC-10, and RC-15; conductivity ranged from 20.1 microsiemens per centimeter (µS/cm) at RC-2 to 60.3 µS/cm

SG-12R; and turbidity ranged from 0 nephelometric turbidity units (NTU) at RC-10 to 1.6 NTU at SG-9. The ORP exhibited the most variation of all parameters measured, ranging from 67.9 millivolts (mV) at SG-9 to 192.6 mV at RC-15. In general, water quality data are generally consistent within and between stations, and measured parameters exhibit no clear downstream trends. Average water quality parameters measured at each station are provided in Table 3.

Table 4 presents physical habitat data including average depths, flow velocity, substrate size classes, and percent embedded depth. Similar to water quality data, the substrate data are consistent within and between stations with some variability associated with the channel planform and habitat type at each replicate location. Similar to past years of monitoring, substrate conditions are relatively uniform, which is a function of both the creek environment and the targeted glide and riffle habitats sampled at each station for macroinvertebrate replicates. Most of the stream substrate fell within the gravel or cobble size ranges, with boulder-sized substrate occasionally to commonly present. Few fine sediments (<2 mm diameter) were observed at most stations. On average, the highest percentage of fines was found at SG-9 (11%), while no fines were found at RC-6, RC-4, and RC-15. Mean embedded depth ranged from 19% at RC-6 to 4% at RC-15. No noticeable downstream trends in substrate data were observed during the 2020 monitoring event. A summary description of the habitat characteristics for each station is provided in Appendix A.

3.2 Benthic Macroinvertebrates

Sixteen biological metrics were calculated from the benthic macroinvertebrate data at each monitoring station in accordance with the SOPs, and consistent with prior years' metrics selected for evaluation (Floyd|Snider 2020). Benthic macroinvertebrate metrics represent different functions within the biological community and generally respond to human disturbance in predictable ways. Metrics in this report are grouped into the following categories based on these functions: productivity, richness, trophic / type, community, and tolerance. Explanations of each metric and its relevance are provided in the sections below. Field data forms can be found in Appendix A. The benthic macroinvertebrate photo log and raw taxonomic data are included in Appendices B and C, respectively.

Macroinvertebrate assemblages can exhibit predictable responses to different types of environmental stress. However, the sensitivity of individual metrics varies with the type of environmental stress. Some metrics are known to be good indicators of stress associated with metals contamination, while other metrics are more sensitive to organic/nutrient enrichment, excessive sediment deposition, temperature or dissolved oxygen conditions, or partial dewatering. It is important to note that each metric alone represents only 1 aspect of the community structure. It is the suite of metrics evaluated together that provides an indication of the health of the ecological system. The documented response of each of these metrics to impacts from metals, according to a review of available literature, and the environmental

significance of the response is summarized below and detailed further in Table D-1 (Appendix D). Natural environmental variation (seasonality, storm events, debris inputs, fire, etc.) and changes in elevation must also be considered when analyzing macroinvertebrate metrics, particularly in oligotrophic, dynamic mountain stream systems (Clements 1994).

The macroinvertebrate metrics do not conform to a normal or log-normal data distribution. Differences between stations were evaluated using the non-parametric Kruskal-Wallis Rank Sum test. Where differences were observed between stations with 95% confidence (p-value < 0.05), pairwise comparisons were performed using Dunn's test, with the p-value adjusted to control the false discovery rate, using the Benjamini-Yekutieli adjustment. For metrics with significant pairwise comparisons between reference and Site stations, further details regarding results over time are included to evaluate against baseline conditions.

The metrics associated with richness are intended to represent macroinvertebrate community structure at the station scale and are calculated by pooling the samples for all replicates. Because the replicate samples for richness are pooled, statistical tests for within-station variance were not performed, but Site stations were compared to a threshold value of 80% of the mean of the reference stations (referred to hereafter as the 80% threshold).

The metrics with statistical differences between the reference and Site stations or that resulted in values below the 80% threshold are summarized below, with the relevant stations in parentheses.

- Plecoptera Richness (RC-15)
- Trichoptera Richness (RC-2)
- EPT/EPT+C Ratio (RC-15)

Metric results for each station and statistical comparisons between stations are discussed further in the following sections. Table 5 provides the results of comparisons between reference and Site stations.

Any interpretation of macroinvertebrate community structure data in Railroad Creek must consider the effects of the Wolverine fire on ecological processes. Fires can have both short-term and long-term effects on sediment dynamics and nutrient cycling that can measurably influence community structure (Bixby et al. 2015, Harris et al. 2015). Increased nutrient and sediment delivery in burned catchments can lead to an increase in overall abundance, but the community structure will typically shift toward disturbance-tolerant taxa (Harris et al. 2015, Martens et al. 2019). Fire effects on macroinvertebrate community structure can be compounded by seasonal and interannual flow variability, potentially delaying recovery (Verkaik et al. 2015). Broadly speaking, macroinvertebrate community structure is dynamic and varies spatially and temporally in response to disturbance events like fire. As a consequence, any apparent trends in

community structure should be interpreted with caution, particularly when making inferences about effectiveness of Phase 1 remedial actions.

3.2.1 Productivity Metric

Total abundance per square foot is the only metric used in this report to characterize macroinvertebrate community productivity. The quartile distribution of replicate abundance per square foot for each station is presented in Figure 2, and mean abundance per square foot for each station is presented in Table 6[2].

Macroinvertebrate abundance in cold, oligotrophic, mountain streams commonly ranges from about 90 to 450 individuals per ft^2 and variation within and between stations can be large when comparing a single standing crop estimate between years (Wisseman 2020). Although abundance can be inhibited by metals pollution, the metric is inherently variable, and is not always a reliable indicator of metals impacts (Karr and Chu 1997). The natural variability inherent to the metric must be considered before inferring patterns from the data for a single year.

Mean total abundance at the Site stations ranged from 90 (RC-15) to 148 (RC-2) individuals per square foot. Reference stations had mean total abundance values of 104 and 139 individuals per square foot. There were no statistically significant differences in total abundance between the Site and reference stations in 2020 (Table 5). Additionally, mean total abundance at all stations was within the expected range for a cold, oligotrophic, mountain stream. The general trend over time indicates increased abundance from baseline at all stations (Appendix E, Figure E.1), and the most impaired stations during baseline (RC-2 and RC-5A) show marked increases in this metric.

3.2.2 Richness Metrics

Richness metrics characterize the benthic macroinvertebrate community structure. These metrics can be useful indicators of exposure to various forms of disturbance. In general, higher richness values are observed in habitats that have not been compromised by external stressors. The richness metrics presented in this report include total taxa richness; EPT index; Plecoptera richness; Trichoptera richness; and clinger richness. These metrics were calculated for each station and represent total taxa counts based on the highest practicable level of identification.

Each of the composite metrics (i.e., the richness metrics other than total taxa richness) represents types or groups of taxa that are characteristically found in specific habitat types and have varying degrees of sensitivity to human disturbance and/or pollution, as well as natural environmental variability. For example, the majority of Ephemeroptera (i.e., mayflies) are

[2] Note that median values for each station are shown on boxplot figures, while weighted means are presented in the tables to be consistent with previous reporting. Additionally, because all metrics did not meet normality criteria, statistical tests compared station median values, rather than means.

grazers and include many taxa that are sensitive to metals and other pollutants. Many Plecoptera taxa (e., stoneflies) are predators or shredders, which are sensitive to changes in sedimentation and organic litter, respectively. Trichoptera (i.e., caddisflies) display a range of specialized trophic and habit strategies, and taxa richness tends to decrease with reduced habitat complexity.

The 2020 metric values for Site stations were compared to the 80% threshold for the reference stations. Results are summarized in Tables 7-9 and Figures 3-8. Figure 3 displays the EPT index as a component of total taxa richness. Figure 4 displays 2020 total taxa richness for each station relative to the 80% threshold. The metric, evaluation method, and station ID for those stations that did not meet the 80% threshold are presented in Table 5.

Four of the 6 Site stations (RC-4, SG-9, SG-12R, and RC-10) met the target threshold for all 5 of the richness metrics (Figures 4-8). RC-15 did not meet the 80% threshold for Plecoptera richness and RC-2 did not meet the 80% threshold for Trichoptera richness (Figures 6 and 7, respectively). As indicated in Section 2.1, only the side channel at RC-15 was sampled in 2020 due to safety concerns about the mainstem station. The difference in habitat and location of sampling could represent an important environmental variable for Plecoptera richness at RC-15. The general findings based on the richness metrics, include:

- Total taxa richness was similar across all Site and reference stations, ranging from 70 to 81 (Table 7).

- EPT taxa made up approximately 50% or more of all taxa present at a given station (Figure 3). The values for the EPT index were similar across all Site and reference stations, ranging from 39 to 48 taxa.

- For all Site stations except RC-15, Plecoptera richness was greater in 2020 compared to baseline values in 2010 and 2011. Plecoptera richness at RC-15 decreased from 2019 to 2020 by 7 taxa (Table 8 and Figure 9). The range of Plecopteran richness values across stations observed in 2020 is consistent with the range observed in previous years. All other stations show a general trend of increased Plecoptera taxa richness from the baseline values. Plecoptera richness has been shown to decrease in response to metals due to associated changes in the water chemistry and food resources (Fore 2002, Clements et al. 2000) and Plecopterans are typically the first to disappear in response to human influences such as metal pollution (Puget Sound Benthos 2020). When considered along with previous years' Plecoptera richness results and the other 2020 metric results at this station, the low value for Plecoptera richness at RC-15 relative to the reference station suggests an influence of the different habitat type (i.e., side channel) sampled at this station or natural variability.

- Trichoptera richness has varied over time, but all stations had values in 2020 that were greater than or equal to baseline values in 2010 and 2011 (Table 9 and Figure 10). Additionally, the range or variation of the data across stations (8 taxon) is consistent with the range observed in 2019 (7 taxon). Trichoptera richness increased from 2019 to 2020 at 3 Site stations: RC-4, RC-10, and RC-15. Trichoptera richness decreased from 2019 to 2020 at 1 Site station (RC-2) and both reference stations. Only RC-2 did not meet the target threshold for Trichoptera richness, but the number of taxa in 2020 (10) still represents an increase from the baseline values in 2010 (3 taxon) and 2011 (6 taxon). Trichoptera richness has been reported to have a variable response to metals (Clements 1994, Roline 1988), which is enabled in part by the variation in trophic strategies and habits within the Trichoptera order. Habitat complexity is an important variable to consider when evaluating Trichoptera richness as an indicator of metal pollution due to the potential for confounding factors. Clinger richness was similar across all Site and reference stations, ranging from 31 to 40 (Table 7)

- The similarity of the results for total taxa richness and EPT taxa across stations indicates that habitat is similar between stations and suggests that Site stations are showing characteristics of recovery relative to reference stations.

- The overall trend for total taxa, EPT taxa, and clinger richness show an increase from the baseline at all stations (Appendix E, Figures E.2 - E.4). The most impaired stations sampled during baseline (RC-2, RC-5A, and RC-10) show marked increases in these metrics.

3.2.3 Trophic/Habit Metrics

Trophic and feeding habit metrics used in this report include percent filterers by abundance, percent shredders by abundance, percent clingers by abundance, and the ratio of scrapers to scrapers plus filterers. These metrics quantify a range of trophic/habit strategies represented in the benthic macroinvertebrate community and the relative abundance of specialist versus generalist feeders. These metrics can be used to characterize general invertebrate community structure for a given environment and indicate changes in community structure that are related to disturbance. For example, shredders typically co-dominate with filterers higher in a stream system where coarse organic matter is more abundant, while the dominance shifts to filterers downstream where the nutrient regime shifts toward fine particulate organic matter (Vannote et al. 1980). Scrapers and shredders are specialized feeders that are more sensitive to changes in environmental conditions, while filterers as a group are generalist feeders and more tolerant of environmental variability. Clingers are also specialized feeders, and taxa in this category tend to be sensitive to fine sediments. The ratio of specialized feeder to generalist feeders tends to decrease with exposure to pollution and disturbance-related environmental stressors and is an indicator of these kinds of effects.

Table 10 presents average trophic and feeding habit values for each Site and reference station weighted by relative abundance. Median metric values for the Site stations were statistically compared to median metric values for the reference stations, due to the non-parametric nature of the data. The results of this comparison are presented in Table 5. No Site stations were significantly different from both reference stations for the trophic and feeding habit metrics. While trophic and feeding habit metrics can have mixed responses to metals, the lack of a statistical difference suggests that habitat and the benthic macroinvertebrate community are similar across the sampled stations.

Percentages of shredders ranged from 4.18% to 8.19% (Figure 11). The percentage of clingers ranged from 42% to 70% (Figure 12). The percentage of filterer taxa was low (between 0.21 and 5.88%) across all stations in 2020 (Figure 13), which is consistent with expected community structure in an oligotrophic mountain stream environment. The ratio of scrapers to scrapers plus filterers was high across all stations, ranging between 0.8 and 1.00, showing a predominance of scrapers relative to filterers in the system (Figure 14). The overall trends for trophic/habit metrics at all stations over time are shown in Figures E.5 - E.8 (Appendix E). These trends show a marked increase in the ratio of scrapers to scrapers plus filterers and percent clinger metrics for the most impaired stations sampled during baseline (RC-2 and RC-5A).

3.2.4 Composition Metrics

The metrics quantifying the composition of the benthic macroinvertebrate community include percent contribution of the dominant taxon, percent Ephemeroptera, and the EPT/EPT+C ratio. EPT/EPT+C is the ratio of EPT (pollution sensitive) abundance divided by the sum of EPT abundance and Chironomidae (pollution-tolerant midges) taxa abundance. These metrics provide a measure of community diversity and potential indicators of environmental stress. The percent contribution of the dominant taxon typically increases as community diversity decreases, and can be an indicator of environmental stress, particularly metals (Karr and Chu 1997). Percent Ephemeroptera tends to decrease with increasing stress (Wiseman 2003). Ephemeroptera are sensitive to most types of human influence, so a lower percentage can indicate that community structure has been impacted by contamination, disturbance, or other environmental stressors (Puget Sound Stream Benthos 2020). However, some Ephemeroptera families are relatively tolerant of metals, and in cases where large numbers of these tolerant taxa are present, a high percentage of Ephemeroptera may not always indicate healthy stream conditions (Clements and Kiffney 1994). The EPT/EPT+C ratio has also been shown to decrease in response to stress, as the abundance of more-tolerant chironomids increases relative to the abundance of more-sensitive EPT taxa (McGuire 2009).

Average composition metric values weighted by abundance are presented in Table 11 and the data are displayed in Figures 15-18. Percent dominant taxa and percent Ephemeroptera over time are shown in Figures E.9 and E.10, respectively (Appendix E). Percent contribution of the dominant taxon and percent Ephemeroptera values for the Site stations were not significantly

different from the reference stations in 2020 (Table 5). Only 1 station (RC-15) had a significantly lower EPT/EPT+C ratio compared to both reference stations. However, as indicated in Section 2.1, only the side channel at RC-15 was sampled in 2020 due to safety concerns about the mainstem station. The difference in habitat and location of sampling could represent an important environmental variable for the EPT/EPT+C ratio at RC-15.

The general findings based on the composition metrics, include:

- Percent contribution of the dominant taxon ranged from 19% to 28% at the Site stations and from 21% to 33% at reference stations (Table 11 and Figure 15). Metric values increase with environmental stress. Statistical analysis showed some significant differences between Site stations, but not between the Site stations and reference stations.

- Percent Ephemeroptera ranged from 34% to 53% at the Site stations and from 45% to 56% at the reference stations (Table 11 and Figure 16). Metric values decrease in response to environmental stress. Statistical results did indicate significant differences between Site and reference stations for percent Ephemeroptera, but no one Site station differed significantly from both reference stations. Statistical analysis also showed some significant differences between Site stations. The most impaired stations during baseline sampling (RC-2, RC-5A) show marked increases in the percent Ephemeroptera metric over time.

- The EPT/EPT+C ratio ranged from 0.67 to 0.88 at the Site stations and from 0.88 to 0.87 at the reference stations (Table 12). Metric values decrease in response to environmental stress, due to the greater abundance of more-tolerant chironomids as compared to the more-sensitive EPT taxa (McGuire 2009). Values decreased between 2019 and 2020 at all stations, including the reference stations; however, there is an increasing trend since baseline sampling. Over the course of the monitoring efforts of Railroad Creek, the large majority of EPT/EPT+C values at all stations have been greater than 0.75 (Table 12 and Figure 18), which represents a proportional distribution of EPT taxa relative to EPT and Chironomidae taxa. As noted above, the EPT/ETP+C ratio of 0.67 at RC-15 was the only Site result that was significantly lower than the EPT/EPT+C ratios at both reference stations. Differences in the area sampled in 2020 compared to previous years may have biased the results. In general, this metric does not offer strong interpretive power for moderately impaired to non-impaired sites (McGuire 2009).

- Compared to 2019, the abundance of chironomids increased and the abundance of EPT taxa decreased slightly at all Site and reference stations in 2020. The combination of these shifts resulted in the observed decrease of EPT/EPT+C in 2020. Figure 19 highlights the change in the relative abundances of EPT and chironomid taxa over time at each

station. Natural variability, such as increased detrital material, could have also favored a shift toward chironomid community growth in 2020, and could have been captured in an earlier sampling event in 2020 as compared to 2019 (August vs. September).

3.2.5 Tolerance Metrics

Tolerance metrics include the HBI, the MTI, and percent tolerant taxa by abundance. These metrics provide information about the prevalence of disturbance- and pollution-tolerant species in the benthic macroinvertebrate community. The HBI is scored on a scale from 0 to 10, with higher values indicating a higher proportion of the community is composed of organic pollution-tolerant organisms (Puget Sound Stream Benthos 2020b). Like the HBI, the MTI is scored on a scale from 0 to 10, and higher values indicate that a greater proportion of the community is composed of metals-tolerant organisms (Puget Sound Stream Benthos 2020c). It is important to note that the MTI metric was developed for the Clark Fork River basin (Ingman et al. 1990, McGuire 1987, 1989), a large river system that differs in community composition from Railroad Creek. Metals tolerance values are only available for some taxa in Railroad Creek, meaning that the MTI may not accurately represent the actual distribution of tolerant versus intolerant taxa. The percent tolerant taxa metric is based on an ordinal taxa tolerance rating scale developed by ABA that considers the sensitivity of representative taxa to water temperature and dissolved oxygen levels, with higher percentages representing increasing levels of pollution tolerance.

HBI, MTI, and percent tolerant taxa metric values for the Site and reference stations are presented in Table 13 and Figures 19-21, and statistical comparisons of Site station scores to reference stations are summarized in Table 5. There were no significant differences between the Site stations and both reference stations for these metrics. Metric values over time are shown in Figures E.11 - E.E.13 (Appendix E).

The general findings based on the composition metrics, include:

- The 2020 HBI values ranged from 2.95 to 3.72 at the Site stations and from 2.51 to 3.16 at the reference stations (Table 13 and Figure 20). These values indicate that organic pollution-tolerant organisms are a relatively small component of community structure across all stations. All stations had HBI values below 4.5, indicating either very good or excellent water quality across all stations (Hilsenhoff 1987).

- MTI values in 2020 were also relatively low, ranging between 1.39 and 1.72 at the Site stations and from 1.31 to 1.40 at the reference stations (Table 13 and Figure 21). The low overall range of MTI values over the entire data record suggests that metals-tolerant organisms are a relatively small component of macroinvertebrate community structure in Railroad Creek. McGuire (2006) reports MTI values for communities dominated by species intolerant of metals are less than 4, while values for communities composed of

only the most metals-tolerant species approach 10. However, as noted above, the MTI metric for Railroad Creek is an incomplete indicator of community sensitivity because metals tolerance ratings are available for only a subset of observed taxa (an average of 40% across all stations).

- Percent tolerant taxa by abundance ranged from 0.81% to 1.60% at the Site stations and from 0.58% to 1.25% at the reference stations (Table 13 and Figure 22). These low percentages suggest that a relatively small component of the macroinvertebrate community in Railroad Creek is tolerant to changes in water temperature and dissolved oxygen levels.

- The percent tolerant and MTI metrics show a clear downward trend from baseline conditions for most stations, indicating a downward trend in the proportion of the community composed of pollution-tolerant organisms.

3.2.6 Habitat Correlations

Benthic macroinvertebrate metrics were correlated with substrate composition (e.g., percent sand, gravel, cobble) and embeddedness at the replicate level to provide additional context for interpreting the macroinvertebrate results. Substrate composition and embeddedness are useful covariates because they are unlikely to vary considerably over the summer growth period that supports macroinvertebrate community structure. Other replicate-level habitat variables, such as water depth and flow velocity, are not as useful as covariates because they vary day to day and sometimes hour to hour.

Substrate and embeddedness correlation results are presented in Table 14. A Spearman's correlation coefficient was used because the benthic macroinvertebrate metrics have a non-parametric distribution. The strongest correlation coefficient calculated was -0.37 for percent fines/sand and Trichoptera richness. Percent fines/sand and percent embedded depth were inversely correlated with most richness and trophic/habit metrics, and positively correlated with percent dominant taxa and HBI. Total richness and clinger richness were correlated with percent boulder, while percent shredders was positively correlated with percent cobble.

Consistent with the previous statistical evaluations and predicted responses, macroinvertebrate metrics in Railroad Creek are influenced by fine sediments that fill voids between gravels and cobbles, reducing variety and complexity of the benthic habitat. Sediment dynamics in the watershed are expected to have been influenced by the effects of the Wolverine fire. Specifically, the fire has likely increased the delivery of sand and fine sediments (6 mm diameter and smaller) to the stream channel, particularly in stations where the riparian zone was burned, which predominate downstream of the Site. These sediments are being actively transported and distributed throughout the Railroad Creek system, and habitat suitability for certain

invertebrate species has likely been affected in areas exposed to elevated fine sediment deposition.

3.3 Fish

A summary of the 2020 biomonitoring findings for observed fish species, size class distribution, and abundance estimates at each station is provided in this Section. Historical findings are discussed briefly as well. Water quality parameters collected at each station prior to fish collection are presented in Table 15. Electroshocker settings for each station are presented in Table 16.

When reviewing these results, it is important to recognize that fish population dynamics are multifaceted and influenced by several factors. Trout abundance in general naturally fluctuates over time in mountain streams, primarily in response to environmental factors such as overwintering conditions, spring floods, and low flow periods. Population abundance and size distribution at the Site stations are influenced by annual variations in site fidelity, maturity, fecundity, and mortality rates and the effect of variable habitat conditions on dispersal behavior and carrying capacity. Total abundance and age composition will change in response to these variables at the watershed scale. Confounding factors, like the effects of fire on watershed ecology, sediment and wood inputs, and reproductive life history strategies (e.g., resident vs. adfluvial) will alter these dynamics. The inherent natural variability of trout populations in mountain watersheds underscores the importance of relying on the full data record for the multi-year biomonitoring effort and other available lines of evidence when drawing conclusions about remedial effectiveness on fish.

The following factors should be considered when interpreting the 2020 biomonitoring results:

- Due to increased water depths and unsafe sampling conditions, fish were not collected in 2020 from RC-5A and RC-15. However, 2 substitute Site stations – SG-9 and SG-12R – were selected as alternative biomonitoring stations sampled instead to ensure a similar proportion of Railroad Creek was sampled in 2020 compared to previous years of biomonitoring.

- Fish sampling took place between August 20 through August 28, 2020, which was approximately 1 month earlier than previous sampling events (Table 1). Because there are seasonal differences in the movement and location of fish, the difference in sample time could influence the results from the 2020 biomonitoring effort as compared to previous sampling events.

- Ecological processes, such as increased wood loading and associated habitat formation, in Railroad Creek are evolving in response to the effects of the 2015 Wolverine fire.

3.3.1 Fish Abundance

A total of 289 fish were collected and measured from the 7 sampling stations during the 2020 sampling event (Table 17). Approximately half (49%) of all collected fish were cutthroat trout (*Oncorhynchus clarkii*). Of the remaining fish collected, approximately half (25%) were cutthroat–rainbow trout hybrids, and half (23%) were classified as YOY with no physical characteristics enabling visual identification to species. A total of 8 rainbow trout (*O. mykiss*) were collected from 4 stations, but were collected primarily from the farthest upstream station, RC-6. Rainbow trout represented 3% of the total number of fish observed during 2020 biomonitoring. Seventy-five percent of all fish collected in 2020 were collected from the 3 Site stations located downstream of the tailings piles: SG-9 (24%), SG-12R (33%), and RC-10 (18%), which all had a combination of relatively lower slope gradients and higher large woody debris counts. Nearly all YOY were collected at these stations, except for 1 YOY collected at RC-1 and RC-4, each. No YOY were collected at RC-6 or RC-2. The prevalence of YOY at the downstream stations is likely associated with increased availability of shallow margin habitat, as discussed further in Section 3.3.2. RC-1 included a side channel that ran the length of the station, but it was not sampled due to dense channel-spanning vegetation that rendered it inaccessible.

Although not a component of fish population sampling, a total of 91 trout were captured in the reconstructed channel of Copper Creek. Though fish migration into Copper Creek could result in mortality by stranding, it is not considered an influence on the fish population results in the sampling stations. The sampling methodology is designed to assess the relative populations within and between stations over time, and not to assess the trout population of Railroad Creek as a whole. Copper Creek is also likely one of many accessible habitats within the watershed that could contribute to stranding mortality.

The fish abundance in Railroad Creek was estimated (i.e., as a station-scale population) at the Site and reference stations using standard removal models, as described in the SOPs as well as deviations from the SOPs (Arcadis 2019). Fish were collected using 2 electrofishing passes at 6 of the 7 stations, and fish abundance was calculated using the Seber-LeCren 2-pass removal method (Seber and Le Cren 1967; Section 2.2.3). This method assumes equal catchability (p) between passes. Abundance estimates are most reliable when the catchability is greater or equal to 0.80. The abundance estimate may be highly biased when the catchability is less than or equal to 0.20. Stations sampled using 2 electrofishing passes include RC-6, RC-1, RC-4, RC-2, SG-9, and RC-10. All catchability calculated for these stations ranged between 0.29 and 0.75, indicating variable reliability in the abundance estimates.

Station SG-12R was sampled using 3 electrofishing passes, and fish abundance at this station was estimated using the multi-pass method with the special case for 3 passes (Seber and Whale 1970; Section 2.2.3). This method also assumes each pass has equal catchability. The catchability calculated in association with the abundance estimate at this station ($p = 0.15$) indicates differences in the catchability between passes, violating the assumptions of this method;

therefore, the abundance estimate of 256 fish at SG-12R (standard error [SE] = 162) may be unreliable. The 3 passes conducted at this station yielded similar numbers of fish (36, 34, and 26 fish, respectively), suggesting low sampling efficiency, with fish likely escaping capture during each pass. The habitat at SG-12R included more large woody debris and other complex habitat features that provided ample refugia for fish in that station. The assumption of efficient and equal catchability may be difficult to meet in larger streams where more refuges are present (Schneider 2000). Most fish collected at SG-12R were from a large meander bend scour pool extending nearly the entire length of the station that was difficult to fish due to overhanging vegetation and large woody debris along the banks.

Total fish collected, the abundance estimate, standard error, catchability, and number of passes at each station for all sampling years are summarized in Table 18. Total fish collected across all stations over time is summarized in Figure 23. Fish abundance estimates across all stations over time are summarized in Figure 24. In 2020, the fish abundance estimate ranged from 25 to 30 at the reference stations and from 20 to 256 at the Site stations. The abundance estimates at the reference stations – RC-6 (30, SE = 20.4) and RC-1 (25, SE = 30.3) – and at 2 Site stations – SG-12R (256, SE = 161.8) and RC-10 (85, SE = 32.0) – have relatively high standard error values and may be biased. The combination of velocity refuges, complex habitat, and low fish counts contributed to the high standard error values.

Fish abundance was lower at the reference stations and at RC-4 in 2020 compared to baseline values, and fish abundance was higher than baseline and similar to the previous years of sampling at RC-2 and RC-10. Fish abundance at SG-9 and SG-12R was higher in 2020 compared to all previous years of sampling at RC-5A and RC-15, respectively, although these results are not directly comparable. The lower fish counts and estimated abundance at the reference stations relative to prior years suggest that the 2020 results represent natural variability in the Railroad Creek fish population and are unrelated to potential mining effects. The earlier timing of sample collection in conjunction with seasonal movements and distribution of fish could represent an additional variable that may have influenced the 2020 results. As with benthic macroinvertebrates, abundance of fish in an ecosystem is inherently variable from year to year, and high variability within and between stations can be observed when taking only 1 sample per year. Qualitatively, the numbers of fish captured and observed at each respective station appeared appropriate to the relative degree of quality habitat.

When interpreting abundance estimates, it should be noted that removal models, such as the 2 models used in this analysis, generally yield population estimates that are biased low. This outcome results from the assumption of equal catchability between passes, which is rarely true *in situ*. Fish that remain after the first pass are often more difficult to catch on subsequent passes because they seek cover that may be difficult to sample, previously stunned fish may remain subdued, or they may be small and evade netting. The magnitude of this bias may fluctuate based on stream habitat: larger streams or stations with more instream structure, such as large

woody debris, yield more biased abundance estimates than stations that are smaller and less complex (Rosenberger and Dunham 2005, *as cited in* Pope et al. 2010). The variability in habitat complexity seen across stations, both in 2020 and during previous years of sampling, may be a cause of variability in catchability and standard errors associated with abundance estimates. For example, estimates at RC-4 and RC-2, where the channel is less complex and few refuges exist, exhibited higher catchability and smaller standard errors than other stations sampled in 2020.

The classic removal models, as presented in this analysis, have been improved upon over time. The fish population estimates were re-calculated using a model better able to perform when catchability varies or is low. Results from this analysis are presented in Appendix F.

3.3.1 Fish Size Distribution

The size distribution of the fish community is an indicator of overall population structure and health. In general, a broad distribution of size classes ranging from YOY to mature individuals typical of the maximum achievable size for a given environment is indicative of a healthy reproducing population (Pope et al. 2010). Fish size can be equated to age class, but size at age varies in food-limited, cold-water stream environments. Consequently, there can be considerable overlap between year classes, particularly among larger adults; therefore, any artificial age demarcation beyond YOY could be inaccurate.

Fish count by size class is summarized for all years in Table 19. The YOY designation was based on individuals having a fork length measurement smaller than 65 mm. Size distribution frequencies support the use of 65-mm fork length as a threshold for identifying YOY (Figure 25). Several other year classes are suggested in the size/frequency histograms, particularly the yearling class (fork length = 65-99 mm). Given the small number of fish collected and the likely degree of overlap in size at age, the distinction between these year classes is less certain. The majority of fish collected at each station in 2020 (and prior years) had a fork length between 100 mm and 199 mm, with the exception of SG-9, where fish in the 65- to 99-mm size class were most abundant. The sampling results at SG-9 illustrate this distinct size class in the 2020 distribution (Figure 26). The size classification results from the 2020 sampling event appear similar to results from previous years, with the exception of 2010, when very few YOY were present (Figure 27; Arcadis 2019).

Although fewer fish were collected in 2020 than in the previous years of post-remediation biomonitoring (2018 and 2019), the proportion of YOY is well represented on the overall catch, particularly in stations located downstream of the remediation compared to baseline conditions in 2010. This result is consistent with previous years of post-remediation biomonitoring and suggests that the fish population within the study area remains reproductively viable. It is important to recognize that size distribution at any point in time will reflect the influence of multiple factors, including watershed-scale population dynamics, the suitability of available habitat at a given station for each age class, and temporally specific conditions during sampling,

as well as the effects of remediation. For example, the lack of YOY at RC-2 in 2019 and 2020 likely reflects sub-optimal physical habitat conditions. This station lacks the shallow channel margin habitats and overhanging vegetation where YOY typically have some refugia available. In contrast, YOY were present in abundance at SG-9 and SG-12R where shallow margin and side-channel habitats with refuge and woody debris were more plentiful.

3.3.2 Fish Summary

Overall, fewer fish were collected during the 2020 sampling effort than all previous years of sampling, save the 2010 baseline effort. However, in comparison to this baseline, the estimated abundance at the reference stations decreased in 2020, whereas the estimated abundance at Site station SG-12R is one of the highest in the sampling record, indicating that fish abundance naturally varies independent of potential mining effects.

The size classification results from the 2020 sampling event appear similar to results from previous years, with the exception of 2010, when very few YOY were present (Figure 26; Arcadis 2019). The 2020 proportion of YOY is well represented in the overall catch, particularly in stations located downstream of the remediation compared to baseline conditions in 2010. These results are consistent with previous years of post-remediation biomonitoring and suggests that the fish population within the study area remains reproductively viable.

Trout population dynamics are influenced by many factors and causes of this variation may be intricate. Fish are highly mobile and do not exhibit site fidelity at the scale of a 100-meter station. Fish abundance and size distribution may be associated with the suitability of differential habitat types that vary both between sampling stations within a given year or season, but also within any single sampling station over time as the creek is geomorphically active and habitat conditions change. Abundance and size distribution are further influenced by annual variations in fish maturity at the time of sampling, as well as annual fecundity and mortality rates (Dauwalter et al. 2002; Neville et al. 2016; Platts and Nelson 1988).

Fish populations in dynamic mountain stream environments are strongly influenced by environmental factors, including flow events (i.e., high and low), sediment delivery, and overwintering conditions. Changes in habitat conditions resulting from the Wolverine fire have likely influenced fish population abundance and age structure at the watershed scale. Based on studies conducted in other watersheds, these population-level effects can last for several years (Sedell et al. 2015, Rosenberger et al. 2015). Additionally, variations across sampling events such as timing, flow conditions, and capture efficiency can influence the population represented and abundance estimates. These factors should all be considered when interpreting year-to-year changes in fish abundance within and between stations. The variability highlights the importance of relying on a full, multi-year data record, as well as other available lines of evidence when drawing conclusions about effectiveness of the remediation on the Railroad Creek fish population.

3.4 Summary of Findings

The year 3 post-remediation biomonitoring benthic macroinvertebrate and habitat data were successfully collected from 8 stations and fish population data were successfully collected from 7 stations. During the 2020 sampling event, the water was too deep to safely conduct benthic macroinvertebrate and fish sampling at RC-5A and fish sampling at RC-15. Following an evaluation of alternative stations, SG-9 and SG-12R were selected as alternative biomonitoring stations to RC-5A and RC-15, respectively. SG-9 is located upstream of RC-5A and SG-12R is located upstream of RC-15. Data were subsequently analyzed, in accordance with the methods and procedures approved by the Agencies.

Sixteen biological metrics were used to assess the health of the benthic macroinvertebrate community at each biomonitoring station. Overall, the 2020 benthic macroinvertebrate metrics indicate increased macroinvertebrate community diversity compared to baseline conditions in 2010 and 2011 and reference station conditions. The post-remediation increases in diversity and richness metrics at Site stations, particularly at RC-2, are promising indicators of recovery. Because benthic macroinvertebrate communities can vary seasonally and from year to year, it is important to evaluate the benthic macroinvertebrate data alongside water and sediment quality data. This comprehensive approach can be used to discern the extent of Phase 1 remedial effectiveness from natural variability. The results of the 2020 evaluation of the benthic macroinvertebrate community are summarized below.

- Overall, most Site stations met reference station target thresholds for richness metrics and did not significantly differ from reference stations for the productivity, trophic/habit, composition, and tolerance metrics. Temporal trends for metrics considered to be relatively more sensitive to metals pollution, total taxa, EPT taxa richness, clinger richness, and percent Ephemeroptera, have shown clear signs of improvement at the most impaired stations (RC-2, RC-5A, and RC-10) sampled at baseline.

- Productivity Metric: There were no statistically significant differences in total abundance between the Site and reference stations in 2020.

- Richness Metrics: The 2020 total richness metric was relatively similar across stations. Plecoptera richness at RC-15 and Trichoptera richness at RC-2 differed significantly from reference stations and did not meet the 80% target threshold; however, the values at all stations showed improvement compared to the 2010 baseline values, and 2019 values (except at RC-15). Only the side channel at RC-15 was sampled in 2020 due to safety concerns with sampling in the mainstem, which could represent an environmental variable for the benthic macroinvertebrate results at this station. The Plecoptera and Trichoptera richness results are likely indicators of natural variability, particularly when considered with other metrics suggestive of good- to high-quality stream conditions.

- Trophic/Habit Metrics: There were no significant differences between the refence and Site stations for the trophic/habit metrics. The overall community composition and distribution of trophic strategies and habits in the benthic macroinvertebrate community aligns with expectations for cold-water mountain stream systems.

- Composition Metrics: There were no significant differences between the refence and Site stations for the percent dominant taxon and percent Ephemeroptera metrics. Values for the EPT/EPT+C ratio in 2020 decreased from 2019 values across all stations, and RC-15 differed significantly from reference stations. This result is likely due to natural variability and is not considered to indicate a reduction in habitat quality within Railroad Creek, particularly when considered with other metrics suggestive of good- to high-quality stream conditions.

- Tolerance Metrics: There were no significant differences between the refence and Site stations for the tolerance metrics. These metrics generally indicate good to excellent stream quality across all stations.

- The strongest habitat correlation with benthic macroinvertebrate results was with the mean percentage of fine sediment at a given station, which was inversely correlated with most richness and trophic/habit metrics, and positively correlated with percent dominant taxa and HBI. This correlation is particularly relevant due to the Wolverine fire, which has likely increased sediment loading to Railroad Creek.

When reviewing the results, it is important to recognize that the benthic macroinvertebrate community is influenced by pre- and post-remediation conditions, as well as natural environmental variables. The Wolverine fire was a major watershed-scale disturbance event that can be anticipated to alter the hydrologic, nutrient, and sediment transport regime in Railroad Creek. Post-fire effects will continue to evolve over time, and their influence on the macroinvertebrate community is an important consideration when inferring conclusions about remedial effectiveness from observed trends.

Fish abundance was lower at the reference stations and at RC-4 in 2020 compared to baseline values, and fish abundance was higher than baseline and similar to the previous years of sampling at RC-2 and RC-10. Fish abundance at SG-9 and SG-12R was higher in 2020 compared to all previous years of sampling at RC-5A and RC-15, respectively, although these results are not directly comparable. The lower fish counts and estimated abundance at the reference stations relative to prior years suggest that the 2020 results represent natural variability in the Railroad Creek fish population and are unrelated to potential mining effects.

The size classification results from the 2020 sampling event appear similar to results from previous years, with the exception of 2010, when very few YOY were present (Figure 26;

Arcadis 2019). The 2020 proportion of YOY is well represented in the overall catch, particularly in stations located downstream of the remediation compared to baseline conditions in 2010.

Fish population dynamics are multifaceted, and are strongly influenced by environmental factors, including flow events (i.e., high and low), sediment delivery, and overwintering conditions. Sampling results over time may be influenced by factors such as annual variations in site fidelity, maturity, fecundity, mortality rates, and the effect of habitat on carrying capacity (at both the station scale and watershed scale). Other factors such as variations across sampling events such as timing, flow conditions, and capture efficiency can influence the population represented and abundance estimates. Changes in habitat conditions resulting from the Wolverine fire have also likely influenced fish population abundance and age structure at the watershed scale.

Even though the overall number of fish observed in 2020 was lower than in previous years, the broad distribution of size classes, including YOY, was generally consistent with observations in previous years and indicates a healthy reproducing trout population in Railroad Creek.

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TABLES

Table 1. Timeline of Past Remediation and Biomonitoring Activities

Year	Activity	Monitoring Timing		Report
2010	Baseline biomonitoring	Benthic Macroinvertebrates:	9/8/2010–9/24/2010	MWH 2012a
		Fish:	9/22/2010–9/27/2010	
2011	Baseline biomonitoring	Benthic Macroinvertebrates:	9/8/2011–9/13/2011	MWH 2012b
		Fish:	Not Collected	
2012	Phase 1 selected remedy initiated	--		
2015	Post-Wolverine fire biomonitoring	Benthic Macroinvertebrates:	9/23/2015–10/8/2015	Stantec 2016
		Fish:	10/5/2015–10/11/2015	
2016	Post-Wolverine fire biomonitoring	Benthic Macroinvertebrates:	9/15/2016–9/26/2016	Stantec 2017
		Fish:	9/22/2016–9/29/2016	
2018	Phase 1 remedy completed	--		
2018	Post-Phase 1 biomonitoring, year 1	Benthic Macroinvertebrates:	9/26/2018–9/29/2018	Arcadis 2019
		Fish:	9/30/2018–10/5/2018	
2019	Post-Phase 1 biomonitoring, year 2	Benthic Macroinvertebrates:	9/24/2019–9/30/2019	Confluence 2020
		Fish:	9/25/2019–10/2/2019	
2020	Post-Phase 1 biomonitoring, year 3	Benthic Macroinvertebrates:	8/20/2020–8/24/2020	This report
		Fish:	8/21/2020–8/28/2020	

Table 2. Habitat Description for each 100-Meter Sampling Station

Site	Reach Gradient	Approximate Reach Area (ft^2)	Dominant Habitat Type[1]	Approximate Proportion of Wetted Area	Approximate Average Depth (ft^2)	Large Woody Debris Count	Dominant Substrate	Riparian Condition	Defining Characteristics
RC-6	3-5%	11,483	Fast, turbulent (riffle)	90%	1.1	10	Cobble/gravel	Conifer/deciduous mixed forest, overhanging alder common	Predominantly riffle habitat. Scour pool and dry tributaries along right bank. Overhanging vegetation along most of the reach.
			Slow (pools)	10%	2.5				
RC-1	3%	16,404	Fast, turbulent (riffle)	84%	1.2	4	Boulder/cobble and gravel	Conifer/deciduous mixed forest, overhanging alder common	Predominantly riffle habitat with on large scour pool on the upstream edge of the reach and 2 scour pools just downstream of a woody debris jam. A heavily overgrown shallow side channel paralleling main channel along entire station length was inaccessible and not sampled in 2020.
			Slow (pools)	16%	2.2				
RC-4	4-5%	13,123	Fast, turbulent (riffle)	96%	1.5	8	Cobble/gravel	Armored on right bank, riparian vegetation on left bank	Predominantly riffle habitat with 1 large scour pool formed by boulder grade control at Holden waterline crossing; foot bridge crosses Railroad Creek immediately downstream of waterline crossing; artificial log and boulder bank stabilization on both banks.
			Slow (pools)	4%	3.2				
RC-2	1-2%	11,483	Fast, turbulent (riffle)	92%	1.8	3	Cobble/gravel	Armored on right bank, sparse riparian vegetation on left bank	Predominantly riffle habitat with some scour pool associated with boulders. Relocated reach with constructed riffle-pool complex; riprap stabilization on right bank adjacent to tailings pile; artificial large woody debris habitat features added during remediation. Station is located on a bend to the right.
			Slow (pools)	8%	2.0				
SG-9*	2-3%	16,404	Fast, turbulent (riffle)	17%	1.3	65	Cobble/gravel	Conifer/deciduous mixed forest	Riffle/glide reach, with scour pools, gravel bars, and large woody debris

Site	Reach Gradient	Approximate Reach Area (ft^2)	Dominant Habitat Type[1]	Approximate Proportion of Wetted Area	Approximate Average Depth (ft^2)	Large Woody Debris Count	Dominant Substrate	Riparian Condition	Defining Characteristics
			Fast, nonturbulent (glide)	73%	2.0			impacted by fire, overhanging alder common	located along the margins. A vegetated side channel paralleling main channel along the right bank was inaccessible due to overhanging vegetation and was not sampled in 2020.
			Side channel, slow	2%	0.4				
			Slow (pools)	8%	2.6				
RC-5A[1]	3%	14,436	Fast, turbulent (riffle)	61%	1.6	41	Cobble/gravel	Conifer/deciduous mixed forest	Transition from boulder riffle and glide dominant with bedrock control on right bank to glide dominated by gravel at downstream end; large woody debris features; low-gradient tributary enters on left bank
			Fast, nonturbulent (glide)	36%	1.3				
			Slow (pools)	3%	2.0				
SG-12R*	2%	13,123	Fast, turbulent (riffle)	54%	0.9	20	Cobble/gravel	Conifer/deciduous mixed forest impacted by fire, overhanging alder common	Riffle/glide reach located on a gradual bend to the left. Large, deep, scour pool on right bank running approximately half the length of the reach, with plentiful large woody debris. Gravel bar on left bank with overhanging vegetation.
			Fast, nonturbulent (glide)	12%	1.3				
			Slow (pools)	34%	3.0				
RC-10	3%	13,123	Fast, turbulent (riffle)	66%	1.3	16	Cobble/gravel	Conifer/deciduous mixed forest impacted by fire, overhanging alder common	Riffle/glide reach, with large woody debris throughout. Scour pools and overhanging vegetation along both sides of creak.
			Fast, nonturbulent (glide)	26%	2.5				
			Slow (pools)	8%	2.5				
RC-15	4-7%	8,202	Fast, turbulent (riffle)	79%	1.4	9	Boulder/cobble with some gravel	Conifer/deciduous mixed forest impacted by fire, overhanging alder common	All habitat information presented in this table is for a side channel located on the left bank. Predominantly riffle habitat, with a boulder cascade in the upper half, and a boulder/cobble pool/riffle complex in the lower half. A large
			Side channel, fast	3%	0.5				
			Slow (pools)	18%	2.1				

Site	Reach Gradient	Approximate Reach Area (ft^2)	Dominant Habitat Type[1]	Approximate Proportion of Wetted Area	Approximate Average Depth (ft^2)	Large Woody Debris Count	Dominant Substrate	Riparian Condition	Defining Characteristics
									gravel bar separates this side channel from the main channel.

* Indicates 2020 substitute station. Refer to Section 2.0 for further details.

[1] Data for this station are provided for comparison and are from the 2019 biomonitoring event (Confluence 2020).

Table 3. Water Quality within the 100-Meter Sampling Station, n = 15

Site	Sample Date	Temperature (°C)		Dissolved Oxygen (mg/L)		pH		ORP (mV)		Conductivity (µS/cm)		Turbidity (NTU)	
		Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
RC-6	8/20/2020	13.5	0.5	9.3	0.1	6.8	0.4	116.6	20.0	29.5	2.8	1.0	0.9
RC-1	8/20/2020	13.4	0.6	9.7	0.1	7.2	0.1	89.5	19.5	31.3	0.1	0.9	0.2
RC-4	8/21/2020	13.0	0.1	9.7	0.0	7.3	0.2	152.7	14.1	31.5	1.5	0.7	0.1
RC-2	8/21/2020	12.2	0.9	10.0	0.2	7.2	0.0	112.8	14.9	20.1	16.6	0.6	0.3
SG-9*	8/23/2020	12.0	1.1	9.6	0.2	6.9	0.1	67.9	7.7	57.9	33.8	1.6	2.0
SG-12R*	8/24/2020	11.2	1.7	9.9	0.4	6.7	0.2	113.3	46.1	60.3	25.0	0.8	0.2
RC-10	8/22/2020	13.1	0.6	10.0	0.1	7.3	0.1	190.3	23.5	51.3	0.3	0.0	0.1
RC-15	8/24/2020	12.4	0.4	9.9	0.1	7.3	0.0	192.6	28.5	53.2	0.1	0.5	0.1

* Indicates 2020 substitute station. Refer to Section 2.0 for further details.

Table 4. Physical Habitat Characteristics within the 100-Meter Sampling Station, n = 15

	Depth (ft)		Flow Velocity at Bottom (ft/s)		Flow Velocity at 0.6x Depth From Surface (ft/s)		% Fines/Sand (<2 mm)		% Gravel (2-64 mm)		% Cobble (64-256 mm)		% Boulder (>256 mm)		% Embedded Depth	
Site	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
RC-6	0.75	0.19	0.31	0.17	0.53	0.22	0	1	40	28	58	28	3	9	19	16
RC-1	0.82	0.23	0.31	0.15	0.47	0.26	1	3	29	25	44	23	24	26	11	4
RC-4	0.79	0.19	0.43	0.30	0.55	0.32	0	0	23	20	61	21	16	25	11	2
RC-2	0.64	0.17	0.29	0.21	0.51	0.31	7	7	35	25	53	30	5	14	8	6
SG-9*	0.80	0.24	0.17	0.14	0.41	0.27	11	11	46	26	41	29	3	8	13	25
SG-12R*	0.85	0.22	0.34	0.16	0.60	0.23	4	5	62	17	34	19	0	0	8	7
RC-10	0.80	0.24	0.38	0.15	0.54	0.24	10	11	39	33	43	28	8	13	6	3
* Indicates 2020 substitute station. Refer to Section 2.0 for further details.																

Table 5. Benthic Macroinvertebrate Metrics Statistical Results Summary

Metric	Method	Analysis of Variance p-value	Percent of the Reference Station Mean	Stations Differing from Reference Stations[1]
Productivity				
Total Abundance	Kruskal-Wallis Rank Sum Test	0.159		
Richness				
Total Richness	80% of Reference Station Mean			
EPT	80% of Reference Station Mean			
Plecoptera Richness	80% of Reference Station Mean		67%	RC-15
Trichoptera Richness	80% of Reference Station Mean		74%	RC-2
Clinger Richness	80% of Reference Station Mean			
Trophic/Habitat Metrics				
% Shredders	Kruskal-Wallis Rank Sum Test	0.159		
% Clingers[3]	Kruskal-Wallis Rank Sum Test	0.000*		
% Collector-Filterers	Kruskal-Wallis Rank Sum Test	0.085		
Scraper to Scraper-Filterer Ratio	Kruskal-Wallis Rank Sum Test	0.059		
Composition Metrics				
% Dominant Taxa[2]	Kruskal-Wallis Rank Sum Test	0.008*		
% Ephemeroptera[3]	Kruskal-Wallis Rank Sum Test	0.000*		
EPT/EPT+C	Kruskal-Wallis Rank Sum Test	0.000*		RC-15
Tolerance Metrics				
HBI[3]	Kruskal-Wallis Rank Sum Test	0.000*		
MTI[2]	Kruskal-Wallis Rank Sum Test	0.004*		
% Tolerant Taxa	Kruskal-Wallis Rank Sum Test	0.577		

* Value is significant at alpha = 0.05.

1 Dunn's Test was used to evaluate non-parametric pairwise comparisons.

2 Though variance was detected, Site stations did not differ significantly from reference stations.

3 Though variance was detected and there were differences between reference and Site stations, Site stations did not differ significantly from both reference stations.

Table 6. Benthic Macroinvertebrate Productivity Metric Summary, 2020

Station	Productivity Metric
	Total Abundance
Reference Stations	
RC-6	104
RC-1	139
Habitat Disturbance Zone	
RC-4	95
Metals Impact Zone	
RC-2	148
SG-9*	104
Recovery Zone	
SG-12R*	136
RC-10	103
RC-15	90

* Indicates 2020 substitute station. Refer to Section 2.0 for further details.

Table 7. Benthic Macroinvertebrate Richness Metrics Summary, 2020

Station	Richness Metrics				
	Total taxa richness	EPT Index	Plecoptera (stoneflies)	Trichoptera (caddisflies)	Clinger richness
Reference Stations					
RC-6	72	45	16	14	35
RC-1	78	46	17	13	36
Habitat Disturbance Zone					
RC-4	78	48	14	18	40
Metals Impact Zone					
RC-2	80	39	16	10	31
SG-9*	81	43	16	11	37
Recovery Zone					
SG-12R*	71	40	14	13	34
RC-10	78	45	15	14	36
RC-15	70	40	11	14	37
* Indicates 2020 substitute station. Refer to Section 2.0 for further details.					

Table 8. Plecoptera Richness, All Years

Plecoptera Taxa Richness							
Station	Year						
	2010	2011	2015	2016	2018	2019	2020
Reference Stations							
RC-6	14	15	16	18	18	15	16
RC-1	13	15	15	17	20	19	17
Habitat Disturbance							
RC-4	11	10	16	19	21	14	14
Metals Impact Zone							
RC-2	2	5	12	12	16	14	16
SG-9*	--	--	--	--	--	--	16
RC-5A	7	6	8	10	16	15	--
Recovery Zone							
SG-12R*	--	--	--	--	--	--	14
RC-10	10	10	12	13	16	12	15
RC-15	13	14	15	15	17	18	11
* Indicates 2020 substitute station. Refer to Section 2.0 for further details.							

Table 9. Trichoptera Richness, All Years

Trichoptera Taxa Richness							
Station	Year						
	2010	2011	2015	2016	2018	2019	2020
Reference Stations							
RC-6	10	13	13	16	16	15	14
RC-1	11	7	9	13	17	16	13
Habitat Disturbance Zone							
RC-4	8	7	12	14	16	16	18
Metals Impact Zone							
RC-2	3	6	4	5	9	13	10
SG-9*	--	--	--	--	--	--	11
RC-5A	6	7	6	8	7	12	--
Recovery Zone							
SG-12R*	--	--	--	--	--	--	13
RC-10	7	6	10	9	14	9	14
RC-15	11	12	14	12	13	11	14
* Indicates 2020 substitute station. Refer to Section 2.0 for further details.							

Table 10. Benthic Macroinvertebrate Trophic/Habit Metrics Summary, 2020

Station	Trophic/Habit Metrics			
	% Filterers	% Shredders	% Clingers	Scrapers/Scrapers+Filterers
Reference Stations				
RC-6	0.97	5.41	70	0.98
RC-1	0.38	4.18	52	0.99
Habitat Disturbance Zone				
RC-4	0.21	4.93	64	0.99
Metals Impact Zone				
RC-2	0.59	6.36	42	0.98
SG-9*	5.88	4.22	46	0.79
Recovery Zone				
SG-12R*	1.86	6.12	53	0.95
RC-10	1.81	7.18	51	0.94
RC-15	0.81	8.19	52	0.97

* Indicates 2020 substitute station. Refer to Section 2.0 for further details.

Note: Numbers in this table are replicate mean values weighted by the relative abundance of each replicate.

Table 11. Benthic Macroinvertebrate Composition Metrics Summary, 2020

Station	Composition Metrics		
	% Ephemeroptera	% Contribution of Dominant Taxon	EPT/EPT+C[1]
Reference Stations			
RC-6	56	21	0.87
RC-1	45	33	0.88
Habitat Disturbance Zone			
RC-4	53	20	0.81
Metals Impact Zone			
RC-2	35	28	0.69
SG-9*	34	19	0.58
Recovery Zone			
SG-12R*	45	19	0.72
RC-10	42	27	0.80
RC-15	35	20	0.67

* Indicates 2020 substitute station. Refer to Section 2.0 for further details.

[1] The EPT/EPT+C ratio is calculated using the same equation as the EPTC ratio reported in the 2019 ACAR (Floyd|Snider 2020).

Note: Numbers in this table are replicate mean values weighted by the relative abundance of each replicate.

Table 12. EPT/EPT+C, All Years

EPT/EPT+C[1]							
Station	Year						
	2010	2011	2015	2016	2018	2019	2020
Reference Stations							
RC-6	0.91	0.87	0.88	0.91	0.96	0.95	0.87
RC-1	0.88	0.91	0.89	0.90	0.91	0.92	0.88
Habitat Disturbance Zone							
RC-4	0.85	0.85	0.84	0.93	0.89	0.92	0.81
Metals Impact Zone							
RC-2	0.15	0.27	0.30	0.93	0.87	0.91	0.69
SG-9*	--	--	--	--	--	--	0.58
RC-5A	0.39	0.60	0.31	0.90	0.97	0.94	--
Recovery Zone							
SG-12R*	--	--	--	--	--	--	0.72
RC-10	0.71	0.63	0.77	0.86	0.95	0.93	0.80
RC-15	0.80	0.74	0.89	0.93	0.95	0.87	0.67

* Indicates 2020 substitute station. Refer to Section 2.0 for further details.

[1] The EPT/EPT+C ratio is calculated using the same equation as the EPTC ratio reported in the 2019 ACAR (Floyd|Snider 2020).

Note: Numbers in this table are replicate mean values weighted by the relative abundance of each replicate.

Table 13. Benthic Macroinvertebrate Tolerance Metrics Summary, 2020

Station	Tolerance Metrics		
	HBI	MTI	% Tolerant by Abundance
Reference Stations			
RC-6	2.51	1.31	0.58
RC-1	3.16	1.40	1.25
Habitat Disturbance Zone			
RC-4	2.95	1.40	1.34
Metals Impact Zone			
RC-2	3.53	1.72	1.04
SG-9*	3.72	1.39	1.60
Recovery Zone			
SG-12R*	3.43	1.60	0.83
RC-10	3.37	1.72	1.23
RC-15	3.44	1.72	0.81

* Indicates 2020 substitute station. Refer to Section 2.0 for further details.

Note: Numbers in this table are replicate mean values weighted by the relative abundance of each replicate.

Table 14. Correlation of Benthic Macroinvertebrate Metrics with Replicate-Level Substrate Parameters

Metric	Fines/Sand (%)	Gravel (%)	Cobble (%)	Boulder (%)	Embedded Depth (%)
Productivity					
Total Abundance	-0.13	0.07	-0.07	0.12	-0.07
Richness					
Total Richness	-0.24*	-0.04	-0.04	0.23*	-0.17
EPT	-0.27*	-0.05	0.02	0.18	-0.18
Plecoptera Richness	-0.13	-0.01	0.01	0.12	-0.07
Tricoptera Richness	-0.37*	0.01	0.03	0.11	-0.30*
Clinger Richness	-0.30*	-0.08	0.01	0.24*	-0.16
EPT/EPT+C	0	-0.04	0.03	-0.05	-0.06
Trophic/Habitat Metrics					
% Shredders	-0.30*	-0.18	0.31*	-0.11	-0.08
% Clingers	0	-0.05	0.06	-0.17	-0.20*
% Collector-Filterers	-0.13	-0.1	0.13	0.08	-0.11
Scraper to Scraper-Filterer Ratio	-0.31*	0.04	0.08	-0.07	-0.30*
Composition Metrics					
% Dominant Taxa	0.27*	0.12	-0.16	0.01	0.20*
% Ephemeroptera	0.09	-0.06	0.06	-0.17	-0.15
Tolerance Metrics					
HBI	0.26*	0.11	-0.20*	0.16	0.19
MTI	-0.1	-0.08	0.22*	-0.12	0.23*
% Tolerant Taxa	-0.02	-0.01	-0.16	0.18	0.16
* Spearman's correlation coefficient is significant at alpha = 0.05					

Table 15. Water Quality Parameters Collected during Fish Sampling

Station	Temperature (°C)	Conductivity (µS/cm)	Dissolved Oxygen (mg/L)	pH
RC-6	11.0	31.1	9.75	5.04
RC-1	12.5	30.1	9.32	5.15
RC-4	10.2	27.8	10.25	6.86
RC-2	13.1	29.0	9.64	6.97
SG-9*	9.5	37.4	10.46	7.09
SG-12R*	9.5	53.8	10.36	6.96
RC-10	9.6	62.2	10.63	7.41
* Indicates 2020 substitute station. Refer to Section 2.0 for further details.				

Table 16. Backpack Electrofisher Setting

Site	Pulse Width	Pulse Frequency	Volts	Time (minutes)	Number of Passes	Temperature (°C)	Conductivity (µS/cm)	Dissolved Oxygen (mg/L)	pH
RC-6	3000	40	800-900	240	2	11.0	31	9.75	5.04
RC-1	500	40	800-900	240	2	12.5	30	9.32	5.15
RC-4	500	40	850-900	120	2	10.2	28	10.25	6.86
RC-2	500	40	800-900	125	2	13.1	29	9.64	6.97
SG-9*	500	40	800-900	130	2	9.5	37	10.46	7.09
RC-10	500	40	800-900	250	2	9.6	62	10.63	7.41
SG-12R*	500	40	800-1440	265	3	9.5	54	10.36	6.96
* Indicates 2020 substitute station. Refer to Section 2.0 for further details.									

Table 17. 2020 Fish Collection Summary

Site	Total Fish	% of Fish Collected at Station	Unknown (YOY)		Cutthroat Trout		Hybrid		Rainbow Trout	
			Total	% of Total Fish	Total	% of Total Fish	Total	% of Total Fish	Total	% of Total Fish
RC-6	18	6%	--	--	10	56%	3	17%	5	28%
RC-1	12	4%	1	8%	5	42%	5	42%	1	8%
RC-4	25	9%	1	4%	11	44%	12	48%	1	4%
RC-2	16	6%	--	--	6	38%	10	63%	--	--
SG-9*	70	24%	20	29%	44	63%	6	9%	--	--
SG-12R*	96	33%	27	28%	52	54%	16	17%	1	1%
RC-10	52	18%	18	35%	15	29%	19	37%	--	--
Total	289	100%	67	23%	143	49%	71	25%	8	3%
* Indicates 2020 substitute station. Refer to Section 2.0 for further details.										

Table 18. Estimated Fish Abundance per 100-Meter Station, All Years

Station	Metric	2010[1]	2015	2016	2018[2]	2019	2020
RC-6	Total Fish Collected	54	58	65	53	34	18
	Number of Passes	3	2	2	3	3	2
	Population Estimate (SE)	58 (3.1)	63 (4.4)	71 (4.9)	78 (20.5)	274 (1,221.8)	30 (20.4)
	Catchability (p)	0.60	0.71	0.70	0.31	0.04	0.36
RC-1	Total Fish Collected	56	94	90	113	50	12
	Number of Passes	3	2	2	2	3	2
	Population Estimate (SE)	67 (8.1)	110 (9.7)	124 (22.1)	130 (9.4)	75 (20.8)	25 (30.3)
	Catchability (p)	0.45	0.62	0.47	0.64	0.31	0.29
RC-4	Total Fish Collected	45	59	67	59	35	25
	Number of Passes	3	2	2	2	2	2
	Population Estimate (SE)	59 (11.2)	67 (6.0)	97 (23.4)	91 (27.8)	44 (9.2)	27 (2.2)
	Catchability (p)	0.38	0.66	0.44	0.41	0.54	0.75
RC-2	Total Fish Collected	11	22	34	77	19	16
	Number of Passes	3	2	3	2	2	2
	Population Estimate (SE)	11 (0.8)	23 (1.0)	38 (4.3)	94 (11.3)	29 (14.6)	20 (6.1)
	Catchability (p)	0.68	0.84	0.51	0.57	0.42	0.55
SG-9[3]	Total Fish Collected	--	--	--	--	--	70
	Number of Passes	--	--	--	--	--	2
	Population Estimate (SE)	--	--	--	--	--	92 (15.7)
	Catchability (p)	--	--	--	--	--	0.51
RC-5A	Total Fish Collected	9	42	39	44	50	--
	Number of Passes	1	2	3	3	2	--
	Population Estimate (SE)	--	53 (9.5)	43 (3.5)	--	73 (20.8)	--
	Catchability (p)	--	0.55	0.55	--	0.44	--
SG-12R[3]	Total Fish Collected	--	--	--	--	--	96
	Number of Passes	--	--	--	--	--	3
	Population Estimate (SE)	--	--	--	--	--	256 (161.8)
	Catchability (p)	--	--	--	--	--	0.15
RC-10	Total Fish Collected	15	50	118	58	88	52
	Number of Passes	2	3	2	2	2	2
	Population Estimate (SE)	15 (0.8)	89 (38.2)	146 (15.2)	70 (9.2)	96 (5.5)	85 (32.0)
	Catchability (p)	0.85	0.24	0.56	0.59	0.71	0.38
RC-15	Total Fish Collected	61	59	111	74	109	--
	Number of Passes	2	2	2	2	2	--
	Population Estimate (SE)	63 (2.0)	73 (10.7)	125 (8.1)	110 (27.3)	201 (67.7)	--
	Catchability (p)	0.83	0.56	0.66	0.43	0.32	--

Station	Metric	2010[1]	2015	2016	2018[2]	2019	2020

1 Only 1 pass was completed at RC-5A in 2015. No population estimate was calculated.

2 Population estimate for RC-5A could not be completed because passes 2 and 3 collected more fish than pass 1, violating the assumptions of the method.

3 No fish were collected from RC-5A or RC-15 in 2020 due to hazardous instream conditions ; SG-9 and SG-12R were sampled as substitutes.

Table 19. Fish Size Classes, All Years

Station	Size Class (mm)	2010	2015	2016	2018	2019	2020
RC-6	<65	--	10	21	6	9	--
	65-99	8	10	13	9	9	5
	100-199	43	35	28	36	12	12
	200-299	3	3	3	2	4	1
RC-1	<65	3	27	28	51	12	1
	65-99	6	17	15	8	10	2
	100-199	41	43	43	50	27	7
	200-299	6	7	4	4	1	2
RC-4	<65	1	6	11	11	3	1
	65-99	6	9	9	6	9	6
	100-199	34	38	40	38	21	17
	200-299	4	6	7	4	2	1
RC-2	<65	--	--	17	11	--	--
	65-99	--	--	--	1	1	7
	100-199	9	17	16	57	16	8
	200-299	2	5	1	8	2	1
SG-9*	<65	--	--	--	--	--	20
	65-99	--	--	--	--	--	28
	100-199	--	--	--	--	--	21
	200-299	--	--	--	--	--	1
RC-5A	<65	--	11	18	3	14	--
	65-99	--	2	--	7	4	--
	100-199	5	21	17	32	28	--
	200-299	4	8	4	2	4	--
SG-12R*	<65	--	--	--	--	--	27
	65-99	--	--	--	--	--	12
	100-199	--	--	--	--	--	55
	200-299	--	--	--	--	--	2
RC-10	<65	3	19	43	28	50	18
	65-99	2	6	27	14	7	9
	100-199	9	25	46	16	30	25
	200-299	1	--	2	--	1	--
RC-15	<65	3	12	27	17	39	--
	65-99	18	--	27	15	7	--
	100-199	38	43	55	41	63	--
	200-299	2	4	2	1	--	--

* Indicates 2020 substitute station. Refer to Section 2.0 for further details.

FIGURES

Figure 1. 2020 Biomonitoring Stations

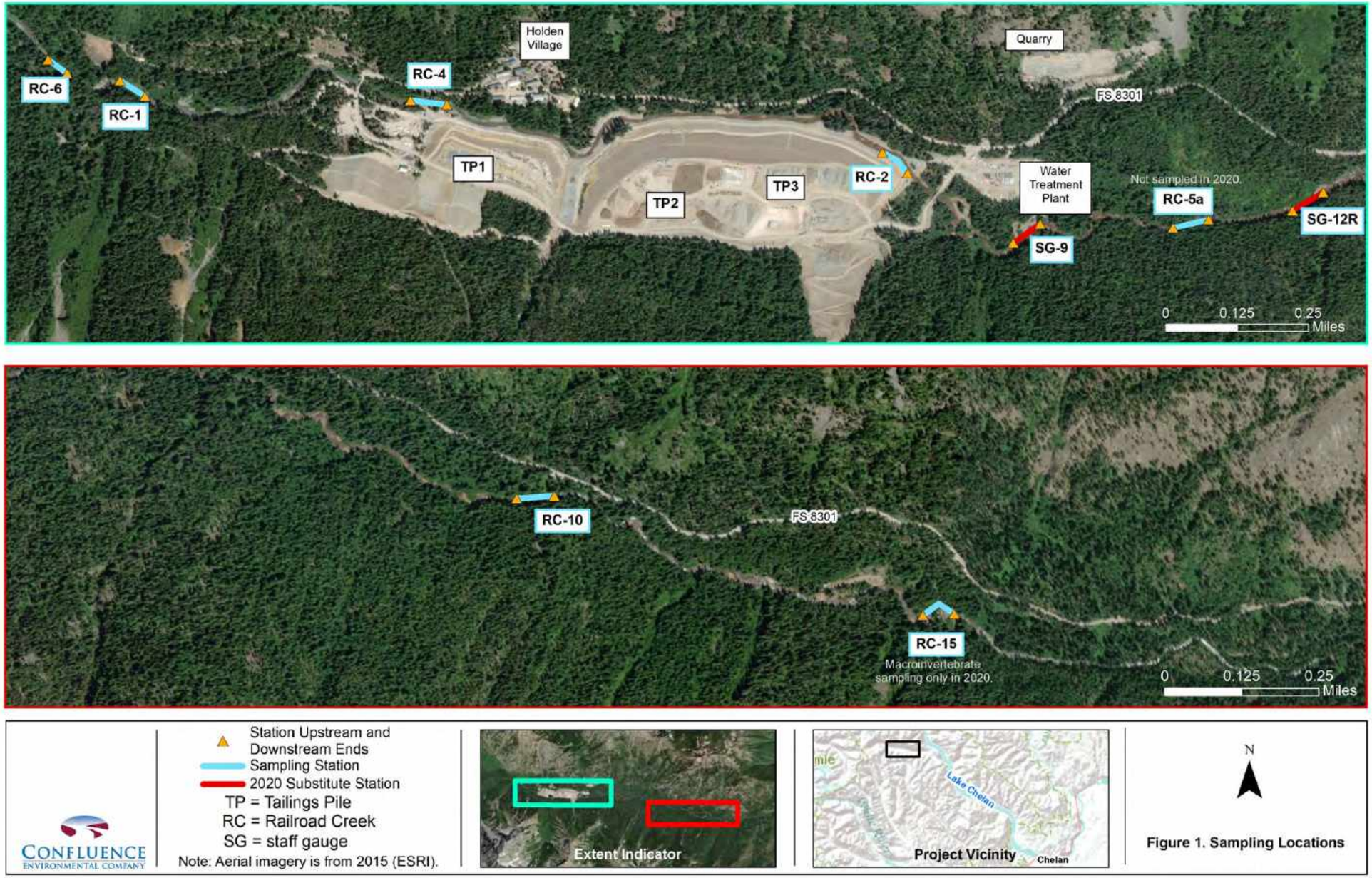
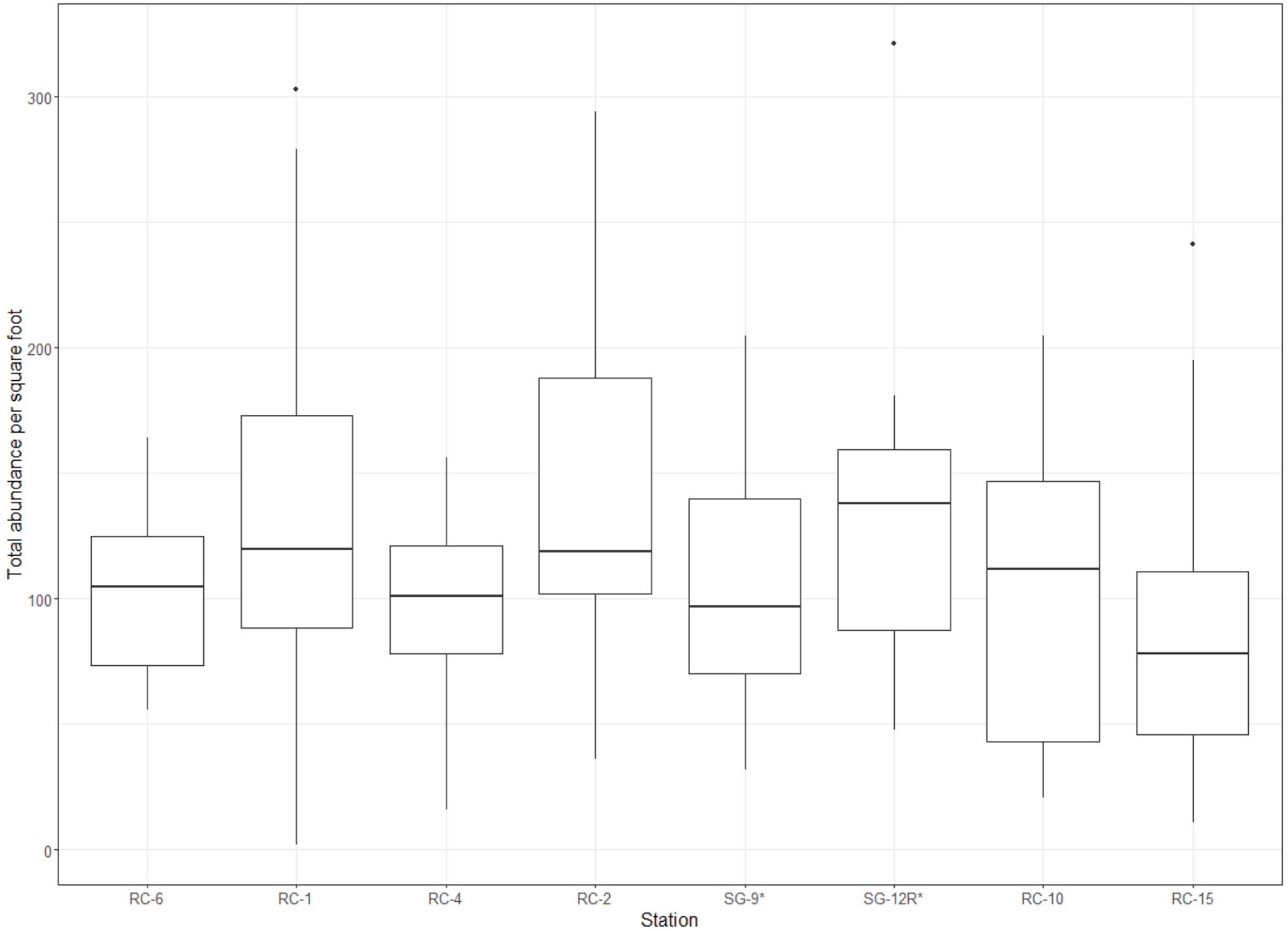
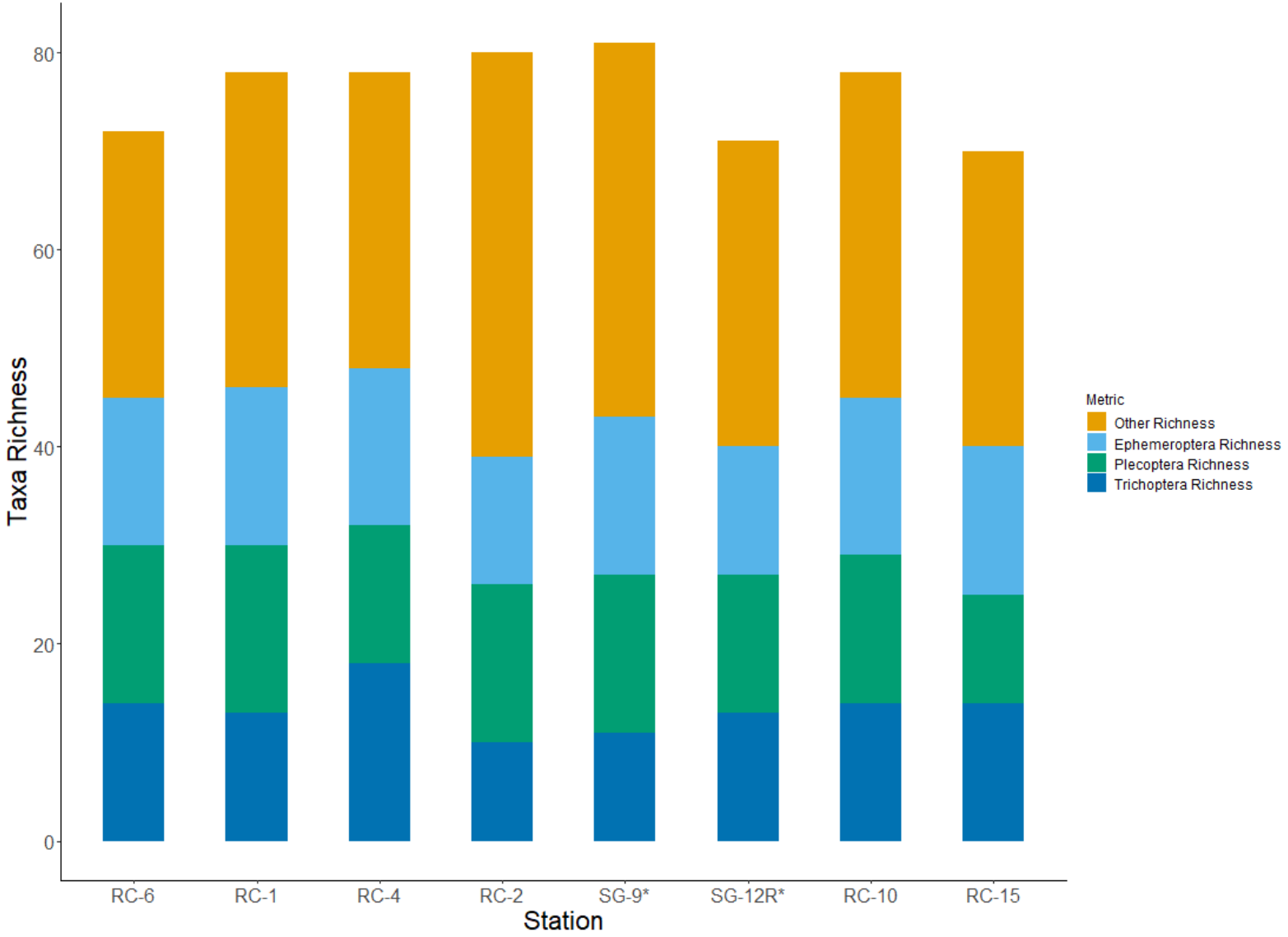


Figure 2. Quartile Distribution of Benthic Macroinvertebrate Abundance per Square Foot by Station, 2020



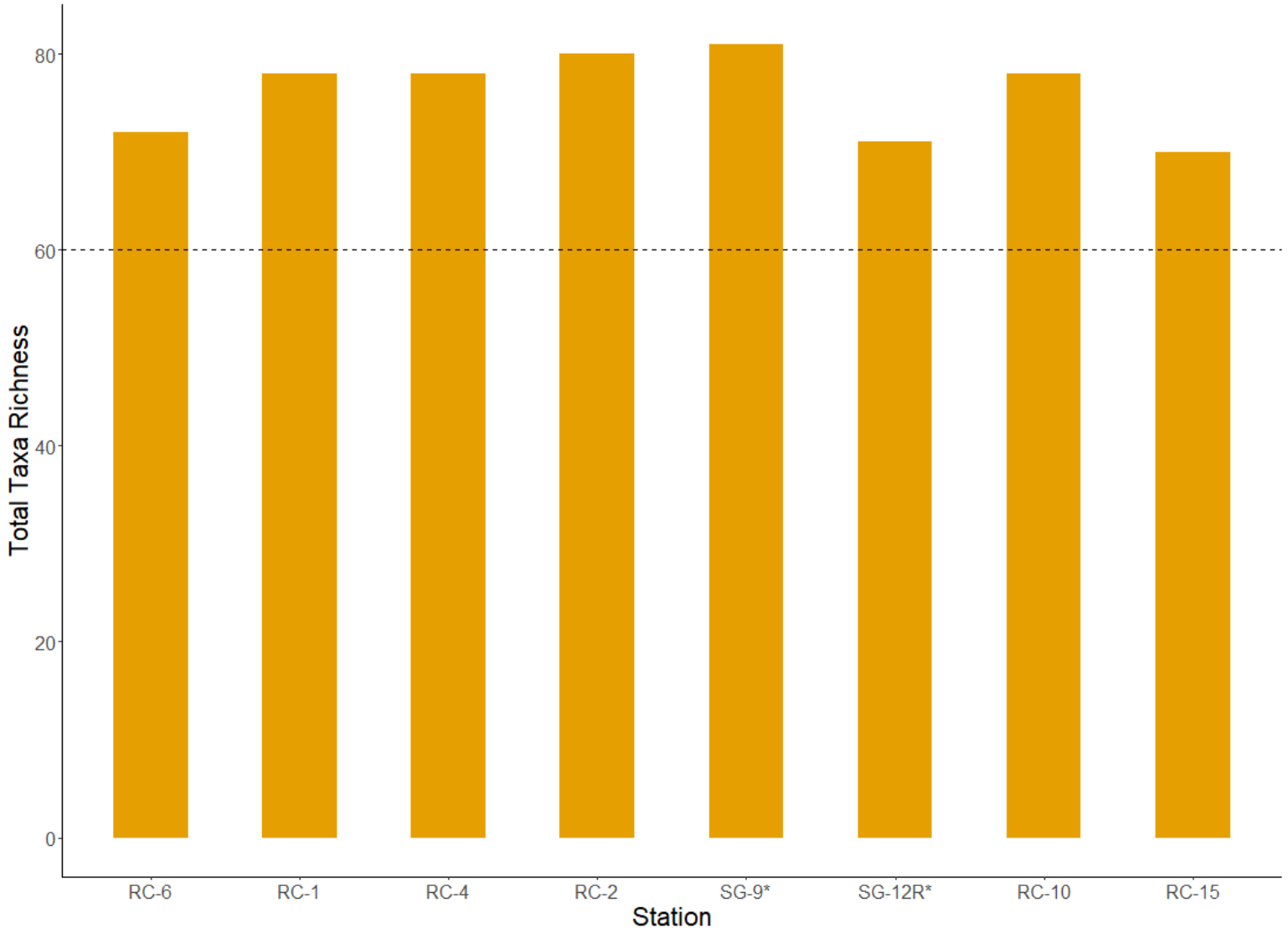
*Indicates 2020 substitute station. Refer to Section 2.0 for further details.

Figure 3. Total Richness & EPT Richness, 2020



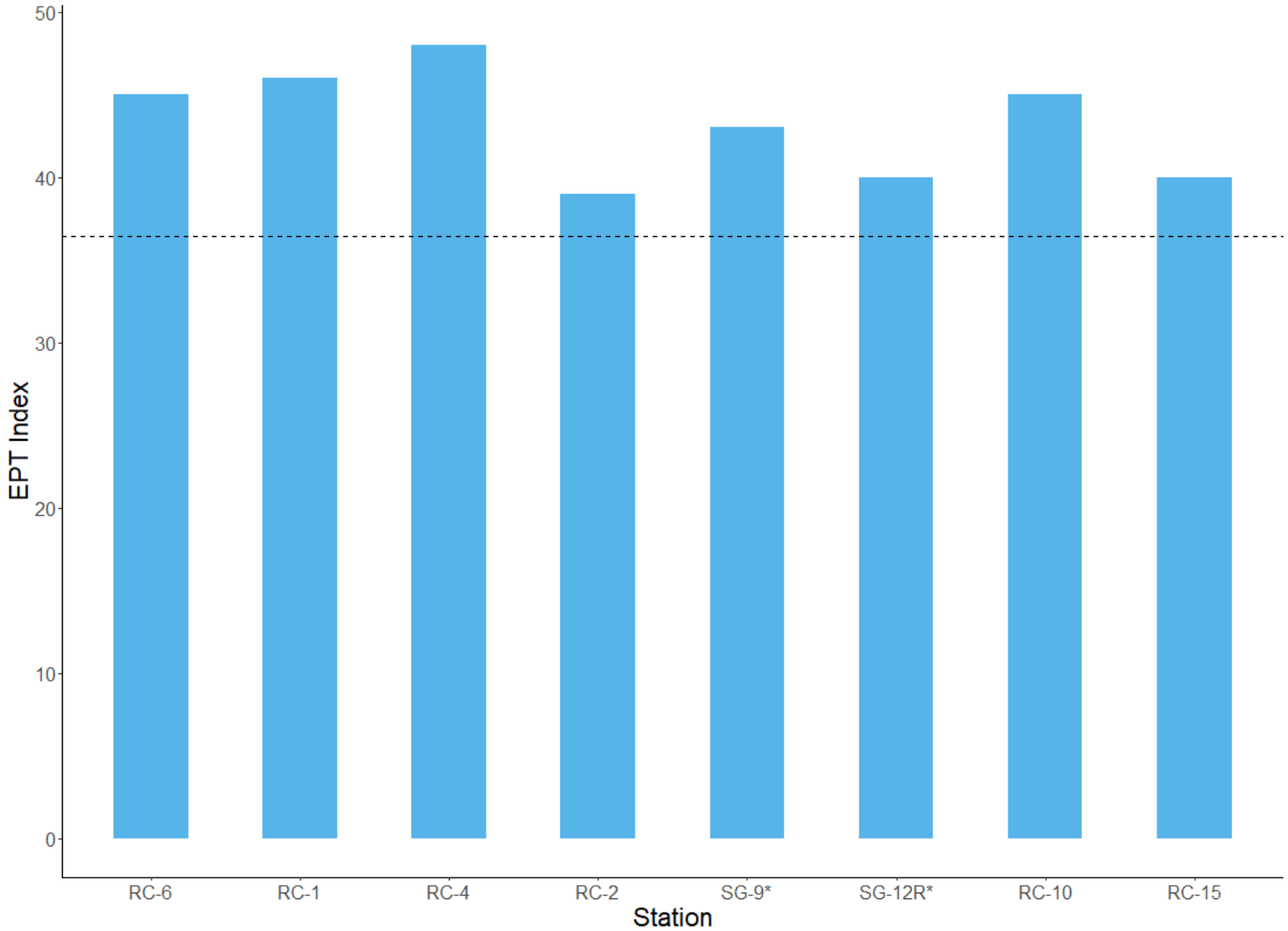
*Indicates 2020 substitute station. Refer to Section 2.0 for further details.

Figure 4. Total Richness Relative to Target Richness, 2020



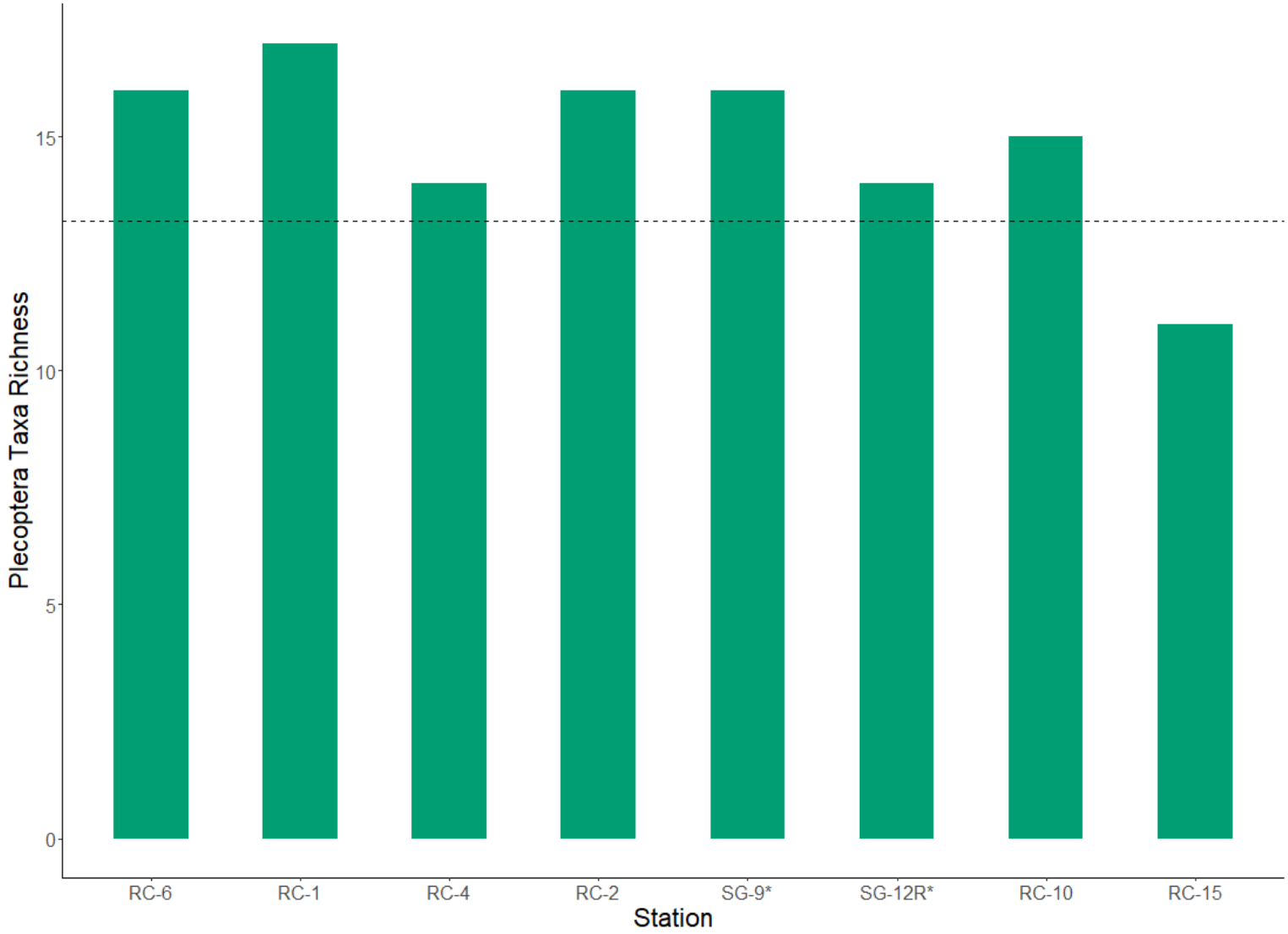
*Indicates 2020 substitute station. Refer to Section 2.0 for further details.

Figure 5. EPT Richness Index by Station, 2020



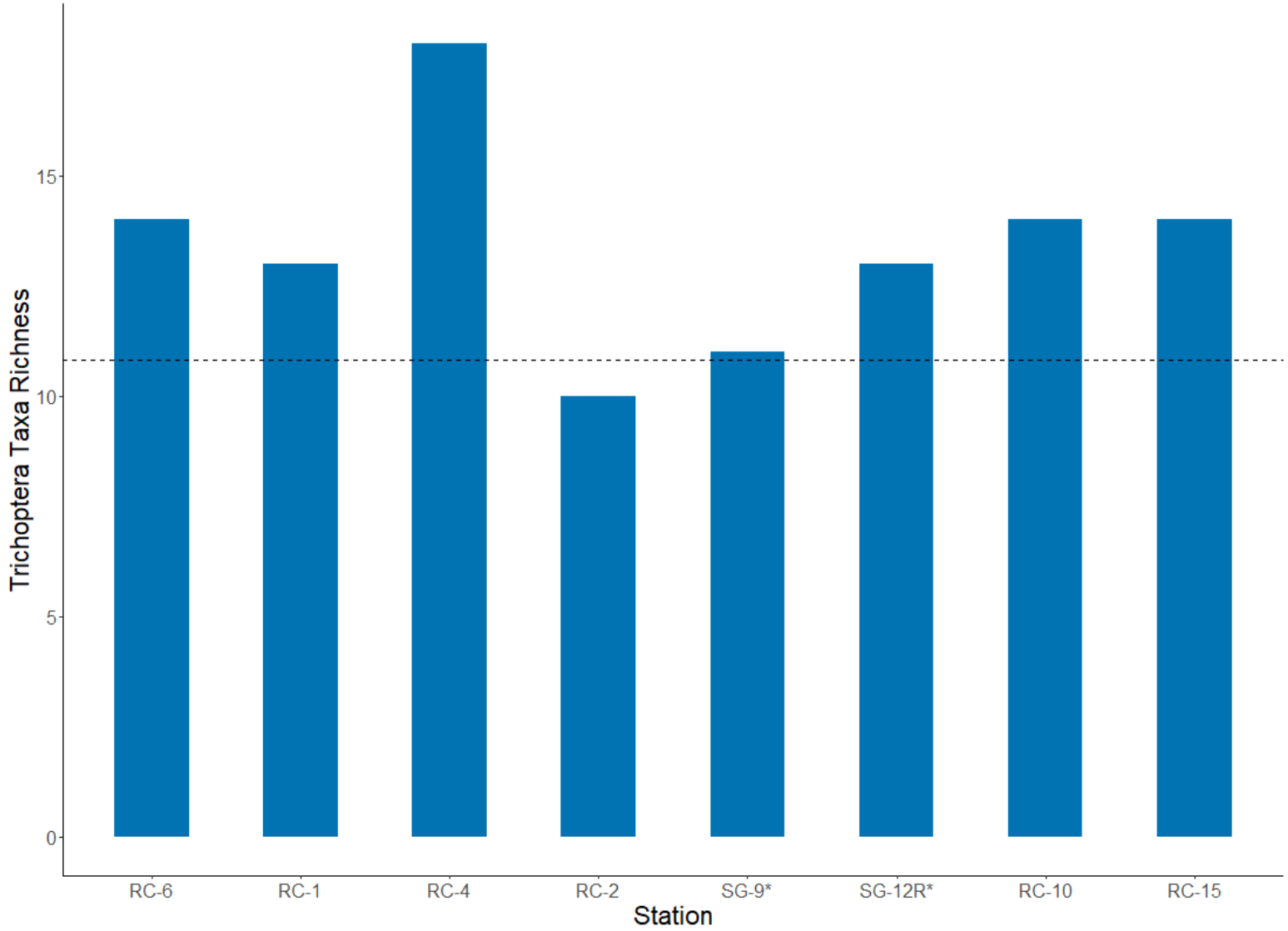
*Indicates 2020 substitute station. Refer to Section 2.0 for further details.

Figure 6. Plecoptera Richness by Station, 2020



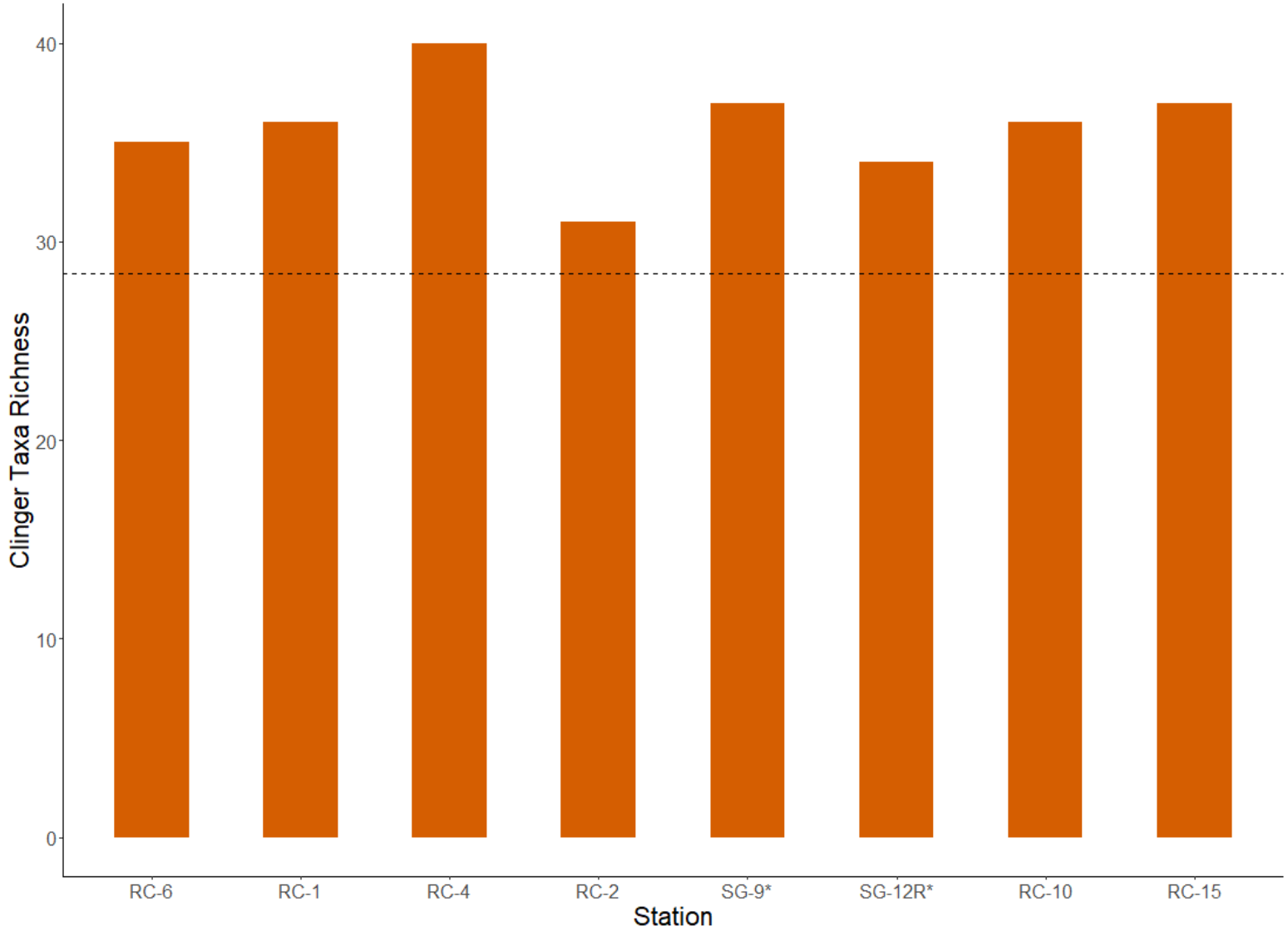
*Indicates 2020 substitute station. Refer to Section 2.0 for further details.

Figure 7. Trichoptera Richness by Station, 2020



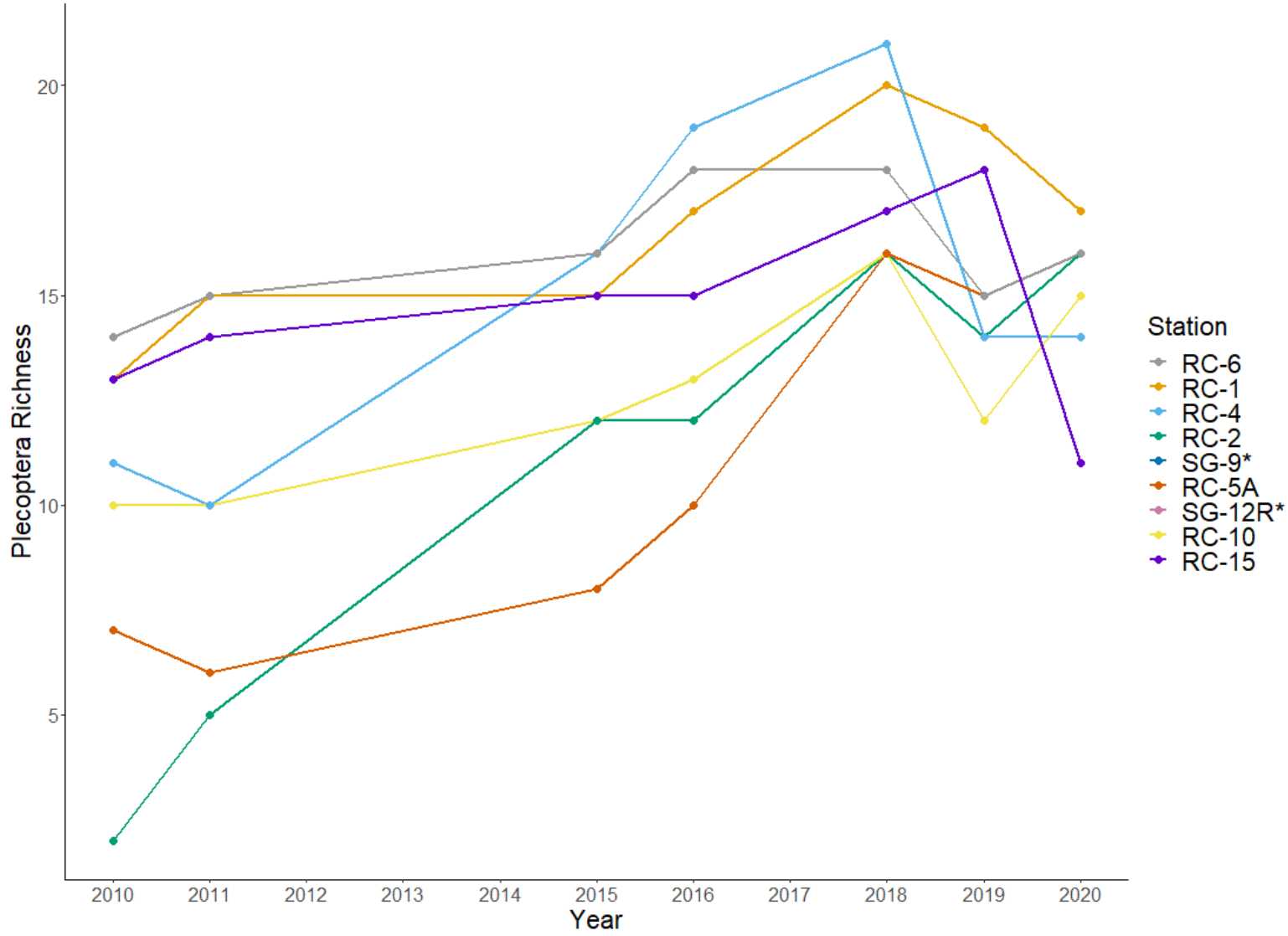
*Indicates 2020 substitute station. Refer to Section 2.0 for further details.

Figure 8. Clinger Richness by Station, 2020



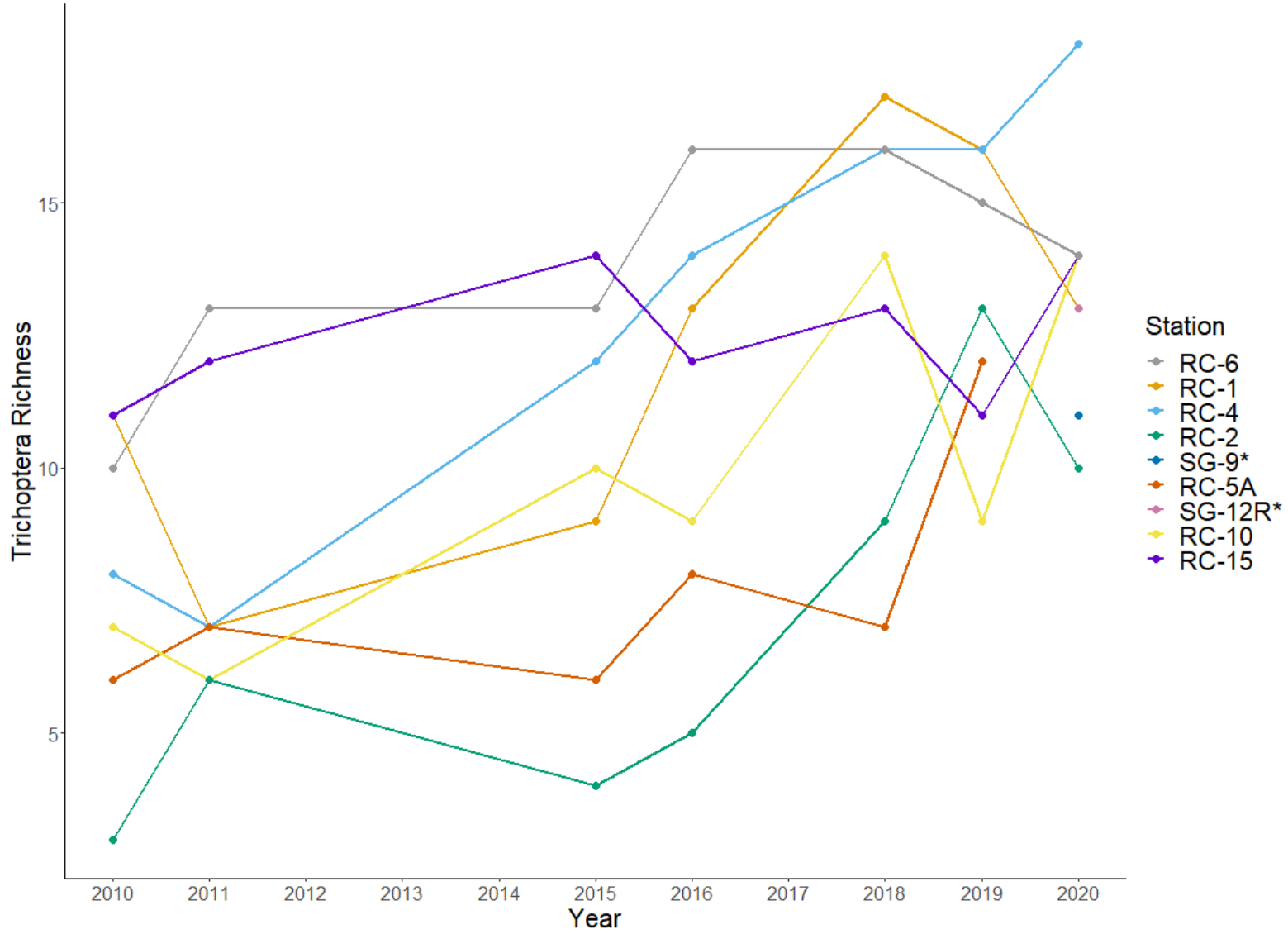
*Indicates 2020 substitute station. Refer to Section 2.0 for further details.

Figure 9. Plecoptera Richness by Station, All Years



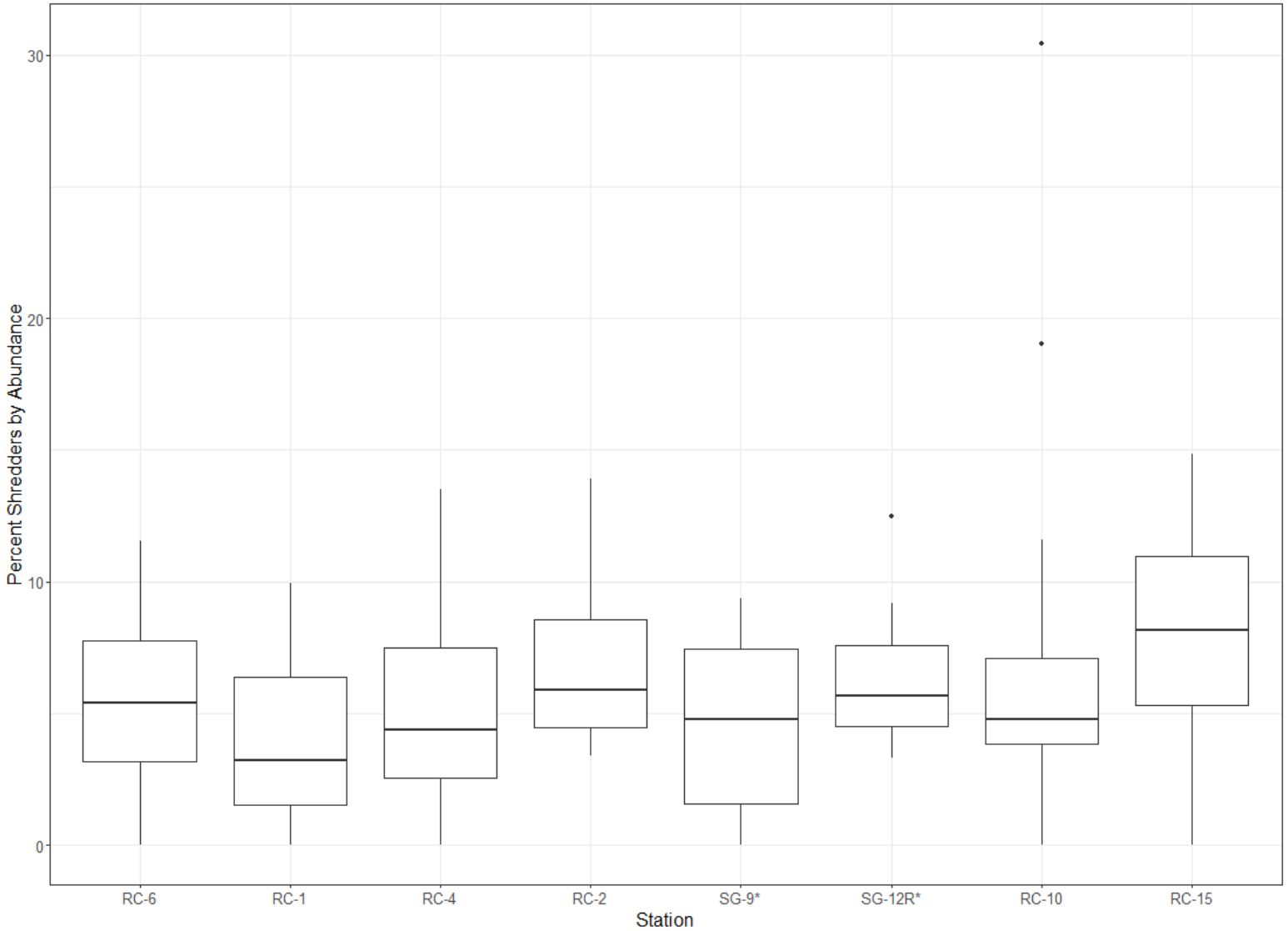
*Indicates 2020 substitute station. Refer to Section 2.0 for further details.

Figure 10. Trichoptera Richness by Station, All Years



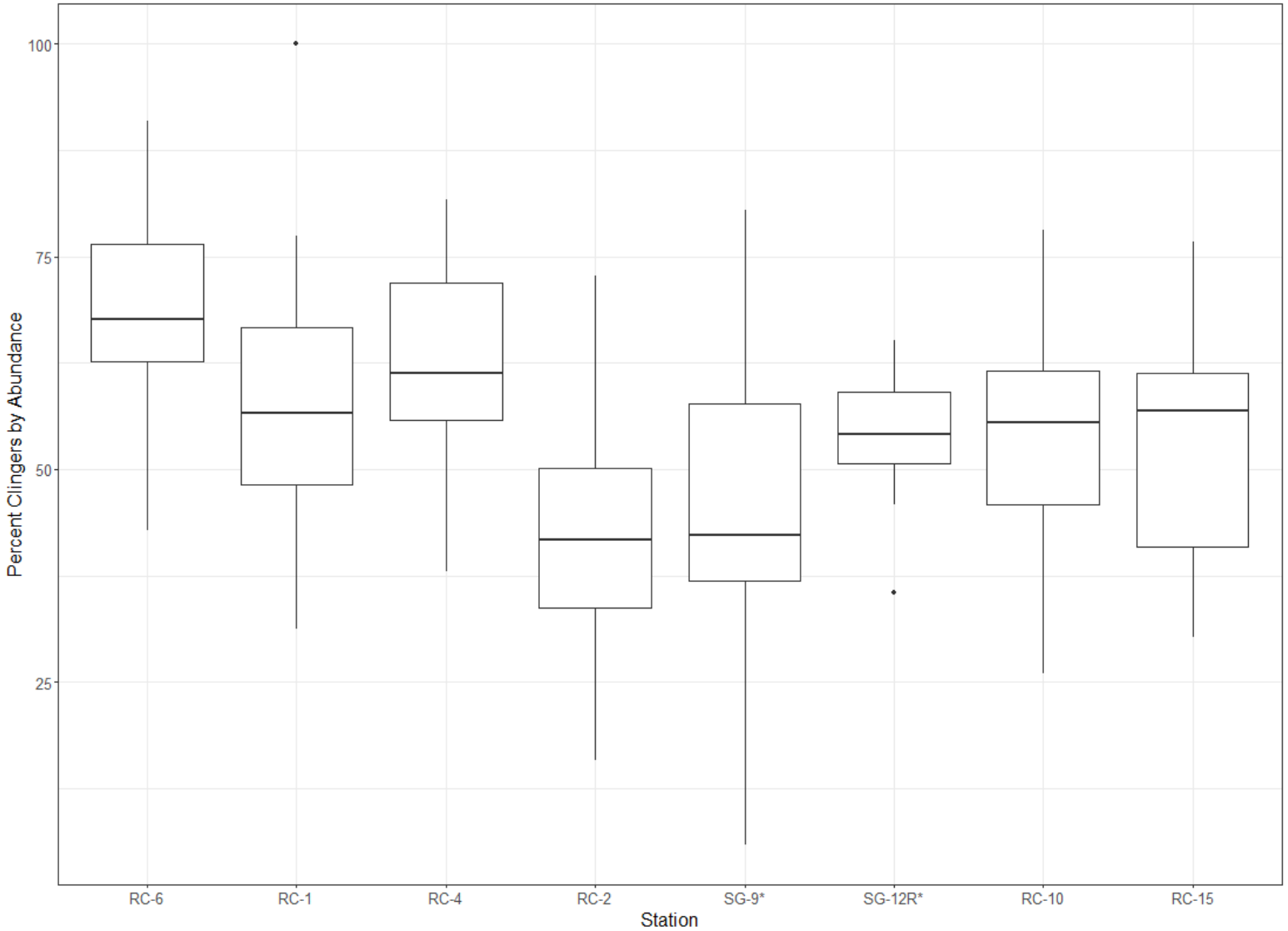
*Indicates 2020 substitute station. Refer to Section 2.0 for further details.

Figure 11. Quartile Distribution of Percent Shredders by Station, 2020



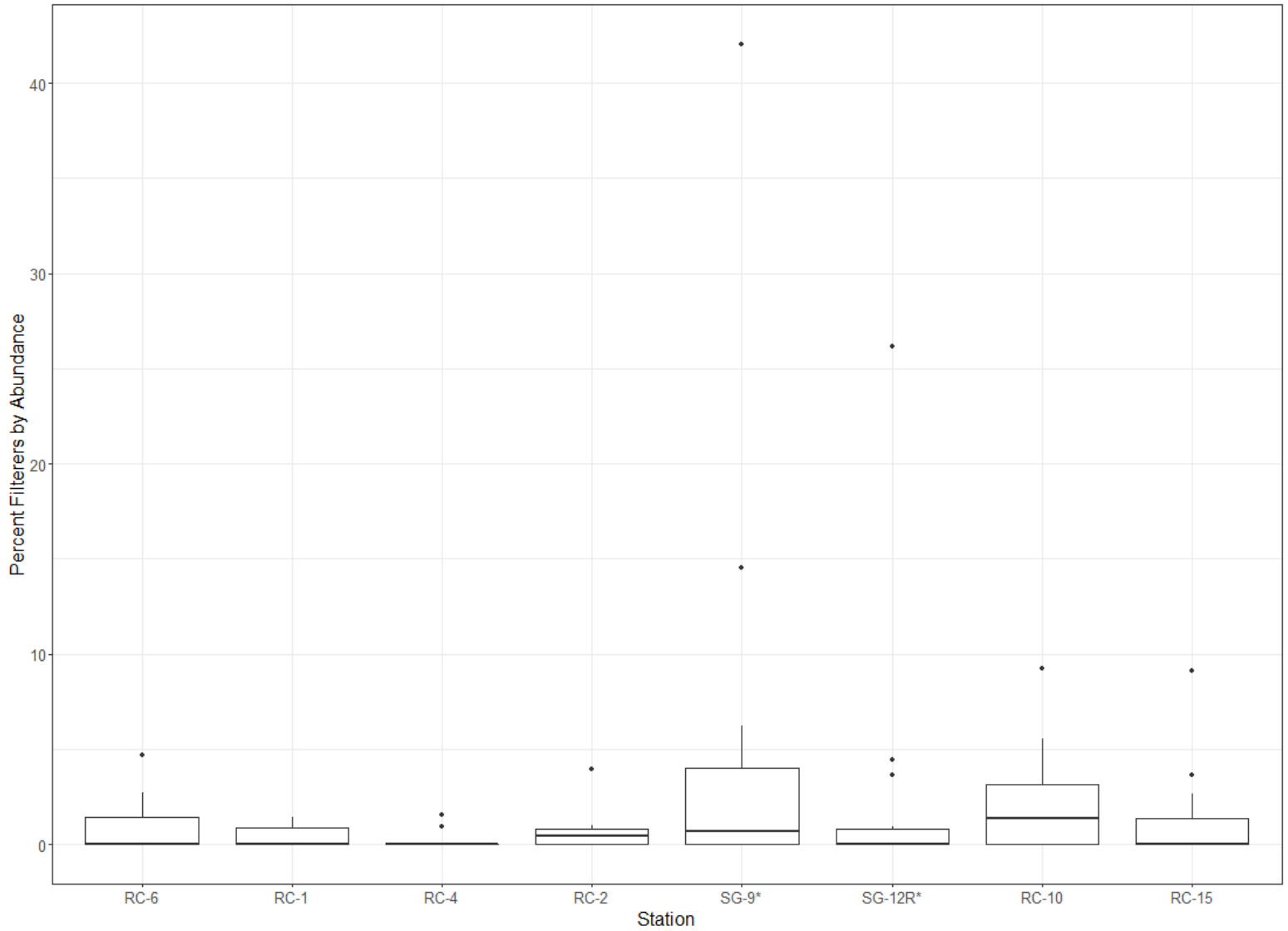
*Indicates 2020 substitute station. Refer to Section 2.0 for further details.

Figure 12. Quartile Distribution of Percent Clingers by Station, 2020



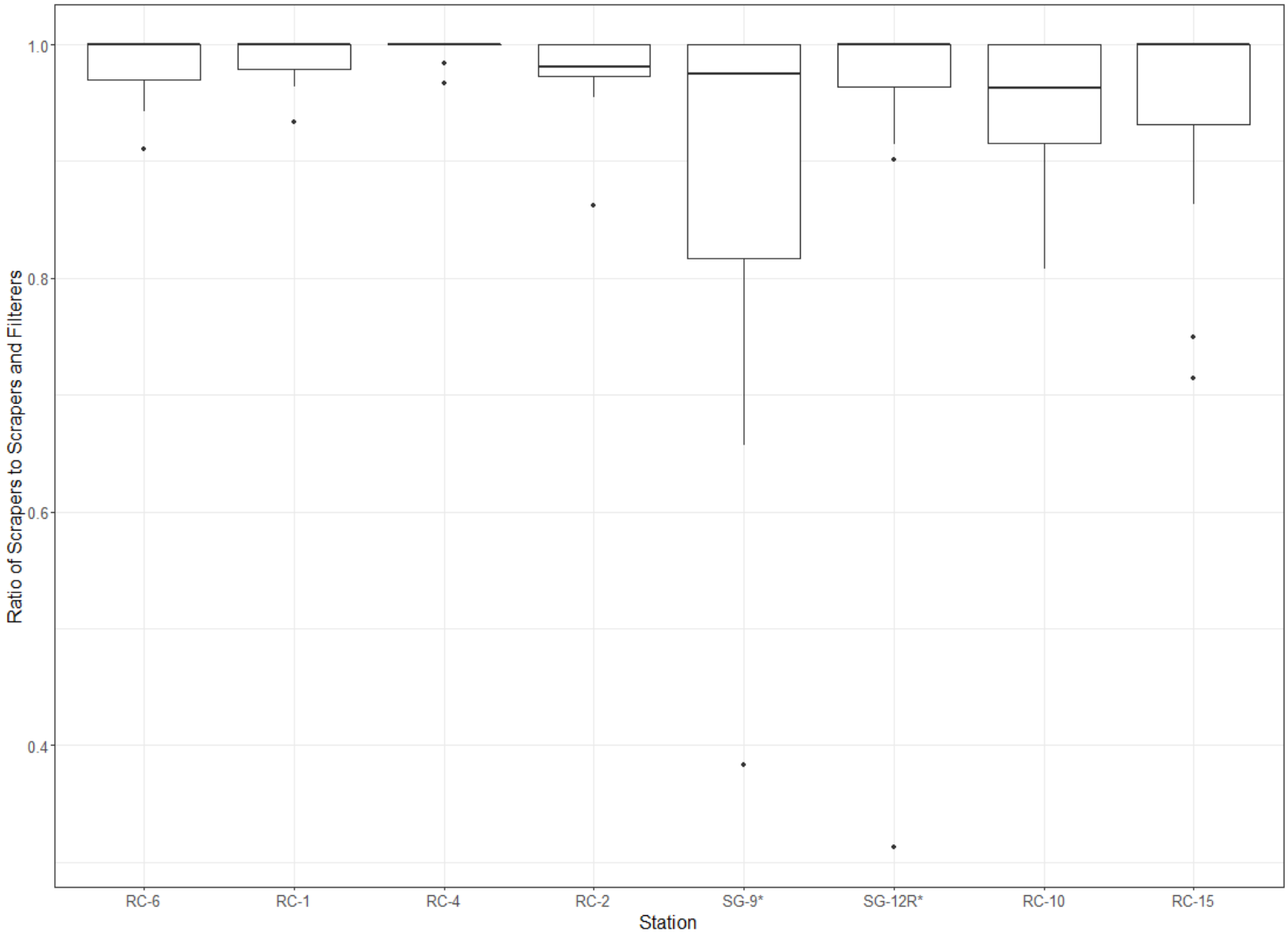
*Indicates 2020 substitute station. Refer to Section 2.0 for further details.

Figure 13. Quartile Distribution of Percent Filterers by Station, 2020



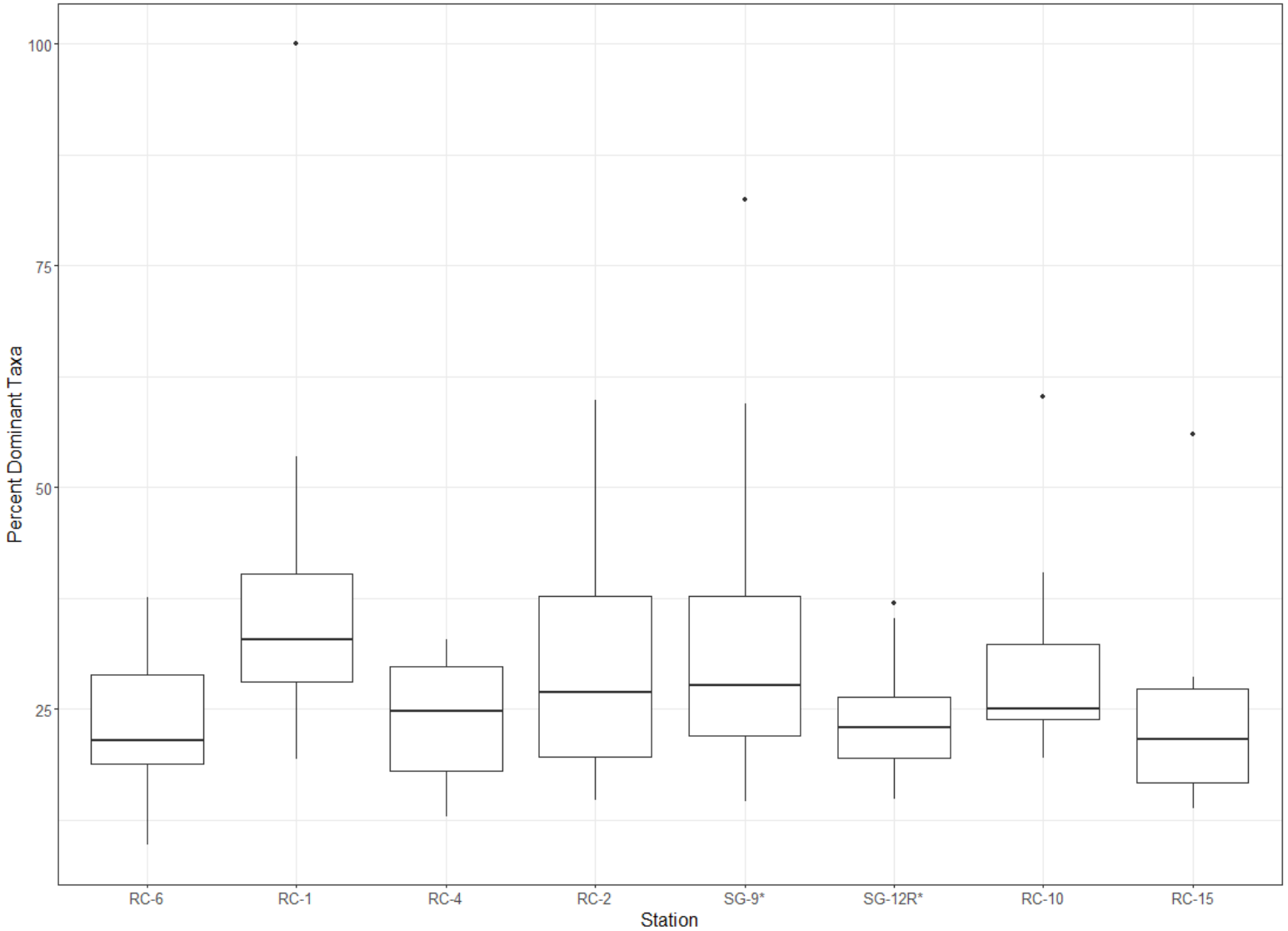
*Indicates 2020 substitute station. Refer to Section 2.0 for further details.

Figure 14. Quartile Distribution of Ratio of Scrapers to Scrapers and Filtering Collector Scores by Station, 2020



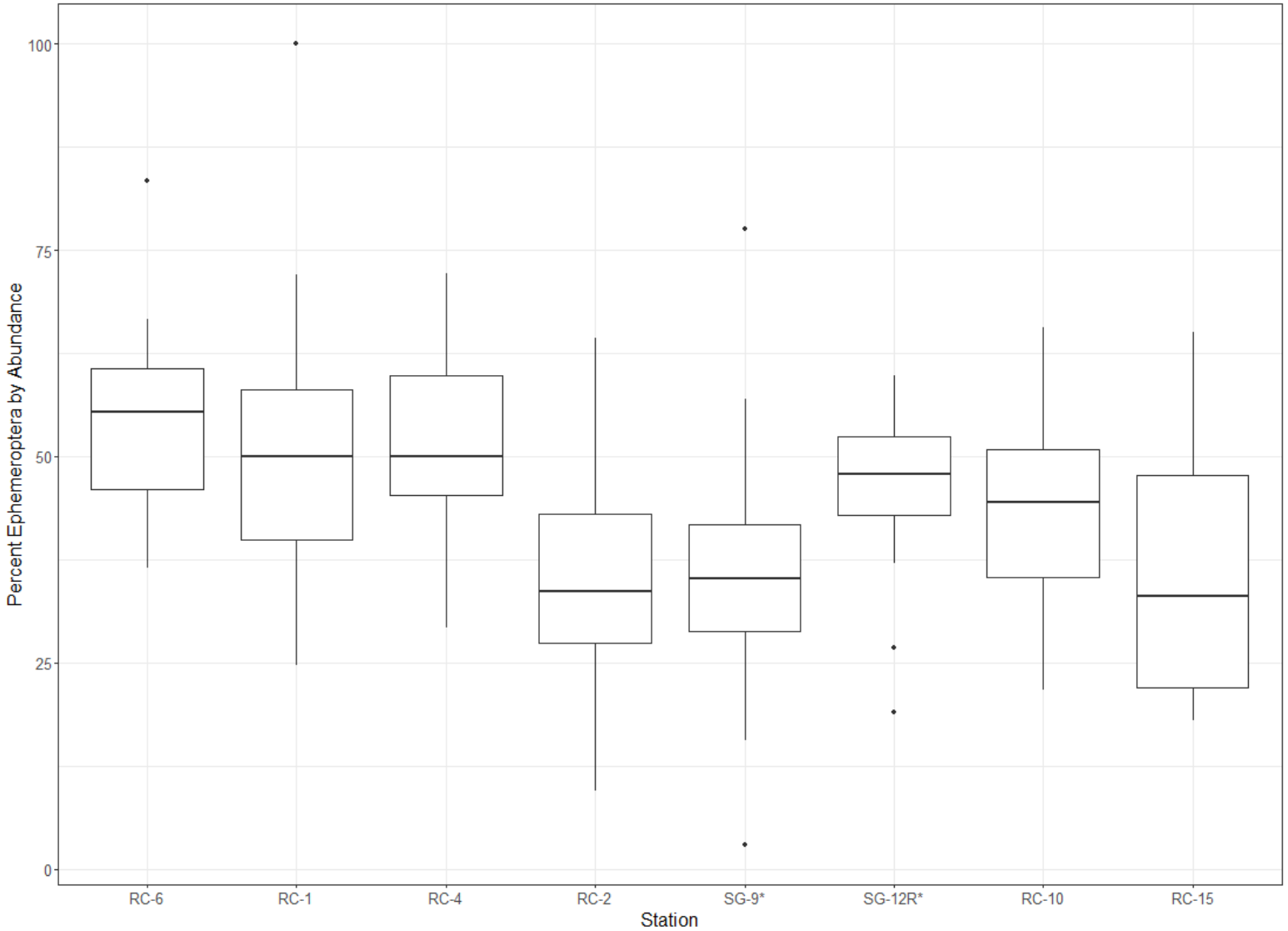
*Indicates 2020 substitute station. Refer to Section 2.0 for further details.

Figure 15. Quartile Distribution of Percent Contribution of Dominant Taxon Scores by Station, 2020



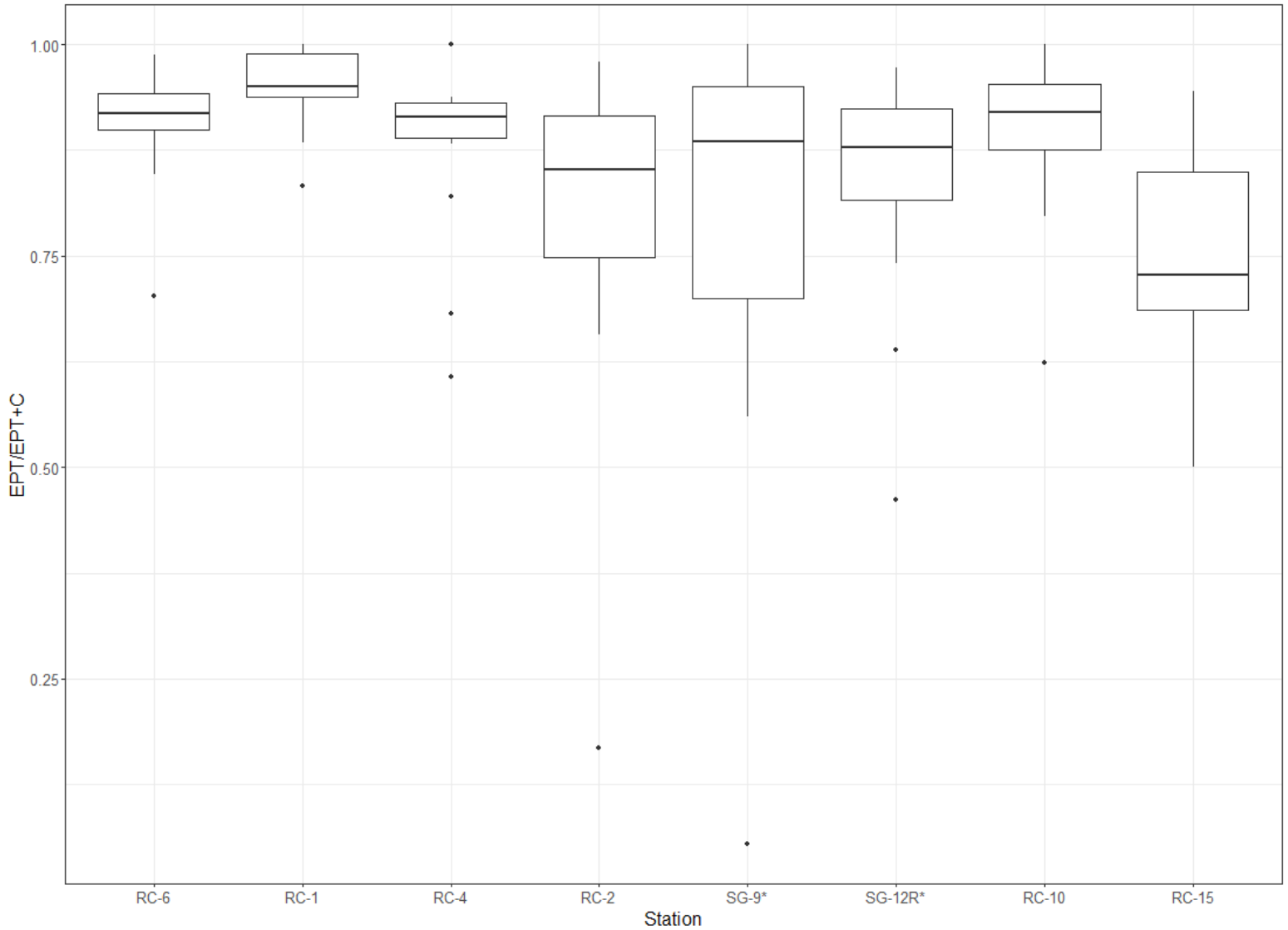
*Indicates 2020 substitute station. Refer to Section 2.0 for further details.

Figure 16. Quartile Distribution of Percent Ephemeroptera by Station, 2020



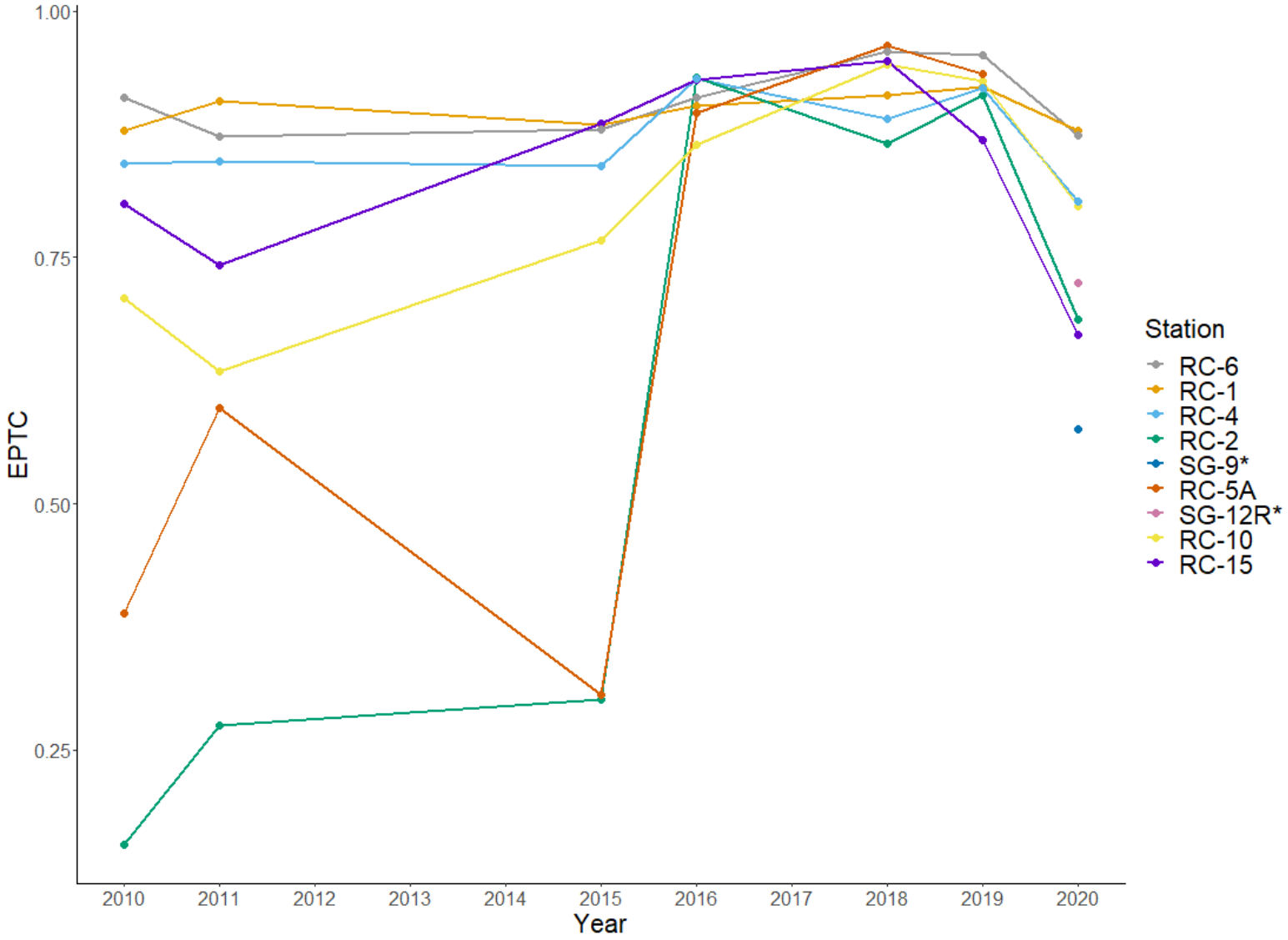
*Indicates 2020 substitute station. Refer to Section 2.0 for further details.

Figure 17. Quartile Distribution of EPT/EPT+C Metric Scores by Station, 2020



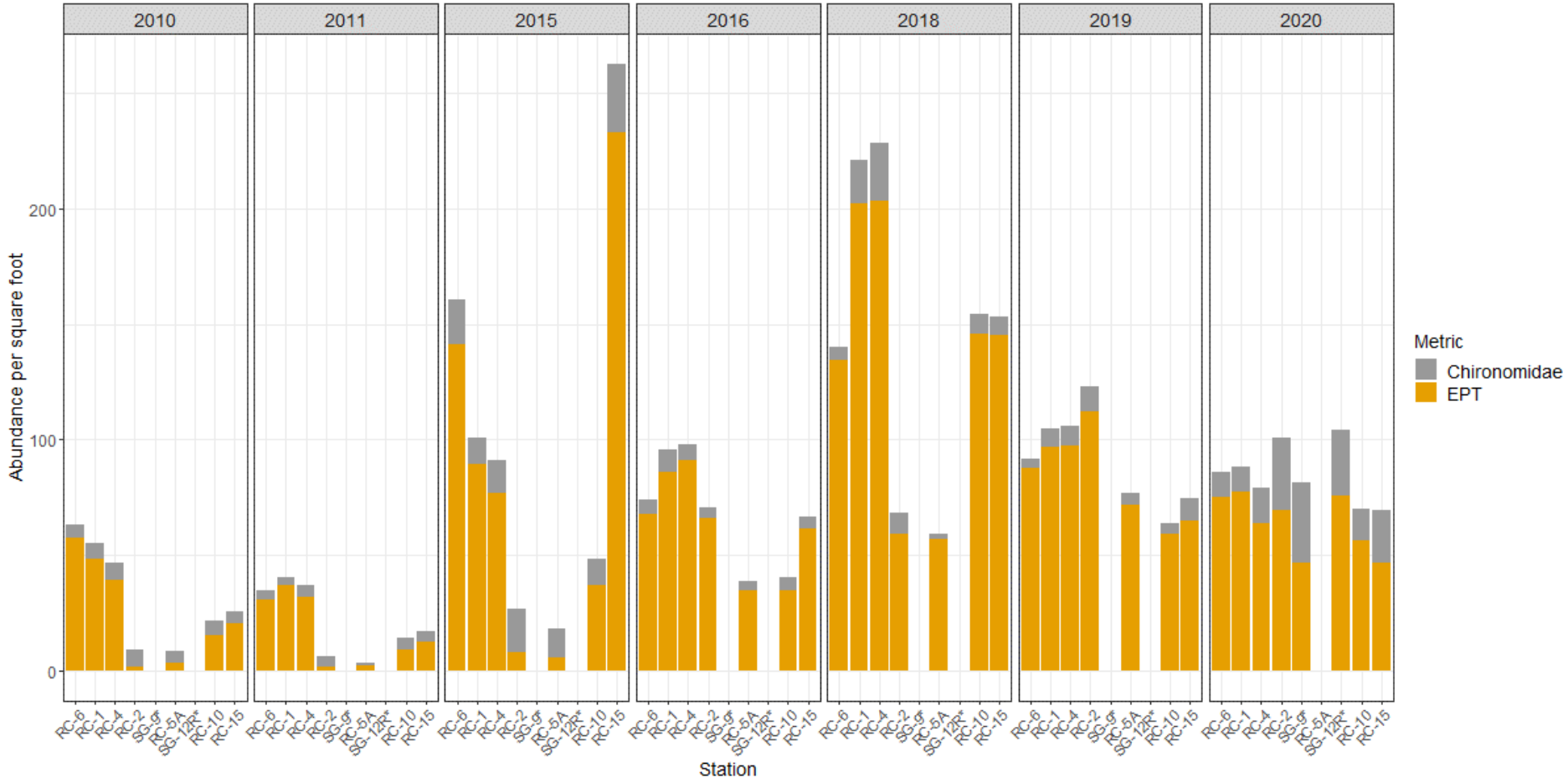
*Indicates 2020 substitute station. Refer to Section 2.0 for further details.

Figure 18. Abundance-Weighted Mean EPT/EPT+C Scores by Station, All Years



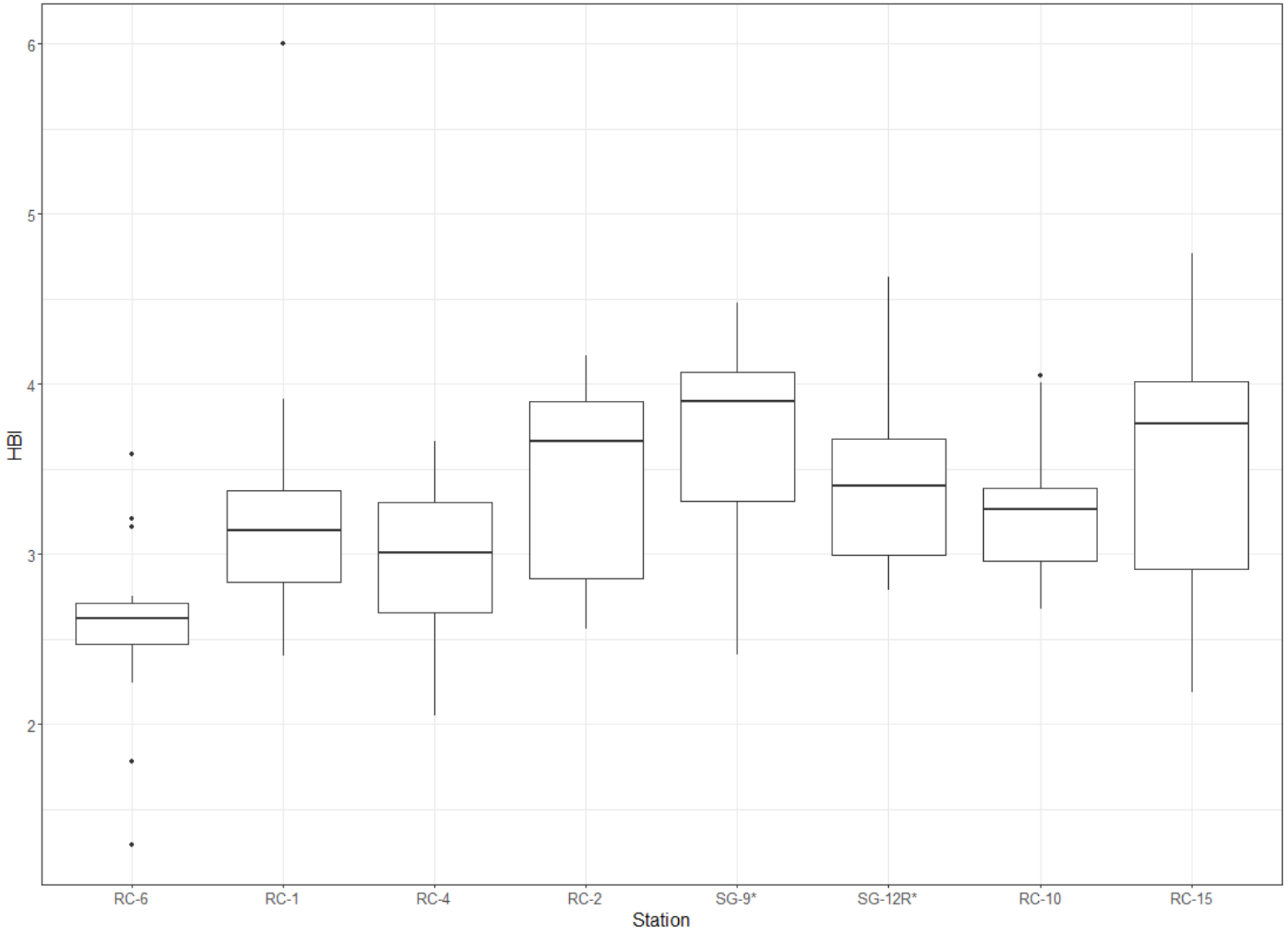
*Indicates 2020 substitute station. Refer to Section 2.0 for further details.

Figure 19. Relative Proportion of EPT to Chironomid Abundance by Station and Year



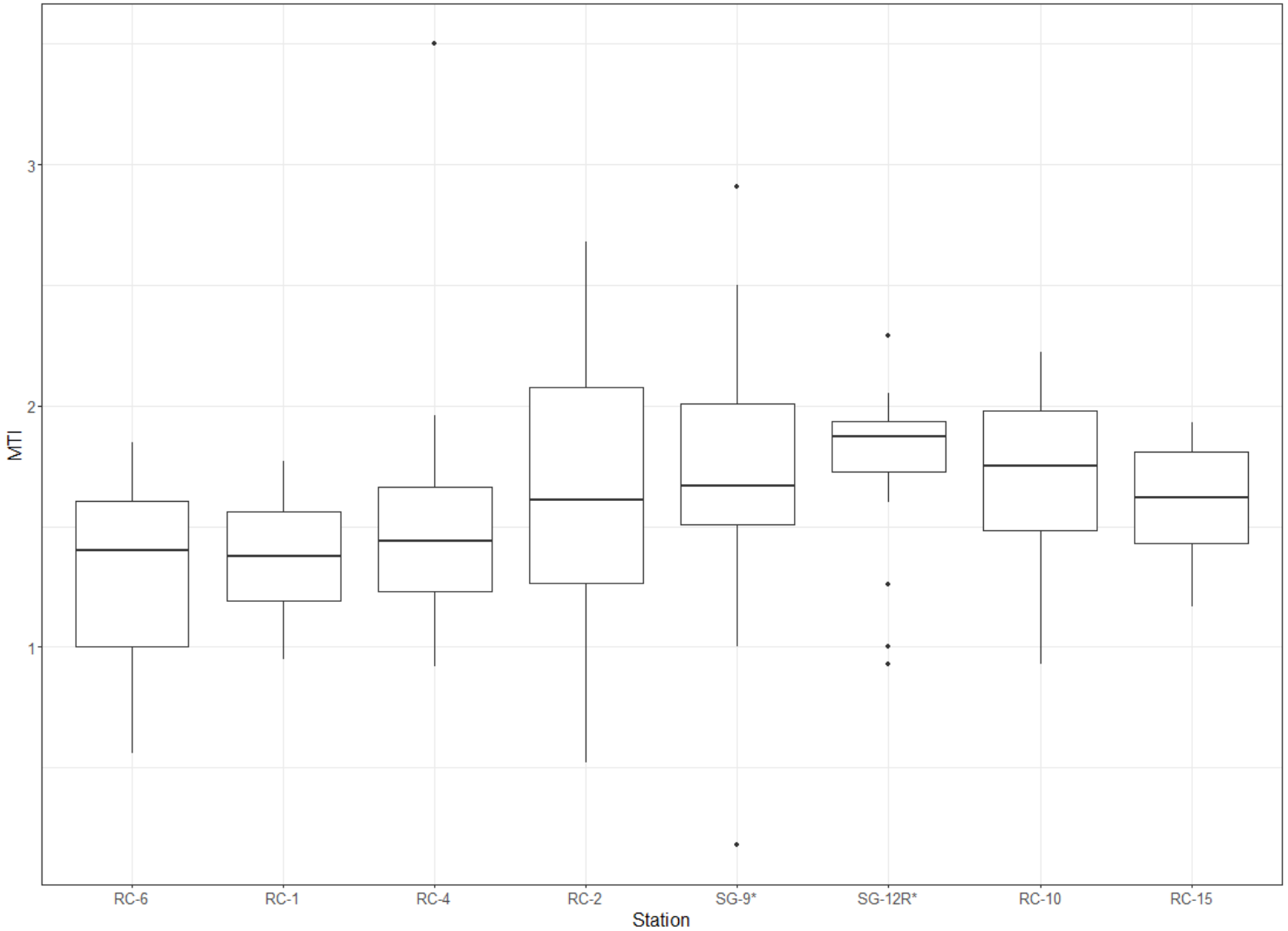
*Indicates 2020 substitute station. Refer to Section 2.0 for further details.

Figure 20. Quartile Distribution of HBI Scores by Station, 2020



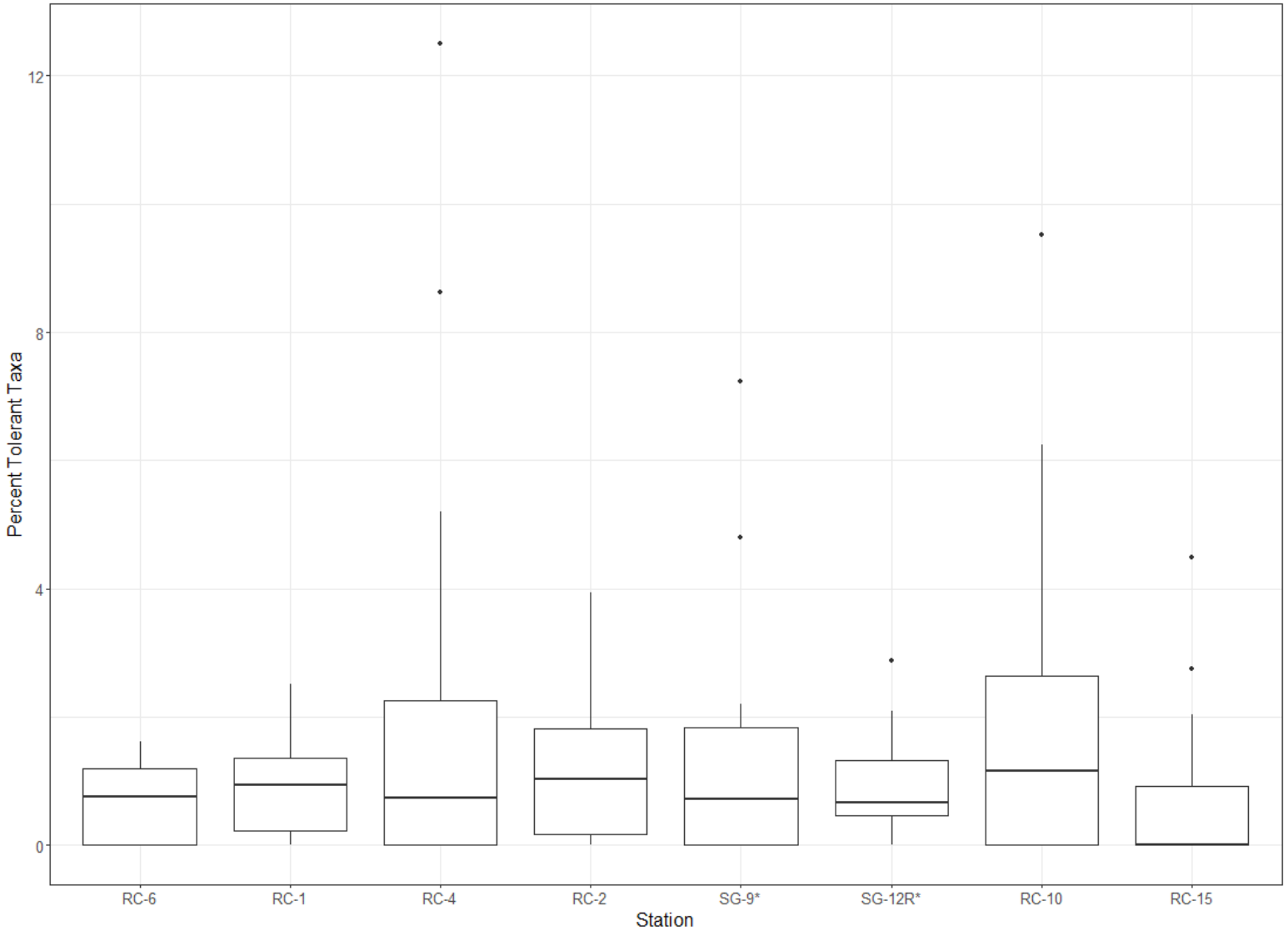
*Indicates 2020 substitute station. Refer to Section 2.0 for further details.

Figure 21. Quartile Distribution of MTI Scores by Station, 2020



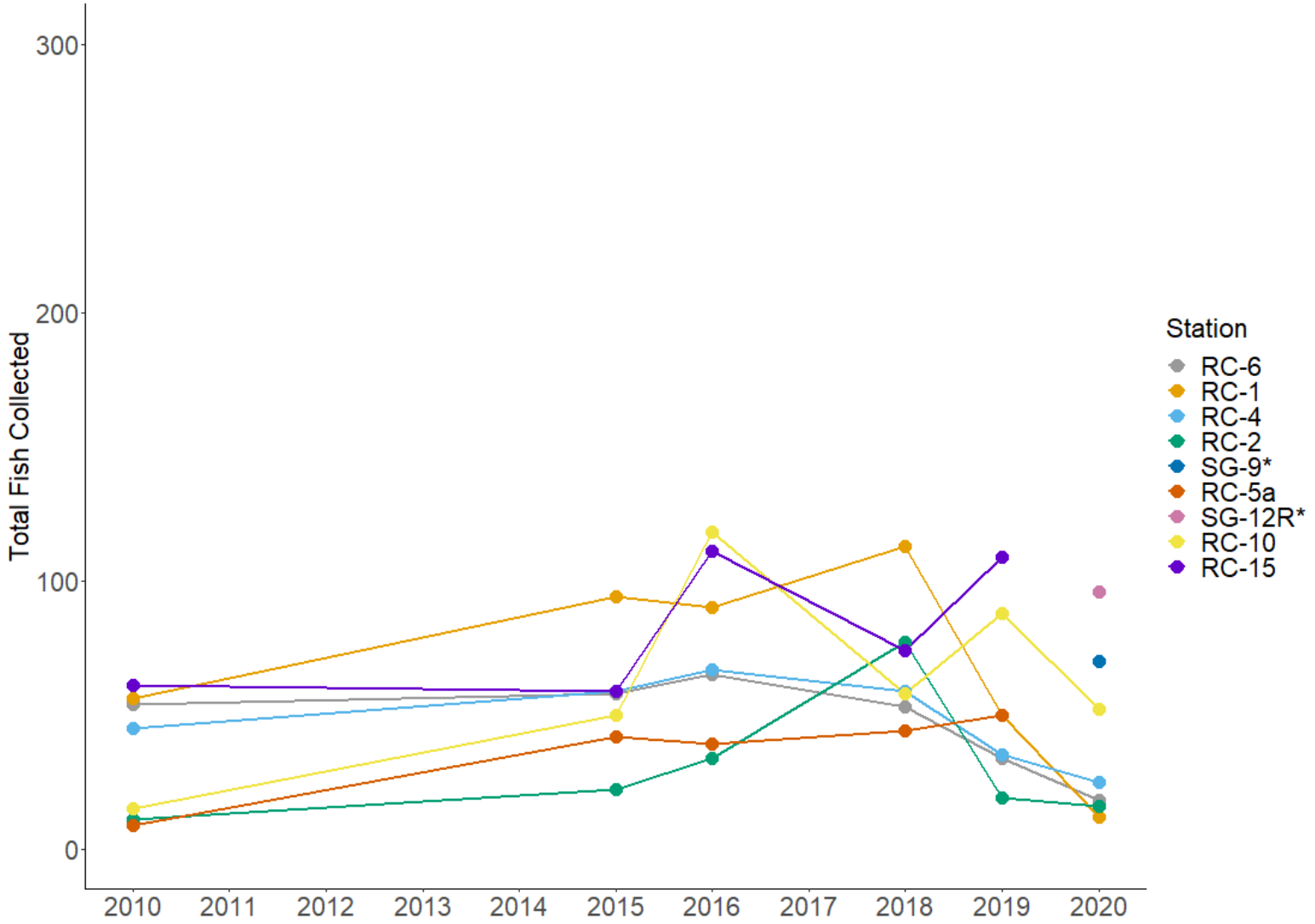
*Indicates 2020 substitute station. Refer to Section 2.0 for further details.

Figure 22. Quartile Distribution of Percent Tolerant Taxa by Station, 2020



*Indicates 2020 substitute station. Refer to Section 2.0 for further details.

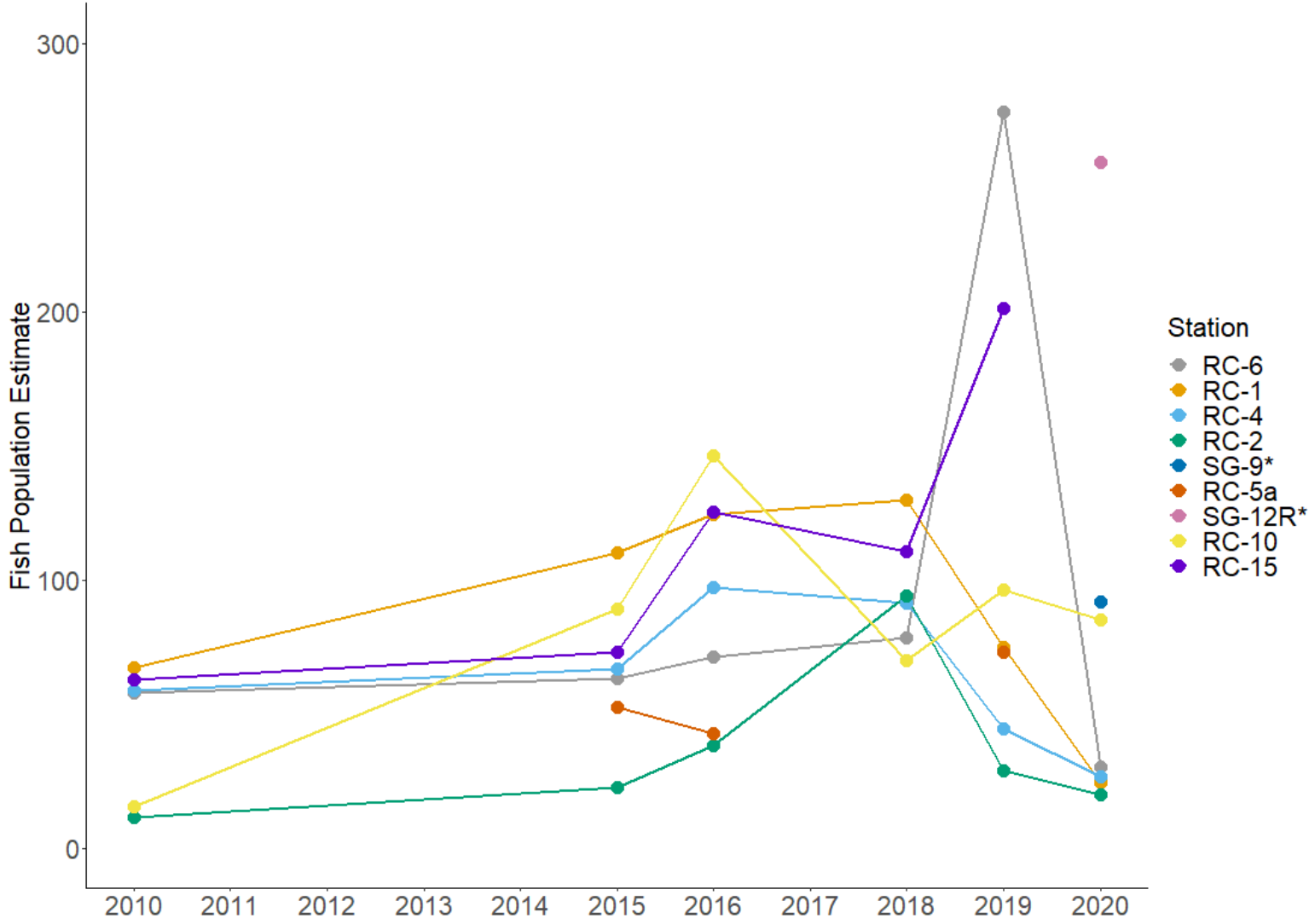
Figure 23. Total Fish Collected, All Years[1]



1 The 2018 total at RC-2 was reduced by half to normalize to abundance/100-meter station.

*Indicates 2020 substitute station. Refer to Section 2.0 for further details.

Figure 24. Fish Abundance Estimates, All Years [1]



1 The 2018 total at RC-2 was reduced by half to normalize to abundance/100-meter station.
*Indicates 2020 substitute station. Refer to Section 2.0 for further details.

Figure 25. Fish Size Frequency Histogram, 2020 All Stations (binwidth = 10)

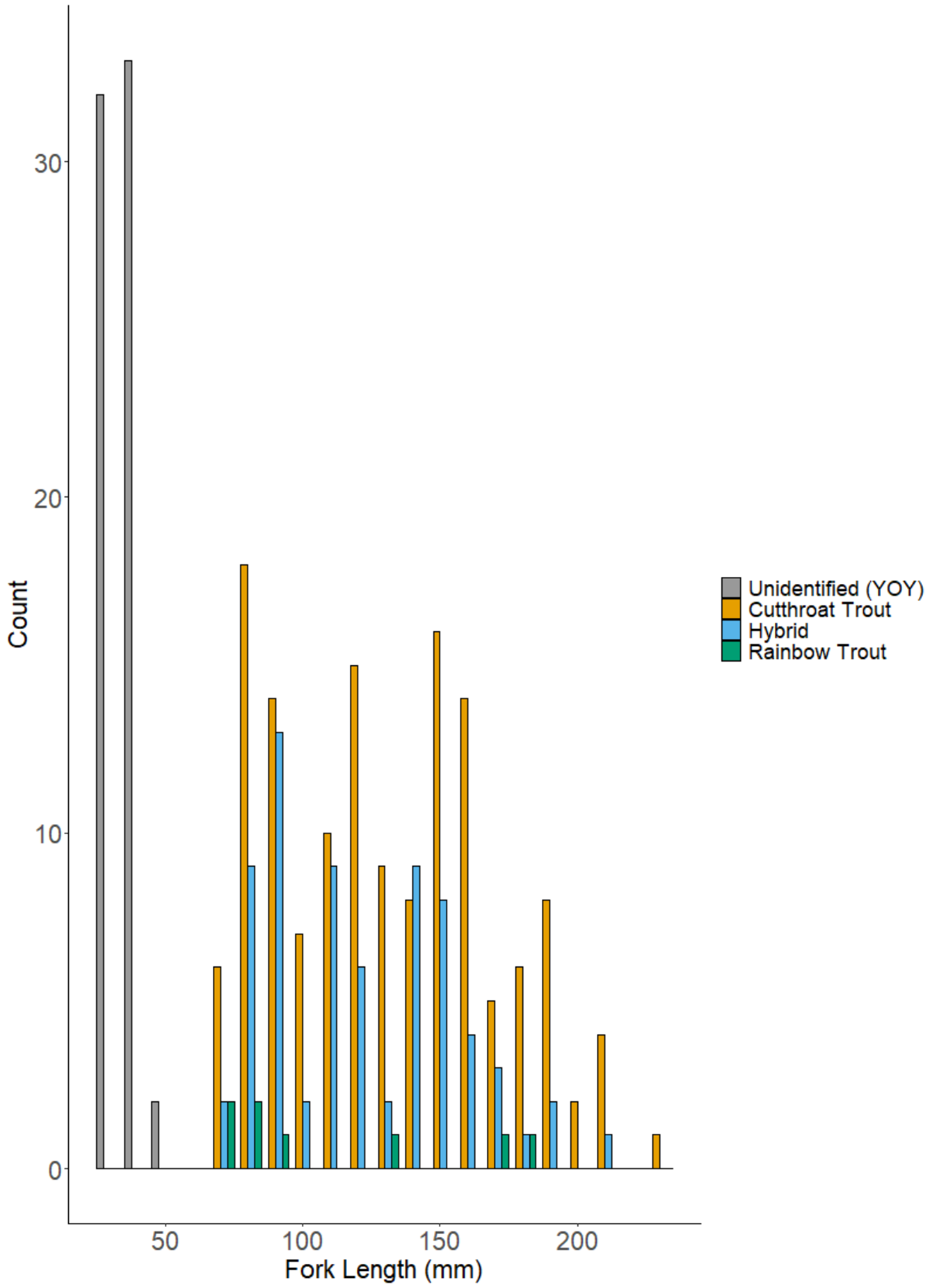
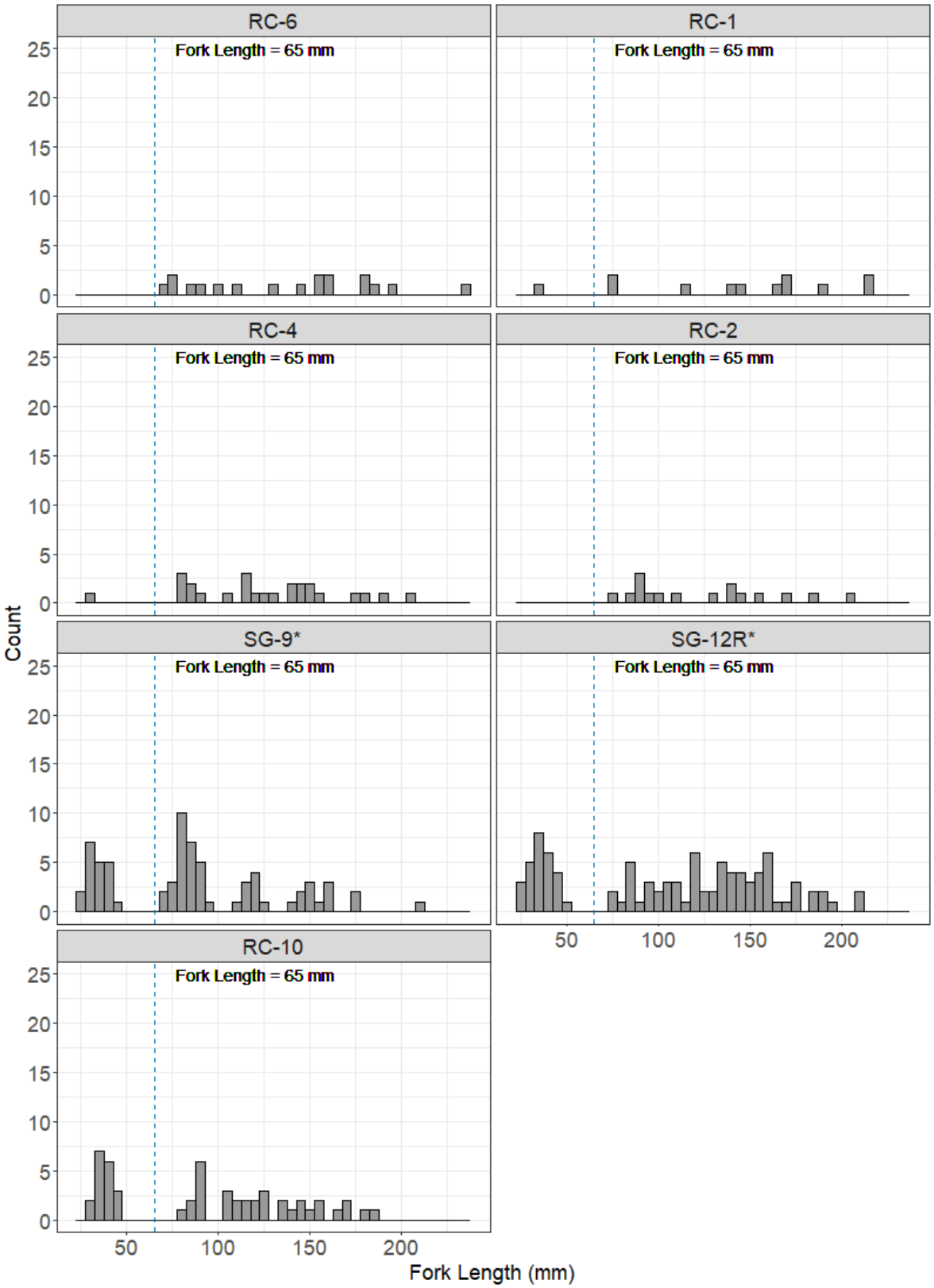
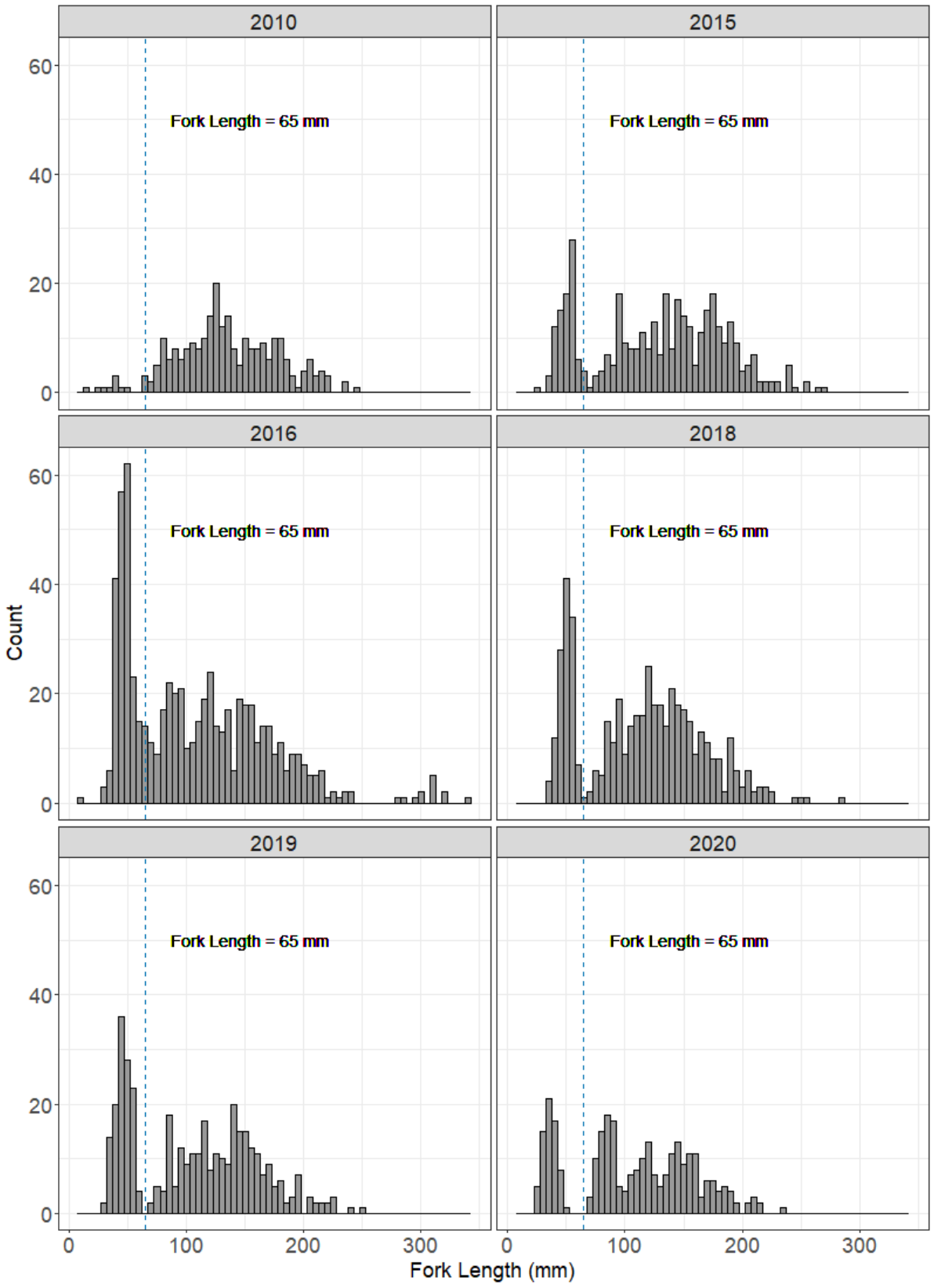


Figure 26. Fish Size Frequency Histograms, 2020 All Species by Station (binwidth = 5)



*Indicates 2020 substitute station. Refer to Section 2.0 for further details.

Figure 27. Sampling Size Frequency Histograms, All Species and Stations (binwidth = 5)



Appendix A
Field Forms

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for double-sided printing

Station Descriptions

RC-6

RC-6 is the upper-most reference station. This station has a generally straight planform with an average gradient of between 3% and 5%, and an approximate reach area of 11,483 ft^2. The channel bed is characterized predominantly by cobble- and gravel-sized substrate with scattered boulders. The dominant habitat types are composed of riffles (~90% of the wetted area) with an average depth of 1.1 ft and pools (~10% of the wetted area) with an average depth of 2.5 ft. The station is qualitatively characterized as having a moderate amount of overall habitat complexity relative to other stations. Habitat features include large boulders at the upper end of the station forming hydraulic complexity, overhanging riparian vegetation throughout, occasional small scour pools along the right bank, and 10 observed pieces of large woody debris (LWD). The riparian community is composed of an undisturbed mixed conifer and deciduous forest.

RC-1

RC-1 is located approximately 550 feet downstream of RC-6 and represents the second reference station. This station has a sinuous planform with an average gradient of 3%, and an approximate reach area of 16,404 ft^2. The channel bed is characterized predominantly by boulder-, cobble- and gravel-sized substrate. Dominant habitat types include riffles (~84% of the wetted area) with an average depth of 1.2 ft and pools (~16% of the wetted area) with an average depth of 2.2 ft. Qualitatively, the station is characterized as having a moderate amount of overall habitat complexity relative to other stations. Habitat features include 3 scour pools (1 at the upstream end and 2 downstream of a woody debris jam near the downstream end), some overhanging riparian vegetation, and 4 observed pieces of LWD. The left bank is incised throughout much of the station. A heavily overgrown, shallow side channel parallels the main channel along the entire station length. The riparian community is composed of an undisturbed mixed conifer and deciduous forest.

RC-4

RC-4 is located approximately 2,700 ft downstream of RC-1 and represents the upper-most Site station located at the upstream edge of Tailings Pile (TP) 1. RC-4 represents the upstream boundary of the Railroad Creek realignment, which was completed as part of the remedial action. This station has a generally straight planform with an average gradient of between 4 and 5%, and an approximate reach area of 13,123 ft^2. The channel bed is characterized predominantly by cobble- and gravel-sized substrate. Dominant habitat types include riffles (~96% of the wetted area) with an average depth of 1.5 ft and pools (~4% of the wetted area) with an average depth of 3.2 ft. Qualitatively, the station is characterized as having a moderate-low amount of overall habitat complexity relative to other stations. Habitat features include a large scour pool at the upstream end formed by a boulder grade control at the Holden waterline crossing, log and boulder bank stabilization along both banks, overhanging riparian vegetation concentrated

along the left bank, several gravel bars along both banks, and 8 observed pieces of LWD. A footbridge crosses Railroad Creek immediately downstream of the waterline crossing. The riparian community is composed of a mixed conifer and deciduous forest, which is dense throughout the left bank, and comparatively sparse along the right bank due to remediation activities.

RC-2

RC-2 is located approximately 4,500 ft downstream of RC-4 and represents the second Site station. Located at the downstream edge of TP 3, RC-2 is the downstream boundary of the Railroad Creek realignment. This station generally has a sinuous planform with an average gradient of between 1 and 2%, and an approximate reach area of 11,483 ft^2. The channel bed is characterized predominantly by cobble- and gravel-sized substrate. Dominant habitat types include riffles (~92% of the wetted area) with an average depth of 1.8 ft and pools (~8% of the wetted area) with an average depth of 2 ft. Qualitatively, the station is characterized as having a low amount of overall habitat complexity relative to other stations. Habitat features include logs installed post-remediation along the banks and within the stream (3 observed pieces of LWD) and constructed riffle-pool complexes. The right bank is armored with riprap to provide bank stabilization. Vegetation is absent from the riparian area along the right bank, and the left bank is sparsely vegetated.

SG-9

SG-9 is a Site station, located approximately 1,400 ft downstream of RC-2. SG-9 was selected as an alternative biomonitoring station to RC-5A due to high water levels and unsafe sampling conditions at RC-5A, which is located approximately 1,350 ft downstream of SG-9. SG-9 was selected as an alternative station because of the similarity in habitat conditions to those at other sampling stations. SG-9 generally has a straight planform with an average gradient of between 2 and 3%, and an approximate reach area of 16,404 ft^2. The channel bed is characterized predominantly by cobble- and gravel-sized substrate, with boulders common. Dominant habitat types include glides (~73% of the wetted channel) with an average depth of 2 ft, riffles (~17% of the wetted channel) with an average depth of 1.3 ft, side channels (~2% of wetted channel) with an average depth of 0.4 ft, and pools (~8% of wetted channel) with an average depth of 2.6 ft. Qualitatively, the station is characterized as having a high amount of overall habitat complexity relative to other stations. Habitat features include a log jam near the upstream end, several scour pools, gravel bars along both banks, three side channels (2 narrow, shallow channels and 1 wide, densely vegetated channel), and some overhanging riparian vegetation concentrated along the downstream half of the station. The riparian community is composed of a mixed conifer and deciduous forest, which was impacted by the 2015 Wolverine fire.

SG-12R

SG-12R is a Site station located approximately 2,500 ft downstream of SG-9. SG-12R was selected as an alternative fish sampling station to RC-15 due to high water levels and unsafe sampling conditions at RC-15. Benthic macroinvertebrate sampling was conducted at SG-12R and in a portion of RC-15. This station has an arcing, sinuous planform, with an average gradient of 2%, and an approximate reach area of 13,123 ft^2. The channel bed is characterized by cobble- and gravel-sized substrate. Dominant habitat types include riffles (~54% of the wetted channel) with an average depth of 0.9 ft, glides (~12% of the wetted channel) with an average depth of 1.3 ft, and pools (~34% of the wetted channel) with an average depth of 3 ft. Qualitatively, the station is characterized as having a high amount of overall habitat complexity relative to other stations, particularly due to wood content. Habitat features include a large, deep scour pool with complex LWD features that extends along the right bank throughout approximately half of the station, a gravel bar along the left bank, overhanging riparian vegetation along the right bank, and 20 observed pieces of LWD. The riparian community is composed of a mixed conifer and deciduous forest, which was impacted by the 2015 Wolverine fire.

RC-10

RC-10 is a Site station located approximately 11,000 ft downstream of RC-12R. This station generally has a straight planform with an average gradient of 3%, and an approximate reach area of 13,123 ft^2. The channel bed is characterized predominantly by cobble- and gravel-sized substrate. Dominant habitat types include riffles (~66% of wetted channel) with an average depth of 1.3 ft, glides (~26% of wetted channel) with an average depth of 2.5 ft, and pools (~8% of wetted channel) with an average depth of 2.5 ft. The station is qualitatively characterized as having a high amount of overall habitat complexity relative to other stations. Habitat features include several scour pools, gravel bars along the left bank, overhanging riparian vegetation along both banks, and 16 observed pieces of LWD. The riparian community is composed of a mixed conifer and deciduous forest, which was impacted by the 2015 Wolverine fire.

RC-15

RC-15 is the downstream-most Site station located approximately 3,600 ft downstream of RC-10. Due to high water levels and unsafe sampling conditions, fish sampling was not conducted, and benthic macroinvertebrate sampling was conducted in a side channel of RC-15. The habitat information presented characterizes the side channel where benthic macroinvertebrate sampling was conducted, which is located on the left bank, separated from the main channel by a large gravel bar. The station has an arcing, sinuous planform with an average gradient of between 4 and 7%, and an approximate reach area of 8,202 ft^2. The channel bed is characterized predominantly by boulder-, cobble-, and gravel-sized substrate. Dominant habitat types include riffles (~79% of wetted channel) with an average depth of 1.4 ft, side channels (~3% of wetted channel) with an average depth of 0.5 ft, and pools (~18% of wetted channel) with an average depth of 2.1 ft. Qualitatively, the station is characterized as having a moderate amount of overall

habitat complexity relative to other stations. Habitat features include a boulder cascade within the upper half of the station, a boulder/cobble pool/riffle complex within the downstream half of the station, overhanging riparian vegetation along both banks, a large gravel bar on the left bank separating the side channel from the main channel, and 9 observed pieces of LWD. The riparian community is composed of a mixed conifer and deciduous forest, which was impacted by the 2015 Wolverine fire.

348584

Holden Mine Biomonitoring – 2020

Macroinvertebrate Sampling - Chain of Custody Form

Site: RC-1 Field Crew: EM, KH, CB, NW

Date: 8/20/20 Time Start: 1041 Time End: 1600 Weather: Partly Cloudy ~70°F

Sample Site and Replicate Label	Substrate Comp. - % of total				Ferricrete*	Embedded Depth %	Temperature (°C)	DO (mg/L)	pH	RedOx (mV)	Conductivity (µS/cm)	Turbidity (NTU)
	Fines/Sand (<2 mm)	Gravel (2-64 mm)	Cobble (64-256 mm)	Boulder (>256 mm)								
Holden Mine Biomonitoring 2020 Sample Location ID: **RC-1-2020-01-BI** Habitat type: Glide Collection Date/Time: 8/20/20 1041 Collected By: NW/EM	0	10	75	15	0	10	12.5	9.83	7.18	111.9	31.5	0.7
Holden Mine Biomonitoring 2020 Sample Location ID: **RC-1-2020-02-BI** Habitat type: Riffle Collection Date/Time: 8/20/20 1110 Collected By: NW/EM	0	30	60	0	0	10	12.5	9.63	7.18	114.3	31.4	0.8
Holden Mine Biomonitoring 2020 Sample Location ID: **RC-1-2020-03-BI** Habitat type: Riffle Collection Date/Time: 8/20/20 1154 Collected By: NW, EM	0	0	30	70	0	15	12.5	9.83	7.08	111.2	31.4	0.7
Holden Mine Biomonitoring 2020 Sample Location ID: **RC-1-2020-04-BI** Habitat type: Riffle Collection Date/Time: 8/20/20 1215 Collected By: NW/EM	0	30	55	15	0	10	12.8	9.78	7.23	89.1	31.5	1.1
Holden Mine Biomonitoring 2020 Sample Location ID: **RC-1-2020-05-BI** Habitat type: Riffle Collection Date/Time: 8/20/20 1310 Collected By: EM, NW, KH	0	15	35	50	0	10	12.8	9.78	7.21	93.2	31.5	0.7
Holden Mine Biomonitoring 2020 Sample Location ID: **RC-1-2020-06-BI** Habitat type: Riffle Collection Date/Time: 8/20/20 1330 Collected By: KH/EM/NW	0	15	15	70	0	20	13.6	9.60	7.18	42.5	31.3	0.8
Holden Mine Biomonitoring 2020 Sample Location ID: **RC-1-2020-07-BI** Habitat type: Glide Collection Date/Time: 8/20/20 1350 Collected By: NW/EM/KH	5	40	35	20	0	10	13.7	9.59	7.19	55.2	31.2	0.9

Site: RC-1

Macroinvertebrate Sampling - Chain of Custody Form

Sample Site and Replicate Label	Substrate Comp. - % of total				Ferricrete*	Embedded Depth %	Temperature (°C)	DO (mg/L)	pH	RedOx (mV)	Conductivity (S/m)	Turbidity (NTU)
	Sand (0.6-2 mm)	Gravel (2-64 mm)	Cobble (64-256 mm)	Boulder (>256 mm)								
Holden Mine Biomonitoring 2020 Sample Location ID: **RC-1-2020-08-BI** Habitat type: Riffle Collection Date/Time: 8/20/20 1411 Collected By: EM / NW	0	25	50	25	0	10	13.8	9.58	7.31	280	31.1	0.7
Holden Mine Biomonitoring 2020 Sample Location ID: **RC-1-2020-09-BI** Habitat type: Riffle Collection Date/Time: 8/20/20 1425 Collected By: EM / NW	5	0	80	10	0	10	13.8	9.59	7.19	87.8	31.2	1.0
Holden Mine Biomonitoring 2020 Sample Location ID: **RC-1-2020-10-BI** Habitat type: Riffle Collection Date/Time: 8/20/20 1435 Collected By: EM / NW	0	95	5	0	0	5	13.8	9.59	7.29	88.3	31.2	1.3
Holden Mine Biomonitoring 2020 Sample Location ID: **RC-1-2020-11-BI** Habitat type: RIFFLE Collection Date/Time: 8/20/20 1454 Collected By: NAW / CB	0	45	55	0	0	10	13.8	9.59	7.30	89.5	31.2	0.8
Holden Mine Biomonitoring 2020 Sample Location ID: **RC-1-2020-12-BI** Habitat type: RIFFLE Collection Date/Time: 08/20/20 1504 Collected By: NAW / CB	0	10	30	60	0	15	13.8	9.59	7.29	90.2	31.2	1.1
Holden Mine Biomonitoring 2020 Sample Location ID: **RC-1-2020-13-BI** Habitat type: RIFFLE Collection Date/Time: 8/20/20 1513 Collected By: NAW / CB	0	60	15	25	0	10	13.8	9.58	7.29	91.4	31.2	0.8
Holden Mine Biomonitoring 2020 Sample Location ID: **RC-1-2020-14-BI** Habitat type: GLIDE Collection Date/Time: 8/20/20 1528 Collected By: NAW / CB	0	25	75	0	0	10	13.9	9.57	7.26	95.3	31.2	1.0
Holden Mine Biomonitoring 2020 Sample Location ID: **RC-1-2020-15-BI** Habitat type: RIFFLE Collection Date/Time: 8/20/20 1539 Collected By: NAW / CB	10	40	50	0	0	15	13.9	9.55	7.24	104.4	31.2	0.9

Holden Mine Biomonitoring – 2020

Macroinvertebrate Sampling – Site Coordinate, Depth and Flow Form

Site: RC-1 **Field Crew:** CB / NW / EM / KH **Page:** 1 of 1

Date: 8/20/20

Location Coordinates:	Latitude	Longitude
50 meter upstream marker	48.199597	-120.790152
Center (site location)	48.199531	-120.789621
50-meter downstream marker	48.199206	-120.789174

Replicate #:	Latitude	Longitude	Depth (ft)	Flow Velocity (ft/s)	
				At Bottom	At 0.6x Depth (from surface)
[Site] RC-1 -2020-01-BI	48.199583	-120.790074	0.75	0.471	0.754
[Site] RC-1 -2020-02-BI	48.199601	-120.789978	0.75	0.489	0.701
[Site] RC-1 -2020-03-BI	48.19958	-120.789934	0.90	0.141	0.351
[Site] RC-1 -2020-04-BI	48.199579	-120.789857	0.75	0.247	0.221
[Site] RC-1 -2020-05-BI	48.199589	-120.789793	0.90	0.382	0.519
[Site] RC-1 -2020-06-BI	48.199555	-120.789786	1.25	0.432	0.966
[Site] RC-1 -2020-07-BI	48.199554	-120.789695	0.90	0.030	0.086
[Site] RC-1 -2020-08-BI	48.199511	-120.78972	0.70	0.270	0.622
[Site] RC-1 -2020-09-BI	48.199476	-120.789517	0.70	0.366	0.634
[Site] RC-1 -2020-10-BI	48.19945	-120.78948	0.50	0.170	0.106
[Site] RC-1 -2020-11-BI	48.199429	-120.78941	1.0	0.309	0.342
[Site] RC-1 -2020-12-BI	48.199412	-120.789379	0.9	0.389	0.521
[Site] RC-1 -2020-13-BI	48.199364	-120.789343	0.3	0.082	0.066
[Site] RC-1 -2020-14-BI	48.19934	-120.789225	1.0	0.317	0.612
[Site] RC-1 -2020-15-BI	48.199206	-120.789174	1.0	0.534	0.774

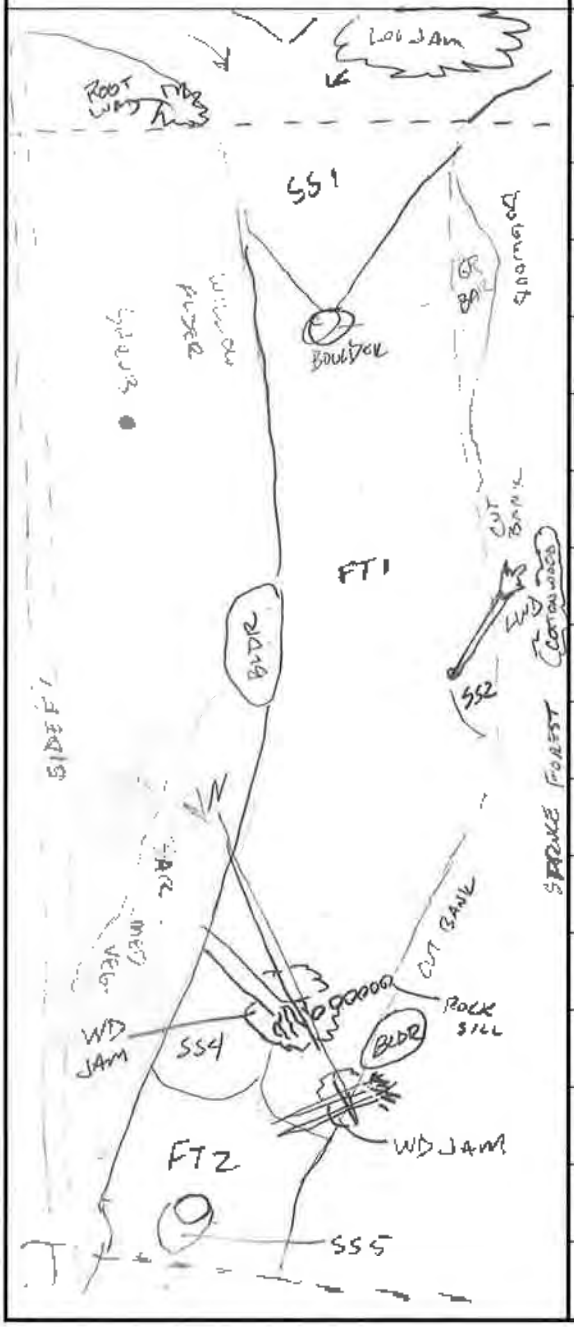
Holden Mine Biomonitoring – 2020

Fish and Macroinvertebrate Sampling – Habitat Unit Mapping Form

Site: RC-1 Field Crew: CB / NW / EM / KH Page: 1 of 2

Date: 8/20/20 Survey Reach Gradient: 3 %

Habitat Unit Map
[Draw and label habitat units in each reach corresponding to unit description]



Channel Unit						Large Woody Debris Count[1]		
Unit ID[a,1]	Length (ft)	Wetted Width (ft)	Depth[b] (ft)	Riffle Crest Depth[c] (ft)	Formed By[c,2]	S 6-12	M 12-20	L >20
SS1	30	50	2.5	1.0	TR			
FT1	210	60	1.1					
SS2	18	8	1.7	1.0	WD		1	
SS3	27	20	3.2	1.2	BO/WD	☒1		
SS4	21	15	2.0	1.2	WD	1		1
FT2	58	40	1.2					
SS5	8	6	1.5	1.1				

Notes:

a Channel unit type code followed by the ordered number of that unit type within the reach (e.g. FT1, SS1, FT2, SSPL1, FT3, etc.)

b Average depth in fast water units, maximum depth in pool units

c Applies to pool units only.

1 Channel Unit Type Codes: Slow water (pools), **SD** - Dam pool; **SS** - Scour Pool, **SSPL** - Plunge pool; Fast water (riffle, glide), **FT** - Fast turbulent, **FN** - Fast non-turbulent; **SIDES** - Side channel slow, **SIDEF** - Side channel fast, **SIDED** - Side channel dry; **DM** - Dry main channel; **ARTIF** - culverts, dams, **WF** - Waterfall, **CH** - Chute, **CA** - Cascade; **M** - Marshlands; **TR** - Tributary confluence.

2 Formed By Codes: **BV** - Beaver, **WD** - Wood, **BR** - Bedrock, **BO** - Boulder, **SB** - Streambend, **TR** - Tributary confluence, **CU** - Culvert, **DA** - Dam, **RS** - Restoration, **RR** - Riprap/stabilization, **OT** – Other

3 LWD Category Definitions: **S** – Diameter >6 in @ 20 feet from large end; **M** – Diameter >12 in @ 35 ft from large end; **L** – Diameter >20 in @35 ft from large end.

Holden Mine Biomonitoring – 2020

Macroinvertebrate Sampling - Chain of Custody Form

Site: RC 2
Date: 8/21/20 8/22/20
Field Crew: KH, PO, KAM, NW, IS, EM
Time Start: 15:07 8:00 Time End: 16:37 8:53
Weather: RAIN

Sample Site and Replicate Label	Substrate Comp. - % of total				Ferricrete*	Embedded Depth %	Temperature (°C)	DO (mg/L)	pH	RedOx (mV)	Conductivity (S/m)	Turbidity (NTU)
	Fines/Sand (<2 mm)	Gravel (2-64 mm)	Cobble (64-256 mm)	Boulder (>256 mm)								
Holden Mine Biomonitoring 2020 Sample Location ID: **RC-2-2020-01-BI** Habitat type: Riffle Collection Date/Time: 8/21/20 1535 Collected By: NW/IS	0	10	90	0	0	10	12.2	illegible	illegible	135	illegible	illegible
Holden Mine Biomonitoring 2020 Sample Location ID: **RC-2-2020-02-BI** Habitat type: Riffle Collection Date/Time: 8/21/20 1545 Collected By: IS/NW	0	25	50	25	0	20	12.8	illegible	illegible	116.5	33.2	0.50
Holden Mine Biomonitoring 2020 Sample Location ID: **RC-2-2020-03-BI** Habitat type: Riffle Collection Date/Time: 8/21/20 1555 Collected By: NW/IS	0	20	80	0	0	20	12.8	9.85	7.18	111.1	33.2	0.73
Holden Mine Biomonitoring 2020 Sample Location ID: **RC-2-2020-04-BI** Habitat type: Riffle Collection Date/Time: 8/21/20 1600 Collected By: NW/IS	0	10	90	0	0	5	12.8	9.85	7.19	106.1	33.2	0.8
Holden Mine Biomonitoring 2020 Sample Location ID: **RC-2-2020-05-BI** Habitat type: Riffle Collection Date/Time: 8/21/20 1605 Collected By: IS/NW	0	10	90	0	0	10	12.8	9.78	7.27	106.0	33.2	0.76
Holden Mine Biomonitoring 2020 Sample Location ID: **RC-2-2020-06-BI** Habitat type: Riffle Collection Date/Time: 8/21/20 1615 Collected By: NW/IS	0	25	75	0	0	5	12.8	9.83	7.16	108.0	33.2	0.62
Holden Mine Biomonitoring 2020 Sample Location ID: **RC-2-2020-07-BI** Habitat type: Pool Collection Date/Time: 8/21/20 1620 Collected By: NW/IS	10	10	80	0	0	5	12.8	9.87	7.25	100.5	33.2	0.78

Site: RC2

Macroinvertebrate Sampling - Chain of Custody Form

Sample Site and Replicate Label	Substrate Comp. - % of total				Ferricrete*	Embedded Depth %	Temperature (°C)	DO (mg/L)	pH	RedOx (mV)	Conductivity (µS/m)	Turbidity (NTU)
	Sand (0.6-2 mm)	Gravel (2-64 mm)	Cobble (64-256 mm)	Boulder (>256 mm)								
Holden Mine Biomonitoring 2020 Sample Location ID: **RC-2-2020-08-BI** Habitat type: Riffle Collection Date/Time: 8/21/20 1625 Collected By: NW IS	15	75	10	0	0	2	12.8	9.88	7.21	91.0	33.2	0.58
Holden Mine Biomonitoring 2020 Sample Location ID: **RC-2-2020-09-BI** Habitat type: Riffle Collection Date/Time: 8/21/20 1629 Collected By: NW IS	5	80	15	0	0	3	12.8	9.86	7.22	100.6	33.2	1.06
Holden Mine Biomonitoring 2020 Sample Location ID: **RC-2-2020-10-BI** Habitat type: Riffle Collection Date/Time: 8/21/20 1637 Collected By: NW IS	10	70	20	0	0	5	12.8	9.86	7.26	94.0	33.1	0.84
Holden Mine Biomonitoring 2020 Sample Location ID: **RC-2-2020-11-BI** Habitat type: Riffle Collection Date/Time: 8/~~21~~/20 8/22/20 8:03 Collected By: NW IS	10	30	60	0	0	5	10.8	10.31	7.2	142.2	33.3	0.1
Holden Mine Biomonitoring 2020 Sample Location ID: **RC-2-2020-12-BI** Habitat type: Riffle Collection Date/Time: 8/22/20 8:11 Collected By: NW, IKS	5	15	30	50	0	5	10.8	10.32	7.11	126.9	33.3	0.1
Holden Mine Biomonitoring 2020 Sample Location ID: **RC-2-2020-13-BI** Habitat type: Riffle Collection Date/Time: 8/22 8:30 Collected By: IS, NW	25	60	15	0	0	10	11	10.29	7.25	127.0	33.4	1.0
Holden Mine Biomonitoring 2020 Sample Location ID: **RC-2-2020-14-BI** Habitat type: Riffle Collection Date/Time: 8/22 8:44 Collected By: IS, NW	10	40	50	0	0	10	10.9	10.29	7.21	129.5	33.2	0.1
Holden Mine Biomonitoring 2020 Sample Location ID: **RC-2-2020-15-BI** Habitat type: Riffle Collection Date/Time: 8/22 8:53 Collected By: IS, NW	10	50	40	0	0	5	11	10.27	7.17	129.5	32.3	0.2

Holden Mine Biomonitoring – 2020

Macroinvertebrate Sampling – Site Coordinate, Depth and Flow Form

Site: RC-2
Date: 8/21/20

Field Crew: KAM/NAW/IKS/PO/KH

Location Coordinates:	Latitude	Longitude
50 meter upstream marker	48.19784735	-120.7611307
Center (site location)	48.19767077	-120.76055504
50-meter downstream marker	48.19722938	-120.76013048

Replicate #:	Latitude	Longitude	Depth (ft)	Flow Velocity (ft/s)	
				At Bottom	At 0.6x Depth (from surface)
[Site] RC-2 -2020-01-BI	48.19784735	120.7611307	0.5	0.294	0.621
[Site] RC-2 -2020-02-BI	48.19773954	120.76100641	0.9	0.358	0.670
[Site] RC-2 -2020-03-BI	48.19776425	120.76093721	0.8	0.169	0.373
[Site] RC-2 -2020-04-BI	48.19778117	120.76084458	0.5	0.145	0.188
[Site] RC-2 -2020-05-BI	48.19770586	120.76072450	0.65	0.331	0.639
[Site] RC-2 -2020-06-BI	48.19773457	120.76068609	0.75	0.381	0.855
[Site] RC-2 -2020-07-BI	48.19766809	120.76052024	0.4	0.009	0.043
[Site] RC-2 -2020-08-BI	48.19766333	120.76052198	0.4	0.704	0.966
[Site] RC-2 -2020-09-BI	48.19759801	120.76049536	0.5	0.132	0.179
[Site] RC-2 -2020-10-BI	48.19755208	120.76040559	0.5	0.204	0.330
[Site] RC-2 -2020-11-BI	48.19739805	120.76027188	0.7	0.280	0.556
[Site] RC-2 -2020-12-BI	48.19731567	120.76016774	0.7	0.377	0.962
[Site] RC-2 -2020-13-BI	48.19721502	120.76026250	0.8	0.041	0.074
[Site] RC-2 -2020-14-BI	48.19729319	120.76031024	0.6	0.350	0.654
[Site] RC-2 -2020-15-BI	48.19742157	120.76041790	0.9	0.206	0.1665

In low flow pool eddy

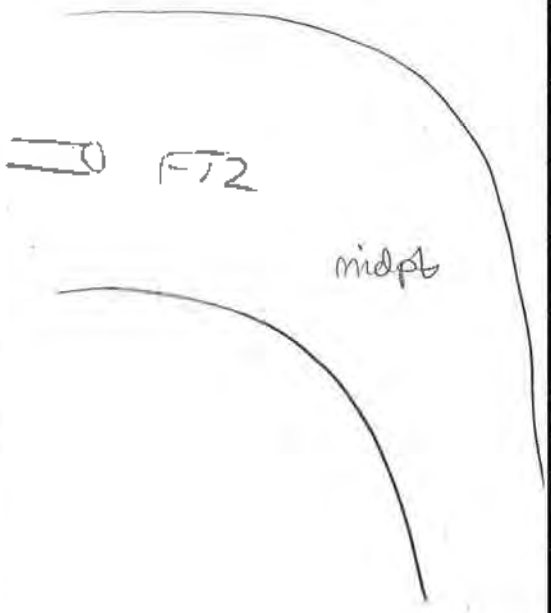
Holden Mine Biomonitoring – 2020

Fish and Macroinvertebrate Sampling – Habitat Unit Mapping Form

Site: EC-2 **Field Crew:** Kam/IKS/NW/KH/PKD **Page:** 1 of 2

Date: 8/22/20 **Survey Reach Gradient:** 1-2%

Habitat Unit Map (Draw and label habitat units in each reach corresponding to unit description)	Channel Unit						Large Woody Debris Count[3]		
	Unit ID[a,1]	Length (ft)	Wetted Width (ft)	Depth[b] (ft)	Riffle Crest Depth[c] (ft)	Formed By[c,2]	S 6-12	M 12-20	L >20
See pg 2 of 2 for habitat details									



Notes:

a Channel unit type code followed by the ordered number of that unit type within the reach (e.g. FT1, SS1, FT2, SSPL1, FT3, etc.)

b Average depth in fast water units, maximum depth in pool units

c Applies to pool units only.

1 Channel Unit Type Codes: Slow water (pools), **SD** - Dam pool; **SS** - Scour Pool, **SSPL** - Plunge pool; Fast water (riffle, glide), **FT** - Fast turbulent, **FN** - Fast non-turbulent; **SIDES** - Side channel slow, **SIDEF** - Side channel fast, **SIDED** - Side channel dry; **DM** - Dry main channel; **ARTIF** - culverts, dams, **WF** - Waterfall, **CH** - Chute, **CA** - Cascade; **M** - Marshlands; **TR** - Tributary confluence.

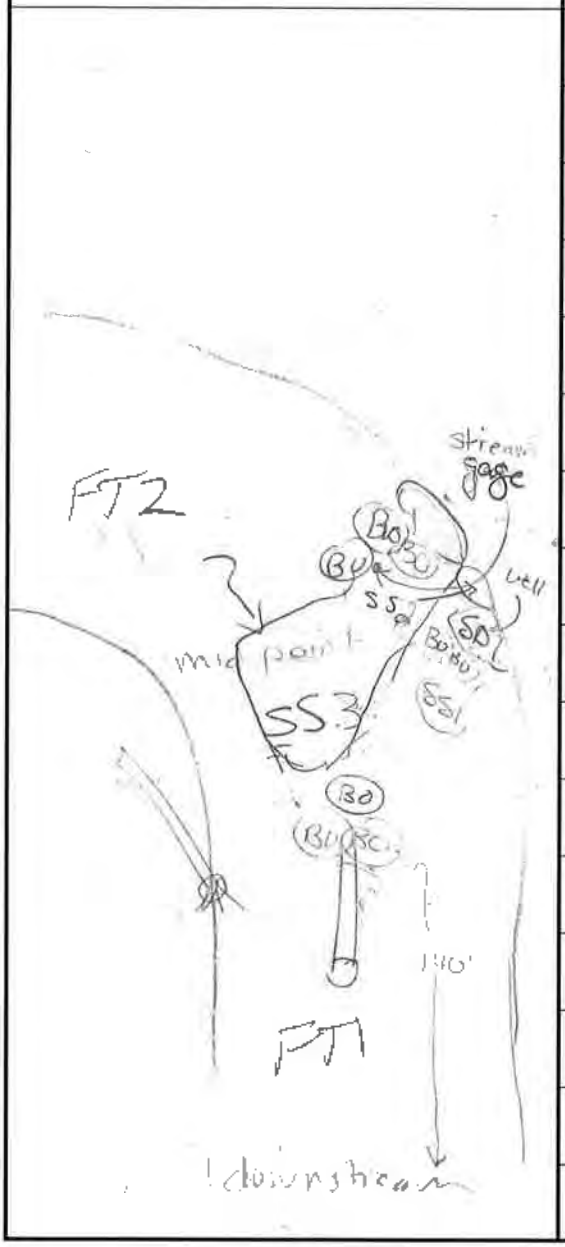
2 Formed By Codes: **BV** - Beaver, **WD** - Wood, **BR** - Bedrock, **BO** - Boulder, **SB** - Streambend, **TR** - Tributary confluence, **CU** - Culvert, **DA** - Dam, **RS** - Restoration, **RR** - Riprap/stabilization, **OT** – Other

3 LWD Category Definitions: **S** – Diameter >6 in @ 20 feet from large end; **M** – Diameter >12 in @ 35 ft from large end; **L** – Diameter >20 in @35 ft from large end.

Holden Mine Biomonitoring – 2020

Fish and Macroinvertebrate Sampling – Habitat Unit Mapping Form

Site: RC-2 **Field Crew:** KAM/IKS/NN/KH/PRO

Additional Notes/Observations	Channel Unit						Large Woody Debris Count[3]		
	Unit ID[a,1]	Length (ft)	Wetted Width (ft)	Depth[b] (ft)	Riffle Crest Depth[c] (ft)	Formed By[c,2]	S 6-12	M 12-20	L >20
	FT1	100	35	1.5-2	—	—		1	1
	SS1	10'	8'	2	1	BO			
	SD1	5	5	1.5	0.5	BO			
	SS2	10	5	1	0.5	BO/BANK			
	SS3	50	10-15	3'	1.5	BO/WD			1
	FT2	150	35	1.5-2	—	—			

Notes:

a Channel unit type code followed by the ordered number of that unit type within the reach (e.g. FT1, SS1, FT2, SSPL1, FT3, etc.)

b Average depth in fast water units, maximum depth in pool units

c Applies to pool units only.

1 Channel Unit Type Codes: Slow water (pools), **SD** - Dam pool; **SS** - Scour Pool, **SSPL** - Plunge pool; Fast water (riffle, glide), **FT** - Fast turbulent, **FN** - Fast non-turbulent; **SIDES** - Side channel slow, **SIDEF** - Side channel fast, **SIDED** - Side channel dry; **DM** - Dry main channel; **ARTIF** - culverts, dams, **WF** - Waterfall, **CH** - Chute, **CA** - Cascade; **M** - Marshlands; **TR** - Tributary confluence.

2 Formed By Codes: **BV** - Beaver, **WD** - Wood, **BR** - Bedrock, **BO** - Boulder, **SB** - Streambend, **TR** - Tributary confluence, **CU** - Culvert, **DA** - Dam, **RS** - Restoration, **RR** - Riprap/stabilization, **OT** – Other

3 LWD Category Definitions: **S** – Diameter >6 in @ 20 feet from large end; **M** – Diameter >12 in @ 35 ft from large end; **L** – Diameter >20 in @35 ft from large end.

Holden Mine Biomonitoring – 2020

Macroinvertebrate Sampling - Chain of Custody Form

Site: RC 4
Date: 8/21/20

Field Crew: Pam, Kara, Kerrie, Natalie, Irene
Time Start: 10:04 Time End: 15:04

Weather: Overcast

Sample Site and Replicate Label	Substrate Comp. - % of total				Ferricrete*	Embedded Depth %	Temperature (°C)	DO (mg/L)	pH	RedOx (mV)	Conductivity (µS/m)	Turbidity (NTU)
	Fines/Sand (<2 mm)	Gravel (2-64 mm)	Cobble (64-256 mm)	Boulder (>256 mm)								
Holden Mine Biomonitoring 2020 Sample Location ID: **RC-4-2020-01-BI** Habitat type: Riffle Collection Date/Time: 8/21 10:27 Collected By: PO, KH, KAM, IS	0	25	75	0	0	10	13	9.68	7.8	116.4	277	0.70
Holden Mine Biomonitoring 2020 Sample Location ID: **RC-4-2020-02-BI** Habitat type: Riffle Collection Date/Time: 8/21 10:21 Collected By: PO, KH, KAM, NW, IS	0	30	70	0	0	10	12.9	9.66	7.13	130.1	30.9	0.85
Holden Mine Biomonitoring 2020 Sample Location ID: **RC-4-2020-03-BI** Habitat type: Riffle Collection Date/Time: 8/21 10:58 Collected By: PO, KH, KAM, NW, IS	0	40	60	0	0	10	12.9	9.68	7.21	138.5	31.8	0.80
Holden Mine Biomonitoring 2020 Sample Location ID: **RC-4-2020-04-BI** Habitat type: Riffle Collection Date/Time: 8/21 11:04 Collected By: PO, KH, KAM, NW, IS	0	0	20	80	0	10	12.9	9.72	7.26	149.5	31.9	0.86
Holden Mine Biomonitoring 2020 Sample Location ID: **RC-4-2020-05-BI** Habitat type: Riffle Collection Date/Time: 8/21 11:25 Collected By: PO, KH, KAM, NW, IS	0	60	40	0	0	10	12.9	9.67	7.24	155.2	33.6	0.79
Holden Mine Biomonitoring 2020 Sample Location ID: **RC-4-2020-06-BI** Habitat type: Riffle Collection Date/Time: 8/21 11:33 Collected By: PO, KH, KAM, NW, IS	0	40	60	0	0	10	12.9	9.69	7.19	162.1	36.9	0.71
Holden Mine Biomonitoring 2020 Sample Location ID: **RC-4-2020-07-BI** Habitat type: Riffle Collection Date/Time: 8/21 11:45 Collected By: PO, KH, KAM, NW, IS	0	45	55	0	0	10	12.9	9.69	7.18	165.8	32.7	0.71

Site: RC-4

Macroinvertebrate Sampling - Chain of Custody Form

Sample Site and Replicate Label	Substrate Comp. - % of total				Ferricrete*	Embedded Depth %	Temperature (°C)	DO (mg/L)	pH	RedOx (mV)	Conductivity (µS/cm)	Turbidity (NTU)
	Sand (0.6-2 mm)	Gravel (2-64 mm)	Cobble (64-256 mm)	Boulder (>256 mm)								
Holden Mine Biomonitoring 2020 Sample Location ID: **RC-4-2020-08-BI** Habitat type: Riffle Collection Date/Time: 8/21 11:57 Collected By: PO, KH, KAM, NW, IS	0	50	50	0	0	10	13.0	9.63	7.28	162.6	32.0	0.78
Holden Mine Biomonitoring 2020 Sample Location ID: **RC-4-2020-09-BI** Habitat type: Riffle Collection Date/Time: 8/21/20 12: Collected By: PO, KH, KAM, IKS, NAW	0	0	90	10	0	10	13.1	9.63	7.34	150	31.1	0.58
Holden Mine Biomonitoring 2020 Sample Location ID: **RC-4-2020-10-BI** Habitat type: Riffle Collection Date/Time: 8/21/20 13: Collected By: IKS, NW, KAM, PO, KH	0	5	70	25	0	10	13.1	9.73	7.22	157.2	32	0.9
Holden Mine Biomonitoring 2020 Sample Location ID: **RC-4-2020-11-BI** Habitat type: Riffle Collection Date/Time: 8/21/20 13: Collected By: IKS/NAW/KAM	0	0	100	0	0	15	13.1	9.73	7.19	157.2	31.9	0.58
Holden Mine Biomonitoring 2020 Sample Location ID: **RC-4-2020-12-BI** Habitat type: Riffle Collection Date/Time: 8/21/20 13:29 Collected By: IKS/NW/KAM	0	20	60	20	0	15	13.1	9.72	7.22	158.8	28.7	0.72
Holden Mine Biomonitoring 2020 Sample Location ID: **RC-4-2020-13-BI** Habitat type: Riffle Collection Date/Time: 8/21/20 13: Collected By: IKS/NAW/KAM/PO/KH	0	10	50	40	0	10	13	9.60	7.22	160.5	32	0.70
Holden Mine Biomonitoring 2020 Sample Location ID: **RC-4-2020-14-BI** Habitat type: Riffle Collection Date/Time: 8/21/20 15:40 Collected By: IKS/NAW/KAM/PO/KH	0	10	30	60	0	10	13	9.6	7.29	162.5	32	0.64
Holden Mine Biomonitoring 2020 Sample Location ID: **RC-4-2020-15-BI** Habitat type: Riffle Collection Date/Time: 8/21/20 13:55 Collected By: IKS/NAW/KAM/PO/KH	0	10	80	10	0	10	13	9.71	7.27	162.4	32	0.7

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Holden Mine Biomonitoring – 2020

Macroinvertebrate Sampling – Site Coordinate, Depth and Flow Form

Site: RC-4
Date: 8/21/20

Field Crew: KAM/IS/NW/PO/KH

Location Coordinates:	Latitude	Longitude
50 meter upstream marker	48.19911451	-120.77906074
Center (site location)	48.19906151	-120.77831891
50-meter downstream marker	48.19897217	-120.77773218

Replicate #:	Latitude	Longitude	Depth (ft)	Flow Velocity (ft/s) M/S	
				At Bottom	At 0.6x Depth (from surface)
[Site] RC-4 -2020-01-BI	48.19911039	120.77910892	0.7	0.249	0.332
[Site] RC-4 -2020-02-BI	48.19911430	120.77898636	1	0.470	0.890
[Site] RC-4 -2020-03-BI	48.19914711	120.77892121	1.1	0.493	0.714
[Site] RC-4 -2020-04-BI	48.19906840	120.77885368	0.7	0.663	0.743
[Site] RC-4 -2020-05-BI	48.19910943	120.77868575	0.5	0.058	0.060
[Site] RC-4 -2020-06-BI	48.19906239	120.77866520	0.4	0.044	[illegible]
[Site] RC-4 -2020-07-BI	48.19917265	120.77851136	0.6	[illegible]	[illegible]
[Site] RC-4 -2020-08-BI	48.19908962	120.77837778	0.8	[illegible]	[illegible]
[Site] RC-4 -2020-09-BI	48.19910645	120.77826147	1.0	0.560	0.814
[Site] RC-4 -2020-10-BI	48.19910610	120.77821454	0.8	0.397	0.471
[Site] RC-4 -2020-11-BI	48.19907234	120.77813613	1.0	1.105	0.811
[Site] RC-4 -2020-12-BI	48.19905917	120.77807891	0.8	0.720	0.766
[Site] RC-4 -2020-13-BI	48.19906045	120.77800668	0.9	0.243	0.400
[Site] RC-4 -2020-14-BI	48.19901224	120.77798512	0.8	0.225	0.514
[Site] RC-4 -2020-15-BI	48.19900344	120.77796592	0.8	0.744	1.102

To center of channel

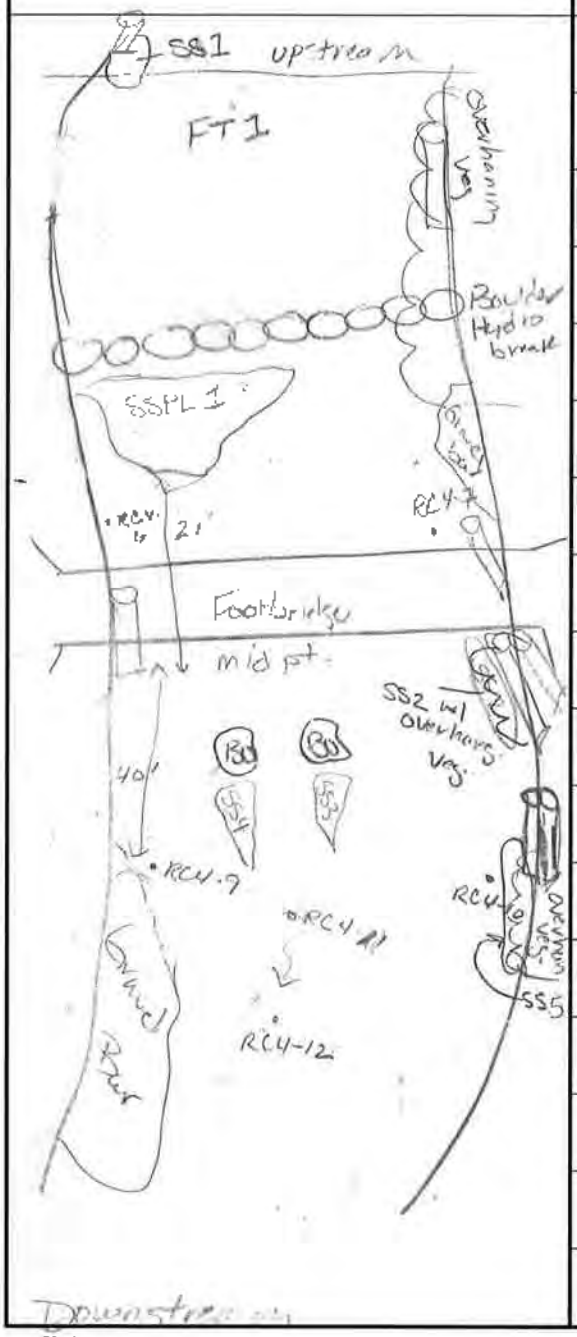
Holden Mine Biomonitoring – 2020

Fish and Macroinvertebrate Sampling – Habitat Unit Mapping Form

Site: RC-4 **Field Crew:** Kam, IKS, NW, KH, PD **Page:** 1 of 2

Date: 8/21/2020 **Survey Reach Gradient:** 4-5%

Habitat Unit Map
(Draw and label habitat units in each reach corresponding to unit description)



Channel Unit						Large Woody Debris Count[3]		
Unit ID[a,1]	Length (ft)	Wetted Width (ft)	Depth[b] (ft)	Riffle Crest Depth[c] (ft)	Formed By[c,2]	S 6-12	M 12-20	L >20
FT1	330	40	0.5-2.5	—	—			11X1
SS1	20ft (5' alin x-axis)	5'	3.0	0.5	WD			1
SSPL1	20'	15'	4+	1.5	BO			
SS2	15	4	2	0.5	LW			11
SS3	5	4	2	0.5	BO			
SS4	5	6	2.5	0.5	BO			
SS5	15	5	2.5	0.5	WD/bank			

Notes:

a Channel unit type code followed by the ordered number of that unit type within the reach (e.g. FT1, SS1, FT2, SSPL1, FT3, etc.)

b Average depth in fast water units, maximum depth in pool units

c Applies to pool units only.

1 Channel Unit Type Codes: Slow water (pools), **SD** - Dam pool; **SS** - Scour Pool, **SSPL** - Plunge pool; Fast water (riffle, glide), **FT** - Fast turbulent, **FN** - Fast non-turbulent; **SIDES** - Side channel slow, **SIDEF** - Side channel fast, **SIDED** - Side channel dry; **DM** - Dry main channel; **ARTIF** - culverts, dams, **WF** - Waterfall, **CH** - Chute, **CA** - Cascade; **M** - Marshlands; **TR** - Tributary confluence.

2 Formed By Codes: **BV** - Beaver, **WD** - Wood, **BR** - Bedrock, **BO** - Boulder, **SB** - Streambend, **TR** - Tributary confluence, **CU** - Culvert, **DA** - Dam, **RS** - Restoration, **RR** - Riprap/stabilization, **OT** – Other

3 LWD Category Definitions: **S** – Diameter >6 in @ 20 feet from large end; **M** – Diameter >12 in @ 35 ft from large end; **L** – Diameter >20 in @35 ft from large end.

Holden Mine Biomonitoring – 2020

Macroinvertebrate Sampling - Chain of Custody Form

Site: SG-9 Field Crew: IS, NW, KM, PO, KH Page: 1 of 2

Date: 8/23/20 Time Start: 9:00am Time End: 14:05 Weather: Sunny, mild 70s

update labels to SG-9

Sample Site and Replicate Label	Substrate Comp. - % of total				Ferricrete*	Embedded Depth %	Temperature (°C)	DO (mg/L)	pH	RedOx (mV)	Conductivity (S/m)	Turbidity (NTU)
	Fines/Sand (<2 mm)	Gravel (2-64 mm)	Cobble (64-256 mm)	Boulder (>256 mm)								
Holden Mine Biomonitoring 2020 Sample Location ID: SG-9-2020-01-BI Habitat type: Riffle Collection Date/Time: 8/23/20 9:40 Collected By: IS/NW	20	70	10	0	0	20	10.2	9.44	6.99	64.2	35.1	0.9
Holden Mine Biomonitoring 2020 Sample Location ID: SG-9-2020-02-BI Habitat type: Riffle Collection Date/Time: 8/23/20 10:10 Collected By: IS/NW	10	10	80	0	0	5	10.5	9.49	6.93	71.3	37.2	0.86
Holden Mine Biomonitoring 2020 Sample Location ID: SG-9-2020-03-BI Habitat type: Riffle Collection Date/Time: 8/23/20 10:30 Collected By: NW, IS	20	20	60	0	0	5	10.7	9.42	6.78	65.5	14.44	0.42
Holden Mine Biomonitoring 2020 Sample Location ID: SG-9-2020-04-BI Habitat type: S.D.C Riffle Collection Date/Time: 8/23/20 10:55 Collected By: IS, NW	5	70	25	0	0	3	11	9.78	7.0	67.2	35.4	0.89
Holden Mine Biomonitoring 2020 Sample Location ID: SG-9-2020-05-BI Habitat type: Riffle Collection Date/Time: 8/23/20 11:20 Collected By: IS/NW	0	40	60	0	0	20	11.3	9.54	6.96	74.2	35.5	0.82
Holden Mine Biomonitoring 2020 Sample Location ID: SG-9-2020-06-BI Habitat type: Riffle Collection Date/Time: 8/23/20 11:35 Collected By: IS/NW	0	30	40	30	0	3	11.4	9.81	6.8	71.0	35.5	0.95
Holden Mine Biomonitoring 2020 Sample Location ID: SG-9-2020-07-BI Habitat type: Riffle Collection Date/Time: 8/23/20 11:50 Collected By: NW, IS	10	45	45	0	0	10	11.10	9.99	6.91	67.0	35.6	0.84

Conductivity meter drifted significantly - end of day need check is showing drifting readings

Site: SG-9

Macroinvertebrate Sampling - Chain of Custody Form

Sample Site and Replicate Label	Substrate Comp. - % of total				Ferricrete*	Embedded Depth %	Temperature (°C)	DO (mg/L)	pH	RedOx (mV)	Conductivity (S/m)	Turbidity (NTU)
	Sand (0.6-2 mm)	Gravel (2-64 mm)	Cobble (64-256 mm)	Boulder (>256 mm)								
Holden Mine Biomonitoring 2020 Sample Location ID: SG-9 -2020-08-BI Habitat type: Riffle Collection Date/Time: 8/22/20 1730 Collected By: IS, NW	20	40	30	10	0	5	11.7	9.85	6.92	685	356	0.95
Holden Mine Biomonitoring 2020 Sample Location ID: SG-9 -2020-09-BI Habitat type: Riffle Collection Date/Time: 8/22/20 1715 Collected By: IS, NW	40	60	~~0~~	~~0~~	~~0~~	100	12.6	9.79	7.0	563	71.4	1.6
Holden Mine Biomonitoring 2020 Sample Location ID: SG-9 -2020-10-BI Habitat type: Riffle Collection Date/Time: 8/23/20 13:35 Collected By: NW/KH	5	95	0	0	0	5	12.2	9.55	7.05	556	68.5	1.0
Holden Mine Biomonitoring 2020 Sample Location ID: SG-9 -2020-11-BI Habitat type: Riffle Collection Date/Time: 8/23/20 13:35 Collected By: NW/KH	5	65	30	~~0~~	~~0~~	10	12.8	9.95	7.06	641.5	68.1	1.0
Holden Mine Biomonitoring 2020 Sample Location ID: SG-9 -2020-12-BI Habitat type: Riffle Collection Date/Time: 8/25/20 13:42 Collected By: NW/KH	17	80	3	~~0~~	~~0~~	5	13.9	9.27	6.96	651	74.6	1.60
Holden Mine Biomonitoring 2020 Sample Location ID: SG-9 -2020-13-BI Habitat type: Riffle Collection Date/Time: 13:50 Collected By: NW/KH	~~0~~	25	75	~~0~~	~~0~~	~~0~~	12.9	9.43	6.35	699.3	65.5	0.30
Holden Mine Biomonitoring 2020 Sample Location ID: SG-9 -2020-14-BI Habitat type: Riffle Collection Date/Time: 8/23/20 14:00 Collected By: KH/NW	5	15	~~80~~	~~0~~	~~0~~	5	13.1	9.53	6.96	670	41.5	0.95
Holden Mine Biomonitoring 2020 Sample Location ID: SG-9 -2020-15-BI Habitat type: Riffle Collection Date/Time: 8/28/20 14:05 Collected By: KH/NW	5	25	~~70~~	~~0~~	~~0~~	~~0~~	13.0	9.60	6.94	674	Unk	1.2

Holden Mine Biomonitoring – 2020

Macroinvertebrate Sampling – Site Coordinate, Depth and Flow Form

Site: SG-9 **Field Crew:** IS, NW, KM, PO, KH **Page:** 1 of 1

Date: 8/23/20

Location Coordinates:	Latitude	Longitude
50 meter upstream marker	48.19547519	120.75631465
Center (site location)	48.19561179	120.75568384
50-meter downstream marker	48.19596629	120.75526343

Replicate #:	Latitude	Longitude	Depth (ft)	Flow Velocity (ft/s)	
				At Bottom	At 0.6x Depth (from surface)
[Site] SG-9 -2020-01-BI	48.19539040	120.76619011	0.50	0.016	0.100
[Site] SG-9 -2020-02-BI	48.19543039	120.75610897	0.70	0.039 ~~0.0~~ 0.0	0.039
[Site] SG-9 -2020-03-BI	48.19554177	120.75608126	0.90	0.334	0.577
[Site] SG-9 -2020-04-BI	48.19546393	120.75588651	0.60	0.007	0.260
[Site] SG-9 -2020-05-BI	48.19554316	120.75594380	0.50	0.268	0.364
[Site] SG-9 -2020-06-BI	48.19557838	120.75586799	0.80	0.181	0.424
[Site] SG-9 -2020-07-BI	48.19562912 ~~48.19557838~~	120.75575380 ~~120.75586799~~	1.0	0.070	0.702
[Site] SG-9 -2020-08-BI	48.19562500	120.75564134	0.80 ~~1.0~~	0.137	0.511
[Site] SG-9 -2020-09-BI	48.19573194	120.75555030	0.75	0.053	0.050
[Site] SG-9 -2020-10-BI	48.19578542	120.75544868	0.90	0.175	0.270
[Site] SG-9 -2020-11-BI	48.19583722	120.75534893	1.1	0.345	0.743
[Site] SG-9 -2020-12-BI	48.19591141	120.75540356	0.30	0.019	0.074
[Site] SG-9 -2020-13-BI	48.19586119	120.75529227	1.0	0.429	0.747
[Site] SG-9 -2020-14-BI	48.19581832	120.75520489	1.0	0.209	0.460
[Site] SG-9 -2020-15-BI	48.19592189	120.75520192	1.1	0.316	0.829

Holden Mine Biomonitoring – 2020

Fish and Macroinvertebrate Sampling – Habitat Unit Mapping Form

Site: SG-9 **Field Crew:** KAM | DWI | KS | KH **Page:** 1 of 2

Date: 8/23/2020 **Survey Reach Gradient:** 2.3%

Habitat Unit Map
(Draw and label habitat units in each reach corresponding to unit description)



Channel Unit						Large Woody Debris Count[3]		
Unit ID[a,c]	Length (ft)	Wetted Width (ft)	Depth[b] (ft)	Riffle Crest Depth[c] (ft)	Formed By[c,2]	S 6-12	M 12-20	L >20
FN1	100	40	1.5-2.5	—	—	IIII		III I
SS1	10	5	2.5	1.5	BO/WD			1
FT1	100	20	1.0-2.0	—		III II		II
Sides 1	150	3-10	0.2-0.7	—	LWD	IIII		III IIII
FN2		30	1.5-2.5	—	—			
SS2	50	10	3	1.5	WD	IIII	II	III
Sides 2	past downstr. end of trail	30	<0.5	—	—	II	I	IIII
FT2	25	30	0.5-1.5	—	—		II	
sides 3	110	3	0.3	—	—	II	I	III
SS3	20	10	2	0.5	WD	I		
SS4	60	10	3	0.9	WD/BO			IIII
Log jam								>20

Notes:

a Channel unit type code followed by the ordered number of that unit type within the reach (e.g. FT1, SS1, FT2, SSPL1, FT3, etc.)

b Average depth in fast water units, maximum depth in pool units

c Applies to pool units only.

1 Channel Unit Type Codes: Slow water (pools), **SD** - Dam pool; **SS** - Scour Pool, **SSPL** - Plunge pool; Fast water (riffle, glide), **FT** - Fast turbulent, **FN** - Fast non-turbulent; **SIDES** - Side channel slow, **SIDEF** - Side channel fast, **SIDED** - Side channel dry; **DM** - Dry main channel; **ARTIF** - culverts, dams, **WF** - Waterfall, **CH** - Chute, **CA** - Cascade; **M** - Marshlands; **TR** - Tributary confluence.

2 Formed By Codes: **BV** - Beaver, **WD** - Wood, **BR** - Bedrock, **BO** - Boulder, **SB** - Streambend, **TR** - Tributary confluence, **CU** - Culvert, **DA** - Dam, **RS** - Restoration, **RR** - Riprap/stabilization, **OT** – Other

3 LWD Category Definitions: **S** – Diameter >6 in @ 20 feet from large end; **M** – Diameter >12 in @ 35 ft from large end; **L** – Diameter >20 in @35 ft from large end.

Holden Mine Biomonitoring – 2020

Macroinvertebrate Sampling - Chain of Custody Form

Site: RC-6
Date: 8.20.20
Field Crew: IS, KM, RC, TS
Time Start: 10:30 Time End: 1630PM

Weather: Overcast / Light Rain

Sample Site and Replicate Label	Substrate Comp. - % of total				Ferricrete*	Embedded Depth %	Temperature (°C)	DO (mg/L)	pH	RedOx (mV)	Conductivity (S/m)	Turbidity (NTU)
	Fines/Sand (<2 mm)	Gravel (2-64 mm)	Cobble (64-256 mm)	Boulder (>256 mm)								
Holden Mine Biomonitoring 2020 Sample Location ID: **RC-6-2020-01-BI** Habitat type: Riffle Collection Date/Time: 8.20 @ 10:40 Collected By: IS RC	-	10	90	-	N	10	12.4	9.53	5.54	168.8	30.1	0.68
Holden Mine Biomonitoring 2020 Sample Location ID: **RC-6-2020-02-BI** Habitat type: Riffle Collection Date/Time: 8.20 @ 11.05 Collected By: IS, RC	-	25	50	25	N	20	12.7	9.28	6.60	108.6	30.2	0.63
Holden Mine Biomonitoring 2020 Sample Location ID: **RC-6-2020-03-BI** Habitat type: Riffle Collection Date/Time: 8.20 @ 11 35 Collected By: IS, RC	-	25	75	25	N	10	12.8	9.27	6.79	98.6	30.2	0.73
Holden Mine Biomonitoring 2020 Sample Location ID: **RC-6-2020-04-BI** Habitat type: Riffle Collection Date/Time: 8.20 @ 13:20 Collected By: IS, RC	-	10	90	-	N	20	13.6	8.97	6.10	111.2	17.4	4.19
Holden Mine Biomonitoring 2020 Sample Location ID: **RC-6-2020-05-BI** Habitat type: Riffle Collection Date/Time: 8.20 @ 13:45 Collected By: IS RC	-	50	50	-	N	10	13.6	9.26	6.70	103.3	30.4	0.92
Holden Mine Biomonitoring 2020 Sample Location ID: **RC-6-2020-06-BI** Habitat type: Riffle Collection Date/Time: 8.20 @ 14:05 Collected By: IS	-	50	50	-	N	10	13.7	9.35	6.84	103.4	30.3	0.67
Holden Mine Biomonitoring 2020 Sample Location ID: **RC-6-2020-07-BI** Habitat type: Riffle Collection Date/Time: 8/20 14:26 Collected By: RC, TS	~~40~~	30	~~40~~		N	10	13.8	9.07	6.96	99.7	30.3	0.69

Site: RC-6

Macroinvertebrate Sampling - Chain of Custody Form

Sample Site and Replicate Label	Substrate Comp. - % of total				Ferricrete*	Embedded Depth %	Temperature (°C)	DO (mg/L)	pH	RedOx (mV)	Conductivity (S/m)	Turbidity (NTU)
	Sand (0.6-2 mm)	Gravel (2-64 mm)	Cobble (64-256 mm)	Boulder (>256 mm)								
Holden Mine Biomonitoring 2020 Sample Location ID: **RC-6-2020-08-BI** Habitat type: Glide Collection Date/Time: 8/20 15:10 Collected By: RC TS		80	20		N	20	13.8	9.37	6.99	109.2	30.2	0.97
Holden Mine Biomonitoring 2020 Sample Location ID: **RC-6-2020-09-BI** Habitat type: Riffle Collection Date/Time: 8/20 15:23 Collected By: RC TS		10	70		N		13.8	9.27				
Holden Mine Biomonitoring 2020 Sample Location ID: **RC-6-2020-10-BI** Habitat type: Riffle Collection Date/Time: 8/20 16:05 Collected By: RC, TS, IS, Ian NO PHOTOS		--	80		N	<3	13.8	9.39			30.2	
Holden Mine Biomonitoring 2020 Sample Location ID: **RC-6-2020-11-BI** Habitat type: Riffle Collection Date/Time: 8/20 16:24 Collected By: RC, TS, IS Photo on KAMI phone		90	10		N	20	13.8	9.20	7.15	108.9	30.2	0.60
Holden Mine Biomonitoring 2020 Sample Location ID: **RC-6-2020-12-BI** Habitat type: Riffle Collection Date/Time: 8/20 16:40 Collected By: RC, TS, IS Photos on KAMI phone		50	50		N	50	13.8	9.10	7.12	116.4	30.2	0.61
Holden Mine Biomonitoring 2020 Sample Location ID: **RC-6-2020-13-BI** Habitat type: Riffle Collection Date/Time: 8/20 15:51 Collected By: RC, TS		90	10		N	<10	13.8	9.26	6.51	143.6	30.2	0.77
Holden Mine Biomonitoring 2020 Sample Location ID: **RC-6-2020-14-BI** Habitat type: Riffle Collection Date/Time: 8/20 15:37 Collected By: RC, TS	5	85	10		N	60	13.6	9.28	7.03	112.3	30.2	1.15
Holden Mine Biomonitoring 2020 Sample Location ID: **RC-6-2020-15-BI** Habitat type: Riffle Collection Date/Time: 8/20 14:45 Collected By: RC TS		25	75		N	25	13.8	9.17	7.06	102.3	30.3	0.78

Holden Mine Biomonitoring – 2020

Macroinvertebrate Sampling – Site Coordinate, Depth and Flow Form

Site: RC-6 **Field Crew:** KAM, IKS, RC TS **Page:** 1 of 1

Date: 8/20/2020

Location Coordinates:	Latitude	Longitude
50 meter upstream marker	48.20016170	120.79281871
Center (site location)	48.19988243	120.79229895
50-meter downstream marker	48.19959528	120.79173014

Replicate #:	Latitude	Longitude	Depth (ft)	Flow Velocity (ft/s) m/s	
				At Bottom	At 0.6x Depth (from surface)
[Site] RC6 -2020-01-BI	48.19960055	120.79159	0.7	0.181	0.786
[Site] RC6 -2020-02-BI	48.19970	120.79182	0.9	0.655	0.57
[Site] RC6 -2020-03-BI	48.19976	120.79205	0.6	0.46	0.46
[Site] RC6 -2020-04-BI	48.19979	120.79	1.0	0.216	0.570
[Site] RC6 -2020-05-BI	48.19970	120.79	0.3	0.281	0.414
[Site] RC6 -2020-06-BI	48.19979	120.79223	0.8	0.47	0.580
[Site] RC6 -2020-07-BI	48.19	120.79225	0.7	0.233	0.284
[Site] RC6 -2020-08-BI	48.19	120.79	1.0	0.284	0.624
[Site] RC6 -2020-09-BI	48.	120.79250	0.8	0.5	0.623
[Site] RC6 -2020-10-BI	48.20013168	120.79269873	0.7	0.477	0.616
[Site] RC6 -2020-11-BI	48.20008142	120.79271469	0.8	0	0.067
[Site] RC6 -2020-12-BI	48.20013137	120.79276038	0.7	0.17	0.237
[Site] RC6 -2020-13-BI	48.20006380	120.79253830	1.0	0.117	0.780
[Site] RC6 -2020-14-BI	48.20001074	120.79257173	0.6	0.622	0.588
[Site] RC6 -2020-15-BI	48.19991487	120.79229960	0.8	0.311	0.401

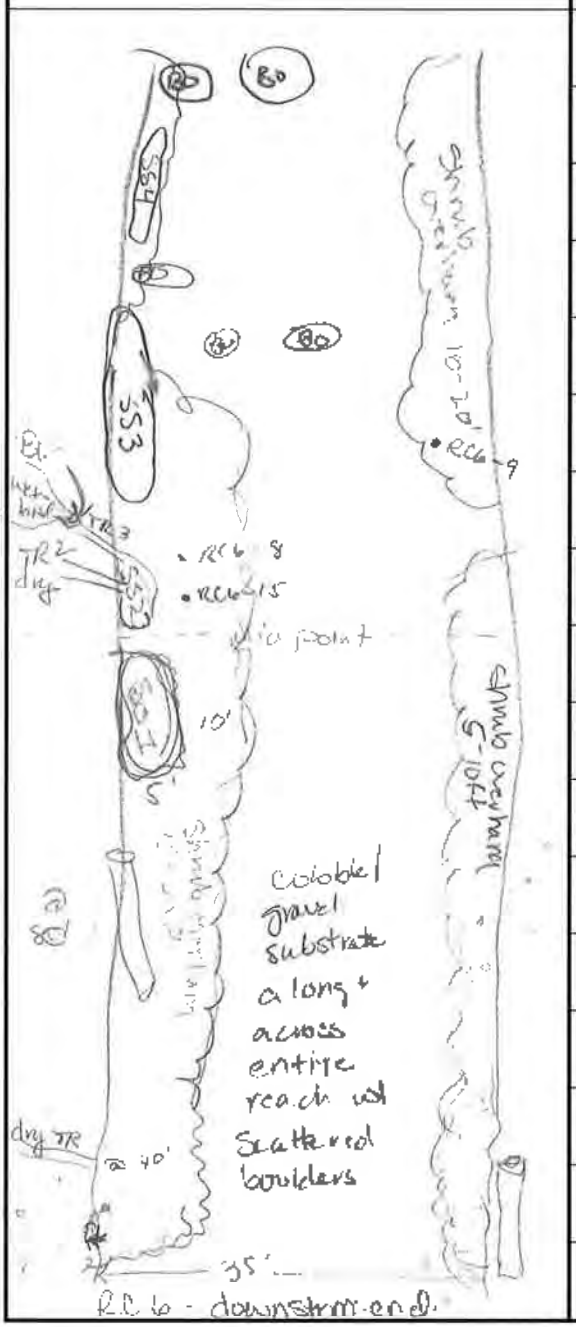
Holden Mine Biomonitoring – 2020

Fish and Macroinvertebrate Sampling – Habitat Unit Mapping Form

Site: RC-6 **Field Crew:** KMM **Page:** 1 of 2

Date: 8/20/2020 **Survey Reach Gradient:** 3-5 %

Habitat Unit Map
(Draw and label habitat units in each reach corresponding to unit description)



Channel Unit						Large Woody Debris Count[3]		
Unit ID[a,1]	Length (ft)	Wetted Width (ft)	Depth[b] (ft)	Riffle Crest Depth[c] (ft)	Formed By[c,2]	S 6-12	M 12-20	L >20
FT1 @ 0'	180	35	0.5-1	—	—			II
TR1 @ 40'	—	0' dry	0' dry	—	—			
SS1 @ 140'	10'	5'	2	0.2	WD			III
SS2 @ 165'		5	1.5	0.2	SB/ WR			
TR2 @ 165'	—	0' dry	0' dry	—	—			
TR3 @ 180'	15'	5'	0.5	—	—			
FN/FT2 180	50	35	0.5-2	—	—			
SS3 @ 220	50	15	3.5	0.4	BO/ WD/ Bank			
FT2 220	100	35	0.5-2	—	—	III	I	
SS4 @ 280	30	10'	2.5'	0.7	BO/ Bank			
SS5 @ 315	10'	5'	3+	0.7	BO/ WD			

Notes:

a Channel unit type code followed by the ordered number of that unit type within the reach (e.g. **FT1**, SS1, FT2, SSPL1, FT3, etc.)

b Average depth in fast water units, maximum depth in pool units

c Applies to pool units only.

1 Channel Unit Type Codes: Slow water (pools), **SD** - Dam pool; **SS** - Scour Pool, **SSPL** - Plunge pool; Fast water (riffle, glide), **FT** - Fast turbulent, **FN** - Fast non-turbulent; **SIDES** - Side channel slow, **SIDEF** - Side channel fast, **SIDED** - Side channel dry; **DM** - Dry main channel; **ARTIF** - culverts, dams, **WF** - Waterfall, **CH** - Chute, **CA** - Cascade; **M** - Marshlands; **TR** - Tributary confluence.

2 Formed By Codes: **BV** - Beaver, **WD** - Wood, **BR** - Bedrock, **BO** - Boulder, **SB** - Streambend, **TR** - Tributary confluence, **CU** - Culvert, **DA** - Dam, **RS** - Restoration, **RR** - Riprap/stabilization, **OT** – Other

3 LWD Category Definitions: **S** – Diameter >6 in @ 20 feet from large end; **M** – Diameter >12 in @ 35 ft from large end; **L** – Diameter >20 in @35 ft from large end.

Holden Mine Biomonitoring – 2020

Macroinvertebrate Sampling - Chain of Custody Form

Site: RC-10 Field Crew: KAM, IKS, NAW, PO, KH

Date: 8/22/20 Time Start: 10:42 Time End: 14:30 Weather: Sunny, low 70s

Sample Site and Replicate Label	Substrate Comp. - % of total				Ferricrete*	Embedded Depth %	Temperature (°C)	DO (mg/L)	pH	RedOx (mV)	Conductivity (µS/cm)	Turbidity (NTU)
	Fines/Sand (<2 mm)	Gravel (2-64 mm)	Cobble (64-256 mm)	Boulder (>256 mm)								
Holden Mine Biomonitoring 2020 Sample Location ID: **RC-10-2020-01-BI** Habitat type: Riffle Collection Date/Time: 8/22 10:42 Collected By: NW, IS	10	50	30	10	0	10	11.9	10.28	7.47	58.9	50.8	0
Holden Mine Biomonitoring 2020 Sample Location ID: **RC-10-2020-02-BI** Habitat type: Riffle Collection Date/Time: 8/22/20 11:05 Collected By: IS/NW	10	80	10	0	0	5	12.1	10.17	7.44	163.0	50.8	0
Holden Mine Biomonitoring 2020 Sample Location ID: **RC-10-2020-03-BI** Habitat type: Riffle Collection Date/Time: 8/22/20 11:15 Collected By: IS/NW	25	0	55	20	0	10	12.2	10.21	7.37	168.7	50.9	0
Holden Mine Biomonitoring 2020 Sample Location ID: **RC-10-2020-04-BI** Habitat type: Riffle Collection Date/Time: 8/22/20 11:30 Collected By: IS/NW	40	0	60	0	0	3	12.9	9.99	7.50	164.3	51.4	0.20
Holden Mine Biomonitoring 2020 Sample Location ID: **RC-10-2020-05-BI** Habitat type: Riffle Collection Date/Time: 8/22 12:37 Collected By: NW, IS	10	0	50	40	0	5	12.9	10.03	7.28	177.5	51.4	0
Holden Mine Biomonitoring 2020 Sample Location ID: **RC-10-2020-06-BI** Habitat type: Riffle Collection Date/Time: 8/22 12:46 Collected By: NW, IS	15	85	0	0	0	3	13.0	9.97	7.38	177.4	51.3	0
Holden Mine Biomonitoring 2020 Sample Location ID: **RC-10-2020-07-BI** Habitat type: Riffle Collection Date/Time: 8/22 12:57 Collected By: IS NW	0	30	70	0	0	3	13.1	9.94	7.30	181.6	51.3	0

Site: RC-10

Macroinvertebrate Sampling - Chain of Custody Form

Sample Site and Replicate Label	Substrate Comp. - % of total				Ferricrete*	Embedded Depth %	Temperature (°C)	DO (mg/L)	pH	RedOx (mV)	Conductivity (S/m)	Turbidity (NTU)	
	Sand (0.6-2 mm)	Gravel (2-64 mm)	Cobble (64-256 mm)	Boulder (>256 mm)									
Holden Mine Biomonitoring 2020 Sample Location ID: RC-10-2020-09-BI Habitat type: Riffle Collection Date/Time: 8/22/20 13:04 Collected By: IS / MW	15	85	0	0	0	3	13.2	9.92	7.31	182.6	57.2	0	photo labeled as 08 (use time)
Holden Mine Biomonitoring 2020 Sample Location ID: RC-10-2020-08-BI Habitat type: Riffle Collection Date/Time: 8/22/20 13:28 Collected By: IS / MW	0	10	76	15	0	5	13.4	9.86	7.37	244.7	57.4	0	photo labeled correctly
Holden Mine Biomonitoring 2020 Sample Location ID: RC-10-2020-10-BI Habitat type: Riffle Collection Date/Time: 8/22/20 13:56 Collected By: IS / MW	5	15	80	0	0	10	13.6	9.80	7.48	197.3	57.3	0.37	
Holden Mine Biomonitoring 2020 Sample Location ID: RC-10-2020-11-BI Habitat type: Riffle Collection Date/Time: 8/22/20 14:00 Collected By: KAm / MW / IKS	5	15	50	30	0	5	13.6	9.87	7.32	200.2	57.4	0	
Holden Mine Biomonitoring 2020 Sample Location ID: RC-10-2020-12-BI Habitat type: Riffle Collection Date/Time: 8/22/20 14:02 Collected By: KAm / MW / IKS	10	70	20	0	0	10	13.7	9.86	7.21	209.7	57.4	0	
Holden Mine Biomonitoring 2020 Sample Location ID: RC-10-2020-13-BI Habitat type: Riffle Collection Date/Time: 8/22/20 14:15 Collected By: KAm / MW / IKS	10	80	10	0	0	5	13.7	9.86	7.30	208	57.5	0	pool tail out
Holden Mine Biomonitoring 2020 Sample Location ID: RC-10-2020-14-BI Habitat type: Riffle Collection Date/Time: 8/22/20 14:25 Collected By: KAm / MW / IKS	0	30	70	0	0	3	13.8	9.86	7.32	212.4	57.6	0	
Holden Mine Biomonitoring 2020 Sample Location ID: RC-10-2020-15-BI Habitat type: Riffle Collection Date/Time: 8/22/20 14:30 Collected By: KAm / MW / IKS	0	40	60	0	0	5	13.7	9.85	7.30	209.5	57.6	0.06	

Holden Mine Biomonitoring – 2020

Macroinvertebrate Sampling – Site Coordinate, Depth and Flow Form

Site: RC-10 Field Crew: KAM/JKG/ NW/ PRD/ KH Page: 1 of 1

Date: 8/22/20

Location Coordinates:	Latitude	Longitude
50 meter upstream marker	48.190777681	120.705[illegible]6141
Center (site location)	48.19076356	120.70466874
50-meter downstream marker	48.[illegible]	120.[illegible]

Replicate #:	Latitude	Longitude	Depth (ft)	Flow Velocity (ft/s)	
				At Bottom	At 0.6x Depth (from surface)
[Site] RC-10 -2020-01-BI	48.19[illegible]984	120.70527413	0.40	0.219	0.189
[Site] RC-10 -2020-02-BI	48.19[illegible]147	120.70515141	0.30	0.449	0.421
[Site] RC-10 -2020-03-BI	48.[illegible]	120.[illegible]	1.0	0.[illegible]	0.[illegible]
[Site] RC-10 -2020-04-BI	48.[illegible]	120.[illegible]	0.65	0.074	0.031
[Site] RC-10 -2020-05-BI	48.[illegible]	120.[illegible]	1.1	0.370	0.626
[Site] RC-10 -2020-06-BI	48.[illegible]	120.[illegible]	1.1	0.320	0.410
[Site] RC-10 -2020-07-BI	48.190741[illegible]36	120.[illegible]	0.8	0.458	0.670
[Site] RC-10 -2020-08-BI	48.[illegible]	120.[illegible]	0.8	0.200	0.510
[Site] RC-10 -2020-09-BI	48.[illegible]	120.[illegible]	1.0	0.[illegible]	0.[illegible]
[Site] RC-10 -2020-10-BI	48.[illegible]	120.[illegible]	1.0	0.[illegible]	1.0[illegible]
[Site] RC-10 -2020-11-BI	48.190[illegible]795	120.[illegible]	0.6	0.412	0.553
[Site] RC-10 -2020-12-BI	48.190741[illegible]241	120.701142[illegible]96	0.7	0.307	0.[illegible]23
[Site] RC-10 -2020-13-BI	48.190768[illegible]66	120.70[illegible]5012	0.6	0.271	0.451
[Site] _____-2020-14-BI	48.19071567	120.70399808	0.9	0.546	0.746
[Site] _____-2020-15-BI	48.190[illegible]8213	120.70[illegible]857	0.85	0.541	0.998

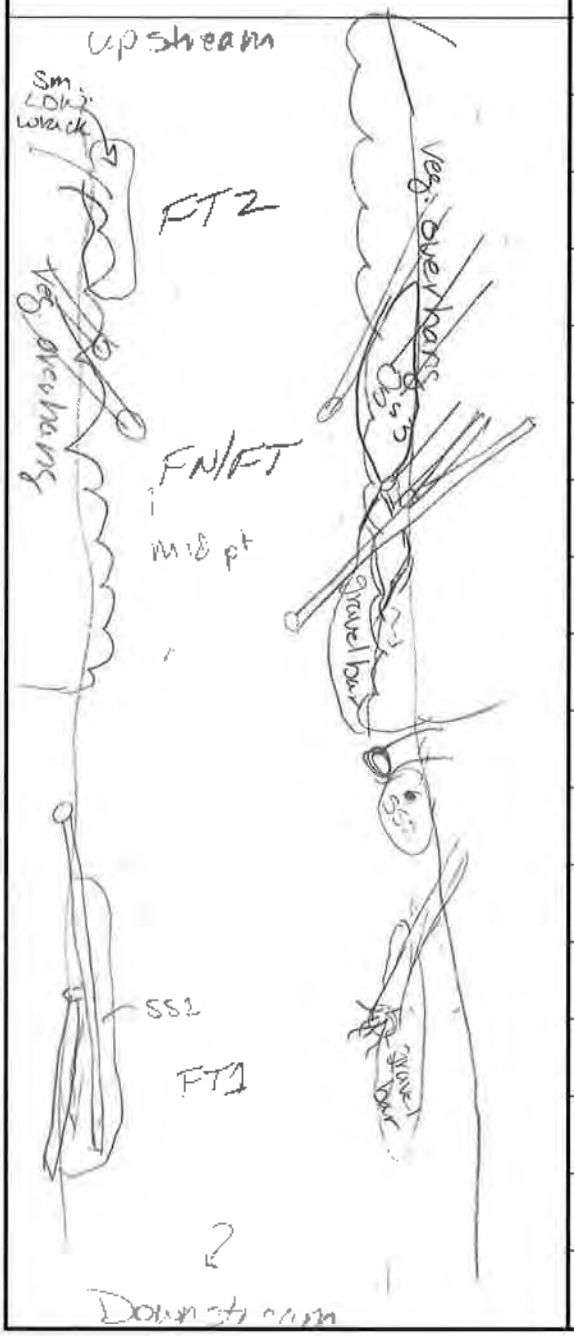
Holden Mine Biomonitoring – 2020

Fish and Macroinvertebrate Sampling – Habitat Unit Mapping Form

Site: RC-10 **Field Crew:** KAM/KS/NW/PRO/KH **Page:** 1 of 2

Date: 8/22/20 **Survey Reach Gradient:** 3%

Habitat Unit Map
(Draw and label habitat units in each reach corresponding to unit description)



Channel Unit						Large Woody Debris Count[3]		
Unit ID[a,1]	Length (ft)	Wetted Width (ft)	Depth[b] (ft)	Riffle Crest Depth[c] (ft)	Formed By[c,2]	S 6-12	M 12-20	L >20
FT1	150	40	0.5-2	—	—	11		1111
SS1	60	10	2.5	0.9	WD/Bank			11
SS2	20	10	2	0.6	WD			
FN/FT	85	40	2-3	—	—		1	
FT2	65	40	0.5-2	—	—	~~1111~~		
SS3	30	10	3	0.5	WD			11

Notes:

a Channel unit type code followed by the ordered number of that unit type within the reach (e.g. FT1, SS1, FT2, SSPL1, FT3, etc.)

b Average depth in fast water units, maximum depth in pool units

c Applies to pool units only.

1 Channel Unit Type Codes: Slow water (pools), **SD** - Dam pool; **SS** - Scour Pool, **SSPL** - Plunge pool; Fast water (riffle, glide), **FT** - Fast turbulent, **FN** - Fast non-turbulent; **SIDES** - Side channel slow, **SIDEF** - Side channel fast, **SIDED** - Side channel dry; **DM** - Dry main channel; **ARTIF** - culverts, dams, **WF** - Waterfall, **CH** - Chute, **CA** - Cascade; **M** - Marshlands; **TR** - Tributary confluence.

2 Formed By Codes: **BV** - Beaver, **WD** - Wood, **BR** - Bedrock, **BO** - Boulder, **SB** - Streambend, **TR** - Tributary confluence, **CU** - Culvert, **DA** - Dam, **RS** - Restoration, **RR** - Riprap/stabilization, **OT** – Other

3 LWD Category Definitions: **S** – Diameter >6 in @ 20 feet from large end; **M** – Diameter >12 in @ 35 ft from large end; **L** – Diameter >20 in @35 ft from large end.

Holden Mine Biomonitoring – 2020

Macroinvertebrate Sampling - Chain of Custody Form

Site: SG-12R **Field Crew:** IS, KM, NW, PO, KH

Date: 8/23/20 / 8/24/20 **Time Start:** 15:40 / 8:00 **Time End:** 16:30 / 9:57 8/27/20 **Weather:** Sunny, Wind 7 os

Sample Site and Replicate Label	Substrate Comp. - % of total				Ferricrete*	Embedded Depth %	Temperature (°C)	DO (mg/L)	pH	RedOx (mV)	Conductivity (S/m)	Turbidity (NTU)
	Fines/Sand (<2 mm)	Gravel (2-64 mm)	Cobble (64-256 mm)	Boulder (>256 mm)								
Holden Mine Biomonitoring 2020 Sample Location ID: SG-12R 2020-01-BI Habitat type: Riffle 12A Collection Date/Time: 8/23/20 15:41 Collected By: IS, KH	0	60	40	0	0	2	13.4	9.15	6.97	89.7	54.9	1.06
Holden Mine Biomonitoring 2020 Sample Location ID: SG-12R 2020-02-BI Habitat type: Riffle 12A Collection Date/Time: 8/23/20 15:48 Collected By: IS, KH	10	60	30	0	0	5	13.5	9.44	6.59	109.2	54.5	0.63
Holden Mine Biomonitoring 2020 Sample Location ID: SG-12R 2020-03-BI Habitat type: Riffle 12A Collection Date/Time: 8/23/20 16:02 Collected By: IS, NW	10	60	30	0	0	5	13.5	9.35	6.97	84.0	55.0	0.78
Holden Mine Biomonitoring 2020 Sample Location ID: SG-12R 2020-04-BI Habitat type: Riffle 12A Collection Date/Time: 8/23/20 16:16 Collected By: IS, NW	10	90	0	0	0	30	13.6	9.52	6.78	83.3	56.7	0.62
Holden Mine Biomonitoring 2020 Sample Location ID: SG-12R 2020-05-BI Habitat type: Riffle 12A Collection Date/Time: 8/23/20 16:20 Collected By: IS, NW, KM	0	40	60	0	0	10	13.5	9.59	6.69	79.6	55.5	0.75
Holden Mine Biomonitoring 2020 Sample Location ID: SG-12R 2020-06-BI Habitat type: Riffle 12A Collection Date/Time: 8/24/20 8:21 Collected By: IS, NW, EM	0	30	70	0	0	5	9.8	10.33	6.62	193.3	53	0.8
Holden Mine Biomonitoring 2020 Sample Location ID: SG-12R 2020-07-BI Habitat type: Riffle 12A Collection Date/Time: 8/24/20 8:28 Collected By: IS, NW, EM	5	75	20	0	0	10	9.8	10.20	6.53	180.9	52.7	1.1

8/23/20 Conductivity meter drifted significantly - end of day cal check shows drifting readings

Site: SG-12R

Macroinvertebrate Sampling - Chain of Custody Form

Sample Site and Replicate Label	Substrate Comp. - % of total				Ferricrete*	Embedded Depth %	Temperature (°C)	DO (mg/L)	pH	RedOx (mV)	Conductivity (S/m)	Turbidity (NTU)
	Sand (0.6-2 mm)	Gravel (2-64 mm)	Cobble (64-256 mm)	Boulder (>256 mm)								
Holden Mine Biomonitoring 2020 Sample Location ID SG-12R 2020-08-BI Habitat type: Riffle 12A Collection Date/Time: 8/24/20 8:37 Collected By: IS, NW, EM	5	70	25	0	0	10	9.8	10.07	6.39	179.4	54.7	1.1
Holden Mine BiomonitSG-12R **020** Sample Location ID SG-12R 2020-09-BI Habitat type: Riffle 12A Collection Date/Time: 8/24/20 8:44 Collected By: NW, IS	0	80	20	0	0	5	9.9	10.21	6.59	166.3	53.4	0.7
Holden Mine Biomonitoring 2020 Sample Location ID SG-12R 2020-10-BI Habitat type: Riffle 12A Collection Date/Time: 8/23/20 8:55 Collected By: NW, IS	0	60	40	0	0	5	9.9	10.2	6.77	5.9	150.5	0.7
Holden Mine Biomonitoring 2020 Sample Location ID SG-12R 2020-11-BI Habitat type: Riffle 12A Collection Date/Time: 8/24/20 9:01 Collected By: NW, IS	10	60	30	0	0	10	10.0	10.14	6.64	NL.4	53.6	0.6
Holden Mine Biomonitoring 2020 Sample Location ID SG-12R 2020-12-BI Habitat type: Riffle 12A Collection Date/Time: 8/24/20 9:16 Collected By: NW, IS	10	65	25	0	0	3	10.1	10.18	6.91	135.4	55.3	0.7
Holden Mine Biomonitoring 2020 Sample Location ID SG-12R 2020-13-BI Habitat type: Riffle 12A Collection Date/Time: 8/24/20 9:30 Collected By: IS, NW	0	50	50	0	0	5	10.2	10.14	6.93	129.2	52.1	0.6
Holden Mine Biomonitoring 2020 Sample Location ID SG-12R 2020-14-BI Habitat type: Riffle 12A Collection Date/Time: 8/24/20 9:47 Collected By: IS, NW	0	40	60	0	0	5	10.4	10.12	6.95	135	[illegible]	0.8
Holden Mine Biomonitoring 2020 Sample Location ID SG-12R 2020-15-BI Habitat type: Riffle 12A Collection Date/Time: 8/24/20 9:57 Collected By: IS, NW	0	85	15	0	0	10	10.5	10.13	6.94	120.6	54.5	0.5

Holden Mine Biomonitoring – 2020

Macroinvertebrate Sampling – Site Coordinate, Depth and Flow Form

Site: SG-12R
Date: 8/23/20

Field Crew: IS, NW, KM, PO, KH

Location Coordinates:	Latitude	Longitude
50 meter upstream marker	48.196292	-120.745688
Center (site location)	48.19653	-120.745099
50-meter downstream marker	48.196753	-120.744524

m/s

Replicate #:	Latitude	Longitude	Depth (ft)	Flow Velocity (ft/s)	
				At Bottom	At 0.6x Depth (from surface)
[Site] SG-12R-2020-01-BI	48.19672294	120.7449772	0.8	0.38	0.648
[Site] SG-12R-2020-02-BI	48.19666580	120.74457156	0.7	0.192	0.322
[Site] SG-12R-2020-03-BI	48.19666788	120.74470257	1.0	0.309	0.695
[Site] SG-12R-2020-04-BI	48196677879	120.7447863	0.2	0.142	0.142
[Site] SG-12R-2020-05-BI	4819662956	120.7447249	0.8	0.662	0.8000
[Site] SG-12R-2020-06-BI	48.19660960	120.74480919	0.8	0.430	0.716
[Site] SG-12R-2020-07-BI	48.19655546	120.74486641	1.1	0.313	0.720
[Site] SG-12R-2020-08-BI	48.19649869	120.74497460	1.0	0.142	0.227
[Site] SG-12R-2020-09-BI	48.19643753	120.74510921	0.9	0.226	0.382
[Site] SG-12R-2020-10-BI	48.19639170	120.74517063	1.0	0.148	0.687
[Site] SG-12R-2020-11-BI	48.19639024	120.74529492	0.9	0.553	0.826
[Site] SG-12R-2020-12-BI	48.19636808	120.74532020	0.9	0.262	0.490
[Site] SG-12R-2020-13-BI	48.19632608	120.74540403	1.1	0.399	0.696
[Site] SG-12R-2020-14-BI	48.19632235	120.74555168	0.7	0.448	0.800
[Site] SG-12R-2020-15-BI	48.19627046	120.74563086	0.9	0.619	0.861

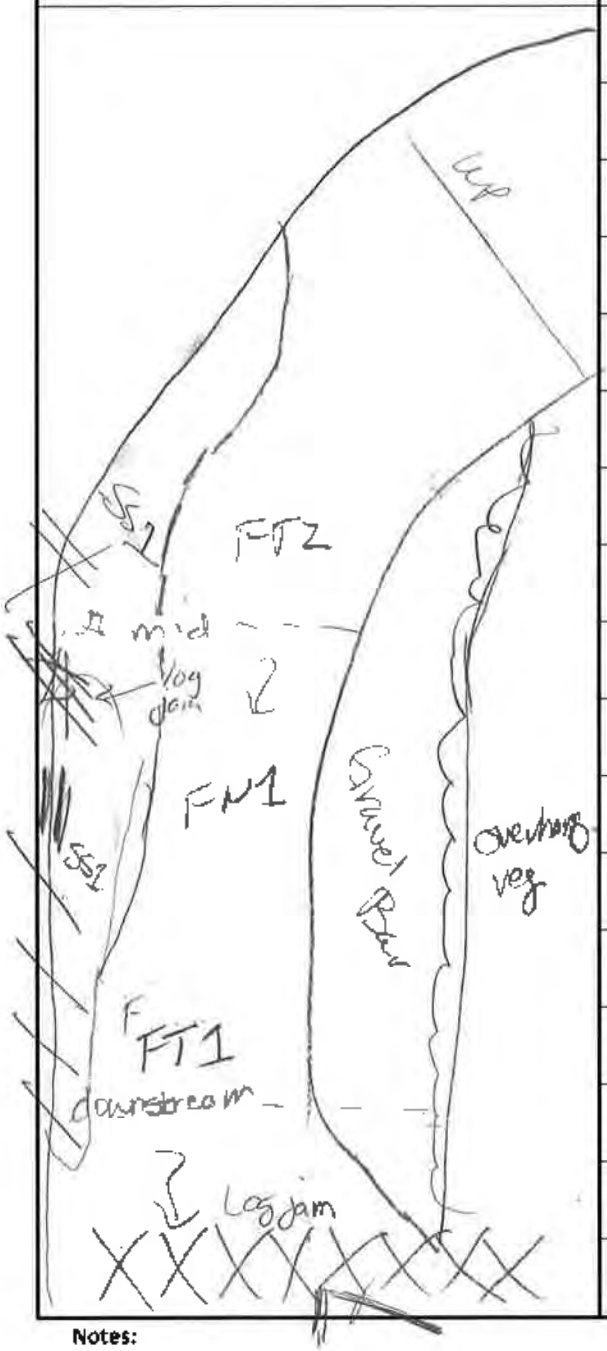
Holden Mine Biomonitoring – 2020

Fish and Macroinvertebrate Sampling – Habitat Unit Mapping Form

Site: SG-12R **Field Crew:** CS, KAM, GC, RC **Page:** 1 of 2

Date: 8/24/2020 **Survey Reach Gradient:** ~2%

Habitat Unit Map
[Draw and label habitat units in each reach corresponding to unit description)



Channel Unit						Large Woody Debris Count[3]		
Unit ID[a,1]	Length (ft)	Wetted Width (ft)	Depth[b] (ft)	Riffle Crest Depth[c] (ft)	Formed By[c,2]	S 6-12	M 12-20	L >20
FT1	~70	40	0.5-1	—	—	I		
SS1	180	10-25	3+	0.5	WD	III	IIII III	IIII
FN1	80	20	0.5-2.0	—	—			
FT2	150	30-40	0.5-1.5	—	—			I

Notes:

a Channel unit type code followed by the ordered number of that unit type within the reach (e.g. FT1, SS1, FT2, SSPL1, FT3, etc.)

b Average depth in fast water units, maximum depth in pool units

c Applies to pool units only.

1 Channel Unit Type Codes: Slow water (pools), **SD** - Dam pool; **SS** - Scour Pool, **SSPL** - Plunge pool; Fast water (riffle, glide), **FT** - Fast turbulent, **FN** - Fast non-turbulent; **SIDES** - Side channel slow, **SIDEF** - Side channel fast, **SIDED** - Side channel dry; **DM** - Dry main channel; **ARTIF** - culverts, dams, **WF** - Waterfall, **CH** - Chute, **CA** - Cascade; **M** - Marshlands; **TR** - Tributary confluence.

2 Formed By Codes: **BV** - Beaver, **WD** - Wood, **BR** - Bedrock, **BO** - Boulder, **SB** - Streambend, **TR** - Tributary confluence, **CU** - Culvert, **DA** - Dam, **RS** - Restoration, **RR** - Riprap/stabilization, **OT** – Other

3 LWD Category Definitions: **S** – Diameter >6 in @ 20 feet from large end; **M** – Diameter >12 in @ 35 ft from large end; **L** – Diameter >20 in @35 ft from large end.

Holden Mine Biomonitoring – 2020

Macroinvertebrate Sampling - Chain of Custody Form

Site: RC-15
Date: 8/24/20

Field Crew: NW, KH, E.M, IS, MM, CB, TC
Time Start: 12:00 Time End: 13:57

Weather: Sunny/clear

Sample Site and Replicate Label	Substrate Comp. - % of total				Ferricrete*	Embedded Depth %	Temperature (°C)	DO (mg/L)	pH	RedOx (mV)	Conductivity (µS/m)	Turbidity (NTU)
	Fines/Sand (<2 mm)	Gravel (2-64 mm)	Cobble (64-256 mm)	Boulder (>256 mm)								
Holden Mine Biomonitoring 2020 Sample Location ID: **RC-15-2020-04-BI** Habitat type: Riffle 12:00 Collection Date/Time: 8/24/20 Collected By: IS, NW, MM	0	95	5		0	5	11.9	10.09	7.31	184.9	57.1	0.5
Holden Mine Biomonitoring 2020 Sample Location ID: **RC-15-2020-02-BI** Habitat type: Riffle Collection Date/Time: 8/24/20 12:12 Collected By: IS, NW, MM	0	25	5	70	0	3	11.9	9.99	7.42	185.2	53.0	0.3
Holden Mine Biomonitoring 2020 Sample Location ID: **RC-15-2020-03-BI** Habitat type: Riffle Collection Date/Time: 8/24/20 12:26 Collected By: IS, NW, MM	0	5	95	0	0	3	11.8	10.01	7.32	189.3	53.1	0.4
Holden Mine Biomonitoring 2020 Sample Location ID: **RC-15-2020-01-BI** Habitat type: Riffle Collection Date/Time: 8/24/20 12:32 Collected By: IS, NW, MM	0	35	50	15	0	3	12.0	10.03	7.37	191.2	53.1	0.7
Holden Mine Biomonitoring 2020 Sample Location ID: **RC-15-2020-05-BI** Habitat type: Riffle Collection Date/Time: 8/24/20 12:34 Collected By: IS, NW, MM	0	5	85	10	0	3	12.2	9.94	7.30	195.0	57.2	0.4
Holden Mine Biomonitoring 2020 Sample Location ID: **RC-15-2020-06-BI** Habitat type: Riffle Collection Date/Time: 8/24/20 12:45 Collected By: IS, NW, MM	0	10	20	70	0	3	12.2	9.97	7.29	196.6	53.3	0.4
Holden Mine Biomonitoring 2020 Sample Location ID: **RC-15-2020-07-BI** Habitat type: Riffle Collection Date/Time: 8/24/20 12:54 Collected By: IS, NW, MM	0	5	25	70	0	3	12.3	9.97	7.34	198.8	53.3	0.5

*Photos reversed for 4 and 1

Site: RC-15

Macroinvertebrate Sampling - Chain of Custody Form

Sample Site and Replicate Label	Substrate Comp. - % of total				Ferricrete*	Embedded Depth %	Temperature (°C)	DO (mg/L)	pH	RedOx (mV)	Conductivity (µS/m)	Turbidity (NTU)
	Sand (0.6-2 mm)	Gravel (2-64 mm)	Cobble (64-256 mm)	Boulder (>256 mm)								
Holden Mine Biomonitoring 2020 Sample Location ID: **RC-15-2020-08-BI** Habitat type: Riffle Collection Date/Time: 8/24/20 13:08 Collected By: IS, NW, MM	0	5	15	80	0	3	12.4	9.94	7.29	199.2	53.2	0.4
Holden Mine Biomonitoring 2020 Sample Location ID: **RC-15-2020-09-BI** Habitat type: Riffle Collection Date/Time: 8/24/20 13:10 Collected By: IS, NW, MM	0	5	90	5	0	3	12.4	9.93	7.31	206.2	53.2	0.4
Holden Mine Biomonitoring 2020 Sample Location ID: **RC-15-2020-10-BI** Habitat type: Riffle Collection Date/Time: 8/24/20 13:27 Collected By: IS, NW, MM	0	30	30	40	0	3	12.6	9.86	7.3	210.1	53.2	0.4
Holden Mine Biomonitoring 2020 Sample Location ID: **RC-15-2020-11-BI** Habitat type: Riffle Collection Date/Time: 8/24/20 13:29 Collected By: IS, NW, MM	0	10	75	15	0	3	12.6	9.92	7.37	206.5	53.2	0.5
Holden Mine Biomonitoring 2020 Sample Location ID: **RC-15-2020-12-BI** Habitat type: Riffle Collection Date/Time: 8/24/20 13:37 Collected By: IS, NW, MM	0	5	85	10	0	3	12.8	9.88	7.32	207.7	53.2	0.5
Holden Mine Biomonitoring 2020 Sample Location ID: **RC-15-2020-13-BI** Habitat type: Riffle Collection Date/Time: 8/24/20 13:42 Collected By: IS, NW, MM	0	80	20	0	0	10	12.0	9.77	7.38	204.7	53.3	0.4
Holden Mine Biomonitoring 2020 Sample Location ID: **RC-15-2020-14-BI** Habitat type: Riffle Collection Date/Time: 8/24/20 13:51 Collected By: IS, MM, NW	0	10	60	30	0	3	12.9	9.75	7.37	208.0	53.4	0.5
Holden Mine Biomonitoring 2020 Sample Location ID: **RC-15-2020-15-BI** Habitat type: Riffle Collection Date/Time: 8/24/20 13:57 Collected By: IS, NW, MM	0	30	30	40	0	5	13.1	9.77	7.40	209.4	53.5	0.5

Holden Mine Biomonitoring – 2020

Macroinvertebrate Sampling – Site Coordinate, Depth and Flow Form

Site: RC-15
Date: 8/24/20

Field Crew: KAM, RC, GC, CS

Location Coordinates:	Latitude	Longitude
50 meter upstream marker	48.18800514	120.69462672
Center (site location)	48.18826721	120.69006910
50-meter downstream marker	48.18802687	120.68952502

Replicate #:	Latitude	Longitude	Depth (ft)	Flow Velocity (ft/s)	
				At Bottom	At 0.6x Depth (from surface)
[Site] RC-15 -2020-01-BI	48.18815498	120.68994018	0.4	0.252	0.238
[Site] RC-15 -2020-02-BI	48.18801741	120.68969873	1.0	0.149	0.478
[Site] RC-15 -2020-03-BI	48.18801788	120.68960567	0.4	0.462	0.522
[Site] RC-15 -2020-04-BI	48.18802687	120.68952502	0.6	0.078	0.184
[Site] RC-15 -2020-05-BI	48.18821813	120.68999693	0.7	0.347	0.469
[Site] RC-15 -2020-06-BI	48.18821063	120.69004828	0.5	0.333	0.493
[Site] RC-15 -2020-07-BI	48.18823578	120.69009099	0.7	0.218	0.360
[Site] RC-15 -2020-08-BI	48.18822714	120.69012324	0.3	0.105	0.191
[Site] RC-15 -2020-09-BI	48.18825141	120.69020459	0.8	0.215	0.244
[Site] RC-15 -2020-10-BI	48.18824171	120.69028737	0.7	0.164	0.103
[Site] RC-15 -2020-11-BI	48.18825708	120.69036679	1.0	0.097	0.313
[Site] RC-15 -2020-12-BI	48.18822137	120.69043709	0.4	0.172	0.298
[Site] RC-15 -2020-13-BI	48.18817874	120.69050745	0.6	0.197	0.215
[Site] RC-15 -2020-14-BI	48.18809321	120.69048969	0.7	0.269	0.258
[Site] RC-15 -2020-15-BI	48.18805976	120.69054542	0.7	0.049	0.166

Sorry that 01 is out of order!

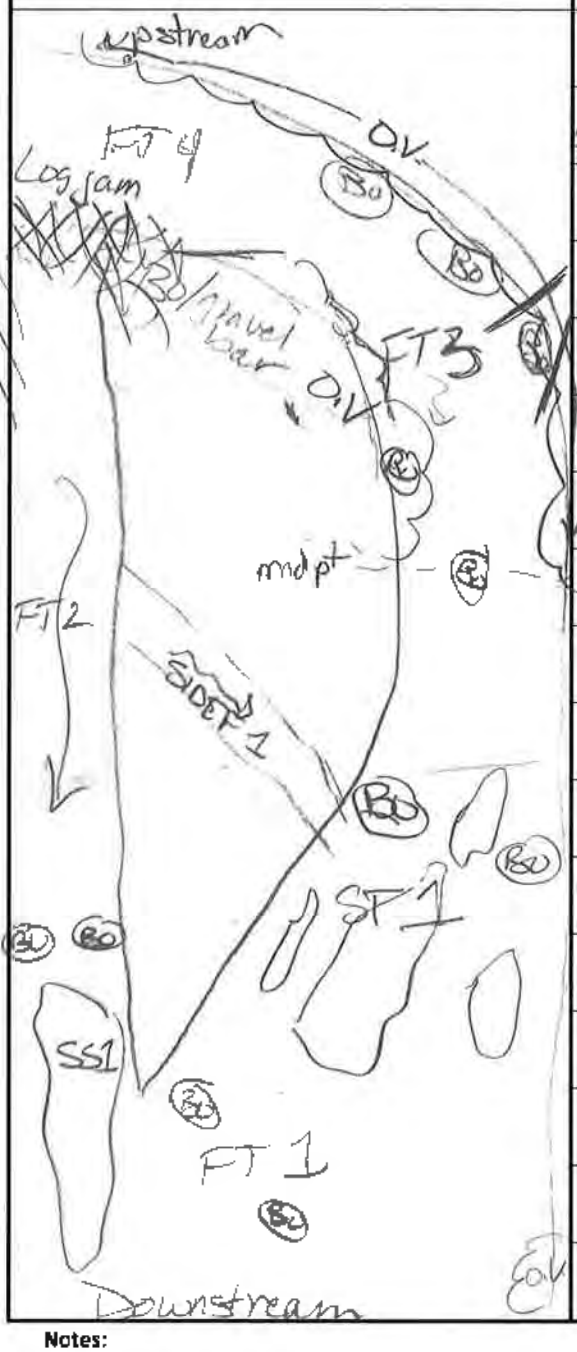
Holden Mine Biomonitoring – 2020

Fish and Macroinvertebrate Sampling – Habitat Unit Mapping Form

Site: RC-15 **Field Crew:** KAM, RC, GC, CE **Page:** 1 of 2

Date: 8/24/20 **Survey Reach Gradient:** 5-7% = mid to down; 4% = up to mid

Habitat Unit Map
(Draw and label habitat units in each reach corresponding to unit description)



Channel Unit						Large Woody Debris Count[3]		
Unit ID[a,1]	Length (ft)	Wetted Width (ft)	Depth[b] (ft)	Riffle Crest Depth[c] (ft)	Formed By[c,2]	S 6-12	M 12-20	L >20
FT 1	50	40	1.5-2.5	—	—			
SS1	50	20	3+	1.5	BO			
~~ST1~~	~~25~~	~~20~~	~~2~~	~~0.5~~	~~BO~~			1
FT2 = chute [+ scour pool from Log jam								IIII
SIDET 1	25	10	0.5	—	—			
Habitat w/in			SIDET 2					
ST 1	25	20	0.5-2	0.5	BO			1
FT 3	75	10-20			BO		1	1
in small pools created by boulders throughout FT3								
ea. sm. pool	≈ 3ft x 5ft w/ residual depth 5							50.5ft
FT4	75	10-15	0.5-1	—	—		1	1
Log jam								>25

Notes:

a Channel unit type code followed by the ordered number of that unit type within the reach (e.g. FT1, SS1, FT2, SSPL1, FT3, etc.)

b Average depth in fast water units, maximum depth in pool units OV = overhanging veg

c Applies to pool units only.

1 Channel Unit Type Codes: Slow water (pools), **SD** - Dam pool; **SS** - Scour Pool, **SSPL** - Plunge pool; Fast water (riffle, glide), **FT** - Fast turbulent, **FN** - Fast non-turbulent; **SIDES** - Side channel slow, **SIDEF** - Side channel fast, **SIDED** - Side channel dry; **DM** - Dry main channel; **ARTIF** - culverts, dams, **WF** - Waterfall, **CH** - Chute, **CA** - Cascade; **M** - Marshlands; **TR** - Tributary confluence. ST = step pool

2 Formed By Codes: **BV** - Beaver, **WD** - Wood, **BR** - Bedrock, **BO** - Boulder, **SB** - Streambend, **TR** - Tributary confluence, **CU** - Culvert, **DA** - Dam, **RS** - Restoration, **RR** - Riprap/stabilization, **OT** – Other

3 LWD Category Definitions: **S** – Diameter >6 in @ 20 feet from large end; **M** – Diameter >12 in @ 35 ft from large end; **L** – Diameter >20 in @35 ft from large end.

Fish Electroshocking Field Form

Project: Rio Tinto Holden Mine Remediation Project - 2020 Biomonitoring
Site Name: RC- 1
Stream Name Railroad Creek
Date: 8/21/2020 **Time:** 0926
Latitude: **Longitude:**
Field Crew: C. Sowcarty, M. Meeders, C. Brauer, GABE, EVAN, RYAN, TYLER

Water Quality Parameters	
Temperature	12.5°
Conductivity	30.1
DO	9.32
pH	5.15

0926

Turb. 1.33

Stream Description
fast reach with tree over top + 3-4 good pools

12.5 ~~Temp~~

Shocker Settings				
		Pass 1	Pass 2	Pass 3
Pulse Width (500 uS):		500uS	500uS	
Pulse Frequency (30-50 Hz):		40Hz	40Hz	
Duty Cycle (Begin 12%):		12%	12%	
Volts (Begin 500-800):		900	900	
Time Begin:	1000	1000	1240	
Time End:	1320	1040	1315	
Total Fish Caught		7	5	
Total Fish 1st and 2nd pass:		13		
2nd pass as % of total of 1st & 2nd			if >40% then do a third pass	

Time Pass 1 = 40 min
Time Pass 2 = 35 min

Shocker 1 = 4910 sec.
Shocker 2 = 1351 sec

Pass	Species	Fork Length (mm)	Weight (g)	Observations
1	CT	190	77.2	burn marks
1	CT/RT	163	47.7	photo 1 (CB)
1	CT	74	3.6	~~photo~~ inconclusive
1	CT/RT	168	57.7	
1	CT/RT	214	90.0	photo 2 (CB)
1	RT	170	58.5	photo 3 (CB)
1	CT/RT	144	35.1	
2	YOY	33	0.1	dead
2	CT	219	93.7	photo 1 (MDM)
2	CT	138	26.0	photo 2 (MDM)
2	CT/RT	116	15.6	
2	CT	74	3.5	

~~photo~~ (CB)

Pass	Species	Fork Length (mm)	Weight (g)	Observations

Pass	Species	Fork Length (mm)	Weight (g)	Observations

Pass	Species	Fork Length (mm)	Weight (g)	Observations

Fish Electroshocking Field Form

Project: Rio Tinto Holden Mine Remediation Project 2020 Biomonitoring
Site Name: RC-6
Stream Name Railroad Creek
Date: 8/22/2020 **Time:** 0830
Latitude: **Longitude:**
Field Crew: C. Soncarty, C. Berger, E. Malczyk, R. Crotty, T. Scott, M. Manders, G. Cisneros

Water Quality Parameters	
Temperature	11.0
Conductivity	31.1
DO	9.75
pH	5.04

0915

Stream Description
High gradient stream w/ cobbles, some undercut banks and overhanging veg. One large boulder

Shocker Settings				
		Pass 1	Pass 2	Pass 3
Pulse Width (500 uS):		3ms	3ms	
Pulse Frequency (30-50 Hz):		40Hz	40 Hz	
Duty Cycle (Begin 12%):		12%	12%	
Volts (Begin 500-800):		900	900	
Time Begin:	0922	0922	1202	
Time End:		1022	1242	
Total Fish Caught		11	7	
Total Fish 1st and 2nd pass:		18		
2nd pass as % of total of 1st & 2nd		38%	if >40% then do a third pass	

Shock time

	pass 1	pass 2	~~pass 3~~
#1:	2254	3030	
#2:	5948	6602	

Pass	Species	Fork Length (mm)	Weight (g)	Observations
1	CT	181	61.8	
1	RB	77	4.2	
1	CT/RB	92	14.3	
1	RB	129	27.3	photo 1 (MDM)
1	RB	182	65.9	photo 2 (MDM) + CB
1	CT	155	37.9	
1	CT	101	11.4	
1	RB	74	5.6	
1	CT/RB	162	41.0	
1	CT	146	31.1	
1	RB	72	3.5	
2	CT	85	8.2	
2	CT	235	142.3	photo 3 (MDM) + CB
2	CT/RB	157	69.9	
2	CT	194	76.4	
2	CT	157	34.3	
2	CT	161	42.5	
2	CT	110	14.2	

Pass	Species	Fork Length (mm)	Weight (g)	Observations

Note: Pass 1 had 1 dropper that was in the net but didn't make it in the bucket

Pass	Species	Fork Length (mm)	Weight (g)	Observations

Pass	Species	Fork Length (mm)	Weight (g)	Observations

Fish Electroshocking Field Form

Project: Rio Tinto Holden Mine Remediation Project - 2020 Biomonitoring
Site Name: SG-9
Stream Name Railroad Creek
Date: 8/27/2020 **Time:** 0815
Latitude: **Longitude:**
Field Crew: I. Sato, C. Berger, M. Meaders, T. Scott, P. Osterhout, K. Hitchko, E. Maley2, N. White

Water Quality Parameters	
Temperature	9.5
Conductivity	37.4
DO	10:46
pH	7.09

Time 0900

Stream Description
High velocity stream w/ lots of LWD and large side channel along LB at the lower end

Shocker Settings		Pass 1	Pass 2	Pass 3
Pulse Width (500 uS):				
Pulse Frequency (30-50 Hz):				
Duty Cycle (Begin 12%):				
Volts (Begin 500-800):		800-900	1310-1440	
Time Begin:		9:52		
Time End:		11:46		
Total Fish Caught				
Total Fish 1st and 2nd pass.		47	23	
2nd pass as % of total of 1st & 2nd		33%	if >40% then do a third pass	

Shocker Time
Pass 1 Pass 2
#1: 13700
#2: 2123

Pass	Species	Fork Length (mm)	Weight (g)	Observations
1	YOY	29	0.4	
1	YOY	37	0.5	mort
1	YOY	26	0.4	
1	YOY	34	0.2	
1	YOY	39	0.7	
1	YOY	27	0.1	
1	YOY	43	0.9	
1	YOY	36	0.9	
1	YOY	29	0.2	
1	YOY	42	0.7	mort
1	YOY	30	0.4	
1	YOY	38	0.7	
1	YOY	42	0.8	
1	YOY	29	0.4	
1	CT	85	7.7	
1	CT	119	18.0	
1	CT	99	4.16	
1	CT	85	6.3	
1	CT	89	7.1	
1	CT	81	5.9	
1	CT	93	8.1	
1	CT	120	16.6	photo (11)
1	CT/RB	114	13.7	photo (11)
1	YOY	36	0.3	
1	YOY	29	0.2	
1	CT	87	6.6	
1	CT	95	4.6	
1	CT/RB	69	3.9	
1	CT	95	4.1	
1	CT/RB	97	4.7	
1	CT	120	14.0	
1	CT	86	6.6	

Pass	Species	Fork Length (mm)	Weight (g)	Observations
1	CT	86	7.1	
1	CT/RB	84	6.7	
1	CT	80	5.4	
1	CT	212	95.5	photo (13)
1	CT	114	12.5	
1	CT	138	26.5	
1	CT	144	26.9	
1	CT	148	30.5	
1	CT/RB	112	14.0	
1	CT	149	33.2	photo (13)
1	CT	156	38.6	
1	CT	90	7.8	
1	CT	146	34.4	
1	CT	160	41.7	
1	CT	175	55.6	
2	YOY	32	0.3	
2	YOY	26	0.3	
2	YOY	38	0.4	
2	YOY	29	0.5	
2	CT	164	40.4	mort
2	CT	84	5.7	
2	CT	78	5.1	
2	CT	90	7.4	
2	CT	114	14.6	
2	CT	78	6.2	
2	CT	80	6.0	
2	CT	70	3.3	
2	CT/RB	81	5.5	
2	CT	78	5.2	
2	CT	150	34.1	
2	CT	89	8.7	
2	CT	120	19.9	

Pass	Species	Fork Length (mm)	Weight (g)	Observations
2	CT	160	53.0	photo (B)
2	CT	78	4.4	
2	CT	89	7.5	
2	CT	78	5.2	
2	CT	176	57.4	
2	CT	124	19.7	

Pass	Species	Fork Length (mm)	Weight (g)	Observations

Fish Electroshocking Field Form

Project: Rio Tinto Holden Mine Remediation Project - 2020 Biomonitoring
Site Name: RC- 2
Stream Name Railroad Creek
Date: 8/27/2020 **Time:** 5:207 - 4:10 E
Latitude: **Longitude:**
Field Crew: C. SOUCATY, M. MEADERS, C. BEILER, GABE, RYAN, TYLER, EVAN

PASS 1
8772 Sec
6002 Sec

PASS 2
9834 Sec
6771 Sec

Water Quality Parameters	
Temperature	13.1
Conductivity	29.0
DO	9.64
pH	6.97

Stream Description
ENGINEERED CHANNEL, FULL SH COVER, DIRECT SUN EXPOSURE.

Shocker Settings				
		Pass 1	Pass 2	Pass 3
Pulse Width (500 uS):		500	500	
Pulse Frequency (30-50 Hz):		40Hz	40Hz	
Duty Cycle (Begin 12%):		12%	12%	
Volts (Begin 500-800):		900	900	
Time Begin:	2:07	2:07	3:30	
Time End:		2:47	4:10	
Total Fish Caught		11	5	
Total Fish 1st and 2nd pass:		16		
2nd pass as % of total of 1st & 2nd			If >40% then do a third pass	

Pass	Species	Fork Length (mm)	Weight (g)	Observations
1	CT/RB	94	8.4	MORTALITY
1	CT/RB	98	7.0	
1	CT/RB	109	9.6	
1	CT/RB	141	32.5	
1	CT	132	25.5	
1	CT/RB	170	46.12	
1	CT/RB	98	8.8	
1	CT/RB	139	27.2	
1	CT/RB	89	4.3	
1	CT	204	78.6	
1	CT	83	6.6	
2	CT/RB	153	39.2	
2	CT	186	73.5	
2	CT	89	6.3	
2	CT/RB	146	38.0	
2	CT	75	5.1	

Pass	Species	Fork Length (mm)	Weight (g)	Observations

Pass	Species	Fork Length (mm)	Weight (g)	Observations

Pass	Species	Fork Length (mm)	Weight (g)	Observations

Fish Electroshocking Field Form

Project: Rio Tinto Holden Mine Remediation Project - 2020 Biomonitoring
Site Name: RC- 4
Stream Name Railroad Creek
Date: 8/23/2020 **Time:** 0830
Latitude: **Longitude:**
Field Crew: C. Sorcanty, A. Meadows, G. , R. T.

time 0913

Water Quality Parameters	
Temperature	10.2
Conductivity	27.8
DO	10.25
pH	6.86

Stream Description
Engineered stream – eroding banks w/ some willows + alders one big drop w/ turbid pool

Shocker Settings					
		S#2 Pass 1 S#1		S#2 Pass 2 S#1	Pass 3
Pulse Width (500 uS):					
Pulse Frequency (30-50 Hz):		40	40	40	40
Duty Cycle (Begin 12%):		15%	12%	12%	12%
Volts (Begin 500-800):		850	900	850	900
Time Begin:	0915	0915		1150	
Time End:		1020		1236	
Total Fish Caught		20		5	
Total Fish 1st and 2nd pass:		25		25	
2nd pass as % of total of 1st & 2nd		20%		if >40% then do a third pass	

shocker time

	Pass 1	Pass 2
#1	4178	5063
#2	7459	8050

Pass	Species	Fork Length (mm)	Weight (g)	Observations
1	CT	129	20.7	small burn
1	RB	87	6.9	
1	CT	149	38.9	
1	CT/RB	116	14.7	
1	CT/RB	141	32.5	
1	CT/RB	146	31.2	
1	CT/RB	150	33.0	
1	CT	107	10.6	
1	CT	82	4.0	
1	CT/RB	123	22.1	
1	CT	121	18.5	
1	CT	85	6.4	
1	CT	141	27.3	
1	CT	205	97.5	
1	CT/RB	188	74.3	
1	CT/RB	175	55.0	
1	CT/RB	78	4.8	
1	CT/RB	89	8.3	
1	CT/RB	155	40.0	
1	CT/RB	82	5.0	
2	YOY	38	0.4	
2	CT	115	14.4	
2	CT	115	13.2	burn on eye
2	CT	146	29.5	
2	CT/RB	182	62.9	

Pass	Species	Fork Length (mm)	Weight (g)	Observations

Pass	Species	Fork Length (mm)	Weight (g)	Observations

Pass	Species	Fork Length (mm)	Weight (g)	Observations

Fish Electroshocking Field Form

Project: Rio Tinto Holden Mine Remediation Project - 2020 Biomonitoring
Site Name: RC-10
Stream Name Railroad Creek
Date: 8/28/2020 **Time:** 8am
Latitude: **Longitude:**
Field Crew: M. Meaders, E. Malczyk, N. White, K. Hitchko, I. Sato, C. Berger, P. Osterhout, T. Scott

Water Quality Parameters	
Temperature	9.6
Conductivity	82.2
DO	10.63
pH	7.41

Stream Description
wide reach, large amount of wood and brush along banks, high velocity current at upstream end. side channel on left bank

Shocker time: P.1 1756 P.2 3453

H·2 5864 7785

Shocker Settings near dump truck end	Pass 1	Pass 2	Pass 3
Pulse Width (500 uS):			
Pulse Frequency (30 50 Hz):	40		
Duty Cycle (Begin 12%):	12%		
Volts (Begin 500-800):	800-900		
Time Begin:	9:45	1238	
Time End:	11:05	1400	
Total Fish Caught			
Total Fish 1st and 2nd pass:	32	20	
2nd pass as % of total of 1st & 2nd		if >40% then do a third pass	

Pass	Species	Fork Length (mm)	Weight (g)	Observations
1	CT	120	17.8	
1	CT	146	20.6	
1	CT	154	35.1	
1	CT/RB	152	34.9	
1	CT/RB	92	8.0	
1	CT/RB	84	5.8	
1	CT/RB	109	12.5	
1	CT	115	16.4	
1	CT	181	57.6	DNA TO (KH)
1	CT	105	12.2	
1	CT/RB	110	13.2	
1	CT	135	21.6	
1	CT/RB	133	24.0	
1	CT/RB	114	14.0	
1	CT/RB	90	6.7	
1	CT/RB	123	17.2	
1	CT	124	18.1	
1	CT	118	16.8	
1	CT	172	38.8	
1	CT	163	40.7	
1	YOY	43	0.6	
1	YOY	39	0.5	
1	CT/RB	90	7.5	
1	YOY	31	0.2	
1	YOY	39	0.5	
1	CT/RB	103	10.5	
1	YOY	34	0.3	
1	YOY	42	0.6	
1	CT/RB	91	7.1	
1	YOY	44	0.7	
1	YOY	44	0.8	mort
1	YOY	34	0.2	

Pass	Species	Fork Length (mm)	Weight (g)	Observations
2	CT/RB	92	7.7	MORT
2	YOY	40	0.9	
2	YOY	34	0.6	
2	YOY	42	1.0	
2	YOY	38	0.9	
2	YOY	36	0.4	
2	YOY	37	0.4	
2	YOY	34	0.3	
2	YOY	36	0.6	
2	YOY	29	0.1	
2	CT/RB	92	7.1	
2	CT/RB	142	28.9	
2	CT	105	10.7	
2	CT/RB	144	27.9	
2	CT/RB	83	5.8	
2	CT	183	59.9	
2	CT	156	37.6	
2	CT/RB	99	5.0	
2	CT	169	47.5	
2	CT/RB	126	19.3	

* fish capture numbers reduced by debris wrack + swift current

Pass	Species	Fork Length (mm)	Weight (g)	Observations

Pass	Species	Fork Length (mm)	Weight (g)	Observations

Fish Electroshocking Field Form

Project: Rio Tinto Holden Mine Remediation Project 2020 Biomonitoring
Site Name: SG-12R
Stream Name: Railroad Creek
Date: 8/25/2020 **Time:** 0830
Latitude: **Longitude:**
Field Crew: C. Berger, N. White, K. Hitchco, T. Scott, E. Malczyk, M. Meaders, P. Osterhout

Water Quality Parameters	
Temperature	9.5
Conductivity	53.8
DO	10.86
pH	10.96

Time 0908

Stream Description
Wide reach with lots of wood and back water - pools along the L-B (looking u/s)

Shocker Settings				
		Pass 1	Pass 2	Pass 3
Pulse Width (500 uS):				
Pulse Frequency (30-50 Hz):		40	40	40
Duty Cycle (Begin 12%):		12%	12%	12%
Volts (Begin 500-800):		900	900	900
Time Begin:	1020	1020	1255	1500
Time End:		1130	1420	1545
Total Fish Caught		36		
Total Fish 1st and 2nd pass:				
2nd pass as % of total of 1st & 2nd			if >40% then do a third pass	

Shocker Time

	Pass 1	Pass 2	Pass 3
#1	10789	11870	12530
#2	8698	10714	11455

Pass	Species	Fork Length (mm)	Weight (g)	Observations
1	CT/RB	85	6.4	
1	CT/RB	75	4.0	
1	CT/RB	120	16.9	
1	CT	102	9.9	
1	CT/RB	154	33.1	
1	CT/RB	140	23.6	
1	CT	133	24.3	burn scar
1	CT/RB	160	33.0	
1	CT/RB	148	30.8	
1	CT	109	12.6	
1	CT	121	17.9	
1	CT	153	36.6	~~burn scar~~ (photo1 - NW)
1	CT/RB	140	25.1	
1	CT	163	42.6	
1	CT	172	46.3	
1	CT/RB	160	36.8	
1	RB	[illegible]	5.1	
1	CT	[illegible]	16.2	
1	CT	[illegible]	29.1	
1	CT	[illegible]	54.5	
1	CT	[illegible]	16.4	
1	YOY	[illegible]	0.3	
1	YOY	30	0.2	
1	YOY	42	0.8	
1	YOY	34	0.2	Mort
1	YOY	42	0.7	mort
1	YOY	28	0.1	mort
1	YOY	[illegible]	0.8	
1	YOY	[illegible]	0.3	
1	YOY	34	0.4	photo2 - NW
1	YOY	[illegible]	0.6	
1	YOY	[illegible]	0.6	

Pass	Species	Fork Length (mm)	Weight (g)	Observations
1	YOY	25	0.1	
1	YOY	26	0.2	
1	YOY	34	0.3	
1	CT	87	6.8	
2	CT	94	8.8	
2	CT	162	40.7	
2	CT	[illegible]	14.8	
2	CT	[illegible]	34.6	
2	CT/RB	118	15.0	
2	CT/RB	107	10.0	
2	CT	194	46.0	
2	CT/RB	139	26.2	
2	CT	119	13.8	
2	CT/RB	94	5.6	
2	CT	83	4.9	Mort
2	CT	186	61.0	
2	CT/RB	87	7.5	
2	CT	158	37.9	
2	YOY	46	0.4	Mort
2	YOY	35	0.1	Mort
2	YOY	41	0.4	Mort
2	CT	87	5.4	
2	CT	153	33.6	
2	YOY	70	0.2	Mort
2	CT	130	19.0	
2	CT	147	28.2	
2	YOY	41	0.1	Mort
2	CT	177	56.2	
2	CT	125	21.1	
2	CT/RB	109	11.4	
2	CT/RB	106	10.2	
2	YOY	44	0.1	

& turned voltage down to 800 in shall ow areas w/ YOY

Pass	Species	Fork Length (mm)	Weight (g)	Observations
2	YOY	34	0.4	
2	YOY	48	0.3	
2	CT	104	10.7	
2	YOY	36	0.2	
2	YOY	25	0.1	
2	YOY	39	0.3	
3	CT	187	59.0	
3	CT	210	93.1	
3	CT	137	26.2	
3	CT	120	16.9	
3	CT	100	9.3	
3	CT	124	17.5	
3	CT	124	18.5	
3	CT	157	37.1	
3	CT	188	71.0	Burn
3	CT	130	18.9	
3	CT	133	23.4	Burn
3	CT	142	27.3	
3	CT	160	41.5	
3	CT	133	23.9	
3	CT	96	8.5	
3	CT	112	13.3	
3	CT	150	32.4	
3	CT	195	79.8	
3	CT	210	86.7	
3	YOY	41	0.4	
3	YOY	39	0.3	
3	CT	145	28.5	
3	CT	81	4.8	
3	CT	148	33.5	
3	CT	190	64.3	
3	CT	146	28.7	

Pass	Species	Fork Length (mm)	Weight (g)	Observations

Project: RT-Holden

Field Event:

FLOYD | SNIDER

Date		Instrument 1		Instrument 2		Instrument 3		Instrument 4		Instrument 5		Instrument 6		
	Instrument type													
3/20/20	Serial #	0142		1427		0307								
Date	Parameter	Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initials
	pH (7.00)	7.10	–	7.02	–	–	–							
	pH (4.00)	4.04	4.00	3.87	4.01	4.08	4.00							
3/20/20	Spc. Conductance	~~21.9~~	~~21.9~~	~~1383~~	–	14.15	14.10							
	Turbidity (0)	~~4.75~~	0.05	-1.20	0	0.1	-0.1							
(I) 1383	~~Turbidity (124)~~													
(F) 1409	DO %	92.3	91.8	93	92.2	89.9	91.9							
	ORP (2/8.7	~~213.4~~	220	213.5	220	219.2	220							
	Serial #	1427		0307**		0142								
	pH (7.00)	7.05	–	7.06	–	7.03	–							
8/21/20	pH (4.00)	4.04	4.00	3.97	4.00	4.11	4.00							
	Spc. Conductance	1454	1409	M30	1409	1415	1409							
	Turbidity (0)	0.00	0.02											
	Turbidity (124)	–	–	–	–	–	–							
	DO %	–	–	–	–	–	–							
	ORP	–	–	–	–	–	–							
	Serial #													
	pH (7.00)	7.02	7.02	~~7.04~~	*									
8/22/20	pH (4.00)	4.09	3.99	~~4.01~~	~~3.99~~									
	Spc. Conductance	1330	1410											
	Turbidity (0)	–	–											
	Turbidity (124)	–	–											
	DO %	93.0	–											
	ORP	226.8	219.9											
	Serial #													
	pH (7.00)	7.03	–	~~6.78~~ 7.04	–									
8/23/20	pH (4.00)	3.97	3.96	4.02	~~3.99~~ 3.97									
	Spc. Conductance	1411	1409	1671	1402									
	Turbidity (0)	0	0	-0.04	-0.09									
	Turbidity (124)	–	–	–	–									
	DO %	~~92.5~~	95.0	92.8	93.7									
	ORP	224.6	219.9	~~233.5~~ 239.3	~~227.9~~ 219.9									

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Project: RT-Holden

Field Event: [8/25/20][8/27/20]

Date		Instrument 1		Instrument 2		Instrument 3		Instrument 4		Instrument 5		Instrument 6		Initials
	Instrument type	YSI												
	Serial #	0307		1427		1427		0307						
	Parameter	Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final	
8/25	pH (7.00)	7.07	7.00	7.08	—	6.87	—	6.93	—					
	pH (4.00)	3.99	—	3.77	4.00	4.00	4.00	3.79	4.00					
	Spc. Conductance	1358	1407	1513	1409	1367	1409	1395	1409					
	Turbidity (0)	1.02	-0.05	-5.47	0.01	-0.70	-0.05	-1.27	0.01					
	Turbidity (124)	—	—	—	—	—	—	—	—					
	DO %	—	—	—	—	—	—							
	ORP	—	—	—	—	—	—							
	Serial #													
	pH (7.00)													
	pH (4.00)													
	Spc. Conductance													
	Turbidity (0)													
	Turbidity (124)													
	DO %													
	ORP													
	Serial #													
	pH (7.00)													
	pH (4.00)													
	Spc. Conductance													
	Turbidity (0)													
	Turbidity (124)													
	DO %													
	ORP													
	Serial #													
	pH (7.00)													
	pH (4.00)													
	Spc. Conductance													
	Turbidity (0)													
	Turbidity (124)													
	DO %													
	ORP													

Project: RT-Holden

Field Event:

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Date		Instrument 1		Instrument 2		Instrument 3		Instrument 4		Instrument 5		Instrument 6		Initials
	Instrument type	YSI		YSI										
	Serial #	0307		1427										
	Parameter	Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final	
	pH (7.00)	6.94	—	7.02	6.79									
	pH (4.00)	4.09	4.00	4.15	—									
	Spc. Conductance	1488	1409	1153	1409									
	Turbidity (0)	-0.8	0.2	6.01	-0.09									
	Turbidity (124)			—	—									
	DO %	93.2	9.06 mg	92.7	9.08									
	ORP	218.2	220.0	201.1	220.0									
	Serial #													
	pH (7.00)			1.08	—									
	pH (4.00)													
	Spc. Conductance													
	Turbidity (0)													
	Turbidity (124)													
	DO %													
	ORP													
	Serial #													
	pH (7.00)													
	pH (4.00)													
	Spc. Conductance													
	Turbidity (0)													
	Turbidity (124)													
	DO %													
	ORP													
	Serial #													
	pH (7.00)													
	pH (4.00)													
	Spc. Conductance													
	Turbidity (0)													
	Turbidity (124)													
	DO %													
	ORP													

Appendix B

Benthic Macroinvertebrate & Habitat Photo Log

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for double-sided printing



Photo 1 — Replicate 1 label (RC-6).



Photo 2 — Representative substrate in replicate 1 (RC-6).



Photo 3— Label for replicate 2 (RC-6).

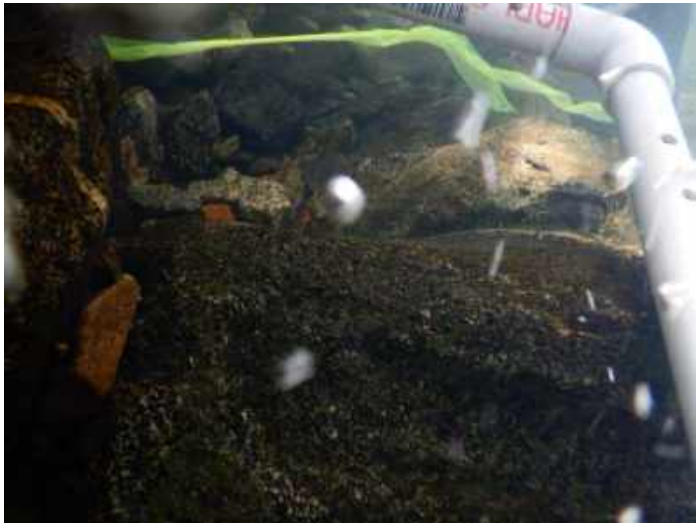


Photo 4— Representative substrate in replicate 2 (RC-6).



Photo 5 — Replicate 3 label (RC-6).



Photo 6 — Representative substrate in replicate 3 (RC-6).



Photo 7— Label for replicate 4 (RC-6).



Photo 8— Representative substrate in replicate 4 (RC-6).

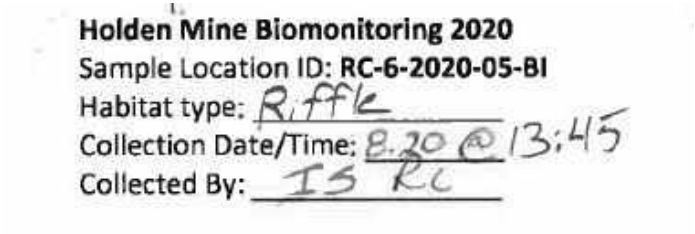


Photo 9 — Replicate 5 label (RC-6).



Photo 10 — Representative substrate in replicate 5 (RC-6).



Photo 11 — Label for replicate 6 (RC-6).



Photo 12— Representative substrate in replicate 6 (RC-6).



Photo 13 — Replicate 7 label (RC-6).



Photo 14 — Representative substrate in replicate 7 (RC-6).



Photo 15— Label for replicate 8 (RC-6).



Photo 16— Representative substrate in replicate 8 (RC-6).



Photo 17 — Replicate 9 label (RC-6).



Photo 18 — Representative substrate in replicate 9 (RC-6).



Photo 19— Replicate 10 label (RC-6).

Photo Missing

Photo 20— Representative substrate in replicate 10 (RC-6).



Photo 21 — Replicate 11 label (RC-6).



Photo 22 — Representative substrate in replicate 11 (RC-6).



Photo 23— Replicate 12 label (RC-6).



Photo 24— Representative substrate in replicate 12 (RC-6).



Photo 25 — Replicate 13 label (RC-6).



Photo 26 — Representative substrate in replicate 13 (RC-6).



Photo 27— Replicate 14 label (RC-6).

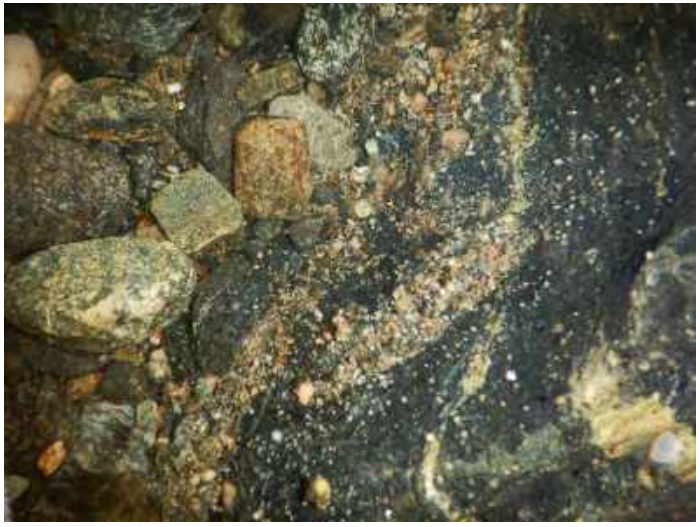


Photo 28— Representative substrate in replicate 14 (RC-6).



Photo 29 — Replicate 15 label (RC-6).



Photo 30 — Representative substrate in replicate 15 (RC-6).

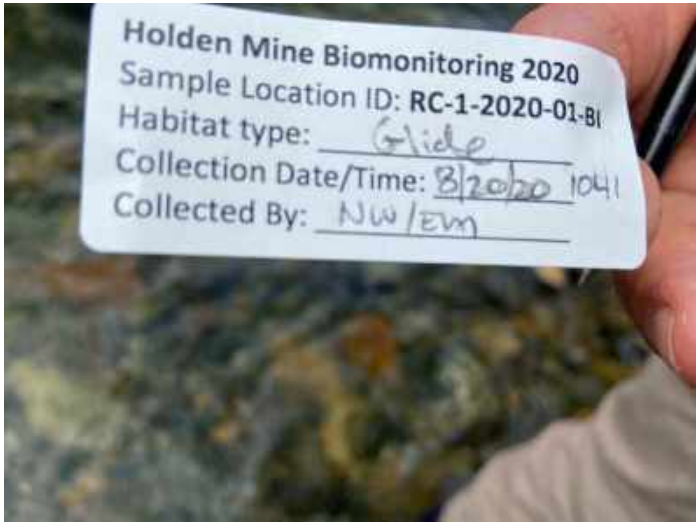


Photo 31— Replicate 1 label (RC-1).



Photo 32— Representative substrate in replicate 1 (RC-1).



Photo 33 — Replicate 2 label (RC-1).



Photo 34 — Representative substrate in replicate 2 (RC-1).

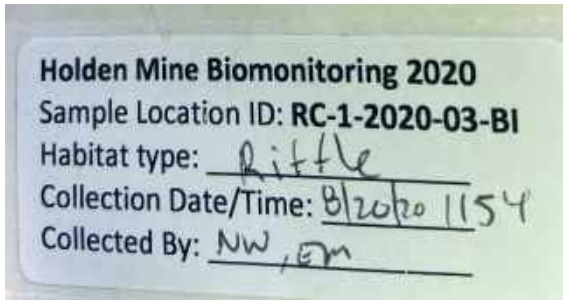


Photo 35— Replicate 3 label (RC-1).



Photo 36— Representative substrate in replicate 3 (RC-1).

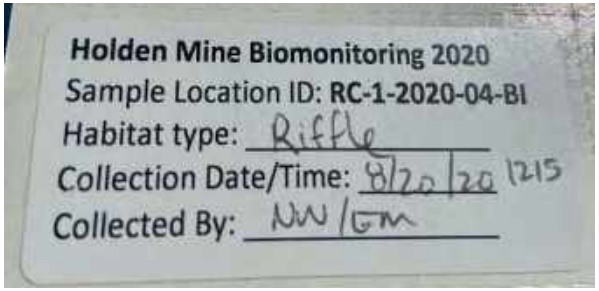


Photo 37 — Replicate 4 label (RC-1).



Photo 38 — Representative substrate in replicate 4 (RC-1).

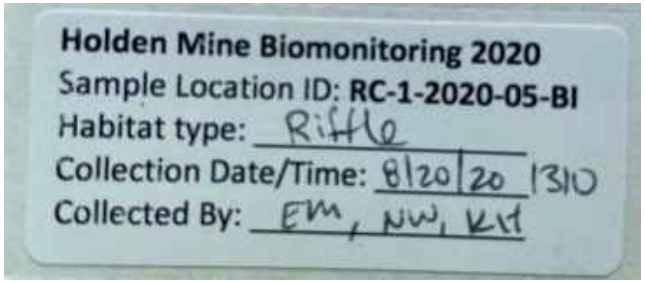


Photo 39— Replicate 5 label (RC-1).



Photo 40— Representative substrate in replicate 5 (RC-1).

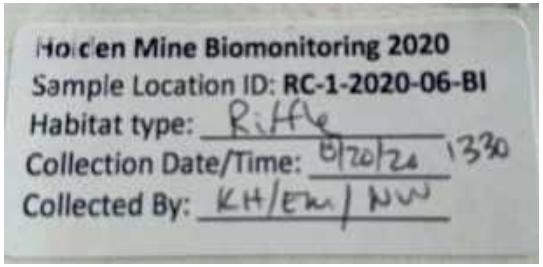


Photo 41 — Replicate 6 label (RC-1).



Photo 42 — Representative substrate in replicate 6 (RC-1).

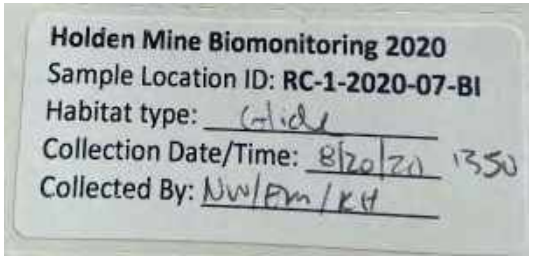


Photo 43— Replicate 7 label (RC-1).



Photo 44— Representative substrate in replicate 7 (RC-1).

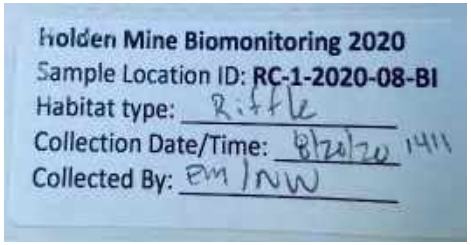


Photo 45 — Replicate 8 label (RC-1).



Photo 46 — Representative substrate in replicate 8 (RC-1).

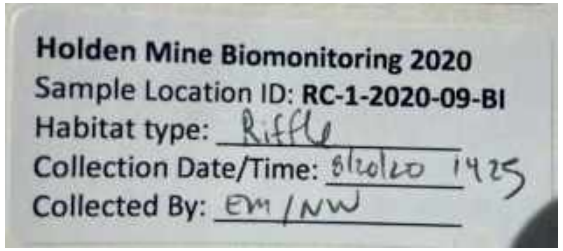


Photo 47— Replicate 9 label (RC-1).



Photo 48— Representative substrate in replicate 9 (RC-1).

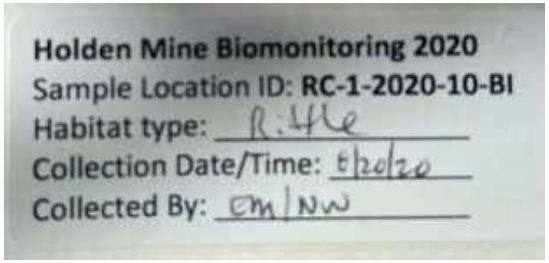


Photo 49 — Replicate 10 label (RC-1).



Photo 50 — Representative substrate in replicate 10 (RC-1).

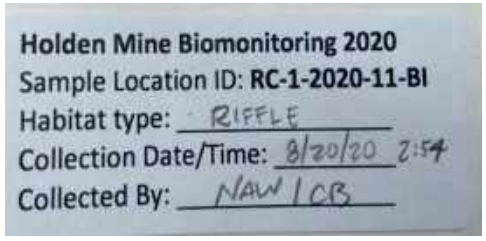


Photo 51— Replicate 11 label (RC-1).



Photo 52— Representative substrate in replicate 11 (RC-1).

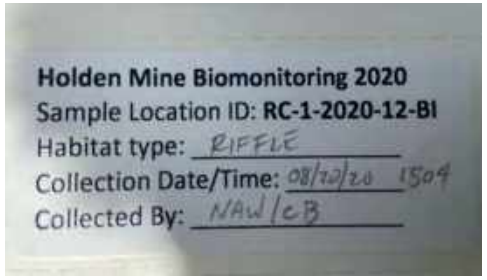


Photo 53 — Replicate 12 label (RC-1).



Photo 54 — Representative substrate in replicate 12 (RC-1).

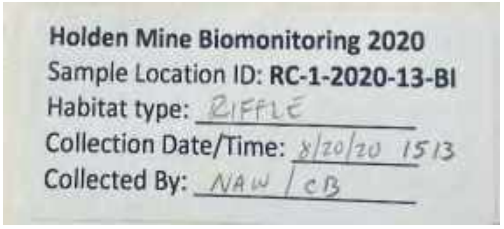


Photo 55— Replicate 13 label (RC-1).



Photo 56— Representative substrate in replicate 13 (RC-1).

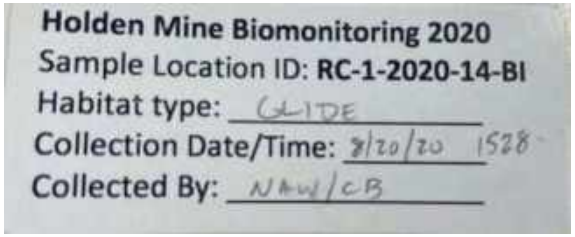


Photo 57 — Replicate 14 label (RC-1).



Photo 58 — Representative substrate in replicate 14 (RC-1).

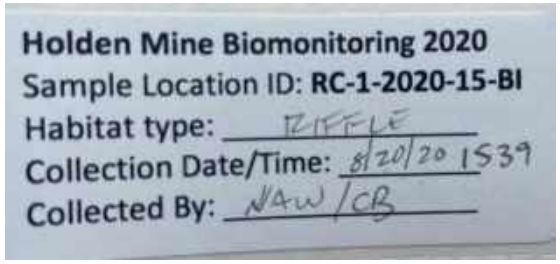


Photo 59— Replicate 15 label (RC-1).



Photo 60— Representative substrate in replicate 15 (RC-1).



Photo 61 — Replicate 1 label (RC-4).



Photo 62 — Representative substrate in replicate 1 (RC-4).



Photo 63— Replicate 2 label (RC-4).



Photo 64— Representative substrate in replicate 2 (RC-4).



Photo 65 — Replicate 3 label (RC-4).



Photo 66 — Representative substrate in replicate 3 (RC-4).



Photo 67— Replicate 4 label (RC-4).



Photo 68— Representative substrate in replicate 4 (RC-4).



Photo 69— Replicate 5 label (RC-4).



Photo 70 — Representative substrate in replicate 5 (RC-4).



Photo 71— Replicate 6 label (RC-4).



Photo 72— Representative substrate in replicate 6 (RC-4).



Photo 73 — Replicate 7 label (RC-4).



Photo 74 — Representative substrate in replicate 7 (RC-4).



Photo 75— Replicate 8 label (RC-4).



Photo 76— Representative substrate in replicate 8 (RC-4).



Photo 77 — Replicate 9 label (RC-4).



Photo 78 — Representative substrate in replicate 9 (RC-4).



Photo 79— Replicate 10 label (RC-4).



Photo 80— Representative substrate in replicate 10 (RC-4).



Photo 81 — Replicate 11 label (RC-4).



Photo 82 — Representative substrate in replicate 11 (RC-4).



Photo 83— Replicate 12 label (RC-4).



Photo 84— Representative substrate in replicate 12 (RC-4).



Photo 85 — Replicate 13 label (RC-4).



Photo 86 — Representative substrate in replicate 13 (RC-4).



Photo 87— Replicate 14 label (RC-4).



Photo 88— Representative substrate in replicate 14 (RC-4).



Photo 89 — Replicate 15 label (RC-4).



Photo 90 — Representative substrate in replicate 15 (RC-4).



Photo 91— Replicate 1 label (RC-2).



Photo 92— Representative substrate in replicate 1 (RC-2).

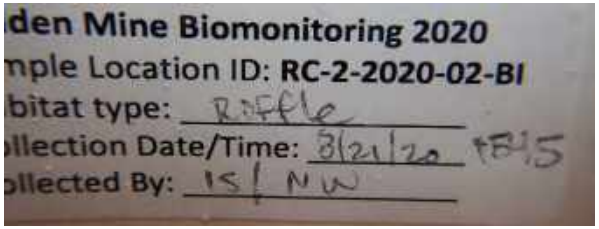


Photo 93 — Replicate 2 label (RC-2).



Photo 94 — Representative substrate in replicate 2 (RC-2).



Photo 95— Replicate 3 label (RC-2).



Photo 96— Representative substrate in replicate 3 (RC-2).



Photo 97 — Replicate 4 label (RC-2).



Photo 98 — Representative substrate in replicate 4 (RC-2).



Photo 99— Replicate 5 label (RC-2).



Photo 100— Representative substrate in replicate 5 (RC-2).



Photo 101 — Replicate 6 label (RC-2).



Photo 102 — Representative substrate in replicate 6 (RC-2).



Photo 103— Replicate 7 label (RC-2).



Photo 104— Representative substrate in replicate 7 (RC-2).

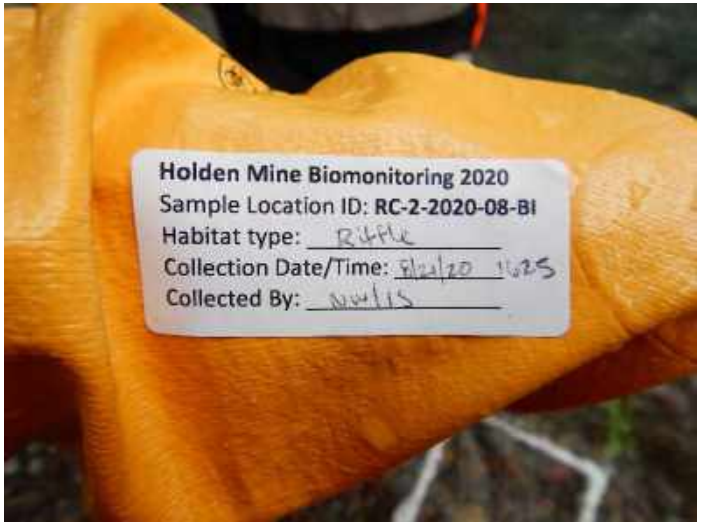


Photo 105 — Replicate 8 label (RC-2).



Photo 106 — Representative substrate in replicate 8 (RC-2).



Photo 107— Replicate 9 label (RC-2).



Photo 108— Representative substrate in replicate 9 (RC-2).



Photo 109 — Replicate 10 label (RC-2).



Photo 110 — Representative substrate in replicate 10 (RC-2).



Photo 111— Replicate 11 label (RC-2).



Photo 112— Representative substrate in replicate 11 (RC-2).



Photo 113 — Replicate 12 label (RC-2).



Photo 114 — Representative substrate in replicate 12 (RC-2).



Photo 115— Replicate 13 label (RC-2).



Photo 116— Representative substrate in replicate 13 (RC-2).



Photo 117 — Replicate 14 label (RC-2).



Photo 118 — Representative substrate in replicate 14 (RC-2).



Photo 119— Replicate 15 label (RC-2).



Photo 120— Representative substrate in replicate 15 (RC-2).



Photo 121 — Replicate 1 label (SG-9).



Photo 122 — Representative substrate in replicate 1 (SG-9).



Photo 123— Replicate 2 label (SG-9).



Photo 124— Representative substrate in replicate 2 (SG-9).

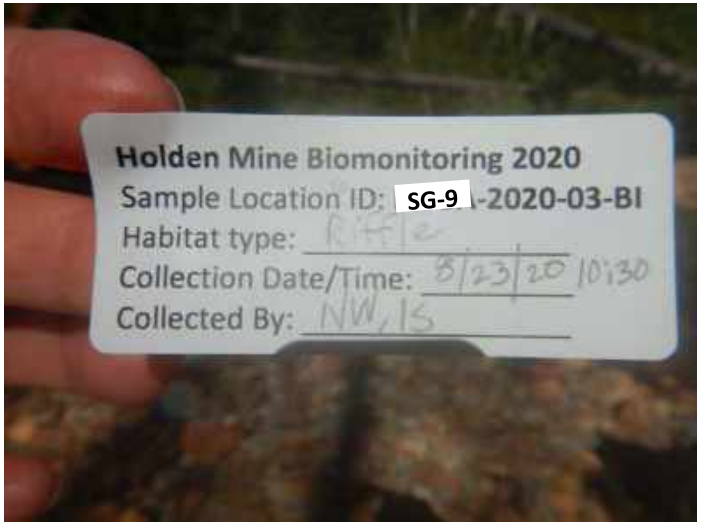


Photo 125 — Replicate 3 label (SG-9).



Photo 126 — Representative substrate in replicate 3 (SG-9).



Photo 127— Replicate 4 label (SG-9).



Photo 128— Representative substrate in replicate 4 (SG-9).

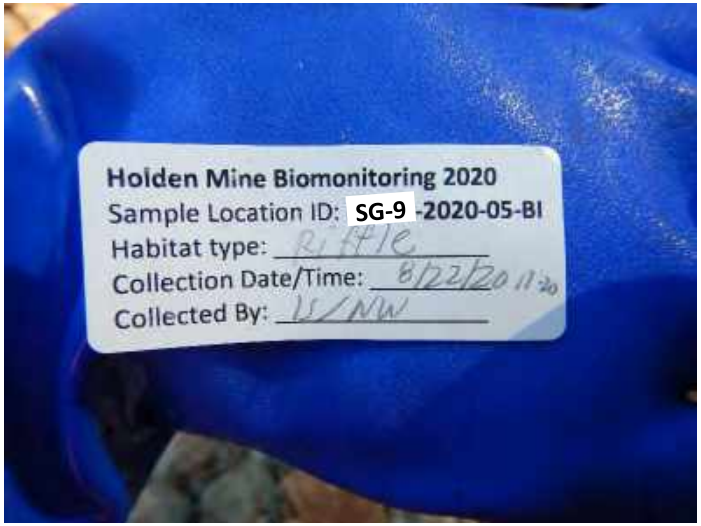


Photo 129 — Replicate 5 label (SG-9).



Photo 130 — Representative substrate in replicate 5 (SG-9).

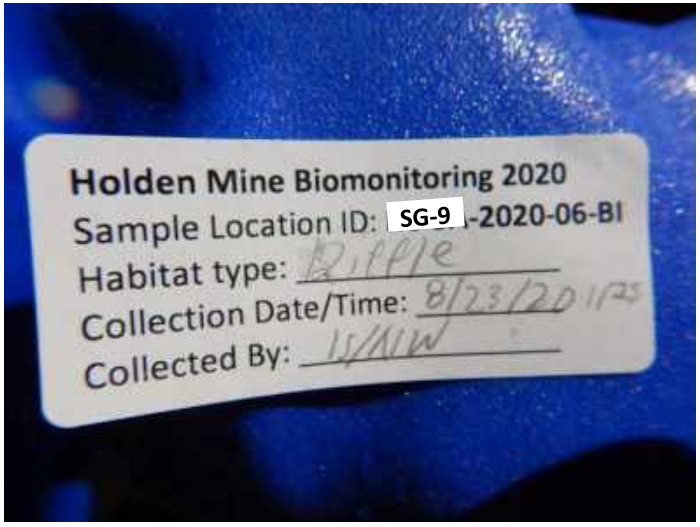


Photo 131— Replicate 6 label (SG-9).

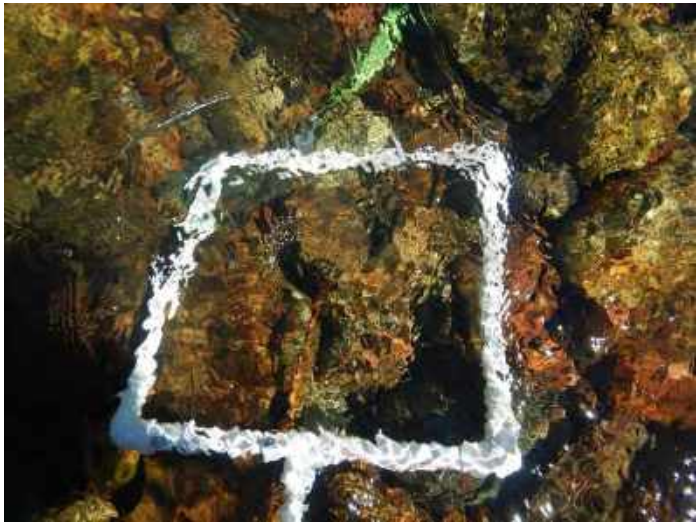


Photo 132— Representative substrate in replicate 6 (SG-9).



Photo 133 — Replicate 7 label (SG-9).



Photo 134 — Representative substrate in replicate 7 (SG-9).

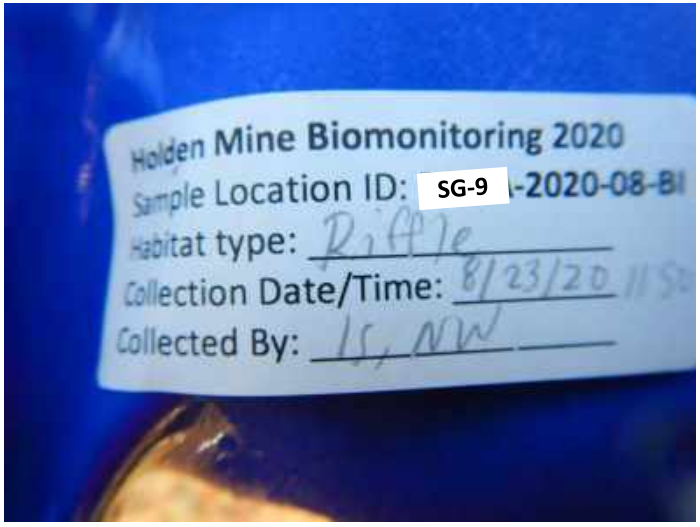


Photo 135— Replicate 8 label (SG-9).

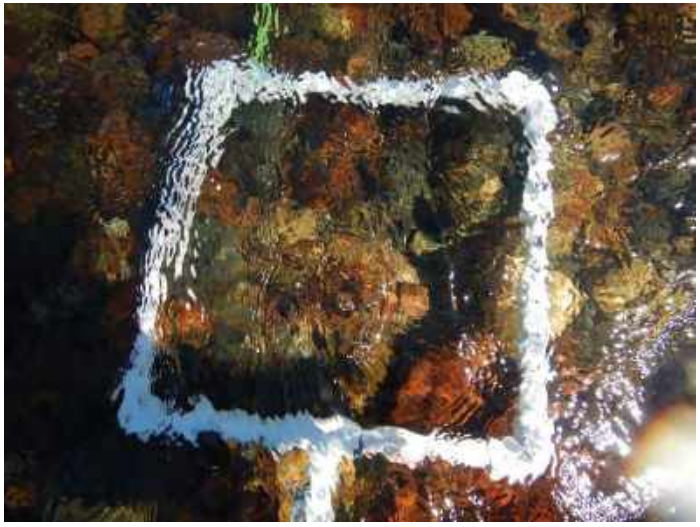


Photo 136— Representative substrate in replicate 8 (SG-9).



Photo 137 — Replicate 9 label (SG-9).

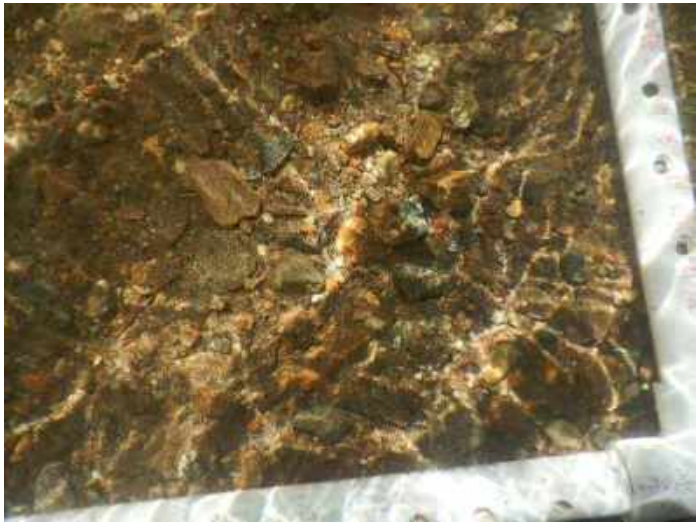


Photo 138 — Representative substrate in replicate 9 (SG-9).



Photo 139— Replicate 10 label (SG-9).

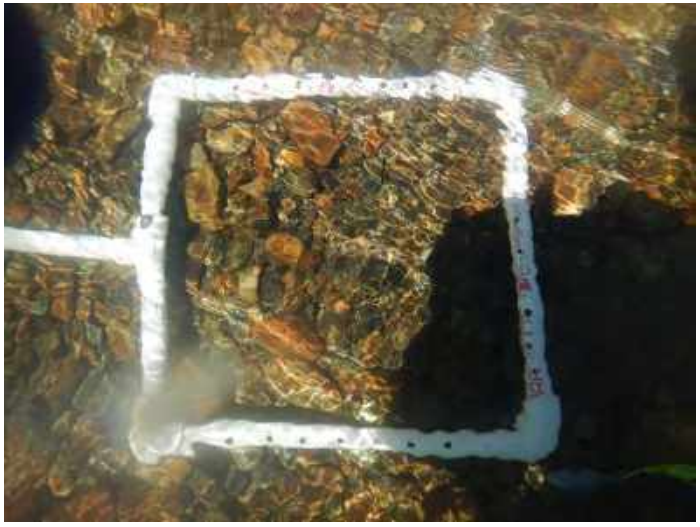


Photo 140— Representative substrate in replicate 10 (SG-9).



Photo 141 — Replicate 11 label (SG-9).

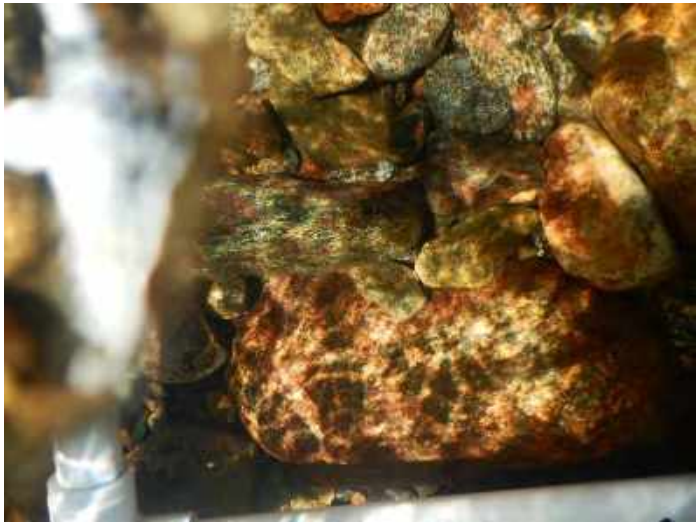


Photo 142 — Representative substrate in replicate 11 (SG-9).



Photo 143— Replicate 12 label (SG-9).



Photo 144— Representative substrate in replicate 12 (SG-9).



Photo 145 — Replicate 13 label (SG-9).



Photo 146 — Representative substrate in replicate 13 (SG-9).



Photo 147— Replicate 14 label (SG-9).



Photo 148— Representative substrate in replicate 14 (SG-9).



Photo 149 — Replicate 15 label (SG-9).



Photo 150 — Representative substrate in replicate 15 (SG-9).



Photo 151— Replicate 1 label (RC-10).



Photo 152— Representative substrate in replicate 1 (RC-10).



Photo 153 — Replicate 2 label (RC-10).

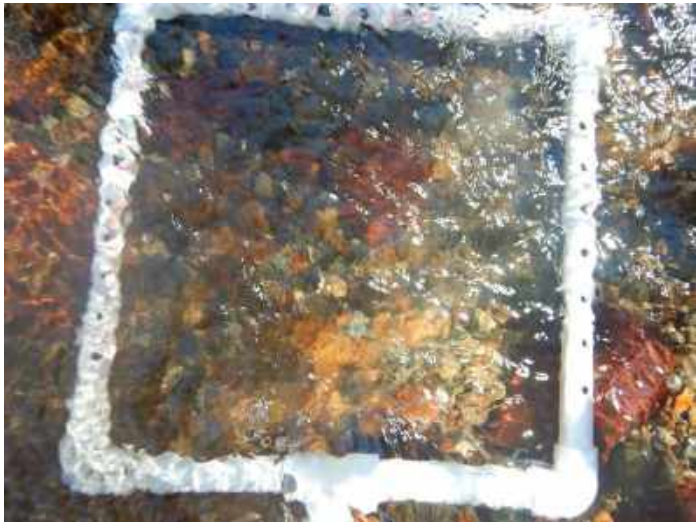


Photo 154 — Representative substrate in replicate 2 (RC-10).



Photo 155— Replicate 3 label (RC-10).



Photo 156— Representative substrate in replicate 3 (RC-10).



Photo 157 — Replicate 4 label (RC-10).



Photo 158— Representative substrate in replicate 4 (RC-10).



Photo 159— Replicate 5 label (RC-10).



Photo 160— Representative substrate in replicate 5 (RC-10).



Photo 161 — Replicate 6 label (RC-10).



Photo 162 — Representative substrate in replicate 6 (RC-10).



Photo 163— Replicate 7 label (RC-10).

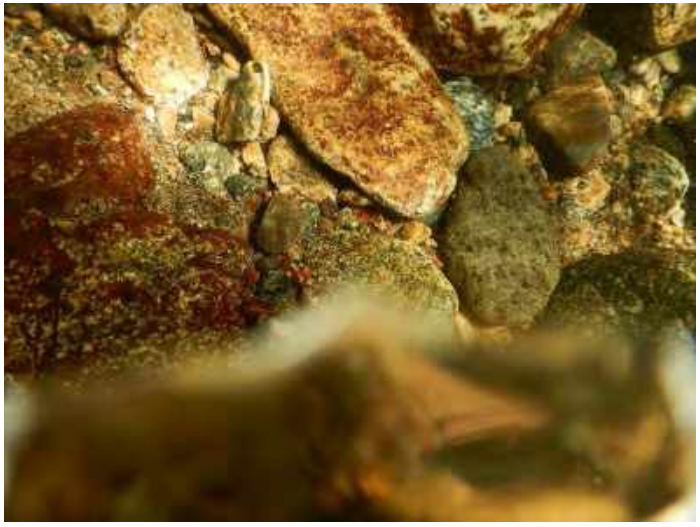


Photo 164— Representative substrate in replicate 7 (RC-10).



Photo 165 — Replicate 8 label (RC-10).

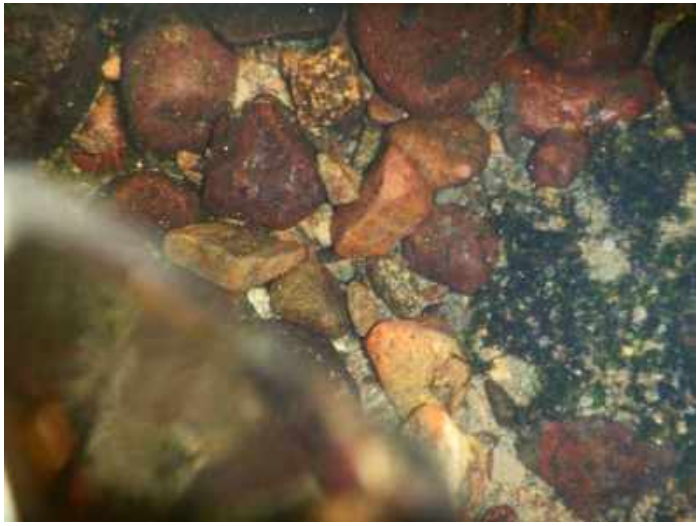


Photo 166 — Representative substrate in replicate 8 (RC-10).



Photo 167— Replicate 9 label (RC-10).



Photo 168— Representative substrate in replicate 9 (RC-10).



Photo 169 — Replicate 10 label (RC-10).



Photo 170 — Representative substrate in replicate 10 (RC-10).



Photo 171— Replicate 11 label (RC-10).



Photo 172— Representative substrate in replicate 11 (RC-10).



Photo 173 — Replicate 12 label (RC-10).



Photo 174 — Representative substrate in replicate 12 (RC-10).



Photo 175— Replicate 13 label (RC-10).



Photo 176— Representative substrate in replicate 13 (RC-10).



Photo 177 — Replicate 14 label (RC-10).

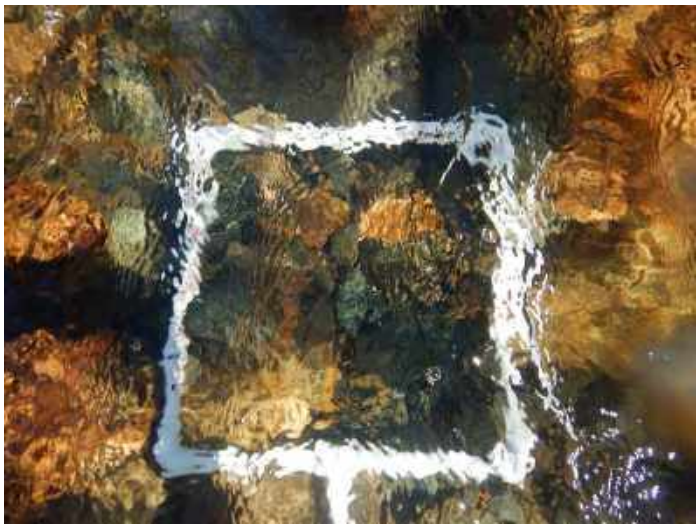


Photo 178 — Representative substrate in replicate 14 (RC-10).



Photo 179— Replicate 15 label (RC-10).



Photo 180— Representative substrate in replicate 15 (RC-10).

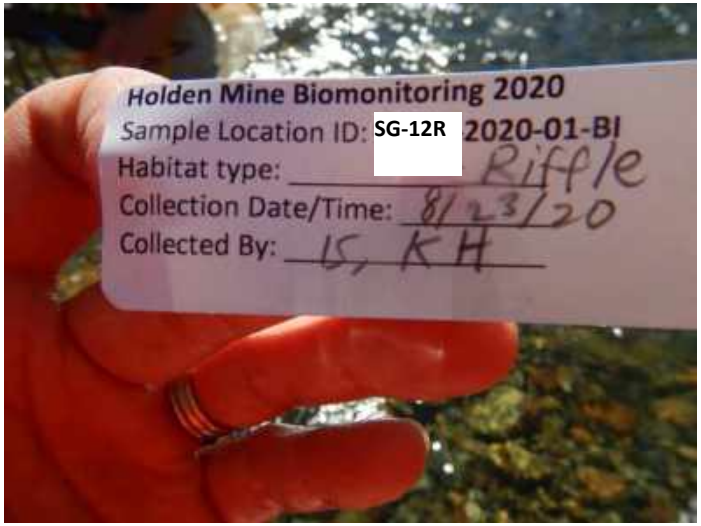


Photo 181 — Replicate 1 label (SG-12R).



Photo 182 — Representative substrate in replicate 1 (SG-12R).



Photo 183— Replicate 2 label (SG-12R).



Photo 184— Representative substrate in replicate 2 (SG-12R).

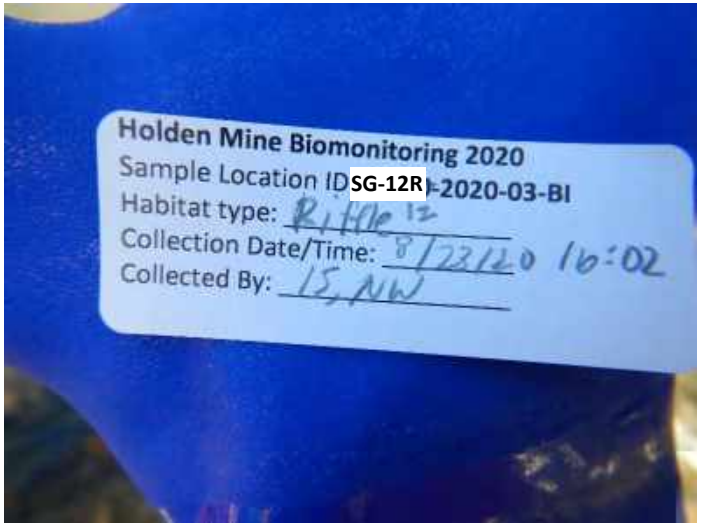


Photo 185 — Replicate 3 label (SG-12R).



Photo 186 — Representative substrate in replicate 3 (SG-12R).

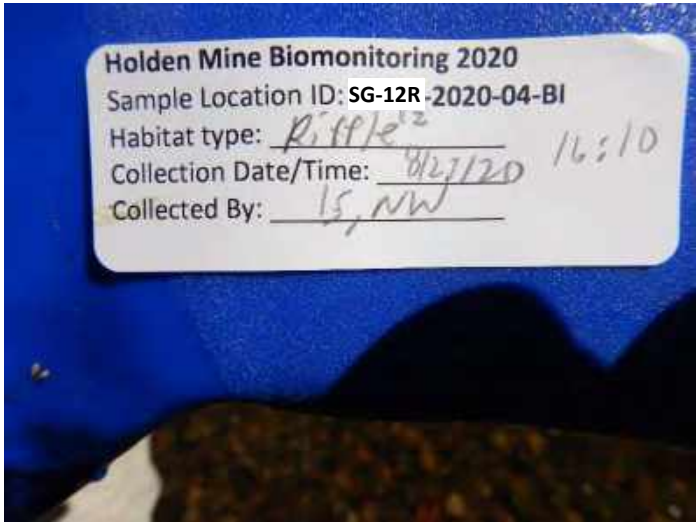


Photo 187— Replicate 4 label (SG-12R).



Photo 188— Representative substrate in replicate 4 (SG-12R).

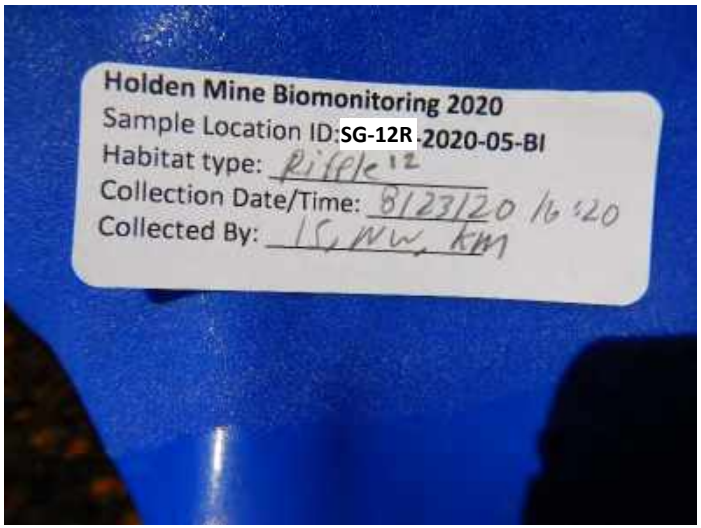


Photo 189 — Replicate 5 label (SG-12R).



Photo 190 — Representative substrate in replicate 5 (SG-12R).



Photo 191— Replicate 6 label (SG-12R).



Photo 192— Representative substrate in replicate 6 (SG-12R).



Photo 193 — Replicate 7 label (SG-12R).



Photo 194 — Representative substrate in replicate 7 (SG-12R).



Photo 195— Replicate 8 label (SG-12R).



Photo 196— Representative substrate in replicate 8 (SG-12R).



Photo 197 — Replicate 9 label (SG-12R).

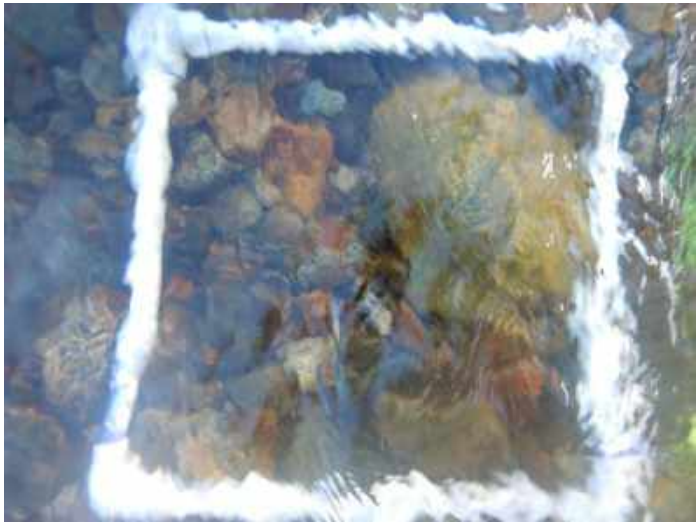


Photo 198 — Representative substrate in replicate 9 (SG-12R).



Photo 199— Replicate 10 label (SG-12R).



Photo 200— Representative substrate in replicate 10 (SG-12R).



Photo 201 — Replicate 11 label (SG-12R).



Photo 202 — Representative substrate in replicate 11 (SG-12R).



Photo 203— Replicate 12 label (SG-12R).



Photo 204— Representative substrate in replicate 12 (SG-12R).



Photo 205 — Replicate 13 label (SG-12R).

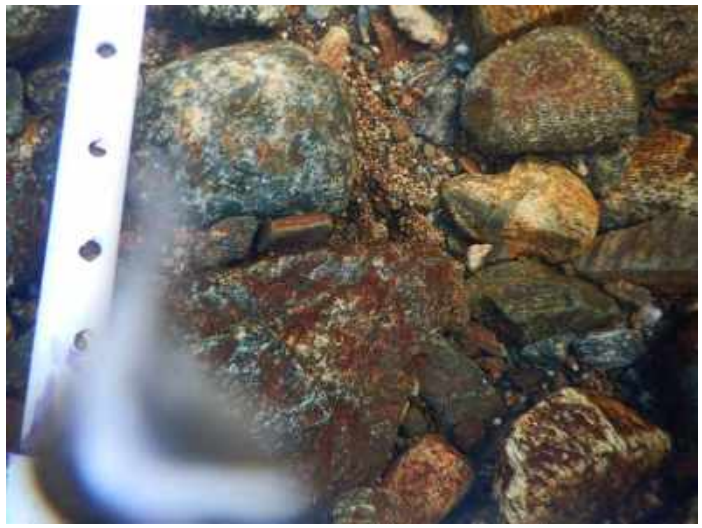


Photo 206 — Representative substrate in replicate 13 (SG-12R).



Photo 207— Replicate 14 label (SG-12R).



Photo 208— Representative substrate in replicate 14 (SG-12R).



Photo 209 — Replicate 15 label (SG-12R).



Photo 210 — Representative substrate in replicate 15 (SG-12R).

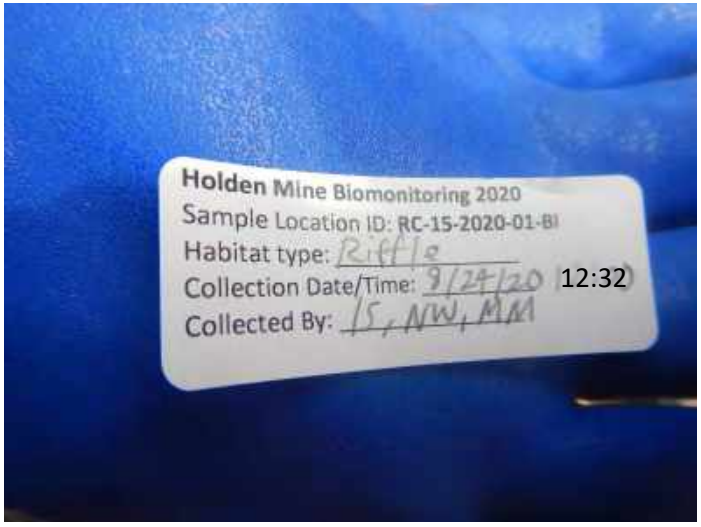


Photo 211 — Replicate 1 label (RC-15).



Photo 212 — Representative substrate in replicate 1 (RC-15).



Photo 213 — Replicate 2 label (RC-15).



Photo 214 — Representative substrate in replicate 2 (RC-15).



Photo 215 — Replicate 3 label (RC-15).



Photo 216 — Representative substrate in replicate 3 (RC-15).



Photo 217 — Replicate 4 label (RC-15).



Photo 218 — Representative substrate in replicate 4 (RC-15).



Photo 219 — Replicate 5 label (RC-15).

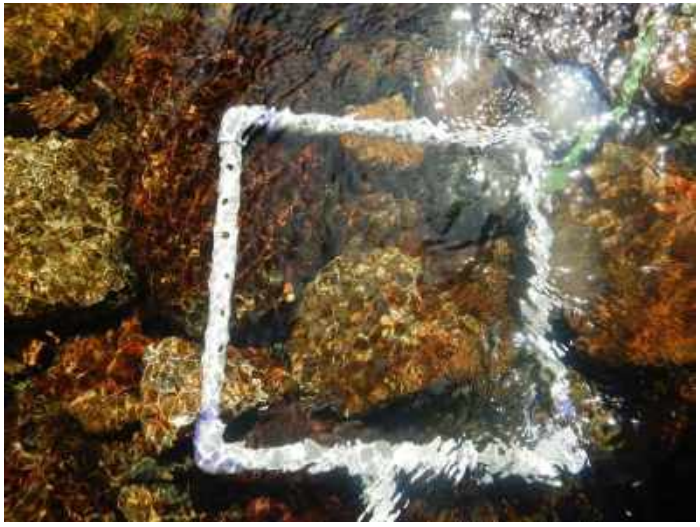


Photo 220 — Representative substrate in replicate 5 (RC-15).



Photo 221 — Replicate 6 label (RC-15).



Photo 222 — Representative substrate in replicate 6 (RC-15).



Photo 223 — Replicate 7 label (RC-15).



Photo 224 — Representative substrate in replicate 7 (RC-15).



Photo 225 — Replicate 8 label (RC-15).

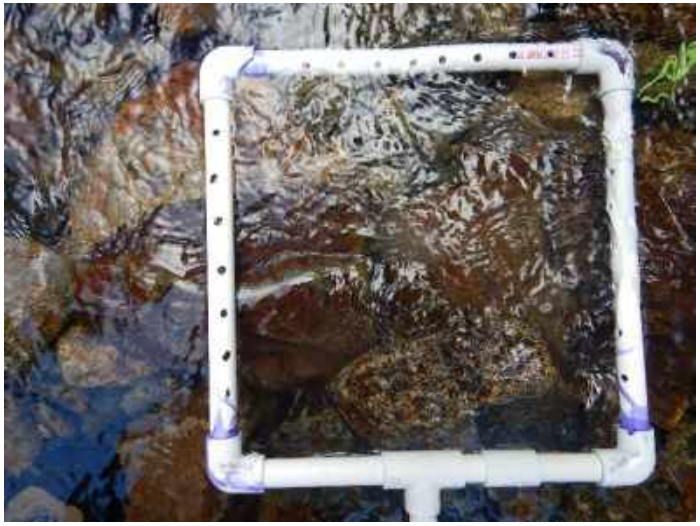


Photo 226 — Representative substrate in replicate 8 (RC-15).



Photo 227 — Replicate 9 label (RC-15).



Photo 228 — Representative substrate in replicate 9 (RC-15).



Photo 229 — Replicate 10 label (RC-15).



Photo 230 — Representative substrate in replicate 10 (RC-15).



Photo 231 — Replicate 11 label (RC-15).



Photo 232 — Representative substrate in replicate 11 (RC-15).



Photo 233 — Replicate 12 label (RC-15).

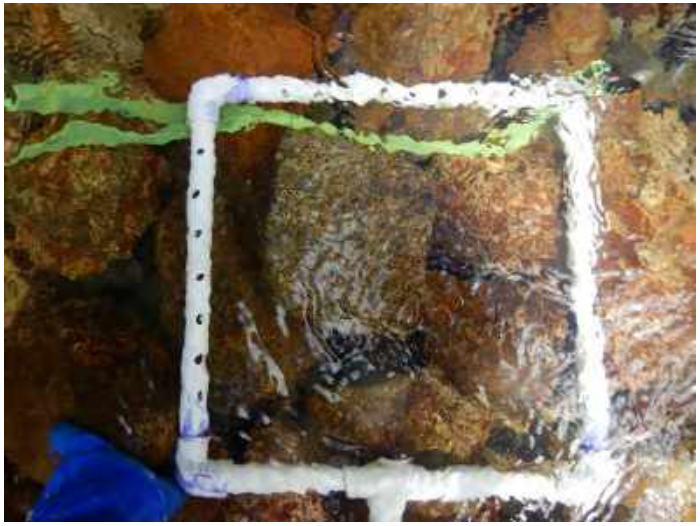


Photo 234 — Representative substrate in replicate 12 (RC-15).



Photo 235 — Replicate 13 label (RC-15).



Photo 236 — Representative substrate in replicate 13 (RC-15).



Photo 237 — Replicate 14 label (RC-15).



Photo 238 — Representative substrate in replicate 14 (RC-15).

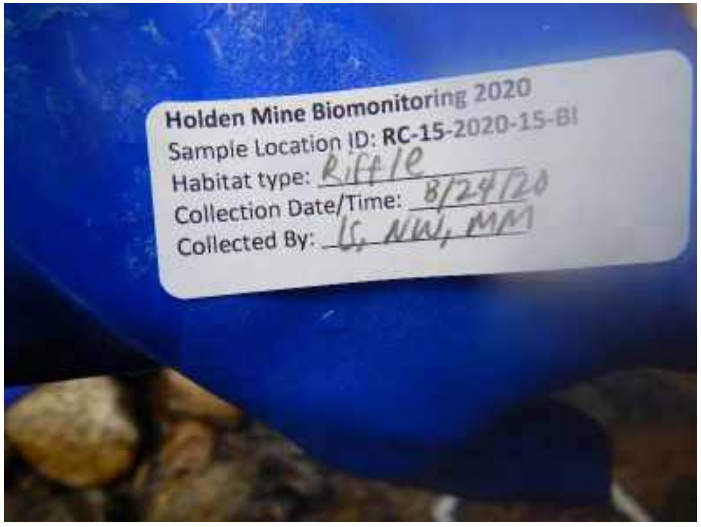


Photo 239 — Replicate 15 label (RC-15).



Photo 240 — Representative substrate in replicate 15 (RC-15).

Representative Fish Photos



Photo 241 — Example cutthroat trout from population study.



Photo 242 — Example rainbow trout from population study.



Photo 243— Example cutthroat/rainbow trout hybrid from population study.

Overview Station Photos



Photo 244 — Upstream view of RC-6.



Photo 245 — Center view for RC-6.



Photo 246— Downstream view of RC-6.

Photo Missing

Photo 247— Upstream view of RC-1.



Photo 248 — Center view of RC-1.



Photo 249 — Downstream view of RC-1.



Photo 250— Upstream view of RC-4.



Photo 251— Center view of RC-4.



Photo 252 — Downstream view of RC-4.



Photo 253 — Upstream view of RC-2.



Photo 254 — Center view of RC-2.



Photo 255— Downstream view of RC-2.



Photo 256 — Upstream view of SG-9.



Photo 257 — Center view of SG-9.

Photo Missing

Photo 258 — Downstream view of SG-9.



Photo 259 — Upstream view of SG-12R.



Photo 260 — Center view of SG-12R.



Photo 261 — Downstream view of SG-12R.



Photo 262 — Upstream view of RC-10.



Photo 263 — Center view of RC-10.



Photo 264 — Downstream view of RC-10.



Photo 265 — Upstream view of RC-15.



Photo 266 — Center view of RC-15.



Photo 267 — Downstream view of RC-15.

Appendix C

Benthic Macroinvertebrate Raw Taxonomic Data

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Taxonomy Long Output for 2020 Benthic Macroinvertebrate Data (ID by Aquatic Biology Associates)
Note: Abundance converted to square meter.

Waterbody	Station	Date	Replicate	Taxon	Stage	Insect	Origin	Higher.classification	Order	Family	Common.name	Abundance
Railroad Creek	15	2015-08-24	1	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	10.76
Railroad Creek	15	2015-08-24	1	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	21.52
Railroad Creek	15	2015-08-24	1	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	21.52
Railroad Creek	15	2015-08-24	1	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	10.76
Railroad Creek	15	2015-08-24	1	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	10.76
Railroad Creek	15	2015-08-24	1	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	21.52
Railroad Creek	15	2015-08-24	1	Eukiefferiella brehmi group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	15	2015-08-24	1	Tvetenia bavarica group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	15	2015-08-24	1	Taeniopterygidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Taeniopterygidae	stoneflies	10.76
Railroad Creek	1	2020-08-20	1	Ecclisomyia	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Limnephilidae	caddisflies	10.76
Railroad Creek	1	2020-08-20	1	Dicranota	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	10.76
Railroad Creek	1	2020-08-20	1	Hexatoma	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	32.28
Railroad Creek	1	2020-08-20	1	Polycelis	U	non-insect	Aquatic	Turbellaria	miscellaneous non-insect	Planariidae	flat worms	21.52
Railroad Creek	1	2020-08-20	1	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	64.56
Railroad Creek	1	2020-08-20	1	Drunella coloradensis/flavilinea	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	21.52
Railroad Creek	1	2020-08-20	1	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	86.08
Railroad Creek	1	2020-08-20	1	Drunella spinifera	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	21.52
Railroad Creek	1	2020-08-20	1	Ephemerella tibialis	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	1	2020-08-20	1	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	107.6
Railroad Creek	1	2020-08-20	1	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	204.44
Railroad Creek	1	2020-08-20	1	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	21.52
Railroad Creek	1	2020-08-20	1	Chaetocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	1	2020-08-20	1	Ceratopogoninae	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Ceratopogonidae	no-see-um midges	21.52
Railroad Creek	1	2020-08-20	1	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	193.68
Railroad Creek	1	2020-08-20	1	Capniidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Capniidae	stoneflies	10.76
Railroad Creek	1	2020-08-20	1	Paraperla	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	32.28
Railroad Creek	1	2020-08-20	1	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	21.52
Railroad Creek	6	2020-08-20	1	Glossosoma	P	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Glossosomatidae	caddisflies	21.52
Railroad Creek	6	2020-08-20	1	Rhyacophila betteni group	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	6	2020-08-20	1	Rhyacophila brunnea/vemna group	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	6	2020-08-20	1	Rhyacophila hyalinata group	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	6	2020-08-20	1	Polycelis	U	non-insect	Aquatic	Turbellaria	miscellaneous non-insect	Planariidae	flat worms	10.76
Railroad Creek	6	2020-08-20	1	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	118.36
Railroad Creek	6	2020-08-20	1	Drunella coloradensis/flavilinea	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	6	2020-08-20	1	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	129.12
Railroad Creek	6	2020-08-20	1	Ephemerella alleni	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	6	2020-08-20	1	Ephemerella tibialis	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	6	2020-08-20	1	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	64.56
Railroad Creek	6	2020-08-20	1	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	538
Railroad Creek	6	2020-08-20	1	Epeorus longimanus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	10.76
Railroad Creek	6	2020-08-20	1	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	301.28
Railroad Creek	6	2020-08-20	1	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	32.28
Railroad Creek	6	2020-08-20	1	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	32.28
Railroad Creek	6	2020-08-20	1	Menetus	U	non-insect	Aquatic	Mollusca: Gastropoda	x	Planorbidae	snails	10.76
Railroad Creek	6	2020-08-20	1	Suwallini	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	32.28
Railroad Creek	6	2020-08-20	1	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	32.28
Railroad Creek	6	2020-08-20	1	Zapada columbiana	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	6	2020-08-20	1	Pteronarcys princeps	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Pteronarcyidae	stoneflies	21.52
Railroad Creek	2	2020-08-21	1	Arctopsychinae	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydropsychidae	caddisflies	10.76
Railroad Creek	2	2020-08-21	1	Hexatoma	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	21.52
Railroad Creek	2	2020-08-21	1	Clinocera	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Empididae	dance flies	10.76
Railroad Creek	2	2020-08-21	1	Polycelis	U	non-insect	Aquatic	Turbellaria	miscellaneous non-insect	Planariidae	flat worms	10.76
Railroad Creek	2	2020-08-21	1	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	193.68
Railroad Creek	2	2020-08-21	1	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	43.04
Railroad Creek	2	2020-08-21	1	Drunella spinifera	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	2	2020-08-21	1	Ephemerella alleni	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	21.52
Railroad Creek	2	2020-08-21	1	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	43.04
Railroad Creek	2	2020-08-21	1	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	322.8
Railroad Creek	2	2020-08-21	1	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	150.64
Railroad Creek	2	2020-08-21	1	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	53.8
Railroad Creek	2	2020-08-21	1	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	21.52
Railroad Creek	2	2020-08-21	1	Diamesa	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Diamesinae	midges	10.76
Railroad Creek	2	2020-08-21	1	Pagastia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Diamesinae	midges	10.76
Railroad Creek	2	2020-08-21	1	Brillia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	2	2020-08-21	1	Corynoneura	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	2	2020-08-21	1	Eukiefferiella brehmi group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	2	2020-08-21	1	Eukiefferiella claripennis group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	2	2020-08-21	1	Orthocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	32.28
Railroad Creek	2	2020-08-21	1	Thienemanniella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	96.84
Railroad Creek	2	2020-08-21	1	Tvetenia bavarica group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	86.08
Railroad Creek	2	2020-08-21	1	Lebertia	U	non-insect	Aquatic	Arachnida: Acari	x	x	mites	21.52
Railroad Creek	2	2020-08-21	1	Ceratopogoninae	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Ceratopogonidae	no-see-um midges	21.52
Railroad Creek	2	2020-08-21	1	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	1678.56
Railroad Creek	2	2020-08-21	1	Capniidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Capniidae	stoneflies	43.04
Railroad Creek	2	2020-08-21	1	Chloroperlidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	10.76
Railroad Creek	2	2020-08-21	1	Suwallini	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	32.28
Railroad Creek	2	2020-08-21	1	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	53.8
Railroad Creek	2	2020-08-21	1	Zapada cinctipes	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	64.56
Railroad Creek	2	2020-08-21	1	Zapada columbiana	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	21.52
Railroad Creek	2	2020-08-21	1	Taeniopterygidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Taeniopterygidae	stoneflies	10.76
Railroad Creek	4	2020-08-21	1	Arctopsychinae	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydropsychidae	caddisflies	10.76
Railroad Creek	4	2020-08-21	1	Parapsyche elsis	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydropsychidae	caddisflies	10.76
Railroad Creek	4	2020-08-21	1	Polycentropus	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Polycentopodidae	caddisflies	10.76
Railroad Creek	4	2020-08-21	1	Rhyacophila brunnea/vemna group	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	4	2020-08-21	1	Dicranota	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	10.76
Railroad Creek	4	2020-08-21	1	Hexatoma	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	10.76
Railroad Creek	4	2020-08-21	1	Chelifera/Metachela	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Empididae	dance flies	21.52
Railroad Creek	4	2020-08-21	1	Chelifera/Metachela	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Empididae	dance flies	10.76
Railroad Creek	4	2020-08-21	1	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	86.08
Railroad Creek	4	2020-08-21	1	Drunella coloradensis/flavilinea	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	4	2020-08-21	1	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	64.56
Railroad Creek	4	2020-08-21	1	Drunella spinifera	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	75.32
Railroad Creek	4	2020-08-21	1	Ephemerella alleni	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	4	2020-08-21	1	Ephemerella tibialis	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	21.52
Railroad Creek	4	2020-08-21	1	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	96.84
Railroad Creek	4	2020-08-21	1	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	333.56
Railroad Creek	4	2020-08-21	1	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	10.76
Railroad Creek	4	2020-08-21	1	Neoleptophlebia/Paraleptophlebia	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Leptophlebiidae	mayflies	10.76
Railroad Creek	4	2020-08-21	1	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	32.28
Railroad Creek	4	2020-08-21	1	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	86.08
Railroad Creek	4	2020-08-21	1	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	21.52
Railroad Creek	4	2020-08-21	1	Brillia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	43.04
Railroad Creek	4	2020-08-21	1	Thienemanniella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	4	2020-08-21	1	Tvetenia bavarica group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	86.08
Railroad Creek	4	2020-08-21	1	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	538
Railroad Creek	4	2020-08-21	1	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	21.52
Railroad Creek	4	2020-08-21	1	Visoka cataractae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	4	2020-08-21	1	Zapada cinctipes	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	10	2020-08-22	1	Simulium	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Simuliidae	black flies	10.76
Railroad Creek	10	2020-08-22	1	Apatania	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Apataniidae	caddisflies	21.52
Railroad Creek	10	2020-08-22	1	Rhyacophila brunnea/vemna group	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	10	2020-08-22	1	Hexatoma	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	10.76
Railroad Creek	10	2020-08-22	1	Clinocera	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Empididae	dance flies	10.76
Railroad Creek	10	2020-08-22	1	Oreogeton	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Empididae	dance flies	10.76
Railroad Creek	10	2020-08-22	1	Ameletus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ameletidae	mayflies	21.52

Waterbody	Station	Date	Replicate	Taxon	Stage	Insect	Origin	Higher.classification	Order	Family	Common.name	Abundance
Railroad Creek	10	2020-08-22	1	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	43.04
Railroad Creek	10	2020-08-22	1	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	10	2020-08-22	1	Drunella spinifera	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	32.28
Railroad Creek	10	2020-08-22	1	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	53.8
Railroad Creek	10	2020-08-22	1	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	150.64
Railroad Creek	10	2020-08-22	1	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	21.52
Railroad Creek	10	2020-08-22	1	Neoleptophlebia/Paraleptophlebia	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Leptophlebiidae	mayflies	10.76
Railroad Creek	10	2020-08-22	1	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	43.04
Railroad Creek	10	2020-08-22	1	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	10.76
Railroad Creek	10	2020-08-22	1	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	107.6
Railroad Creek	10	2020-08-22	1	Orthocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	10	2020-08-22	1	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	86.08
Railroad Creek	10	2020-08-22	1	Capniidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Capniidae	stoneflies	21.52
Railroad Creek	10	2020-08-22	1	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	10.76
Railroad Creek	10	2020-08-22	1	Zapada cinctipes	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	21.52
Railroad Creek	10	2020-08-22	1	Doroneuria	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlidae	stoneflies	32.28
Railroad Creek	5	2020-08-23	1	Simulium	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Simuliidae	black flies	21.52
Railroad Creek	5	2020-08-23	1	Parapsyche elsis	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydropsychidae	caddisflies	10.76
Railroad Creek	5	2020-08-23	1	Dicranota	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	10.76
Railroad Creek	5	2020-08-23	1	Chelifera/Metachela	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Empididae	dance flies	10.76
Railroad Creek	5	2020-08-23	1	Ameletus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ameletidae	mayflies	32.28
Railroad Creek	5	2020-08-23	1	Drunella spinifera	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	5	2020-08-23	1	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	10.76
Railroad Creek	5	2020-08-23	1	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	204.44
Railroad Creek	5	2020-08-23	1	Zapada cinctipes	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	21.52
Railroad Creek	5	2020-08-23	1	Zapada frigida	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	12A	2020-08-24	1	Simulium	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Simuliidae	black flies	32.28
Railroad Creek	12A	2020-08-24	1	Arctopsyche	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydropsychidae	caddisflies	10.76
Railroad Creek	12A	2020-08-24	1	Ecclisomyia	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Limnephilidae	caddisflies	10.76
Railroad Creek	12A	2020-08-24	1	Baetis bicaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	75.32
Railroad Creek	12A	2020-08-24	1	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	279.76
Railroad Creek	12A	2020-08-24	1	Drunella coloradensis/flavilinea	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	12A	2020-08-24	1	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	12A	2020-08-24	1	Ephemerella tibialis	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	32.28
Railroad Creek	12A	2020-08-24	1	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	204.44
Railroad Creek	12A	2020-08-24	1	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	139.88
Railroad Creek	12A	2020-08-24	1	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	172.16
Railroad Creek	12A	2020-08-24	1	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	75.32
Railroad Creek	12A	2020-08-24	1	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	236.72
Railroad Creek	12A	2020-08-24	1	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	1215.88
Railroad Creek	12A	2020-08-24	1	Brillia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	12A	2020-08-24	1	Chaetocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	12A	2020-08-24	1	Eukiefferiella brehmi group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	12A	2020-08-24	1	Orthocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	12A	2020-08-24	1	Thienemanniella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	12A	2020-08-24	1	Tvetenia bavarica group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	172.16
Railroad Creek	12A	2020-08-24	1	Ceratopogoninae	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Ceratopogonidae	no-see-um midges	10.76
Railroad Creek	12A	2020-08-24	1	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	408.88
Railroad Creek	12A	2020-08-24	1	Capniidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Capniidae	stoneflies	10.76
Railroad Creek	12A	2020-08-24	1	Suwallini	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	43.04
Railroad Creek	12A	2020-08-24	1	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	43.04
Railroad Creek	12A	2020-08-24	1	Visoka cataractae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	12A	2020-08-24	1	Zapada cinctipes	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	107.6
Railroad Creek	12A	2020-08-24	1	Megarcys	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlodidae	stoneflies	10.76
Railroad Creek	12A	2020-08-24	1	Taeniopterygidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Taeniopterygidae	stoneflies	75.32
Railroad Creek	15	2015-08-24	10	Arctopsychinae	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydropsychidae	caddisflies	21.52
Railroad Creek	15	2015-08-24	10	Chelifera/Metachela	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Empididae	dance flies	10.76
Railroad Creek	15	2015-08-24	10	Ameletus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ameletidae	mayflies	10.76
Railroad Creek	15	2015-08-24	10	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	32.28
Railroad Creek	15	2015-08-24	10	Drunella spinifera	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	15	2015-08-24	10	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	21.52
Railroad Creek	15	2015-08-24	10	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	21.52
Railroad Creek	15	2015-08-24	10	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	10.76
Railroad Creek	15	2015-08-24	10	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	21.52
Railroad Creek	15	2015-08-24	10	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	32.28
Railroad Creek	15	2015-08-24	10	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	150.64
Railroad Creek	15	2015-08-24	10	Corynoneura	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	15	2015-08-24	10	Eukiefferiella brehmi group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	15	2015-08-24	10	Eukiefferiella pseudomontana group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	15	2015-08-24	10	Orthocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	15	2015-08-24	10	Rheocricotopus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	15	2015-08-24	10	Tvetenia bavarica group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	32.28
Railroad Creek	15	2015-08-24	10	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	43.04
Railroad Creek	15	2015-08-24	10	Zapada cinctipes	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	43.04
Railroad Creek	15	2015-08-24	10	Doroneuria	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlidae	stoneflies	10.76
Railroad Creek	1	2020-08-20	10	Ecclisomyia	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Limnephilidae	caddisflies	10.76
Railroad Creek	1	2020-08-20	10	Rhyacophila betteni group	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	53.8
Railroad Creek	1	2020-08-20	10	Rhyacophila narvae	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	1	2020-08-20	10	Dicranota	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	21.52
Railroad Creek	1	2020-08-20	10	Hesperoconopa	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	10.76
Railroad Creek	1	2020-08-20	10	Clinocera	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Empididae	dance flies	21.52
Railroad Creek	1	2020-08-20	10	Polycelis	U	non-insect	Aquatic	Turbellaria	miscellaneous non-insect	Planariidae	flat worms	32.28
Railroad Creek	1	2020-08-20	10	Ameletus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ameletidae	mayflies	10.76
Railroad Creek	1	2020-08-20	10	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	129.12
Railroad Creek	1	2020-08-20	10	Drunella coloradensis/flavilinea	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	21.52
Railroad Creek	1	2020-08-20	10	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	86.08
Railroad Creek	1	2020-08-20	10	Ephemerella alleni	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	1	2020-08-20	10	Ephemerella tibialis	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	1	2020-08-20	10	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	107.6
Railroad Creek	1	2020-08-20	10	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	204.44
Railroad Creek	1	2020-08-20	10	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	161.4
Railroad Creek	1	2020-08-20	10	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	75.32
Railroad Creek	1	2020-08-20	10	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	21.52
Railroad Creek	1	2020-08-20	10	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	10.76
Railroad Creek	1	2020-08-20	10	Brillia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	1	2020-08-20	10	Chaetocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	75.32
Railroad Creek	1	2020-08-20	10	Thienemanniella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	1	2020-08-20	10	Ostracoda	U	non-insect	Aquatic	Crustacea: Ostracoda	x	x	seed shrimp	32.28
Railroad Creek	1	2020-08-20	10	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	1603.24
Railroad Creek	1	2020-08-20	10	Capniidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Capniidae	stoneflies	64.56
Railroad Creek	1	2020-08-20	10	Chloroperlidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	10.76
Railroad Creek	1	2020-08-20	10	Suwallini	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	10.76
Railroad Creek	1	2020-08-20	10	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	64.56
Railroad Creek	1	2020-08-20	10	Visoka cataractae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	1	2020-08-20	10	Zapada columbiana	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	1	2020-08-20	10	Calineuria californica	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlidae	stoneflies	10.76
Railroad Creek	1	2020-08-20	10	Doroneuria	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlidae	stoneflies	10.76
Railroad Creek	1	2020-08-20	10	Taeniopterygidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Taeniopterygidae	stoneflies	53.8
Railroad Creek	6	2020-08-20	10	Glossosoma	P	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Glossosomatidae	caddisflies	10.76
Railroad Creek	6	2020-08-20	10	Rhyacophila betteni group	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	21.52
Railroad Creek	6	2020-08-20	10	Dicranota	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	21.52
Railroad Creek	6	2020-08-20	10	Hesperoconopa	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	10.76
Railroad Creek	6	2020-08-20	10	Baetis bicaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	21.52
Railroad Creek	6	2020-08-20	10	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	129.12
Railroad Creek	6	2020-08-20	10	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	86.08

Taxonomy Long Output for 2020 Benthic Macroinvertebrate Data (ID by Aquatic Biology Associates)
Note: Abundance converted to square meter.

Waterbody	Station	Date	Replicate	Taxon	Stage	Insect	Origin	Higher.classification	Order	Family	Common.name	Abundance
Railroad Creek	6	2020-08-20	10	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	355.08
Railroad Creek	6	2020-08-20	10	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	182.92
Railroad Creek	6	2020-08-20	10	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	10.76
Railroad Creek	6	2020-08-20	10	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	10.76
Railroad Creek	6	2020-08-20	10	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	462.68
Railroad Creek	6	2020-08-20	10	Suwallini	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	10.76
Railroad Creek	6	2020-08-20	10	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	10.76
Railroad Creek	2	2020-08-21	10	Agraylea	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydroptilidae	caddisflies	10.76
Railroad Creek	2	2020-08-21	10	Hexatoma	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	32.28
Railroad Creek	2	2020-08-21	10	Ameletus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ameletidae	mayflies	10.76
Railroad Creek	2	2020-08-21	10	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	53.8
Railroad Creek	2	2020-08-21	10	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	2	2020-08-21	10	Drunella spinifera	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	32.28
Railroad Creek	2	2020-08-21	10	Ephemerella tibialis	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	2	2020-08-21	10	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	43.04
Railroad Creek	2	2020-08-21	10	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	32.28
Railroad Creek	2	2020-08-21	10	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	10.76
Railroad Creek	2	2020-08-21	10	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	129.12
Railroad Creek	2	2020-08-21	10	Parorthocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	2	2020-08-21	10	Tvetenia bavarica group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	2	2020-08-21	10	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	258.24
Railroad Creek	2	2020-08-21	10	Chloroperlidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	10.76
Railroad Creek	2	2020-08-21	10	Moselia	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Leuctridae	stoneflies	10.76
Railroad Creek	2	2020-08-21	10	Zapada cinctipes	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	21.52
Railroad Creek	4	2020-08-21	10	Agraylea	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydroptilidae	caddisflies	21.52
Railroad Creek	4	2020-08-21	10	Drunella spinifera	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	21.52
Railroad Creek	4	2020-08-21	10	Ephemerella alleni	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	32.28
Railroad Creek	4	2020-08-21	10	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	32.28
Railroad Creek	4	2020-08-21	10	Cricotopus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	4	2020-08-21	10	Hydrobaenus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	4	2020-08-21	10	Sperchon	U	non-insect	Aquatic	Arachnida: Acari	x	x	mites	10.76
Railroad Creek	4	2020-08-21	10	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	10.76
Railroad Creek	4	2020-08-21	10	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	10.76
Railroad Creek	4	2020-08-21	10	Zapada columbiana	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	10	2020-08-22	10	Simulium	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Simuliidae	black flies	64.56
Railroad Creek	10	2020-08-22	10	Arctopsyche	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydropsychidae	caddisflies	10.76
Railroad Creek	10	2020-08-22	10	Parapsyche elsis	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydropsychidae	caddisflies	10.76
Railroad Creek	10	2020-08-22	10	Rhyacophila coloradensis group	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	21.52
Railroad Creek	10	2020-08-22	10	Clinocera	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Empididae	dance flies	10.76
Railroad Creek	10	2020-08-22	10	Empididae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Empididae	dance flies	10.76
Railroad Creek	10	2020-08-22	10	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	247.48
Railroad Creek	10	2020-08-22	10	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	43.04
Railroad Creek	10	2020-08-22	10	Drunella spinifera	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	21.52
Railroad Creek	10	2020-08-22	10	Ephemerella alleni	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	10	2020-08-22	10	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	290.52
Railroad Creek	10	2020-08-22	10	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	139.88
Railroad Creek	10	2020-08-22	10	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	21.52
Railroad Creek	10	2020-08-22	10	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	43.04
Railroad Creek	10	2020-08-22	10	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	32.28
Railroad Creek	10	2020-08-22	10	Parorthocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	10	2020-08-22	10	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	473.44
Railroad Creek	10	2020-08-22	10	Zapada cinctipes	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	86.08
Railroad Creek	10	2020-08-22	10	Zapada columbiana	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	21.52
Railroad Creek	10	2020-08-22	10	Doroneuria	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlidae	stoneflies	10.76
Railroad Creek	10	2020-08-22	10	Megarcys	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlodidae	stoneflies	10.76
Railroad Creek	5	2020-08-23	10	Hexatoma	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	10.76
Railroad Creek	5	2020-08-23	10	Ameletus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ameletidae	mayflies	182.92
Railroad Creek	5	2020-08-23	10	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	43.04
Railroad Creek	5	2020-08-23	10	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	5	2020-08-23	10	Ephemerella alleni	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	5	2020-08-23	10	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	32.28
Railroad Creek	5	2020-08-23	10	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	10.76
Railroad Creek	5	2020-08-23	10	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	10.76
Railroad Creek	5	2020-08-23	10	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	172.16
Railroad Creek	5	2020-08-23	10	Brillia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	5	2020-08-23	10	Chaetocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	5	2020-08-23	10	Nanocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	5	2020-08-23	10	Rheocricotopus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	5	2020-08-23	10	Thienemanniella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	5	2020-08-23	10	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	43.04
Railroad Creek	5	2020-08-23	10	Capniidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Capniidae	stoneflies	10.76
Railroad Creek	5	2020-08-23	10	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	43.04
Railroad Creek	5	2020-08-23	10	Zapada cinctipes	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	21.52
Railroad Creek	12A	2020-08-24	10	Arctopsychinae	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydropsychidae	caddisflies	10.76
Railroad Creek	12A	2020-08-24	10	Rhyacophila narvae	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	12A	2020-08-24	10	Clinocera	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Empididae	dance flies	10.76
Railroad Creek	12A	2020-08-24	10	Oreogeton	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Empididae	dance flies	10.76
Railroad Creek	12A	2020-08-24	10	Ameletus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ameletidae	mayflies	10.76
Railroad Creek	12A	2020-08-24	10	Baetis bicaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	32.28
Railroad Creek	12A	2020-08-24	10	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	182.92
Railroad Creek	12A	2020-08-24	10	Drunella coloradensis/flavilinea	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	12A	2020-08-24	10	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	32.28
Railroad Creek	12A	2020-08-24	10	Ephemerella alleni	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	12A	2020-08-24	10	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	225.96
Railroad Creek	12A	2020-08-24	10	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	150.64
Railroad Creek	12A	2020-08-24	10	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	161.4
Railroad Creek	12A	2020-08-24	10	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	21.52
Railroad Creek	12A	2020-08-24	10	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	75.32
Railroad Creek	12A	2020-08-24	10	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	64.56
Railroad Creek	12A	2020-08-24	10	Chaetocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	12A	2020-08-24	10	Corynoneura	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	12A	2020-08-24	10	Eukiefferiella claripennis group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	12A	2020-08-24	10	Parametriocnemus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	12A	2020-08-24	10	Rheocricotopus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	12A	2020-08-24	10	Thienemanniella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	12A	2020-08-24	10	Tvetenia bavarica group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	43.04
Railroad Creek	12A	2020-08-24	10	Ceratopogoninae	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Ceratopogonidae	no-see-um midges	10.76
Railroad Creek	12A	2020-08-24	10	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	387.36
Railroad Creek	12A	2020-08-24	10	Capniidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Capniidae	stoneflies	10.76
Railroad Creek	12A	2020-08-24	10	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	21.52
Railroad Creek	12A	2020-08-24	10	Visoka cataractae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	12A	2020-08-24	10	Zapada cinctipes	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	75.32
Railroad Creek	12A	2020-08-24	10	Zapada columbiana	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	12A	2020-08-24	10	Doroneuria	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlidae	stoneflies	10.76
Railroad Creek	12A	2020-08-24	10	Megarcys	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlodidae	stoneflies	10.76
Railroad Creek	12A	2020-08-24	10	Perlodidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlodidae	stoneflies	10.76
Railroad Creek	12A	2020-08-24	10	Taeniopterygidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Taeniopterygidae	stoneflies	10.76
Railroad Creek	15	2015-08-24	11	Simulium	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Simuliidae	black flies	10.76
Railroad Creek	15	2015-08-24	11	Arctopsyche	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydropsychidae	caddisflies	10.76
Railroad Creek	15	2015-08-24	11	Dolophilodes	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Philopotamidae	caddisflies	32.28
Railroad Creek	15	2015-08-24	11	Rhyacophila brunnea/vemna group	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	32.28
Railroad Creek	15	2015-08-24	11	Rhyacophila	P	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	15	2015-08-24	11	Dicranota	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	21.52
Railroad Creek	15	2015-08-24	11	Wiedemannia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Empididae	dance flies	10.76
Railroad Creek	15	2015-08-24	11	Baetis bicaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	10.76

Waterbody	Station	Date	Replicate	Taxon	Stage	Insect	Origin	Higher.classification	Order	Family	Common.name	Abundance
Railroad Creek	15	2015-08-24	11	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	139.88
Railroad Creek	15	2015-08-24	11	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	15	2015-08-24	11	Drunella spinifera	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	15	2015-08-24	11	Ephemerella tibialis	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	15	2015-08-24	11	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	10.76
Railroad Creek	15	2015-08-24	11	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	64.56
Railroad Creek	15	2015-08-24	11	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	21.52
Railroad Creek	15	2015-08-24	11	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	10.76
Railroad Creek	15	2015-08-24	11	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	129.12
Railroad Creek	15	2015-08-24	11	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	129.12
Railroad Creek	15	2015-08-24	11	Pagastia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Diamesinae	midges	10.76
Railroad Creek	15	2015-08-24	11	Corynoneura	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	15	2015-08-24	11	Eukiefferiella brehmi group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	15	2015-08-24	11	Orthocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	15	2015-08-24	11	Rheocricotopus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	15	2015-08-24	11	Thienemanniella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	15	2015-08-24	11	Tvetenia bavarica group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	43.04
Railroad Creek	15	2015-08-24	11	Ostracoda	U	non-insect	Aquatic	Crustacea: Ostracoda	x	x	seed shrimp	10.76
Railroad Creek	15	2015-08-24	11	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	204.44
Railroad Creek	15	2015-08-24	11	Zapada cinctipes	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	118.36
Railroad Creek	15	2015-08-24	11	Zapada columbiana	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	15	2015-08-24	11	Doroneuria	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlidae	stoneflies	21.52
Railroad Creek	15	2015-08-24	11	Skwala	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlodidae	stoneflies	10.76
Railroad Creek	15	2015-08-24	11	Taeniopterygidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Taeniopterygidae	stoneflies	10.76
Railroad Creek	1	2020-08-20	11	Glossosoma	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Glossosomatidae	caddisflies	10.76
Railroad Creek	1	2020-08-20	11	Arctopsychinae	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydropsychidae	caddisflies	10.76
Railroad Creek	1	2020-08-20	11	Rhyacophila betteni group	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	1	2020-08-20	11	Rhyacophila brunnea/vemna group	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	1	2020-08-20	11	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	129.12
Railroad Creek	1	2020-08-20	11	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	32.28
Railroad Creek	1	2020-08-20	11	Drunella spinifera	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	1	2020-08-20	11	Ephemerella alleni	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	21.52
Railroad Creek	1	2020-08-20	11	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	32.28
Railroad Creek	1	2020-08-20	11	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	150.64
Railroad Creek	1	2020-08-20	11	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	258.24
Railroad Creek	1	2020-08-20	11	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	53.8
Railroad Creek	1	2020-08-20	11	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	32.28
Railroad Creek	1	2020-08-20	11	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	21.52
Railroad Creek	1	2020-08-20	11	Chaetocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	1	2020-08-20	11	Rheocricotopus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	1	2020-08-20	11	Thienemanniella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	1	2020-08-20	11	Tvetenia bavarica group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	1	2020-08-20	11	Pisidium	U	non-insect	Aquatic	Mollusca: Bivalvia	x	Sphaeriidae	pea clams	10.76
Railroad Creek	1	2020-08-20	11	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	538
Railroad Creek	1	2020-08-20	11	Ephydridae	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Ephydridae	shore and brine flies	10.76
Railroad Creek	1	2020-08-20	11	Capniidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Capniidae	stoneflies	10.76
Railroad Creek	1	2020-08-20	11	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	75.32
Railroad Creek	1	2020-08-20	11	Zapada cinctipes	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	21.52
Railroad Creek	1	2020-08-20	11	Zapada columbiana	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	32.28
Railroad Creek	1	2020-08-20	11	Calineuria californica	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlidae	stoneflies	10.76
Railroad Creek	1	2020-08-20	11	Taeniopterygidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Taeniopterygidae	stoneflies	21.52
Railroad Creek	6	2020-08-20	11	Rhyacophila brunnea/vemna group	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	6	2020-08-20	11	Dicranota	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	10.76
Railroad Creek	6	2020-08-20	11	Ameletus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ameletidae	mayflies	10.76
Railroad Creek	6	2020-08-20	11	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	21.52
Railroad Creek	6	2020-08-20	11	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	43.04
Railroad Creek	6	2020-08-20	11	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	64.56
Railroad Creek	6	2020-08-20	11	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	75.32
Railroad Creek	6	2020-08-20	11	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	21.52
Railroad Creek	6	2020-08-20	11	Neoleptophlebia/Paraleptophlebia	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Leptophlebiidae	mayflies	10.76
Railroad Creek	6	2020-08-20	11	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	10.76
Railroad Creek	6	2020-08-20	11	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	32.28
Railroad Creek	6	2020-08-20	11	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	118.36
Railroad Creek	6	2020-08-20	11	Brillia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	6	2020-08-20	11	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	139.88
Railroad Creek	6	2020-08-20	11	Capniidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Capniidae	stoneflies	10.76
Railroad Creek	6	2020-08-20	11	Chloroperlidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	10.76
Railroad Creek	6	2020-08-20	11	Suwallini	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	10.76
Railroad Creek	6	2020-08-20	11	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	53.8
Railroad Creek	6	2020-08-20	11	Moselia	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Leuctridae	stoneflies	10.76
Railroad Creek	2	2020-08-21	11	Dolophilodes	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Philopotamidae	caddisflies	10.76
Railroad Creek	2	2020-08-21	11	Rhyacophila betteni group	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	2	2020-08-21	11	Hexatoma	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	21.52
Railroad Creek	2	2020-08-21	11	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	118.36
Railroad Creek	2	2020-08-21	11	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	21.52
Railroad Creek	2	2020-08-21	11	Drunella spinifera	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	21.52
Railroad Creek	2	2020-08-21	11	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	96.84
Railroad Creek	2	2020-08-21	11	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	139.88
Railroad Creek	2	2020-08-21	11	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	32.28
Railroad Creek	2	2020-08-21	11	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	32.28
Railroad Creek	2	2020-08-21	11	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	43.04
Railroad Creek	2	2020-08-21	11	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	107.6
Railroad Creek	2	2020-08-21	11	Pagastia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Diamesinae	midges	10.76
Railroad Creek	2	2020-08-21	11	Brillia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	43.04
Railroad Creek	2	2020-08-21	11	Corynoneura	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	2	2020-08-21	11	Eukiefferiella claripennis group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	2	2020-08-21	11	Orthocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	2	2020-08-21	11	Thienemanniella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	2	2020-08-21	11	Tvetenia bavarica group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	32.28
Railroad Creek	2	2020-08-21	11	Ceratopogoninae	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Ceratopogonidae	no-see-um midges	10.76
Railroad Creek	2	2020-08-21	11	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	344.32
Railroad Creek	2	2020-08-21	11	Capniidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Capniidae	stoneflies	32.28
Railroad Creek	2	2020-08-21	11	Visoka cataractae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	2	2020-08-21	11	Zapada cinctipes	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	64.56
Railroad Creek	2	2020-08-21	11	Zapada columbiana	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	4	2020-08-21	11	Apatania	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Apataniidae	caddisflies	10.76
Railroad Creek	4	2020-08-21	11	Pedomoecus sierra	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Apataniidae	caddisflies	10.76
Railroad Creek	4	2020-08-21	11	Glossosoma	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Glossosomatidae	caddisflies	21.52
Railroad Creek	4	2020-08-21	11	Parapsyche elsis	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydropsychidae	caddisflies	21.52
Railroad Creek	4	2020-08-21	11	Cryptochia	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Limnephilidae	caddisflies	10.76
Railroad Creek	4	2020-08-21	11	Ecclisomyia	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Limnephilidae	caddisflies	21.52
Railroad Creek	4	2020-08-21	11	Rhyacophila betteni group	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	4	2020-08-21	11	Dicranota	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	10.76
Railroad Creek	4	2020-08-21	11	Hexatoma	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	32.28
Railroad Creek	4	2020-08-21	11	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	118.36
Railroad Creek	4	2020-08-21	11	Drunella coloradensis/flavilinea	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	21.52
Railroad Creek	4	2020-08-21	11	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	32.28
Railroad Creek	4	2020-08-21	11	Drunella spinifera	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	21.52
Railroad Creek	4	2020-08-21	11	Ephemerella tibialis	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	21.52
Railroad Creek	4	2020-08-21	11	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	129.12
Railroad Creek	4	2020-08-21	11	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	441.16
Railroad Creek	4	2020-08-21	11	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	64.56
Railroad Creek	4	2020-08-21	11	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	21.52
Railroad Creek	4	2020-08-21	11	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	96.84
Railroad Creek	4	2020-08-21	11	Brillia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76

Waterbody	Station	Date	Replicate	Taxon	Stage	Insect	Origin	Higher.classification	Order	Family	Common.name	Abundance
Railroad Creek	4	2020-08-21	11	Tvetenia bavarica group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	4	2020-08-21	11	Ceratopogoninae	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Ceratopogonidae	no-see-um midges	10.76
Railroad Creek	4	2020-08-21	11	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	236.72
Railroad Creek	4	2020-08-21	11	Suwallini	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	10.76
Railroad Creek	4	2020-08-21	11	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	10.76
Railroad Creek	4	2020-08-21	11	Visoka cataractae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	4	2020-08-21	11	Zapada columbiana	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	32.28
Railroad Creek	10	2020-08-22	11	Arctopsychinae	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydropsychidae	caddisflies	10.76
Railroad Creek	10	2020-08-22	11	Eloeophila	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	10.76
Railroad Creek	10	2020-08-22	11	Chelifera/Metachela	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Empididae	dance flies	10.76
Railroad Creek	10	2020-08-22	11	Clinocera	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Empididae	dance flies	10.76
Railroad Creek	10	2020-08-22	11	Ameletus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ameletidae	mayflies	32.28
Railroad Creek	10	2020-08-22	11	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	107.6
Railroad Creek	10	2020-08-22	11	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	64.56
Railroad Creek	10	2020-08-22	11	Drunella spinifera	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	10	2020-08-22	11	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	75.32
Railroad Creek	10	2020-08-22	11	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	376.6
Railroad Creek	10	2020-08-22	11	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	129.12
Railroad Creek	10	2020-08-22	11	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	21.52
Railroad Creek	10	2020-08-22	11	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	53.8
Railroad Creek	10	2020-08-22	11	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	21.52
Railroad Creek	10	2020-08-22	11	Pagastia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Diamesinae	midges	10.76
Railroad Creek	10	2020-08-22	11	Krenosmittia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	10	2020-08-22	11	Orthocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	10	2020-08-22	11	Parametriocnemus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	10	2020-08-22	11	Tvetenia bavarica group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	10	2020-08-22	11	Ceratopogoninae	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Ceratopogonidae	no-see-um midges	10.76
Railroad Creek	10	2020-08-22	11	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	720.92
Railroad Creek	10	2020-08-22	11	Capniidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Capniidae	stoneflies	10.76
Railroad Creek	10	2020-08-22	11	Suwallini	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	10.76
Railroad Creek	10	2020-08-22	11	Visoka cataractae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	10	2020-08-22	11	Zapada cinctipes	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	10	2020-08-22	11	Doroneuria	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlidae	stoneflies	10.76
Railroad Creek	10	2020-08-22	11	Taeniopterygidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Taeniopterygidae	stoneflies	10.76
Railroad Creek	5	2020-08-23	11	Simulium	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Simuliidae	black flies	10.76
Railroad Creek	5	2020-08-23	11	Arctopsyche	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydropsychidae	caddisflies	10.76
Railroad Creek	5	2020-08-23	11	Arctopsychinae	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydropsychidae	caddisflies	10.76
Railroad Creek	5	2020-08-23	11	Ecclisomyia	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Limnephilidae	caddisflies	10.76
Railroad Creek	5	2020-08-23	11	Ameletus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ameletidae	mayflies	32.28
Railroad Creek	5	2020-08-23	11	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	204.44
Railroad Creek	5	2020-08-23	11	Drunella coloradensis/flavilinea	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	5	2020-08-23	11	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	64.56
Railroad Creek	5	2020-08-23	11	Ephemerella tibialis	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	5	2020-08-23	11	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	86.08
Railroad Creek	5	2020-08-23	11	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	172.16
Railroad Creek	5	2020-08-23	11	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	53.8
Railroad Creek	5	2020-08-23	11	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	32.28
Railroad Creek	5	2020-08-23	11	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	10.76
Railroad Creek	5	2020-08-23	11	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	247.48
Railroad Creek	5	2020-08-23	11	Pagastia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Diamesinae	midges	10.76
Railroad Creek	5	2020-08-23	11	Brillia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	5	2020-08-23	11	Eukiefferiella claripennis group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	5	2020-08-23	11	Orthocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	5	2020-08-23	11	Rheocricotopus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	5	2020-08-23	11	Tvetenia bavarica group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	118.36
Railroad Creek	5	2020-08-23	11	Optioservus	A	insect	Aquatic	Arthropoda: Insecta	Coleoptera	Elmidae	riffle beetles	10.76
Railroad Creek	5	2020-08-23	11	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	10.76
Railroad Creek	5	2020-08-23	11	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	32.28
Railroad Creek	5	2020-08-23	11	Zapada cinctipes	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	21.52
Railroad Creek	5	2020-08-23	11	Taeniopterygidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Taeniopterygidae	stoneflies	10.76
Railroad Creek	12A	2020-08-24	11	Simulium	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Simuliidae	black flies	32.28
Railroad Creek	12A	2020-08-24	11	Arctopsyche	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydropsychidae	caddisflies	32.28
Railroad Creek	12A	2020-08-24	11	Hexatoma	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	21.52
Railroad Creek	12A	2020-08-24	11	Chelifera/Metachela	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Empididae	dance flies	10.76
Railroad Creek	12A	2020-08-24	11	Baetis bicaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	53.8
Railroad Creek	12A	2020-08-24	11	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	86.08
Railroad Creek	12A	2020-08-24	11	Drunella coloradensis/flavilinea	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	12A	2020-08-24	11	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	21.52
Railroad Creek	12A	2020-08-24	11	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	150.64
Railroad Creek	12A	2020-08-24	11	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	161.4
Railroad Creek	12A	2020-08-24	11	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	10.76
Railroad Creek	12A	2020-08-24	11	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	10.76
Railroad Creek	12A	2020-08-24	11	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	43.04
Railroad Creek	12A	2020-08-24	11	Brillia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	12A	2020-08-24	11	Eukiefferiella claripennis group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	12A	2020-08-24	11	Tvetenia bavarica group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	32.28
Railroad Creek	12A	2020-08-24	11	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	150.64
Railroad Creek	12A	2020-08-24	11	Zapada cinctipes	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	21.52
Railroad Creek	12A	2020-08-24	11	Taeniopterygidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Taeniopterygidae	stoneflies	21.52
Railroad Creek	15	2015-08-24	12	Apatania	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Apataniidae	caddisflies	10.76
Railroad Creek	15	2015-08-24	12	Rhabdomastix (Rhabdomastix)	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	10.76
Railroad Creek	15	2015-08-24	12	Dixa	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Dixidae	dixid midges	10.76
Railroad Creek	15	2015-08-24	12	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	21.52
Railroad Creek	15	2015-08-24	12	Drunella spinifera	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	15	2015-08-24	12	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	43.04
Railroad Creek	15	2015-08-24	12	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	43.04
Railroad Creek	15	2015-08-24	12	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	43.04
Railroad Creek	15	2015-08-24	12	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	43.04
Railroad Creek	15	2015-08-24	12	Corynoneura	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	15	2015-08-24	12	Orthocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	15	2015-08-24	12	Parorthocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	15	2015-08-24	12	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	118.36
Railroad Creek	15	2015-08-24	12	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	10.76
Railroad Creek	15	2015-08-24	12	Zapada cinctipes	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	1	2020-08-20	12	Glossosoma	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Glossosomatidae	caddisflies	32.28
Railroad Creek	1	2020-08-20	12	Arctopsychinae	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydropsychidae	caddisflies	10.76
Railroad Creek	1	2020-08-20	12	Rhyacophila betteni group	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	21.52
Railroad Creek	1	2020-08-20	12	Rhyacophila betteni group	P	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	1	2020-08-20	12	Hexatoma	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	10.76
Railroad Creek	1	2020-08-20	12	Polycelis	U	non-insect	Aquatic	Turbellaria	miscellaneous non-insect	Planariidae	flat worms	43.04
Railroad Creek	1	2020-08-20	12	Baetis bicaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	10.76
Railroad Creek	1	2020-08-20	12	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	193.68
Railroad Creek	1	2020-08-20	12	Caudatella hystrix	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	1	2020-08-20	12	Drunella coloradensis/flavilinea	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	1	2020-08-20	12	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	150.64
Railroad Creek	1	2020-08-20	12	Drunella spinifera	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	1	2020-08-20	12	Ephemerella alleni	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	1	2020-08-20	12	Ephemerella tibialis	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	1	2020-08-20	12	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	43.04
Railroad Creek	1	2020-08-20	12	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	494.96
Railroad Creek	1	2020-08-20	12	Epeorus longimanus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	10.76
Railroad Creek	1	2020-08-20	12	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	204.44
Railroad Creek	1	2020-08-20	12	Neoleptophlebia/Paraleptophlebia	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Leptophlebiidae	mayflies	10.76
Railroad Creek	1	2020-08-20	12	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	10.76
Railroad Creek	1	2020-08-20	12	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	75.32

Waterbody	Station	Date	Replicate	Taxon	Stage	Insect	Origin	Higher.classification	Order	Family	Common.name	Abundance
Railroad Creek	1	2020-08-20	12	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	75.32
Railroad Creek	1	2020-08-20	12	Pagastia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Diamesinae	midges	10.76
Railroad Creek	1	2020-08-20	12	Chaetocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	1	2020-08-20	12	Eukiefferiella brehmi group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	1	2020-08-20	12	Eukiefferiella claripennis group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	32.28
Railroad Creek	1	2020-08-20	12	Rheocricotopus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	1	2020-08-20	12	Tvetenia bavarica group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	32.28
Railroad Creek	1	2020-08-20	12	Trombidiformes	U	non-insect	Aquatic	Arachnida: Acari	Trombidiformes	x	mites	10.76
Railroad Creek	1	2020-08-20	12	Ceratopogoninae	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Ceratopogonidae	no-see-um midges	10.76
Railroad Creek	1	2020-08-20	12	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	1517.16
Railroad Creek	1	2020-08-20	12	Capniidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Capniidae	stoneflies	10.76
Railroad Creek	1	2020-08-20	12	Paraperla	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	10.76
Railroad Creek	1	2020-08-20	12	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	32.28
Railroad Creek	1	2020-08-20	12	Zapada cinctipes	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	1	2020-08-20	12	Zapada columbiana	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	21.52
Railroad Creek	1	2020-08-20	12	Zapada frigida	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	1	2020-08-20	12	Frisonia picticeps	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlodidae	stoneflies	10.76
Railroad Creek	1	2020-08-20	12	Megarcys	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlodidae	stoneflies	10.76
Railroad Creek	1	2020-08-20	12	Taeniopterygidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Taeniopterygidae	stoneflies	32.28
Railroad Creek	6	2020-08-20	12	Apatania	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Apataniidae	caddisflies	10.76
Railroad Creek	6	2020-08-20	12	Ecclisomyia	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Limnephilidae	caddisflies	10.76
Railroad Creek	6	2020-08-20	12	Rhyacophila brunnea/vemna group	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	43.04
Railroad Creek	6	2020-08-20	12	Polycelis	U	non-insect	Aquatic	Turbellaria	miscellaneous non-insect	Planariidae	flat worms	10.76
Railroad Creek	6	2020-08-20	12	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	118.36
Railroad Creek	6	2020-08-20	12	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	118.36
Railroad Creek	6	2020-08-20	12	Drunella spinifera	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	6	2020-08-20	12	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	21.52
Railroad Creek	6	2020-08-20	12	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	86.08
Railroad Creek	6	2020-08-20	12	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	10.76
Railroad Creek	6	2020-08-20	12	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	10.76
Railroad Creek	6	2020-08-20	12	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	21.52
Railroad Creek	6	2020-08-20	12	Brillia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	6	2020-08-20	12	Tvetenia bavarica group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	6	2020-08-20	12	Nemata	U	non-insect	Aquatic	Nemata	miscellaneous non-insect	x	round worms	10.76
Railroad Creek	6	2020-08-20	12	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	10.76
Railroad Creek	6	2020-08-20	12	Suwallini	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	10.76
Railroad Creek	6	2020-08-20	12	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	10.76
Railroad Creek	6	2020-08-20	12	Visoka cataractae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	21.52
Railroad Creek	6	2020-08-20	12	Zapada cinctipes	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	6	2020-08-20	12	Calineuria californica	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlidae	stoneflies	10.76
Railroad Creek	6	2020-08-20	12	Doroneuria	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlidae	stoneflies	10.76
Railroad Creek	2	2020-08-21	12	Simulium	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Simuliidae	black flies	21.52
Railroad Creek	2	2020-08-21	12	Apatania	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Apataniidae	caddisflies	10.76
Railroad Creek	2	2020-08-21	12	Arctopsyche	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydropsychidae	caddisflies	32.28
Railroad Creek	2	2020-08-21	12	Arctopsychinae	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydropsychidae	caddisflies	96.84
Railroad Creek	2	2020-08-21	12	Parapsyche elsis	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydropsychidae	caddisflies	32.28
Railroad Creek	2	2020-08-21	12	Rhyacophila brunnea/vemna group	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	21.52
Railroad Creek	2	2020-08-21	12	Chelifera/Metachela	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Empididae	dance flies	10.76
Railroad Creek	2	2020-08-21	12	Ameletus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ameletidae	mayflies	21.52
Railroad Creek	2	2020-08-21	12	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	215.2
Railroad Creek	2	2020-08-21	12	Drunella coloradensis/flavilinea	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	2	2020-08-21	12	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	64.56
Railroad Creek	2	2020-08-21	12	Drunella spinifera	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	21.52
Railroad Creek	2	2020-08-21	12	Ephemerella tibialis	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	32.28
Railroad Creek	2	2020-08-21	12	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	96.84
Railroad Creek	2	2020-08-21	12	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	193.68
Railroad Creek	2	2020-08-21	12	Epeorus longimanus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	21.52
Railroad Creek	2	2020-08-21	12	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	32.28
Railroad Creek	2	2020-08-21	12	Neoleptophlebia/Paraleptophlebia	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Leptophlebiidae	mayflies	10.76
Railroad Creek	2	2020-08-21	12	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	53.8
Railroad Creek	2	2020-08-21	12	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	107.6
Railroad Creek	2	2020-08-21	12	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	107.6
Railroad Creek	2	2020-08-21	12	Brillia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	43.04
Railroad Creek	2	2020-08-21	12	Chaetocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	2	2020-08-21	12	Eukiefferiella brehmi group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	64.56
Railroad Creek	2	2020-08-21	12	Krenosmittia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	2	2020-08-21	12	Parametriocnemus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	2	2020-08-21	12	Rheocricotopus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	2	2020-08-21	12	Tvetenia bavarica group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	182.92
Railroad Creek	2	2020-08-21	12	Ceratopogoninae	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Ceratopogonidae	no-see-um midges	21.52
Railroad Creek	2	2020-08-21	12	Nemata	U	non-insect	Aquatic	Nemata	miscellaneous non-insect	x	round worms	10.76
Railroad Creek	2	2020-08-21	12	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	1226.64
Railroad Creek	2	2020-08-21	12	Capniidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Capniidae	stoneflies	10.76
Railroad Creek	2	2020-08-21	12	Suwallini	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	10.76
Railroad Creek	2	2020-08-21	12	Leuctridae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Leuctridae	stoneflies	10.76
Railroad Creek	2	2020-08-21	12	Moselia	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Leuctridae	stoneflies	10.76
Railroad Creek	2	2020-08-21	12	Visoka cataractae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	32.28
Railroad Creek	2	2020-08-21	12	Zapada cinctipes	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	118.36
Railroad Creek	2	2020-08-21	12	Zapada columbiana	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	75.32
Railroad Creek	2	2020-08-21	12	Doroneuria	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlidae	stoneflies	10.76
Railroad Creek	2	2020-08-21	12	Megarcys	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlodidae	stoneflies	32.28
Railroad Creek	2	2020-08-21	12	Taeniopterygidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Taeniopterygidae	stoneflies	10.76
Railroad Creek	4	2020-08-21	12	Arctopsychinae	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydropsychidae	caddisflies	10.76
Railroad Creek	4	2020-08-21	12	Rhyacophila betteni group	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	4	2020-08-21	12	Rhyacophila brunnea/vemna group	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	21.52
Railroad Creek	4	2020-08-21	12	Clinocera	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Empididae	dance flies	21.52
Railroad Creek	4	2020-08-21	12	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	107.6
Railroad Creek	4	2020-08-21	12	Caudatella hystrix	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	4	2020-08-21	12	Drunella coloradensis/flavilinea	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	4	2020-08-21	12	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	43.04
Railroad Creek	4	2020-08-21	12	Drunella spinifera	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	4	2020-08-21	12	Ephemerella alleni	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	4	2020-08-21	12	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	64.56
Railroad Creek	4	2020-08-21	12	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	322.8
Railroad Creek	4	2020-08-21	12	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	43.04
Railroad Creek	4	2020-08-21	12	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	32.28
Railroad Creek	4	2020-08-21	12	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	43.04
Railroad Creek	4	2020-08-21	12	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	43.04
Railroad Creek	4	2020-08-21	12	Pagastia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Diamesinae	midges	10.76
Railroad Creek	4	2020-08-21	12	Brillia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	4	2020-08-21	12	Tvetenia bavarica group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	4	2020-08-21	12	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	96.84
Railroad Creek	4	2020-08-21	12	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	43.04
Railroad Creek	4	2020-08-21	12	Zapada cinctipes	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	4	2020-08-21	12	Zapada columbiana	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	4	2020-08-21	12	Taeniopterygidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Taeniopterygidae	stoneflies	10.76
Railroad Creek	10	2020-08-22	12	Prosimulium	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Simuliidae	black flies	10.76
Railroad Creek	10	2020-08-22	12	Pedomoecus sierra	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Apataniidae	caddisflies	10.76
Railroad Creek	10	2020-08-22	12	Ecclisomyia	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Limnephilidae	caddisflies	10.76
Railroad Creek	10	2020-08-22	12	Rhyacophila atrata group	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	21.52
Railroad Creek	10	2020-08-22	12	Rhyacophila brunnea/vemna group	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	10	2020-08-22	12	Rhabdomastix (Rhabdomastix)	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	10.76
Railroad Creek	10	2020-08-22	12	Chelifera/Metachela	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Empididae	dance flies	10.76
Railroad Creek	10	2020-08-22	12	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	86.08
Railroad Creek	10	2020-08-22	12	Drunella coloradensis/flavilinea	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76

Waterbody	Station	Date	Replicate	Taxon	Stage	Insect	Origin	Higher.classification	Order	Family	Common.name	Abundance
Railroad Creek	10	2020-08-22	12	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	21.52
Railroad Creek	10	2020-08-22	12	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	32.28
Railroad Creek	10	2020-08-22	12	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	96.84
Railroad Creek	10	2020-08-22	12	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	107.6
Railroad Creek	10	2020-08-22	12	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	43.04
Railroad Creek	10	2020-08-22	12	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	10.76
Railroad Creek	10	2020-08-22	12	Brillia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	10	2020-08-22	12	Chaetocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	10	2020-08-22	12	Eukiefferiella claripennis group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	10	2020-08-22	12	Krenosmittia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	10	2020-08-22	12	Thienemanniella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	10	2020-08-22	12	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	946.88
Railroad Creek	10	2020-08-22	12	Chloroperlidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	10.76
Railroad Creek	10	2020-08-22	12	Zapada cinctipes	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	21.52
Railroad Creek	10	2020-08-22	12	Taeniopterygidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Taeniopterygidae	stoneflies	32.28
Railroad Creek	5	2020-08-23	12	Ecclisomyia	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Limnephilidae	caddisflies	10.76
Railroad Creek	5	2020-08-23	12	Rhyacophila betteni group	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	5	2020-08-23	12	Dicranota	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	21.52
Railroad Creek	5	2020-08-23	12	Hexatoma	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	64.56
Railroad Creek	5	2020-08-23	12	Rhabdomastix (Rhabdomastix)	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	10.76
Railroad Creek	5	2020-08-23	12	Polycelis	U	non-insect	Aquatic	Turbellaria	miscellaneous non-insect	Planariidae	flat worms	10.76
Railroad Creek	5	2020-08-23	12	Ameletus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ameletidae	mayflies	312.04
Railroad Creek	5	2020-08-23	12	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	21.52
Railroad Creek	5	2020-08-23	12	Drunella coloradensis/flavilinea	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	5	2020-08-23	12	Ephemerella alleni	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	21.52
Railroad Creek	5	2020-08-23	12	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	43.04
Railroad Creek	5	2020-08-23	12	Neoleptophlebia/Paraleptophlebia	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Leptophlebiidae	mayflies	10.76
Railroad Creek	5	2020-08-23	12	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	53.8
Railroad Creek	5	2020-08-23	12	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	150.64
Railroad Creek	5	2020-08-23	12	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	118.36
Railroad Creek	5	2020-08-23	12	Brillia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	5	2020-08-23	12	Chaetocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	53.8
Railroad Creek	5	2020-08-23	12	Corynoneura	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	32.28
Railroad Creek	5	2020-08-23	12	Cricotopus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	5	2020-08-23	12	Paramerina	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Tanypodinae	midges	10.76
Railroad Creek	5	2020-08-23	12	Ceratopogoninae	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Ceratopogonidae	no-see-um midges	21.52
Railroad Creek	5	2020-08-23	12	Hydroporinae	L	insect	Aquatic	Arthropoda: Insecta	Coleoptera	Dytiscidae	predaceous diving beetles	21.52
Railroad Creek	5	2020-08-23	12	Ostracoda	U	non-insect	Aquatic	Crustacea: Ostracoda	x	x	seed shrimp	10.76
Railroad Creek	5	2020-08-23	12	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	21.52
Railroad Creek	5	2020-08-23	12	Capniidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Capniidae	stoneflies	10.76
Railroad Creek	5	2020-08-23	12	Suwallini	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	32.28
Railroad Creek	5	2020-08-23	12	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	333.56
Railroad Creek	5	2020-08-23	12	Visoka cataractae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	53.8
Railroad Creek	5	2020-08-23	12	Zapada cinctipes	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	53.8
Railroad Creek	5	2020-08-23	12	Kogotus/Rickera	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlodidae	stoneflies	10.76
Railroad Creek	12A	2020-08-24	12	Arctopsyche	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydropsychidae	caddisflies	32.28
Railroad Creek	12A	2020-08-24	12	Arctopsychinae	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydropsychidae	caddisflies	32.28
Railroad Creek	12A	2020-08-24	12	Parapsyche elsis	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydropsychidae	caddisflies	10.76
Railroad Creek	12A	2020-08-24	12	Rhyacophila betteni group	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	21.52
Railroad Creek	12A	2020-08-24	12	Rhyacophila betteni group	P	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	12A	2020-08-24	12	Hexatoma	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	10.76
Railroad Creek	12A	2020-08-24	12	Clinocera	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Empididae	dance flies	10.76
Railroad Creek	12A	2020-08-24	12	Polycelis	U	non-insect	Aquatic	Turbellaria	miscellaneous non-insect	Planariidae	flat worms	10.76
Railroad Creek	12A	2020-08-24	12	Baetis bicaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	10.76
Railroad Creek	12A	2020-08-24	12	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	96.84
Railroad Creek	12A	2020-08-24	12	Drunella coloradensis/flavilinea	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	12A	2020-08-24	12	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	32.28
Railroad Creek	12A	2020-08-24	12	Drunella spinifera	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	21.52
Railroad Creek	12A	2020-08-24	12	Ephemerella alleni	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	12A	2020-08-24	12	Ephemerella tibialis	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	12A	2020-08-24	12	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	204.44
Railroad Creek	12A	2020-08-24	12	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	150.64
Railroad Creek	12A	2020-08-24	12	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	118.36
Railroad Creek	12A	2020-08-24	12	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	53.8
Railroad Creek	12A	2020-08-24	12	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	75.32
Railroad Creek	12A	2020-08-24	12	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	64.56
Railroad Creek	12A	2020-08-24	12	Pagastia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Diamesinae	midges	10.76
Railroad Creek	12A	2020-08-24	12	Brillia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	12A	2020-08-24	12	Corynoneura	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	12A	2020-08-24	12	Eukiefferiella brehmi group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	12A	2020-08-24	12	Krenosmittia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	12A	2020-08-24	12	Orthocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	12A	2020-08-24	12	Parametriocnemus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	12A	2020-08-24	12	Thienemanniella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	12A	2020-08-24	12	Tvetenia bavarica group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	32.28
Railroad Creek	12A	2020-08-24	12	Sperchon	U	non-insect	Aquatic	Arachnida: Acari	x	x	mites	10.76
Railroad Creek	12A	2020-08-24	12	Ceratopogoninae	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Ceratopogonidae	no-see-um midges	43.04
Railroad Creek	12A	2020-08-24	12	Ostracoda	U	non-insect	Aquatic	Crustacea: Ostracoda	x	x	seed shrimp	10.76
Railroad Creek	12A	2020-08-24	12	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	376.6
Railroad Creek	12A	2020-08-24	12	Capniidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Capniidae	stoneflies	32.28
Railroad Creek	12A	2020-08-24	12	Chloroperlidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	10.76
Railroad Creek	12A	2020-08-24	12	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	21.52
Railroad Creek	12A	2020-08-24	12	Zapada cinctipes	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	43.04
Railroad Creek	12A	2020-08-24	12	Zapada columbiana	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	12A	2020-08-24	12	Calineuria californica	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlidae	stoneflies	10.76
Railroad Creek	12A	2020-08-24	12	Doroneuria	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlidae	stoneflies	10.76
Railroad Creek	12A	2020-08-24	12	Taeniopterygidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Taeniopterygidae	stoneflies	75.32
Railroad Creek	15	2015-08-24	13	Lepidostoma	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Lepidostomatidae	caddisflies	10.76
Railroad Creek	15	2015-08-24	13	Rhyacophila betteni group	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	15	2015-08-24	13	Rhyacophila vagrita	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	96.84
Railroad Creek	15	2015-08-24	13	Dicranota	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	10.76
Railroad Creek	15	2015-08-24	13	Chelifera/Metachela	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Empididae	dance flies	10.76
Railroad Creek	15	2015-08-24	13	Clinocera	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Empididae	dance flies	21.52
Railroad Creek	15	2015-08-24	13	Chelifera/Metachela	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Empididae	dance flies	10.76
Railroad Creek	15	2015-08-24	13	Ameletus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ameletidae	mayflies	96.84
Railroad Creek	15	2015-08-24	13	Baetis bicaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	10.76
Railroad Creek	15	2015-08-24	13	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	86.08
Railroad Creek	15	2015-08-24	13	Drunella coloradensis/flavilinea	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	32.28
Railroad Creek	15	2015-08-24	13	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	15	2015-08-24	13	Ephemerella excrucians group	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	21.52
Railroad Creek	15	2015-08-24	13	Ephemerella tibialis	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	15	2015-08-24	13	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	107.6
Railroad Creek	15	2015-08-24	13	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	96.84
Railroad Creek	15	2015-08-24	13	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	53.8
Railroad Creek	15	2015-08-24	13	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	53.8
Railroad Creek	15	2015-08-24	13	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	53.8
Railroad Creek	15	2015-08-24	13	Brillia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	15	2015-08-24	13	Orthocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	15	2015-08-24	13	Parametriocnemus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	15	2015-08-24	13	Parorthocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	15	2015-08-24	13	Tvetenia bavarica group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	15	2015-08-24	13	Ceratopogoninae	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Ceratopogonidae	no-see-um midges	43.04
Railroad Creek	15	2015-08-24	13	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	1452.6
Railroad Creek	15	2015-08-24	13	Capniidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Capniidae	stoneflies	75.32
Railroad Creek	15	2015-08-24	13	Zapada cinctipes	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	64.56

Waterbody	Station	Date	Replicate	Taxon	Stage	Insect	Origin	Higher.classification	Order	Family	Common.name	Abundance
Railroad Creek	15	2015-08-24	13	Doroneuria	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlidae	stoneflies	10.76
Railroad Creek	15	2015-08-24	13	Frisonia picticeps	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlodidae	stoneflies	10.76
Railroad Creek	15	2015-08-24	13	Skwala	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlodidae	stoneflies	43.04
Railroad Creek	1	2020-08-20	13	Simulium	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Simuliidae	black flies	10.76
Railroad Creek	1	2020-08-20	13	Rhyacophila betteni group	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	1	2020-08-20	13	Rhyacophila narvae	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	1	2020-08-20	13	Polycelis	U	non-insect	Aquatic	Turbellaria	miscellaneous non-insect	Planariidae	flat worms	10.76
Railroad Creek	1	2020-08-20	13	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	118.36
Railroad Creek	1	2020-08-20	13	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	64.56
Railroad Creek	1	2020-08-20	13	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	10.76
Railroad Creek	1	2020-08-20	13	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	43.04
Railroad Creek	1	2020-08-20	13	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	32.28
Railroad Creek	1	2020-08-20	13	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	32.28
Railroad Creek	1	2020-08-20	13	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	43.04
Railroad Creek	1	2020-08-20	13	Eukiefferiella brehmi group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	1	2020-08-20	13	Ceratopogoninae	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Ceratopogonidae	no-see-um midges	21.52
Railroad Creek	1	2020-08-20	13	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	247.48
Railroad Creek	1	2020-08-20	13	Capniidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Capniidae	stoneflies	10.76
Railroad Creek	1	2020-08-20	13	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	10.76
Railroad Creek	1	2020-08-20	13	Zapada columbiana	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	32.28
Railroad Creek	1	2020-08-20	13	Calineuria californica	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlidae	stoneflies	10.76
Railroad Creek	1	2020-08-20	13	Taeniopterygidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Taeniopterygidae	stoneflies	21.52
Railroad Creek	6	2020-08-20	13	Simulium	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Simuliidae	black flies	10.76
Railroad Creek	6	2020-08-20	13	Glossosoma	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Glossosomatidae	caddisflies	21.52
Railroad Creek	6	2020-08-20	13	Glossosoma	P	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Glossosomatidae	caddisflies	10.76
Railroad Creek	6	2020-08-20	13	Arctopsychinae	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydropsychidae	caddisflies	21.52
Railroad Creek	6	2020-08-20	13	Parapsyche elsis	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydropsychidae	caddisflies	43.04
Railroad Creek	6	2020-08-20	13	Baetis bicaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	21.52
Railroad Creek	6	2020-08-20	13	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	161.4
Railroad Creek	6	2020-08-20	13	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	139.88
Railroad Creek	6	2020-08-20	13	Ephemerella tibialis	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	32.28
Railroad Creek	6	2020-08-20	13	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	43.04
Railroad Creek	6	2020-08-20	13	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	312.04
Railroad Creek	6	2020-08-20	13	Epeorus longimanus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	32.28
Railroad Creek	6	2020-08-20	13	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	96.84
Railroad Creek	6	2020-08-20	13	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	32.28
Railroad Creek	6	2020-08-20	13	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	64.56
Railroad Creek	6	2020-08-20	13	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	21.52
Railroad Creek	6	2020-08-20	13	Brillia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	6	2020-08-20	13	Eukiefferiella brehmi group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	6	2020-08-20	13	Eukiefferiella devonica group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	6	2020-08-20	13	Pisidium	U	non-insect	Aquatic	Mollusca: Bivalvia	x	Sphaeriidae	pea clams	10.76
Railroad Creek	6	2020-08-20	13	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	107.6
Railroad Creek	6	2020-08-20	13	Capniidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Capniidae	stoneflies	10.76
Railroad Creek	6	2020-08-20	13	Suwallini	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	10.76
Railroad Creek	6	2020-08-20	13	Zapada columbiana	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	43.04
Railroad Creek	6	2020-08-20	13	Zapada oregonensis group	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	6	2020-08-20	13	Doroneuria	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlidae	stoneflies	10.76
Railroad Creek	6	2020-08-20	13	Pteronarcys princeps	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Pteronarcyidae	stoneflies	21.52
Railroad Creek	6	2020-08-20	13	Taeniopterygidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Taeniopterygidae	stoneflies	10.76
Railroad Creek	2	2020-08-21	13	Hexatoma	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	21.52
Railroad Creek	2	2020-08-21	13	Ameletus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ameletidae	mayflies	118.36
Railroad Creek	2	2020-08-21	13	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	10.76
Railroad Creek	2	2020-08-21	13	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	21.52
Railroad Creek	2	2020-08-21	13	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	86.08
Railroad Creek	2	2020-08-21	13	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	817.76
Railroad Creek	2	2020-08-21	13	Brillia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	2	2020-08-21	13	Eukiefferiella claripennis group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	2	2020-08-21	13	Hydrobaenus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	32.28
Railroad Creek	2	2020-08-21	13	Parakiefferiella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	2	2020-08-21	13	Parorthocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	32.28
Railroad Creek	2	2020-08-21	13	Rheocricotopus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	2	2020-08-21	13	Stilocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	2	2020-08-21	13	Tvetenia bavarica group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	2	2020-08-21	13	Trombidiformes	U	non-insect	Aquatic	Arachnida: Acari	Trombidiformes	x	mites	10.76
Railroad Creek	2	2020-08-21	13	Ceratopogoninae	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Ceratopogonidae	no-see-um midges	21.52
Railroad Creek	2	2020-08-21	13	Hydroporinae	A	insect	Aquatic	Arthropoda: Insecta	Coleoptera	Dytiscidae	predaceous diving beetles	10.76
Railroad Creek	2	2020-08-21	13	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	32.28
Railroad Creek	2	2020-08-21	13	Capniidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Capniidae	stoneflies	21.52
Railroad Creek	2	2020-08-21	13	Zapada cinctipes	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	32.28
Railroad Creek	4	2020-08-21	13	Rhyacophila atrata group	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	4	2020-08-21	13	Rhyacophila betteni group	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	4	2020-08-21	13	Rhyacophila brunnea/vemna group	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	32.28
Railroad Creek	4	2020-08-21	13	Hexatoma	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	32.28
Railroad Creek	4	2020-08-21	13	Rhabdomastix (Rhabdomastix)	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	10.76
Railroad Creek	4	2020-08-21	13	Chelifera/Metachela	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Empididae	dance flies	10.76
Railroad Creek	4	2020-08-21	13	Ameletus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ameletidae	mayflies	10.76
Railroad Creek	4	2020-08-21	13	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	150.64
Railroad Creek	4	2020-08-21	13	Drunella coloradensis/flavilinea	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	21.52
Railroad Creek	4	2020-08-21	13	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	86.08
Railroad Creek	4	2020-08-21	13	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	236.72
Railroad Creek	4	2020-08-21	13	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	269
Railroad Creek	4	2020-08-21	13	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	10.76
Railroad Creek	4	2020-08-21	13	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	10.76
Railroad Creek	4	2020-08-21	13	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	64.56
Railroad Creek	4	2020-08-21	13	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	21.52
Railroad Creek	4	2020-08-21	13	Eukiefferiella brehmi group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	4	2020-08-21	13	Eukiefferiella claripennis group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	4	2020-08-21	13	Parametriocnemus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	4	2020-08-21	13	Rheocricotopus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	4	2020-08-21	13	Tvetenia bavarica group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	43.04
Railroad Creek	4	2020-08-21	13	Sperchon	U	non-insect	Aquatic	Arachnida: Acari	x	x	mites	10.76
Railroad Creek	4	2020-08-21	13	Pisidium	U	non-insect	Aquatic	Mollusca: Bivalvia	x	Sphaeriidae	pea clams	21.52
Railroad Creek	4	2020-08-21	13	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	129.12
Railroad Creek	4	2020-08-21	13	Suwallini	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	10.76
Railroad Creek	4	2020-08-21	13	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	21.52
Railroad Creek	4	2020-08-21	13	Visoka cataractae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	21.52
Railroad Creek	4	2020-08-21	13	Zapada cinctipes	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	43.04
Railroad Creek	4	2020-08-21	13	Zapada columbiana	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	32.28
Railroad Creek	4	2020-08-21	13	Calineuria californica	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlidae	stoneflies	10.76
Railroad Creek	4	2020-08-21	13	Doroneuria	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlidae	stoneflies	21.52
Railroad Creek	10	2020-08-22	13	Pedomoecus sierra	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Apataniidae	caddisflies	10.76
Railroad Creek	10	2020-08-22	13	Arctopsychinae	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydropsychidae	caddisflies	10.76
Railroad Creek	10	2020-08-22	13	Rhyacophila atrata group	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	10	2020-08-22	13	Hexatoma	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	21.52
Railroad Creek	10	2020-08-22	13	Rhabdomastix (Rhabdomastix)	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	10.76
Railroad Creek	10	2020-08-22	13	Chelifera/Metachela	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Empididae	dance flies	32.28
Railroad Creek	10	2020-08-22	13	Clinocera	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Empididae	dance flies	10.76
Railroad Creek	10	2020-08-22	13	Oreogeton	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Empididae	dance flies	10.76
Railroad Creek	10	2020-08-22	13	Ameletus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ameletidae	mayflies	64.56
Railroad Creek	10	2020-08-22	13	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	236.72
Railroad Creek	10	2020-08-22	13	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	32.28
Railroad Creek	10	2020-08-22	13	Ephemerella excrucians group	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	10	2020-08-22	13	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	53.8
Railroad Creek	10	2020-08-22	13	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	182.92

Waterbody	Station	Date	Replicate	Taxon	Stage	Insect	Origin	Higher.classification	Order	Family	Common.name	Abundance
Railroad Creek	10	2020-08-22	13	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	64.56
Railroad Creek	10	2020-08-22	13	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	32.28
Railroad Creek	10	2020-08-22	13	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	43.04
Railroad Creek	10	2020-08-22	13	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	53.8
Railroad Creek	10	2020-08-22	13	Boreoheptagyia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Diamesinae	midges	10.76
Railroad Creek	10	2020-08-22	13	Pagastia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Diamesinae	midges	21.52
Railroad Creek	10	2020-08-22	13	Lopescladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	10	2020-08-22	13	Orthocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	10	2020-08-22	13	Parametriocnemus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	10	2020-08-22	13	Parorthocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	10	2020-08-22	13	Thienemanniella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	75.32
Railroad Creek	10	2020-08-22	13	Tvetenia bavarica group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	10	2020-08-22	13	Lebertia	U	non-insect	Aquatic	Arachnida: Acari	x	x	mites	10.76
Railroad Creek	10	2020-08-22	13	Sperchon	U	non-insect	Aquatic	Arachnida: Acari	x	x	mites	10.76
Railroad Creek	10	2020-08-22	13	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	688.64
Railroad Creek	10	2020-08-22	13	Capniidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Capniidae	stoneflies	32.28
Railroad Creek	10	2020-08-22	13	Chloroperlidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	10.76
Railroad Creek	10	2020-08-22	13	Zapada cinctipes	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	32.28
Railroad Creek	10	2020-08-22	13	Taeniopterygidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Taeniopterygidae	stoneflies	10.76
Railroad Creek	5	2020-08-23	13	Simulium	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Simuliidae	black flies	10.76
Railroad Creek	5	2020-08-23	13	Arctopsyche	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydropsychidae	caddisflies	10.76
Railroad Creek	5	2020-08-23	13	Arctopsychinae	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydropsychidae	caddisflies	10.76
Railroad Creek	5	2020-08-23	13	Rhyacophila betteni group	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	5	2020-08-23	13	Dicranota	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	10.76
Railroad Creek	5	2020-08-23	13	Hexatoma	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	21.52
Railroad Creek	5	2020-08-23	13	Polycelis	U	non-insect	Aquatic	Turbellaria	miscellaneous non-insect	Planariidae	flat worms	10.76
Railroad Creek	5	2020-08-23	13	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	129.12
Railroad Creek	5	2020-08-23	13	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	5	2020-08-23	13	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	10.76
Railroad Creek	5	2020-08-23	13	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	107.6
Railroad Creek	5	2020-08-23	13	Epeorus longimanus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	10.76
Railroad Creek	5	2020-08-23	13	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	86.08
Railroad Creek	5	2020-08-23	13	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	10.76
Railroad Creek	5	2020-08-23	13	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	21.52
Railroad Creek	5	2020-08-23	13	Rheocricotopus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	5	2020-08-23	13	Tvetenia bavarica group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	5	2020-08-23	13	Ceratopogoninae	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Ceratopogonidae	no-see-um midges	32.28
Railroad Creek	5	2020-08-23	13	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	172.16
Railroad Creek	5	2020-08-23	13	Suwallini	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	10.76
Railroad Creek	5	2020-08-23	13	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	43.04
Railroad Creek	5	2020-08-23	13	Visoka cataractae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	5	2020-08-23	13	Zapada cinctipes	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	21.52
Railroad Creek	5	2020-08-23	13	Zapada columbiana	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	5	2020-08-23	13	Taeniopterygidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Taeniopterygidae	stoneflies	32.28
Railroad Creek	12A	2020-08-24	13	Arctopsychinae	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydropsychidae	caddisflies	10.76
Railroad Creek	12A	2020-08-24	13	Rhyacophila betteni group	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	12A	2020-08-24	13	Rhyacophila brunnea/vemna group	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	12A	2020-08-24	13	Baetis bicaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	43.04
Railroad Creek	12A	2020-08-24	13	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	215.2
Railroad Creek	12A	2020-08-24	13	Drunella coloradensis/flavilinea	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	21.52
Railroad Creek	12A	2020-08-24	13	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	12A	2020-08-24	13	Ephemerella tibialis	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	12A	2020-08-24	13	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	225.96
Railroad Creek	12A	2020-08-24	13	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	193.68
Railroad Creek	12A	2020-08-24	13	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	96.84
Railroad Creek	12A	2020-08-24	13	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	10.76
Railroad Creek	12A	2020-08-24	13	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	43.04
Railroad Creek	12A	2020-08-24	13	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	86.08
Railroad Creek	12A	2020-08-24	13	Pagastia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Diamesinae	midges	10.76
Railroad Creek	12A	2020-08-24	13	Brillia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	12A	2020-08-24	13	Eukiefferiella brehmi group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	43.04
Railroad Creek	12A	2020-08-24	13	Eukiefferiella claripennis group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	12A	2020-08-24	13	Orthocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	32.28
Railroad Creek	12A	2020-08-24	13	Thienemanniella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	12A	2020-08-24	13	Tvetenia bavarica group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	75.32
Railroad Creek	12A	2020-08-24	13	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	398.12
Railroad Creek	12A	2020-08-24	13	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	10.76
Railroad Creek	12A	2020-08-24	13	Zapada cinctipes	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	43.04
Railroad Creek	12A	2020-08-24	13	Zapada columbiana	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	12A	2020-08-24	13	Zapada oregonensis group	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	12A	2020-08-24	13	Calineuria californica	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlidae	stoneflies	10.76
Railroad Creek	12A	2020-08-24	13	Kogotus/Rickera	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlodidae	stoneflies	10.76
Railroad Creek	12A	2020-08-24	13	Megarcys	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlodidae	stoneflies	10.76
Railroad Creek	12A	2020-08-24	13	Taeniopterygidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Taeniopterygidae	stoneflies	21.52
Railroad Creek	15	2015-08-24	14	Glossosoma	P	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Glossosomatidae	caddisflies	10.76
Railroad Creek	15	2015-08-24	14	Arctopsyche	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydropsychidae	caddisflies	10.76
Railroad Creek	15	2015-08-24	14	Arctopsychinae	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydropsychidae	caddisflies	10.76
Railroad Creek	15	2015-08-24	14	Ameletus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ameletidae	mayflies	32.28
Railroad Creek	15	2015-08-24	14	Baetis bicaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	10.76
Railroad Creek	15	2015-08-24	14	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	10.76
Railroad Creek	15	2015-08-24	14	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	32.28
Railroad Creek	15	2015-08-24	14	Drunella spinifera	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	21.52
Railroad Creek	15	2015-08-24	14	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	10.76
Railroad Creek	15	2015-08-24	14	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	129.12
Railroad Creek	15	2015-08-24	14	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	10.76
Railroad Creek	15	2015-08-24	14	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	53.8
Railroad Creek	15	2015-08-24	14	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	172.16
Railroad Creek	15	2015-08-24	14	Brillia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	15	2015-08-24	14	Corynoneura	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	32.28
Railroad Creek	15	2015-08-24	14	Orthocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	15	2015-08-24	14	Parorthocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	15	2015-08-24	14	Thienemanniella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	15	2015-08-24	14	Tvetenia bavarica group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	32.28
Railroad Creek	15	2015-08-24	14	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	21.52
Railroad Creek	15	2015-08-24	14	Capniidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Capniidae	stoneflies	10.76
Railroad Creek	15	2015-08-24	14	Zapada cinctipes	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	96.84
Railroad Creek	15	2015-08-24	14	Doroneuria	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlidae	stoneflies	10.76
Railroad Creek	15	2015-08-24	14	Frisonia picticeps	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlodidae	stoneflies	10.76
Railroad Creek	15	2015-08-24	14	Taeniopterygidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Taeniopterygidae	stoneflies	10.76
Railroad Creek	1	2020-08-20	14	Apatania	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Apataniidae	caddisflies	10.76
Railroad Creek	1	2020-08-20	14	Glossosoma	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Glossosomatidae	caddisflies	10.76
Railroad Creek	1	2020-08-20	14	Arctopsychinae	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydropsychidae	caddisflies	10.76
Railroad Creek	1	2020-08-20	14	Rhyacophila brunnea/vemna group	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	21.52
Railroad Creek	1	2020-08-20	14	Chelifera/Metachela	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Empididae	dance flies	10.76
Railroad Creek	1	2020-08-20	14	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	118.36
Railroad Creek	1	2020-08-20	14	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	172.16
Railroad Creek	1	2020-08-20	14	Drunella spinifera	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	1	2020-08-20	14	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	96.84
Railroad Creek	1	2020-08-20	14	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	355.08
Railroad Creek	1	2020-08-20	14	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	86.08
Railroad Creek	1	2020-08-20	14	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	21.52
Railroad Creek	1	2020-08-20	14	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	53.8
Railroad Creek	1	2020-08-20	14	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	10.76
Railroad Creek	1	2020-08-20	14	Brillia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	1	2020-08-20	14	Chaetocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76

Waterbody	Station	Date	Replicate	Taxon	Stage	Insect	Origin	Higher.classification	Order	Family	Common.name	Abundance
Railroad Creek	1	2020-08-20	14	Corynoneura	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	1	2020-08-20	14	Orthocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	1	2020-08-20	14	Parametriocnemus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	1	2020-08-20	14	Tvetenia bavarica group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	64.56
Railroad Creek	1	2020-08-20	14	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	43.04
Railroad Creek	1	2020-08-20	14	Capniidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Capniidae	stoneflies	10.76
Railroad Creek	1	2020-08-20	14	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	10.76
Railroad Creek	1	2020-08-20	14	Zapada cinctipes	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	43.04
Railroad Creek	1	2020-08-20	14	Zapada columbiana	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	21.52
Railroad Creek	1	2020-08-20	14	Pteronarcys princeps	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Pteronarcyidae	stoneflies	21.52
Railroad Creek	1	2020-08-20	14	Taeniopterygidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Taeniopterygidae	stoneflies	10.76
Railroad Creek	6	2020-08-20	14	Simulium	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Simuliidae	black flies	10.76
Railroad Creek	6	2020-08-20	14	Glossosoma	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Glossosomatidae	caddisflies	75.32
Railroad Creek	6	2020-08-20	14	Arctopsychinae	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydropsychidae	caddisflies	10.76
Railroad Creek	6	2020-08-20	14	Parapsyche elsis	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydropsychidae	caddisflies	32.28
Railroad Creek	6	2020-08-20	14	Rhyacophila brunnea/vemna group	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	6	2020-08-20	14	Rhyacophila narvae	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	6	2020-08-20	14	Dicranota	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	10.76
Railroad Creek	6	2020-08-20	14	Hexatoma	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	10.76
Railroad Creek	6	2020-08-20	14	Baetis bicaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	32.28
Railroad Creek	6	2020-08-20	14	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	21.52
Railroad Creek	6	2020-08-20	14	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	32.28
Railroad Creek	6	2020-08-20	14	Ephemerella tibialis	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	6	2020-08-20	14	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	21.52
Railroad Creek	6	2020-08-20	14	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	247.48
Railroad Creek	6	2020-08-20	14	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	204.44
Railroad Creek	6	2020-08-20	14	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	10.76
Railroad Creek	6	2020-08-20	14	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	10.76
Railroad Creek	6	2020-08-20	14	Orthocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	6	2020-08-20	14	Parametriocnemus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	6	2020-08-20	14	Ceratopogoninae	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Ceratopogonidae	no-see-um midges	10.76
Railroad Creek	6	2020-08-20	14	Pisidium	U	non-insect	Aquatic	Mollusca: Bivalvia	x	Sphaeriidae	pea clams	21.52
Railroad Creek	6	2020-08-20	14	Nemata	U	non-insect	Aquatic	Nemata	miscellaneous non-insect	x	round worms	10.76
Railroad Creek	6	2020-08-20	14	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	365.84
Railroad Creek	6	2020-08-20	14	Suwallini	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	21.52
Railroad Creek	6	2020-08-20	14	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	21.52
Railroad Creek	6	2020-08-20	14	Leuctridae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Leuctridae	stoneflies	10.76
Railroad Creek	6	2020-08-20	14	Visoka cataractae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	21.52
Railroad Creek	6	2020-08-20	14	Zapada columbiana	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	2	2020-08-21	14	Simulium	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Simuliidae	black flies	43.04
Railroad Creek	2	2020-08-21	14	Arctopsyche	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydropsychidae	caddisflies	32.28
Railroad Creek	2	2020-08-21	14	Agraylea	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydroptilidae	caddisflies	10.76
Railroad Creek	2	2020-08-21	14	Rhyacophila brunnea/vemna group	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	2	2020-08-21	14	Hexatoma	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	21.52
Railroad Creek	2	2020-08-21	14	Oreogeton	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Empididae	dance flies	10.76
Railroad Creek	2	2020-08-21	14	Polycelis	U	non-insect	Aquatic	Turbellaria	miscellaneous non-insect	Planariidae	flat worms	10.76
Railroad Creek	2	2020-08-21	14	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	43.04
Railroad Creek	2	2020-08-21	14	Drunella coloradensis/flavilinea	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	2	2020-08-21	14	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	86.08
Railroad Creek	2	2020-08-21	14	Drunella spinifera	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	2	2020-08-21	14	Ephemerella alleni	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	2	2020-08-21	14	Cinygma	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	10.76
Railroad Creek	2	2020-08-21	14	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	43.04
Railroad Creek	2	2020-08-21	14	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	118.36
Railroad Creek	2	2020-08-21	14	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	43.04
Railroad Creek	2	2020-08-21	14	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	43.04
Railroad Creek	2	2020-08-21	14	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	118.36
Railroad Creek	2	2020-08-21	14	Diamesa	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Diamesinae	midges	10.76
Railroad Creek	2	2020-08-21	14	Brillia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	2	2020-08-21	14	Chaetocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	2	2020-08-21	14	Corynoneura	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	2	2020-08-21	14	Krenosmittia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	2	2020-08-21	14	Orthocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	53.8
Railroad Creek	2	2020-08-21	14	Thienemanniella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	2	2020-08-21	14	Tvetenia bavarica group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	2	2020-08-21	14	Lebertia	U	non-insect	Aquatic	Arachnida: Acari	x	x	mites	10.76
Railroad Creek	2	2020-08-21	14	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	161.4
Railroad Creek	2	2020-08-21	14	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	10.76
Railroad Creek	2	2020-08-21	14	Zapada cinctipes	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	53.8
Railroad Creek	2	2020-08-21	14	Zapada columbiana	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	2	2020-08-21	14	Isoperla	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlodidae	stoneflies	10.76
Railroad Creek	2	2020-08-21	14	Kogotus/Rickera	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlodidae	stoneflies	10.76
Railroad Creek	4	2020-08-21	14	Pedomoecus sierra	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Apataniidae	caddisflies	10.76
Railroad Creek	4	2020-08-21	14	Arctopsyche	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydropsychidae	caddisflies	10.76
Railroad Creek	4	2020-08-21	14	Rhyacophila betteni group	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	21.52
Railroad Creek	4	2020-08-21	14	Rhyacophila narvae	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	4	2020-08-21	14	Rhyacophila	P	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	4	2020-08-21	14	Dicranota	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	21.52
Railroad Creek	4	2020-08-21	14	Hexatoma	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	10.76
Railroad Creek	4	2020-08-21	14	Polycelis	U	non-insect	Aquatic	Turbellaria	miscellaneous non-insect	Planariidae	flat worms	21.52
Railroad Creek	4	2020-08-21	14	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	139.88
Railroad Creek	4	2020-08-21	14	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	107.6
Railroad Creek	4	2020-08-21	14	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	129.12
Railroad Creek	4	2020-08-21	14	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	107.6
Railroad Creek	4	2020-08-21	14	Neoleptophlebia/Paraleptophlebia	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Leptophlebiidae	mayflies	21.52
Railroad Creek	4	2020-08-21	14	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	10.76
Railroad Creek	4	2020-08-21	14	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	53.8
Railroad Creek	4	2020-08-21	14	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	96.84
Railroad Creek	4	2020-08-21	14	Chaetocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	4	2020-08-21	14	Corynoneura	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	4	2020-08-21	14	Eukiefferiella brehmi group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	4	2020-08-21	14	Orthocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	4	2020-08-21	14	Rheocricotopus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	4	2020-08-21	14	Tvetenia bavarica group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	4	2020-08-21	14	Sperchon	U	non-insect	Aquatic	Arachnida: Acari	x	x	mites	10.76
Railroad Creek	4	2020-08-21	14	Ceratopogoninae	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Ceratopogonidae	no-see-um midges	21.52
Railroad Creek	4	2020-08-21	14	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	53.8
Railroad Creek	4	2020-08-21	14	Suwallini	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	10.76
Railroad Creek	4	2020-08-21	14	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	53.8
Railroad Creek	4	2020-08-21	14	Leuctridae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Leuctridae	stoneflies	10.76
Railroad Creek	4	2020-08-21	14	Visoka cataractae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	32.28
Railroad Creek	4	2020-08-21	14	Zapada cinctipes	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	10	2020-08-22	14	Simulium	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Simuliidae	black flies	10.76
Railroad Creek	10	2020-08-22	14	Apatania	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Apataniidae	caddisflies	10.76
Railroad Creek	10	2020-08-22	14	Arctopsyche	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydropsychidae	caddisflies	43.04
Railroad Creek	10	2020-08-22	14	Ecclisomyia	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Limnephilidae	caddisflies	10.76
Railroad Creek	10	2020-08-22	14	Clinocera	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Empididae	dance flies	10.76
Railroad Creek	10	2020-08-22	14	Ameletus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ameletidae	mayflies	10.76
Railroad Creek	10	2020-08-22	14	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	43.04
Railroad Creek	10	2020-08-22	14	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	10	2020-08-22	14	Drunella spinifera	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	10	2020-08-22	14	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	10.76
Railroad Creek	10	2020-08-22	14	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	139.88
Railroad Creek	10	2020-08-22	14	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	139.88
Railroad Creek	10	2020-08-22	14	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	21.52

Waterbody	Station	Date	Replicate	Taxon	Stage	Insect	Origin	Higher.classification	Order	Family	Common.name	Abundance
Railroad Creek	10	2020-08-22	14	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	75.32
Railroad Creek	10	2020-08-22	14	Pagastia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Diamesinae	midges	10.76
Railroad Creek	10	2020-08-22	14	Brillia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	10	2020-08-22	14	Chaetocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	10	2020-08-22	14	Orthocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	10	2020-08-22	14	Tvetenia bavarica group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	10	2020-08-22	14	Sperchon	U	non-insect	Aquatic	Arachnida: Acari	x	x	mites	10.76
Railroad Creek	10	2020-08-22	14	Ceratopogoninae	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Ceratopogonidae	no-see-um midges	10.76
Railroad Creek	10	2020-08-22	14	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	161.4
Railroad Creek	10	2020-08-22	14	Zapada cinctipes	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	10	2020-08-22	14	Zapada columbiana	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	10	2020-08-22	14	Doroneuria	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlidae	stoneflies	10.76
Railroad Creek	10	2020-08-22	14	Frisonia picticeps	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlodidae	stoneflies	10.76
Railroad Creek	5	2020-08-23	14	Simulium	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Simuliidae	black flies	247.48
Railroad Creek	5	2020-08-23	14	Arctopsyche	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydropsychidae	caddisflies	10.76
Railroad Creek	5	2020-08-23	14	Parapsyche elsis	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydropsychidae	caddisflies	21.52
Railroad Creek	5	2020-08-23	14	Hexatoma	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	21.52
Railroad Creek	5	2020-08-23	14	Ameletus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ameletidae	mayflies	32.28
Railroad Creek	5	2020-08-23	14	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	161.4
Railroad Creek	5	2020-08-23	14	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	32.28
Railroad Creek	5	2020-08-23	14	Ephemerella alleni	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	5	2020-08-23	14	Ephemerella tibialis	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	32.28
Railroad Creek	5	2020-08-23	14	Cinygma	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	21.52
Railroad Creek	5	2020-08-23	14	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	107.6
Railroad Creek	5	2020-08-23	14	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	193.68
Railroad Creek	5	2020-08-23	14	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	86.08
Railroad Creek	5	2020-08-23	14	Neoleptophlebia/Paraleptophlebia	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Leptophlebiidae	mayflies	10.76
Railroad Creek	5	2020-08-23	14	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	21.52
Railroad Creek	5	2020-08-23	14	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	32.28
Railroad Creek	5	2020-08-23	14	Brillia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	5	2020-08-23	14	Chaetocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	5	2020-08-23	14	Rheocricotopus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	5	2020-08-23	14	Thienemanniella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	215.2
Railroad Creek	5	2020-08-23	14	Tvetenia bavarica group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	64.56
Railroad Creek	5	2020-08-23	14	Ceratopogoninae	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Ceratopogonidae	no-see-um midges	32.28
Railroad Creek	5	2020-08-23	14	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	236.72
Railroad Creek	5	2020-08-23	14	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	21.52
Railroad Creek	5	2020-08-23	14	Zapada cinctipes	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	21.52
Railroad Creek	5	2020-08-23	14	Zapada columbiana	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	5	2020-08-23	14	Doroneuria	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlidae	stoneflies	21.52
Railroad Creek	12A	2020-08-24	14	Rhyacophila brunnea/vemna group	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	12A	2020-08-24	14	Dicranota	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	10.76
Railroad Creek	12A	2020-08-24	14	Baetis bicaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	64.56
Railroad Creek	12A	2020-08-24	14	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	43.04
Railroad Creek	12A	2020-08-24	14	Drunella coloradensis/flavilinea	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	12A	2020-08-24	14	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	12A	2020-08-24	14	Drunella spinifera	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	12A	2020-08-24	14	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	107.6
Railroad Creek	12A	2020-08-24	14	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	118.36
Railroad Creek	12A	2020-08-24	14	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	269
Railroad Creek	12A	2020-08-24	14	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	10.76
Railroad Creek	12A	2020-08-24	14	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	21.52
Railroad Creek	12A	2020-08-24	14	Krenosmittia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	12A	2020-08-24	14	Orthocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	12A	2020-08-24	14	Tvetenia bavarica group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	12A	2020-08-24	14	Ceratopogoninae	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Ceratopogonidae	no-see-um midges	10.76
Railroad Creek	12A	2020-08-24	14	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	484.2
Railroad Creek	12A	2020-08-24	14	Chloroperlidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	10.76
Railroad Creek	12A	2020-08-24	14	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	10.76
Railroad Creek	12A	2020-08-24	14	Zapada cinctipes	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	32.28
Railroad Creek	12A	2020-08-24	14	Calineuria californica	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlidae	stoneflies	10.76
Railroad Creek	12A	2020-08-24	14	Megarcys	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlodidae	stoneflies	10.76
Railroad Creek	12A	2020-08-24	14	Taeniopterygidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Taeniopterygidae	stoneflies	21.52
Railroad Creek	15	2015-08-24	15	Simulium	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Simuliidae	black flies	21.52
Railroad Creek	15	2015-08-24	15	Arctopsychinae	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydropsychidae	caddisflies	10.76
Railroad Creek	15	2015-08-24	15	Lepidostoma	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Lepidostomatidae	caddisflies	10.76
Railroad Creek	15	2015-08-24	15	Ecclisomyia	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Limnephilidae	caddisflies	21.52
Railroad Creek	15	2015-08-24	15	Dicranota	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	10.76
Railroad Creek	15	2015-08-24	15	Clinocera	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Empididae	dance flies	32.28
Railroad Creek	15	2015-08-24	15	Ameletus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ameletidae	mayflies	10.76
Railroad Creek	15	2015-08-24	15	Baetis bicaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	10.76
Railroad Creek	15	2015-08-24	15	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	21.52
Railroad Creek	15	2015-08-24	15	Drunella coloradensis/flavilinea	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	15	2015-08-24	15	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	32.28
Railroad Creek	15	2015-08-24	15	Drunella spinifera	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	15	2015-08-24	15	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	32.28
Railroad Creek	15	2015-08-24	15	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	64.56
Railroad Creek	15	2015-08-24	15	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	21.52
Railroad Creek	15	2015-08-24	15	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	32.28
Railroad Creek	15	2015-08-24	15	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	96.84
Railroad Creek	15	2015-08-24	15	Corynoneura	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	15	2015-08-24	15	Eukiefferiella claripennis group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	15	2015-08-24	15	Orthocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	15	2015-08-24	15	Parametriocnemus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	15	2015-08-24	15	Rheocricotopus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	15	2015-08-24	15	Thienemanniella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	43.04
Railroad Creek	15	2015-08-24	15	Tvetenia bavarica group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	43.04
Railroad Creek	15	2015-08-24	15	Lebertia	U	non-insect	Aquatic	Arachnida: Acari	x	x	mites	32.28
Railroad Creek	15	2015-08-24	15	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	225.96
Railroad Creek	15	2015-08-24	15	Zapada cinctipes	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	64.56
Railroad Creek	15	2015-08-24	15	Doroneuria	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlidae	stoneflies	10.76
Railroad Creek	15	2015-08-24	15	Skwala	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlodidae	stoneflies	10.76
Railroad Creek	15	2015-08-24	15	Taeniopterygidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Taeniopterygidae	stoneflies	21.52
Railroad Creek	1	2020-08-20	15	Simulium	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Simuliidae	black flies	21.52
Railroad Creek	1	2020-08-20	15	Glossosoma	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Glossosomatidae	caddisflies	32.28
Railroad Creek	1	2020-08-20	15	Arctopsychinae	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydropsychidae	caddisflies	43.04
Railroad Creek	1	2020-08-20	15	Rhyacophila blarina	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	1	2020-08-20	15	Rhyacophila brunnea/vemna group	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	1	2020-08-20	15	Neothremma	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Uenoidae	caddisflies	10.76
Railroad Creek	1	2020-08-20	15	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	172.16
Railroad Creek	1	2020-08-20	15	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	118.36
Railroad Creek	1	2020-08-20	15	Drunella spinifera	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	21.52
Railroad Creek	1	2020-08-20	15	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	215.2
Railroad Creek	1	2020-08-20	15	Epeorus longimanus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	10.76
Railroad Creek	1	2020-08-20	15	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	182.92
Railroad Creek	1	2020-08-20	15	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	21.52
Railroad Creek	1	2020-08-20	15	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	21.52
Railroad Creek	1	2020-08-20	15	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	129.12
Railroad Creek	1	2020-08-20	15	Brillia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	1	2020-08-20	15	Corynoneura	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	1	2020-08-20	15	Eukiefferiella brehmi group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	1	2020-08-20	15	Parametriocnemus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	1	2020-08-20	15	Stilocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	1	2020-08-20	15	Tvetenia bavarica group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	32.28
Railroad Creek	1	2020-08-20	15	Sperchonopsis	U	non-insect	Aquatic	Arachnida: Acari	x	x	mites	21.52

Waterbody	Station	Date	Replicate	Taxon	Stage	Insect	Origin	Higher.classification	Order	Family	Common.name	Abundance
Railroad Creek	1	2020-08-20	15	Ceratopogoninae	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Ceratopogonidae	no-see-um midges	10.76
Railroad Creek	1	2020-08-20	15	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	355.08
Railroad Creek	1	2020-08-20	15	Capniidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Capniidae	stoneflies	10.76
Railroad Creek	1	2020-08-20	15	Chloroperlidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	10.76
Railroad Creek	1	2020-08-20	15	Paraperla	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	10.76
Railroad Creek	1	2020-08-20	15	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	86.08
Railroad Creek	1	2020-08-20	15	Leuctridae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Leuctridae	stoneflies	10.76
Railroad Creek	1	2020-08-20	15	Visoka cataractae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	21.52
Railroad Creek	1	2020-08-20	15	Zapada cinctipes	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	32.28
Railroad Creek	1	2020-08-20	15	Zapada columbiana	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	64.56
Railroad Creek	1	2020-08-20	15	Zapada oregonensis group	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	21.52
Railroad Creek	1	2020-08-20	15	Calineuria californica	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlidae	stoneflies	10.76
Railroad Creek	1	2020-08-20	15	Megarcys	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlodidae	stoneflies	21.52
Railroad Creek	1	2020-08-20	15	Taeniopterygidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Taeniopterygidae	stoneflies	21.52
Railroad Creek	6	2020-08-20	15	Glossosoma	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Glossosomatidae	caddisflies	10.76
Railroad Creek	6	2020-08-20	15	Rhyacophila betteni group	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	6	2020-08-20	15	Rhyacophila brunnea/vemna group	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	6	2020-08-20	15	Polycelis	U	non-insect	Aquatic	Turbellaria	miscellaneous non-insect	Planariidae	flat worms	10.76
Railroad Creek	6	2020-08-20	15	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	193.68
Railroad Creek	6	2020-08-20	15	Drunella coloradensis/flavilinea	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	6	2020-08-20	15	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	129.12
Railroad Creek	6	2020-08-20	15	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	107.6
Railroad Creek	6	2020-08-20	15	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	247.48
Railroad Creek	6	2020-08-20	15	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	64.56
Railroad Creek	6	2020-08-20	15	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	64.56
Railroad Creek	6	2020-08-20	15	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	118.36
Railroad Creek	6	2020-08-20	15	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	32.28
Railroad Creek	6	2020-08-20	15	Ceratopogoninae	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Ceratopogonidae	no-see-um midges	21.52
Railroad Creek	6	2020-08-20	15	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	53.8
Railroad Creek	6	2020-08-20	15	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	21.52
Railroad Creek	6	2020-08-20	15	Visoka cataractae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	6	2020-08-20	15	Zapada oregonensis group	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	2	2020-08-21	15	Simulium	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Simuliidae	black flies	10.76
Railroad Creek	2	2020-08-21	15	Apatania	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Apataniidae	caddisflies	10.76
Railroad Creek	2	2020-08-21	15	Arctopsychinae	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydropsychidae	caddisflies	32.28
Railroad Creek	2	2020-08-21	15	Rhyacophila brunnea/vemna group	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	2	2020-08-21	15	Dicranota	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	10.76
Railroad Creek	2	2020-08-21	15	Hexatoma	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	10.76
Railroad Creek	2	2020-08-21	15	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	204.44
Railroad Creek	2	2020-08-21	15	Drunella coloradensis/flavilinea	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	43.04
Railroad Creek	2	2020-08-21	15	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	96.84
Railroad Creek	2	2020-08-21	15	Drunella spinifera	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	32.28
Railroad Creek	2	2020-08-21	15	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	86.08
Railroad Creek	2	2020-08-21	15	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	225.96
Railroad Creek	2	2020-08-21	15	Epeorus longimanus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	10.76
Railroad Creek	2	2020-08-21	15	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	86.08
Railroad Creek	2	2020-08-21	15	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	43.04
Railroad Creek	2	2020-08-21	15	Eukiefferiella brehmi group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	2	2020-08-21	15	Orthocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	2	2020-08-21	15	Rheocricotopus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	2	2020-08-21	15	Thienemanniella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	2	2020-08-21	15	Tvetenia bavarica group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	2	2020-08-21	15	Ceratopogoninae	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Ceratopogonidae	no-see-um midges	10.76
Railroad Creek	2	2020-08-21	15	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	193.68
Railroad Creek	2	2020-08-21	15	Capniidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Capniidae	stoneflies	21.52
Railroad Creek	2	2020-08-21	15	Paraperla	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	10.76
Railroad Creek	2	2020-08-21	15	Zapada cinctipes	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	2	2020-08-21	15	Frisonia picticeps	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlodidae	stoneflies	10.76
Railroad Creek	2	2020-08-21	15	Megarcys	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlodidae	stoneflies	21.52
Railroad Creek	2	2020-08-21	15	Taeniopterygidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Taeniopterygidae	stoneflies	10.76
Railroad Creek	4	2020-08-21	15	Simulium	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Simuliidae	black flies	10.76
Railroad Creek	4	2020-08-21	15	Parapsyche elsis	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydropsychidae	caddisflies	21.52
Railroad Creek	4	2020-08-21	15	Rhyacophila brunnea/vemna group	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	4	2020-08-21	15	Polycelis	U	non-insect	Aquatic	Turbellaria	miscellaneous non-insect	Planariidae	flat worms	10.76
Railroad Creek	4	2020-08-21	15	Ameletus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ameletidae	mayflies	10.76
Railroad Creek	4	2020-08-21	15	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	150.64
Railroad Creek	4	2020-08-21	15	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	53.8
Railroad Creek	4	2020-08-21	15	Drunella spinifera	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	4	2020-08-21	15	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	129.12
Railroad Creek	4	2020-08-21	15	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	344.32
Railroad Creek	4	2020-08-21	15	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	139.88
Railroad Creek	4	2020-08-21	15	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	10.76
Railroad Creek	4	2020-08-21	15	Brillia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	4	2020-08-21	15	Chaetocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	4	2020-08-21	15	Corynoneura	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	4	2020-08-21	15	Orthocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	4	2020-08-21	15	Parametriocnemus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	4	2020-08-21	15	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	10.76
Railroad Creek	4	2020-08-21	15	Capniidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Capniidae	stoneflies	10.76
Railroad Creek	4	2020-08-21	15	Suwallini	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	21.52
Railroad Creek	4	2020-08-21	15	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	21.52
Railroad Creek	4	2020-08-21	15	Leuctridae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Leuctridae	stoneflies	10.76
Railroad Creek	4	2020-08-21	15	Visoka cataractae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	21.52
Railroad Creek	4	2020-08-21	15	Zapada columbiana	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	32.28
Railroad Creek	4	2020-08-21	15	Calineuria californica	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlidae	stoneflies	10.76
Railroad Creek	4	2020-08-21	15	Doroneuria	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlidae	stoneflies	43.04
Railroad Creek	4	2020-08-21	15	Megarcys	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlodidae	stoneflies	10.76
Railroad Creek	4	2020-08-21	15	Taeniopterygidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Taeniopterygidae	stoneflies	10.76
Railroad Creek	10	2020-08-22	15	Simulium	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Simuliidae	black flies	64.56
Railroad Creek	10	2020-08-22	15	Simulium	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Simuliidae	black flies	21.52
Railroad Creek	10	2020-08-22	15	Arctopsyche	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydropsychidae	caddisflies	21.52
Railroad Creek	10	2020-08-22	15	Arctopsychinae	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydropsychidae	caddisflies	10.76
Railroad Creek	10	2020-08-22	15	Parapsyche elsis	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydropsychidae	caddisflies	10.76
Railroad Creek	10	2020-08-22	15	Rhyacophila brunnea/vemna group	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	10	2020-08-22	15	Hexatoma	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	10.76
Railroad Creek	10	2020-08-22	15	Chelifera/Metachela	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Empididae	dance flies	10.76
Railroad Creek	10	2020-08-22	15	Clinocera	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Empididae	dance flies	10.76
Railroad Creek	10	2020-08-22	15	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	387.36
Railroad Creek	10	2020-08-22	15	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	10	2020-08-22	15	Ephemerella tibialis	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	10	2020-08-22	15	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	10.76
Railroad Creek	10	2020-08-22	15	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	269
Railroad Creek	10	2020-08-22	15	Epeorus grandis group	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	21.52
Railroad Creek	10	2020-08-22	15	Epeorus longimanus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	32.28
Railroad Creek	10	2020-08-22	15	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	193.68
Railroad Creek	10	2020-08-22	15	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	10.76
Railroad Creek	10	2020-08-22	15	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	21.52
Railroad Creek	10	2020-08-22	15	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	21.52
Railroad Creek	10	2020-08-22	15	Eukiefferiella brehmi group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	10	2020-08-22	15	Eukiefferiella claripennis group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	10	2020-08-22	15	Orthocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	10	2020-08-22	15	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	236.72
Railroad Creek	10	2020-08-22	15	Capniidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Capniidae	stoneflies	21.52
Railroad Creek	10	2020-08-22	15	Chloroperlidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	10.76
Railroad Creek	10	2020-08-22	15	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	10.76

Waterbody	Station	Date	Replicate	Taxon	Stage	Insect	Origin	Higher.classification	Order	Family	Common.name	Abundance
Railroad Creek	10	2020-08-22	15	Zapada cinctipes	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	10	2020-08-22	15	Zapada columbiana	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	10	2020-08-22	15	Zapada oregonensis group	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	10	2020-08-22	15	Doroneuria	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlidae	stoneflies	10.76
Railroad Creek	10	2020-08-22	15	Frisonia picticeps	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlodidae	stoneflies	10.76
Railroad Creek	10	2020-08-22	15	Taeniopterygidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Taeniopterygidae	stoneflies	10.76
Railroad Creek	5	2020-08-23	15	Simulium	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Simuliidae	black flies	624.08
Railroad Creek	5	2020-08-23	15	Arctopsychinae	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydropsychidae	caddisflies	10.76
Railroad Creek	5	2020-08-23	15	Parapsyche elsis	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydropsychidae	caddisflies	10.76
Railroad Creek	5	2020-08-23	15	Rhyacophila brunnea/vemna group	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	5	2020-08-23	15	Rhyacophila coloradensis group	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	5	2020-08-23	15	Empididae Genus B	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Empididae	dance flies	10.76
Railroad Creek	5	2020-08-23	15	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	107.6
Railroad Creek	5	2020-08-23	15	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	43.04
Railroad Creek	5	2020-08-23	15	Ephemerella tibialis	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	5	2020-08-23	15	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	43.04
Railroad Creek	5	2020-08-23	15	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	86.08
Railroad Creek	5	2020-08-23	15	Epeorus grandis group	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	10.76
Railroad Creek	5	2020-08-23	15	Epeorus longimanus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	43.04
Railroad Creek	5	2020-08-23	15	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	161.4
Railroad Creek	5	2020-08-23	15	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	10.76
Railroad Creek	5	2020-08-23	15	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	75.32
Railroad Creek	5	2020-08-23	15	Brillia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	5	2020-08-23	15	Eukiefferiella claripennis group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	5	2020-08-23	15	Orthocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	5	2020-08-23	15	Tvetenia bavarica group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	43.04
Railroad Creek	5	2020-08-23	15	Ceratopogoninae	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Ceratopogonidae	no-see-um midges	10.76
Railroad Creek	5	2020-08-23	15	Suwallini	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	21.52
Railroad Creek	5	2020-08-23	15	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	10.76
Railroad Creek	5	2020-08-23	15	Zapada cinctipes	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	32.28
Railroad Creek	5	2020-08-23	15	Zapada columbiana	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	21.52
Railroad Creek	5	2020-08-23	15	Megarcys	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlodidae	stoneflies	10.76
Railroad Creek	5	2020-08-23	15	Pteronarcys princeps	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Pteronarcyidae	stoneflies	21.52
Railroad Creek	12A	2020-08-24	15	Arctopsychinae	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydropsychidae	caddisflies	10.76
Railroad Creek	12A	2020-08-24	15	Rhyacophila atrata group	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	12A	2020-08-24	15	Rhyacophila brunnea/vemna group	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	12A	2020-08-24	15	Rhyacophila angelita group	P	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	12A	2020-08-24	15	Baetis bicaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	21.52
Railroad Creek	12A	2020-08-24	15	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	150.64
Railroad Creek	12A	2020-08-24	15	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	21.52
Railroad Creek	12A	2020-08-24	15	Ephemerella alleni	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	12A	2020-08-24	15	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	53.8
Railroad Creek	12A	2020-08-24	15	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	118.36
Railroad Creek	12A	2020-08-24	15	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	107.6
Railroad Creek	12A	2020-08-24	15	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	21.52
Railroad Creek	12A	2020-08-24	15	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	10.76
Railroad Creek	12A	2020-08-24	15	Pagastia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Diamesinae	midges	21.52
Railroad Creek	12A	2020-08-24	15	Eukiefferiella claripennis group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	12A	2020-08-24	15	Parorthocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	12A	2020-08-24	15	Tvetenia bavarica group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	12A	2020-08-24	15	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	269
Railroad Creek	12A	2020-08-24	15	Visoka cataractae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	12A	2020-08-24	15	Zapada cinctipes	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	12A	2020-08-24	15	Taeniopterygidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Taeniopterygidae	stoneflies	32.28
Railroad Creek	15	2015-08-24	2	Arctopsychinae	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydropsychidae	caddisflies	10.76
Railroad Creek	15	2015-08-24	2	Rhyacophila brunnea/vemna group	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	15	2015-08-24	2	Rhyacophila vagrita	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	15	2015-08-24	2	Hexatoma	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	10.76
Railroad Creek	15	2015-08-24	2	Baetis bicaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	107.6
Railroad Creek	15	2015-08-24	2	Caudatella hystrix	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	15	2015-08-24	2	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	75.32
Railroad Creek	15	2015-08-24	2	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	43.04
Railroad Creek	15	2015-08-24	2	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	215.2
Railroad Creek	15	2015-08-24	2	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	355.08
Railroad Creek	15	2015-08-24	2	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	10.76
Railroad Creek	15	2015-08-24	2	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	21.52
Railroad Creek	15	2015-08-24	2	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	32.28
Railroad Creek	15	2015-08-24	2	Pagastia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Diamesinae	midges	21.52
Railroad Creek	15	2015-08-24	2	Brillia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	15	2015-08-24	2	Eukiefferiella brehmi group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	15	2015-08-24	2	Eukiefferiella pseudomontana group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	15	2015-08-24	2	Tvetenia bavarica group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	32.28
Railroad Creek	15	2015-08-24	2	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	258.24
Railroad Creek	15	2015-08-24	2	Zapada cinctipes	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	21.52
Railroad Creek	15	2015-08-24	2	Doroneuria	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlidae	stoneflies	10.76
Railroad Creek	15	2015-08-24	2	Megarcys	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlodidae	stoneflies	10.76
Railroad Creek	15	2015-08-24	2	Taeniopterygidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Taeniopterygidae	stoneflies	32.28
Railroad Creek	1	2020-08-20	2	Simulium	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Simuliidae	black flies	10.76
Railroad Creek	1	2020-08-20	2	Apatania	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Apataniidae	caddisflies	10.76
Railroad Creek	1	2020-08-20	2	Glossosoma	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Glossosomatidae	caddisflies	43.04
Railroad Creek	1	2020-08-20	2	Arctopsychinae	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydropsychidae	caddisflies	75.32
Railroad Creek	1	2020-08-20	2	Dolophilodes	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Philopotamidae	caddisflies	10.76
Railroad Creek	1	2020-08-20	2	Rhyacophila atrata group	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	1	2020-08-20	2	Rhyacophila brunnea/vemna group	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	1	2020-08-20	2	Neophylax occidentis	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Uenoidae	caddisflies	10.76
Railroad Creek	1	2020-08-20	2	Chelifera/Metachela	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Empididae	dance flies	10.76
Railroad Creek	1	2020-08-20	2	Oreogeton	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Empididae	dance flies	21.52
Railroad Creek	1	2020-08-20	2	Polycelis	U	non-insect	Aquatic	Turbellaria	miscellaneous non-insect	Planariidae	flat worms	10.76
Railroad Creek	1	2020-08-20	2	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	204.44
Railroad Creek	1	2020-08-20	2	Drunella coloradensis/flavilinea	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	1	2020-08-20	2	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	139.88
Railroad Creek	1	2020-08-20	2	Drunella spinifera	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	86.08
Railroad Creek	1	2020-08-20	2	Ephemerella alleni	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	1	2020-08-20	2	Ephemerella tibialis	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	1	2020-08-20	2	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	118.36
Railroad Creek	1	2020-08-20	2	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	742.44
Railroad Creek	1	2020-08-20	2	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	75.32
Railroad Creek	1	2020-08-20	2	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	43.04
Railroad Creek	1	2020-08-20	2	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	75.32
Railroad Creek	1	2020-08-20	2	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	10.76
Railroad Creek	1	2020-08-20	2	Pagastia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Diamesinae	midges	10.76
Railroad Creek	1	2020-08-20	2	Brillia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	1	2020-08-20	2	Chaetocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	1	2020-08-20	2	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	581.04
Railroad Creek	1	2020-08-20	2	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	10.76
Railroad Creek	1	2020-08-20	2	Leuctridae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Leuctridae	stoneflies	21.52
Railroad Creek	1	2020-08-20	2	Doroneuria	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlidae	stoneflies	21.52
Railroad Creek	1	2020-08-20	2	Megarcys	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlodidae	stoneflies	10.76
Railroad Creek	1	2020-08-20	2	Taeniopterygidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Taeniopterygidae	stoneflies	32.28
Railroad Creek	6	2020-08-20	2	Simulium	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Simuliidae	black flies	10.76
Railroad Creek	6	2020-08-20	2	Pedomoecus sierra	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Apataniidae	caddisflies	10.76
Railroad Creek	6	2020-08-20	2	Glossosoma	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Glossosomatidae	caddisflies	86.08
Railroad Creek	6	2020-08-20	2	Glossosoma	P	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Glossosomatidae	caddisflies	10.76
Railroad Creek	6	2020-08-20	2	Arctopsychinae	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydropsychidae	caddisflies	21.52
Railroad Creek	6	2020-08-20	2	Parapsyche elsis	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydropsychidae	caddisflies	21.52

Waterbody	Station	Date	Replicate	Taxon	Stage	Insect	Origin	Higher.classification	Order	Family	Common.name	Abundance
Railroad Creek	6	2020-08-20	2	Rhyacophila atrata group	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	53.8
Railroad Creek	6	2020-08-20	2	Rhyacophila brunnea/vemna group	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	6	2020-08-20	2	Rhyacophila narvae	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	6	2020-08-20	2	Rhyacophila angelita group	P	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	6	2020-08-20	2	Hexatoma	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	10.76
Railroad Creek	6	2020-08-20	2	Chelifera/Metachela	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Empididae	dance flies	10.76
Railroad Creek	6	2020-08-20	2	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	118.36
Railroad Creek	6	2020-08-20	2	Caudatella hystrix	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	6	2020-08-20	2	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	236.72
Railroad Creek	6	2020-08-20	2	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	21.52
Railroad Creek	6	2020-08-20	2	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	548.76
Railroad Creek	6	2020-08-20	2	Epeorus longimanus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	10.76
Railroad Creek	6	2020-08-20	2	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	32.28
Railroad Creek	6	2020-08-20	2	Neoleptophlebia/Paraleptophlebia	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Leptophlebiidae	mayflies	10.76
Railroad Creek	6	2020-08-20	2	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	21.52
Railroad Creek	6	2020-08-20	2	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	64.56
Railroad Creek	6	2020-08-20	2	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	53.8
Railroad Creek	6	2020-08-20	2	Lebertia	U	non-insect	Aquatic	Arachnida: Acari	x	x	mites	10.76
Railroad Creek	6	2020-08-20	2	Sperchonopsis	U	non-insect	Aquatic	Arachnida: Acari	x	x	mites	10.76
Railroad Creek	6	2020-08-20	2	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	53.8
Railroad Creek	6	2020-08-20	2	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	21.52
Railroad Creek	6	2020-08-20	2	Visoka cataractae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	32.28
Railroad Creek	6	2020-08-20	2	Zapada columbiana	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	43.04
Railroad Creek	6	2020-08-20	2	Zapada frigida	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	2	2020-08-21	2	Simulium	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Simuliidae	black flies	10.76
Railroad Creek	2	2020-08-21	2	Arctopsyche	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydropsychidae	caddisflies	10.76
Railroad Creek	2	2020-08-21	2	Rhyacophila	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	2	2020-08-21	2	Polycelis	U	non-insect	Aquatic	Turbellaria	miscellaneous non-insect	Planariidae	flat worms	53.8
Railroad Creek	2	2020-08-21	2	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	139.88
Railroad Creek	2	2020-08-21	2	Drunella coloradensis/flavilinea	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	2	2020-08-21	2	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	86.08
Railroad Creek	2	2020-08-21	2	Drunella spinifera	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	21.52
Railroad Creek	2	2020-08-21	2	Ephemerella tibialis	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	2	2020-08-21	2	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	43.04
Railroad Creek	2	2020-08-21	2	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	279.76
Railroad Creek	2	2020-08-21	2	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	96.84
Railroad Creek	2	2020-08-21	2	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	21.52
Railroad Creek	2	2020-08-21	2	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	53.8
Railroad Creek	2	2020-08-21	2	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	32.28
Railroad Creek	2	2020-08-21	2	Diamesa	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Diamesinae	midges	10.76
Railroad Creek	2	2020-08-21	2	Pagastia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Diamesinae	midges	53.8
Railroad Creek	2	2020-08-21	2	Brillia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	2	2020-08-21	2	Eukiefferiella brehmi group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	32.28
Railroad Creek	2	2020-08-21	2	Eukiefferiella claripennis group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	2	2020-08-21	2	Orthocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	2	2020-08-21	2	Tvetenia bavarica group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	64.56
Railroad Creek	2	2020-08-21	2	Sperchon	U	non-insect	Aquatic	Arachnida: Acari	x	x	mites	10.76
Railroad Creek	2	2020-08-21	2	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	1172.84
Railroad Creek	2	2020-08-21	2	Capniidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Capniidae	stoneflies	21.52
Railroad Creek	2	2020-08-21	2	Chloroperlidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	10.76
Railroad Creek	2	2020-08-21	2	Suwallini	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	10.76
Railroad Creek	2	2020-08-21	2	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	32.28
Railroad Creek	2	2020-08-21	2	Visoka cataractae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	21.52
Railroad Creek	2	2020-08-21	2	Zapada cinctipes	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	118.36
Railroad Creek	2	2020-08-21	2	Taeniopterygidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Taeniopterygidae	stoneflies	21.52
Railroad Creek	4	2020-08-21	2	Glossosoma	P	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Glossosomatidae	caddisflies	10.76
Railroad Creek	4	2020-08-21	2	Parapsyche elsis	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydropsychidae	caddisflies	10.76
Railroad Creek	4	2020-08-21	2	Rhyacophila brunnea/vemna group	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	21.52
Railroad Creek	4	2020-08-21	2	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	129.12
Railroad Creek	4	2020-08-21	2	Drunella coloradensis/flavilinea	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	43.04
Railroad Creek	4	2020-08-21	2	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	32.28
Railroad Creek	4	2020-08-21	2	Drunella spinifera	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	4	2020-08-21	2	Ephemerella tibialis	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	21.52
Railroad Creek	4	2020-08-21	2	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	64.56
Railroad Creek	4	2020-08-21	2	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	279.76
Railroad Creek	4	2020-08-21	2	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	32.28
Railroad Creek	4	2020-08-21	2	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	10.76
Railroad Creek	4	2020-08-21	2	Brillia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	4	2020-08-21	2	Eukiefferiella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	43.04
Railroad Creek	4	2020-08-21	2	Parorthocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	4	2020-08-21	2	Tvetenia bavarica group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	4	2020-08-21	2	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	86.08
Railroad Creek	4	2020-08-21	2	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	21.52
Railroad Creek	10	2020-08-22	2	Simulium	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Simuliidae	black flies	21.52
Railroad Creek	10	2020-08-22	2	Apatania	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Apataniidae	caddisflies	10.76
Railroad Creek	10	2020-08-22	2	Parapsyche elsis	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydropsychidae	caddisflies	10.76
Railroad Creek	10	2020-08-22	2	Ecclisomyia	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Limnephilidae	caddisflies	53.8
Railroad Creek	10	2020-08-22	2	Hexatoma	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	21.52
Railroad Creek	10	2020-08-22	2	Rhabdomastix (Rhabdomastix)	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	10.76
Railroad Creek	10	2020-08-22	2	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	43.04
Railroad Creek	10	2020-08-22	2	Drunella spinifera	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	43.04
Railroad Creek	10	2020-08-22	2	Ephemerella alleni	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	10	2020-08-22	2	Ephemerella tibialis	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	10	2020-08-22	2	Cinygma	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	10.76
Railroad Creek	10	2020-08-22	2	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	129.12
Railroad Creek	10	2020-08-22	2	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	21.52
Railroad Creek	10	2020-08-22	2	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	139.88
Railroad Creek	10	2020-08-22	2	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	10.76
Railroad Creek	10	2020-08-22	2	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	107.6
Railroad Creek	10	2020-08-22	2	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	269
Railroad Creek	10	2020-08-22	2	Brillia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	10	2020-08-22	2	Corynoneura	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	10	2020-08-22	2	Eukiefferiella claripennis group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	10	2020-08-22	2	Parametriocnemus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	10	2020-08-22	2	Tvetenia bavarica group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	10	2020-08-22	2	Sperchon	U	non-insect	Aquatic	Arachnida: Acari	x	x	mites	10.76
Railroad Creek	10	2020-08-22	2	Hydroporinae	L	insect	Aquatic	Arthropoda: Insecta	Coleoptera	Dytiscidae	predaceous diving beetles	10.76
Railroad Creek	10	2020-08-22	2	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	43.04
Railroad Creek	10	2020-08-22	2	Capniidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Capniidae	stoneflies	21.52
Railroad Creek	10	2020-08-22	2	Zapada cinctipes	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	96.84
Railroad Creek	10	2020-08-22	2	Zapada columbiana	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	10	2020-08-22	2	Isoperla	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlodidae	stoneflies	10.76
Railroad Creek	5	2020-08-23	2	Hexatoma	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	10.76
Railroad Creek	5	2020-08-23	2	Ameletus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ameletidae	mayflies	10.76
Railroad Creek	5	2020-08-23	2	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	53.8
Railroad Creek	5	2020-08-23	2	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	21.52
Railroad Creek	5	2020-08-23	2	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	43.04
Railroad Creek	5	2020-08-23	2	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	10.76
Railroad Creek	5	2020-08-23	2	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	21.52
Railroad Creek	5	2020-08-23	2	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	10.76
Railroad Creek	5	2020-08-23	2	Diamesa	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Diamesinae	midges	10.76
Railroad Creek	5	2020-08-23	2	Orthocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	5	2020-08-23	2	Tvetenia bavarica group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	5	2020-08-23	2	Pisidium	U	non-insect	Aquatic	Mollusca: Bivalvia	x	Sphaeriidae	pea clams	21.52
Railroad Creek	5	2020-08-23	2	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	225.96

Waterbody	Station	Date	Replicate	Taxon	Stage	Insect	Origin	Higher.classification	Order	Family	Common.name	Abundance
Railroad Creek	5	2020-08-23	2	Zapada cinctipes	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	12A	2020-08-24	2	Simulium	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Simuliidae	black flies	225.96
Railroad Creek	12A	2020-08-24	2	Simulium	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Simuliidae	black flies	10.76
Railroad Creek	12A	2020-08-24	2	Polycelis	U	non-insect	Aquatic	Turbellaria	miscellaneous non-insect	Planariidae	flat worms	10.76
Railroad Creek	12A	2020-08-24	2	Baetis bicaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	10.76
Railroad Creek	12A	2020-08-24	2	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	43.04
Railroad Creek	12A	2020-08-24	2	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	21.52
Railroad Creek	12A	2020-08-24	2	Drunella spinifera	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	12A	2020-08-24	2	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	53.8
Railroad Creek	12A	2020-08-24	2	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	32.28
Railroad Creek	12A	2020-08-24	2	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	21.52
Railroad Creek	12A	2020-08-24	2	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	118.36
Railroad Creek	12A	2020-08-24	2	Brillia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	12A	2020-08-24	2	Corynoneura	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	12A	2020-08-24	2	Eukiefferiella brehmi group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	12A	2020-08-24	2	Orthocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	12A	2020-08-24	2	Parametriocnemus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	12A	2020-08-24	2	Parorthocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	12A	2020-08-24	2	Tvetenia bavarica group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	53.8
Railroad Creek	12A	2020-08-24	2	Ceratopogoninae	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Ceratopogonidae	no-see-um midges	10.76
Railroad Creek	12A	2020-08-24	2	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	129.12
Railroad Creek	12A	2020-08-24	2	Capniidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Capniidae	stoneflies	21.52
Railroad Creek	12A	2020-08-24	2	Zapada cinctipes	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	32.28
Railroad Creek	12A	2020-08-24	2	Zapada columbiana	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	21.52
Railroad Creek	15	2015-08-24	3	Simulium	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Simuliidae	black flies	10.76
Railroad Creek	15	2015-08-24	3	Glossosoma	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Glossosomatidae	caddisflies	10.76
Railroad Creek	15	2015-08-24	3	Arctopsyche	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydropsychidae	caddisflies	32.28
Railroad Creek	15	2015-08-24	3	Arctopsychinae	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydropsychidae	caddisflies	32.28
Railroad Creek	15	2015-08-24	3	Rhyacophila betteni group	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	21.52
Railroad Creek	15	2015-08-24	3	Rhyacophila brunnea/vemna group	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	15	2015-08-24	3	Neothremma	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Uenoidae	caddisflies	21.52
Railroad Creek	15	2015-08-24	3	Dicranota	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	10.76
Railroad Creek	15	2015-08-24	3	Clinocera	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Empididae	dance flies	10.76
Railroad Creek	15	2015-08-24	3	Baetis bicaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	21.52
Railroad Creek	15	2015-08-24	3	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	150.64
Railroad Creek	15	2015-08-24	3	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	53.8
Railroad Creek	15	2015-08-24	3	Ephemerella alleni	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	15	2015-08-24	3	Ephemerella tibialis	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	32.28
Railroad Creek	15	2015-08-24	3	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	21.52
Railroad Creek	15	2015-08-24	3	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	333.56
Railroad Creek	15	2015-08-24	3	Epeorus longimanus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	10.76
Railroad Creek	15	2015-08-24	3	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	462.68
Railroad Creek	15	2015-08-24	3	Neoleptophlebia/Paraleptophlebia	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Leptophlebiidae	mayflies	10.76
Railroad Creek	15	2015-08-24	3	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	10.76
Railroad Creek	15	2015-08-24	3	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	139.88
Railroad Creek	15	2015-08-24	3	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	86.08
Railroad Creek	15	2015-08-24	3	Pagastia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Diamesinae	midges	10.76
Railroad Creek	15	2015-08-24	3	Brillia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	32.28
Railroad Creek	15	2015-08-24	3	Eukiefferiella brehmi group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	32.28
Railroad Creek	15	2015-08-24	3	Eukiefferiella claripennis group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	15	2015-08-24	3	Eukiefferiella pseudomontana group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	15	2015-08-24	3	Krenosmittia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	15	2015-08-24	3	Thienemanniella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	15	2015-08-24	3	Tvetenia bavarica group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	43.04
Railroad Creek	15	2015-08-24	3	Deuterophlebia	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Deuterophlebiidae	mountain midges	10.76
Railroad Creek	15	2015-08-24	3	Nemata	U	non-insect	Aquatic	Nemata	miscellaneous non-insect	x	round worms	10.76
Railroad Creek	15	2015-08-24	3	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	193.68
Railroad Creek	15	2015-08-24	3	Capniidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Capniidae	stoneflies	10.76
Railroad Creek	15	2015-08-24	3	Chloroperlidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	10.76
Railroad Creek	15	2015-08-24	3	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	10.76
Railroad Creek	15	2015-08-24	3	Zapada cinctipes	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	75.32
Railroad Creek	15	2015-08-24	3	Zapada columbiana	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	32.28
Railroad Creek	15	2015-08-24	3	Doroneuria	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlidae	stoneflies	53.8
Railroad Creek	15	2015-08-24	3	Taeniopterygidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Taeniopterygidae	stoneflies	21.52
Railroad Creek	1	2020-08-20	3	Glossosoma	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Glossosomatidae	caddisflies	10.76
Railroad Creek	1	2020-08-20	3	Glossosoma	P	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Glossosomatidae	caddisflies	10.76
Railroad Creek	1	2020-08-20	3	Arctopsychinae	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydropsychidae	caddisflies	10.76
Railroad Creek	1	2020-08-20	3	Hexatoma	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	10.76
Railroad Creek	1	2020-08-20	3	Oreogeton	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Empididae	dance flies	10.76
Railroad Creek	1	2020-08-20	3	Polycelis	U	non-insect	Aquatic	Turbellaria	miscellaneous non-insect	Planariidae	flat worms	21.52
Railroad Creek	1	2020-08-20	3	Ameletus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ameletidae	mayflies	10.76
Railroad Creek	1	2020-08-20	3	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	96.84
Railroad Creek	1	2020-08-20	3	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	107.6
Railroad Creek	1	2020-08-20	3	Drunella spinifera	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	1	2020-08-20	3	Ephemerella alleni	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	1	2020-08-20	3	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	10.76
Railroad Creek	1	2020-08-20	3	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	365.84
Railroad Creek	1	2020-08-20	3	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	32.28
Railroad Creek	1	2020-08-20	3	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	10.76
Railroad Creek	1	2020-08-20	3	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	32.28
Railroad Creek	1	2020-08-20	3	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	10.76
Railroad Creek	1	2020-08-20	3	Corynoneura	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	1	2020-08-20	3	Eukiefferiella brehmi group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	1	2020-08-20	3	Protzia	U	non-insect	Aquatic	Arachnida: Acari	x	x	mites	10.76
Railroad Creek	1	2020-08-20	3	Pisidium	U	non-insect	Aquatic	Mollusca: Bivalvia	x	Sphaeriidae	pea clams	10.76
Railroad Creek	1	2020-08-20	3	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	408.88
Railroad Creek	1	2020-08-20	3	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	10.76
Railroad Creek	1	2020-08-20	3	Zapada columbiana	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	6	2020-08-20	3	Simulium	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Simuliidae	black flies	21.52
Railroad Creek	6	2020-08-20	3	Glossosoma	P	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Glossosomatidae	caddisflies	21.52
Railroad Creek	6	2020-08-20	3	Arctopsyche	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydropsychidae	caddisflies	10.76
Railroad Creek	6	2020-08-20	3	Arctopsychinae	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydropsychidae	caddisflies	10.76
Railroad Creek	6	2020-08-20	3	Empididae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Empididae	dance flies	10.76
Railroad Creek	6	2020-08-20	3	Baetis bicaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	21.52
Railroad Creek	6	2020-08-20	3	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	182.92
Railroad Creek	6	2020-08-20	3	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	64.56
Railroad Creek	6	2020-08-20	3	Ephemerella alleni	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	6	2020-08-20	3	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	21.52
Railroad Creek	6	2020-08-20	3	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	269
Railroad Creek	6	2020-08-20	3	Epeorus grandis group	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	21.52
Railroad Creek	6	2020-08-20	3	Epeorus longimanus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	21.52
Railroad Creek	6	2020-08-20	3	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	344.32
Railroad Creek	6	2020-08-20	3	Neoleptophlebia/Paraleptophlebia	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Leptophlebiidae	mayflies	10.76
Railroad Creek	6	2020-08-20	3	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	86.08
Railroad Creek	6	2020-08-20	3	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	21.52
Railroad Creek	6	2020-08-20	3	Brillia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	6	2020-08-20	3	Rheocricotopus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	6	2020-08-20	3	Tvetenia bavarica group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	43.04
Railroad Creek	6	2020-08-20	3	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	344.32
Railroad Creek	6	2020-08-20	3	Capniidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Capniidae	stoneflies	43.04
Railroad Creek	6	2020-08-20	3	Suwallini	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	21.52
Railroad Creek	6	2020-08-20	3	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	43.04
Railroad Creek	6	2020-08-20	3	Zapada columbiana	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	64.56
Railroad Creek	6	2020-08-20	3	Calineuria californica	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlidae	stoneflies	10.76
Railroad Creek	6	2020-08-20	3	Pteronarcys princeps	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Pteronarcyidae	stoneflies	21.52

Waterbody	Station	Date	Replicate	Taxon	Stage	Insect	Origin	Higher.classification	Order	Family	Common.name	Abundance
Railroad Creek	2	2020-08-21	3	Arctopsychinae	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydropsychidae	caddisflies	10.76
Railroad Creek	2	2020-08-21	3	Clinocera	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Empididae	dance flies	10.76
Railroad Creek	2	2020-08-21	3	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	96.84
Railroad Creek	2	2020-08-21	3	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	32.28
Railroad Creek	2	2020-08-21	3	Drunella spinifera	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	2	2020-08-21	3	Ephemerella tibialis	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	2	2020-08-21	3	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	118.36
Railroad Creek	2	2020-08-21	3	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	139.88
Railroad Creek	2	2020-08-21	3	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	53.8
Railroad Creek	2	2020-08-21	3	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	10.76
Railroad Creek	2	2020-08-21	3	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	21.52
Railroad Creek	2	2020-08-21	3	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	161.4
Railroad Creek	2	2020-08-21	3	Pagastia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Diamesinae	midges	10.76
Railroad Creek	2	2020-08-21	3	Eukiefferiella brehmi group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	2	2020-08-21	3	Eukiefferiella devonica group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	2	2020-08-21	3	Orthocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	75.32
Railroad Creek	2	2020-08-21	3	Tvetenia bavarica group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	2	2020-08-21	3	Ceratopogoninae	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Ceratopogonidae	no-see-um midges	10.76
Railroad Creek	2	2020-08-21	3	Pisidium	U	non-insect	Aquatic	Mollusca: Bivalvia	x	Sphaeriidae	pea clams	10.76
Railroad Creek	2	2020-08-21	3	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	462.68
Railroad Creek	2	2020-08-21	3	Suwallini	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	64.56
Railroad Creek	2	2020-08-21	3	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	10.76
Railroad Creek	2	2020-08-21	3	Visoka cataractae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	2	2020-08-21	3	Zapada cinctipes	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	43.04
Railroad Creek	2	2020-08-21	3	Zapada columbiana	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	21.52
Railroad Creek	2	2020-08-21	3	Doroneuria	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlidae	stoneflies	10.76
Railroad Creek	2	2020-08-21	3	Taeniopterygidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Taeniopterygidae	stoneflies	53.8
Railroad Creek	4	2020-08-21	3	Rhyacophila brunnea/vemna group	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	4	2020-08-21	3	Hexatoma	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	21.52
Railroad Creek	4	2020-08-21	3	Oreogeton	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Empididae	dance flies	10.76
Railroad Creek	4	2020-08-21	3	Baetis bicaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	10.76
Railroad Creek	4	2020-08-21	3	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	150.64
Railroad Creek	4	2020-08-21	3	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	53.8
Railroad Creek	4	2020-08-21	3	Drunella spinifera	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	4	2020-08-21	3	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	32.28
Railroad Creek	4	2020-08-21	3	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	312.04
Railroad Creek	4	2020-08-21	3	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	129.12
Railroad Creek	4	2020-08-21	3	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	43.04
Railroad Creek	4	2020-08-21	3	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	53.8
Railroad Creek	4	2020-08-21	3	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	21.52
Railroad Creek	4	2020-08-21	3	Brillia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	4	2020-08-21	3	Eukiefferiella brehmi group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	4	2020-08-21	3	Sperchonopsis	U	non-insect	Aquatic	Arachnida: Acari	x	x	mites	10.76
Railroad Creek	4	2020-08-21	3	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	96.84
Railroad Creek	4	2020-08-21	3	Suwallini	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	10.76
Railroad Creek	4	2020-08-21	3	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	32.28
Railroad Creek	4	2020-08-21	3	Zapada columbiana	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	4	2020-08-21	3	Soliperla	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Peltoperlidae	stoneflies	10.76
Railroad Creek	4	2020-08-21	3	Calineuria californica	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlidae	stoneflies	10.76
Railroad Creek	4	2020-08-21	3	Doroneuria	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlidae	stoneflies	10.76
Railroad Creek	4	2020-08-21	3	Setvena	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlodidae	stoneflies	10.76
Railroad Creek	10	2020-08-22	3	Hexatoma	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	10.76
Railroad Creek	10	2020-08-22	3	Ameletus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ameletidae	mayflies	75.32
Railroad Creek	10	2020-08-22	3	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	10.76
Railroad Creek	10	2020-08-22	3	Drunella spinifera	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	10	2020-08-22	3	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	32.28
Railroad Creek	10	2020-08-22	3	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	10.76
Railroad Creek	10	2020-08-22	3	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	21.52
Railroad Creek	10	2020-08-22	3	Lebertia	U	non-insect	Aquatic	Arachnida: Acari	x	x	mites	21.52
Railroad Creek	10	2020-08-22	3	Ceratopogoninae	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Ceratopogonidae	no-see-um midges	10.76
Railroad Creek	10	2020-08-22	3	Zapada cinctipes	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	10	2020-08-22	3	Doroneuria	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlidae	stoneflies	10.76
Railroad Creek	5	2020-08-23	3	Prosimulium	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Simuliidae	black flies	10.76
Railroad Creek	5	2020-08-23	3	Simulium	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Simuliidae	black flies	32.28
Railroad Creek	5	2020-08-23	3	Arctopsychinae	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydropsychidae	caddisflies	21.52
Railroad Creek	5	2020-08-23	3	Parapsyche elsis	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydropsychidae	caddisflies	10.76
Railroad Creek	5	2020-08-23	3	Ecclisomyia	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Limnephilidae	caddisflies	10.76
Railroad Creek	5	2020-08-23	3	Rhyacophila brunnea/vemna group	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	5	2020-08-23	3	Ameletus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ameletidae	mayflies	32.28
Railroad Creek	5	2020-08-23	3	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	408.88
Railroad Creek	5	2020-08-23	3	Caudatella hystrix	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	32.28
Railroad Creek	5	2020-08-23	3	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	21.52
Railroad Creek	5	2020-08-23	3	Drunella spinifera	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	53.8
Railroad Creek	5	2020-08-23	3	Ephemerella excrucians group	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	5	2020-08-23	3	Ephemerella tibialis	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	21.52
Railroad Creek	5	2020-08-23	3	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	21.52
Railroad Creek	5	2020-08-23	3	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	86.08
Railroad Creek	5	2020-08-23	3	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	10.76
Railroad Creek	5	2020-08-23	3	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	32.28
Railroad Creek	5	2020-08-23	3	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	32.28
Railroad Creek	5	2020-08-23	3	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	53.8
Railroad Creek	5	2020-08-23	3	Pagastia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Diamesinae	midges	10.76
Railroad Creek	5	2020-08-23	3	Brillia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	5	2020-08-23	3	Orthocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	32.28
Railroad Creek	5	2020-08-23	3	Rheocricotopus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	5	2020-08-23	3	Tvetenia bavarica group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	32.28
Railroad Creek	5	2020-08-23	3	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	172.16
Railroad Creek	5	2020-08-23	3	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	21.52
Railroad Creek	5	2020-08-23	3	Zapada columbiana	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	12A	2020-08-24	3	Simulium	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Simuliidae	black flies	10.76
Railroad Creek	12A	2020-08-24	3	Apatania	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Apataniidae	caddisflies	10.76
Railroad Creek	12A	2020-08-24	3	Hexatoma	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	21.52
Railroad Creek	12A	2020-08-24	3	Clinocera	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Empididae	dance flies	10.76
Railroad Creek	12A	2020-08-24	3	Baetis bicaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	43.04
Railroad Creek	12A	2020-08-24	3	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	204.44
Railroad Creek	12A	2020-08-24	3	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	12A	2020-08-24	3	Ephemerella tibialis	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	12A	2020-08-24	3	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	139.88
Railroad Creek	12A	2020-08-24	3	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	355.08
Railroad Creek	12A	2020-08-24	3	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	193.68
Railroad Creek	12A	2020-08-24	3	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	10.76
Railroad Creek	12A	2020-08-24	3	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	43.04
Railroad Creek	12A	2020-08-24	3	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	10.76
Railroad Creek	12A	2020-08-24	3	Brillia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	12A	2020-08-24	3	Chaetocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	12A	2020-08-24	3	Tvetenia bavarica group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	12A	2020-08-24	3	Ceratopogoninae	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Ceratopogonidae	no-see-um midges	10.76
Railroad Creek	12A	2020-08-24	3	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	365.84
Railroad Creek	12A	2020-08-24	3	Capniidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Capniidae	stoneflies	21.52
Railroad Creek	12A	2020-08-24	3	Chloroperlidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	10.76
Railroad Creek	12A	2020-08-24	3	Suwallini	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	21.52
Railroad Creek	12A	2020-08-24	3	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	10.76
Railroad Creek	12A	2020-08-24	3	Zapada columbiana	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	12A	2020-08-24	3	Megarcys	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlodidae	stoneflies	10.76
Railroad Creek	12A	2020-08-24	3	Taeniopterygidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Taeniopterygidae	stoneflies	21.52

Waterbody	Station	Date	Replicate	Taxon	Stage	Insect	Origin	Higher.classification	Order	Family	Common.name	Abundance
Railroad Creek	15	2015-08-24	4	Arctopsychinae	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydropsychidae	caddisflies	10.76
Railroad Creek	15	2015-08-24	4	Wiedemannia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Empididae	dance flies	10.76
Railroad Creek	15	2015-08-24	4	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	43.04
Railroad Creek	15	2015-08-24	4	Drunella coloradensis/flavilinea	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	15	2015-08-24	4	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	64.56
Railroad Creek	15	2015-08-24	4	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	53.8
Railroad Creek	15	2015-08-24	4	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	129.12
Railroad Creek	15	2015-08-24	4	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	10.76
Railroad Creek	15	2015-08-24	4	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	10.76
Railroad Creek	15	2015-08-24	4	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	21.52
Railroad Creek	15	2015-08-24	4	Orthocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	15	2015-08-24	4	Parametriocnemus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	15	2015-08-24	4	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	43.04
Railroad Creek	15	2015-08-24	4	Doroneuria	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlidae	stoneflies	10.76
Railroad Creek	15	2015-08-24	4	Frisonia picticeps	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlodidae	stoneflies	10.76
Railroad Creek	1	2020-08-20	4	Rhyacophila brunnea/vemna group	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	21.52
Railroad Creek	1	2020-08-20	4	Rhyacophila vagrita	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	1	2020-08-20	4	Hexatoma	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	10.76
Railroad Creek	1	2020-08-20	4	Oreogeton	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Empididae	dance flies	10.76
Railroad Creek	1	2020-08-20	4	Baetis bicaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	10.76
Railroad Creek	1	2020-08-20	4	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	150.64
Railroad Creek	1	2020-08-20	4	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	118.36
Railroad Creek	1	2020-08-20	4	Drunella spinifera	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	21.52
Railroad Creek	1	2020-08-20	4	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	150.64
Railroad Creek	1	2020-08-20	4	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	215.2
Railroad Creek	1	2020-08-20	4	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	43.04
Railroad Creek	1	2020-08-20	4	Neoleptophlebia/Paraleptophlebia	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Leptophlebiidae	mayflies	10.76
Railroad Creek	1	2020-08-20	4	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	10.76
Railroad Creek	1	2020-08-20	4	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	10.76
Railroad Creek	1	2020-08-20	4	Chaetocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	1	2020-08-20	4	Eukiefferiella brehmi group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	1	2020-08-20	4	Ceratopogoninae	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Ceratopogonidae	no-see-um midges	10.76
Railroad Creek	1	2020-08-20	4	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	96.84
Railroad Creek	1	2020-08-20	4	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	10.76
Railroad Creek	1	2020-08-20	4	Zapada cinctipes	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	1	2020-08-20	4	Zapada columbiana	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	21.52
Railroad Creek	1	2020-08-20	4	Calineuria californica	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlidae	stoneflies	10.76
Railroad Creek	1	2020-08-20	4	Doroneuria	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlidae	stoneflies	10.76
Railroad Creek	6	2020-08-20	4	Simulium	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Simuliidae	black flies	53.8
Railroad Creek	6	2020-08-20	4	Glossosoma	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Glossosomatidae	caddisflies	86.08
Railroad Creek	6	2020-08-20	4	Arctopsychinae	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydropsychidae	caddisflies	10.76
Railroad Creek	6	2020-08-20	4	Parapsyche elsis	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydropsychidae	caddisflies	21.52
Railroad Creek	6	2020-08-20	4	Rhyacophila betteni group	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	6	2020-08-20	4	Rhyacophila brunnea/vemna group	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	6	2020-08-20	4	Rhyacophila betteni group	P	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	6	2020-08-20	4	Baetis bicaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	10.76
Railroad Creek	6	2020-08-20	4	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	32.28
Railroad Creek	6	2020-08-20	4	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	21.52
Railroad Creek	6	2020-08-20	4	Ephemerella tibialis	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	43.04
Railroad Creek	6	2020-08-20	4	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	10.76
Railroad Creek	6	2020-08-20	4	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	172.16
Railroad Creek	6	2020-08-20	4	Epeorus longimanus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	10.76
Railroad Creek	6	2020-08-20	4	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	247.48
Railroad Creek	6	2020-08-20	4	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	32.28
Railroad Creek	6	2020-08-20	4	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	43.04
Railroad Creek	6	2020-08-20	4	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	32.28
Railroad Creek	6	2020-08-20	4	Chaetocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	6	2020-08-20	4	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	172.16
Railroad Creek	6	2020-08-20	4	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	10.76
Railroad Creek	6	2020-08-20	4	Visoka cataractae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	32.28
Railroad Creek	6	2020-08-20	4	Zapada columbiana	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	21.52
Railroad Creek	6	2020-08-20	4	Zapada oregonensis group	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	6	2020-08-20	4	Pteronarcys princeps	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Pteronarcyidae	stoneflies	32.28
Railroad Creek	2	2020-08-21	4	Agraylea	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydroptilidae	caddisflies	10.76
Railroad Creek	2	2020-08-21	4	Rhyacophila narvae	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	2	2020-08-21	4	Hexatoma	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	21.52
Railroad Creek	2	2020-08-21	4	Polycelis	U	non-insect	Aquatic	Turbellaria	miscellaneous non-insect	Planariidae	flat worms	21.52
Railroad Creek	2	2020-08-21	4	Ameletus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ameletidae	mayflies	21.52
Railroad Creek	2	2020-08-21	4	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	129.12
Railroad Creek	2	2020-08-21	4	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	43.04
Railroad Creek	2	2020-08-21	4	Drunella spinifera	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	2	2020-08-21	4	Ephemerella alleni	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	2	2020-08-21	4	Ephemerella tibialis	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	2	2020-08-21	4	Cinygma	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	10.76
Railroad Creek	2	2020-08-21	4	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	96.84
Railroad Creek	2	2020-08-21	4	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	236.72
Railroad Creek	2	2020-08-21	4	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	53.8
Railroad Creek	2	2020-08-21	4	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	21.52
Railroad Creek	2	2020-08-21	4	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	86.08
Railroad Creek	2	2020-08-21	4	Tvetenia bavarica group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	53.8
Railroad Creek	2	2020-08-21	4	Thienemannimyia complex	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Tanypodinae	midges	10.76
Railroad Creek	2	2020-08-21	4	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	86.08
Railroad Creek	2	2020-08-21	4	Capniidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Capniidae	stoneflies	10.76
Railroad Creek	2	2020-08-21	4	Suwallini	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	10.76
Railroad Creek	2	2020-08-21	4	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	32.28
Railroad Creek	2	2020-08-21	4	Zapada cinctipes	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	53.8
Railroad Creek	2	2020-08-21	4	Doroneuria	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlidae	stoneflies	10.76
Railroad Creek	2	2020-08-21	4	Kogotus/Rickera	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlodidae	stoneflies	21.52
Railroad Creek	2	2020-08-21	4	Taeniopterygidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Taeniopterygidae	stoneflies	10.76
Railroad Creek	4	2020-08-21	4	Arctopsychinae	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydropsychidae	caddisflies	32.28
Railroad Creek	4	2020-08-21	4	Parapsyche elsis	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydropsychidae	caddisflies	43.04
Railroad Creek	4	2020-08-21	4	Rhyacophila brunnea/vemna group	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	53.8
Railroad Creek	4	2020-08-21	4	Rhyacophila coloradensis group	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	4	2020-08-21	4	Rhyacophila vagrita	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	75.32
Railroad Creek	4	2020-08-21	4	Polycelis	U	non-insect	Aquatic	Turbellaria	miscellaneous non-insect	Planariidae	flat worms	43.04
Railroad Creek	4	2020-08-21	4	Ameletus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ameletidae	mayflies	21.52
Railroad Creek	4	2020-08-21	4	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	172.16
Railroad Creek	4	2020-08-21	4	Caudatella hystrix	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	32.28
Railroad Creek	4	2020-08-21	4	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	75.32
Railroad Creek	4	2020-08-21	4	Drunella spinifera	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	21.52
Railroad Creek	4	2020-08-21	4	Ephemerella tibialis	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	4	2020-08-21	4	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	172.16
Railroad Creek	4	2020-08-21	4	Epeorus grandis group	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	10.76
Railroad Creek	4	2020-08-21	4	Epeorus longimanus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	10.76
Railroad Creek	4	2020-08-21	4	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	21.52
Railroad Creek	4	2020-08-21	4	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	75.32
Railroad Creek	4	2020-08-21	4	Brillia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	32.28
Railroad Creek	4	2020-08-21	4	Corynoneura	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	4	2020-08-21	4	Eukiefferiella brehmi group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	53.8
Railroad Creek	4	2020-08-21	4	Orthocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	4	2020-08-21	4	Tvetenia bavarica group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	4	2020-08-21	4	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	10.76
Railroad Creek	4	2020-08-21	4	Visoka cataractae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	43.04
Railroad Creek	4	2020-08-21	4	Zapada cinctipes	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	21.52
Railroad Creek	4	2020-08-21	4	Zapada columbiana	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	64.56

Waterbody	Station	Date	Replicate	Taxon	Stage	Insect	Origin	Higher.classification	Order	Family	Common.name	Abundance
Railroad Creek	4	2020-08-21	4	Pteronarcys princeps	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Pteronarcyidae	stoneflies	32.28
Railroad Creek	10	2020-08-22	4	Agraylea	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydroptilidae	caddisflies	21.52
Railroad Creek	10	2020-08-22	4	Lepidostoma cascadense	P	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Lepidostomatidae	caddisflies	10.76
Railroad Creek	10	2020-08-22	4	Ameletus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ameletidae	mayflies	21.52
Railroad Creek	10	2020-08-22	4	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	10.76
Railroad Creek	10	2020-08-22	4	Drunella spinifera	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	10	2020-08-22	4	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	10.76
Railroad Creek	10	2020-08-22	4	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	10.76
Railroad Creek	10	2020-08-22	4	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	10.76
Railroad Creek	10	2020-08-22	4	Brillia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	10	2020-08-22	4	Chaetocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	10	2020-08-22	4	Eukiefferiella brehmi group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	10	2020-08-22	4	Heterotrissocladius marcidus group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	10	2020-08-22	4	Rheocricotopus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	10	2020-08-22	4	Thienemanniella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	10	2020-08-22	4	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	10.76
Railroad Creek	10	2020-08-22	4	Zapada cinctipes	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	64.56
Railroad Creek	5	2020-08-23	4	Rhyacophila	P	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	5	2020-08-23	4	Hexatoma	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	43.04
Railroad Creek	5	2020-08-23	4	Chelifera/Metachela	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Empididae	dance flies	10.76
Railroad Creek	5	2020-08-23	4	Ameletus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ameletidae	mayflies	53.8
Railroad Creek	5	2020-08-23	4	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	107.6
Railroad Creek	5	2020-08-23	4	Drunella spinifera	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	21.52
Railroad Creek	5	2020-08-23	4	Ephemerella alleni	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	5	2020-08-23	4	Cinygma	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	21.52
Railroad Creek	5	2020-08-23	4	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	53.8
Railroad Creek	5	2020-08-23	4	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	10.76
Railroad Creek	5	2020-08-23	4	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	10.76
Railroad Creek	5	2020-08-23	4	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	75.32
Railroad Creek	5	2020-08-23	4	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	236.72
Railroad Creek	5	2020-08-23	4	Brillia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	5	2020-08-23	4	Chaetocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	5	2020-08-23	4	Corynoneura	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	5	2020-08-23	4	Orthocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	32.28
Railroad Creek	5	2020-08-23	4	Parametriocnemus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	5	2020-08-23	4	Rheocricotopus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	32.28
Railroad Creek	5	2020-08-23	4	Tvetenia bavarica group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	5	2020-08-23	4	Trombidiformes	U	non-insect	Aquatic	Arachnida: Acari	Trombidiformes	x	mites	10.76
Railroad Creek	5	2020-08-23	4	Ceratopogoninae	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Ceratopogonidae	no-see-um midges	32.28
Railroad Creek	5	2020-08-23	4	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	64.56
Railroad Creek	5	2020-08-23	4	Capniidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Capniidae	stoneflies	10.76
Railroad Creek	5	2020-08-23	4	Chloroperlidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	10.76
Railroad Creek	5	2020-08-23	4	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	10.76
Railroad Creek	5	2020-08-23	4	Leuctridae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Leuctridae	stoneflies	10.76
Railroad Creek	5	2020-08-23	4	Visoka cataractae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	5	2020-08-23	4	Zapada cinctipes	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	43.04
Railroad Creek	5	2020-08-23	4	Isoperla	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlodidae	stoneflies	10.76
Railroad Creek	12A	2020-08-24	4	Limnephilidae	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Limnephilidae	caddisflies	10.76
Railroad Creek	12A	2020-08-24	4	Hexatoma	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	64.56
Railroad Creek	12A	2020-08-24	4	Chelifera/Metachela	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Empididae	dance flies	10.76
Railroad Creek	12A	2020-08-24	4	Polycelis	U	non-insect	Aquatic	Turbellaria	miscellaneous non-insect	Planariidae	flat worms	10.76
Railroad Creek	12A	2020-08-24	4	Ameletus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ameletidae	mayflies	21.52
Railroad Creek	12A	2020-08-24	4	Baetis bicaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	86.08
Railroad Creek	12A	2020-08-24	4	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	21.52
Railroad Creek	12A	2020-08-24	4	Drunella coloradensis/flavilinea	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	12A	2020-08-24	4	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	86.08
Railroad Creek	12A	2020-08-24	4	Drunella spinifera	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	32.28
Railroad Creek	12A	2020-08-24	4	Ephemerella alleni	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	12A	2020-08-24	4	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	129.12
Railroad Creek	12A	2020-08-24	4	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	32.28
Railroad Creek	12A	2020-08-24	4	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	86.08
Railroad Creek	12A	2020-08-24	4	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	53.8
Railroad Creek	12A	2020-08-24	4	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	53.8
Railroad Creek	12A	2020-08-24	4	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	172.16
Railroad Creek	12A	2020-08-24	4	Chaetocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	12A	2020-08-24	4	Lebertia	U	non-insect	Aquatic	Arachnida: Acari	x	x	mites	10.76
Railroad Creek	12A	2020-08-24	4	Capniidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Capniidae	stoneflies	10.76
Railroad Creek	12A	2020-08-24	4	Chloroperlidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	10.76
Railroad Creek	12A	2020-08-24	4	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	32.28
Railroad Creek	12A	2020-08-24	4	Zapada cinctipes	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	107.6
Railroad Creek	12A	2020-08-24	4	Zapada columbiana	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	12A	2020-08-24	4	Doroneuria	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlidae	stoneflies	10.76
Railroad Creek	12A	2020-08-24	4	Isoperla	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlodidae	stoneflies	10.76
Railroad Creek	15	2015-08-24	5	Arctopsyche	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydropsychidae	caddisflies	10.76
Railroad Creek	15	2015-08-24	5	Arctopsychinae	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydropsychidae	caddisflies	43.04
Railroad Creek	15	2015-08-24	5	Ecclisomyia	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Limnephilidae	caddisflies	21.52
Railroad Creek	15	2015-08-24	5	Rhyacophila betteni group	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	21.52
Railroad Creek	15	2015-08-24	5	Rhyacophila brunnea/vemna group	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	15	2015-08-24	5	Rhyacophila vagrita	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	15	2015-08-24	5	Rhyacophila angelita group	P	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	15	2015-08-24	5	Rhabdomastix (Rhabdomastix)	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	10.76
Railroad Creek	15	2015-08-24	5	Clinocera	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Empididae	dance flies	21.52
Railroad Creek	15	2015-08-24	5	Ameletus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ameletidae	mayflies	10.76
Railroad Creek	15	2015-08-24	5	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	107.6
Railroad Creek	15	2015-08-24	5	Drunella coloradensis/flavilinea	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	15	2015-08-24	5	Drunella spinifera	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	15	2015-08-24	5	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	32.28
Railroad Creek	15	2015-08-24	5	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	139.88
Railroad Creek	15	2015-08-24	5	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	43.04
Railroad Creek	15	2015-08-24	5	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	139.88
Railroad Creek	15	2015-08-24	5	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	96.84
Railroad Creek	15	2015-08-24	5	Brillia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	15	2015-08-24	5	Corynoneura	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	15	2015-08-24	5	Eukiefferiella pseudomontana group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	15	2015-08-24	5	Orthocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	15	2015-08-24	5	Rheocricotopus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	15	2015-08-24	5	Thienemanniella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	15	2015-08-24	5	Tvetenia bavarica group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	53.8
Railroad Creek	15	2015-08-24	5	Sperchonopsis	U	non-insect	Aquatic	Arachnida: Acari	x	x	mites	10.76
Railroad Creek	15	2015-08-24	5	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	161.4
Railroad Creek	15	2015-08-24	5	Capniidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Capniidae	stoneflies	10.76
Railroad Creek	15	2015-08-24	5	Zapada cinctipes	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	43.04
Railroad Creek	15	2015-08-24	5	Doroneuria	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlidae	stoneflies	21.52
Railroad Creek	1	2020-08-20	5	Lepidostoma	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Lepidostomatidae	caddisflies	10.76
Railroad Creek	1	2020-08-20	5	Rhyacophila atrata group	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	21.52
Railroad Creek	1	2020-08-20	5	Rhyacophila betteni group	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	21.52
Railroad Creek	1	2020-08-20	5	Rhyacophila brunnea/vemna group	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	1	2020-08-20	5	Polycelis	U	non-insect	Aquatic	Turbellaria	miscellaneous non-insect	Planariidae	flat worms	10.76
Railroad Creek	1	2020-08-20	5	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	247.48
Railroad Creek	1	2020-08-20	5	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	75.32
Railroad Creek	1	2020-08-20	5	Drunella spinifera	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	1	2020-08-20	5	Ephemerella tibialis	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	1	2020-08-20	5	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	10.76
Railroad Creek	1	2020-08-20	5	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	269
Railroad Creek	1	2020-08-20	5	Epeorus longimanus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	21.52

Taxonomy Long Output for 2020 Benthic Macroinvertebrate Data (ID by Aquatic Biology Associates)
Note: Abundance converted to square meter.

Waterbody	Station	Date	Replicate	Taxon	Stage	Insect	Origin	Higher.classification	Order	Family	Common.name	Abundance
Railroad Creek	1	2020-08-20	5	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	161.4
Railroad Creek	1	2020-08-20	5	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	10.76
Railroad Creek	1	2020-08-20	5	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	10.76
Railroad Creek	1	2020-08-20	5	Parametriocnemus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	1	2020-08-20	5	Tvetenia bavarica group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	1	2020-08-20	5	Ceratopogoninae	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Ceratopogonidae	no-see-um midges	21.52
Railroad Creek	1	2020-08-20	5	Nemata	U	non-insect	Aquatic	Nemata	miscellaneous non-insect	x	round worms	21.52
Railroad Creek	1	2020-08-20	5	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	602.56
Railroad Creek	1	2020-08-20	5	Capniidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Capniidae	stoneflies	21.52
Railroad Creek	1	2020-08-20	5	Chloroperlidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	21.52
Railroad Creek	1	2020-08-20	5	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	10.76
Railroad Creek	1	2020-08-20	5	Zapada cinctipes	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	53.8
Railroad Creek	1	2020-08-20	5	Doroneuria	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlidae	stoneflies	32.28
Railroad Creek	1	2020-08-20	5	Megarcys	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlodidae	stoneflies	10.76
Railroad Creek	1	2020-08-20	5	Taeniopterygidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Taeniopterygidae	stoneflies	10.76
Railroad Creek	6	2020-08-20	5	Arctopsychinae	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydropsychidae	caddisflies	53.8
Railroad Creek	6	2020-08-20	5	Rhyacophila betteni group	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	6	2020-08-20	5	Rhyacophila brunnea/vemna group	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	21.52
Railroad Creek	6	2020-08-20	5	Dicranota	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	10.76
Railroad Creek	6	2020-08-20	5	Chelifera/Metachela	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Empididae	dance flies	10.76
Railroad Creek	6	2020-08-20	5	Oreogeton	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Empididae	dance flies	10.76
Railroad Creek	6	2020-08-20	5	Polycelis	U	non-insect	Aquatic	Turbellaria	miscellaneous non-insect	Planariidae	flat worms	10.76
Railroad Creek	6	2020-08-20	5	Baetis bicaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	10.76
Railroad Creek	6	2020-08-20	5	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	96.84
Railroad Creek	6	2020-08-20	5	Drunella coloradensis/flavilinea	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	6	2020-08-20	5	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	64.56
Railroad Creek	6	2020-08-20	5	Ephemerella alleni	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	6	2020-08-20	5	Ephemerella tibialis	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	6	2020-08-20	5	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	204.44
Railroad Creek	6	2020-08-20	5	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	53.8
Railroad Creek	6	2020-08-20	5	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	32.28
Railroad Creek	6	2020-08-20	5	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	32.28
Railroad Creek	6	2020-08-20	5	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	64.56
Railroad Creek	6	2020-08-20	5	Brillia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	6	2020-08-20	5	Chaetocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	6	2020-08-20	5	Parametriocnemus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	6	2020-08-20	5	Rheocricotopus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	6	2020-08-20	5	Tvetenia bavarica group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	6	2020-08-20	5	Nemata	U	non-insect	Aquatic	Nemata	miscellaneous non-insect	x	round worms	43.04
Railroad Creek	6	2020-08-20	5	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	129.12
Railroad Creek	6	2020-08-20	5	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	21.52
Railroad Creek	6	2020-08-20	5	Zapada cinctipes	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	43.04
Railroad Creek	6	2020-08-20	5	Zapada columbiana	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	86.08
Railroad Creek	6	2020-08-20	5	Calineuria californica	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlidae	stoneflies	10.76
Railroad Creek	2	2020-08-21	5	Arctopsyche	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydropsychidae	caddisflies	32.28
Railroad Creek	2	2020-08-21	5	Rhyacophila betteni group	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	21.52
Railroad Creek	2	2020-08-21	5	Hexatoma	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	21.52
Railroad Creek	2	2020-08-21	5	Clinocera	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Empididae	dance flies	10.76
Railroad Creek	2	2020-08-21	5	Oreogeton	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Empididae	dance flies	10.76
Railroad Creek	2	2020-08-21	5	Polycelis	U	non-insect	Aquatic	Turbellaria	miscellaneous non-insect	Planariidae	flat worms	21.52
Railroad Creek	2	2020-08-21	5	Ameletus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ameletidae	mayflies	21.52
Railroad Creek	2	2020-08-21	5	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	118.36
Railroad Creek	2	2020-08-21	5	Drunella coloradensis/flavilinea	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	2	2020-08-21	5	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	43.04
Railroad Creek	2	2020-08-21	5	Drunella spinifera	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	2	2020-08-21	5	Ephemerella alleni	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	2	2020-08-21	5	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	225.96
Railroad Creek	2	2020-08-21	5	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	344.32
Railroad Creek	2	2020-08-21	5	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	204.44
Railroad Creek	2	2020-08-21	5	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	32.28
Railroad Creek	2	2020-08-21	5	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	10.76
Railroad Creek	2	2020-08-21	5	Brillia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	2	2020-08-21	5	Corynoneura	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	2	2020-08-21	5	Cricotopus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	2	2020-08-21	5	Eukiefferiella brehmi group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	2	2020-08-21	5	Orthocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	2	2020-08-21	5	Tvetenia bavarica group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	53.8
Railroad Creek	2	2020-08-21	5	Atractides	U	non-insect	Aquatic	Arachnida: Acari	x	x	mites	10.76
Railroad Creek	2	2020-08-21	5	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	161.4
Railroad Creek	2	2020-08-21	5	Capniidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Capniidae	stoneflies	10.76
Railroad Creek	2	2020-08-21	5	Chloroperlidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	21.52
Railroad Creek	2	2020-08-21	5	Suwallini	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	10.76
Railroad Creek	2	2020-08-21	5	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	21.52
Railroad Creek	2	2020-08-21	5	Zapada cinctipes	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	21.52
Railroad Creek	2	2020-08-21	5	Zapada columbiana	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	2	2020-08-21	5	Taeniopterygidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Taeniopterygidae	stoneflies	10.76
Railroad Creek	4	2020-08-21	5	Apatania	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Apataniidae	caddisflies	10.76
Railroad Creek	4	2020-08-21	5	Polycelis	U	non-insect	Aquatic	Turbellaria	miscellaneous non-insect	Planariidae	flat worms	10.76
Railroad Creek	4	2020-08-21	5	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	21.52
Railroad Creek	4	2020-08-21	5	Drunella spinifera	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	43.04
Railroad Creek	4	2020-08-21	5	Cinygma	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	21.52
Railroad Creek	4	2020-08-21	5	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	10.76
Railroad Creek	4	2020-08-21	5	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	21.52
Railroad Creek	4	2020-08-21	5	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	10.76
Railroad Creek	4	2020-08-21	5	Orthocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	4	2020-08-21	5	Rheocricotopus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	4	2020-08-21	5	Ceratopogoninae	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Ceratopogonidae	no-see-um midges	10.76
Railroad Creek	4	2020-08-21	5	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	32.28
Railroad Creek	4	2020-08-21	5	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	10.76
Railroad Creek	4	2020-08-21	5	Zapada cinctipes	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	4	2020-08-21	5	Zapada columbiana	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	10	2020-08-22	5	Prosimulium	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Simuliidae	black flies	10.76
Railroad Creek	10	2020-08-22	5	Simulium	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Simuliidae	black flies	21.52
Railroad Creek	10	2020-08-22	5	Simulium	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Simuliidae	black flies	21.52
Railroad Creek	10	2020-08-22	5	Ecclisomyia	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Limnephilidae	caddisflies	32.28
Railroad Creek	10	2020-08-22	5	Rhyacophila brunnea/vemna group	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	10	2020-08-22	5	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	32.28
Railroad Creek	10	2020-08-22	5	Drunella coloradensis/flavilinea	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	10	2020-08-22	5	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	32.28
Railroad Creek	10	2020-08-22	5	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	10.76
Railroad Creek	10	2020-08-22	5	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	139.88
Railroad Creek	10	2020-08-22	5	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	32.28
Railroad Creek	10	2020-08-22	5	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	21.52
Railroad Creek	10	2020-08-22	5	Pagastia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Diamesinae	midges	10.76
Railroad Creek	10	2020-08-22	5	Brillia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	10	2020-08-22	5	Rheocricotopus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	10	2020-08-22	5	Stilocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	10	2020-08-22	5	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	96.84
Railroad Creek	10	2020-08-22	5	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	21.52
Railroad Creek	10	2020-08-22	5	Zapada cinctipes	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	21.52
Railroad Creek	10	2020-08-22	5	Zapada frigida	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	10	2020-08-22	5	Taeniopterygidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Taeniopterygidae	stoneflies	10.76
Railroad Creek	5	2020-08-23	5	Simulium	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Simuliidae	black flies	10.76
Railroad Creek	5	2020-08-23	5	Arctopsyche	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydropsychidae	caddisflies	10.76
Railroad Creek	5	2020-08-23	5	Parapsyche elsis	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydropsychidae	caddisflies	10.76

Waterbody	Station	Date	Replicate	Taxon	Stage	Insect	Origin	Higher.classification	Order	Family	Common.name	Abundance
Railroad Creek	5	2020-08-23	5	Rhyacophila betteni group	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	5	2020-08-23	5	Dicranota	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	10.76
Railroad Creek	5	2020-08-23	5	Hexatoma	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	32.28
Railroad Creek	5	2020-08-23	5	Rhabdomastix (Rhabdomastix)	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	10.76
Railroad Creek	5	2020-08-23	5	Ameletus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ameletidae	mayflies	10.76
Railroad Creek	5	2020-08-23	5	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	129.12
Railroad Creek	5	2020-08-23	5	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	32.28
Railroad Creek	5	2020-08-23	5	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	64.56
Railroad Creek	5	2020-08-23	5	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	193.68
Railroad Creek	5	2020-08-23	5	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	107.6
Railroad Creek	5	2020-08-23	5	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	43.04
Railroad Creek	5	2020-08-23	5	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	43.04
Railroad Creek	5	2020-08-23	5	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	75.32
Railroad Creek	5	2020-08-23	5	Pagastia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Diamesinae	midges	10.76
Railroad Creek	5	2020-08-23	5	Brillia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	5	2020-08-23	5	Orthocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	5	2020-08-23	5	Rheocricotopus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	5	2020-08-23	5	Tvetenia bavarica group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	53.8
Railroad Creek	5	2020-08-23	5	Ceratopogoninae	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Ceratopogonidae	no-see-um midges	10.76
Railroad Creek	5	2020-08-23	5	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	494.96
Railroad Creek	5	2020-08-23	5	Suwallini	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	10.76
Railroad Creek	5	2020-08-23	5	Zapada cinctipes	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	53.8
Railroad Creek	5	2020-08-23	5	Zapada columbiana	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	5	2020-08-23	5	Kogotus/Rickera	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlodidae	stoneflies	10.76
Railroad Creek	5	2020-08-23	5	Taeniopterygidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Taeniopterygidae	stoneflies	21.52
Railroad Creek	12A	2020-08-24	5	Simulium	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Simuliidae	black flies	86.08
Railroad Creek	12A	2020-08-24	5	Pedomoecus sierra	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Apataniidae	caddisflies	10.76
Railroad Creek	12A	2020-08-24	5	Glossosoma	P	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Glossosomatidae	caddisflies	10.76
Railroad Creek	12A	2020-08-24	5	Arctopsyche	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydropsychidae	caddisflies	10.76
Railroad Creek	12A	2020-08-24	5	Arctopsychinae	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydropsychidae	caddisflies	21.52
Railroad Creek	12A	2020-08-24	5	Rhyacophila betteni group	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	12A	2020-08-24	5	Hexatoma	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	21.52
Railroad Creek	12A	2020-08-24	5	Chelifera/Metachela	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Empididae	dance flies	10.76
Railroad Creek	12A	2020-08-24	5	Baetis bicaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	75.32
Railroad Creek	12A	2020-08-24	5	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	182.92
Railroad Creek	12A	2020-08-24	5	Drunella coloradensis/flavilinea	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	12A	2020-08-24	5	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	75.32
Railroad Creek	12A	2020-08-24	5	Drunella spinifera	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	21.52
Railroad Creek	12A	2020-08-24	5	Ephemerella tibialis	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	21.52
Railroad Creek	12A	2020-08-24	5	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	139.88
Railroad Creek	12A	2020-08-24	5	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	290.52
Railroad Creek	12A	2020-08-24	5	Epeorus longimanus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	10.76
Railroad Creek	12A	2020-08-24	5	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	247.48
Railroad Creek	12A	2020-08-24	5	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	10.76
Railroad Creek	12A	2020-08-24	5	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	86.08
Railroad Creek	12A	2020-08-24	5	Brillia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	32.28
Railroad Creek	12A	2020-08-24	5	Eukiefferiella brehmi group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	12A	2020-08-24	5	Krenosmittia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	12A	2020-08-24	5	Orthocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	12A	2020-08-24	5	Tvetenia bavarica group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	86.08
Railroad Creek	12A	2020-08-24	5	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	269
Railroad Creek	12A	2020-08-24	5	Suwallini	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	21.52
Railroad Creek	12A	2020-08-24	5	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	32.28
Railroad Creek	12A	2020-08-24	5	Zapada cinctipes	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	53.8
Railroad Creek	12A	2020-08-24	5	Zapada columbiana	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	21.52
Railroad Creek	12A	2020-08-24	5	Megarcys	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlodidae	stoneflies	10.76
Railroad Creek	12A	2020-08-24	5	Taeniopterygidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Taeniopterygidae	stoneflies	32.28
Railroad Creek	15	2015-08-24	6	Simulium	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Simuliidae	black flies	10.76
Railroad Creek	15	2015-08-24	6	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	10.76
Railroad Creek	15	2015-08-24	6	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	15	2015-08-24	6	Ephemerella tibialis	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	15	2015-08-24	6	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	21.52
Railroad Creek	15	2015-08-24	6	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	10.76
Railroad Creek	15	2015-08-24	6	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	10.76
Railroad Creek	15	2015-08-24	6	Eukiefferiella brehmi group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	15	2015-08-24	6	Tvetenia bavarica group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	15	2015-08-24	6	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	10.76
Railroad Creek	1	2020-08-20	6	Arctopsychinae	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydropsychidae	caddisflies	10.76
Railroad Creek	1	2020-08-20	6	Rhyacophila betteni group	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	1	2020-08-20	6	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	53.8
Railroad Creek	1	2020-08-20	6	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	32.28
Railroad Creek	1	2020-08-20	6	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	10.76
Railroad Creek	1	2020-08-20	6	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	21.52
Railroad Creek	1	2020-08-20	6	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	43.04
Railroad Creek	1	2020-08-20	6	Tvetenia bavarica group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	1	2020-08-20	6	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	86.08
Railroad Creek	1	2020-08-20	6	Zapada columbiana	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	21.52
Railroad Creek	6	2020-08-20	6	Simulium	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Simuliidae	black flies	21.52
Railroad Creek	6	2020-08-20	6	Glossosoma	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Glossosomatidae	caddisflies	75.32
Railroad Creek	6	2020-08-20	6	Arctopsyche	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydropsychidae	caddisflies	32.28
Railroad Creek	6	2020-08-20	6	Arctopsychinae	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydropsychidae	caddisflies	10.76
Railroad Creek	6	2020-08-20	6	Parapsyche elsis	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydropsychidae	caddisflies	21.52
Railroad Creek	6	2020-08-20	6	Rhyacophila brunnea/vemna group	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	21.52
Railroad Creek	6	2020-08-20	6	Chelifera/Metachela	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Empididae	dance flies	21.52
Railroad Creek	6	2020-08-20	6	Polycelis	U	non-insect	Aquatic	Turbellaria	miscellaneous non-insect	Planariidae	flat worms	10.76
Railroad Creek	6	2020-08-20	6	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	43.04
Railroad Creek	6	2020-08-20	6	Ephemerella tibialis	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	6	2020-08-20	6	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	21.52
Railroad Creek	6	2020-08-20	6	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	107.6
Railroad Creek	6	2020-08-20	6	Epeorus grandis group	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	10.76
Railroad Creek	6	2020-08-20	6	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	96.84
Railroad Creek	6	2020-08-20	6	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	10.76
Railroad Creek	6	2020-08-20	6	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	53.8
Railroad Creek	6	2020-08-20	6	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	10.76
Railroad Creek	6	2020-08-20	6	Brillia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	6	2020-08-20	6	Orthocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	6	2020-08-20	6	Stilocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	6	2020-08-20	6	Sperchon	U	non-insect	Aquatic	Arachnida: Acari	x	x	mites	10.76
Railroad Creek	6	2020-08-20	6	Nemata	U	non-insect	Aquatic	Nemata	miscellaneous non-insect	x	round worms	21.52
Railroad Creek	6	2020-08-20	6	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	64.56
Railroad Creek	6	2020-08-20	6	Zapada columbiana	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	64.56
Railroad Creek	6	2020-08-20	6	Calineuria californica	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlidae	stoneflies	10.76
Railroad Creek	2	2020-08-21	6	Simulium	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Simuliidae	black flies	21.52
Railroad Creek	2	2020-08-21	6	Parapsyche elsis	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydropsychidae	caddisflies	64.56
Railroad Creek	2	2020-08-21	6	Rhyacophila betteni group	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	32.28
Railroad Creek	2	2020-08-21	6	Hexatoma	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	21.52
Railroad Creek	2	2020-08-21	6	Polycelis	U	non-insect	Aquatic	Turbellaria	miscellaneous non-insect	Planariidae	flat worms	21.52
Railroad Creek	2	2020-08-21	6	Ameletus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ameletidae	mayflies	10.76
Railroad Creek	2	2020-08-21	6	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	215.2
Railroad Creek	2	2020-08-21	6	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	75.32
Railroad Creek	2	2020-08-21	6	Drunella spinifera	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	21.52
Railroad Creek	2	2020-08-21	6	Ephemerella alleni	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	2	2020-08-21	6	Ephemerella tibialis	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	43.04
Railroad Creek	2	2020-08-21	6	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	150.64
Railroad Creek	2	2020-08-21	6	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	344.32

Waterbody	Station	Date	Replicate	Taxon	Stage	Insect	Origin	Higher.classification	Order	Family	Common.name	Abundance
Railroad Creek	2	2020-08-21	6	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	365.84
Railroad Creek	2	2020-08-21	6	Neoleptophlebia/Paraleptophlebia	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Leptophlebiidae	mayflies	10.76
Railroad Creek	2	2020-08-21	6	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	118.36
Railroad Creek	2	2020-08-21	6	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	43.04
Railroad Creek	2	2020-08-21	6	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	107.6
Railroad Creek	2	2020-08-21	6	Diamesa	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Diamesinae	midges	10.76
Railroad Creek	2	2020-08-21	6	Brillia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	32.28
Railroad Creek	2	2020-08-21	6	Corynoneura	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	2	2020-08-21	6	Eukiefferiella brehmi group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	2	2020-08-21	6	Krenosmittia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	2	2020-08-21	6	Lopescladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	2	2020-08-21	6	Orthocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	32.28
Railroad Creek	2	2020-08-21	6	Tvetenia bavarica group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	225.96
Railroad Creek	2	2020-08-21	6	Ceratopogoninae	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Ceratopogonidae	no-see-um midges	10.76
Railroad Creek	2	2020-08-21	6	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	505.72
Railroad Creek	2	2020-08-21	6	Ephydridae	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Ephydridae	shore and brine flies	10.76
Railroad Creek	2	2020-08-21	6	Suwallini	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	32.28
Railroad Creek	2	2020-08-21	6	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	53.8
Railroad Creek	2	2020-08-21	6	Visoka cataractae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	2	2020-08-21	6	Zapada cinctipes	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	53.8
Railroad Creek	2	2020-08-21	6	Zapada columbiana	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	86.08
Railroad Creek	2	2020-08-21	6	Doroneuria	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlidae	stoneflies	21.52
Railroad Creek	2	2020-08-21	6	Megarcys	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlodidae	stoneflies	21.52
Railroad Creek	4	2020-08-21	6	Rhyacophila betteni group	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	4	2020-08-21	6	Chelifera/Metachela	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Empididae	dance flies	10.76
Railroad Creek	4	2020-08-21	6	Ameletus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ameletidae	mayflies	32.28
Railroad Creek	4	2020-08-21	6	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	32.28
Railroad Creek	4	2020-08-21	6	Drunella spinifera	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	32.28
Railroad Creek	4	2020-08-21	6	Ephemerella alleni	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	4	2020-08-21	6	Ephemerella tibialis	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	4	2020-08-21	6	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	53.8
Railroad Creek	4	2020-08-21	6	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	10.76
Railroad Creek	4	2020-08-21	6	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	21.52
Railroad Creek	4	2020-08-21	6	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	43.04
Railroad Creek	4	2020-08-21	6	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	107.6
Railroad Creek	4	2020-08-21	6	Brillia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	32.28
Railroad Creek	4	2020-08-21	6	Chaetocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	4	2020-08-21	6	Orthocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	4	2020-08-21	6	Parorthocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	4	2020-08-21	6	Lebertia	U	non-insect	Aquatic	Arachnida: Acari	x	x	mites	10.76
Railroad Creek	4	2020-08-21	6	Sperchonopsis	U	non-insect	Aquatic	Arachnida: Acari	x	x	mites	21.52
Railroad Creek	4	2020-08-21	6	Ceratopogoninae	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Ceratopogonidae	no-see-um midges	10.76
Railroad Creek	4	2020-08-21	6	Suwallini	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	10.76
Railroad Creek	4	2020-08-21	6	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	43.04
Railroad Creek	4	2020-08-21	6	Visoka cataractae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	53.8
Railroad Creek	4	2020-08-21	6	Zapada cinctipes	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	21.52
Railroad Creek	10	2020-08-22	6	Simulium	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Simuliidae	black flies	10.76
Railroad Creek	10	2020-08-22	6	Apatania	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Apataniidae	caddisflies	21.52
Railroad Creek	10	2020-08-22	6	Pedomoecus sierra	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Apataniidae	caddisflies	10.76
Railroad Creek	10	2020-08-22	6	Hexatoma	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	10.76
Railroad Creek	10	2020-08-22	6	Ameletus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ameletidae	mayflies	53.8
Railroad Creek	10	2020-08-22	6	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	107.6
Railroad Creek	10	2020-08-22	6	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	10	2020-08-22	6	Drunella spinifera	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	10	2020-08-22	6	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	32.28
Railroad Creek	10	2020-08-22	6	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	10.76
Railroad Creek	10	2020-08-22	6	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	21.52
Railroad Creek	10	2020-08-22	6	Thienemanniella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	10	2020-08-22	6	Suwallini	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	21.52
Railroad Creek	10	2020-08-22	6	Kogotus/Rickera	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlodidae	stoneflies	10.76
Railroad Creek	5	2020-08-23	6	Arctopsychinae	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydropsychidae	caddisflies	21.52
Railroad Creek	5	2020-08-23	6	Ameletus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ameletidae	mayflies	43.04
Railroad Creek	5	2020-08-23	6	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	107.6
Railroad Creek	5	2020-08-23	6	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	5	2020-08-23	6	Ephemerella alleni	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	32.28
Railroad Creek	5	2020-08-23	6	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	53.8
Railroad Creek	5	2020-08-23	6	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	32.28
Railroad Creek	5	2020-08-23	6	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	21.52
Railroad Creek	5	2020-08-23	6	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	21.52
Railroad Creek	5	2020-08-23	6	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	21.52
Railroad Creek	5	2020-08-23	6	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	269
Railroad Creek	5	2020-08-23	6	Brillia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	5	2020-08-23	6	Cricotopus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	5	2020-08-23	6	Eukiefferiella brehmi group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	5	2020-08-23	6	Eukiefferiella claripennis group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	5	2020-08-23	6	Orthocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	5	2020-08-23	6	Tvetenia bavarica group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	107.6
Railroad Creek	5	2020-08-23	6	Sperchon	U	non-insect	Aquatic	Arachnida: Acari	x	x	mites	10.76
Railroad Creek	5	2020-08-23	6	Nemata	U	non-insect	Aquatic	Nemata	miscellaneous non-insect	x	round worms	10.76
Railroad Creek	5	2020-08-23	6	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	32.28
Railroad Creek	5	2020-08-23	6	Suwallini	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	21.52
Railroad Creek	5	2020-08-23	6	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	10.76
Railroad Creek	5	2020-08-23	6	Zapada cinctipes	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	53.8
Railroad Creek	5	2020-08-23	6	Zapada columbiana	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	21.52
Railroad Creek	5	2020-08-23	6	Calineuria californica	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlidae	stoneflies	10.76
Railroad Creek	12A	2020-08-24	6	Prosimulium	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Simuliidae	black flies	10.76
Railroad Creek	12A	2020-08-24	6	Glossosoma	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Glossosomatidae	caddisflies	10.76
Railroad Creek	12A	2020-08-24	6	Arctopsyche	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydropsychidae	caddisflies	10.76
Railroad Creek	12A	2020-08-24	6	Arctopsychinae	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydropsychidae	caddisflies	10.76
Railroad Creek	12A	2020-08-24	6	Rhyacophila atrata group	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	12A	2020-08-24	6	Rhyacophila brunnea/vemna group	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	32.28
Railroad Creek	12A	2020-08-24	6	Hexatoma	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	10.76
Railroad Creek	12A	2020-08-24	6	Nematomorpha	U	non-insect	Aquatic	Nematomorpha	miscellaneous non-insect	x	horsehair worms	10.76
Railroad Creek	12A	2020-08-24	6	Ameletus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ameletidae	mayflies	10.76
Railroad Creek	12A	2020-08-24	6	Baetis bicaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	53.8
Railroad Creek	12A	2020-08-24	6	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	43.04
Railroad Creek	12A	2020-08-24	6	Drunella coloradensis/flavilinea	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	12A	2020-08-24	6	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	43.04
Railroad Creek	12A	2020-08-24	6	Ephemerella alleni	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	12A	2020-08-24	6	Ephemerella tibialis	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	12A	2020-08-24	6	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	107.6
Railroad Creek	12A	2020-08-24	6	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	215.2
Railroad Creek	12A	2020-08-24	6	Epeorus longimanus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	10.76
Railroad Creek	12A	2020-08-24	6	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	301.28
Railroad Creek	12A	2020-08-24	6	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	10.76
Railroad Creek	12A	2020-08-24	6	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	21.52
Railroad Creek	12A	2020-08-24	6	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	64.56
Railroad Creek	12A	2020-08-24	6	Pagastia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Diamesinae	midges	10.76
Railroad Creek	12A	2020-08-24	6	Brillia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	43.04
Railroad Creek	12A	2020-08-24	6	Corynoneura	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	12A	2020-08-24	6	Orthocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	32.28
Railroad Creek	12A	2020-08-24	6	Tvetenia bavarica group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	32.28
Railroad Creek	12A	2020-08-24	6	Ceratopogoninae	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Ceratopogonidae	no-see-um midges	10.76
Railroad Creek	12A	2020-08-24	6	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	408.88
Railroad Creek	12A	2020-08-24	6	Zapada cinctipes	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	43.04

Waterbody	Station	Date	Replicate	Taxon	Stage	Insect	Origin	Higher.classification	Order	Family	Common.name	Abundance
Railroad Creek	12A	2020-08-24	6	Taeniopterygidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Taeniopterygidae	stoneflies	10.76
Railroad Creek	15	2015-08-24	7	Arctopsyche	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydropsychidae	caddisflies	43.04
Railroad Creek	15	2015-08-24	7	Arctopsychinae	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydropsychidae	caddisflies	10.76
Railroad Creek	15	2015-08-24	7	Parapsyche elsis	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydropsychidae	caddisflies	10.76
Railroad Creek	15	2015-08-24	7	Rhyacophila brunnea/vemna group	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	15	2015-08-24	7	Neophylax occidentis	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Uenoidae	caddisflies	10.76
Railroad Creek	15	2015-08-24	7	Chelifera/Metachela	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Empididae	dance flies	10.76
Railroad Creek	15	2015-08-24	7	Clinocera	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Empididae	dance flies	10.76
Railroad Creek	15	2015-08-24	7	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	86.08
Railroad Creek	15	2015-08-24	7	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	53.8
Railroad Creek	15	2015-08-24	7	Drunella spinifera	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	15	2015-08-24	7	Ephemerella tibialis	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	15	2015-08-24	7	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	21.52
Railroad Creek	15	2015-08-24	7	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	139.88
Railroad Creek	15	2015-08-24	7	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	43.04
Railroad Creek	15	2015-08-24	7	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	32.28
Railroad Creek	15	2015-08-24	7	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	21.52
Railroad Creek	15	2015-08-24	7	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	118.36
Railroad Creek	15	2015-08-24	7	Eukiefferiella brehmi group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	15	2015-08-24	7	Thienemanniella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	15	2015-08-24	7	Tvetenia bavarica group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	32.28
Railroad Creek	15	2015-08-24	7	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	21.52
Railroad Creek	15	2015-08-24	7	Zapada cinctipes	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	75.32
Railroad Creek	15	2015-08-24	7	Zapada oregonensis group	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	15	2015-08-24	7	Taeniopterygidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Taeniopterygidae	stoneflies	32.28
Railroad Creek	1	2020-08-20	7	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	21.52
Railroad Creek	6	2020-08-20	7	Rhyacophila atrata group	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	6	2020-08-20	7	Rhyacophila betteni group	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	43.04
Railroad Creek	6	2020-08-20	7	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	86.08
Railroad Creek	6	2020-08-20	7	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	107.6
Railroad Creek	6	2020-08-20	7	Ephemerella alleni	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	6	2020-08-20	7	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	86.08
Railroad Creek	6	2020-08-20	7	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	161.4
Railroad Creek	6	2020-08-20	7	Epeorus grandis group	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	10.76
Railroad Creek	6	2020-08-20	7	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	96.84
Railroad Creek	6	2020-08-20	7	Neoleptophlebia/Paraleptophlebia	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Leptophlebiidae	mayflies	32.28
Railroad Creek	6	2020-08-20	7	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	43.04
Railroad Creek	6	2020-08-20	7	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	43.04
Railroad Creek	6	2020-08-20	7	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	53.8
Railroad Creek	6	2020-08-20	7	Eukiefferiella claripennis group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	6	2020-08-20	7	Tvetenia bavarica group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	6	2020-08-20	7	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	86.08
Railroad Creek	6	2020-08-20	7	Chloroperlidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	10.76
Railroad Creek	6	2020-08-20	7	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	53.8
Railroad Creek	6	2020-08-20	7	Zapada cinctipes	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	21.52
Railroad Creek	6	2020-08-20	7	Calineuria californica	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlidae	stoneflies	10.76
Railroad Creek	6	2020-08-20	7	Megarcys	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlodidae	stoneflies	10.76
Railroad Creek	6	2020-08-20	7	Pteronarcys princeps	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Pteronarcyidae	stoneflies	10.76
Railroad Creek	2	2020-08-21	7	Hexatoma	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	21.52
Railroad Creek	2	2020-08-21	7	Ameletus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ameletidae	mayflies	118.36
Railroad Creek	2	2020-08-21	7	Ephemerella alleni	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	2	2020-08-21	7	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	10.76
Railroad Creek	2	2020-08-21	7	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	10.76
Railroad Creek	2	2020-08-21	7	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	10.76
Railroad Creek	2	2020-08-21	7	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	64.56
Railroad Creek	2	2020-08-21	7	Lebertia	U	non-insect	Aquatic	Arachnida: Acari	x	x	mites	10.76
Railroad Creek	2	2020-08-21	7	Ceratopogoninae	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Ceratopogonidae	no-see-um midges	10.76
Railroad Creek	2	2020-08-21	7	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	43.04
Railroad Creek	2	2020-08-21	7	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	10.76
Railroad Creek	2	2020-08-21	7	Moselia	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Leuctridae	stoneflies	10.76
Railroad Creek	2	2020-08-21	7	Zapada cinctipes	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	32.28
Railroad Creek	2	2020-08-21	7	Isoperla	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlodidae	stoneflies	10.76
Railroad Creek	2	2020-08-21	7	Taeniopterygidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Taeniopterygidae	stoneflies	10.76
Railroad Creek	4	2020-08-21	7	Apatania	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Apataniidae	caddisflies	10.76
Railroad Creek	4	2020-08-21	7	Arctopsychinae	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydropsychidae	caddisflies	10.76
Railroad Creek	4	2020-08-21	7	Rhyacophila atrata group	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	4	2020-08-21	7	Dicranota	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	10.76
Railroad Creek	4	2020-08-21	7	Hexatoma	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	32.28
Railroad Creek	4	2020-08-21	7	Ameletus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ameletidae	mayflies	75.32
Railroad Creek	4	2020-08-21	7	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	53.8
Railroad Creek	4	2020-08-21	7	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	172.16
Railroad Creek	4	2020-08-21	7	Drunella spinifera	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	64.56
Railroad Creek	4	2020-08-21	7	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	86.08
Railroad Creek	4	2020-08-21	7	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	32.28
Railroad Creek	4	2020-08-21	7	Neoleptophlebia/Paraleptophlebia	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Leptophlebiidae	mayflies	21.52
Railroad Creek	4	2020-08-21	7	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	32.28
Railroad Creek	4	2020-08-21	7	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	21.52
Railroad Creek	4	2020-08-21	7	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	43.04
Railroad Creek	4	2020-08-21	7	Brillia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	4	2020-08-21	7	Tvetenia bavarica group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	4	2020-08-21	7	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	215.2
Railroad Creek	4	2020-08-21	7	Suwallini	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	32.28
Railroad Creek	4	2020-08-21	7	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	10.76
Railroad Creek	4	2020-08-21	7	Visoka cataractae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	21.52
Railroad Creek	4	2020-08-21	7	Zapada cinctipes	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	10	2020-08-22	7	Simulium	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Simuliidae	black flies	10.76
Railroad Creek	10	2020-08-22	7	Rhyacophila atrata group	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	21.52
Railroad Creek	10	2020-08-22	7	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	32.28
Railroad Creek	10	2020-08-22	7	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	10	2020-08-22	7	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	32.28
Railroad Creek	10	2020-08-22	7	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	64.56
Railroad Creek	10	2020-08-22	7	Chaetocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	10	2020-08-22	7	Rheocricotopus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	10	2020-08-22	7	Thienemanniella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	10	2020-08-22	7	Lebertia	U	non-insect	Aquatic	Arachnida: Acari	x	x	mites	10.76
Railroad Creek	10	2020-08-22	7	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	86.08
Railroad Creek	10	2020-08-22	7	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	10.76
Railroad Creek	10	2020-08-22	7	Zapada cinctipes	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	10	2020-08-22	7	Kogotus/Rickera	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlodidae	stoneflies	10.76
Railroad Creek	10	2020-08-22	7	Taeniopterygidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Taeniopterygidae	stoneflies	10.76
Railroad Creek	5	2020-08-23	7	Arctopsychinae	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydropsychidae	caddisflies	10.76
Railroad Creek	5	2020-08-23	7	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	107.6
Railroad Creek	5	2020-08-23	7	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	32.28
Railroad Creek	5	2020-08-23	7	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	43.04
Railroad Creek	5	2020-08-23	7	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	107.6
Railroad Creek	5	2020-08-23	7	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	193.68
Railroad Creek	5	2020-08-23	7	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	32.28
Railroad Creek	5	2020-08-23	7	Brillia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	5	2020-08-23	7	Tvetenia bavarica group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	5	2020-08-23	7	Ceratopogoninae	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Ceratopogonidae	no-see-um midges	10.76
Railroad Creek	5	2020-08-23	7	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	53.8
Railroad Creek	5	2020-08-23	7	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	10.76
Railroad Creek	12A	2020-08-24	7	Arctopsychinae	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydropsychidae	caddisflies	10.76
Railroad Creek	12A	2020-08-24	7	Parapsyche elsis	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydropsychidae	caddisflies	10.76
Railroad Creek	12A	2020-08-24	7	Rhyacophila atrata group	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	21.52

Taxonomy Long Output for 2020 Benthic Macroinvertebrate Data (ID by Aquatic Biology Associates)
Note: Abundance converted to square meter.

Waterbody	Station	Date	Replicate	Taxon	Stage	Insect	Origin	Higher.classification	Order	Family	Common.name	Abundance
Railroad Creek	12A	2020-08-24	7	Hexatoma	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	32.28
Railroad Creek	12A	2020-08-24	7	Chelifera/Metachela	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Empididae	dance flies	10.76
Railroad Creek	12A	2020-08-24	7	Polycelis	U	non-insect	Aquatic	Turbellaria	miscellaneous non-insect	Planariidae	flat worms	21.52
Railroad Creek	12A	2020-08-24	7	Baetis bicaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	86.08
Railroad Creek	12A	2020-08-24	7	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	150.64
Railroad Creek	12A	2020-08-24	7	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	43.04
Railroad Creek	12A	2020-08-24	7	Ephemerella tibialis	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	21.52
Railroad Creek	12A	2020-08-24	7	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	172.16
Railroad Creek	12A	2020-08-24	7	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	139.88
Railroad Creek	12A	2020-08-24	7	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	172.16
Railroad Creek	12A	2020-08-24	7	Neoleptophlebia/Paraleptophlebia	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Leptophlebiidae	mayflies	10.76
Railroad Creek	12A	2020-08-24	7	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	43.04
Railroad Creek	12A	2020-08-24	7	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	86.08
Railroad Creek	12A	2020-08-24	7	Pagastia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Diamesinae	midges	21.52
Railroad Creek	12A	2020-08-24	7	Eukiefferiella claripennis group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	12A	2020-08-24	7	Orthocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	12A	2020-08-24	7	Stilocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	12A	2020-08-24	7	Thienemanniella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	12A	2020-08-24	7	Lebertia	U	non-insect	Aquatic	Arachnida: Acari	x	x	mites	10.76
Railroad Creek	12A	2020-08-24	7	Nemata	U	non-insect	Aquatic	Nemata	miscellaneous non-insect	x	round worms	10.76
Railroad Creek	12A	2020-08-24	7	Ostracoda	U	non-insect	Aquatic	Crustacea: Ostracoda	x	x	seed shrimp	10.76
Railroad Creek	12A	2020-08-24	7	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	258.24
Railroad Creek	12A	2020-08-24	7	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	10.76
Railroad Creek	12A	2020-08-24	7	Zapada cinctipes	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	53.8
Railroad Creek	12A	2020-08-24	7	Zapada columbiana	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	21.52
Railroad Creek	12A	2020-08-24	7	Taeniopterygidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Taeniopterygidae	stoneflies	10.76
Railroad Creek	15	2015-08-24	8	Arctopsyche	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydropsychidae	caddisflies	53.8
Railroad Creek	15	2015-08-24	8	Arctopsychinae	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydropsychidae	caddisflies	21.52
Railroad Creek	15	2015-08-24	8	Lepidostoma	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Lepidostomatidae	caddisflies	10.76
Railroad Creek	15	2015-08-24	8	Rhyacophila brunnea/vemna group	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	15	2015-08-24	8	Chelifera/Metachela	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Empididae	dance flies	10.76
Railroad Creek	15	2015-08-24	8	Clinocera	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Empididae	dance flies	10.76
Railroad Creek	15	2015-08-24	8	Ameletus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ameletidae	mayflies	10.76
Railroad Creek	15	2015-08-24	8	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	86.08
Railroad Creek	15	2015-08-24	8	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	21.52
Railroad Creek	15	2015-08-24	8	Drunella spinifera	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	15	2015-08-24	8	Ephemerella alleni	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	15	2015-08-24	8	Ephemerella tibialis	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	15	2015-08-24	8	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	32.28
Railroad Creek	15	2015-08-24	8	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	53.8
Railroad Creek	15	2015-08-24	8	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	21.52
Railroad Creek	15	2015-08-24	8	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	32.28
Railroad Creek	15	2015-08-24	8	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	118.36
Railroad Creek	15	2015-08-24	8	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	64.56
Railroad Creek	15	2015-08-24	8	Brillia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	15	2015-08-24	8	Parametriocnemus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	15	2015-08-24	8	Tvetenia bavarica group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	32.28
Railroad Creek	15	2015-08-24	8	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	10.76
Railroad Creek	15	2015-08-24	8	Zapada cinctipes	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	53.8
Railroad Creek	15	2015-08-24	8	Taeniopterygidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Taeniopterygidae	stoneflies	10.76
Railroad Creek	1	2020-08-20	8	Glossosoma	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Glossosomatidae	caddisflies	53.8
Railroad Creek	1	2020-08-20	8	Eloeophila	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	10.76
Railroad Creek	1	2020-08-20	8	Polycelis	U	non-insect	Aquatic	Turbellaria	miscellaneous non-insect	Planariidae	flat worms	21.52
Railroad Creek	1	2020-08-20	8	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	107.6
Railroad Creek	1	2020-08-20	8	Drunella coloradensis/flavilinea	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	1	2020-08-20	8	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	53.8
Railroad Creek	1	2020-08-20	8	Drunella spinifera	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	21.52
Railroad Creek	1	2020-08-20	8	Ephemerella tibialis	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	1	2020-08-20	8	Cinygma	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	10.76
Railroad Creek	1	2020-08-20	8	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	32.28
Railroad Creek	1	2020-08-20	8	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	204.44
Railroad Creek	1	2020-08-20	8	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	118.36
Railroad Creek	1	2020-08-20	8	Eukiefferiella claripennis group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	1	2020-08-20	8	Pisidium	U	non-insect	Aquatic	Mollusca: Bivalvia	x	Sphaeriidae	pea clams	10.76
Railroad Creek	1	2020-08-20	8	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	441.16
Railroad Creek	1	2020-08-20	8	Capniidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Capniidae	stoneflies	10.76
Railroad Creek	1	2020-08-20	8	Taeniopterygidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Taeniopterygidae	stoneflies	10.76
Railroad Creek	6	2020-08-20	8	Arctopsychinae	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydropsychidae	caddisflies	10.76
Railroad Creek	6	2020-08-20	8	Polycentropus	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Polycentopodidae	caddisflies	10.76
Railroad Creek	6	2020-08-20	8	Rhyacophila brunnea/vemna group	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	6	2020-08-20	8	Hexatoma	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	21.52
Railroad Creek	6	2020-08-20	8	Polycelis	U	non-insect	Aquatic	Turbellaria	miscellaneous non-insect	Planariidae	flat worms	21.52
Railroad Creek	6	2020-08-20	8	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	64.56
Railroad Creek	6	2020-08-20	8	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	53.8
Railroad Creek	6	2020-08-20	8	Drunella spinifera	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	6	2020-08-20	8	Ephemerella alleni	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	21.52
Railroad Creek	6	2020-08-20	8	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	53.8
Railroad Creek	6	2020-08-20	8	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	53.8
Railroad Creek	6	2020-08-20	8	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	64.56
Railroad Creek	6	2020-08-20	8	Neoleptophlebia/Paraleptophlebia	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Leptophlebiidae	mayflies	10.76
Railroad Creek	6	2020-08-20	8	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	43.04
Railroad Creek	6	2020-08-20	8	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	10.76
Railroad Creek	6	2020-08-20	8	Brillia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	6	2020-08-20	8	Tvetenia bavarica group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	6	2020-08-20	8	Lebertia	U	non-insect	Aquatic	Arachnida: Acari	x	x	mites	10.76
Railroad Creek	6	2020-08-20	8	Chloroperlidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	10.76
Railroad Creek	6	2020-08-20	8	Suwallini	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	21.52
Railroad Creek	6	2020-08-20	8	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	53.8
Railroad Creek	6	2020-08-20	8	Visoka cataractae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	6	2020-08-20	8	Zapada cinctipes	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	21.52
Railroad Creek	6	2020-08-20	8	Zapada columbiana	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	21.52
Railroad Creek	6	2020-08-20	8	Pteronarcys princeps	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Pteronarcyidae	stoneflies	21.52
Railroad Creek	2	2020-08-21	8	Simulium	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Simuliidae	black flies	10.76
Railroad Creek	2	2020-08-21	8	Arctopsyche	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydropsychidae	caddisflies	10.76
Railroad Creek	2	2020-08-21	8	Arctopsychinae	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydropsychidae	caddisflies	10.76
Railroad Creek	2	2020-08-21	8	Agraylea	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydroptilidae	caddisflies	10.76
Railroad Creek	2	2020-08-21	8	Rhyacophila betteni group	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	2	2020-08-21	8	Hexatoma	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	21.52
Railroad Creek	2	2020-08-21	8	Ameletus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ameletidae	mayflies	21.52
Railroad Creek	2	2020-08-21	8	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	32.28
Railroad Creek	2	2020-08-21	8	Drunella coloradensis/flavilinea	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	2	2020-08-21	8	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	2	2020-08-21	8	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	64.56
Railroad Creek	2	2020-08-21	8	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	53.8
Railroad Creek	2	2020-08-21	8	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	269
Railroad Creek	2	2020-08-21	8	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	43.04
Railroad Creek	2	2020-08-21	8	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	32.28
Railroad Creek	2	2020-08-21	8	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	43.04
Railroad Creek	2	2020-08-21	8	Brillia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	32.28
Railroad Creek	2	2020-08-21	8	Chaetocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	2	2020-08-21	8	Tvetenia bavarica group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	53.8
Railroad Creek	2	2020-08-21	8	Ostracoda	U	non-insect	Aquatic	Crustacea: Ostracoda	x	x	seed shrimp	10.76
Railroad Creek	2	2020-08-21	8	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	172.16
Railroad Creek	2	2020-08-21	8	Chloroperlidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	10.76
Railroad Creek	2	2020-08-21	8	Paraperla	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	10.76

Waterbody	Station	Date	Replicate	Taxon	Stage	Insect	Origin	Higher.classification	Order	Family	Common.name	Abundance
Railroad Creek	2	2020-08-21	8	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	75.32
Railroad Creek	2	2020-08-21	8	Zapada cinctipes	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	32.28
Railroad Creek	2	2020-08-21	8	Zapada columbiana	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	2	2020-08-21	8	Taeniopterygidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Taeniopterygidae	stoneflies	10.76
Railroad Creek	4	2020-08-21	8	Apatania	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Apataniidae	caddisflies	21.52
Railroad Creek	4	2020-08-21	8	Micrasema	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Brachycentridae	caddisflies	10.76
Railroad Creek	4	2020-08-21	8	Ecclisomyia	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Limnephilidae	caddisflies	10.76
Railroad Creek	4	2020-08-21	8	Rhyacophila brunnea/vemna group	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	4	2020-08-21	8	Dicranota	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	10.76
Railroad Creek	4	2020-08-21	8	Ameletus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ameletidae	mayflies	193.68
Railroad Creek	4	2020-08-21	8	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	21.52
Railroad Creek	4	2020-08-21	8	Drunella spinifera	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	4	2020-08-21	8	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	43.04
Railroad Creek	4	2020-08-21	8	Neoleptophlebia/Paraleptophlebia	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Leptophlebiidae	mayflies	10.76
Railroad Creek	4	2020-08-21	8	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	10.76
Railroad Creek	4	2020-08-21	8	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	21.52
Railroad Creek	4	2020-08-21	8	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	236.72
Railroad Creek	4	2020-08-21	8	Chaetocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	4	2020-08-21	8	Corynoneura	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	4	2020-08-21	8	Eukiefferiella claripennis group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	4	2020-08-21	8	Orthocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	4	2020-08-21	8	Tvetenia bavarica group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	4	2020-08-21	8	Sperchon	U	non-insect	Aquatic	Arachnida: Acari	x	x	mites	10.76
Railroad Creek	4	2020-08-21	8	Sperchonopsis	U	non-insect	Aquatic	Arachnida: Acari	x	x	mites	10.76
Railroad Creek	4	2020-08-21	8	Ceratopogoninae	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Ceratopogonidae	no-see-um midges	10.76
Railroad Creek	4	2020-08-21	8	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	53.8
Railroad Creek	4	2020-08-21	8	Suwallini	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	10.76
Railroad Creek	4	2020-08-21	8	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	43.04
Railroad Creek	4	2020-08-21	8	Visoka cataractae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	10	2020-08-22	8	Simulium	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Simuliidae	black flies	21.52
Railroad Creek	10	2020-08-22	8	Rhyacophila coloradensis group	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	10	2020-08-22	8	Rhyacophila vagrita	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	10	2020-08-22	8	Dicranota	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	21.52
Railroad Creek	10	2020-08-22	8	Hexatoma	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	10.76
Railroad Creek	10	2020-08-22	8	Chelifera/Metachela	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Empididae	dance flies	21.52
Railroad Creek	10	2020-08-22	8	Clinocera	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Empididae	dance flies	10.76
Railroad Creek	10	2020-08-22	8	Empididae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Empididae	dance flies	10.76
Railroad Creek	10	2020-08-22	8	Ameletus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ameletidae	mayflies	10.76
Railroad Creek	10	2020-08-22	8	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	215.2
Railroad Creek	10	2020-08-22	8	Caudatella hystrix	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	10	2020-08-22	8	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	86.08
Railroad Creek	10	2020-08-22	8	Drunella spinifera	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	32.28
Railroad Creek	10	2020-08-22	8	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	43.04
Railroad Creek	10	2020-08-22	8	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	269
Railroad Creek	10	2020-08-22	8	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	150.64
Railroad Creek	10	2020-08-22	8	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	21.52
Railroad Creek	10	2020-08-22	8	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	32.28
Railroad Creek	10	2020-08-22	8	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	21.52
Railroad Creek	10	2020-08-22	8	Chaetocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	10	2020-08-22	8	Eukiefferiella brehmi group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	10	2020-08-22	8	Parametriocnemus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	10	2020-08-22	8	Parorthocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	10	2020-08-22	8	Tvetenia bavarica group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	10	2020-08-22	8	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	355.08
Railroad Creek	10	2020-08-22	8	Zapada cinctipes	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	32.28
Railroad Creek	10	2020-08-22	8	Zapada columbiana	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	21.52
Railroad Creek	10	2020-08-22	8	Doroneuria	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlidae	stoneflies	10.76
Railroad Creek	10	2020-08-22	8	Megarcys	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlodidae	stoneflies	10.76
Railroad Creek	5	2020-08-23	8	Apatania	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Apataniidae	caddisflies	10.76
Railroad Creek	5	2020-08-23	8	Rhyacophila alberta group	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	5	2020-08-23	8	Hexatoma	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	75.32
Railroad Creek	5	2020-08-23	8	Clinocera	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Empididae	dance flies	10.76
Railroad Creek	5	2020-08-23	8	Ameletus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ameletidae	mayflies	32.28
Railroad Creek	5	2020-08-23	8	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	64.56
Railroad Creek	5	2020-08-23	8	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	43.04
Railroad Creek	5	2020-08-23	8	Drunella spinifera	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	5	2020-08-23	8	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	64.56
Railroad Creek	5	2020-08-23	8	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	96.84
Railroad Creek	5	2020-08-23	8	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	10.76
Railroad Creek	5	2020-08-23	8	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	21.52
Railroad Creek	5	2020-08-23	8	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	43.04
Railroad Creek	5	2020-08-23	8	Chaetocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	53.8
Railroad Creek	5	2020-08-23	8	Orthocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	32.28
Railroad Creek	5	2020-08-23	8	Thienemanniella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	5	2020-08-23	8	Tvetenia bavarica group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	5	2020-08-23	8	Sperchon	U	non-insect	Aquatic	Arachnida: Acari	x	x	mites	10.76
Railroad Creek	5	2020-08-23	8	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	247.48
Railroad Creek	5	2020-08-23	8	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	21.52
Railroad Creek	5	2020-08-23	8	Zapada cinctipes	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	12A	2020-08-24	8	Hexatoma	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	10.76
Railroad Creek	12A	2020-08-24	8	Ameletus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ameletidae	mayflies	118.36
Railroad Creek	12A	2020-08-24	8	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	10.76
Railroad Creek	12A	2020-08-24	8	Drunella coloradensis/flavilinea	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	12A	2020-08-24	8	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	32.28
Railroad Creek	12A	2020-08-24	8	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	10.76
Railroad Creek	12A	2020-08-24	8	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	21.52
Railroad Creek	12A	2020-08-24	8	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	10.76
Railroad Creek	12A	2020-08-24	8	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	21.52
Railroad Creek	12A	2020-08-24	8	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	64.56
Railroad Creek	12A	2020-08-24	8	Parorthocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	12A	2020-08-24	8	Lebertia	U	non-insect	Aquatic	Arachnida: Acari	x	x	mites	10.76
Railroad Creek	12A	2020-08-24	8	Ceratopogoninae	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Ceratopogonidae	no-see-um midges	10.76
Railroad Creek	12A	2020-08-24	8	Ostracoda	U	non-insect	Aquatic	Crustacea: Ostracoda	x	x	seed shrimp	10.76
Railroad Creek	12A	2020-08-24	8	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	118.36
Railroad Creek	12A	2020-08-24	8	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	10.76
Railroad Creek	12A	2020-08-24	8	Visoka cataractae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	12A	2020-08-24	8	Zapada oregonensis group	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	12A	2020-08-24	8	Calineuria californica	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlidae	stoneflies	10.76
Railroad Creek	15	2015-08-24	9	Simulium	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Simuliidae	black flies	21.52
Railroad Creek	15	2015-08-24	9	Simulium	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Simuliidae	black flies	10.76
Railroad Creek	15	2015-08-24	9	Arctopsyche	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydropsychidae	caddisflies	53.8
Railroad Creek	15	2015-08-24	9	Arctopsychinae	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydropsychidae	caddisflies	43.04
Railroad Creek	15	2015-08-24	9	Rhyacophila betteni group	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	15	2015-08-24	9	Rhyacophila brunnea/vemna group	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	21.52
Railroad Creek	15	2015-08-24	9	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	182.92
Railroad Creek	15	2015-08-24	9	Caudatella hystrix	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	15	2015-08-24	9	Drunella coloradensis/flavilinea	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	15	2015-08-24	9	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	21.52
Railroad Creek	15	2015-08-24	9	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	32.28
Railroad Creek	15	2015-08-24	9	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	96.84
Railroad Creek	15	2015-08-24	9	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	43.04
Railroad Creek	15	2015-08-24	9	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	21.52
Railroad Creek	15	2015-08-24	9	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	139.88
Railroad Creek	15	2015-08-24	9	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	107.6
Railroad Creek	15	2015-08-24	9	Brillia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	43.04

Taxonomy Long Output for 2020 Benthic Macroinvertebrate Data (ID by Aquatic Biology Associates)
Note: Abundance converted to square meter.

Waterbody	Station	Date	Replicate	Taxon	Stage	Insect	Origin	Higher.classification	Order	Family	Common.name	Abundance
Railroad Creek	15	2015-08-24	9	Thienemanniella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	15	2015-08-24	9	Tvetenia bavarica group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	43.04
Railroad Creek	15	2015-08-24	9	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	107.6
Railroad Creek	15	2015-08-24	9	Zapada cinctipes	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	86.08
Railroad Creek	15	2015-08-24	9	Zapada columbiana	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	21.52
Railroad Creek	15	2015-08-24	9	Perlodidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlodidae	stoneflies	10.76
Railroad Creek	15	2015-08-24	9	Taeniopterygidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Taeniopterygidae	stoneflies	53.8
Railroad Creek	1	2020-08-20	9	Rhyacophila atrata group	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	1	2020-08-20	9	Rhyacophila brunnea/vemna group	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	21.52
Railroad Creek	1	2020-08-20	9	Dicranota	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	10.76
Railroad Creek	1	2020-08-20	9	Polycelis	U	non-insect	Aquatic	Turbellaria	miscellaneous non-insect	Planariidae	flat worms	10.76
Railroad Creek	1	2020-08-20	9	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	139.88
Railroad Creek	1	2020-08-20	9	Drunella coloradensis/flavilinea	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	1	2020-08-20	9	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	53.8
Railroad Creek	1	2020-08-20	9	Ephemerella tibialis	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	1	2020-08-20	9	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	21.52
Railroad Creek	1	2020-08-20	9	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	172.16
Railroad Creek	1	2020-08-20	9	Epeorus grandis group	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	10.76
Railroad Creek	1	2020-08-20	9	Epeorus longimanus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	32.28
Railroad Creek	1	2020-08-20	9	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	355.08
Railroad Creek	1	2020-08-20	9	Neoleptophlebia/Paraleptophlebia	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Leptophlebiidae	mayflies	10.76
Railroad Creek	1	2020-08-20	9	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	21.52
Railroad Creek	1	2020-08-20	9	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	21.52
Railroad Creek	1	2020-08-20	9	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	43.04
Railroad Creek	1	2020-08-20	9	Chaetocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	1	2020-08-20	9	Eukiefferiella claripennis group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	1	2020-08-20	9	Tvetenia bavarica group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	1	2020-08-20	9	Ceratopogoninae	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Ceratopogonidae	no-see-um midges	10.76
Railroad Creek	1	2020-08-20	9	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	785.48
Railroad Creek	1	2020-08-20	9	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	10.76
Railroad Creek	1	2020-08-20	9	Zapada cinctipes	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	1	2020-08-20	9	Calineuria californica	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlidae	stoneflies	43.04
Railroad Creek	1	2020-08-20	9	Taeniopterygidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Taeniopterygidae	stoneflies	10.76
Railroad Creek	6	2020-08-20	9	Glossosoma	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Glossosomatidae	caddisflies	10.76
Railroad Creek	6	2020-08-20	9	Arctopsychinae	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydropsychidae	caddisflies	21.52
Railroad Creek	6	2020-08-20	9	Rhyacophila betteni group	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	6	2020-08-20	9	Polycelis	U	non-insect	Aquatic	Turbellaria	miscellaneous non-insect	Planariidae	flat worms	10.76
Railroad Creek	6	2020-08-20	9	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	64.56
Railroad Creek	6	2020-08-20	9	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	64.56
Railroad Creek	6	2020-08-20	9	Drunella spinifera	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	6	2020-08-20	9	Ephemerella tibialis	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	6	2020-08-20	9	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	21.52
Railroad Creek	6	2020-08-20	9	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	236.72
Railroad Creek	6	2020-08-20	9	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	32.28
Railroad Creek	6	2020-08-20	9	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	10.76
Railroad Creek	6	2020-08-20	9	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	32.28
Railroad Creek	6	2020-08-20	9	Stilocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	6	2020-08-20	9	Lebertia	U	non-insect	Aquatic	Arachnida: Acari	x	x	mites	10.76
Railroad Creek	6	2020-08-20	9	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	172.16
Railroad Creek	6	2020-08-20	9	Suwallini	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	10.76
Railroad Creek	6	2020-08-20	9	Zapada columbiana	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	43.04
Railroad Creek	6	2020-08-20	9	Megarcys	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlodidae	stoneflies	10.76
Railroad Creek	2	2020-08-21	9	Apatania	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Apataniidae	caddisflies	10.76
Railroad Creek	2	2020-08-21	9	Lepidostoma	P	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Lepidostomatidae	caddisflies	10.76
Railroad Creek	2	2020-08-21	9	Dicranota	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	10.76
Railroad Creek	2	2020-08-21	9	Hexatoma	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	21.52
Railroad Creek	2	2020-08-21	9	Ameletus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ameletidae	mayflies	139.88
Railroad Creek	2	2020-08-21	9	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	21.52
Railroad Creek	2	2020-08-21	9	Ephemerella tibialis	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	2	2020-08-21	9	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	96.84
Railroad Creek	2	2020-08-21	9	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	10.76
Railroad Creek	2	2020-08-21	9	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	21.52
Railroad Creek	2	2020-08-21	9	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	32.28
Railroad Creek	2	2020-08-21	9	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	118.36
Railroad Creek	2	2020-08-21	9	Brillia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	2	2020-08-21	9	Rheocricotopus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	2	2020-08-21	9	Thienemanniella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	2	2020-08-21	9	Sperchon	U	non-insect	Aquatic	Arachnida: Acari	x	x	mites	10.76
Railroad Creek	2	2020-08-21	9	Ceratopogoninae	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Ceratopogonidae	no-see-um midges	32.28
Railroad Creek	2	2020-08-21	9	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	150.64
Railroad Creek	2	2020-08-21	9	Capniidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Capniidae	stoneflies	53.8
Railroad Creek	2	2020-08-21	9	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	32.28
Railroad Creek	2	2020-08-21	9	Visoka cataractae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	2	2020-08-21	9	Zapada cinctipes	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	21.52
Railroad Creek	4	2020-08-21	9	Glossosoma	P	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Glossosomatidae	caddisflies	10.76
Railroad Creek	4	2020-08-21	9	Parapsyche elsis	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydropsychidae	caddisflies	10.76
Railroad Creek	4	2020-08-21	9	Ecclisomyia	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Limnephilidae	caddisflies	10.76
Railroad Creek	4	2020-08-21	9	Rhyacophila betteni group	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	21.52
Railroad Creek	4	2020-08-21	9	Rhyacophila brunnea/vemna group	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	4	2020-08-21	9	Rhyacophila vofixa group	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	4	2020-08-21	9	Hexatoma	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	10.76
Railroad Creek	4	2020-08-21	9	Clinocera	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Empididae	dance flies	10.76
Railroad Creek	4	2020-08-21	9	Ameletus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ameletidae	mayflies	10.76
Railroad Creek	4	2020-08-21	9	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	107.6
Railroad Creek	4	2020-08-21	9	Drunella coloradensis/flavilinea	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	21.52
Railroad Creek	4	2020-08-21	9	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	86.08
Railroad Creek	4	2020-08-21	9	Drunella spinifera	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	21.52
Railroad Creek	4	2020-08-21	9	Ephemerella tibialis	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	21.52
Railroad Creek	4	2020-08-21	9	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	118.36
Railroad Creek	4	2020-08-21	9	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	322.8
Railroad Creek	4	2020-08-21	9	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	21.52
Railroad Creek	4	2020-08-21	9	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	21.52
Railroad Creek	4	2020-08-21	9	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	53.8
Railroad Creek	4	2020-08-21	9	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	21.52
Railroad Creek	4	2020-08-21	9	Brillia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	4	2020-08-21	9	Eukiefferiella brehmi group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	4	2020-08-21	9	Tvetenia bavarica group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	4	2020-08-21	9	Sperchonopsis	U	non-insect	Aquatic	Arachnida: Acari	x	x	mites	10.76
Railroad Creek	4	2020-08-21	9	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	365.84
Railroad Creek	4	2020-08-21	9	Suwallini	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	10.76
Railroad Creek	4	2020-08-21	9	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	21.52
Railroad Creek	4	2020-08-21	9	Visoka cataractae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	43.04
Railroad Creek	4	2020-08-21	9	Zapada cinctipes	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	4	2020-08-21	9	Zapada columbiana	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	4	2020-08-21	9	Calineuria californica	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlidae	stoneflies	21.52
Railroad Creek	4	2020-08-21	9	Megarcys	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlodidae	stoneflies	10.76
Railroad Creek	10	2020-08-22	9	Apatania	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Apataniidae	caddisflies	10.76
Railroad Creek	10	2020-08-22	9	Micrasema	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Brachycentridae	caddisflies	10.76
Railroad Creek	10	2020-08-22	9	Arctopsyche	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydropsychidae	caddisflies	43.04
Railroad Creek	10	2020-08-22	9	Arctopsychinae	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Hydropsychidae	caddisflies	10.76
Railroad Creek	10	2020-08-22	9	Rhyacophila angelita group	P	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Rhyacophilidae	caddisflies	10.76
Railroad Creek	10	2020-08-22	9	Rhabdomastix (Rhabdomastix)	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	10.76
Railroad Creek	10	2020-08-22	9	Chelifera/Metachela	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Empididae	dance flies	43.04
Railroad Creek	10	2020-08-22	9	Oreogeton	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Empididae	dance flies	10.76
Railroad Creek	10	2020-08-22	9	Ameletus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ameletidae	mayflies	10.76

Taxonomy Long Output for 2020 Benthic Macroinvertebrate Data (ID by Aquatic Biology Associates)
Note: Abundance converted to square meter.

Waterbody	Station	Date	Replicate	Taxon	Stage	Insect	Origin	Higher.classification	Order	Family	Common.name	Abundance
Railroad Creek	10	2020-08-22	9	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	215.2
Railroad Creek	10	2020-08-22	9	Drunella coloradensis/flavilinea	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	10	2020-08-22	9	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	43.04
Railroad Creek	10	2020-08-22	9	Drunella spinifera	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	269
Railroad Creek	10	2020-08-22	9	Ephemerella alleni	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	53.8
Railroad Creek	10	2020-08-22	9	Ephemerella tibialis	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	32.28
Railroad Creek	10	2020-08-22	9	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	43.04
Railroad Creek	10	2020-08-22	9	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	10.76
Railroad Creek	10	2020-08-22	9	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	107.6
Railroad Creek	10	2020-08-22	9	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	53.8
Railroad Creek	10	2020-08-22	9	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	32.28
Railroad Creek	10	2020-08-22	9	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	118.36
Railroad Creek	10	2020-08-22	9	Chaetocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	10	2020-08-22	9	Parametriocnemus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	10	2020-08-22	9	Tvetenia bavarica group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	32.28
Railroad Creek	10	2020-08-22	9	Lebertia	U	non-insect	Aquatic	Arachnida: Acari	x	x	mites	10.76
Railroad Creek	10	2020-08-22	9	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	548.76
Railroad Creek	10	2020-08-22	9	Capniidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Capniidae	stoneflies	10.76
Railroad Creek	10	2020-08-22	9	Zapada cinctipes	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	387.36
Railroad Creek	10	2020-08-22	9	Zapada columbiana	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	10	2020-08-22	9	Doroneuria	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlidae	stoneflies	10.76
Railroad Creek	10	2020-08-22	9	Isoperla	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlodidae	stoneflies	10.76
Railroad Creek	5	2020-08-23	9	Pedomoecus sierra	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Apataniidae	caddisflies	10.76
Railroad Creek	5	2020-08-23	9	Lepidostoma	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Lepidostomatidae	caddisflies	10.76
Railroad Creek	5	2020-08-23	9	Dicranota	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	10.76
Railroad Creek	5	2020-08-23	9	Ameletus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ameletidae	mayflies	10.76
Railroad Creek	5	2020-08-23	9	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	10.76
Railroad Creek	5	2020-08-23	9	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	10.76
Railroad Creek	5	2020-08-23	9	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	32.28
Railroad Creek	5	2020-08-23	9	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	64.56
Railroad Creek	5	2020-08-23	9	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	53.8
Railroad Creek	5	2020-08-23	9	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	1818.44
Railroad Creek	5	2020-08-23	9	Brillia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	21.52
Railroad Creek	5	2020-08-23	9	Chaetocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	32.28
Railroad Creek	5	2020-08-23	9	Corynoneura	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	5	2020-08-23	9	Hydrobaenus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	5	2020-08-23	9	Parorthocladius	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	5	2020-08-23	9	Rheocricotopus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	5	2020-08-23	9	Ceratopogoninae	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Ceratopogonidae	no-see-um midges	10.76
Railroad Creek	5	2020-08-23	9	Forcipomyiinae	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Ceratopogonidae	no-see-um midges	10.76
Railroad Creek	5	2020-08-23	9	Ostracoda	U	non-insect	Aquatic	Crustacea: Ostracoda	x	x	seed shrimp	21.52
Railroad Creek	5	2020-08-23	9	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	10.76
Railroad Creek	5	2020-08-23	9	Capniidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Capniidae	stoneflies	10.76
Railroad Creek	5	2020-08-23	9	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	10.76
Railroad Creek	12A	2020-08-24	9	Ecclisomyia	L	insect	Aquatic	Arthropoda: Insecta	Trichoptera	Limnephilidae	caddisflies	10.76
Railroad Creek	12A	2020-08-24	9	Dicranota	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Tipulidae	crane flies	10.76
Railroad Creek	12A	2020-08-24	9	Ameletus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ameletidae	mayflies	10.76
Railroad Creek	12A	2020-08-24	9	Baetis bicaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	10.76
Railroad Creek	12A	2020-08-24	9	Baetis tricaudatus complex	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Baetidae	mayflies	21.52
Railroad Creek	12A	2020-08-24	9	Drunella coloradensis/flavilinea	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	10.76
Railroad Creek	12A	2020-08-24	9	Drunella doddsii	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	32.28
Railroad Creek	12A	2020-08-24	9	Drunella spinifera	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Ephemerellidae	mayflies	21.52
Railroad Creek	12A	2020-08-24	9	Cinygmula	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	247.48
Railroad Creek	12A	2020-08-24	9	Epeorus deceptivus	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	21.52
Railroad Creek	12A	2020-08-24	9	Rhithrogena	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Heptageniidae	mayflies	53.8
Railroad Creek	12A	2020-08-24	9	Neoleptophlebia/Paraleptophlebia	L	insect	Aquatic	Arthropoda: Insecta	Ephemeroptera	Leptophlebiidae	mayflies	10.76
Railroad Creek	12A	2020-08-24	9	Chironomidae	P	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae	midges	21.52
Railroad Creek	12A	2020-08-24	9	Micropsectra	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	32.28
Railroad Creek	12A	2020-08-24	9	Stempellinella	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	53.8
Railroad Creek	12A	2020-08-24	9	Brillia	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	12A	2020-08-24	9	Corynoneura	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	12A	2020-08-24	9	Eukiefferiella brehmi group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	12A	2020-08-24	9	Rheocricotopus	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	10.76
Railroad Creek	12A	2020-08-24	9	Tvetenia bavarica group	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Chironomidae: Orthocladiinae	midges	53.8
Railroad Creek	12A	2020-08-24	9	Lebertia	U	non-insect	Aquatic	Arachnida: Acari	x	x	mites	10.76
Railroad Creek	12A	2020-08-24	9	Ceratopogoninae	L	insect	Aquatic	Arthropoda: Insecta	Diptera	Ceratopogonidae	no-see-um midges	32.28
Railroad Creek	12A	2020-08-24	9	Nemata	U	non-insect	Aquatic	Nemata	miscellaneous non-insect	x	round worms	10.76
Railroad Creek	12A	2020-08-24	9	Ostracoda	U	non-insect	Aquatic	Crustacea: Ostracoda	x	x	seed shrimp	10.76
Railroad Creek	12A	2020-08-24	9	Oligochaeta	U	non-insect	Aquatic	Annelida: Oligochaeta	miscellaneous non-insect	x	segmented worms	75.32
Railroad Creek	12A	2020-08-24	9	Suwallini	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	10.76
Railroad Creek	12A	2020-08-24	9	Sweltsa	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Chloroperlidae	stoneflies	21.52
Railroad Creek	12A	2020-08-24	9	Visoka cataractae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	12A	2020-08-24	9	Zapada cinctipes	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	53.8
Railroad Creek	12A	2020-08-24	9	Zapada columbiana	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Nemouridae	stoneflies	10.76
Railroad Creek	12A	2020-08-24	9	Megarcys	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Perlodidae	stoneflies	10.76
Railroad Creek	12A	2020-08-24	9	Taeniopterygidae	L	insect	Aquatic	Arthropoda: Insecta	Plecoptera	Taeniopterygidae	stoneflies	10.76

Trait Data for Identified Taxa
Information Used to Calculate Metrics Included in Data Output and Report

Taxon	Stage	Insect.	Higher.classification	Origin	Order	Family	Common.name	BCG.Attribute	Feeding.Group	CA.feeding.group	Habit	Tolerance	WY.HBI	PSSB.tolerance	CA.tolerance	Metals.tolerance	BCI.TV	PSSB.long.lived	Voltinism	Development	Occurrence.in.drift	Size.at.maturity	Rheophily	Thermal.preference	a	b
Polycelis	U	non-insect	Turbellaria	Aquatic	miscellaneous non-insect	Planariidae	flat worms	3	PR	PR	CL	HI	4	0	1	11	108	0	2	2	1	1	2	1	0.0082	2.168
Oligochaeta	U	non-insect	Annelida: Oligochaeta	Aquatic	miscellaneous non-insect	x	segmented worms	4	CG	CG	BU	0	5	0	5	11	108	0	2	2	1	2	2	2	0.0758	0.74
Baetis tricaudatus complex	L	insect	Arthropoda: Insecta	Aquatic	Ephemeroptera	Baetidae	mayflies	4	CG	CG	CL	0	6	0	6	11	72	0	3	1	3	1	2	2	0.0053	2.875
Drunella coloradensis/flavilinea	L	insect	Arthropoda: Insecta	Aquatic	Ephemeroptera	Ephemerellidae	mayflies	3	SC	PR	CL	0	2	0	0	0	18	0	2	2	1	2	2	2	0.0019	3.46
Drunella doddsii	L	insect	Arthropoda: Insecta	Aquatic	Ephemeroptera	Ephemerellidae	mayflies	2	SC	CG	CL	MI	1	0	0	0	4	0	1	2	1	3	3	1	0.0019	3.46
Drunella spinifera	L	insect	Arthropoda: Insecta	Aquatic	Ephemeroptera	Ephemerellidae	mayflies	2	PR	PR	CL	HI	0	0	0	1	24	0	1	2	1	3	3	1	0.0019	3.46
Ephemerella tibialis	L	insect	Arthropoda: Insecta	Aquatic	Ephemeroptera	Ephemerellidae	mayflies	3	CG	CG	CL	0	2	0	2	11	48	0	2	2	2	2	2	2	0.0104	2.83
Cinygmula	L	insect	Arthropoda: Insecta	Aquatic	Ephemeroptera	Heptageniidae	mayflies	3	SC	SC	CL	0	4	0	4	11	21	0	2	1	2	2	3	1	0.0108	2.754
Epeorus deceptivus	L	insect	Arthropoda: Insecta	Aquatic	Ephemeroptera	Heptageniidae	mayflies	2	SC	SC	CL	HI	0	0	0	11	21	0	2	2	1	2	3	1	0.0108	2.754
Rhithrogena	L	insect	Arthropoda: Insecta	Aquatic	Ephemeroptera	Heptageniidae	mayflies	3	SC	SC	CL	0	0	0	0	2	21	0	2	1	2	2	3	2	0.0108	2.754
Capniidae	L	insect	Arthropoda: Insecta	Aquatic	Plecoptera	Capniidae	stoneflies	3	SH	SH	SP	MI	1	0	1	0	32	0	2	1	1	2	2	1	0.0049	2.562
Paraperla	L	insect	Arthropoda: Insecta	Aquatic	Plecoptera	Chloroperlidae	stoneflies	2	PR	PR	BU	MI	1	0	0	2	24	0	1	2	1	2	2	1	0.0065	2.724
Sweltsa	L	insect	Arthropoda: Insecta	Aquatic	Plecoptera	Chloroperlidae	stoneflies	3	PR	PR	BU	0	1	0	1	2	24	0	1	2	2	2	2	2	0.0065	2.724
Ecclisomyia	L	insect	Arthropoda: Insecta	Aquatic	Trichoptera	Limnephilidae	caddisflies	2	OM	OM	CL	MI	2	0	2	2	24	0	1	2	1	2	2	1	0.004	2.933
Ceratopogoninae	L	insect	Arthropoda: Insecta	Aquatic	Diptera	Ceratopogonidae	no-see-um midges	4	PR	PR	SP	0	6	0	6	4	108	0	2	1	1	2	2	2	0.0025	2.469
Dicranota	L	insect	Arthropoda: Insecta	Aquatic	Diptera	Tipulidae	crane flies	4	PR	PR	CL	0	3	0	3	2	24	0	2	2	1	2	2	2	0.0029	2.681
Hexatoma	L	insect	Arthropoda: Insecta	Aquatic	Diptera	Tipulidae	crane flies	3	PR	PR	BU	0	2	0	2	2	36	0	1	2	1	3	2	2	0.0029	2.681
Chaetocladius	L	insect	Arthropoda: Insecta	Aquatic	Diptera	Chironomidae: Orthocladiinae	midges	4	CG	CG	SP	MT	6	0	6	11	108	0	3	1	3	1	2	2	0.0018	2.617
Ephemerella alleni	L	insect	Arthropoda: Insecta	Aquatic	Ephemeroptera	Ephemerellidae	mayflies	2	CG	CG	CL	HI	3	0	1	11	48	0	2	2	1	2	2	1	0.0097	2.663
Leuctridae	L	insect	Arthropoda: Insecta	Aquatic	Plecoptera	Leuctridae	stoneflies	3	SH	SH	SP	MI	1	0	0	11	18	0	2	1	1	2	2	1	0.0028	2.719
Doroneuria	L	insect	Arthropoda: Insecta	Aquatic	Plecoptera	Perlidae	stoneflies	2	PR	PR	CL	MI	1	0	1	11	18	0	1	2	1	3	3	1	0.0099	2.879
Taeniopterygidae	L	insect	Arthropoda: Insecta	Aquatic	Plecoptera	Taeniopterygidae	stoneflies	3	SH	OM	SP	0	2	0	2	1	48	0	2	1	1	2	2	1	0.0072	2.655
Megarcys	L	insect	Arthropoda: Insecta	Aquatic	Plecoptera	Perlodidae	stoneflies	2	PR	PR	CL	HI	2	0	2	1	24	0	1	2	1	3	2	1	0.0196	2.742
Apatania	L	insect	Arthropoda: Insecta	Aquatic	Trichoptera	Apataniidae	caddisflies	2	SC	SC	CL	MI	2	0	1	11	18	0	2	2	1	2	2	1	0.0056	2.839
Glossosoma	L	insect	Arthropoda: Insecta	Aquatic	Trichoptera	Glossosomatidae	caddisflies	3	SC	SC	CL	0	1	0	1	11	24	0	3	3	1	2	3	2	0.0082	2.958
Arctopsychinae	L	insect	Arthropoda: Insecta	Aquatic	Trichoptera	Hydropsychidae	caddisflies	3	PR	PR	CL	0	1	0	1	11	18	0	1	2	1	3	3	2	0.0046	2.926
Dolophilodes	L	insect	Arthropoda: Insecta	Aquatic	Trichoptera	Philopotamidae	caddisflies	2	CF	CF	CL	MI	2	0	2	11	24	0	2	2	1	2	3	1	0.005	2.511
Rhyacophila atrata group	L	insect	Arthropoda: Insecta	Aquatic	Trichoptera	Rhyacophilidae	caddisflies	2	PR	PR	CL	MI	1	0	0	11	18	0	2	2	1	2	3	2	0.0099	2.48
Rhyacophila brunnea/vemna group	L	insect	Arthropoda: Insecta	Aquatic	Trichoptera	Rhyacophilidae	caddisflies	3	PR	PR	CL	0	1	0	1	11	18	0	1	2	1	3	3	2	0.0099	2.48
Neophylax occidentis	L	insect	Arthropoda: Insecta	Aquatic	Trichoptera	Uenoidae	caddisflies	2	SC	SC	CL	MI	3	0	3	2	24	0	2	2	1	2	3	1	0.0056	2.839
Oreogeton	L	insect	Arthropoda: Insecta	Aquatic	Diptera	Empididae	dance flies	3	PR	PR	SP	HI	5	0	6	11	95	0	1	2	1	2	2	1	0.0054	2.546
Chelifera/Metachela	L	insect	Arthropoda: Insecta	Aquatic	Diptera	Empididae	dance flies	4	PR	PR	SP	0	6	0	6	4	95	0	2	2	1	2	2	2	0.0054	2.546
Simulium	L	insect	Arthropoda: Insecta	Aquatic	Diptera	Simuliidae	black flies	4	CF	CF	CL	0	6	0	6	11	108	0	3	1	3	1	3	2	0.002	3.011
Chironomidae	P	insect	Arthropoda: Insecta	Aquatic	Diptera	Chironomidae	midges	4	CG	CG	BU	0	6	0	6	11	108	0	3	1	3	1	2	2	0.0018	2.617
Brillia	L	insect	Arthropoda: Insecta	Aquatic	Diptera	Chironomidae: Orthocladiinae	midges	4	CG	SH	SP	0	5	0	5	4	108	0	3	1	3	1	2	2	0.0018	2.617
Micropsectra	L	insect	Arthropoda: Insecta	Aquatic	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	4	CG	CG	CL	0	7	0	7	1	108	0	3	1	3	1	2	2	0.0018	2.617
Pagastia	L	insect	Arthropoda: Insecta	Aquatic	Diptera	Chironomidae: Diamesinae	midges	4	CG	CG	SP	0	1	0	1	9	108	0	3	1	3	1	2	2	0.0018	2.617
Stempellinella	L	insect	Arthropoda: Insecta	Aquatic	Diptera	Chironomidae: Chironominae: Tanytarsini	midges	3	CG	CG	SP	0	4	0	4	0	108	0	3	1	3	1	2	2	0.0018	2.617
Pisidium	U	non-insect	Mollusca: Bivalvia	Aquatic	x	Sphaeriidae	pea clams	4	CF	CF	BU	0	8	0	8	3	108	0	1	3	1	1	2	2	0.0163	2.477
Protzia	U	non-insect	Arachnida: Acari	Aquatic	x	x	mites	3	PA	PR	SW	MT	5	0	8	11	108	0	3	2	2	1	2	2	0.053	2.494
Ameletus	L	insect	Arthropoda: Insecta	Aquatic	Ephemeroptera	Ameletidae	mayflies	2	SC	CG	CL	MI	1	0	0	1	48	0	2	1	1	2	2	1	0.0077	2.588
Zapada columbiana	L	insect	Arthropoda: Insecta	Aquatic	Plecoptera	Nemouridae	stoneflies	2	SH	SH	SP	HI	2	0	2	11	16	0	1	1	1	2	2	1	0.0056	2.762
Glossosoma	P	insect	Arthropoda: Insecta	Aquatic	Trichoptera	Glossosomatidae	caddisflies	3	SC	SC	CL	0	1	0	1	11	24	0	3	3	1	2	3	2	0.0082	2.958
Corynoneura	L	insect	Arthropoda: Insecta	Aquatic	Diptera	Chironomidae: Orthocladiinae	midges	4	CG	CG	SP	0	7	0	7	4	108	0	3	1	3	1	2	2	0.0018	2.617
Eukiefferiella brehmi group	L	insect	Arthropoda: Insecta	Aquatic	Diptera	Chironomidae: Orthocladiinae	midges	4	CG	OM	SP	0	8	0	8	11	108	0	3	1	3	1	2	2	0.0018	2.617
Baetis bicaudatus complex	L	insect	Arthropoda: Insecta	Aquatic	Ephemeroptera	Baetidae	mayflies	2	CG	CG	CL	HI	4	0	4	11	72	0	3	1	3	1	2	1	0.0053	2.875
Neoleptophlebia/Paraleptophlebia	L	insect	Arthropoda: Insecta	Aquatic	Ephemeroptera	Leptophlebiidae	mayflies	4	CG	CG	SP	0	4	0	4	1	24	0	2	1	2	1	2	2	0.0047	2.686
Zapada cinctipes	L	insect	Arthropoda: Insecta	Aquatic	Plecoptera	Nemouridae	stoneflies	4	SH	SH	SP	0	2	0	2	3	16	0	2	1	1	2	2	2	0.0056	2.762
Calineuria californica	L	insect	Arthropoda: Insecta	Aquatic	Plecoptera	Perlidae	stoneflies	2	PR	PR	CL	0	2	0	2	11	24	0	1	2	1	3	3	2	0.0099	2.879
Rhyacophila vagrita	L	insect	Arthropoda: Insecta	Aquatic	Trichoptera	Rhyacophilidae	caddisflies	2	PR	PR	CL	HI	0	0	0	11	18	0	2	2	1	2	3	1	0.0099	2.48
Nemata	U	non-insect	Nemata	Aquatic	miscellaneous non-insect	x	round worms	4	PA	PR	BU	0	5	0	6	11	108	0	2	2	1	2	2	2	0.0758	0.74
Epeorus longimanus	L	insect	Arthropoda: Insecta	Aquatic	Ephemeroptera	Heptageniidae	mayflies	3	SC	SC	CL	MI	0	0	0	11	21	0	2	1	1	2	3	1	0.0108	2.754
Chloroperlidae	L	insect	Arthropoda: Insecta	Aquatic	Plecoptera	Chloroperlidae	stoneflies	3	PR	PR	BU	0	1	0	1	2	24	0	2	2	1	2	2	2	0.0065	2.724
Lepidostoma	L	insect	Arthropoda: Insecta	Aquatic	Trichoptera	Lepidostomatidae	caddisflies	4	SH	SH	CM	0	1	0	1	1	18	0	2	2	1	2	2	2	0.0079	2.649
Rhyacophila betteni group	L	insect	Arthropoda: Insecta	Aquatic	Trichoptera	Rhyacophilidae	caddisflies	3	PR	PR	CL	0	1	0	1	11	18	0	1	2	1	3	3	2	0.0099	2.48
Parametriocnemus	L	insect	Arthropoda: Insecta	Aquatic	Diptera	Chironomidae: Orthocladiinae	midges	4	CG	CG	SP	0	5	0	5	11	108	0	3	1	3	1	2	2	0.0018	2.617
Tvetenia bavarica group	L	insect	Arthropoda: Insecta	Aquatic	Diptera	Chironomidae: Orthocladiinae	midges	4	CG	CG	SP	0	5	0	5	4	108	0	3	1	3	1	2	2	0.0018	2.617
Cinygma	L	insect	Arthropoda: Insecta	Aquatic	Ephemeroptera	Heptageniidae	mayflies	4	SC	SC	CL	0	2	0	2	11	48	0	2	1	2	2	2	2	0.0108	2.754
Eloeophila	L	insect	Arthropoda: Insecta	Aquatic	Diptera	Tipulidae	crane flies	3	PR	PR	BU	0	2	0	3	11	72	0	2	2	1	2	2	2	0.0029	2.681
Eukiefferiella claripennis group	L	insect	Arthropoda: Insecta	Aquatic	Diptera	Chironomidae: Orthocladiinae	midges	4	CG	OM	SP	MT	8	0	8	11	108	0	3	1	3	1	2	2	0.0018	2.617
Epeorus grandis group	L	insect	Arthropoda: Insecta	Aquatic	Ephemeroptera	Heptageniidae	mayflies	2	SC	SC	CL	HI	0	0	0	11	21	0	2	2	1	2	3	1	0.0108	2.754
Ostracoda	U	non-insect	Crustacea: Ostracoda	Aquatic	x	x	seed shrimp	4	CG	CG	SW	0	8	0	6	11	108	0	3	2	1	1	2	2	0.006753	2.27
Suwallini	L	insect	Arthropoda: Insecta	Aquatic	Plecoptera	Chloroperlidae	stoneflies	3	PR	PR	BU	0	1	0	1	2	24	0	2	2	2	2	2	2	0.0065	2.724
Visoka cataractae	L	insect	Arthropoda: Insecta	Aquatic	Plecoptera	Nemouridae	stoneflies	2	SH	SH	SP	HI	2	0	2	11	36	0	1	1	1	2	3	1	0.0056	2.762
Rhyacophila narvae	L	insect	Arthropoda: Insecta	Aquatic	Trichoptera	Rhyacophilidae	caddisflies	2	PR	PR	CL	MI	1	0	0	11	18	0	2	2	1	2	3	1	0.0099	2.48
Clinocera	L	insect	Arthropoda: Insecta	Aquatic	Diptera	Empididae	dance flies	3	PR	PR	CL	0	6	0	6	4	95	0	2	2	1	2	2	2	0.0054	2.546
Hesperoconopa	L	insect	Arthropoda: Insecta	Aquatic	Diptera	Tipulidae	crane flies	2	UN	CG	BU	MI	1	0	1	1	72	0	2	2	1	2	2	1	0.0029	2.681
Thienemanniella	L	insect	Arthropoda: Insecta	Aquatic	Diptera	Chironomidae: Orthocladiinae	midges	4	CG	CG	SP	0	6	0	6	4	108	0	3	1	3	1	2	2	0.0018	2.617
Ephydridae	L	insect	Arthropoda: Insecta	Aquatic	Diptera	Ephydridae	shore and brine flies	5	CG	CG	SP	HT	6	0	6	11	108	0	2	2	1	2	1	2	0.0025	2.692
Rheocricotopus	L	insect	Arthropoda: Insecta	Aquatic	Diptera	Chironomidae: Orthocladiinae	midges	4	CG	CG	SP	0	6	0	6	11	108	0	3	1	3	1	2	2	0.0018	2.617
Trombidiformes	U	non-insect	Arachnida: Acari	Aquatic	Trombidiformes	x	mites	4	PA	PR	SW	0	5	0	5	11	108	0	3	2	2	1	2	2	0.053	2.494
Caudatella hystrix	L	insect	Arthropoda: Insecta	Aquatic	Ephemeroptera	Ephemerellidae	mayflies	2	CG	CG	CL	HI	1	0	1	0	24	0	2	2	1	2	2	1	0.0103	2.676
Zapada frigida	L	insect	Arthropoda: Insecta	Aquatic	Plecoptera	Nemouridae	stoneflies	2	SH	SH	SP	MI	2	0	2	11	16	0	2	1	1	2	2	1	0.0056	2.762
Frisonia picticeps	L	insect	Arthropoda: Insecta	Aquatic	Plecoptera	Perlodidae	stoneflies	1	PR	PR	CL	HI	2	0	2	11	48	0	2	2	1	2	2	1	0.0196	2.742
Rhyacophila betteni group	P	insect	Arthropoda: Insecta	Aquatic	Trichoptera	Rhyacophilidae	caddisflies	3	PR	PR	CL	0	1	0	1	11	18	0	1	2	1	3	3	2	0.0099	2.48
Pteronarcys princeps	L	insect	Arthropoda: Insecta	Aquatic	Plecoptera	Pteronarcyidae	stoneflies	2	SH	OM	SP	MI	1	0	0	1	24	0	1	2	1	3	2	1	0.0324	2.573
Orthocladius	L	insect	Arthropoda: Insecta	Aquatic	Diptera	Chironomidae: Orthocladiinae	midges	3	CG	CG	SP	0	6	0	6	11	108	0	3	1	3	1	2	2	0.0018	2.617
Sperchonopsis	U	non-insect	Arachnida: Acari	Aquatic	x	x	mites	4	PA	PR	SW	MT	5	0	8	11	108	0	3	2	2	1	2	2	0.053	2.494
Zapada oregonensis group	L	insect	Arthropoda: Insecta	Aquatic	Plecoptera	Nemouridae	stoneflies	3	SH	SH	SP	MI	2	0	2	11	16	0	1	1	1	2	2	1	0.0056	2.762
Rhyacophila blarina	L	insect	Arthropoda: Insecta	Aquatic	Trichoptera	Rhyacophilidae	caddisflies	3	PR	PR	CL	0	1	0	1	11	18	0	2	2	1	2	2	2	0.0099	2.48
Neothremma	L	insect	Arthropoda: Insecta	Aquatic	Trichoptera	Uenoidae	caddisflies	2	SC	SC	CL	HI	0	0	0	11	8	0	1	2	1	2	3	1	0.0056	2.839
Stilocladius	L	insect	Arthropoda: Insecta	Aquatic	Diptera	Chironomidae: Orthocladiinae	midges	3	CG	CG	SP	MI	6	0	5	11	108	0	3	1	3	1	2	1	0.0018	2.617
Lebertia	U	non-insect	Arachnida: Acari	Aquatic	x	x	mites	4	PA	PR	SW	MT	5	0	8	11	108	0	3	2	2	1	2	2	0.053	2.494
Diamesa	L	insect	Arthropoda: Insecta	Aquatic	Diptera	Chironomidae: Diamesinae	midges	3	CG	CG	SP	HI	5	0	2	9	108	0	3	1	3	2	2	1	0.0018	2.617
Sperchon	U	non-insect	Arachnida: Acari	Aquatic	x	x	mites	4	PA	PR	SW	MT	5	0	8	11	108	0	3	2	2	1	2	2	0.053	2.494
Arctopsyche	L	insect	Arthropoda: Insecta	Aquatic	Trichoptera	Hydropsychidae	caddisflies	2	PR	PR	CL	0	1	0	1	11	18	0	1	2	1	3	3	2	0.0046	2.926
Rhyacophila	L	insect	Arthropoda: Insecta	Aquatic	Trichoptera	Rhyacophilidae	caddisflies	3	PR	PR	CL	0	0	0	0	11	18	0	2	2	1	2	3	2	0.0099	2.48
Eukiefferiella devonica group	L	insect	Arthropoda: Insecta	Aquatic	Diptera	Chironomidae: Orthocladiinae	midges	4	CG	OM	SP	0	8	0	8	11	108	0	3	1	3	1	2	2	0.0018	2.617
Kogotus/Rickera	L	insect	Arthropoda: Insecta	Aquatic	Plecoptera	Perlodidae	stoneflies	3	PR	PR	CL	MI	2	0	2	11	18	0	2	2	1	3	2	1	0.0196	2.742
Agraylea	L	insect	Arthropoda: Insecta	Aquatic	Trichoptera	Hydroptilidae	caddisflies	2	PH	PH	CM	0	8	0	8	11	108	0	2	2	1	1	2	1	0.0056	2.839
Thienemannimyia complex	L	insect	Arthropoda: Insecta	Aquatic	Diptera	Chironomidae: Tanypodinae	midges	4	PR	PR	SP	0	6	0	6	3	108	0	3	1	3	1	2	2	0.0018	2.617
Atractides	U	non-insect	Arachnida: Acari	Aquatic	x	x	mites	4	PA	PR	SW	MT	5	0	8	11	108	0	3	2	2	1	2	2	0.053	2.494
Cricotopus	L	insect	Arthropoda: Insecta	Aquatic	Diptera	Chironomidae: Orthocladiinae	midges	4	CG	CG	CL	0	7	0	7	10	108	0	3	1	3	1	2	2	0.0018	2.617
Parapsyche elsis	L	insect	Arthropoda: Insecta	Aquatic	Trichoptera	Hydropsychidae	caddisflies	2	PR	PR	CL	HI	1	0	1	11	6	0	1	3	1	3	3	1	0.0046	2.926
Krenosmittia	L	insect	Arthropoda: Insecta	Aquatic	Diptera	Chironomidae: Orthocladiinae	midges	3	CG	CG	SP	HI	1	0	1	11	108	0	3	1	3	1	2	1	0.0018	2.617
Lopescladius	L	insect	Arthropoda: Insecta	Aquatic	Diptera	Chironomidae: Orthocladiinae	midges	4	CG	CG	SP	0	6	0	6	11	108	0	3	1	3	1	2	2	0.0018	2.617
Isoperla	L	insect	Arthropoda: Insecta	Aquatic	Plecoptera	Perlodidae	stoneflies	3	PR	PR	CL	0	2	0	2	3	48	0	2	2	2	2	2	2	0.0196	2.742
Moselia	L	insect	Arthropoda: Insecta	Aquatic	Plecoptera	Leuctridae	stoneflies	2	SH	SH	SP	HI	1	0	0	11	18	0	1	1	1	2	2	1	0.0028	2.719
Lepidostoma	P	insect	Arthropoda: Insecta	Aquatic	Trichoptera	Lepidostomatidae	caddisflies	4	SH	SH	CM	0	1	0	1	1	18	0	2	2	1	2	2	2	0.0079	2.649
Parorthocladius	L	insect	Arthropoda: Insecta	Aquatic	Diptera	Chironomidae: Orthocladiinae	midges	3	CG	CG	SP	0	6	0	5	11	108	0	3	1	3	1	2	2	0.0018	2.617
Hydroporinae	A	insect	Arthropoda: Insecta	Aquatic	Coleoptera	Dytiscidae	predaceous diving beetles	4	PR	PR	SW	MT	5	0	5	11	72	0	2	3	2	2	1	2	0.0618	2.502
Hydrobaenus	L	insect	Arthropoda: Insecta	Aquatic	Diptera	Chironomidae: Orthocladiinae	midges	4	SC	SC	SP	MT	8	0	8	11	108	0	3	1	3	1	2	2	0.0018	2.617
Parakiefferiella	L	insect	Arthropoda: Insecta	Aquatic	Diptera	Chironomidae: Orthocladiinae	midges	4	CG	CG	SP	0	4	0	4	11	108	0	3	1	3	1	2	2	0.0018	2.617

Trait Data for Identified Taxa
Information Used to Calculate Metrics Included in Data Output and Report

Taxon	Stage	Insect.	Higher.classification	Origin	Order	Family	Common.name	BCG.Attribute	Feeding.Group	CA.feeding.group	Habit	Tolerance	WY.HBI	PSSB.tolerance	CA.tolerance	Metals.tolerance	BCI.TV	PSSB.long.lived	Voltinism	Development	Occurrence.in.drift	Size.at.maturity	Rheophily	Thermal.preference	a	b
Polycentropus	L	insect	Arthropoda: Insecta	Aquatic	Trichoptera	Polycentopodidae	caddisflies	3	PR	PR	CL	0	6	0	6	1	108	0	3	3	1	2	3	2	0.0071	2.531
Chelifera/Metachela	P	insect	Arthropoda: Insecta	Aquatic	Diptera	Empididae	dance flies	4	PR	PR	SP	0	6	0	6	4	95	0	2	2	1	2	2	2	0.0054	2.546
Eukiefferiella	L	insect	Arthropoda: Insecta	Aquatic	Diptera	Chironomidae: Orthocladiinae	midges	4	CG	OM	SP	0	8	0	8	11	108	0	3	1	3	1	2	2	0.0018	2.617
Setvena	L	insect	Arthropoda: Insecta	Aquatic	Plecoptera	Perlodidae	stoneflies	2	PR	PR	CL	HI	2	0	2	11	48	0	1	2	1	3	2	1	0.0196	2.742
Soliperla	L	insect	Arthropoda: Insecta	Aquatic	Plecoptera	Peltoperlidae	stoneflies	2	SH	SH	SP	HI	1	0	1	11	12	0	1	3	1	2	2	1	0.017	2.737
Rhyacophila coloradensis group	L	insect	Arthropoda: Insecta	Aquatic	Trichoptera	Rhyacophilidae	caddisflies	3	PR	PR	CL	0	2	0	2	1	18	0	2	2	1	3	3	2	0.0099	2.48
Micrasema	L	insect	Arthropoda: Insecta	Aquatic	Trichoptera	Brachycentridae	caddisflies	3	CG	MH	CL	0	1	0	1	2	24	0	1	2	1	1	2	2	0.0181	2.41
Rhyacophila vofixa group	L	insect	Arthropoda: Insecta	Aquatic	Trichoptera	Rhyacophilidae	caddisflies	2	PR	PR	CL	HI	0	0	0	11	18	0	1	2	1	2	3	1	0.0099	2.48
Cryptochia	L	insect	Arthropoda: Insecta	Aquatic	Trichoptera	Limnephilidae	caddisflies	1	SH	SH	SP	HI	1	0	0	11	110	0	1	2	1	2	1	1	0.004	2.933
Pedomoecus sierra	L	insect	Arthropoda: Insecta	Aquatic	Trichoptera	Apataniidae	caddisflies	1	UN	UN	BU	HI	0	0	0	11	110	0	1	2	1	2	2	1	0.0056	2.839
Rhabdomastix (Rhabdomastix)	L	insect	Arthropoda: Insecta	Aquatic	Diptera	Tipulidae	crane flies	2	SH	SH	BU	MI	3	0	3	11	72	0	1	2	1	3	2	1	0.0029	2.681
Rhyacophila	P	insect	Arthropoda: Insecta	Aquatic	Trichoptera	Rhyacophilidae	caddisflies	3	PR	PR	CL	0	0	0	0	11	18	0	2	2	1	2	3	2	0.0099	2.48
Ephemerella excrucians group	L	insect	Arthropoda: Insecta	Aquatic	Ephemeroptera	Ephemerellidae	mayflies	4	CG	CG	CL	0	1	0	1	3	48	0	2	2	2	2	2	2	0.0097	2.663
Prosimulium	L	insect	Arthropoda: Insecta	Aquatic	Diptera	Simuliidae	black flies	3	CF	CF	CL	MI	3	0	3	11	108	0	2	2	2	1	3	1	0.002	3.011
Rhyacophila alberta group	L	insect	Arthropoda: Insecta	Aquatic	Trichoptera	Rhyacophilidae	caddisflies	2	PR	PR	CL	HI	0	0	0	11	18	0	1	2	1	3	3	1	0.0099	2.48
Forcipomyiinae	L	insect	Arthropoda: Insecta	Aquatic	Diptera	Ceratopogonidae	no-see-um midges	4	CG	CG	SP	0	6	0	6	11	108	0	2	1	1	1	2	2	0.0025	2.469
Nanocladius	L	insect	Arthropoda: Insecta	Aquatic	Diptera	Chironomidae: Orthocladiinae	midges	4	CG	CG	SP	0	3	0	3	11	108	0	3	1	3	1	2	2	0.0018	2.617
Optioservus	A	insect	Arthropoda: Insecta	Aquatic	Coleoptera	Elmidae	riffle beetles	4	CG	SC	CL	MT	4	0	4	3	104	0	1	3	2	1	2	2	0.00093	6.18
Hydroporinae	L	insect	Arthropoda: Insecta	Aquatic	Coleoptera	Dytiscidae	predaceous diving beetles	4	PR	PR	CM	MT	5	0	5	11	72	0	2	3	2	2	1	2	0.0077	2.91
Paramerina	L	insect	Arthropoda: Insecta	Aquatic	Diptera	Chironomidae: Tanypodinae	midges	0	PR	PR	SP	0	6	0	6	11	108	0	3	1	3	1	2	2	0.0018	2.617
Empididae Genus B	L	insect	Arthropoda: Insecta	Aquatic	Diptera	Empididae	dance flies	4	PR	PR	SP	MI	6	0	6	11	95	0	2	2	1	2	2	2	0.0054	2.546
Menetus	U	non-insect	Mollusca: Gastropoda	Aquatic	x	Planorbidae	snails	4	SC	SC	CL	MT	8	0	6	11	108	0	3	2	1	1	2	2	0.0208	3.03
Rhyacophila hyalinata group	L	insect	Arthropoda: Insecta	Aquatic	Trichoptera	Rhyacophilidae	caddisflies	2	PR	PR	CL	MI	1	0	1	11	18	0	1	2	1	3	3	1	0.0099	2.48
Rhyacophila angelita group	P	insect	Arthropoda: Insecta	Aquatic	Trichoptera	Rhyacophilidae	caddisflies	3	PR	PR	CL	0	0	0	0	1	18	0	2	2	1	3	3	2	0.0099	2.48
Empididae	P	insect	Arthropoda: Insecta	Aquatic	Diptera	Empididae	dance flies	4	PR	PR	SP	0	6	0	6	11	95	0	2	2	1	2	2	2	0.0054	2.546
Lepidostoma cascadense	P	insect	Arthropoda: Insecta	Aquatic	Trichoptera	Lepidostomatidae	caddisflies	2	SH	SH	CM	MI	1	0	1	1	18	0	2	2	1	2	2	1	0.0079	2.649
Heterotrissocladius marcidus group	L	insect	Arthropoda: Insecta	Aquatic	Diptera	Chironomidae: Orthocladiinae	midges	3	CG	CG	SP	MI	0	0	0	11	108	0	3	1	3	1	2	1	0.0018	2.617
Simulium	P	insect	Arthropoda: Insecta	Aquatic	Diptera	Simuliidae	black flies	4	CF	CF	CL	0	6	0	6	11	108	0	3	1	3	1	3	2	0.002	3.011
Boreoheptagyia	L	insect	Arthropoda: Insecta	Aquatic	Diptera	Chironomidae: Diamesinae	midges	3	CG	CG	SP	MI	6	0	6	11	108	0	3	1	3	1	2	1	0.0018	2.617
Limnephilidae	L	insect	Arthropoda: Insecta	Aquatic	Trichoptera	Limnephilidae	caddisflies	0	SH	SH	CM	0	4	0	4	11	108	0	2	2	1	2	2	2	0.004	2.933
Nematomorpha	U	non-insect	Nematomorpha	Aquatic	miscellaneous non-insect	x	horsehair worms	0	PA	PR	BU	MT	11	0	6	11	108	0	1	2	1	3	2	2	0.0758	0.74
Perlodidae	L	insect	Arthropoda: Insecta	Aquatic	Plecoptera	Perlodidae	stoneflies	3	PR	PR	CL	0	2	0	2	11	48	0	2	2	1	3	2	2	0.0196	2.742
Eukiefferiella pseudomontana group	L	insect	Arthropoda: Insecta	Aquatic	Diptera	Chironomidae: Orthocladiinae	midges	4	CG	OM	SP	MT	8	0	8	11	108	0	3	1	3	1	2	2	0.0018	2.617
Deuterophlebia	P	insect	Arthropoda: Insecta	Aquatic	Diptera	Deuterophlebiidae	mountain midges	1	SC	SC	CL	HI	0	0	0	11	4	0	2	2	1	1	3	1	0.0067	3.292
Wiedemannia	L	insect	Arthropoda: Insecta	Aquatic	Diptera	Empididae	dance flies	3	PR	PR	CL	MI	6	0	6	11	95	0	2	2	1	2	2	1	0.0054	2.546
Skwala	L	insect	Arthropoda: Insecta	Aquatic	Plecoptera	Perlodidae	stoneflies	3	PR	PR	CL	0	2	0	2	3	18	0	2	2	1	3	2	2	0.0196	2.742
Dixa	L	insect	Arthropoda: Insecta	Aquatic	Diptera	Dixidae	dixid midges	3	CG	CG	SW	0	2	0	2	11	108	0	3	1	3	1	2	2	0.0018	2.617

Appendix D

Benthic Macroinvertebrate Metric Response to Metals in the Environment

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Table D-1. Benthic Macroinvertebrate Metrics – Response to Metals (Adapted from McGuire 2009)

Metric	Metals	Response to Metals	Response Significance[1]	Location of Studies
Productivity				
Abundance	Mg, Al, Zn, Cd, Cu, Pb, Hg, Fe, Mn	Variable	-Abundance is a measure of population size, which is expected to decrease in response to metals. - Species abundances, however, can vary dramatically as a result of natural environmental variation, meaning abundance is not typically a reliable indicator of human influence (Karr and Chu 1997).	-North Fork Holston River, TN (Karr and Chu 1997) -Eagle River, CO (Fore 2002) -Southern Rocky Mountains, CO (Clements et al. 2000)
Richness				
Taxa richness	Zn, Cd, Cu, Pb, Hg, Fe, Mn, Al	Decreases (season dependent with maximum effect in the spring)	-Taxa richness is a measure of taxonomic diversity, which is expected to decrease when chemicals and metals are introduced to the stream as the ecological conditions in the stream cannot support a wide range of species (Reif 2012). -Tolerant species tend to dominate the community structure as sensitive species disappear in response to metal contamination.	-Arkansas River, CO (Clements 1994, Clements and Kiffney 1994) -Southern Rocky Mountains, CO (Clements et al. 2000)
Ephemeroptera, Plecoptera, Trichoptera (EPT) index	Zn, Cu, Cd, Al, Pb, Mn, Fe	Decrease	-The EPT index is a measure of the richness of Ephemeroptera, Plecoptera, and Trichoptera – 3 groups of macroinvertebrates considered especially sensitive to pollution. -EPT values are expected to decrease in response to metals due to associated changes to water chemistry and food availability (Normandeau Associates, Inc. 2012).	-Clark Fork River, MT (McGuire 1993) -Southern Rocky Mountains, CO (Clements et al. 2000)
Plecoptera richness	Zn, Cd, Cu, Pb, Hg, Al, Fe, Mn	Decrease (although some studies have found some genera to be tolerant of metals, ie., *Perlodidae* and *Alloperla*) (Roline 1988)	-Plecoptera richness is a measure of the diversity in Plecoptera species. -Stoneflies are particularly sensitive to human disturbance and are typically the first to disappear in response to external stressors, including metal contamination (Puget Sound Stream Benthos 2020). -Habitat requirements include cool water with high oxygen content. -Plecoptera richness is expected to decrease in response to metals due to associated changes to water chemistry and food resources (Clements 1994).	-Arkansas River, CO (Clements 1994, Clements and Kiffney 1994) -Eagle River, CO (Fore 2002) -Southern Rocky Mountains, CO (Clements et al. 2000)
Trichoptera richness	Zn, Cd, Cu, Pb, Hg, Al, Fe, Mn	-Variable response -Some genera (ie., *Rhyacophila*, *Brachycentrus*, *Hydropsyche*, *Arctopsche*) found to be tolerant of metals and positively associated with Zn concentration (Clements 1994)	-Trichoptera richness is a measure of the diversity in Trichoptera species. -Though caddisflies are diverse in feeding mechanisms and habit, taxa richness of caddisflies tends to decline in response to human disturbance, meaning that low values are often indicative of unhealthy stream conditions with limited habitat complexity. -However, several studies have reported the relative tolerance of Trichoptera to heavy metals as compared to other groups of benthic macroinvertebrates, meaning that taxa richness may reflect mixed responses to metals (Clements 1994). -Habitat complexity is an important variable that must be considered when evaluating this metric in response to metals.	-Arkansas River, CO (Clements 1994, Roline 1988) -Silver Bow Creek and Prickly Pear Creek, MT (Chadwick et al. 1986, Hughes 1985) -Eagle River, CO (Fore 2002) -Southern Rocky Mountains, CO (Clements et al. 2000)
Clinger richness	Zn, Cd, Cu, Pb, Hg, Al, Fe, Mn	Decrease	-Clinger richness is a measure of the diversity in clinger species, which is expected to decrease in response to metals due to changes in water chemistry, sedimentation, and food resources. -Clingers fall within multiple orders of insects including Ephemeroptera, Trichoptera, and Diptera (Cummins et al. 2008).	-Arkansas River, CO (Clements 1994) -Clark Fork River, MT (McGuire 1993) -Eagle River, CO (Fore 2002)

			-Clingers typically occupy the interstitial spaces between cobble and gravel along the bottom of a stream, which they are able to do because of physical adaptations that allow them to hold onto smooth/slick substrates in fast-moving water. -Clingers are sensitive to finer sediments that fill those interstitial spaces as fine sediment reduces the habitat available to them and limits their ability to move deeper into the stream bed (Karr and Chu 1997). -Though clingers fall within multiple orders of insects, many of which are sensitive to metals, clinger richness is typically more reflective of substrate conditions than metal pollution (Karr and Chu 1997).	
Trophic/Habit				
% Shredders	Mg, Al, Zn, Pb, Fe, Cu, Cd	Variable	-The % shredders metric is a measure of the abundance of shredders within the overall population. -Shredders fall within multiple orders of insects including Ephemeroptera and Plecoptera. -Shredders refer to those species of benthic macroinvertebrates that feed by way of tearing and shredding leaves and therefore tend to be present in reaches of the stream that are high in coarse, organic matter (Karr and Chu 1997). -The abundance of shredders is primarily influenced by the interaction between streams and riparian zones (Cummins et. al 1989), meaning the % of shredders within the population is not necessarily a reliable indicator of metal pollution (Kerans and Karr 1994). -Though shredders fall within multiple orders of insects, many of which are sensitive to metals, the % shredders metric is more reflective of riparian conditions (Cummins et al. 1989).	-Tennessee Valley (Kerans and Karr 1994) -Eastern Oregon (Karr and Chu 1997) -Northwest Wyoming (Karr and Chu 1997) -Southern Rocky Mountains, CO (Clements et al. 2000)
Ratio of scrapers / scrapers plus filtering collectors	Mg, Al	Decrease	-This metric is a measure of the range of trophic strategies in the benthic macroinvertebrate community and the relative abundance of specialist versus generalist feeders. -Scrapers (or grazers) are specialist feeders that consume algae and other associated material, while filterers are generalists that collect fine particulate organic matter from the water column. -The ratio is expected to decrease in response to metals as the proportion of specialist feeders declines in areas polluted by metals, likely due to declines in primary productivity (periphyton) (Ecology 1994).	-Tennessee Valley (Karr and Chu 1997) -Eastern Oregon (Karr and Chu 1997)
% Clingers	Zn, Cd, Cu, Pb, Hg	Decrease	-The % clingers metric is a measure of the abundance of clingers within the overall population. -Clingers fall within multiple orders of insects including Ephemeroptera, Trichoptera, and Diptera (Cummins et al. 2008). -Clingers typically occupy the interstitial spaces between cobble and gravel along the bottom of a stream, which they are able to do because of physical adaptations that allow them to hold onto smooth/slick substrates in fast-moving water. -Clingers are sensitive to finer sediments that fill those interstitial spaces as fine sediment reduces the habitat available to them and limits their ability to move deeper into the stream bed (Karr and Chu 1997). -Note that while clingers are typically sensitive to metals, their abundance is influenced primarily by substrate conditions.	-Arkansas River, CO (Clements 1994) -Clark Fork River, MT (McGuire 1993)
% Filterers	Mg, Al, Zn, Pb,	Variable	-The % filterers metric is a measure of the abundance of filterers within the overall population.	-Tennessee Valley (Karr and Chu 1997 and Kerans and Karr 1994)

	Mn, Fe, Cu, Cd		-Filterers are generalist feeders that collect fine particulate organic matter in the water column or sediment using a variety of filters (EPA 2020). -Because filterers are generalist feeders, they have a broad range of acceptable food materials, meaning high abundance values may be an indicator of polluted stream conditions that alter food resources, such as metal pollution (EPA 2020). -The variable response of this metric to metals suggests other factors may be involved, such as include food availability and habitat complexity (Kerans and Karr 1994).	-Southern Rocky Mountains, CO (Clements et al. 2000)
Composition				
Percent contribution of dominant taxon	Mg, Al	Increase	-This metric is a measure of the dominance of the single most abundant taxon. -Elevated metal concentrations in a stream environment causes a decrease in diversity among macroinvertebrates as those taxa less sensitive to disturbance and with fewer habitat requirements dominate the composition of species (Puget Sound Stream Benthos 2020).	-Tennessee Valley (Karr and Chu 1997, Kerans and Karr 1994)
% Ephemeroptera	Zn, Cu, As, Cd, Al, Fe, Mn, Hg, Pb	Decrease	-This metric is a measure of the abundance of Ephemeroptera within the overall population. -Ephemeroptera are sensitive to most types of human influence, so a lower percentage can indicate that the community structure has been impacted by pollution, disturbance, or other environmental stressors (Puget Sound Stream Benthos 2020). -Given that many species of mayflies graze on algae, they are particularly sensitive to metals and other toxic pollutants that can interfere with their food sources (Kuwabara 1985, Genter and Lehman 2000). -Mayflies in the Heptageniidae family are especially sensitive to heavy metals, which is thought to be because the metals damage their gills (Clements et al.. 2000). -Note that some Ephemeroptera families, such as Baetidae, are more tolerant of metal pollution than other mayfly families and can quickly colonize disturbed areas (Clements and Kiffney 1994).	-Arkansas River, CO (Clements and Kiffney 1994, Clements 1994, Courtney and Clements 2000) -Silver Bow and Prickly Pear Creeks, MT (Hughes 1985) -Coal Creek, CO (Peckarsky and Cook 1981) -Eagle River, CO (Fore 2002) -Southern Rocky Mountains, CO (Clements et al. 2000)
Ratio of EPT to EPT plus chironomidae abundances (EPT/EPT-C)	Zn, Cu	Decrease	-The EPT/EPT-C metric is a measure of relative abundance of indicator groups. EPT are considered sensitive to environmental stresses, while Chironamidae, generally, are more tolerant (McGuire 2009). -An even distribution of individuals among the 4 groups suggests a good biotic condition with low concentrations of pollutants (ie. metals), while an increase in the ratio of pollution-tolerant chironomids to EPT can indicate environmental stress within a system (McGuire 2009). -Note that some Ephemeroptera (e.g., Baetidae) and Trichoptera (e.g., Hydropsychinae) families are relatively tolerant of pollution and in cases where large populations of these tolerant EPT taxa are present, the EPT/EPT-C values can be skewed, which can be avoided by using metrics that evaluate the percent of those families (McGuire 2009).	-Clark Fork River, MT (McGuire 2009)
Tolerance				
Hilsenhoff Biotic Index (HBI)	N/A	N/A	-The HBI metric is a measure of the macroinvertebrate community's tolerance to nutrient enrichment (Ecology 1994). The metric assigns pollution-tolerance values to individual taxa, which are used to weight abundance and estimate overall organic pollution levels (EPA 2020). -High values indicate that the macroinvertebrate community is dominated by pollution-tolerant organisms, which indicates the stream reach is contaminated by organic pollution (Gazendam et al. 2011).	N/A

			-Because this metric evaluates organic pollution, which excludes inorganic pollutants such as heavy metals, the metric is not informative as it relates to metal pollution.	
% Tolerant taxa	Zn, Cu, Mg, Al,	Increase	-This metric is a measure of the abundance of benthic macroinvertebrates considered tolerant (those considered tolerant represent the 5-10% most tolerant taxa in a region) of various types of human disturbance (Puget Sound Stream Benthos 2020). -Tolerance is generally non-specific to the type of stressor (EPA 2020). -While tolerant taxa are present at most stream sites, their abundance will increase in areas contaminated by metals, and more sensitive taxa will disappear due to unsuitable conditions (Puget Sound Stream Benthos 2020). -This metric is considered one of the most reliable indicators of human influence (Karr and Chu 1997).	-Arkansas River (Courtney and Clements 2000) -Eagle River, CO (Fore 2002) -Tennessee Valley (Karr and Chu 1997 and Kerans and Karr 1994) -Southwest Oregon (Fore et al. 1996)
Metals Tolerance Index (MTI)	Zn, Cu	Increase	-MTI measures the changes in community composition that are attributable to metals. Tolerance values are assigned to each taxon based on sensitivity to metals. -Higher MTI values indicate that the community composition is tolerant of metals and therefore the stream environment has been subjected to metal pollution and is unable to support sensitive taxa (McGuire 1993). -Note that the sensitivity rankings were developed for the Clark Fork River basin, which may not be applicable to Railroad Creek due to differences in community composition (McGuire 1993).	Clark Fork River, MT (McGuire 1993).
[1]Note that natural environmental variation between seasons and changes in elevation must also be considered when analyzing macroinvertebrate metrics, particularly in oligotrophic, mountain stream systems (Clements 1994).				

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Appendix E

Trend Plots for Non-Significant BMI Metrics

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Figure E.1. Total Abundance per square foot by Station, All Years

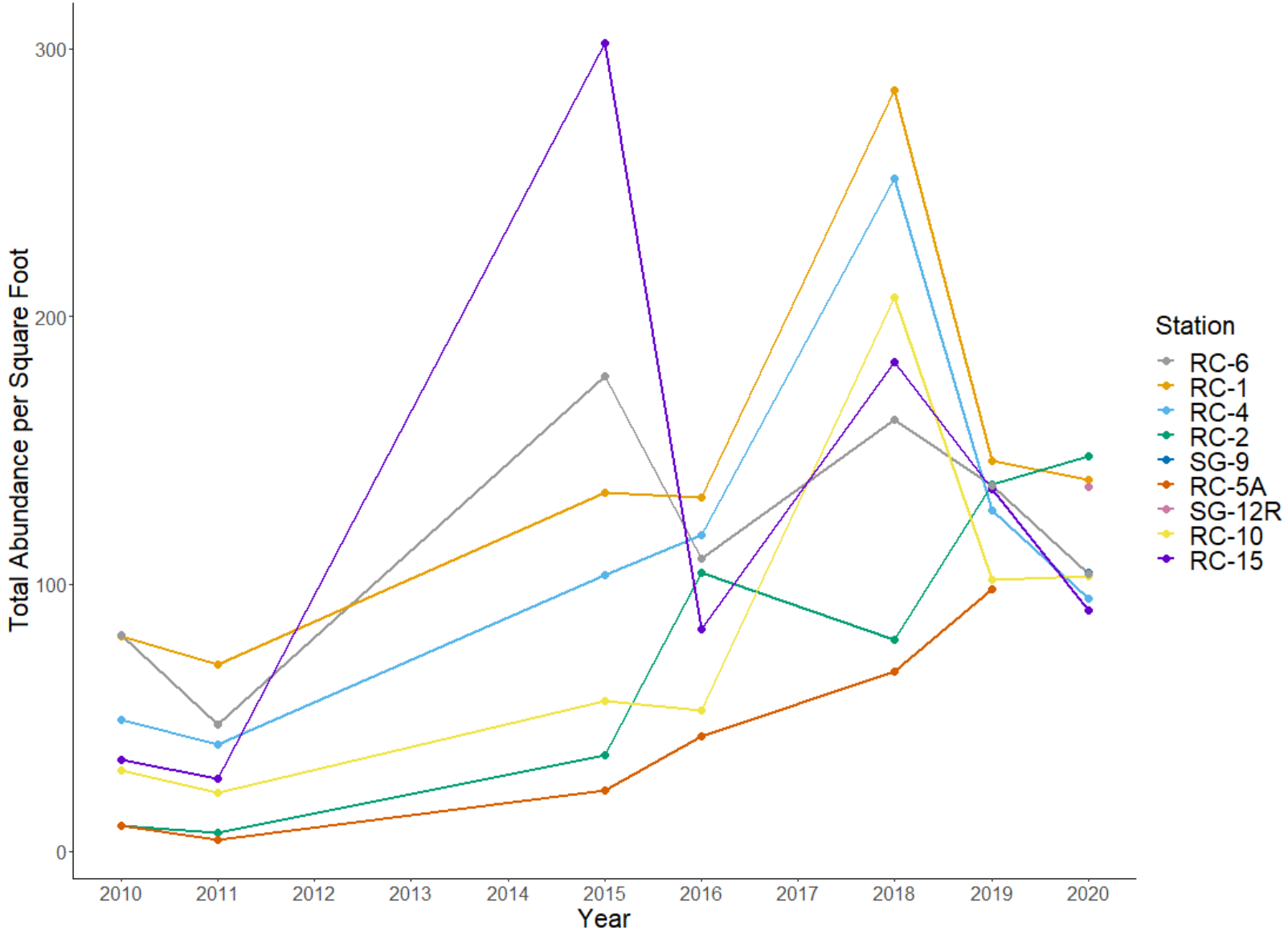


Figure E.2. Total Taxa Richness by Station, All Years

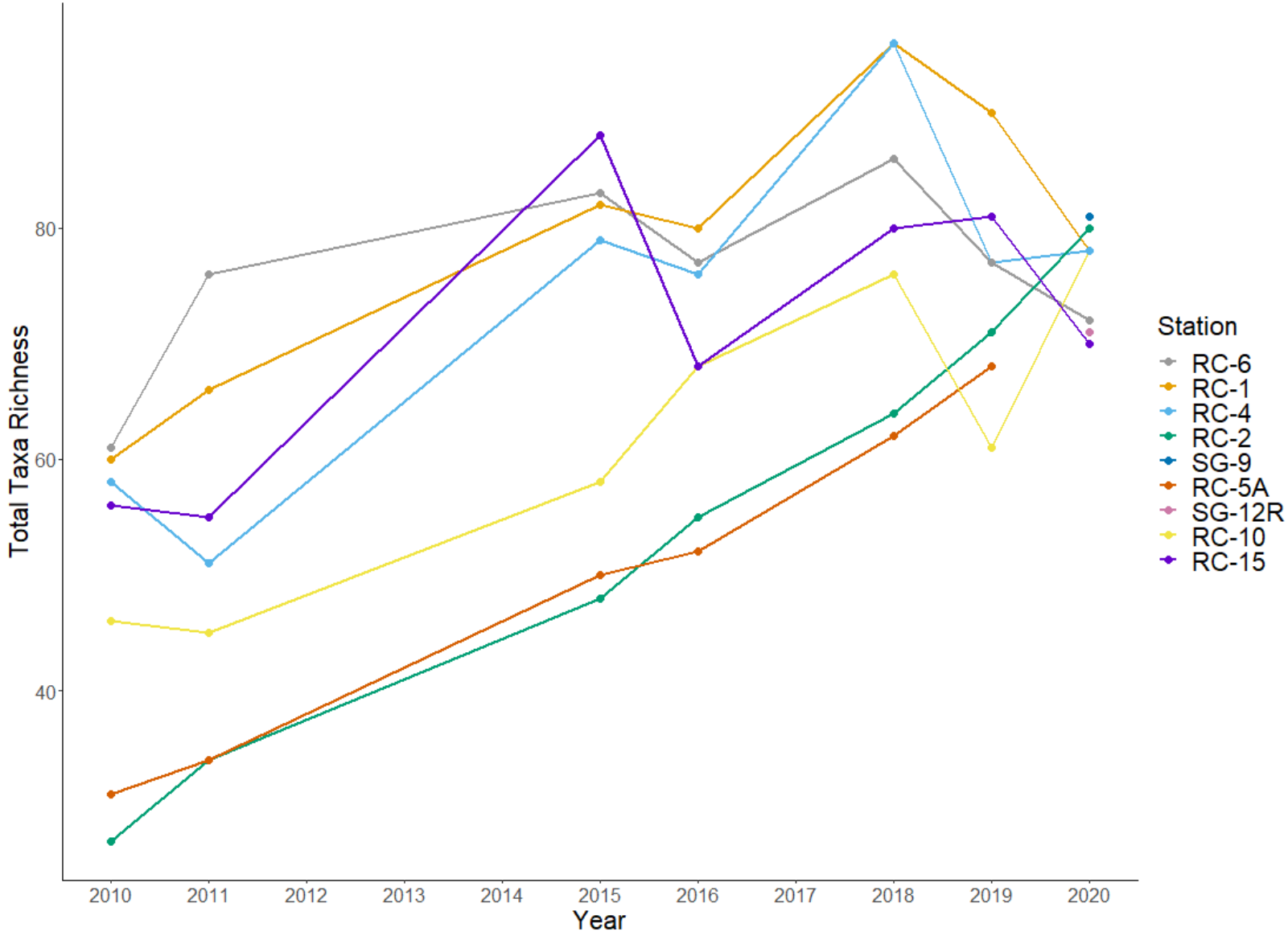


Figure E.3. EPT Taxa Richness by Station, All Years

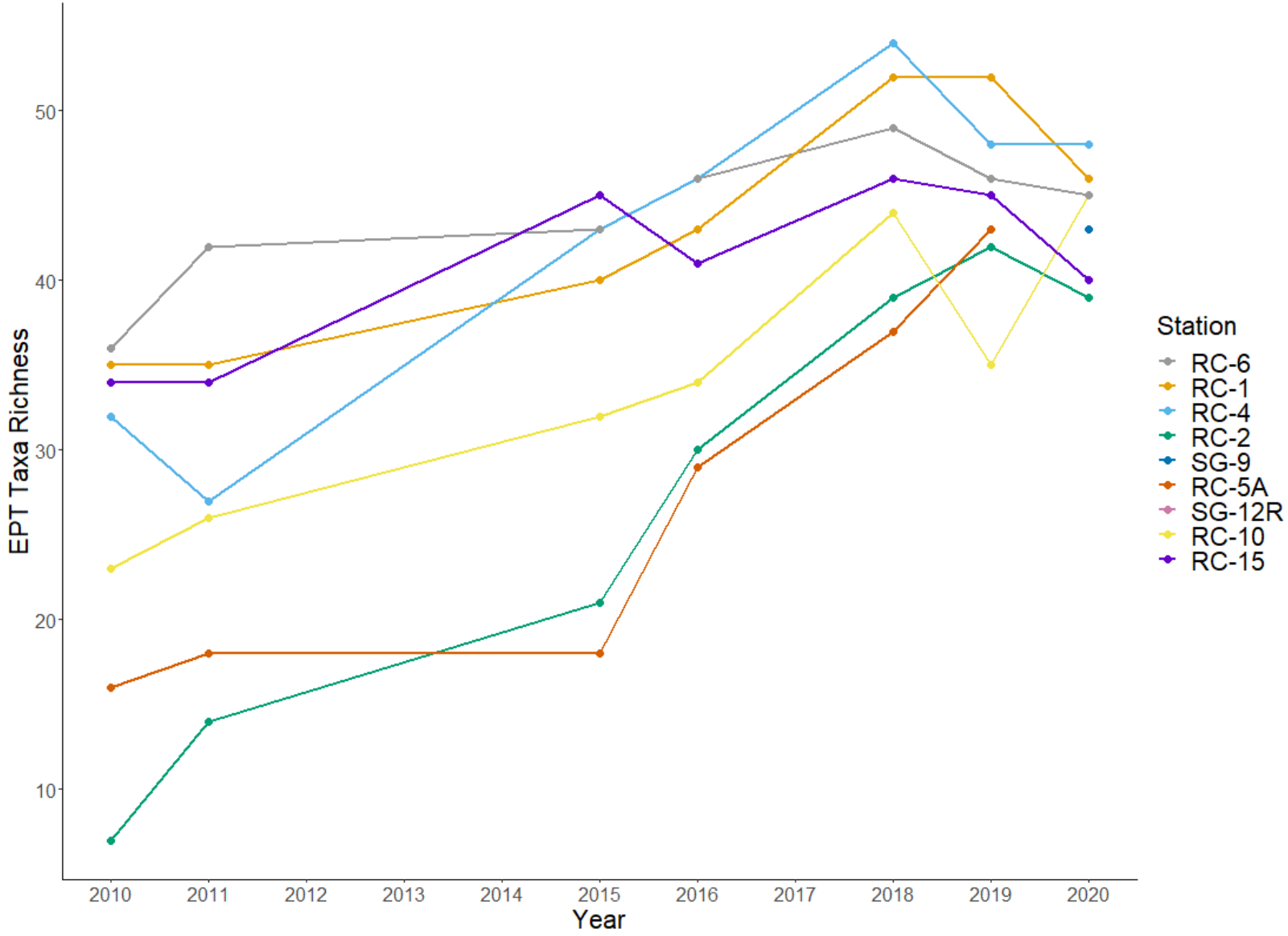


Figure E.4. Clinger Richness by Station, All Years



Figure E.5. Percent Shredders by Station, All Years

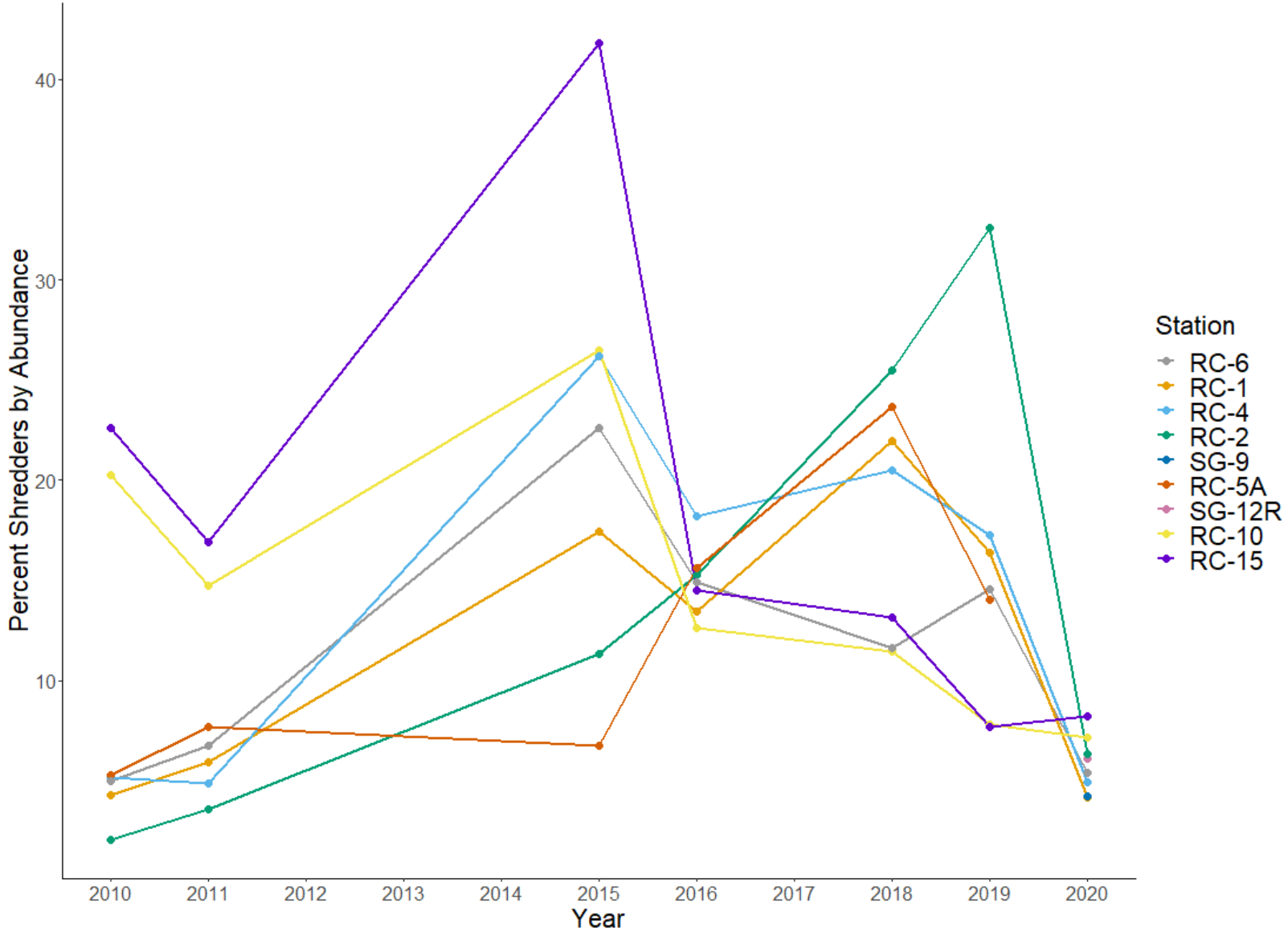


Figure E.6. Ratio of Scrapers to Scrapers and Filterers by Station, All Years

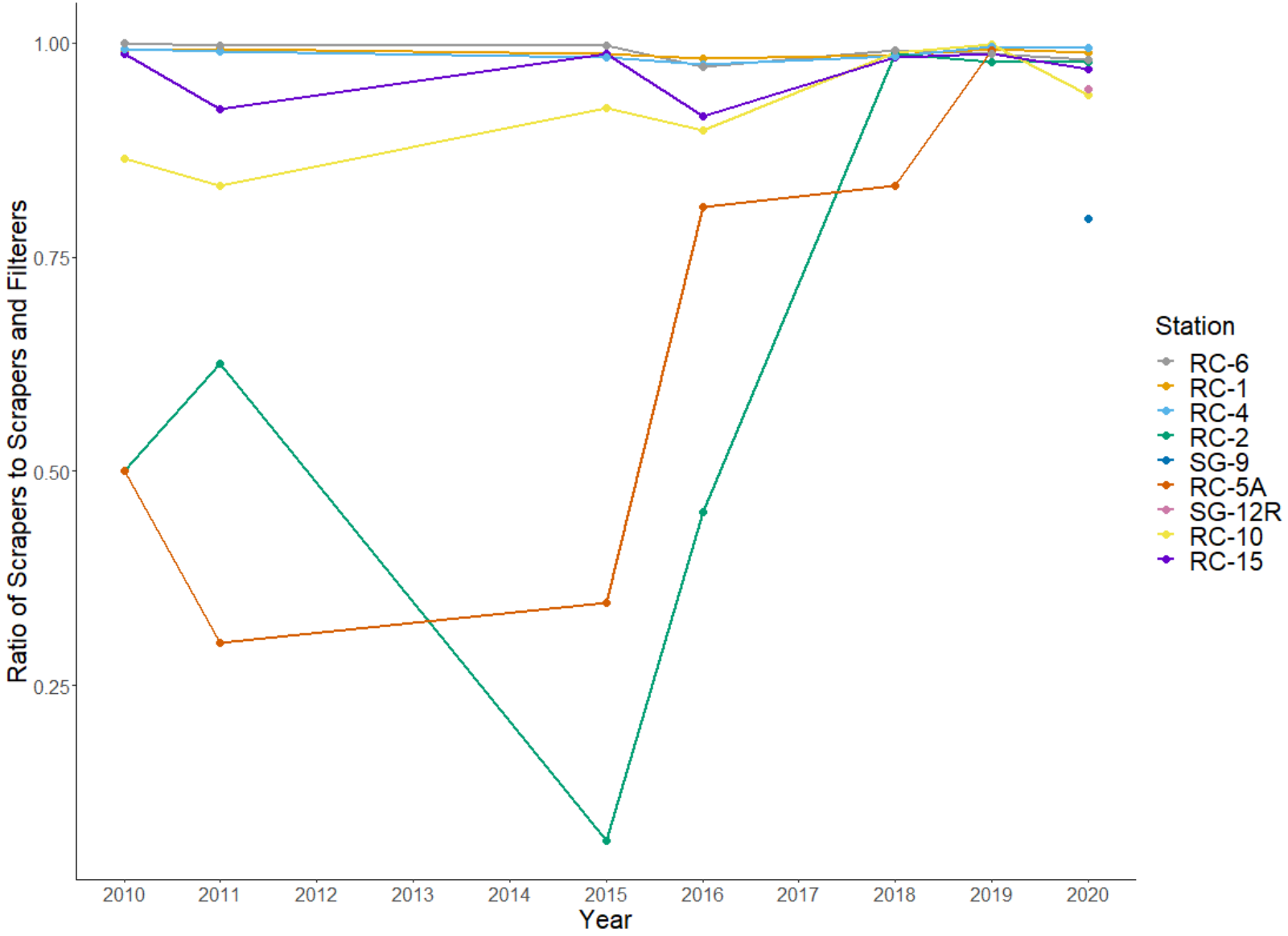


Figure E.7. Percent Clingers by Abundance by Station, All Years

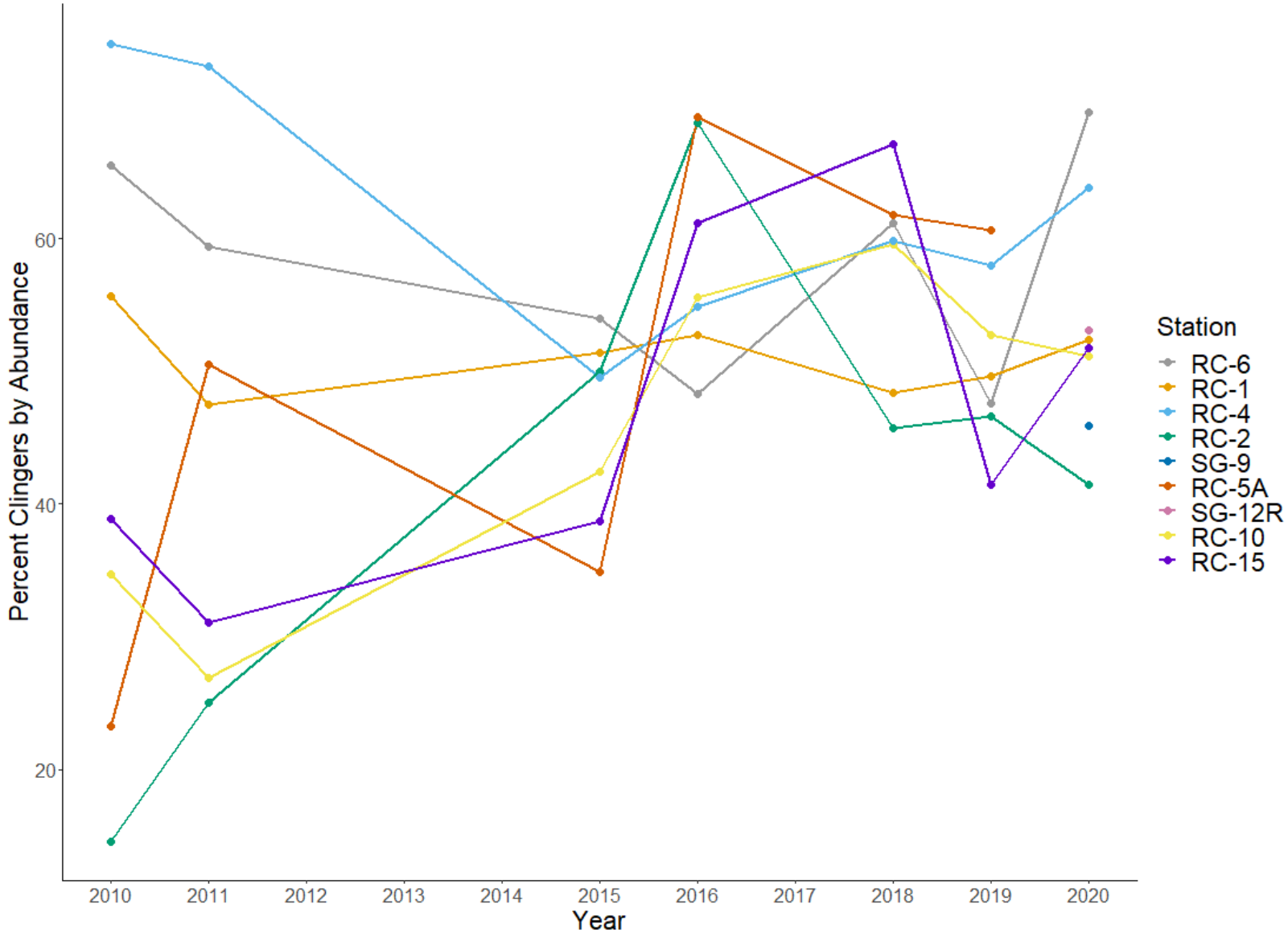


Figure E.8. Percent Filterers by Abundance by Station, All Years

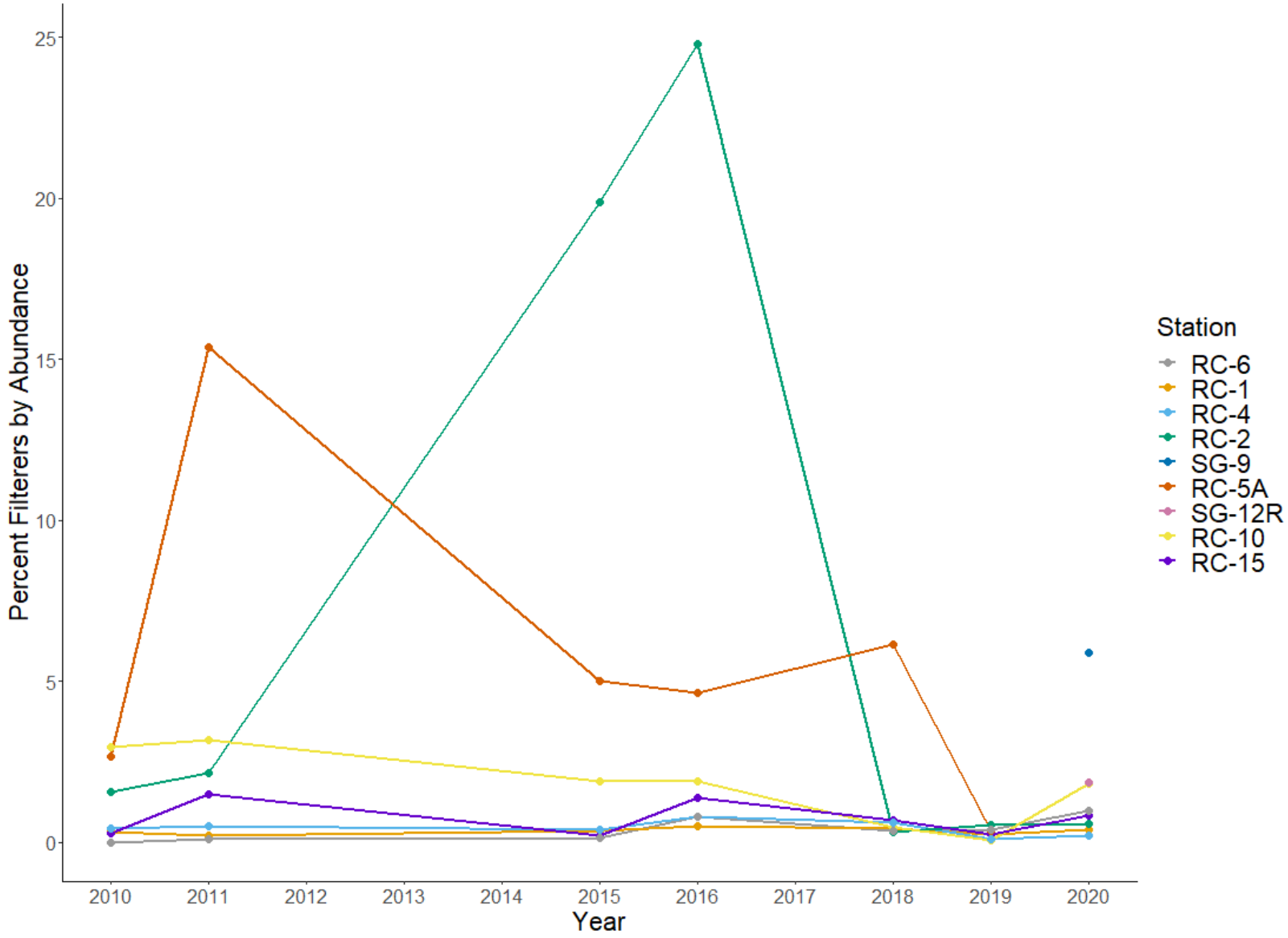


Figure E.9. Percent Dominant Taxa by Abundance by Station, All Years

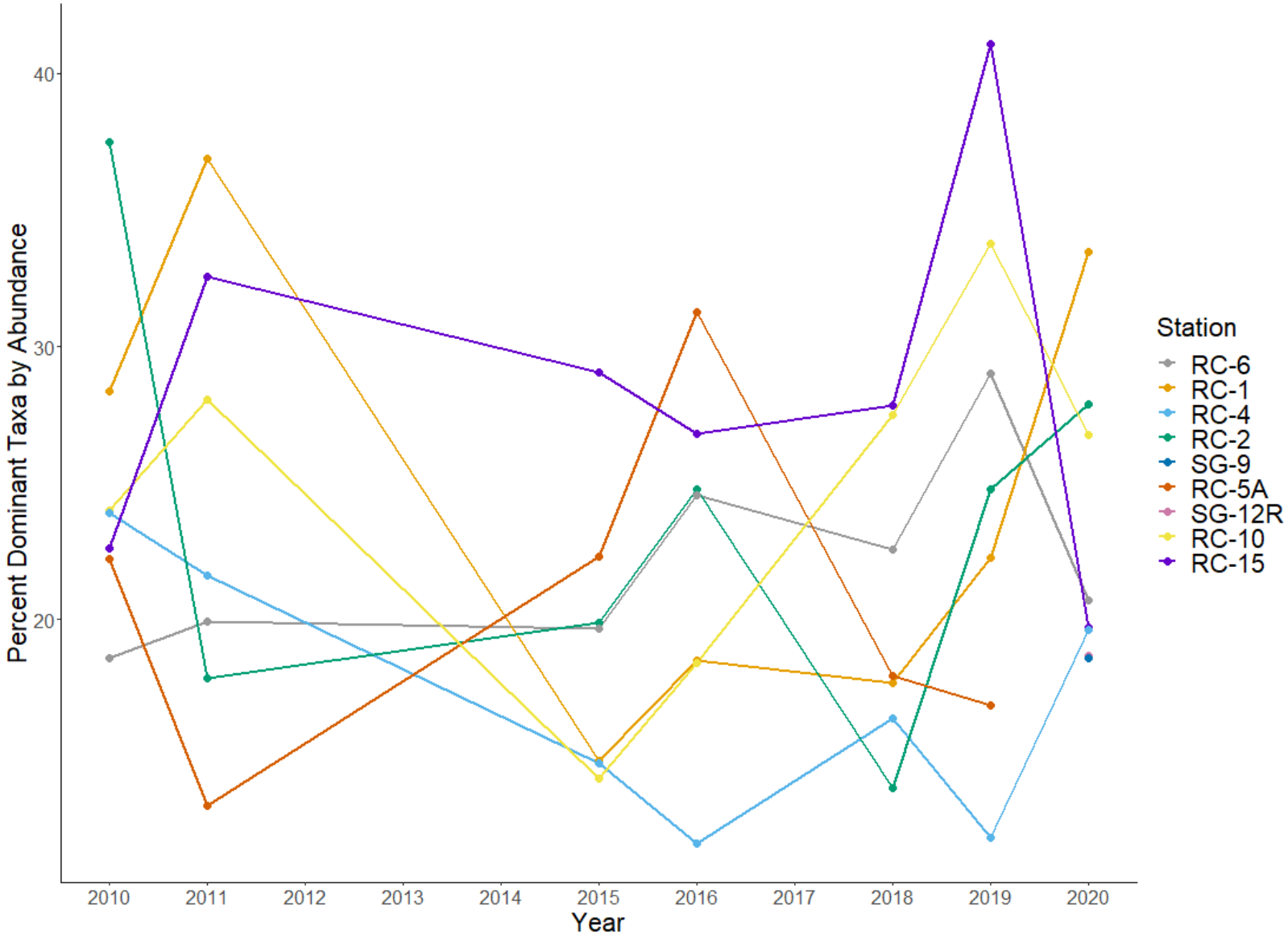


Figure E.10. Percent Ephemeroptera by Abundance by Station, All Years

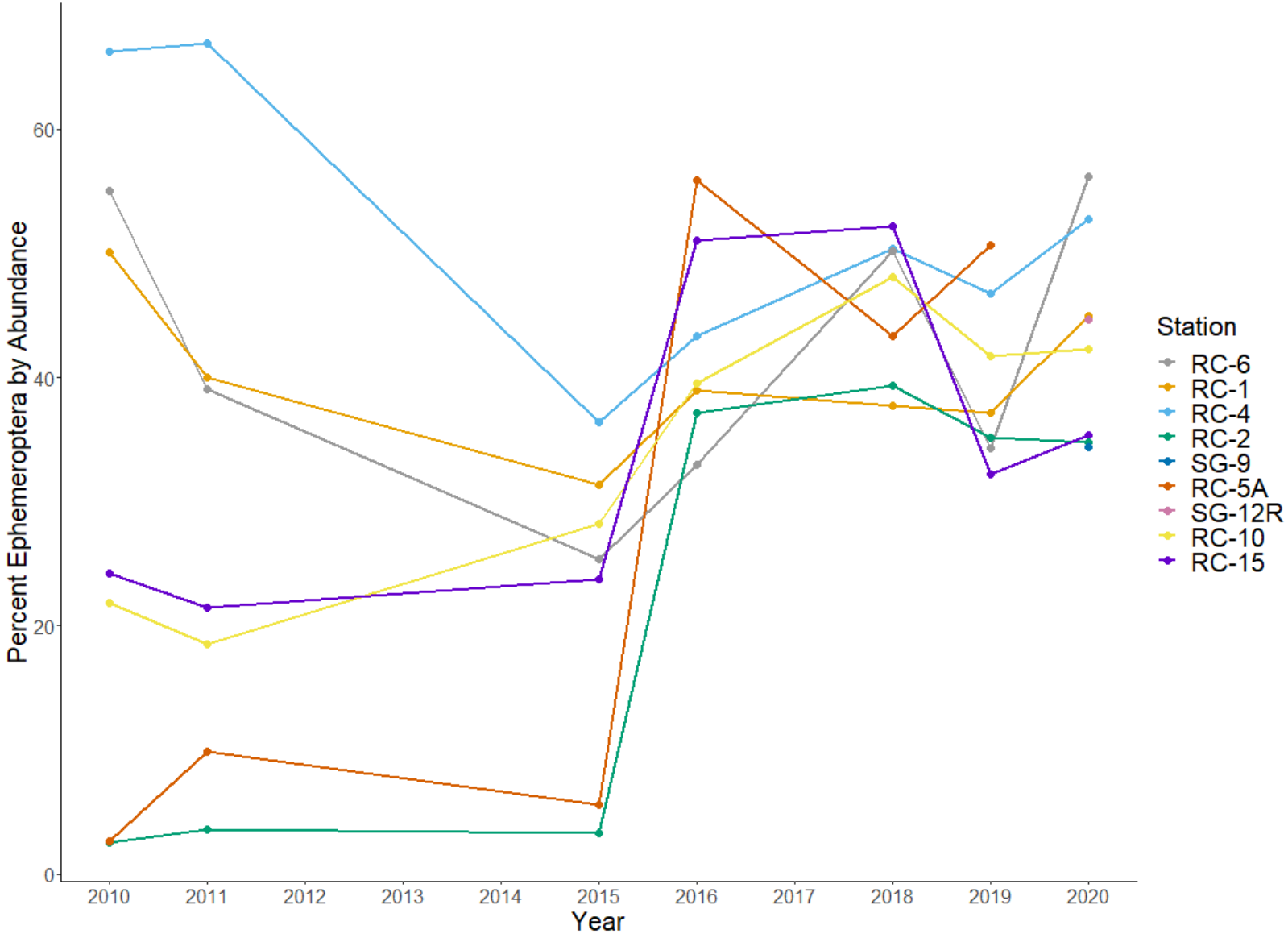


Figure E.11. HBI by Station, All Years

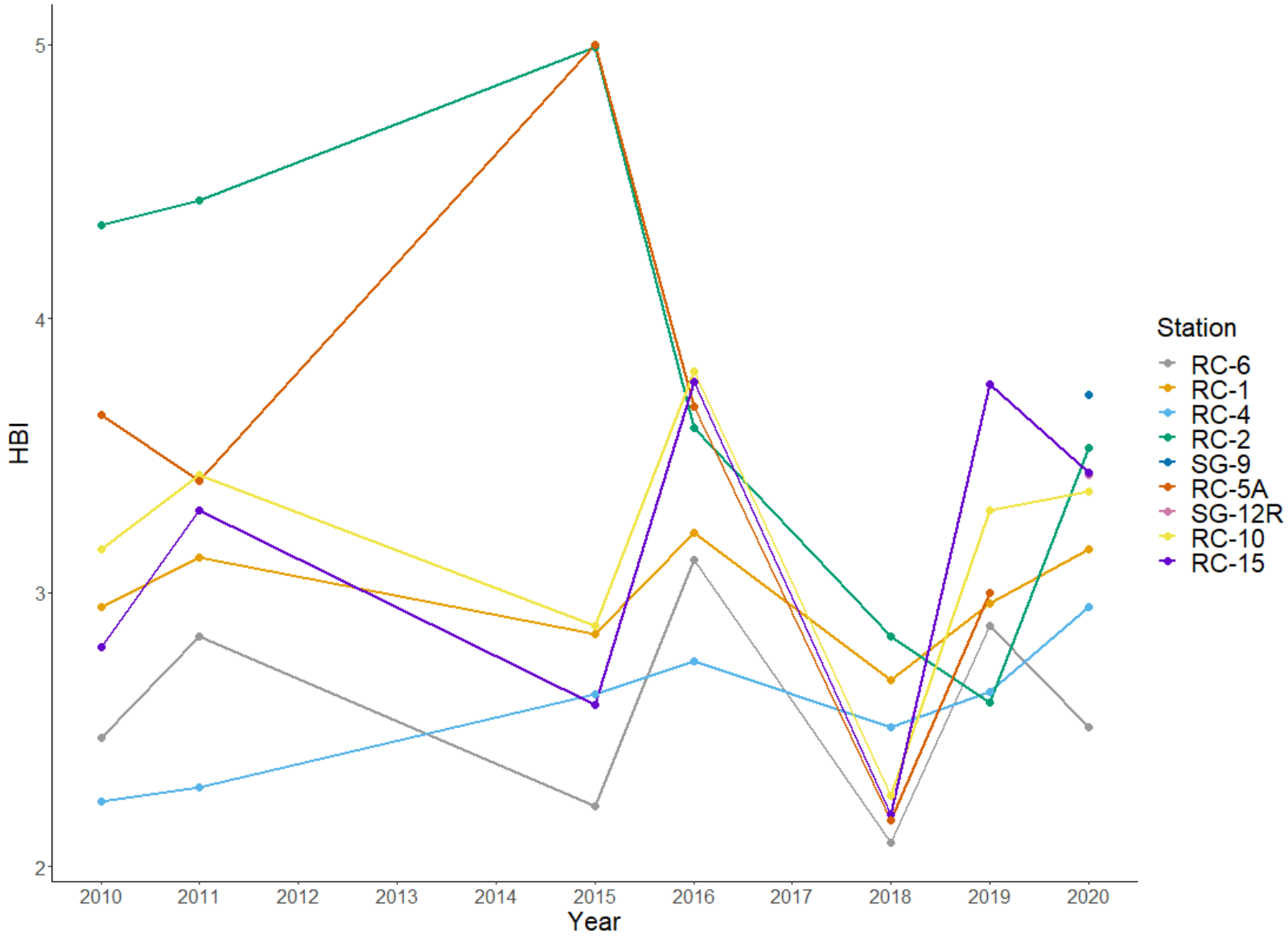


Figure E.12. Percent Tolerant Taxa by Abundance by Station, All Years

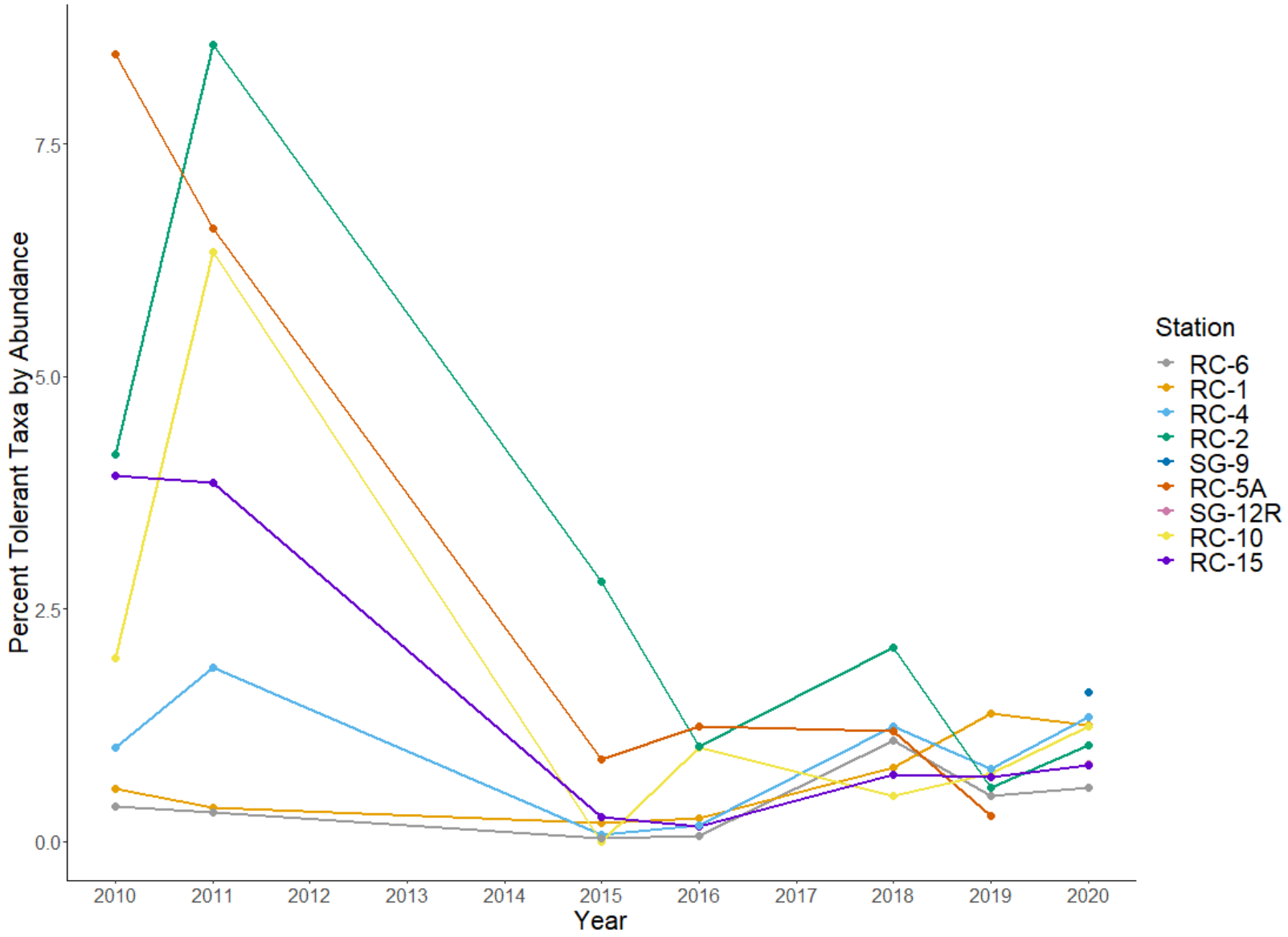
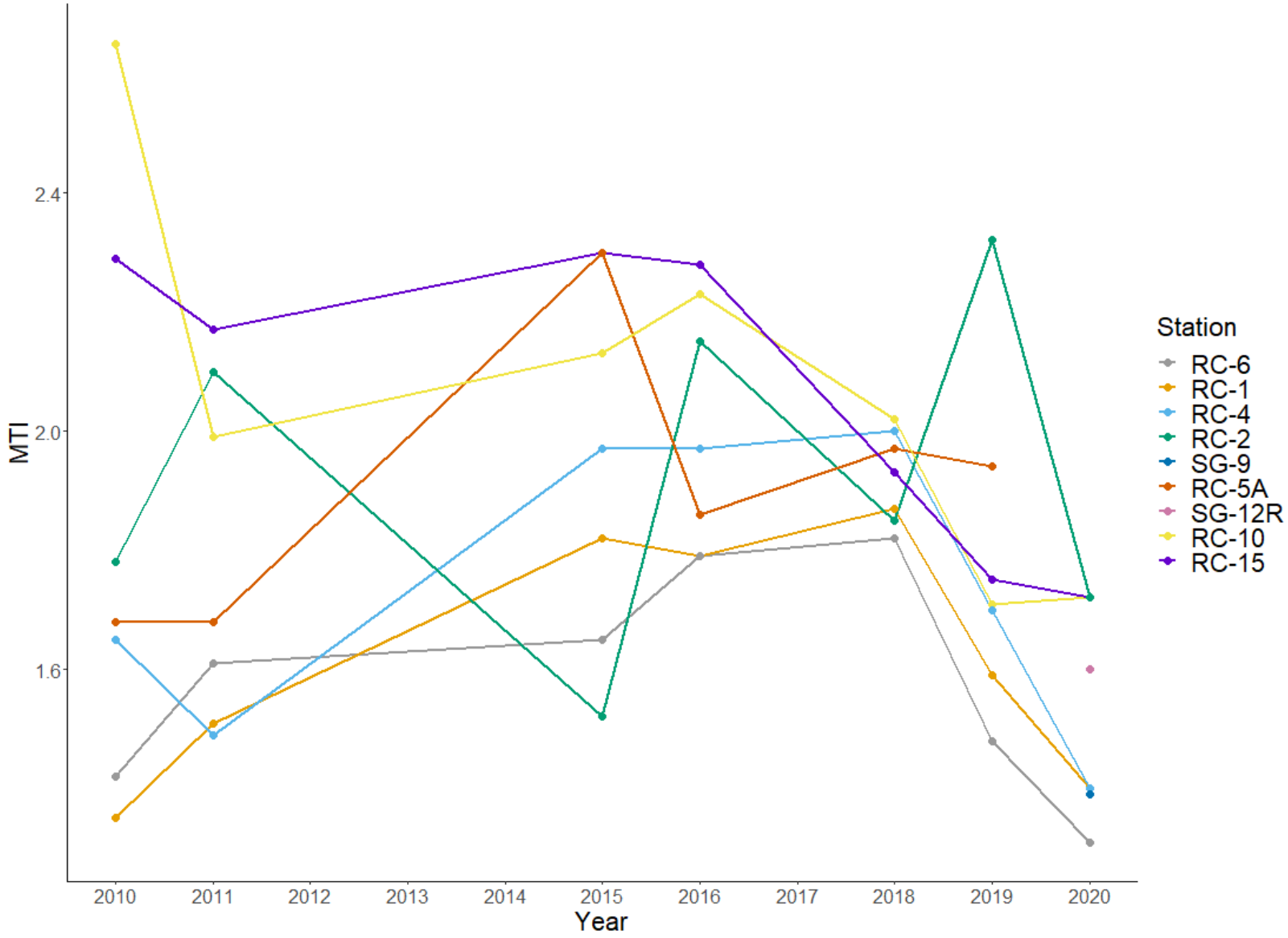


Figure E.13. MTI by Station, All Years



Appendix F

An Improved Method for Estimating the Fish Population in Railroad Creek

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CONFLUENCE
ENVIRONMENTAL COMPANY

Date: January 11, 2021

Re: Appendix F: An improved method for estimating the fish population in Railroad Creek

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Removal models are used to estimate unknown population size. The classic models estimate populations by plotting catch per unit effort of collection as a function of total previous catch, or by obtaining maximum likelihood estimates (Rodriguez de Rivera and McCrea 2020). The methods in the Performance Verification Standards Plan (PVSP; Floyd|Snider 2020) propose estimating the fish population in Railroad Creek prior to, during, and following remedial activities at the Holden Mine site using slight modifications of one of these classic models. However, various improvements to these classic models have been developed over time. One such method is the maximum weighted likelihood model proposed by Carle and Strub (1978), which can better accommodate the variations present in Railroad Creek fish data. This memo presents population estimates for fish in Railroad Creek using the Carle and Strub maximum weighted likelihood model.

CLASSIC REMOVAL MODELS

The methods for estimating fish populations in Railroad Creek provided in the PVSP (Floyd|Snider 2020) follow slight enhancements of the classic removal model. The Seber LeCren model provides an explicit solution for the maximum likelihood model when the number of electrofishing passes (k) equals 2 (Seber and LeCren 1967). Seber and Whale (1970) provide a solution when k equals 3. These methods are collectively referred to as the classic MLE models in this document. The classic MLE models have 2 primary assumptions: 1) that the population is closed, and 2) that the probability of catch is constant for individuals contained within a sampling area, and between sampling events (i.e., electrofishing passes). Furthermore, for the maximum likelihood model to perform well, a large proportion of the population must be caught.

Fish collection within Railroad Creek is conducted within a station closed off with block nets to prevent fish migration in or out of the station. Therefore, data meet the first assumption. However, equal probability of catch is widely recognized as unattainable because the fish that remain after the first removal event are generally more difficult to catch during subsequent removal events (Pope et al. 2010). This results in decreased sampling efficiency between successive sampling events, and yields population estimates that are biased low. The probability of catch likely varies in Railroad Creek, given the range in habitat complexity within and between stations and the variability in fish size present in the creek. This variability is

reflected in the population estimate results calculated using these methods (Table F-1). Standard errors vary widely and are so large in some cases as to render the estimate unusable (e.g., the 2019 estimate for RC-5a). Additionally, the probability of catch (p) is generally low and varies across time and space. Furthermore, no population estimate could be calculated for station RC-5a in 2018 because the probability of catch varied so widely that the model failed.

THE MAXIMUM WEIGHTED LIKELIHOOD MODEL

Carle and Strub (1978) introduced a more robust method for estimating population size from removal data, called the maximum weighted likelihood model (Carle Strub method). This model performs when the probability of catch varies and does not require a large proportion of the population to be caught. In the past, the main drawback of the Carle Strub method has been the iterative procedure required to determine the actual population size. However, statistical software programs, such as R, have virtually eliminated this drawback. Cowx (1983) concluded this method to be the most robust when the probability of catch varied. All years of fish data collected as part of the biomonitoring program were reanalyzed using the Carle Strub method. Results from this analysis are presented in Table F-1, alongside results using the classic MLE methods. Figures E-1 and E-2 visualize the different population estimates over time.

Population estimates using the Carle Strub method are generally smaller than estimates calculated using the classic MLE methods. However, this smaller estimate is accompanied by a reduction in the standard error (SE) and an increased probability of catch estimate. Furthermore, where the classic MLE methods failed to provide usable population estimates at RC-5a in 2018 and RC-6 in 2019, the Carle Strub method calculates a usable estimate, though the probability of catch variability is still evidenced in the large SE. Notably, the trends over time are similar between methods (Figures F-1 and F-2), but the Carle Strub method is less noisy.

Though the Carle Strub method performs better than the classic MLE methods, it is still subject to the assumption of constant probability of catch. This assumption, as discussed above, is rarely met in real-world conditions, and population estimates derived via this method are biased low. Additionally, the bias itself is inconsistent and influenced by stream habitat conditions, such as the presence of instream structure (e.g., large woody debris) (Pope et al. 2010). However, the population estimates derived through removal models may still be used as a relative index of fish abundance over space and time (Pope et al. 2010). The Carle Strub method provides the best method for estimating fish populations residing in a highly dynamic mountain creek environment such as the environment found in Railroad Creek.

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Cowx, I. G. 1983. Review of the methods for estimating fish population size from survey removal data. Fisheries Management 14(2):67-82.

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TABLES

Table F-1. Comparison of fish population estimates in Railroad Creek using the Carle Strub method and the classic MLE methods

Station	Metric		2010	2015	2016	2018	2019	2020
RC-6	Total Fish Collected		54	58	65	53	34	18
	Number of Passes		3	2	2	3	3	2
	Carle Strub Method	Population Estimate (SE)	57 (2.8)	62 (3.7)	70 (4.3)	70 (13.5)	64 (39.1)	22 (6.4)
		Catchability (p)	0.61	0.73	0.72	0.37	0.22	0.55
	Classic MLE Method	Population Estimate (SE)	58 (3.1)	63 (4.4)	71 (4.9)	78 (20.5)	274 (1,221.8)	30 (20.4)
		Catchability (p)	0.60	0.71	0.70	0.31	0.04	0.36
RC-1	Total Fish Collected		56	94	90	113	50	12
	Number of Passes		3	2	2	2	3	2
	Carle Strub Method	Population Estimate (SE)	64 (6.3)	108 (8.8)	118 (18.0)	128 (8.6)	66 (13.2)	14 (4.4)
		Catchability (p)	0.49	0.64	0.51	0.65	0.37	0.57
	Classic MLE Method	Population Estimate (SE)	67 (8.1)	110 (9.7)	124 (22.1)	130 (9.4)	75 (20.8)	25 (30.3)
		Catchability (p)	0.45	0.62	0.47	0.64	0.31	0.29
RC-4	Total Fish Collected		45	59	67	59	35	25
	Number of Passes		3	2	2	2	2	2
	Carle Strub Method	Population Estimate (SE)	54 (7.8)	65 (5.1)	89 (16.7)	81 (18.1)	41 (6.4)	26 (1.8)
		Catchability (p)	0.44	0.69	0.50	0.47	0.60	0.78
	Classic MLE Method	Population Estimate (SE)	59 (11.2)	67 (6.0)	97 (23.4)	91 (27.8)	44 (9.2)	27 (2.2)
		Catchability (p)	0.38	0.66	0.44	0.41	0.54	0.75
RC-2	Total Fish Collected		11	22	34	77	19	16
	Number of Passes		3	2	3	2	2	2
	Carle Strub Method	Population Estimate (SE)	11 (0.6)	22 (0.7)	37 (3.4)	91 (9.6)	23 (6.1)	17 (2.5)
		Catchability (p)	0.73	0.88	0.55	0.60	0.56	0.70
	Classic MLE Method	Population Estimate (SE)	11 (0.8)	23 (1.0)	38 (4.3)	94 (11.3)	29 (14.6)	20 (6.1)
		Catchability (p)	0.68	0.84	0.51	0.57	0.42	0.55
SG-9c	Total Fish Collected		--	--	--	--	--	70
	Number of Passes		--	--	--	--	--	2
	Carle Strub Method	Population Estimate (SE)	--	--	--	--	--	87 (12.3)
		Catchability (p)	--	--	--	--	--	0.55

Station	Metric		2010	2015	2016	2018	2019	2020
	Classic MLE Method	Population Estimate (SE)	--	--	--	--	--	92 (15.7)
		Catchability (p)	--	--	--	--	--	0.51
RC-5a	Total Fish Collected		9	42	39	44	50	--
	Number of Passes		1	2	3	3	2	--
	Carle Strub Method	Population Estimate (SE)	--	49 (6.8)	41 (2.6)	99 (73.1)	66 (14.1)	--
		Catchability (p)	--	0.61	0.60	0.17	0.50	--
	Classic MLE Method	Population Estimate (SE)	--	53 (9.5)	43 (3.5)	--	73 (20.8)	--
		Catchability (p)	--	0.55	0.55	--	0.44	--
SG-12Rc	Total Fish Collected		--	--	--	--	--	96
	Number of Passes		--	--	--	--	--	3
	Carle Strub Method	Population Estimate (SE)	--	--	--	--	--	190 (73.5)
		Catchability (p)	--	--	--	--	--	0.21
	Classic MLE Method	Population Estimate (SE)	--	--	--	--	--	256 (161.8)
		Catchability (p)	--	--	--	--	--	0.15
RC-10	Total Fish Collected		15	50	118	58	88	52
	Number of Passes		2	3	2	2	2	2
	Carle Strub Method	Population Estimate (SE)	15 (0.6)	74 (20.9)	142 (13.2)	67 (7.3)	95 (5.0)	73 (18.7)
		Catchability (p)	0.88	0.31	0.58	0.62	0.72	0.46
	Classic MLE Method	Population Estimate (SE)	15 (0.8)	89 (38.2)	146 (15.2)	70 (9.2)	96 (5.5)	85 (32.0)
		Catchability (p)	0.85	0.24	0.56	0.59	0.71	0.38
RC-15	Total Fish Collected		61	59	111	74	109	--
	Number of Passes		2	2	2	2	2	--
	Carle Strub Method	Population Estimate (SE)	62 (1.7)	70 (8.7)	123 (7.2)	101 (19.6)	178 (46.4)	--
		Catchability (p)	0.85	0.60	0.68	0.48	0.37	--
	Classic MLE Method	Population Estimate (SE)	63 (2.0)	73 (10.7)	125 (8.1)	110 (27.3)	201 (67.7)	--
		Catchability (p)	0.83	0.56	0.66	0.43	0.32	--

FIGURES

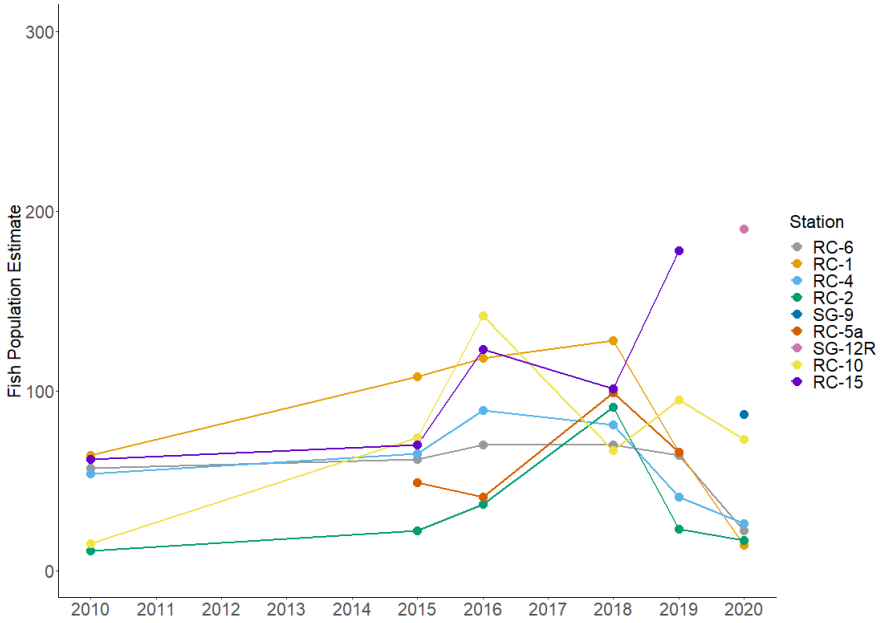


Figure F-1. Fish population estimates in Railroad Creek, calculated using the Carle Strub method

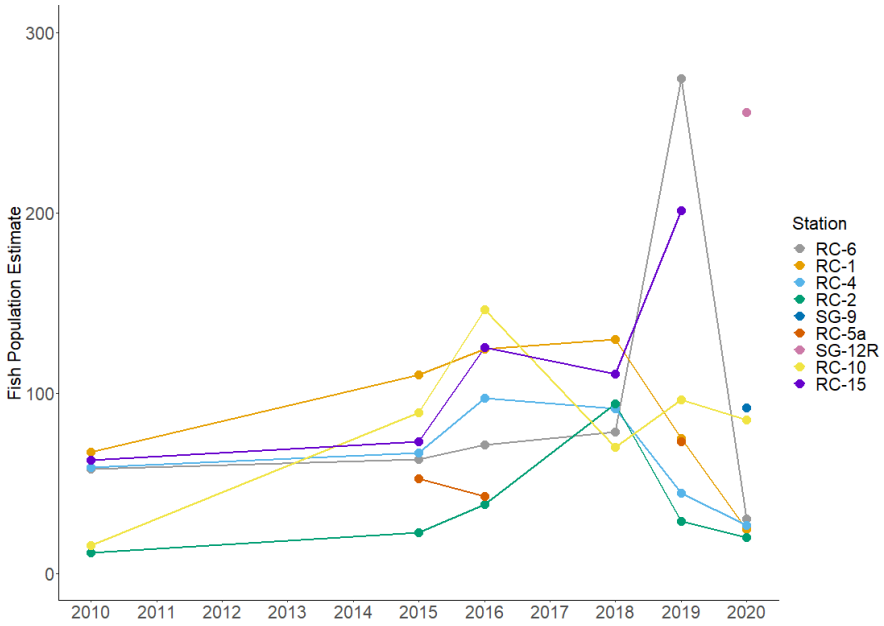


Figure F-2. Fish population estimates in Railroad Creek, calculated using the classic MLE methods



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Appendix G
Periphyton Data Summary

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Table G.1
Chlorophyll *a* Biomass

Area	Location Name	Mean Areal Biomass as Chlorophyll a (mg/m^2)			
		2013	2015	2018	2019
Background	RM 11.1	1.1	4.2	1.5	1.1
	RM 10.8	3.2	2.3	1.1	0.7
Site	RM 10.0	1.0	1.5	1.0	1.9
	RM 9.7	--	--	--	0.84
	RM 9.5	--	--	2.3	1.7
	RM 9.3	1.2	1.9	1.3	0.55
	RM 9.2	--	--	2.1	--
Downstream from Tailings Piles	RM 9.1	--	--	--	1.5
	RM 8.8	0.40	3.5	1.1	1.8
	RM 6.2	0.54	6.7	1.0	1.1

Abbreviations:

mg/m^2 Milligrams per square meter

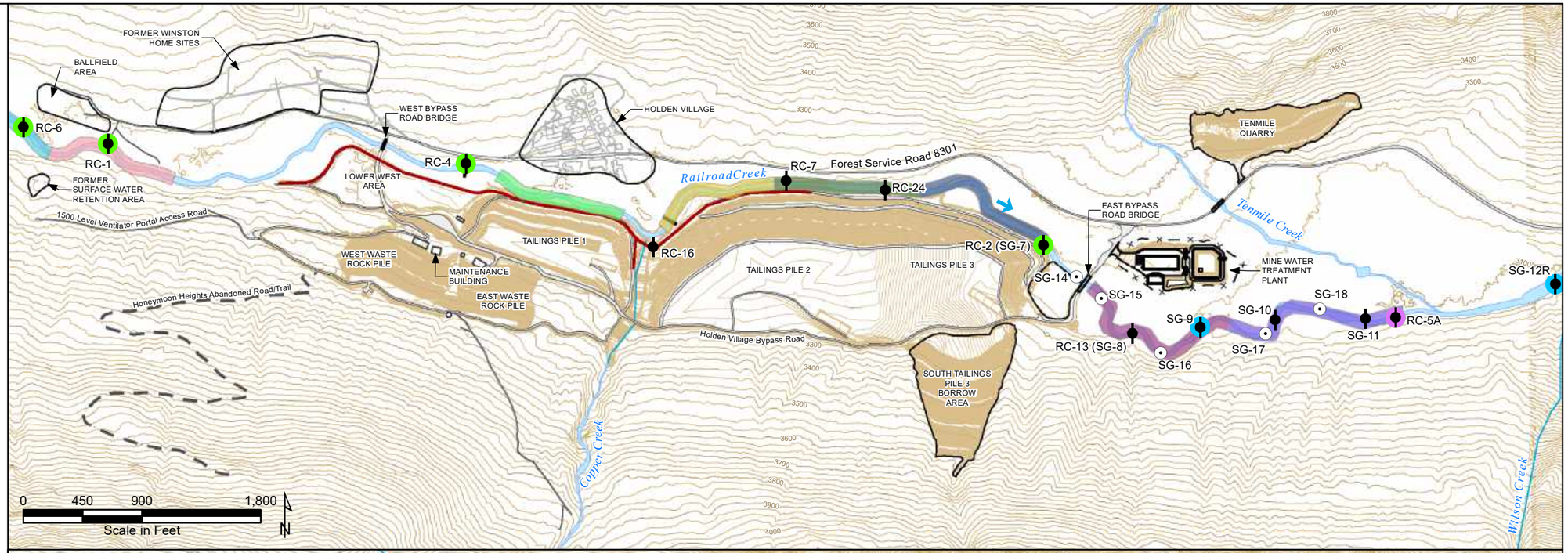
Legend

- Staff Gauge Location
- Surface Water Sample Location
- Aquatic Life Survey Location
- Aquatic Life Survey Location, 2020 Alternate
- Aquatic Life Survey Location, Not Sampled in 2020
- Approximate Location of Subsurface Barrier Wall
- Surface Water Flow Direction
- 100-foot Elevation Index Contour

Ecology Sampling Stations

- RR06.2, RC10.0
- RR08.8, RC5
- RR09.1, RC13
- RR09.3, NA
- RR09.5, NA
- RR09.7, NA
- RR10.0, RC4
- RR10.8, RC1
- RR11.1, RC6

Notes:
- Where surface water samples and staff gauges are collocated, "SG" is included in the location ID and only the surface water sample location is shown.
- Benthic macroinvertebrate surveys and fish population surveys were conducted over a 100-meter reach at each location.
- Regional elevation contours derived from LIDAR survey performed by Terra Remote Sensing, Inc., dated 2003 and USDA-FSA-APFO, publication date 2009. Detailed contours derived from ground and drone surveys were provided by Stantec. Contours are shown in feet above mean sea level.



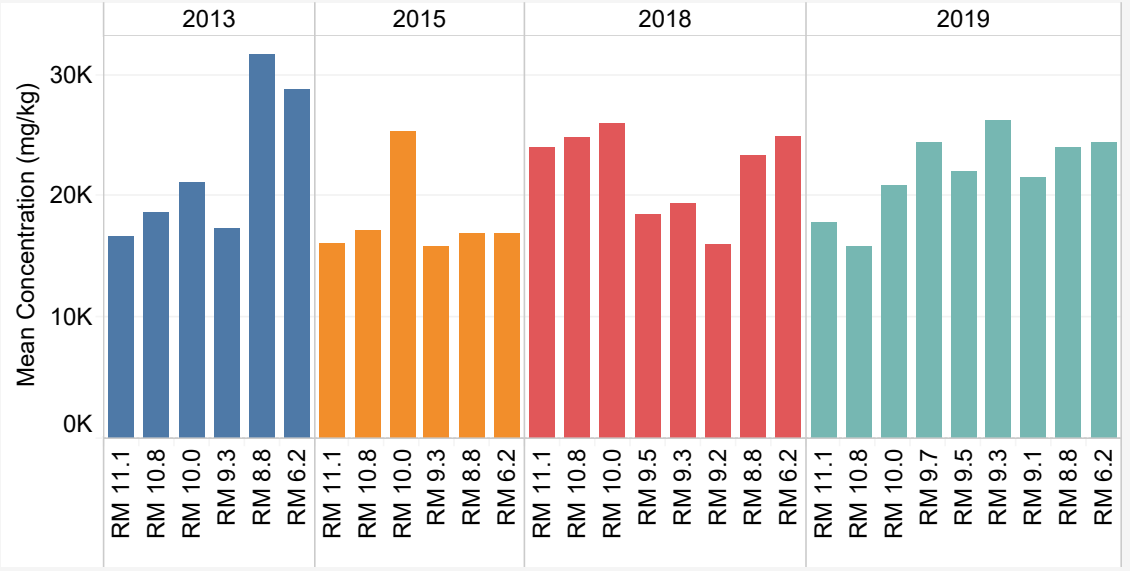
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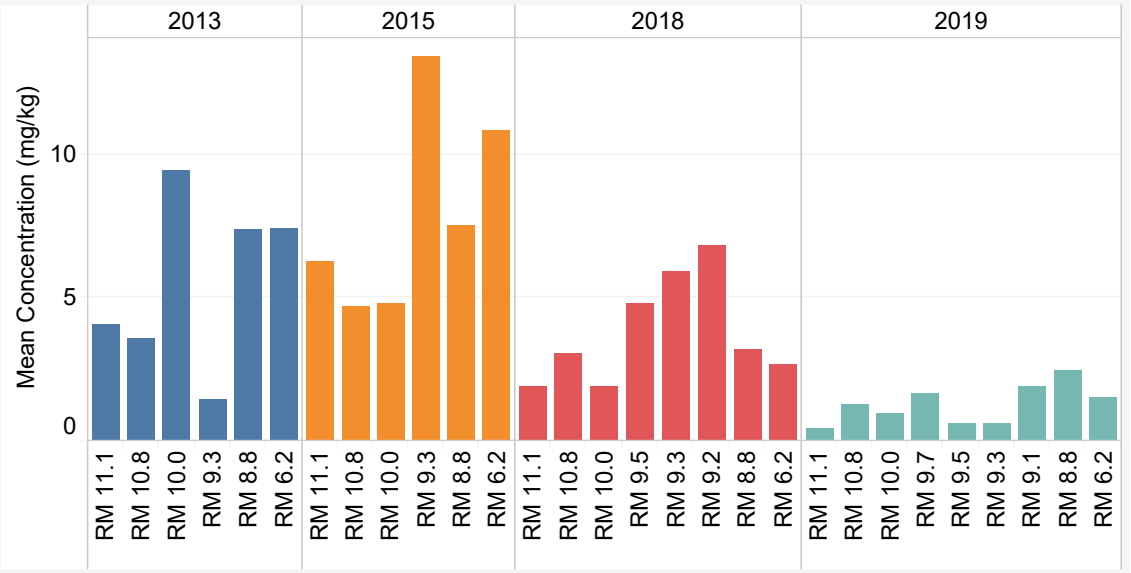
Figure G.1
Surface Water Sampling and Aquatic Life Survey Locations

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Aluminum in Periphyton Tissue



Cadmium in Periphyton Tissue

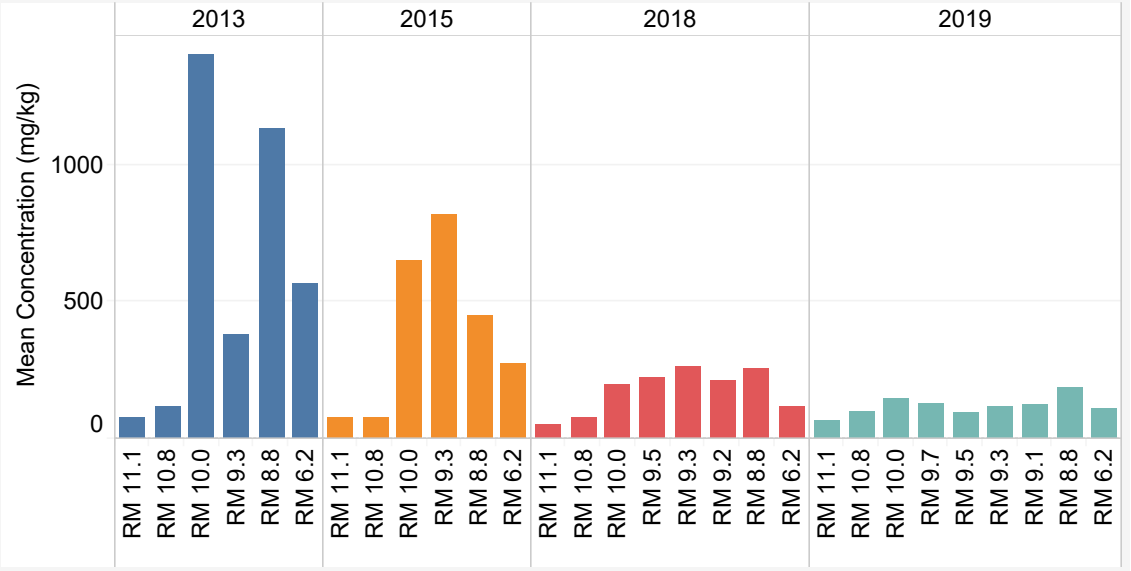


Abbreviations:
mg/kg = Milligrams per kilogram

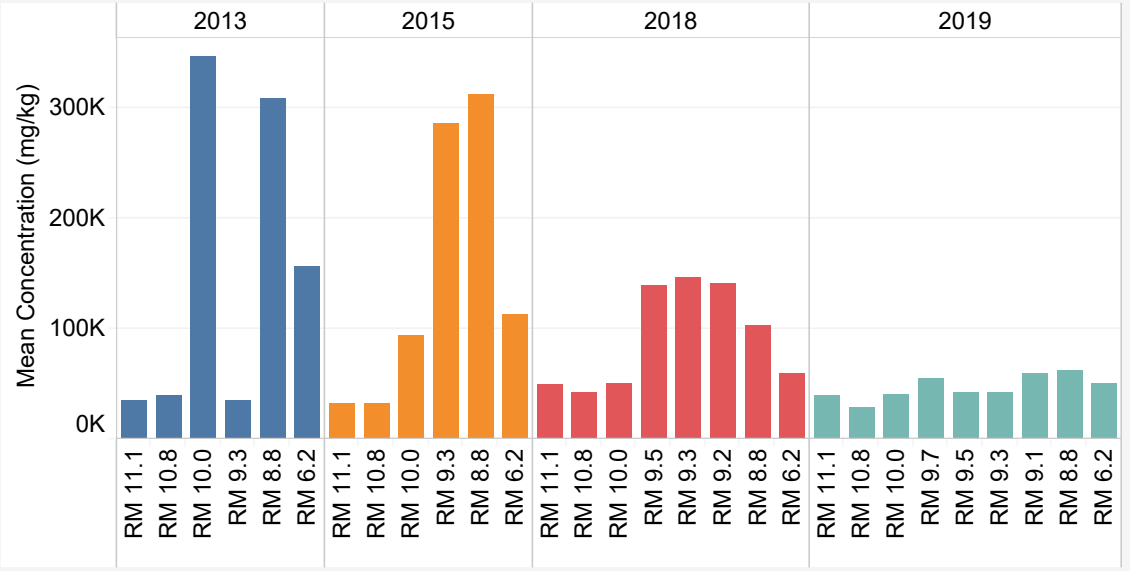
Figure G.2
Detected Concentrations of Metals in Periphyton Tissue (Sheet 1 of 3)

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Copper in Periphyton Tissue



Iron in Periphyton Tissue

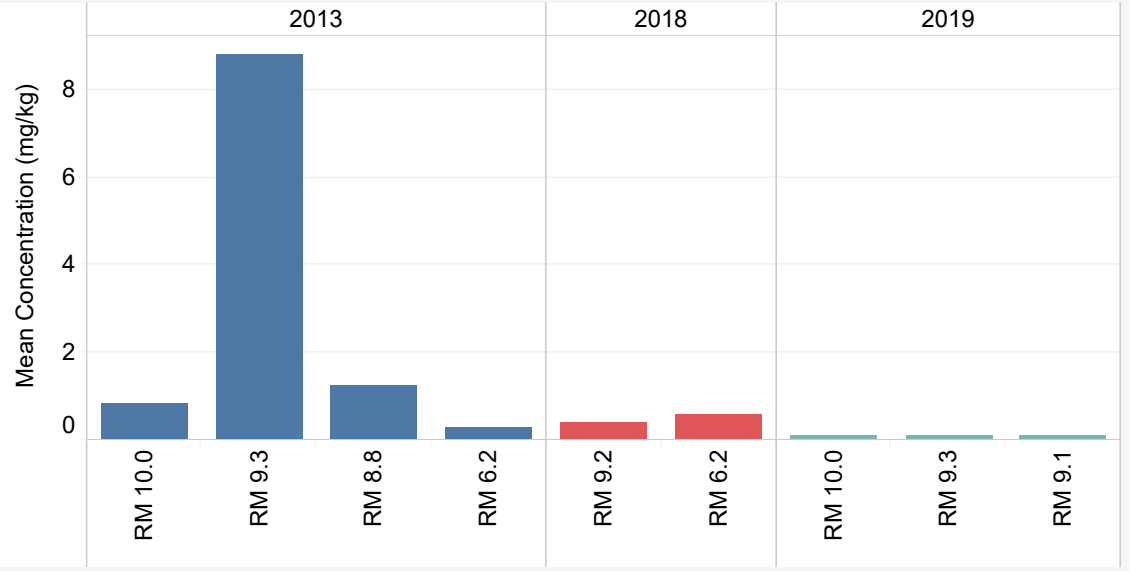


Abbreviations:
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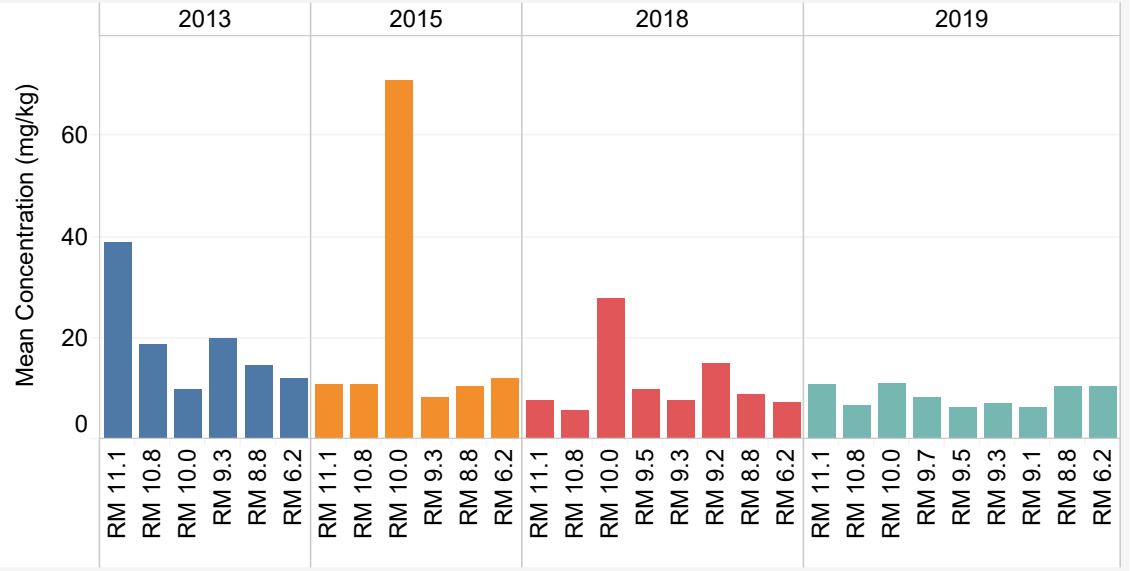
Figure G.2
Detected Concentrations of Metals in Periphyton Tissue (Sheet 2 of 3)

DRAFT

Silver in Periphyton Tissue



Lead in Periphyton Tissue



Abbreviations:
mg/kg = Milligrams per kilogram

Figure G.2
Detected Concentrations of Metals in Periphyton Tissue (Sheet 3 of 3)

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Appendix H
Summer and Fall 2020 Field Photographs

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Photograph 1. Sediment sample station RC-6 on the north bank of Railroad Creek looking east.



Photograph 2. Sediment sample from station RC-6.



Photograph 3. Sediment sample station RC-1 on the north bank of Railroad Creek looking east.



Photograph 4. Sediment sample from RC-1.



Photograph 5. Sediment sample station RC-4 on the south bank of Railroad Creek.



Photograph 6. Sediment sample from RC-4.



Photograph 7. Sediment sample station RC-2 (SG-7) on north bank of Railroad Creek, looking west.



Photograph 8. Sediment sample from RC-2 (SG-7).



Photograph 9. Surface water/biomonitoring station RC-10 looking east from north bank during fall 2020 event.



Photograph 10. Sediment sample station RC-5A on the north bank of Railroad Creek looking east.



Photograph 11. Sediment sample from RC-5A.



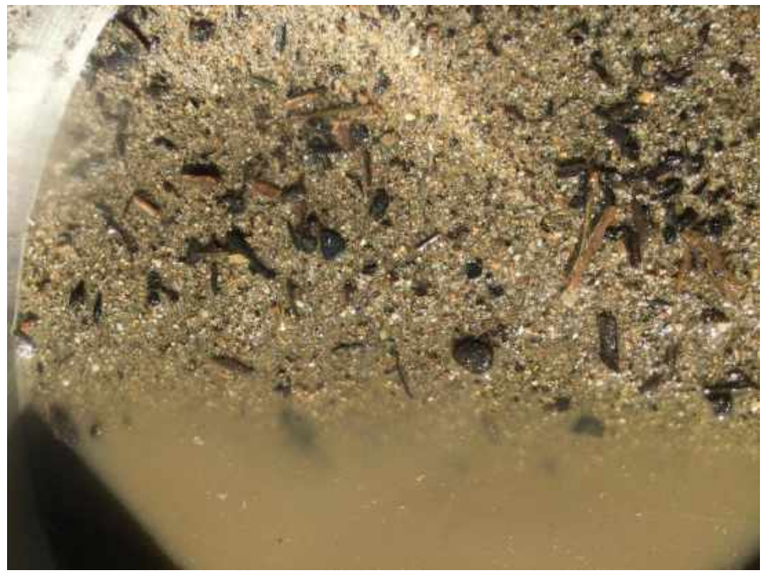
Photograph 12. Sediment sample station RC-10 on north bank of Railroad Creek, looking west toward staff gauge SG-20.



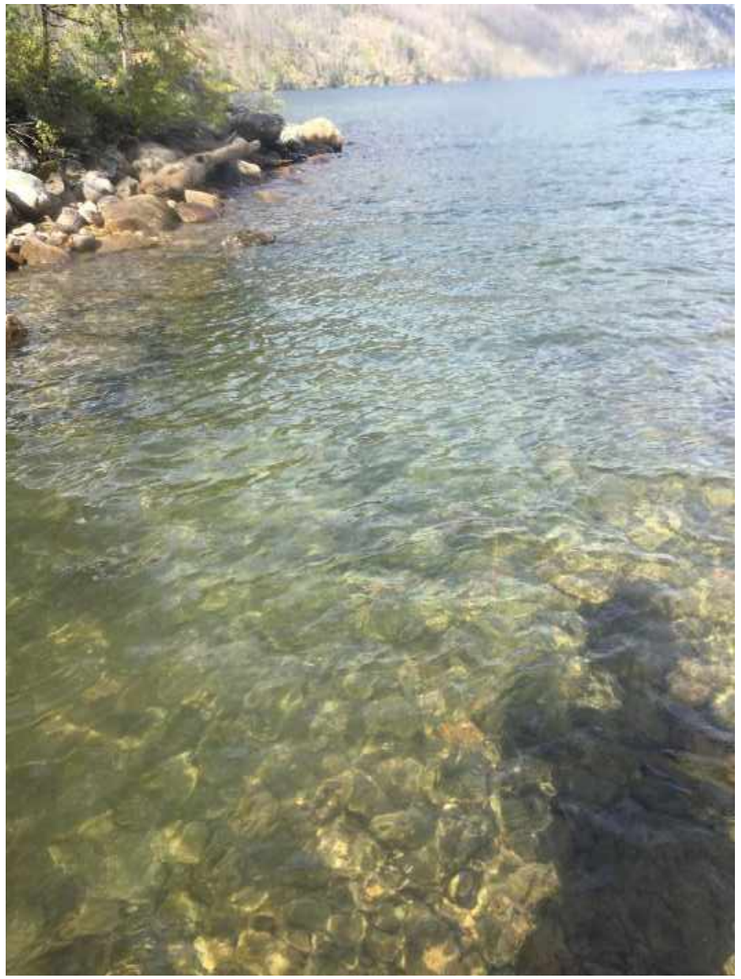
Photograph 13. Sediment at RC-10 (closeup).



Photograph 14. Sediment sample station LB-1 at the mouth of Railroad Creek, looking west.



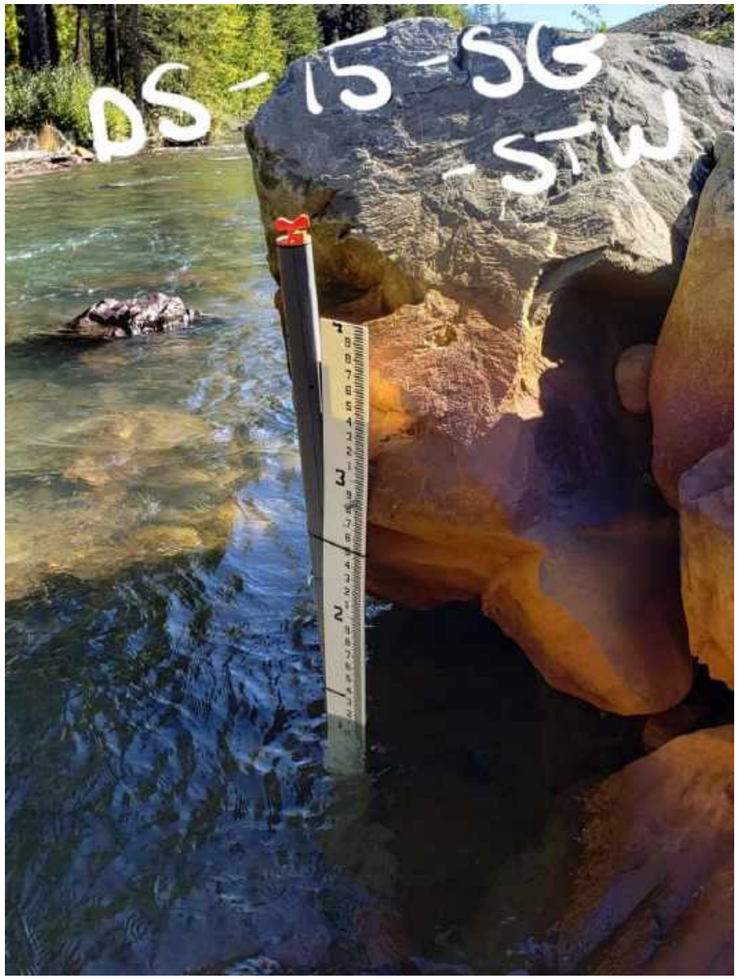
Photograph 15. Sediment sample collected from LB-1.



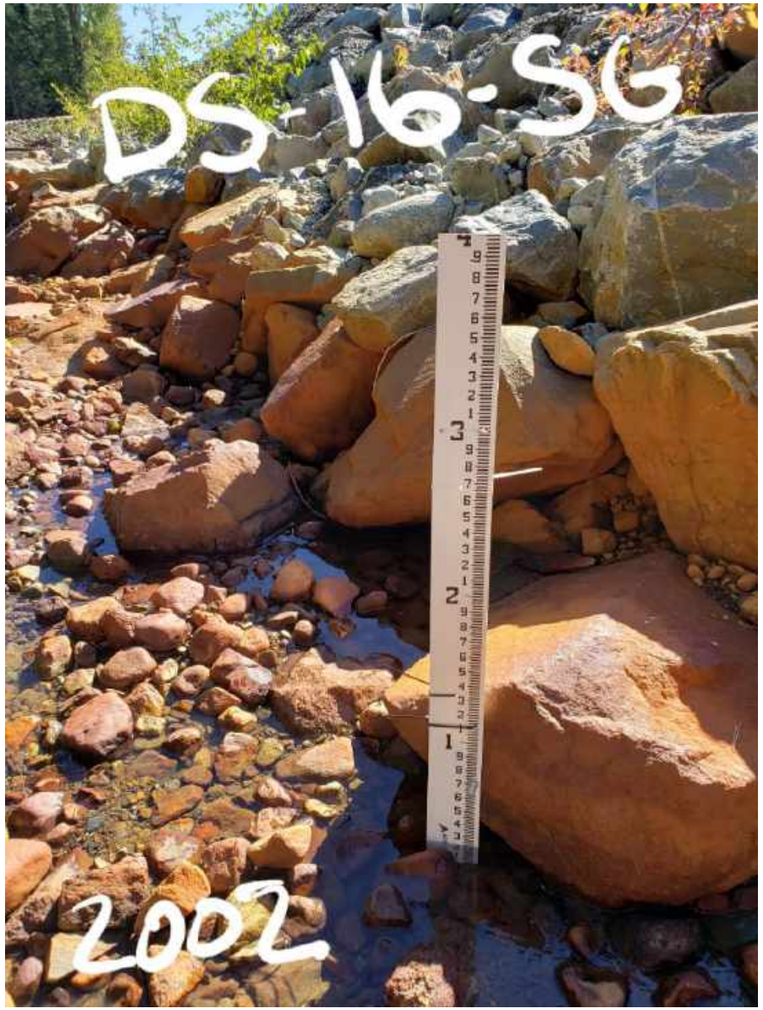
Photograph 16. Sediment sample station LB-2 at the mouth of Railroad Creek, looking west.



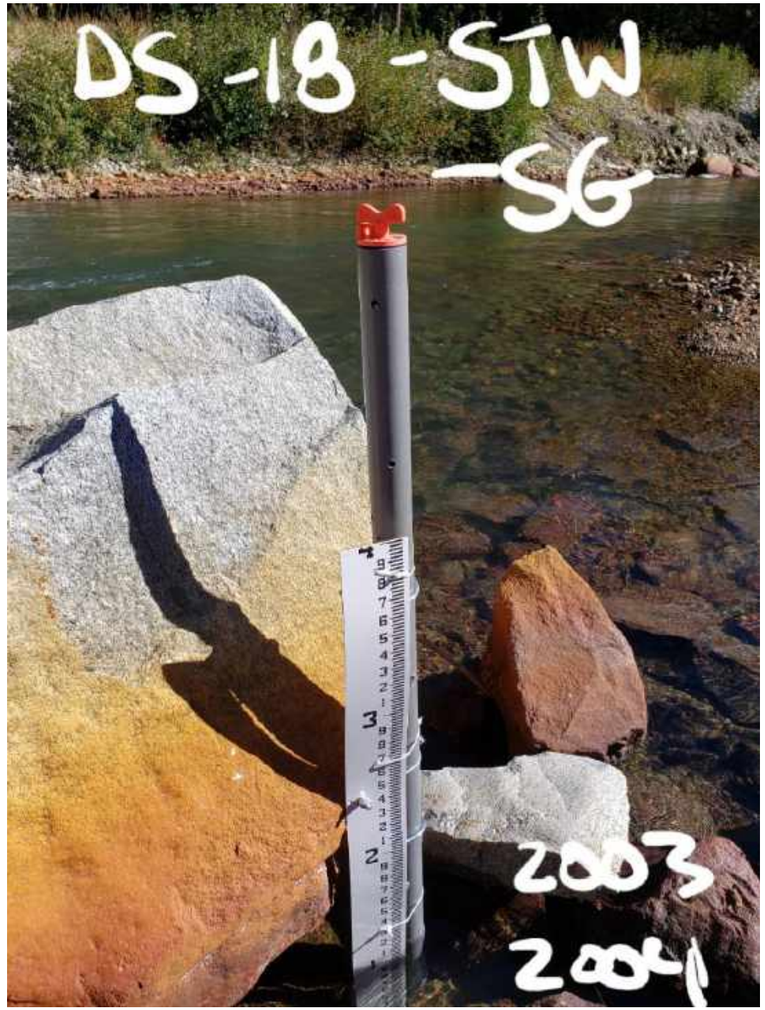
Photograph 17. Sediment sample collected from LB-2.



Photograph 18. New monitoring station (stilling well) DS-15-STW with attached staff gauge, located on south bank of Railroad Creek adjacent to DS-15 monitoring well cluster (photograph looking east/downstream).



Photograph 19. New monitoring station (staff gauge) DS-16-SG located on the south bank of Railroad Creek adjacent to monitoring well cluster DS-16.



Photograph 20. New monitoring station (stilling well) DS-18-STW with attached staff gauge located on the south bank of Railroad Creek adjacent to monitoring well cluster DS-18.



Photograph 21. Replacement for staff gauge SG-8 located on the north bank of Railroad Creek south of the Mine Water Treatment Plant.



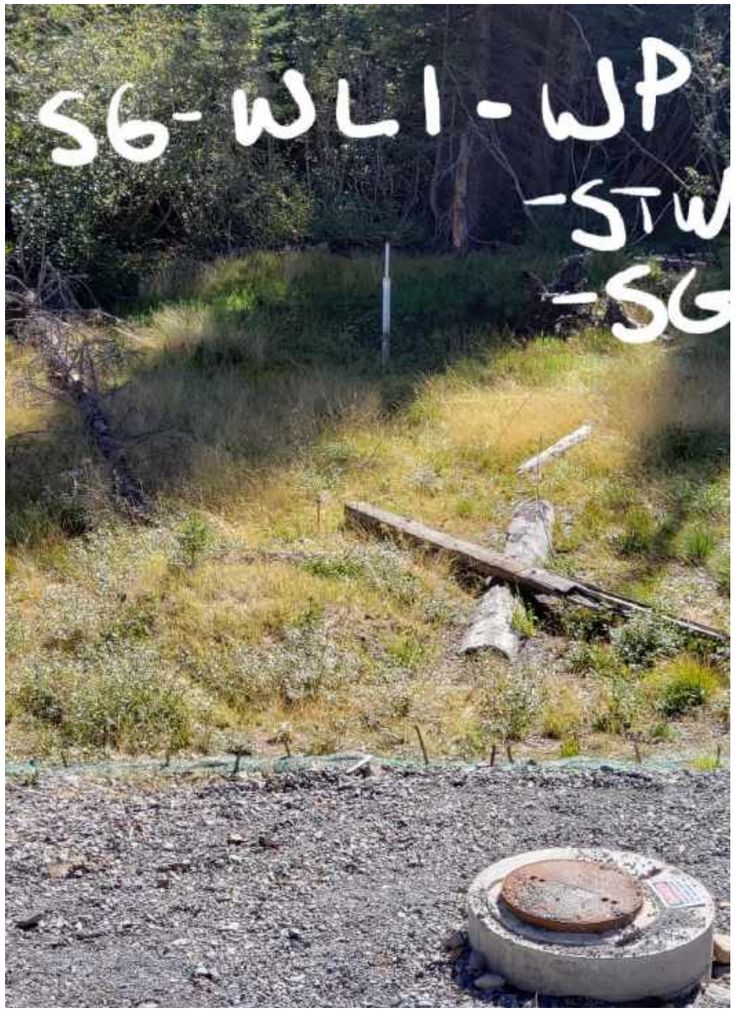
Photograph 22. Replacement staff gauge for damaged SG-9, located on the north bank of Railroad Creek.



Photograph 23. Replacement monitoring points SG-16 (left) and SG-16-WP (right) on north bank of Railroad Creek (photograph looking west/upstream).



Photograph 24. Replacement staff gauge for damaged SG-17, located on north bank of Railroad Creek downstream of Mine Water Treatment Plant. Existing well point SG-17-WP visible in foreground of photo.



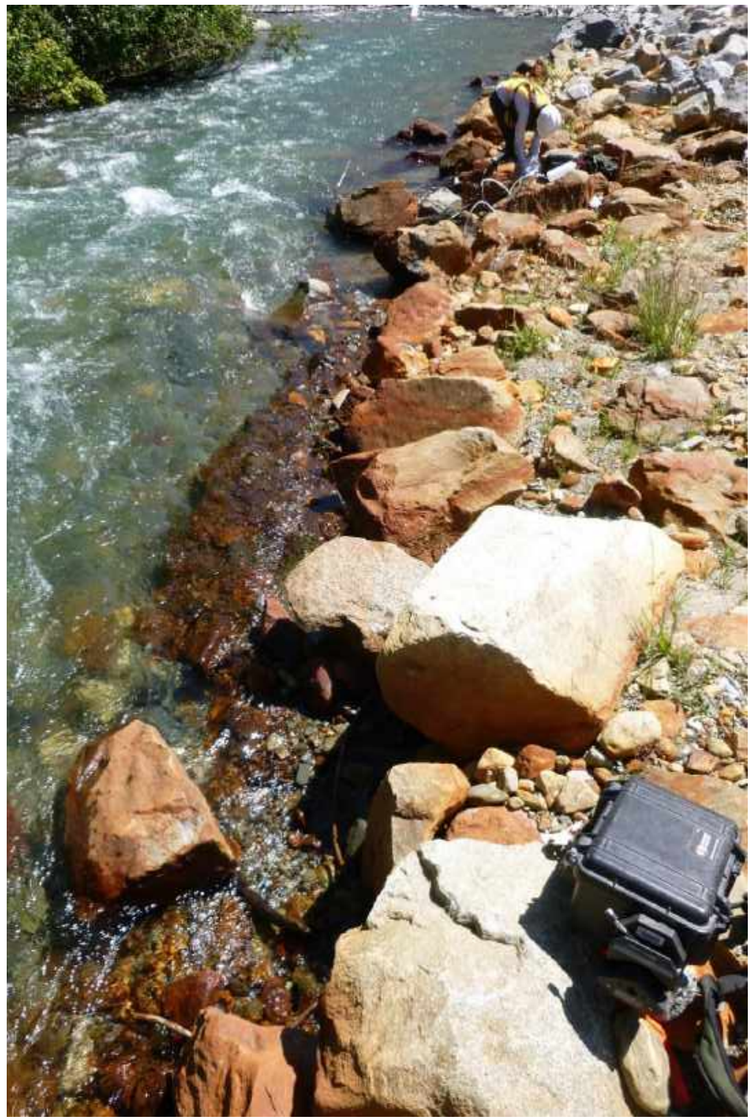
Photograph 25. New monitoring points SG-WL1-WP (well point) and SG-WL1STW (stilling well and staff gauge) located in Wetlands East of Tailings Pile 3 (near SW-TP3-East1). Well point is located to the left of horizontal log.



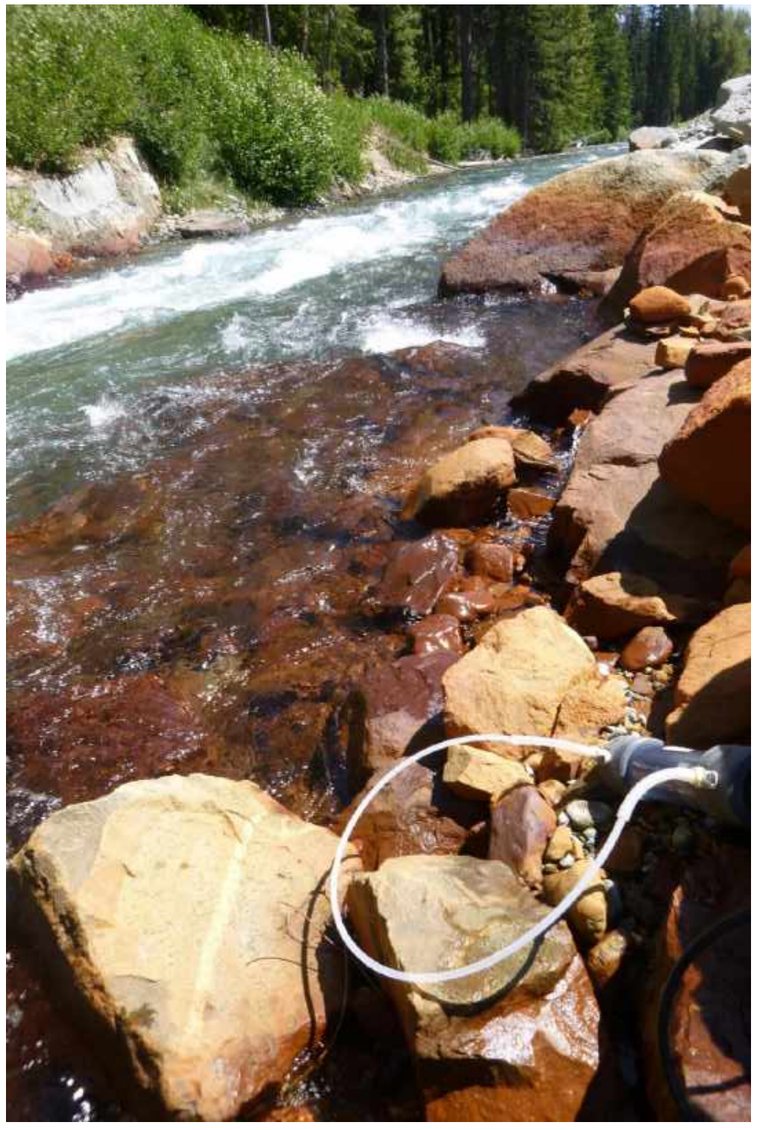
Photograph 26. New monitoring points SG-WL2-WP (well point) and SG-WL2STW (stilling well and staff gauge) located in Wetlands East of Tailings Pile 3 (near SW-TP3-East2).



Photograph 27. Seep location SP-26 located on south side of Railroad Creek. Photograph taken during spring 2020 event.



Photograph 28. Seep location SP-40 located on south side of Railroad Creek at the base of Tailings Pile 1. Photograph taken during summer 2020 sampling, looking east.



Photograph 29. Seep SP-34 on south bank of Railroad Creek at the base of Tailings Pile 2 near the eastern terminus of the barrier wall. Photograph looking east/downstream.



Photograph 30. Area of seep SP-31 on the south bank of Railroad Creek at the eastern toe of Tailings Pile 3. Photograph looking east/downstream.



Photograph 31. Seep SP-40 (closeup) during fall 2020 sampling.



Photograph 32. Seep SP-44 (closeup) located on the south bank of Railroad Creek at the base of Tailings Pile 1 (west of SP-40).



Photograph 33. Seep SP-45 located on the south bank of Railroad Creek at the base of Tailings Pile 3 (west of SP-31). Photograph looking west/upstream toward SG-7 area.



Photograph 34. Seep SP-46 located on south bank of Railroad Creek at the base of Tailings Pile 3 and across from SG-7-STW. Photograph looking northeast toward SG-7-STW.



Photograph 35. Staff gauge SG-WL1 adjacent to wetlands surface water sampling station SW-TP3-East1 during summer 2020 monitoring event.



Photograph 36. Wetland surface water monitoring station SW-TP3-East1 during summer 2020 monitoring event.



Photograph 37. Wetlands East of Tailings Pile 3 during fall 2020 monitoring event. SG-WL1 staff gauge visible on right side of photograph.



Photograph 38. Stilling well and staff gauge (SG-WL2STW) at wetland surface water sampling station SW-TP3-East2 during summer 2020 monitoring event.



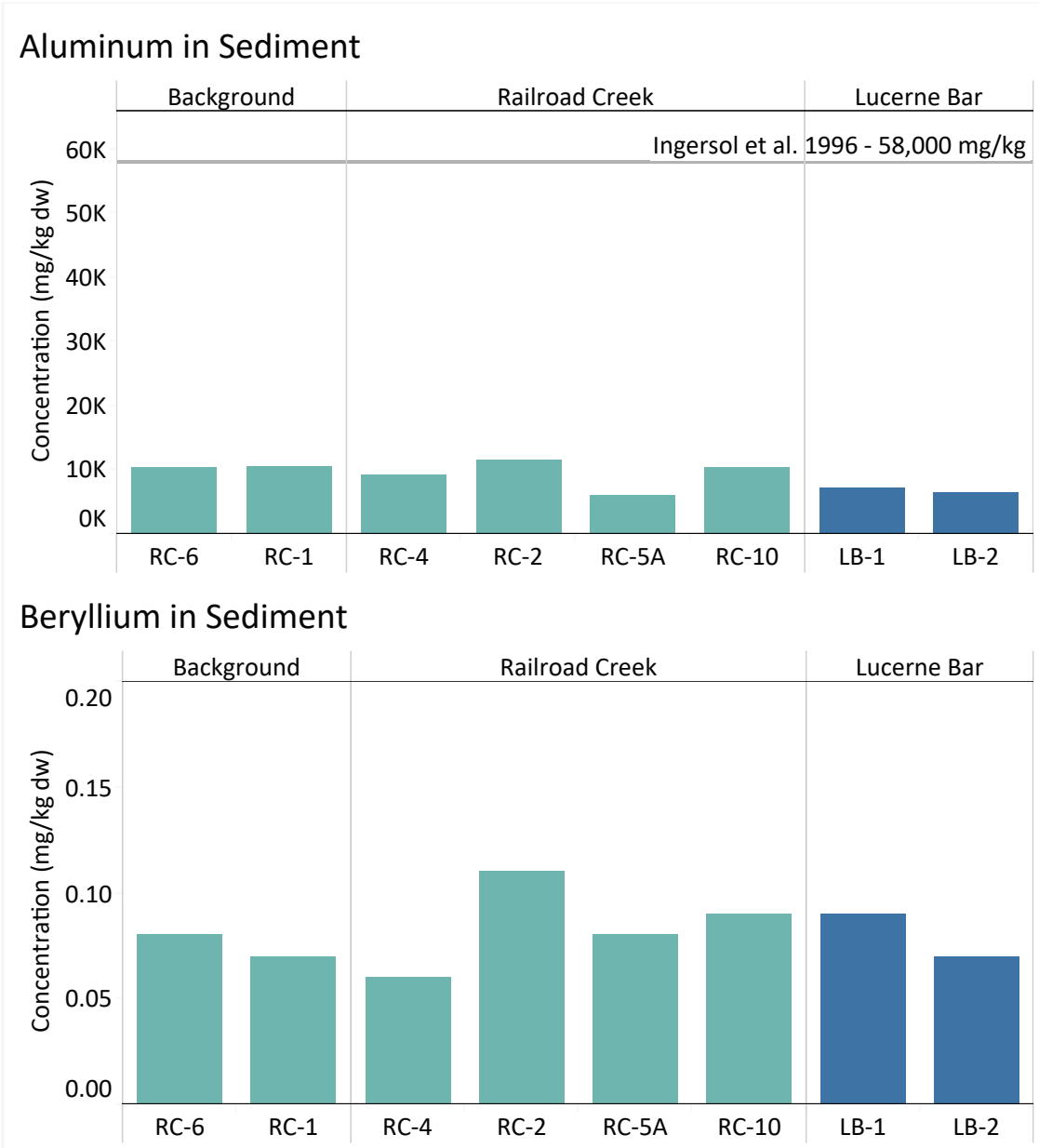
Photograph 39. Wetland surface water station SW-TP3-East2 during summer 2020 monitoring event (photograph from fall 2020 not available).

Holden Mine Site

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Appendix I
Sediment Concentration Charts

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Legend

Sediment criteria

Note:

1. A sediment criterion is not available for beryllium.

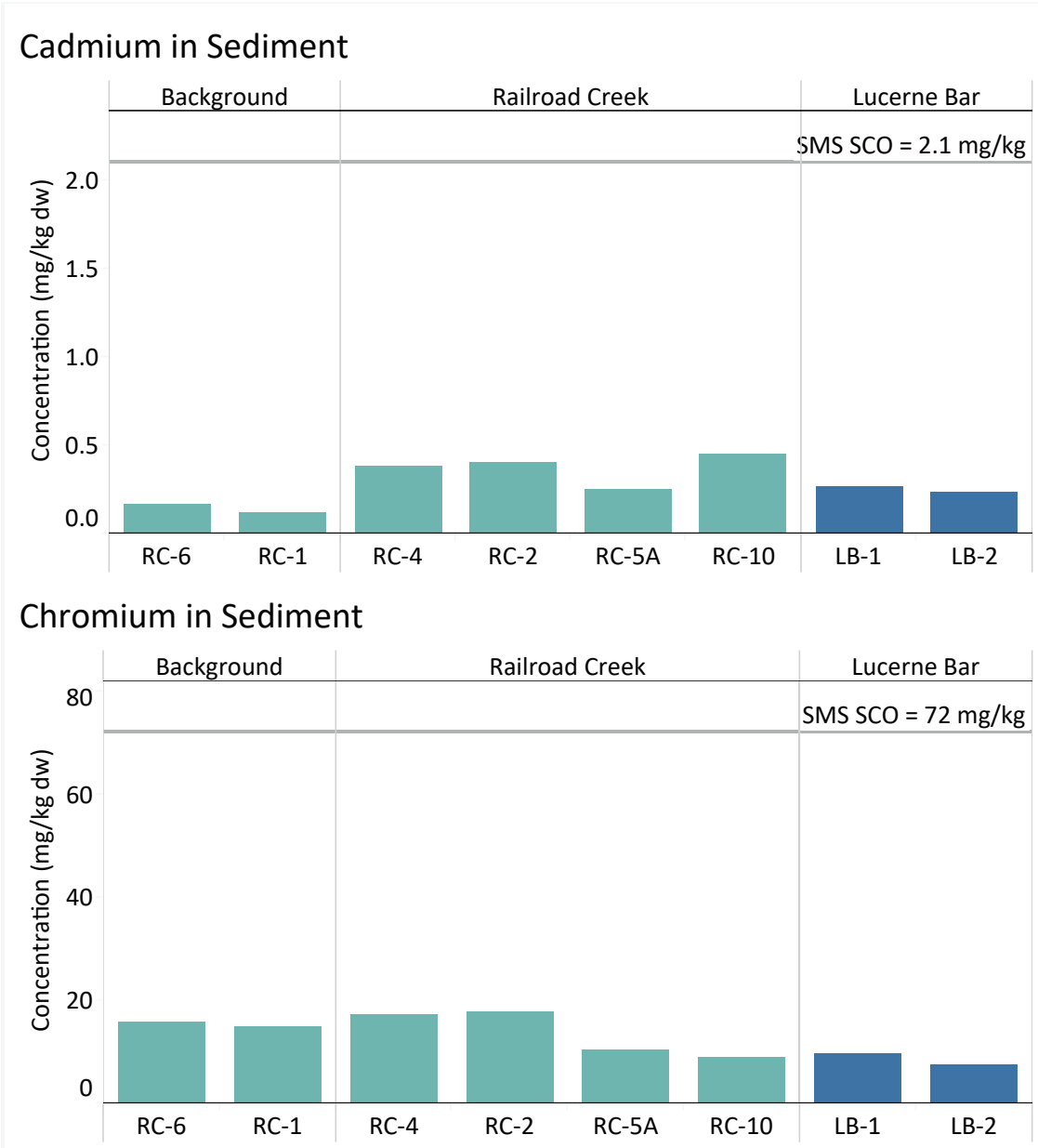
Abbreviations:

dw = dry weight

mg/kg = Milligrams per kilogram

Figure I.1

Metals Concentrations in Sediment in Railroad Creek and Lucerne Bar (Sheet 1 of 4)



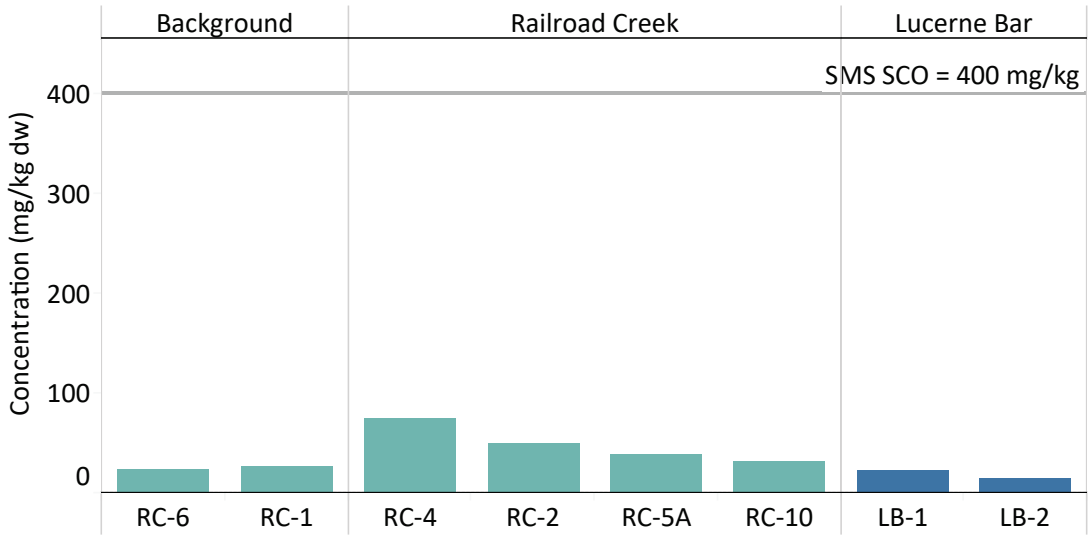
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— Sediment criteria

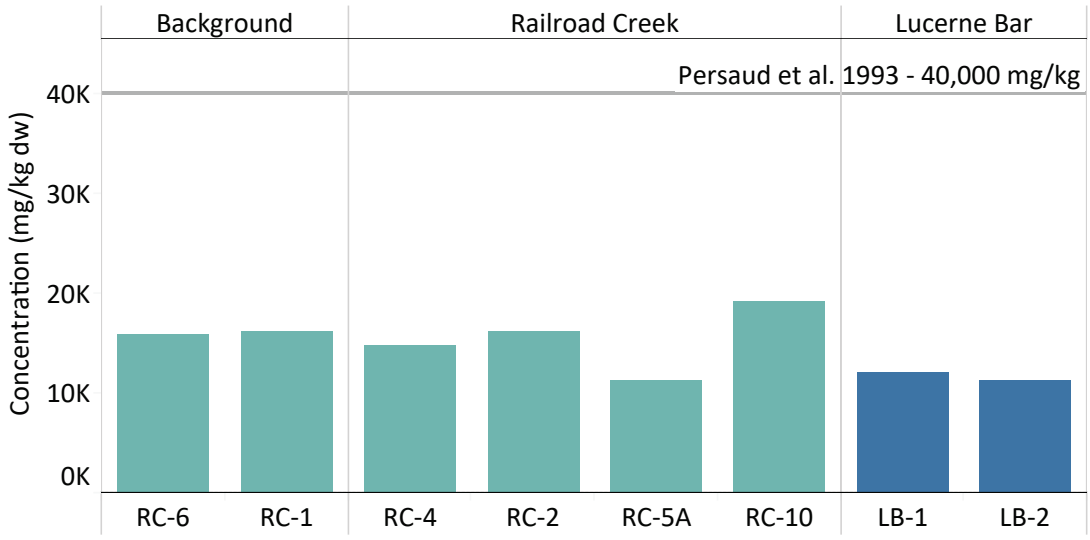
Abbreviations:
dw = dry weight
mg/kg = Milligrams per kilogram

Figure I.1
Metals Concentrations in Sediment in Railroad Creek and Lucerne Bar (Sheet 2 of 4)

Copper in Sediment



Iron in Sediment

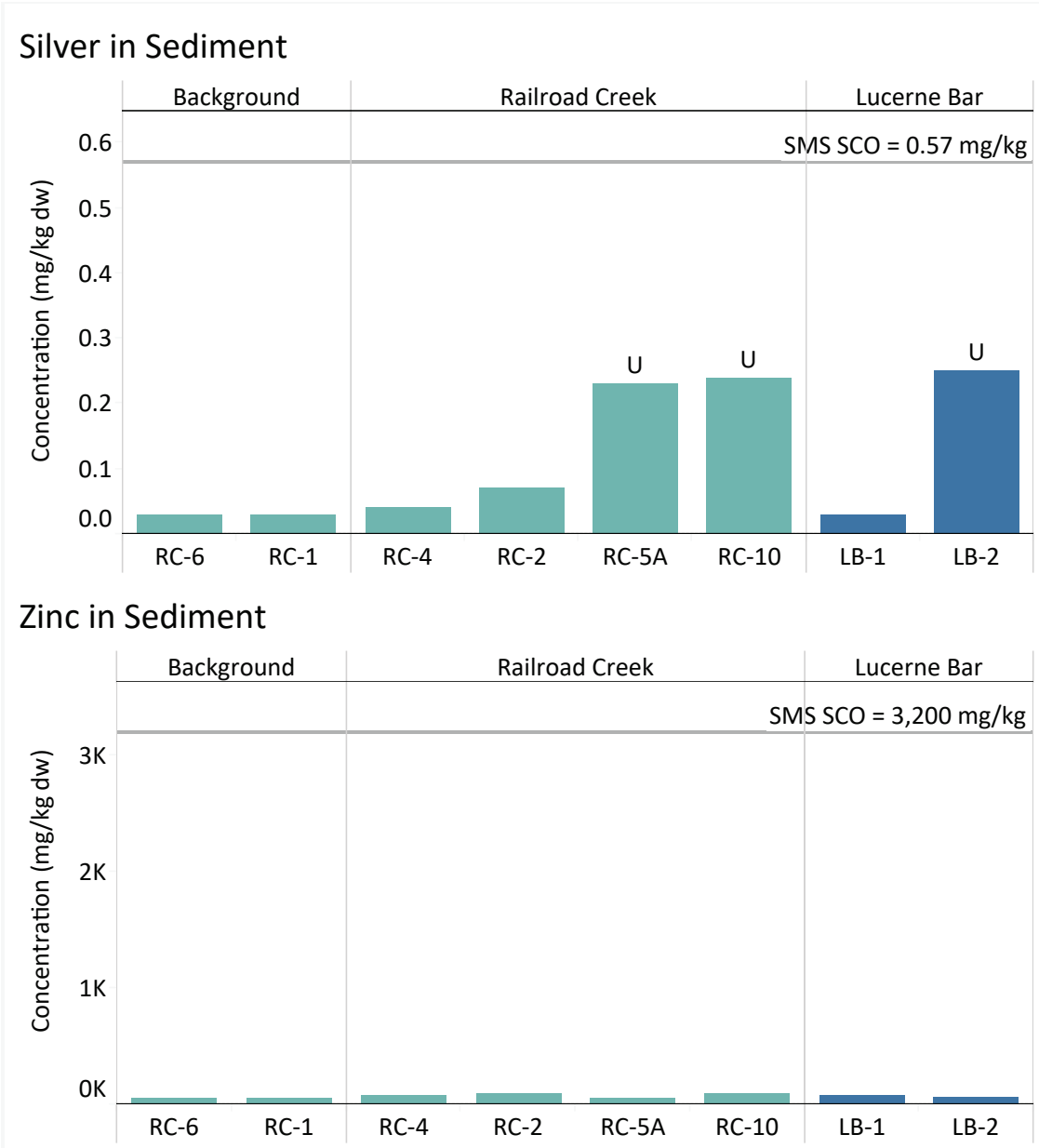


Legend

Sediment criteria

Abbreviations:
dw = dry weight
mg/kg = Milligrams per kilogram

Figure I.1
Metals Concentrations in Sediment in Railroad Creek and Lucerne Bar (Sheet 3 of 4)



Legend

— Sediment criteria

Abbreviations:

dw = dry weight

mg/kg = Milligrams per kilogram

U = Non-detect result

Figure I.1

Metals Concentrations in Sediment in Railroad Creek and Lucerne Bar (Sheet 4 of 4)

Holden Mine Site

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Appendix J
Bioassay Replicate Results

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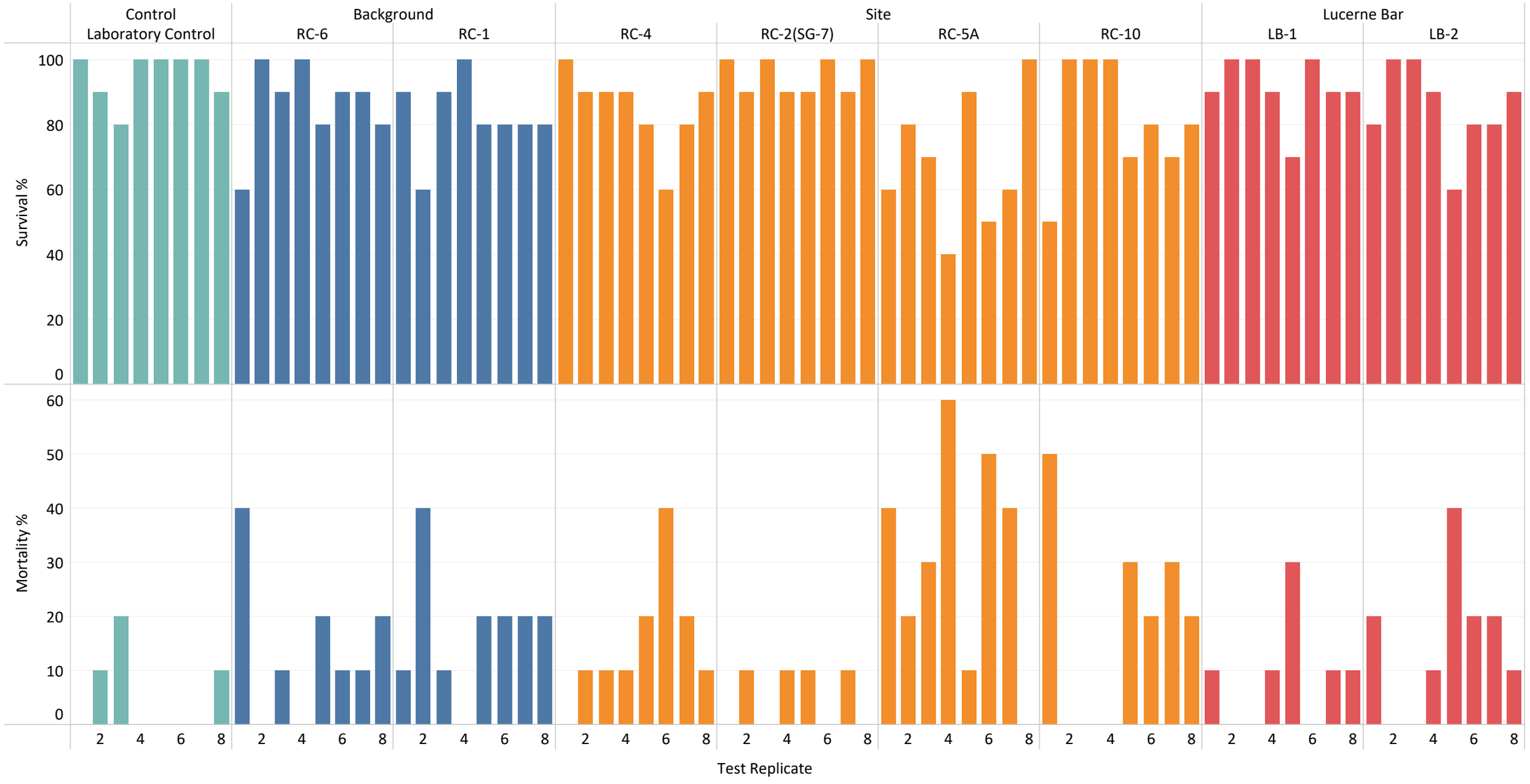


Figure J.1
Chironomid 10-Day Survival Test Results

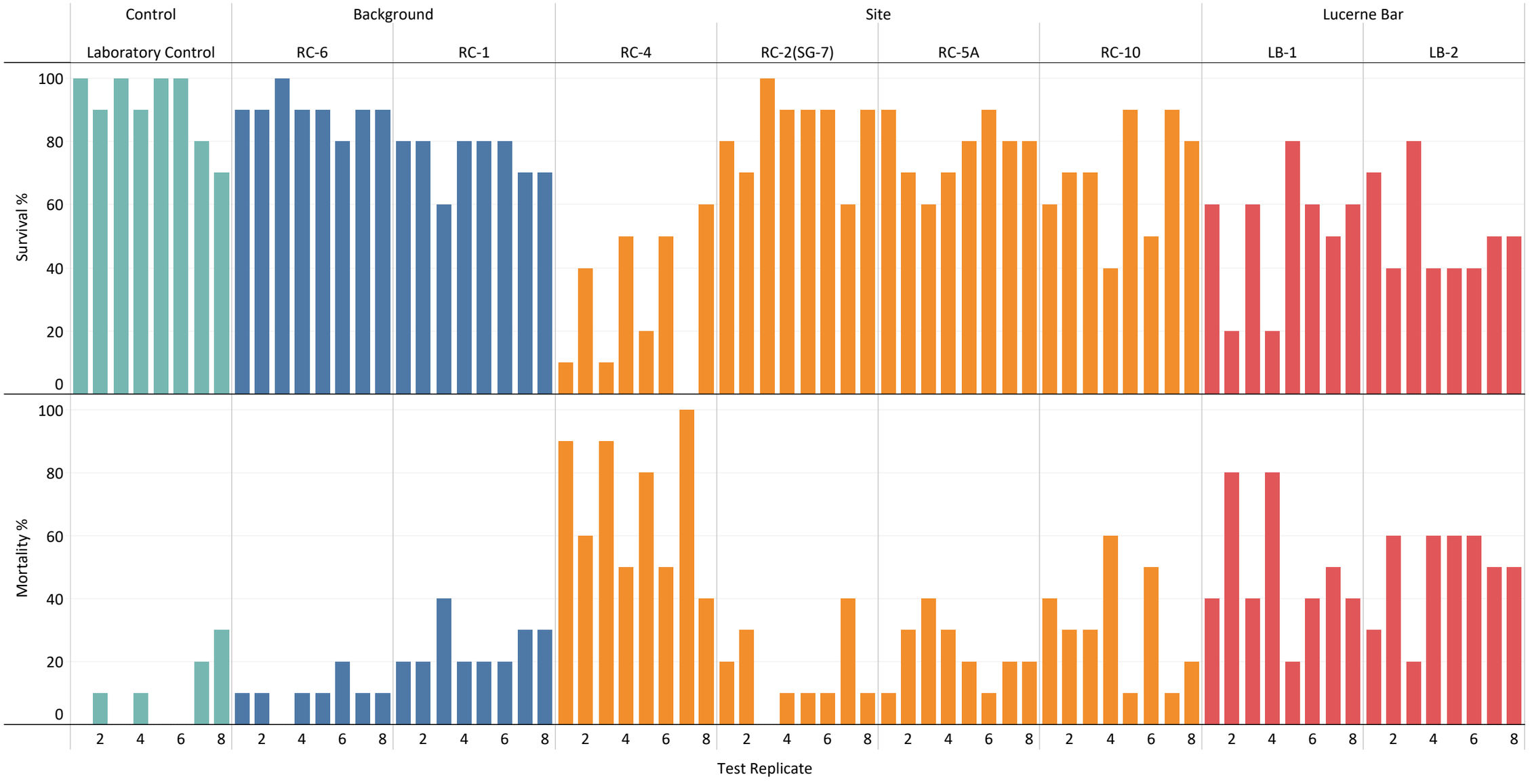


Figure J.2
Hyalella 28-Day Survival Test Results

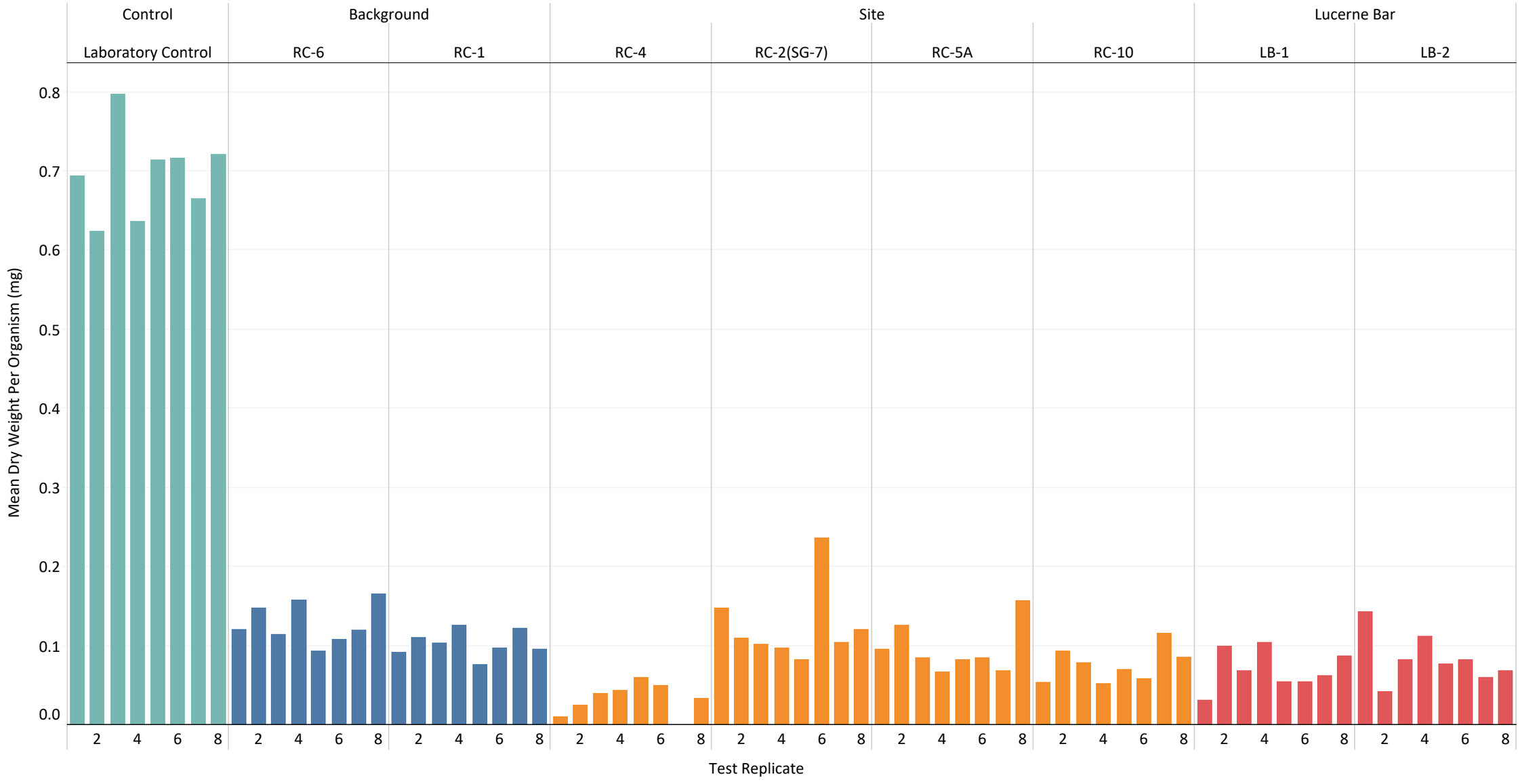


Figure J.3
Hyalella 28-Day Growth Test Results

Holden Mine Site

Performance Standards Verification
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Appendix K
Aquifer Test Report

DRAFT

PACIFIC groundwater GROUP

2020 AQUIFER TESTS
HOLDEN MINE

SEPTEMBER 2020

2020 AQUIFER TESTS
HOLDEN MINE

Prepared for:

Holden Mine
Rio Tinto AUM Company
4700 Daybreak Parkway
South Jordan, Utah, 84009

Prepared by:

Pacific Groundwater Group
2377 Eastlake Avenue East, Suite 200
Seattle, Washington 98102
206.329.0141
www.pgwg.com

9/23/2020
JS1904
holden aquifer test report v5.docx

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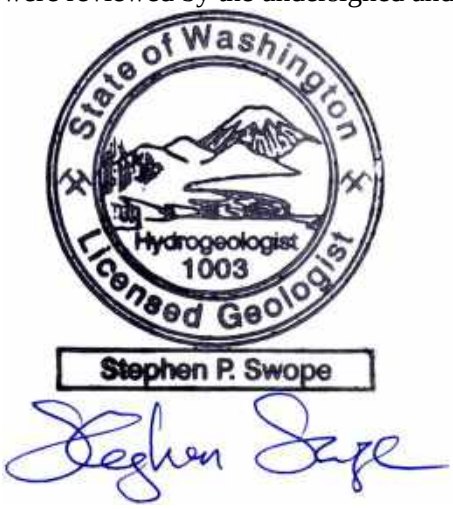
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SIGNATURE

This report, and Pacific Groundwater Group's work contributing to this report, were reviewed by the undersigned and approved for release.



Stephen Swope
Principal Hydrogeologist
Washington State Hydrogeologist No. 1003

1.0 INTRODUCTION

Aquifer testing activities consisted of 14 short-duration constant discharge pumping tests from selected monitoring wells in the vicinity of the unwalled portion of Tailings Pile 2 and Tailings Pile 3 and extending downgradient. The objectives of the aquifer testing were to increase the spatial resolution of aquifer parameter data and the confidence in the range of values used for numerical modeling and calculations, and to support evaluation of groundwater recovery wells. Aquifer testing was completed in accordance with the May 15, 2020 memorandum to the Holden Mine Remedial Project Manager (Floyd|Snider Team 2020), ASTM Method D4050, relevant portions of the approved project Quality Assurance Project Plan (QAPP; MWH 2013a), approved documents containing project standard operating procedures that comprise the Sampling and Analysis Plan (SAP; MWH 2010, 2013a, and 2013b), and the Site-Specific Health and Safety Plan (Floyd|Snider 2020)

The aquifer tests consisted of short-duration constant-rate pumping tests from selected monitoring wells (**Table 1**). A constant-rate aquifer test is frequently used to assess well performance and collect data to estimate aquifer parameters. During a constant-rate test, a well is pumped at a specified or constant rate and the increasing amount of drawdown is recorded over time. After the pump is shut-off, the decreasing amount of drawdown is recorded over time and is referred to as the recovery period. Drawdown and recovery were also collected at nearby observation wells during each pumping test.

2.0 AQUIFER TEST PROCEDURES

PGG conducted constant rate aquifer tests at 14 wells between June 14 and 19, 2020. **Table 1** summarizes the aquifer test average flow rates, test durations, drawdown, and specific yields. The wells were pumped using a submersible Grundfos Redi-Flo2 pump with flow rates measured using a stopwatch and totalizer. Power was supplied by portable generator. Water levels were measured in the pumping well and nearby observation wells using Solinst Levelogger transducers and manual water level measurements. A peristaltic pump was used for the test at DS-16D because the well yield was too low for the RediFlo2 pump operating range. Purge water was either contained in portable totes or discharged to the groundwater collection system piping to prevent recharge interference with testing.

Tests were run for between 61 and 150 minutes, with a target of 100 minutes (3 log cycles). Some tests were run longer than 100 minutes in an effort to better define boundary conditions, while others were discontinued before 100 minutes because Railroad Creek boundary effects were suggested by drawdown stabilization.

Pumping rates were set based on either the maximum flow rate available from the pump, or the expected sustainable yield for the well based on the well completion interval. Because step test data did not exist for identifying optimal pumping rate, mid-test flow rate adjustments were occasionally made due to either excessive or insufficient drawdown. Several wells had a high enough transmissivity that less than 0.5 feet of drawdown could be induced even with the submersible pump operating at full power.

3.0 AQUIFER TEST ANALYSIS

Figures 1-14 show linear plots of drawdown and time for the constant-rate test period and recovery period for all test wells. All data were compensated for atmospheric pressure except for well DS-4I because barometric data were not collected at the time of the test. Atmospheric pressure changes are expected to have negligible effects on the results of the test at DS-4I. Additionally, in some instances data logger

failure occurred during the test, and is observable in figures where a temporal data gap is present during the test period.

The duration of the tests ranged from 61 to 150 minutes of pumping followed by 13-112 minutes of recovery. The average pumping rates for each test ranged from 0.1 to 5.3 gallons per minute (gpm). If possible, the pumping rate was held constant during the duration of the test, but in tests DS-18D, DS-17S, DS-16I, DS-16D, and DS-15S the pumping rate was adjusted and compensated for in the test analysis. Wells that had a rate adjustment show a step-like pattern in the drawdown plots. Aquifer test drawdown and recovery results were analyzed with the software *Aqtesolv* that utilizes a solution appropriate to the data to estimated hydraulic conductivity (HydroSOLVE, 2007). The drawdown and recovery data imported into *Aqtesolv* are presented on log-log plots in **Figures 15 to 30**. The log-log plots were analyzed using Theis curve-matching techniques. Well tests DS-17I and DS-16S had data-logger related issues and were not analyzed in *Aqtesolv*.

Most observation wells showed no influence from pumping during the test and therefore have no observed drawdown. Observation wells were only imported into *Aqtesolv* if drawdown due to pumping was observed. Only during well tests DS-16I, DS-13I, DS-13D, and DS-15S was drawdown observed in the observation wells. Therefore, two values of hydraulic conductivity are reported for these four wells since multiple curve fits were used to fit both the pumping well and observation well data.

Drawdown and recovery data were imported into *Aqtesolv* and analyzed using Theis curve-matching techniques for an unconfined aquifer. Due to data logger failure during the initial pumping period of the DS-15I well test (**Figure 4**), only recovery data were analyzed, and the Cooper-Jacob method for an unconfined aquifer (using an Agarwal transformation for recovery data) was used. For all tests aquifer thickness was assumed to be the saturated thickness of the unconsolidated sediments (which excludes glacial till). In wells that were clustered (shallow, intermediate, deep), the same saturated thickness was assumed for all wells in the cluster. All wells tested partially penetrate the unconsolidated aquifer, and therefore partial penetration effects were accounted for in the Theis solution and an anisotropy ratio of 0.1 was assumed[1]. Hydraulic conductivity was calculated by transmissivity divided by the aquifer thickness. **Table 1** summarizes the hydraulic conductivity estimates based on the *Aqtesolv* analyses for all well tests.

Based on the proximity of the tested wells to Railroad Creek and that drawdown stabilization occurred at many of them, the effect of recharge boundaries were evaluated as part of the *Aqtesolv* analysis. Google Earth was used to estimate the distance from the test wells to Railroad Creek, and recharge boundaries were included as part of a final hydraulic conductivity estimate if they improved the fit of the curve. In actuality, including recharge boundary conditions from Railroad Creek only improved the curve fit at DS-13I and DS-13D. It is unclear why the curve fit for other wells closer to the Creek were not improved by adding recharge conditions to the solution, but potential causes could include that the pumping duration was not long enough (particularly for shallow wells where the expanding cone of depression is dependent upon pore-dewatering); a higher pumping rate is required to sufficiently stress the aquifer system; or the observed drawdown responses are effected by local aquifer conditions and heterogeneities.

The range of hydraulic conductivity values in **Table 1** (0.17 – 220 ft/day) are within the range of previously measured values by URS (2004, 2009, 2010), Dames & Moore (1999), and MWH (2015). These field measurements will be compared with and used to further refine simulated hydraulic conductivity values in the Holden Groundwater Flow Model.

[1] Partial penetration effects are not accounted for in the Cooper-Jacob solution used to analyze the DS-15I recovery data.

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URS, 2010. Holden Mine Alternative Remedy Components Evaluation Draft Hydrogeology Technical Memorandum Addendum in Context of a Contingent Remedy Holden Mine Site. Consultant's report prepared for Intalco. February 24, 2010.

Table 1. Aquifer Test Summary

Holden Mine Remediation

Pumping Well	Test Date	Pumping Duration (min)	Average Pumping Rate (gpm)	Maximum Drawdown (ft)	Specific Yield (gpm/ft)	Approximate Aquifer Thickness (ft)	Test Well K (ft/day)	Observation Well K (ft/day)	Observation Wells
DS-4I	6/18/2020	120	3.1	6.46	0.5	116	5.2	-	DS-4S, DS-4D, DS-4DD, DS-3S
DS-18D	6/17/2020	80	3.4	2.02	1.7	114	18.3	-	DS-18S, DS-18I
DS-18S	6/17/2020	70	4.8	0.61	7.9	114	66.0	-	DS-18I, DS-18D
DS-18I	6/17/2020	80	5.1	0.24	21.1	114	220	-	DS-18S, DS-18D
DS-13D	6/17/2020	100	3.7	0.79	4.7	100	57.6	20.7 (DS-12D)	DS-13S, DS-13I, DS-12S, DS-12I, DS-12D
DS-13I	6/16/2020	100	5.3	1.21	4.3	100	51.1	60.6 (DS-13S, DS-12I, and DS-12D)	DS-13S, DS-12I, DS-12D
TP3-12D	6/15/2020	90	2.9	0.31	9.4	78	88.0	-	TP3-12S
DS-15S	6/13/2020	99	2.6	0.46	5.7	48	58.0	54.8 (DS-15I)	DS-15I
DS-15I	6/12/2020	101	0.5	3.87	0.1	48	0.17	-	DS-15S
DS-16S	6/13/2020	61	4.0	0.42	9.5	58	-	-	DS-16I, DS-16D
DS-16I	6/13/2020	100	2.3	2.75	0.8	58	11.2	1.3 (DS-16D)	DS-16S, DS-16D
DS-16D	6/14/2020	150	0.1	5.11	0.02	58	0.41	-	DS-16I, DS-16S
DS-17S	6/14/2020	100	5.0	0.31	16.2	88	92.1	-	DS-17I
DS-17I	6/14/2020	91	5.0	0.43	11.6	88	-	-	DS-17S

- were tests that were not analyzed

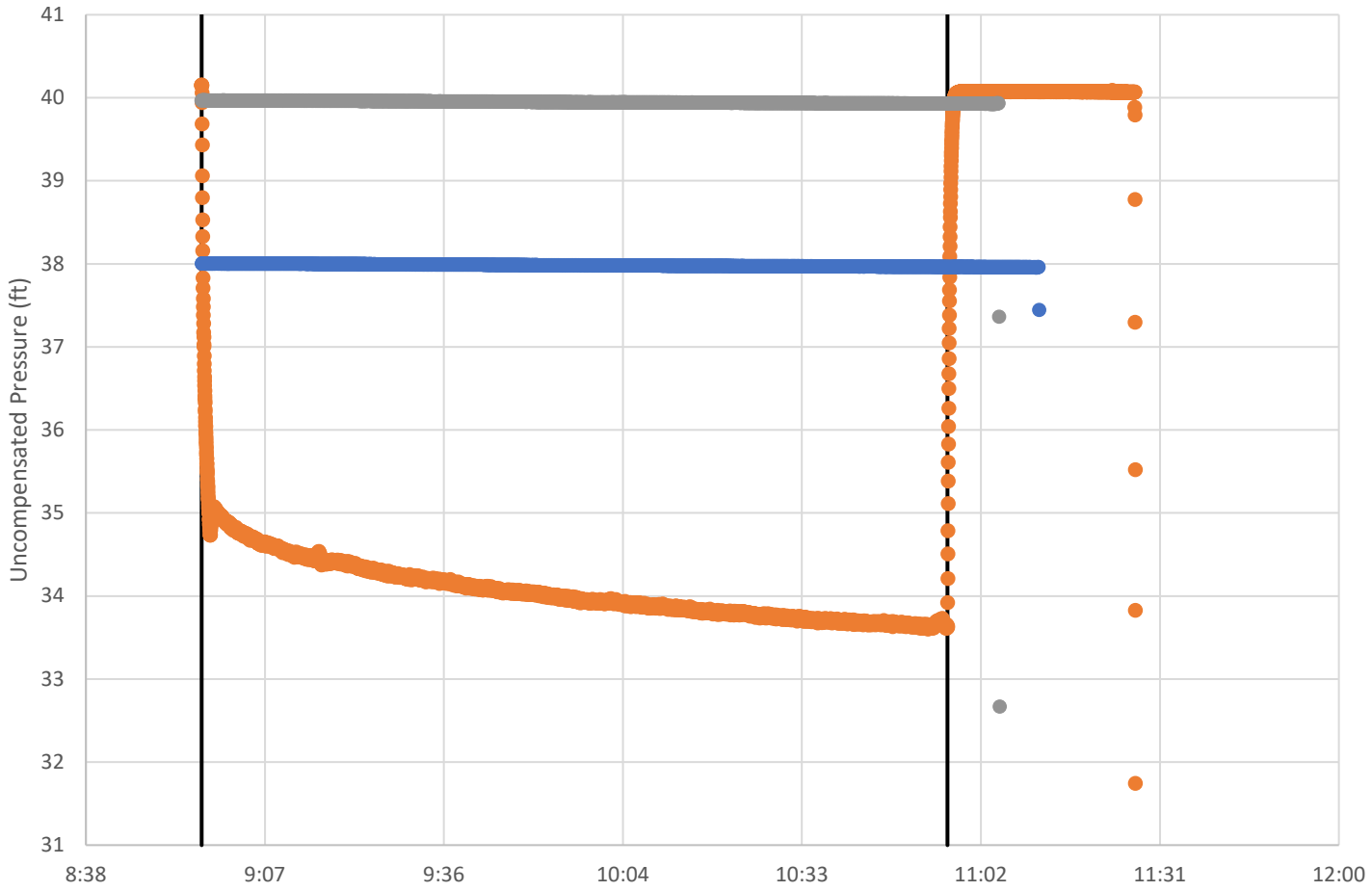


Figure 1. DS-4i Pumping Test, June 18, 2020

PgG

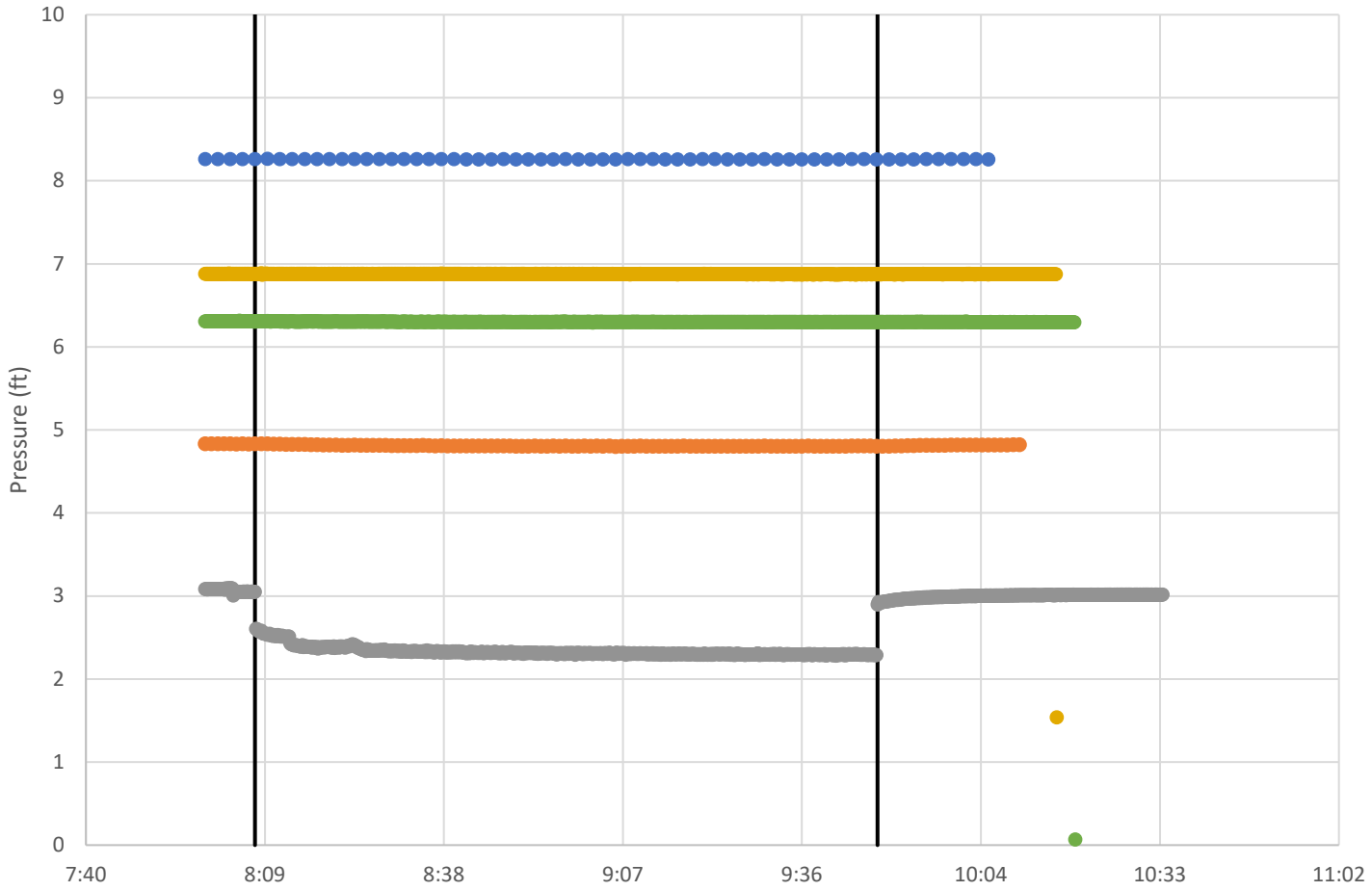


Figure 2. DS-13D Pumping Test, June 17, 2020

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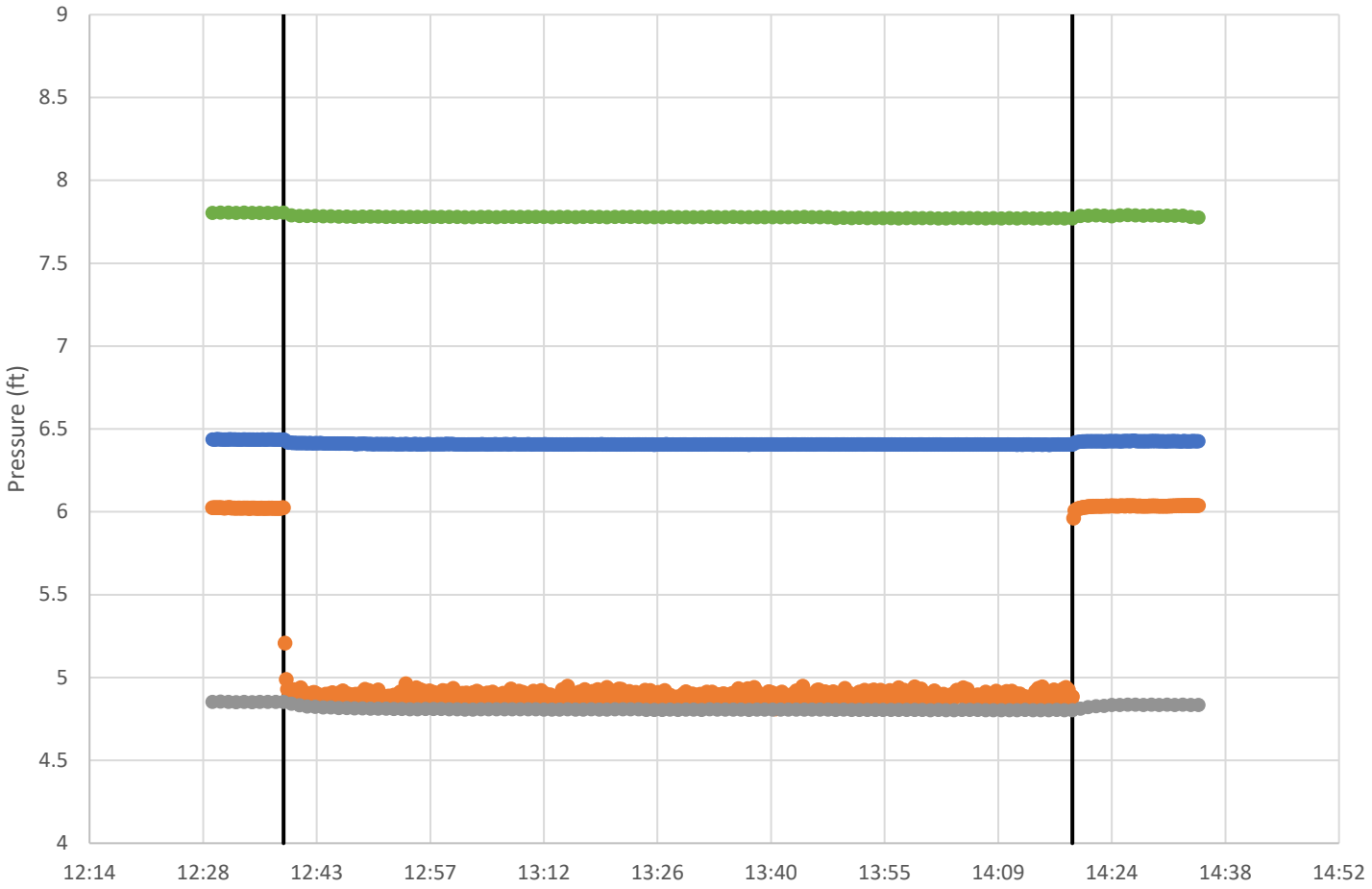


Figure 3. DS-13i Pumping Test, June 16, 2020

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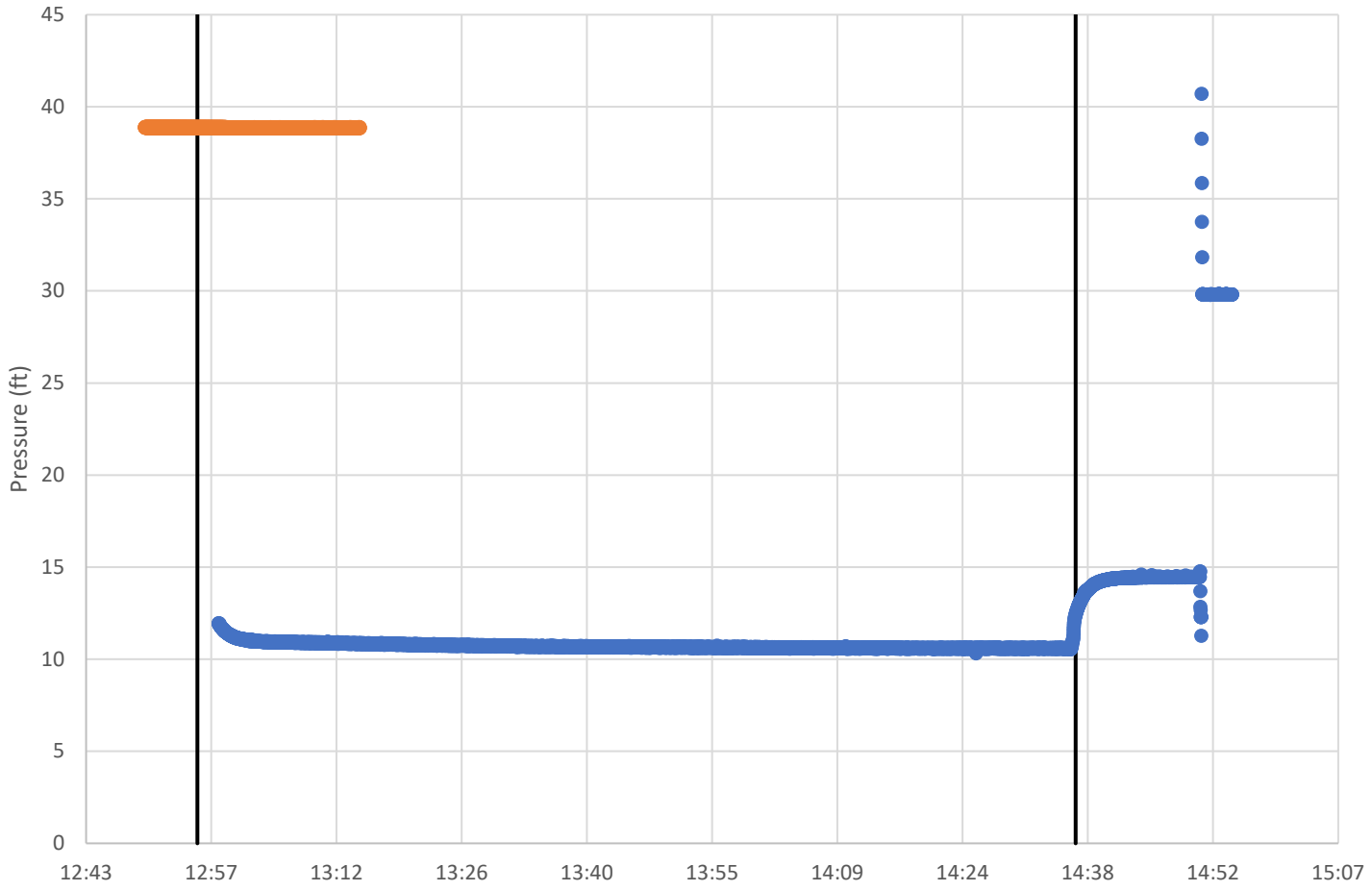


Figure 4. DS-15i Pumping Test, June 12, 2020

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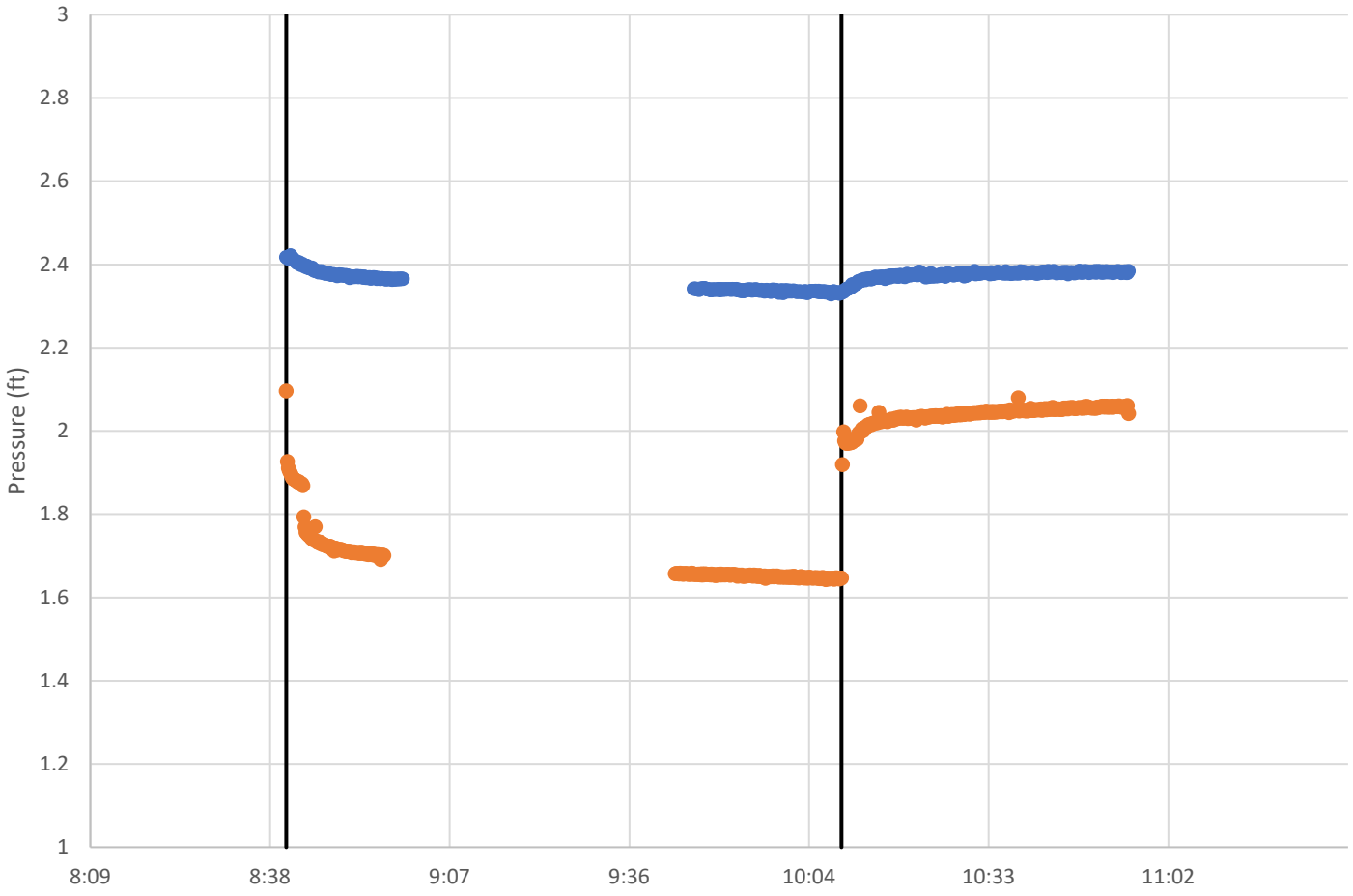


Figure 5. DS-15S Pumping Test, June 13, 2020

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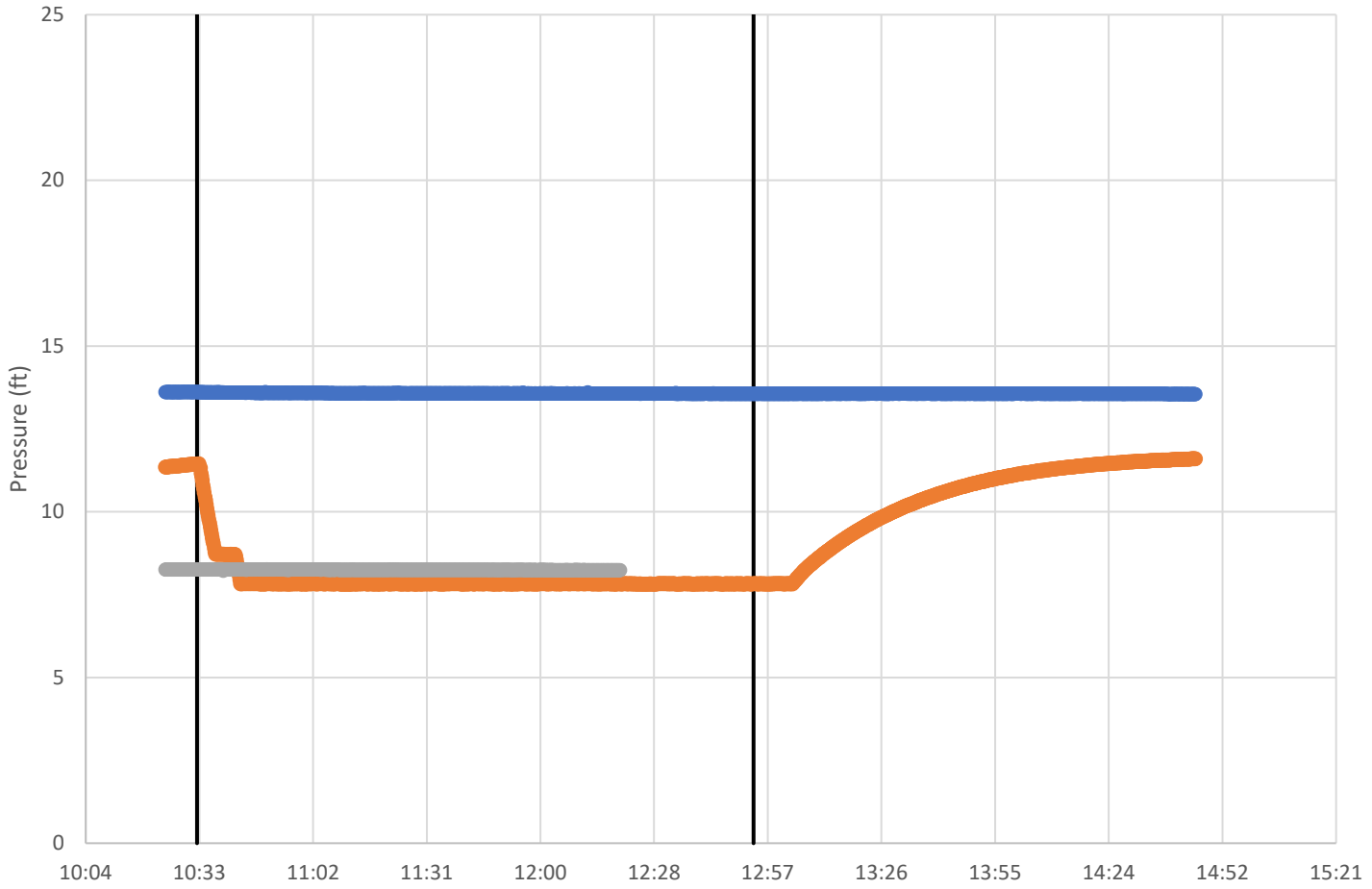


Figure 6. DS-16D Pumping Test, June 13, 2020

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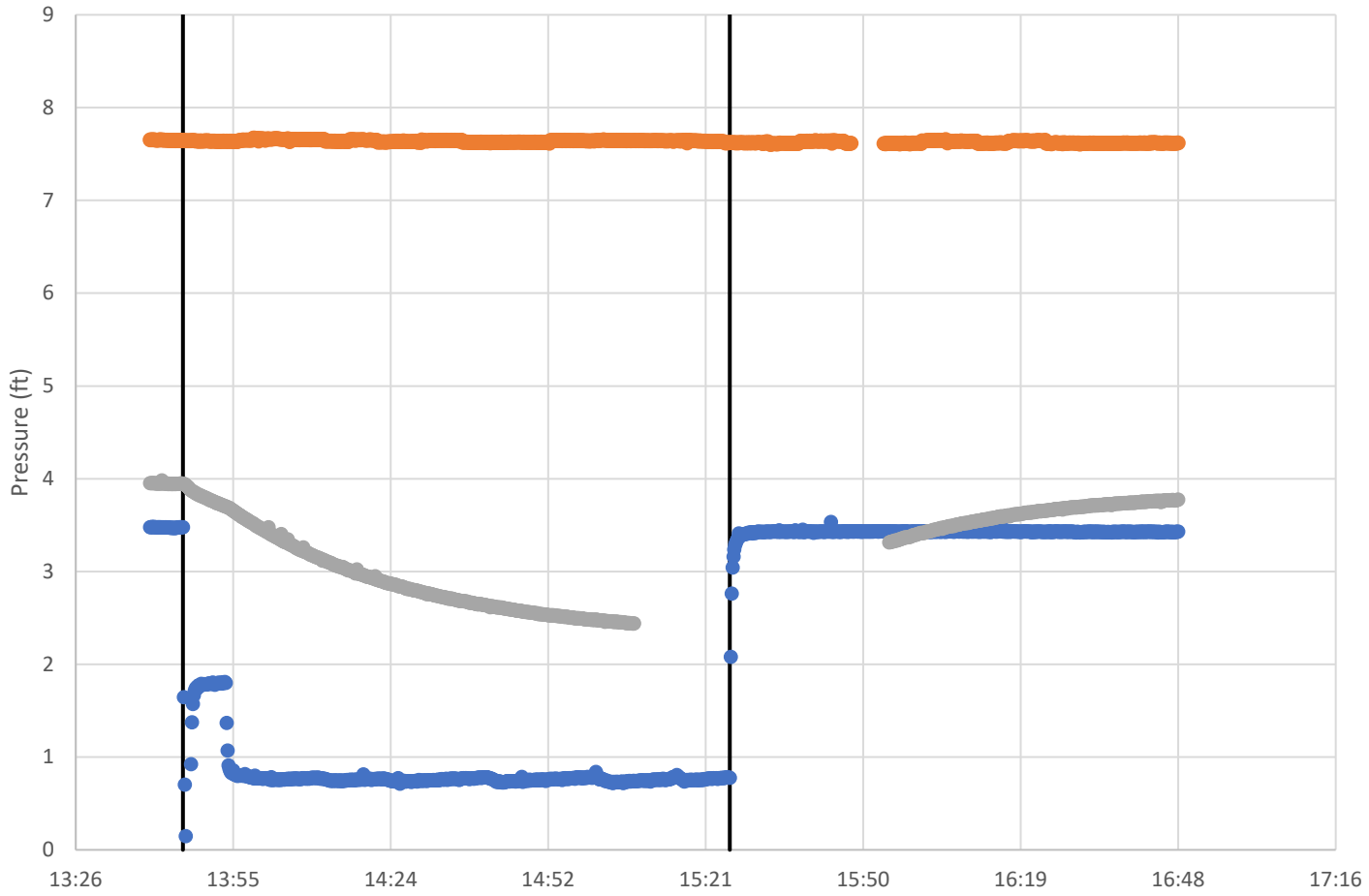


Figure 7. DS-16i Pumping Test, June 13, 2020

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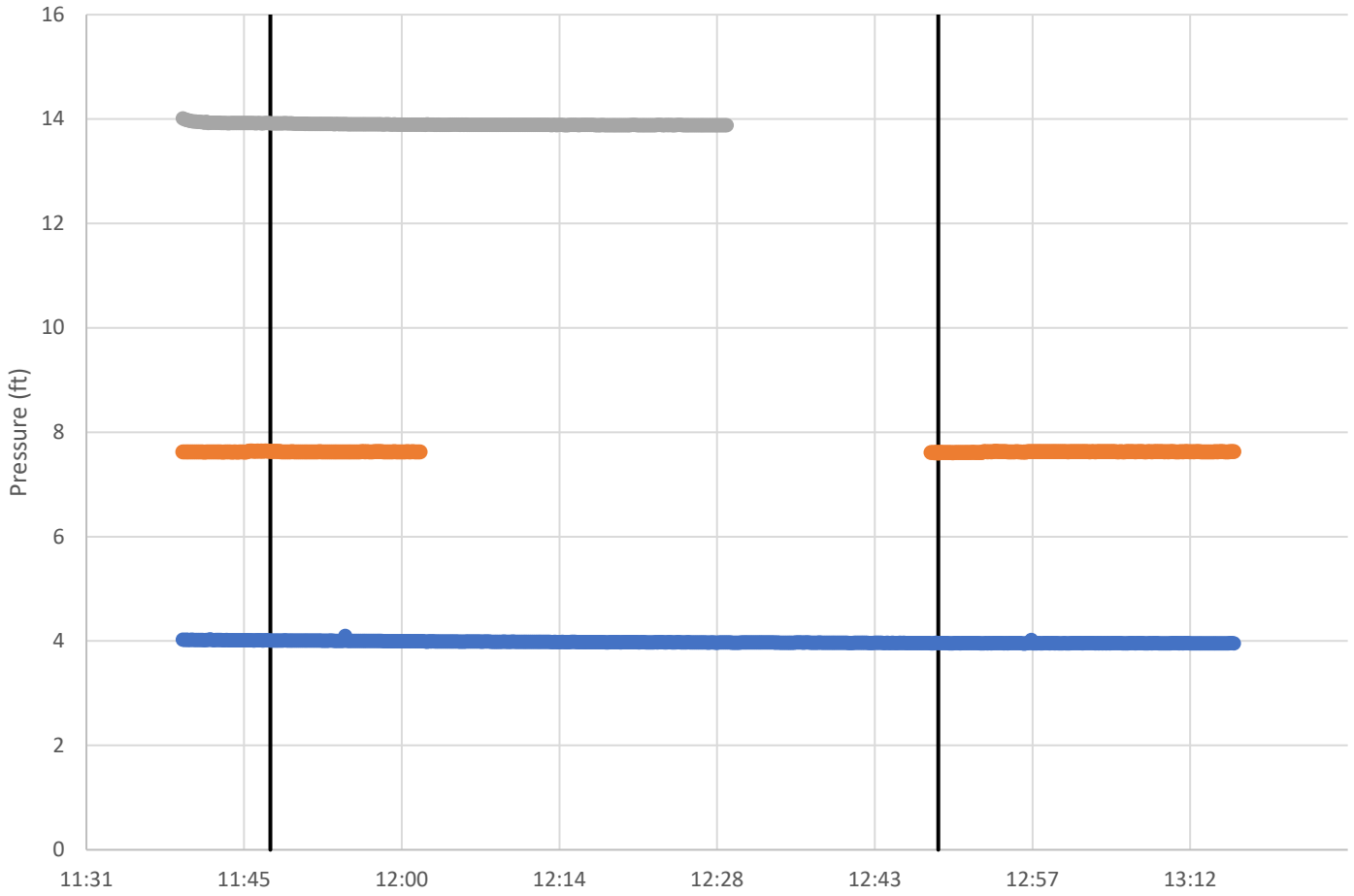


Figure 8. DS-16S Pumping Test, June 13, 2020

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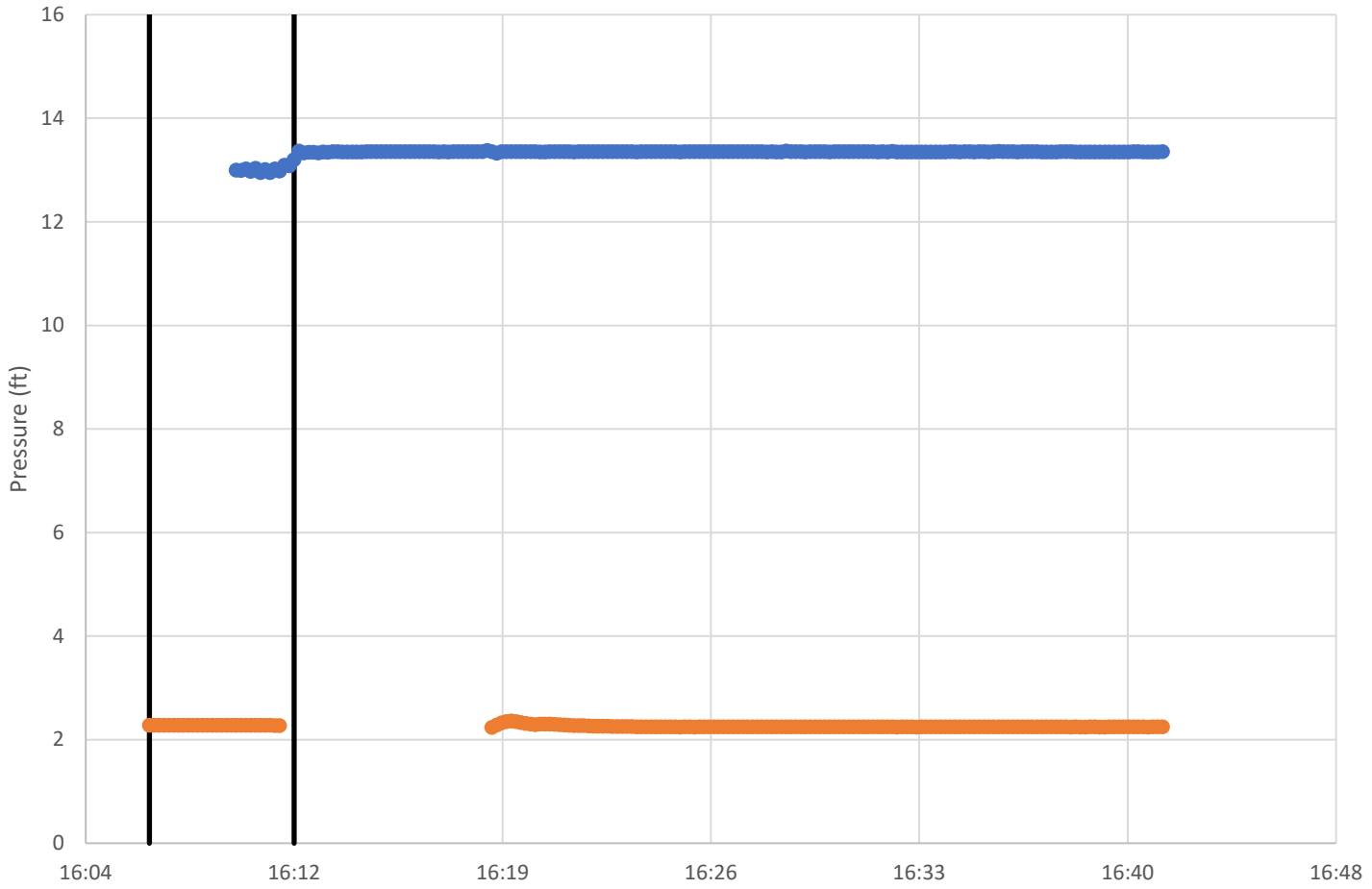


Figure 9. DS-17i Pumping Test, June 14, 2020

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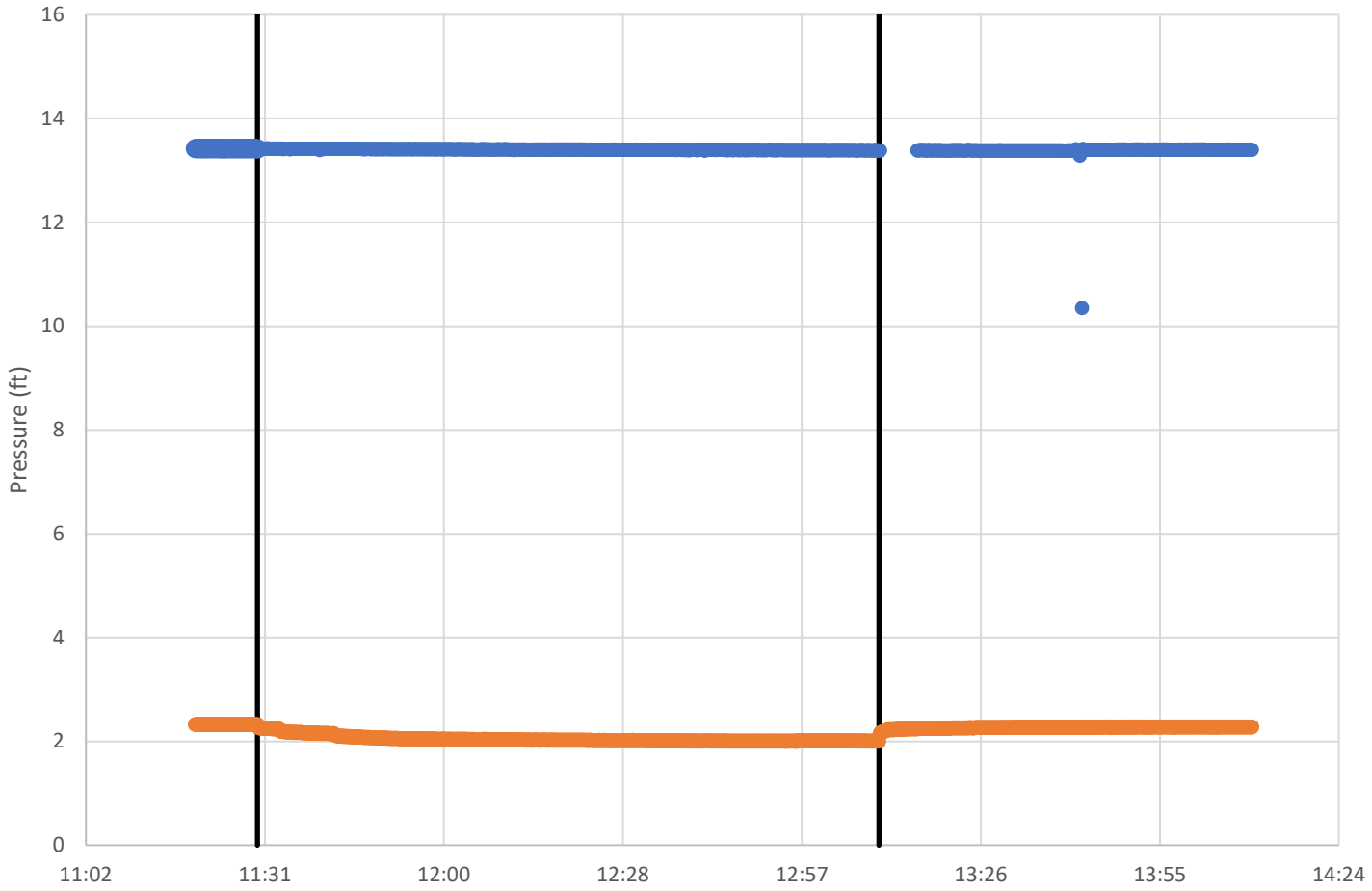


Figure 10. DS-17S Pumping Test, June 14, 2020

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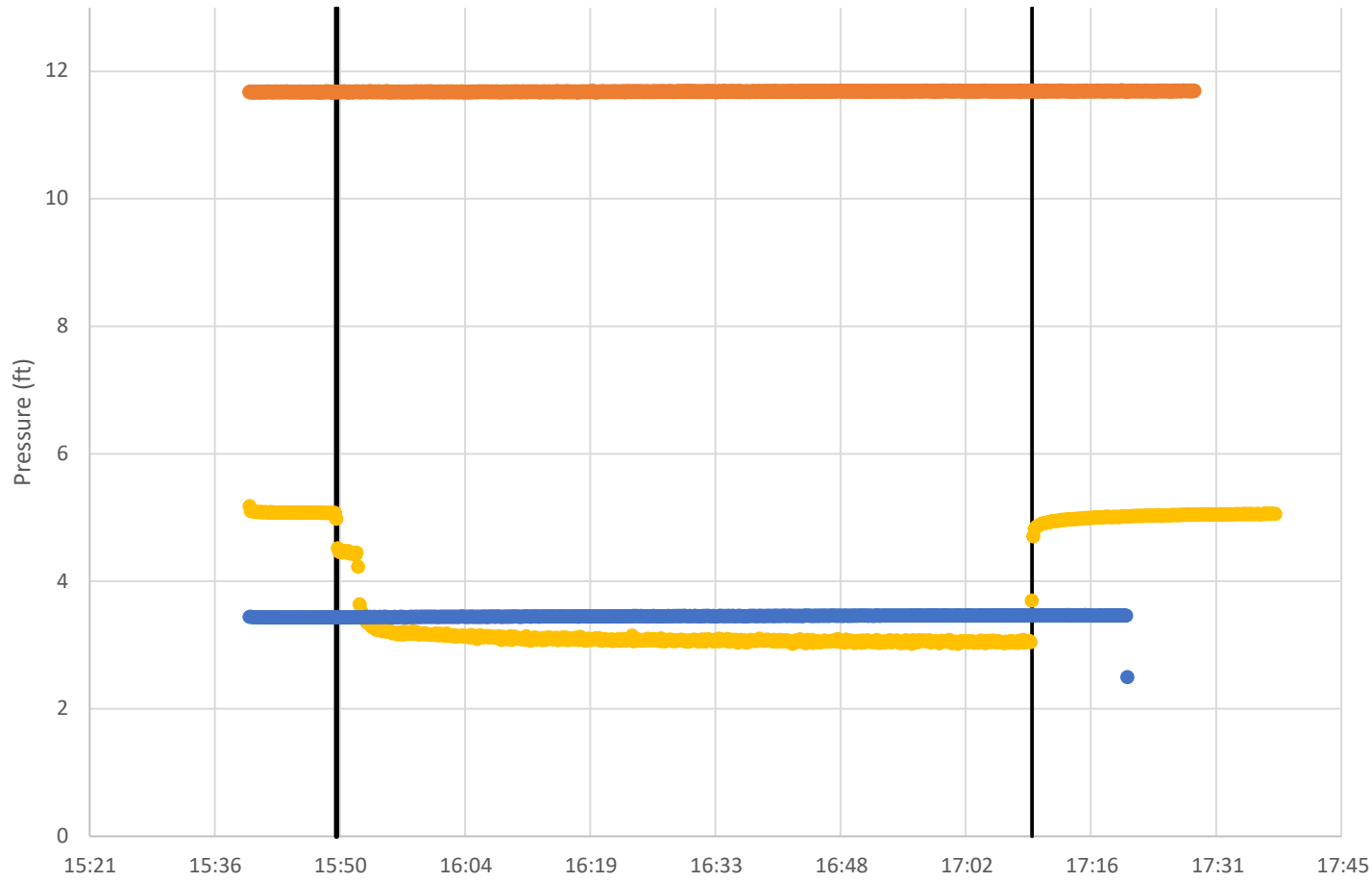


Figure 11. DS-18D Pumping Test, June 17, 2020

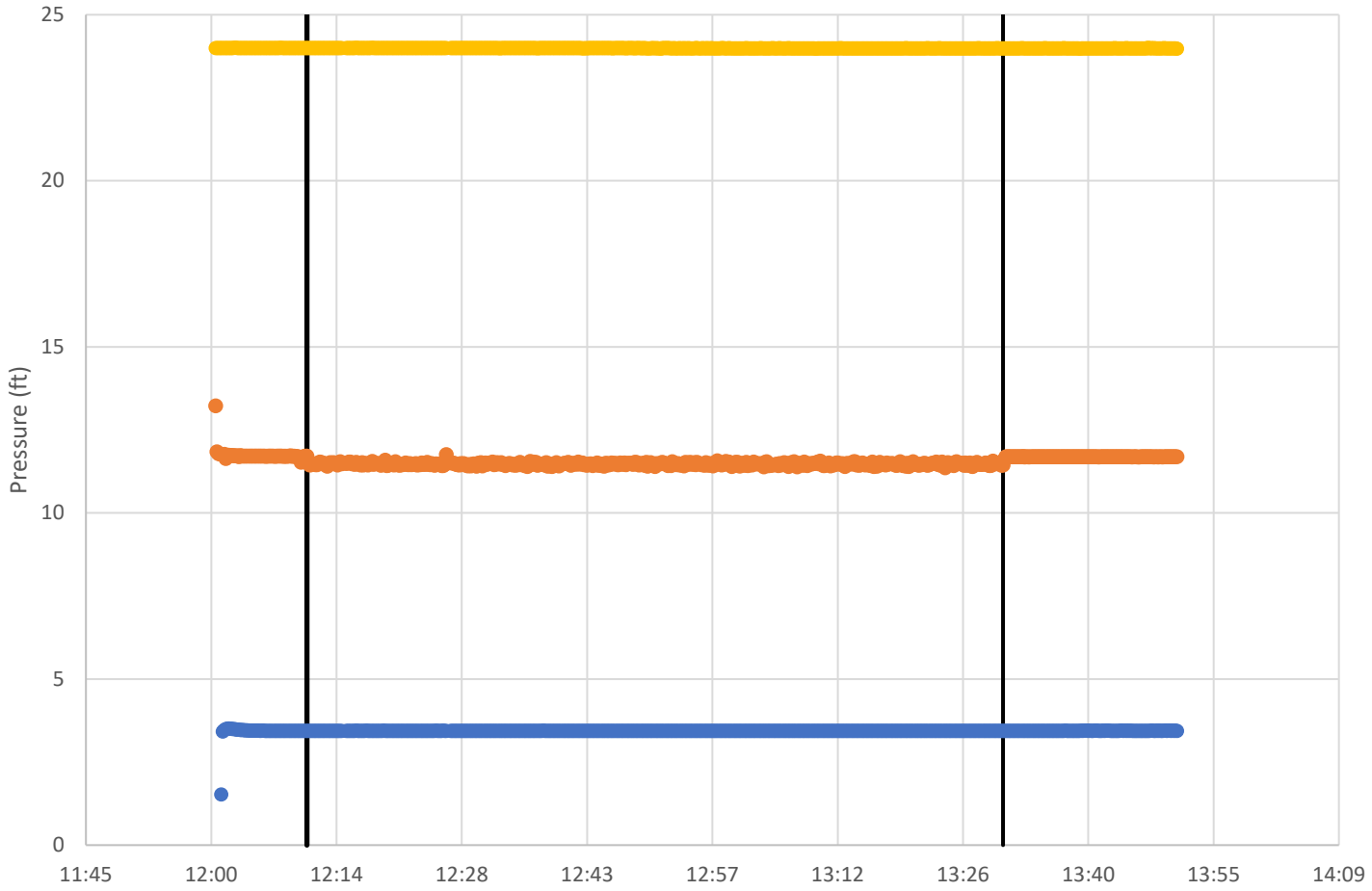


Figure 12. DS-18i Pumping Test, June 17, 2020

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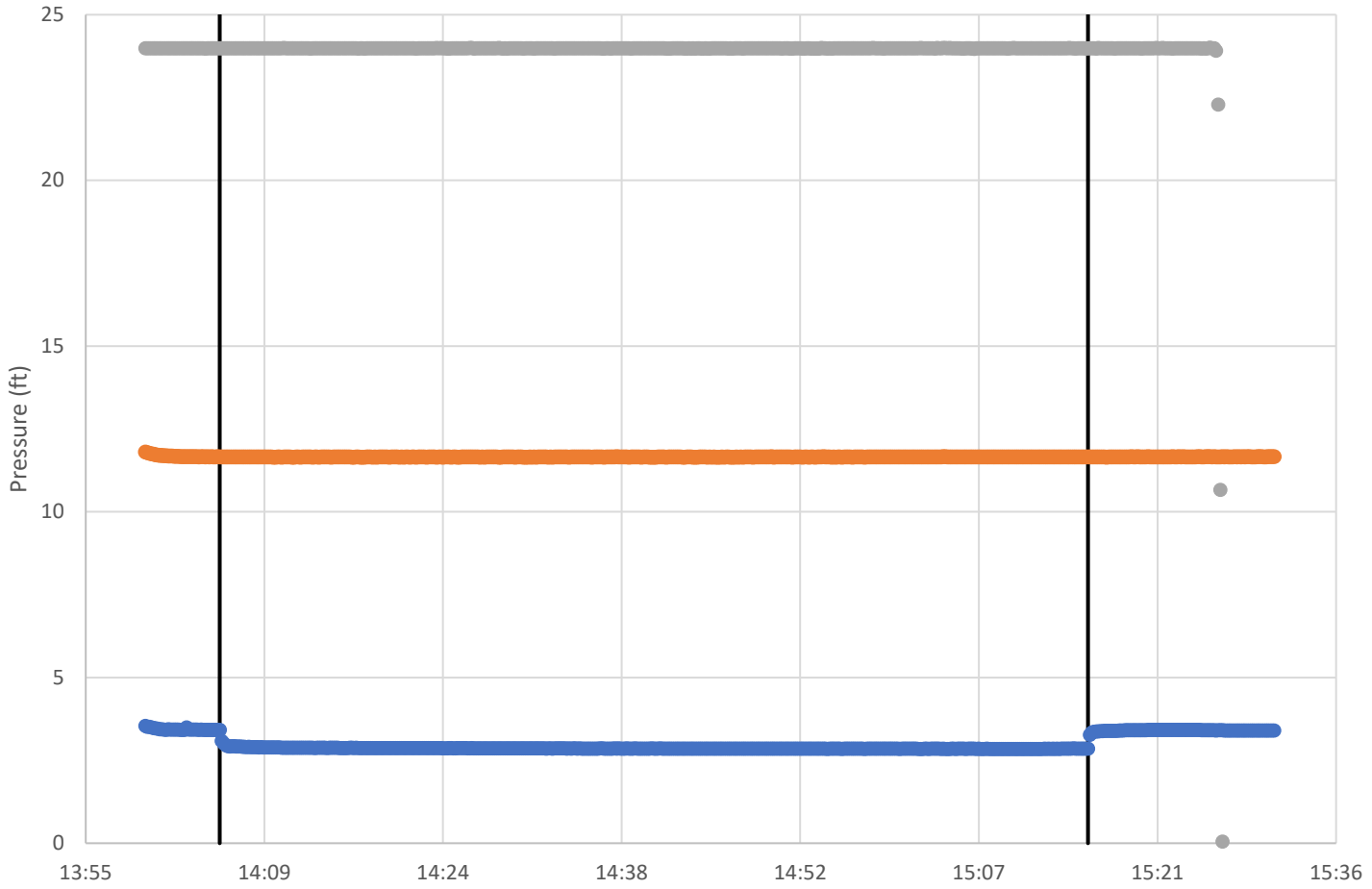


Figure 13. DS-18S Pumping Test, June 17, 2020

PgG

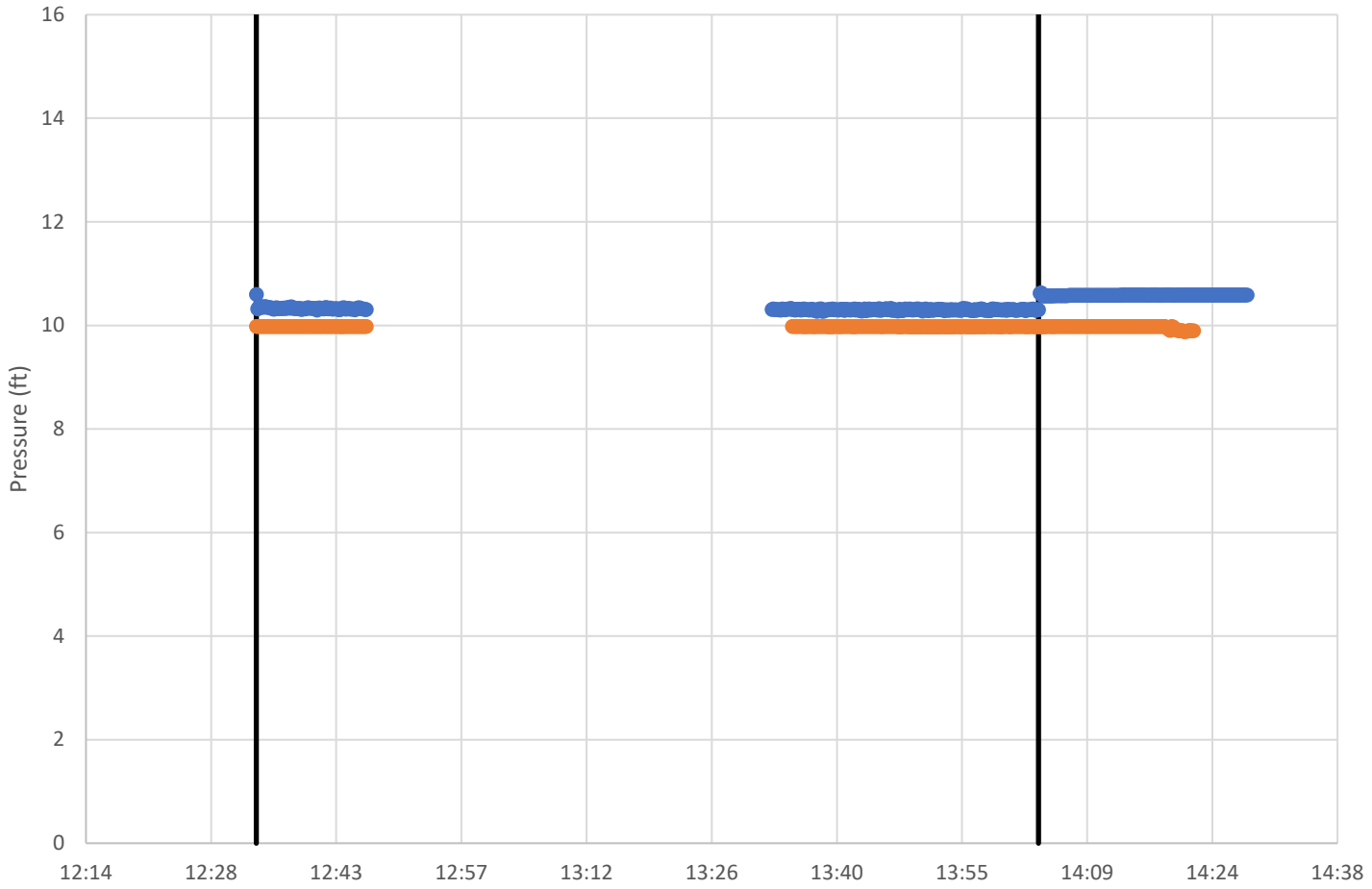
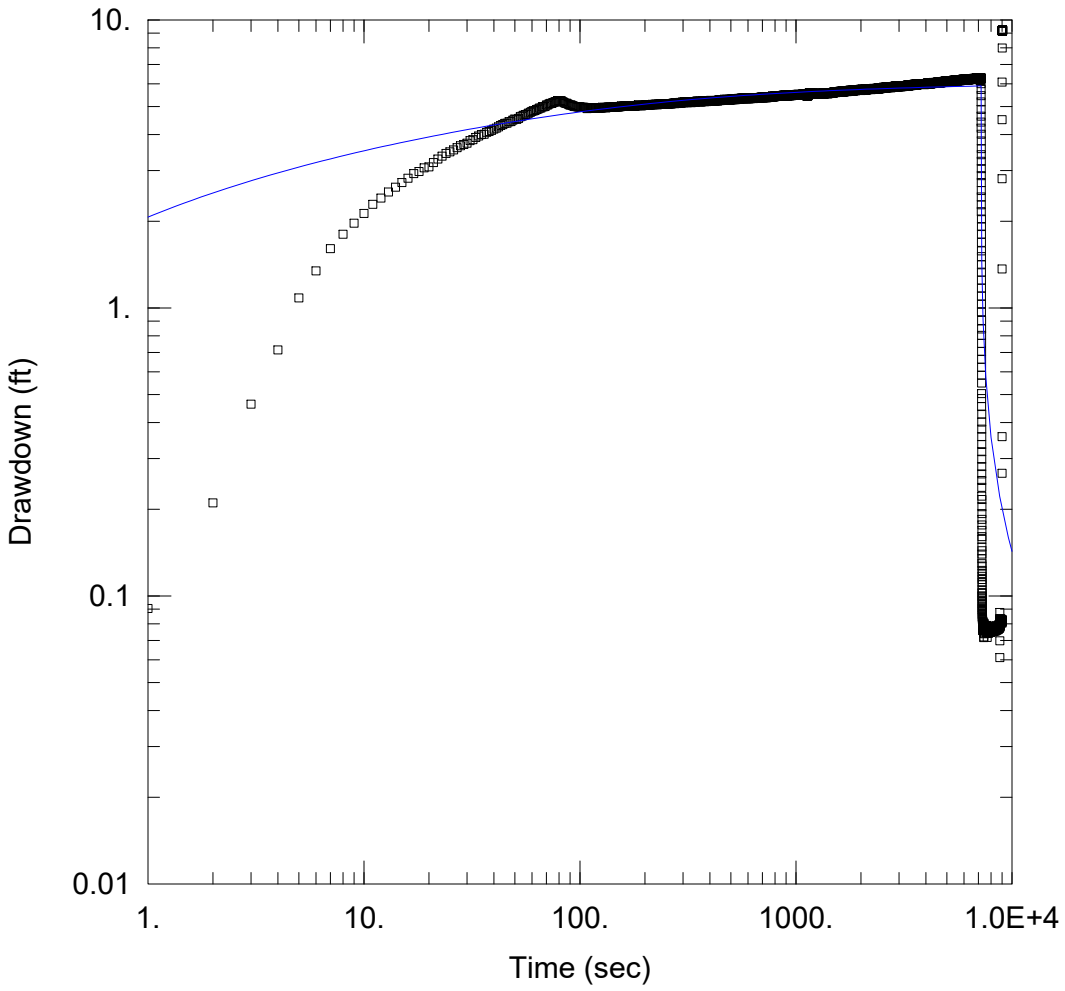


Figure 14. TP3-12D Pumping Test, June 15, 2020



WELL TEST ANALYSIS

Data Set: K:\...\DS-4i_TheisHantush v2.aqt
Date: 08/19/20 Time: 14:36:00

PROJECT INFORMATION

Company: Holden
Test Well: DS-4I

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
DS-4I	0	0

Observation Wells

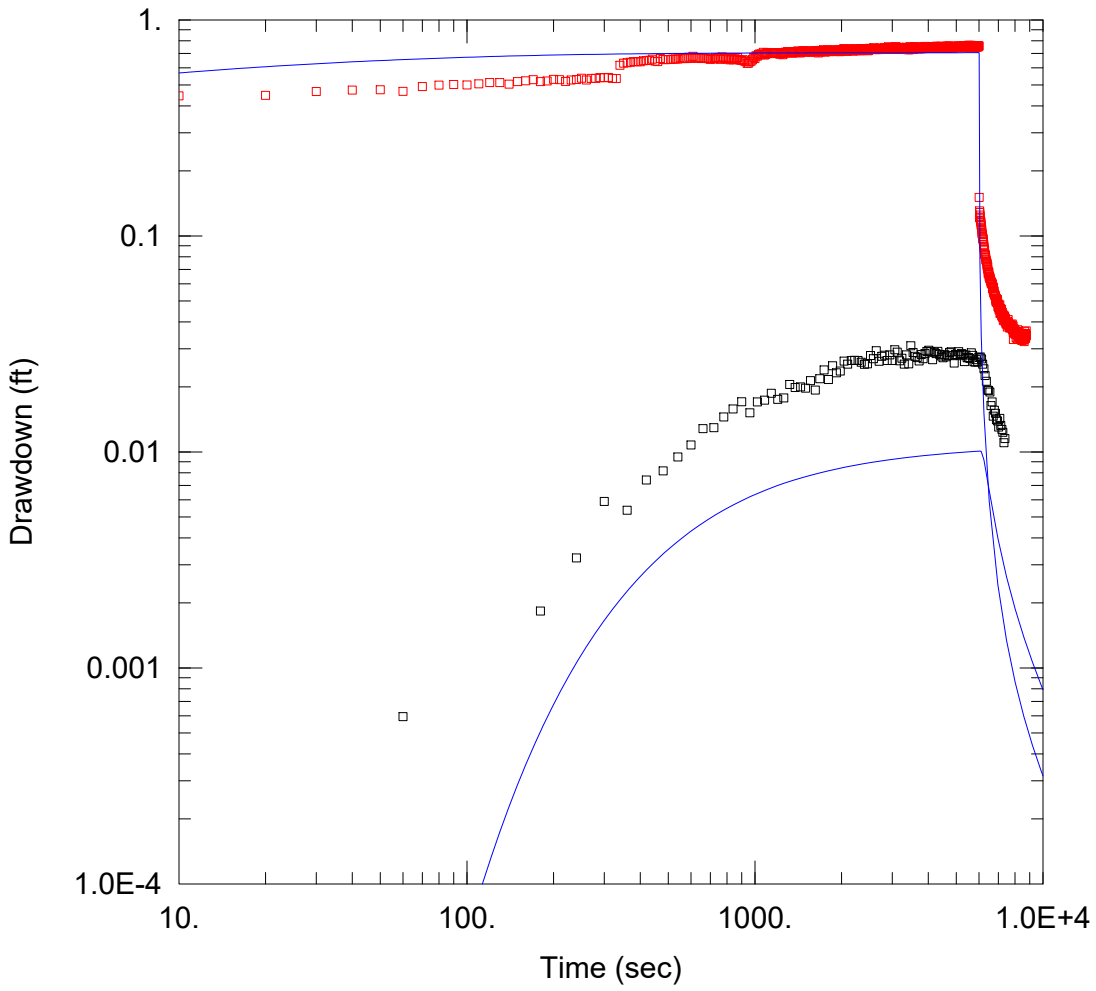
Well Name	X (ft)	Y (ft)
▫ DS-4I	0	0

SOLUTION

Aquifer Model: Unconfined
Solution Method: Theis

T = 603.4 ft^2/day
S = 0.01116
Kz/Kr = 0.1
b = 85. ft

Figure 15. Log-Log Plot for Well DS-4I



WELL TEST ANALYSIS

Data Set: K:\...\DS-13D_TheisHantush v4b fit to Pwell.aqt
Date: 08/19/20 Time: 14:54:51

PROJECT INFORMATION

Company: Holden
Test Well: DS-13D

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
DS-13D	0	63

Observation Wells

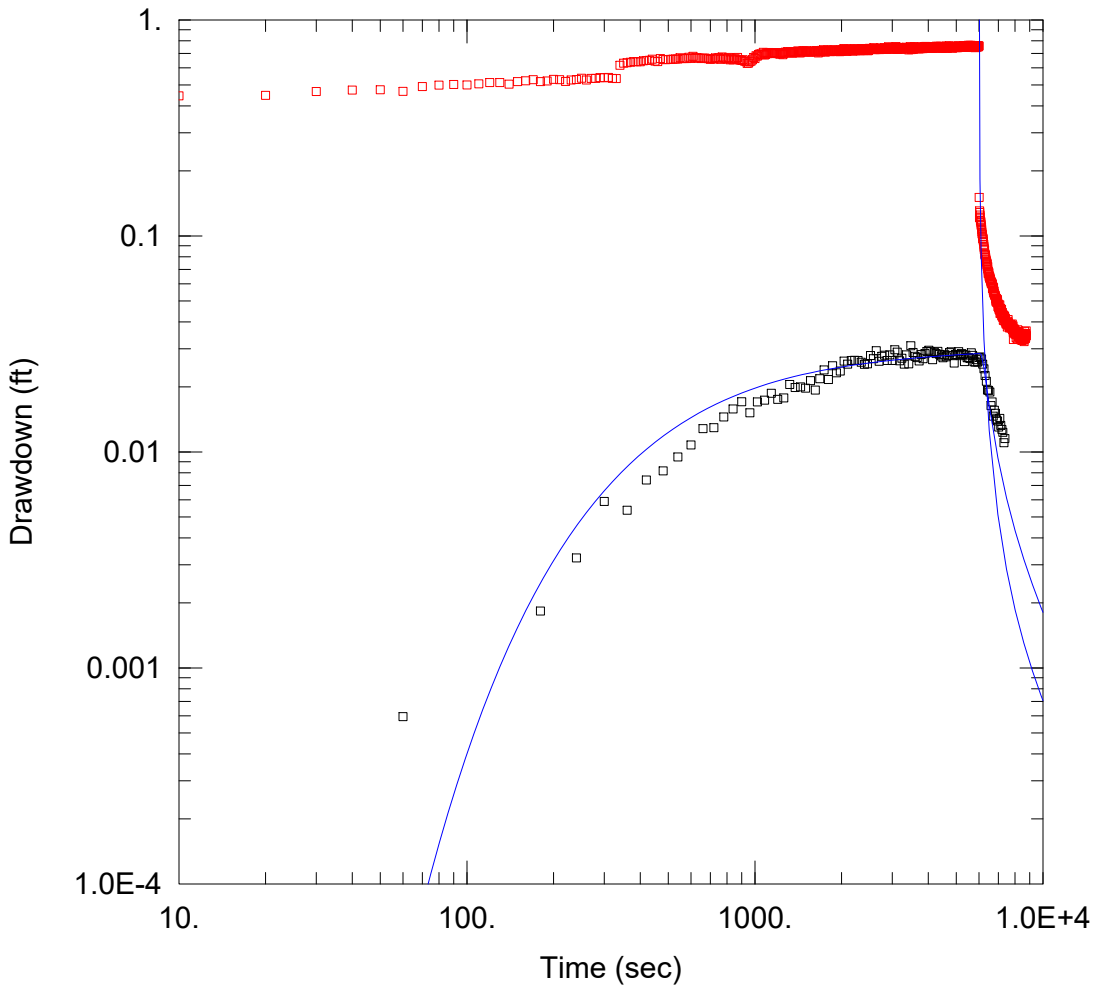
Well Name	X (ft)	Y (ft)
DS-13D	0	63
DS-12D	0	0

SOLUTION

Aquifer Model: Unconfined
Solution Method: Theis

T = 5760.4 ft^2/day
S = 0.0104
Kz/Kr = 0.1
b = 87. ft

Figure 16. Log-Log Plot for Well DS-13D Pumping Well Fit



WELL TEST ANALYSIS

Data Set: K:\...\DS-13D_TheisHantush v4a fit to obswell.aqt
Date: 08/19/20 Time: 14:58:08

PROJECT INFORMATION

Company: Holden
Test Well: DS-13D

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
DS-13D	0	63

Observation Wells

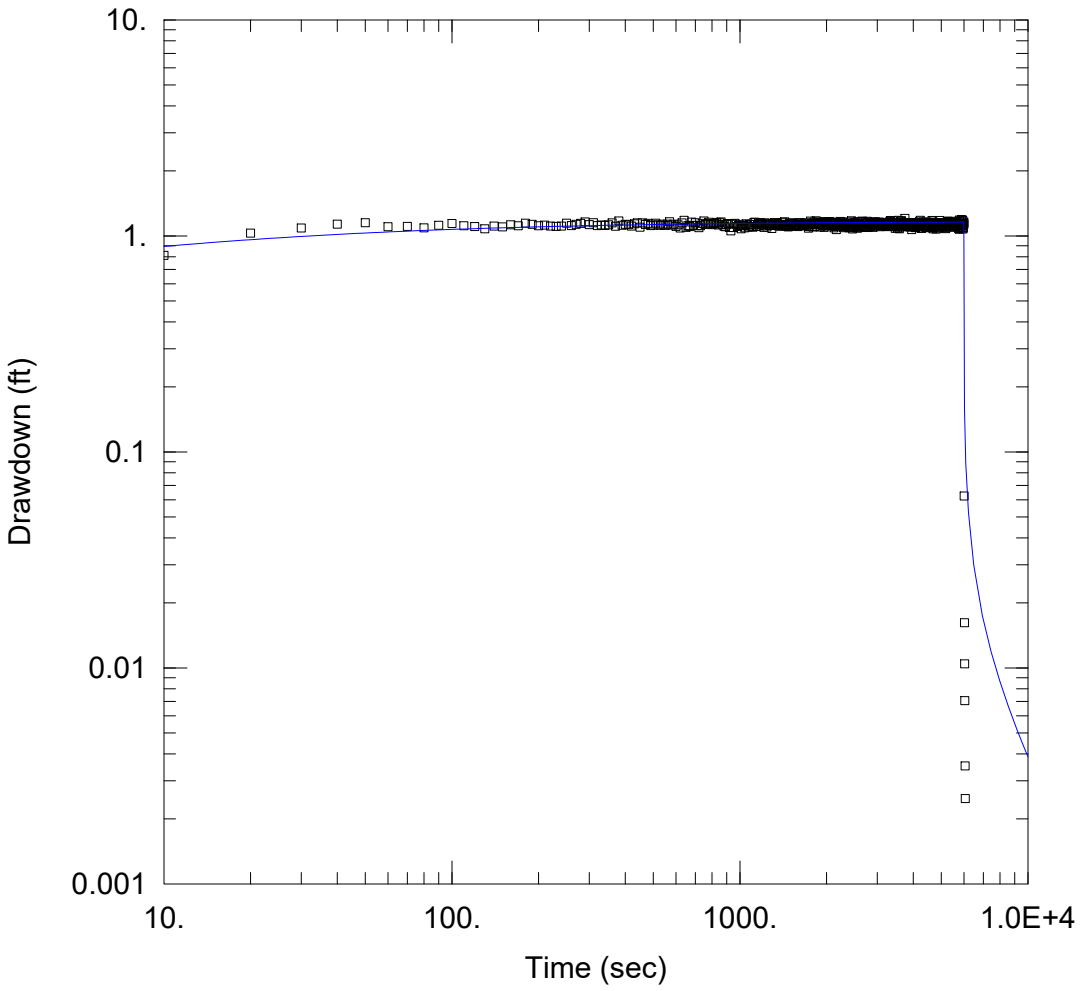
Well Name	X (ft)	Y (ft)
DS-13D	0	63
DS-12D	0	0

SOLUTION

Aquifer Model: Unconfined
Solution Method: Theis

T = 2070.2 ft^2/day
S = 0.00302
Kz/Kr = 0.1
b = 87. ft

Figure 17. Log-Log Plot for Well DS-13D Observation Well Fit



WELL TEST ANALYSIS

Data Set: K:\...\DS-13i_TheisHantush v2.aqt
Date: 08/19/20 Time: 14:46:12

PROJECT INFORMATION

Company: Holden
Test Well: DS-13i

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
DS-13i	0	0

Observation Wells

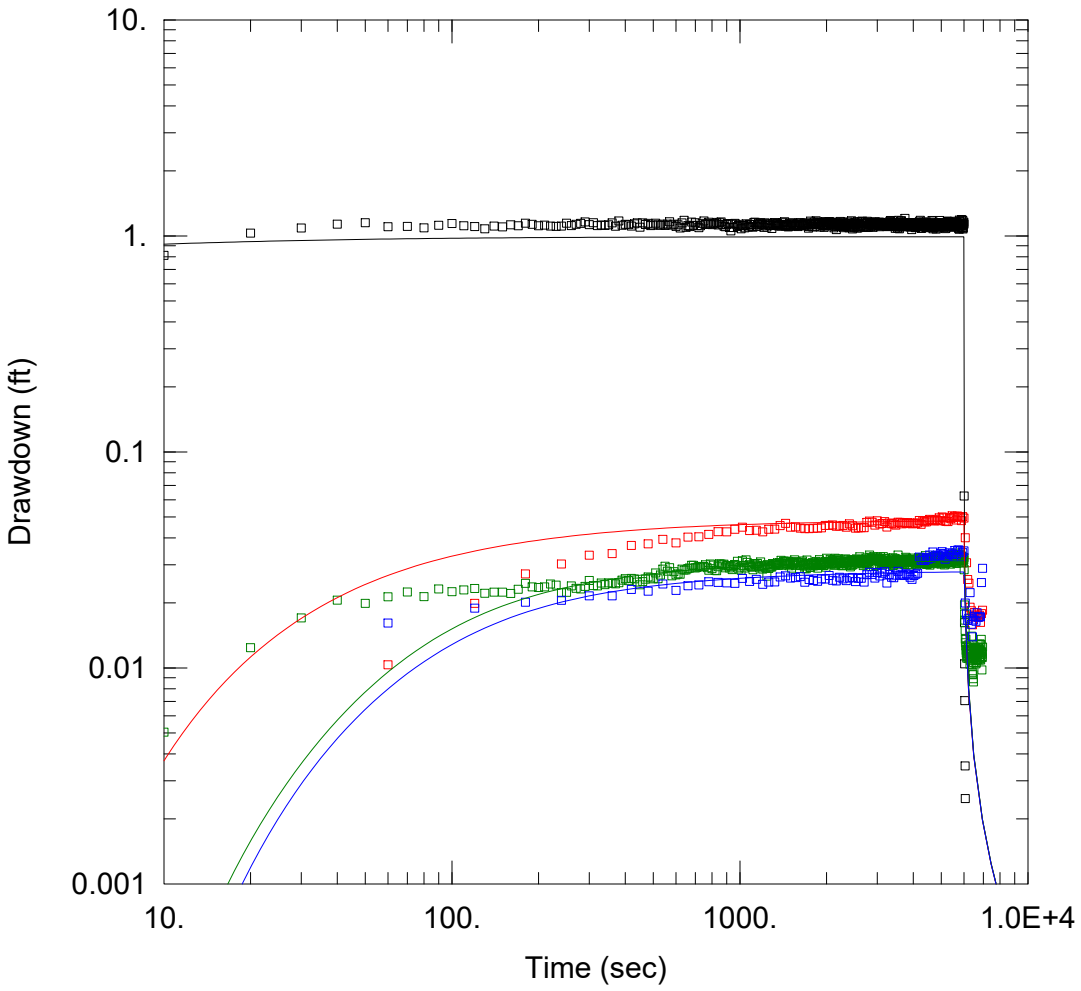
Well Name	X (ft)	Y (ft)
DS-13i	0	0

SOLUTION

Aquifer Model: Unconfined
Solution Method: Theis

T = 5106.3 ft^2/day
S = 0.01136
Kz/Kr = 0.1
b = 87. ft

Figure 18. Log-Log Plot for Well DS-13I Pumping Well Fit



WELL TEST ANALYSIS

Data Set: K:\...\DS-13i_TheisHantush v4 with 13S, 12i and 12D obs wells.aqt
Date: 08/19/20 Time: 14:49:24

PROJECT INFORMATION

Company: Holden
Test Well: DS-13i

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
DS-13i	0	0

Observation Wells

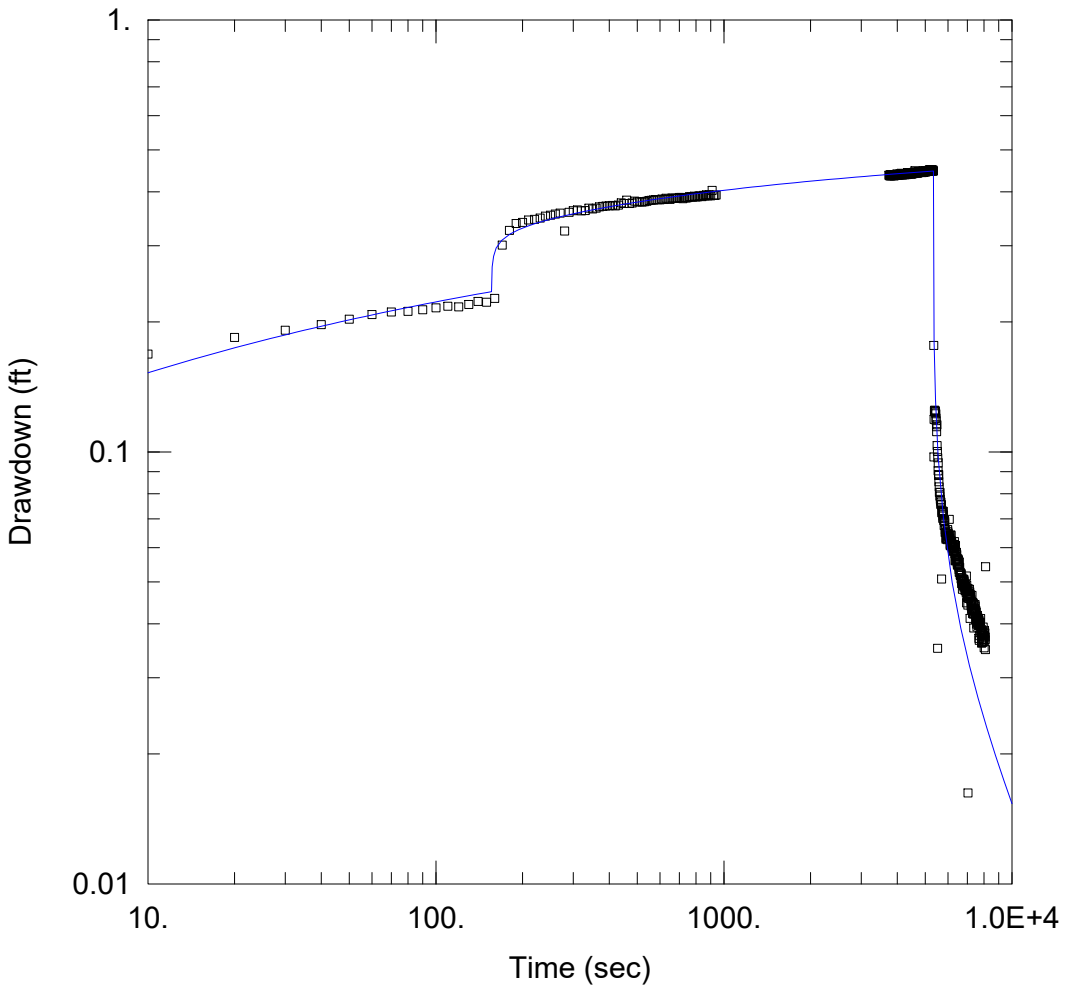
Well Name	X (ft)	Y (ft)
DS-13i	0	0
DS-12D	61	0
DS-13S	0	0
DS-12i	61	0

SOLUTION

Aquifer Model: Unconfined
Solution Method: Theis

T = 6052.4 ft^2/day
S = 0.001224
Kz/Kr = 0.09016
b = 87. ft

Figure 19. Log-Log Plot for Well DS-13I Observation Well Fit



WELL TEST ANALYSIS

Data Set: K:\...\DS-15S_TheisHantush p well fit.aqt
Date: 08/19/20 Time: 15:00:56

PROJECT INFORMATION

Company: Holden
Test Well: DS-15S

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
DS-15S	0	0

Observation Wells

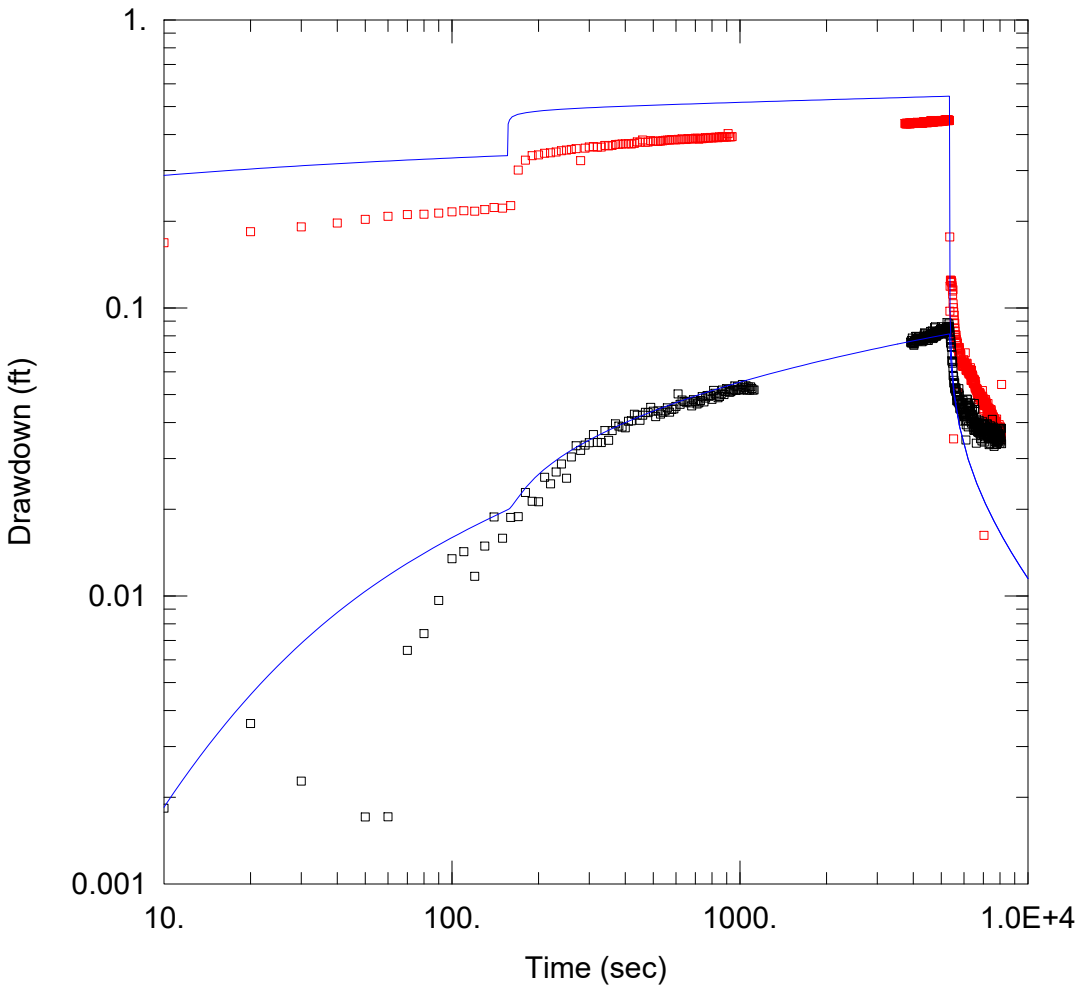
Well Name	X (ft)	Y (ft)
▫ DS-15S	0	0

SOLUTION

Aquifer Model: Unconfined
Solution Method: Theis

T = 2783.1 ft^2/day
S = 0.107
Kz/Kr = 0.1
b = 50. ft

Figure 20. Log-Log Plot for Well DS-15S Pumping Well Fit



WELL TEST ANALYSIS

Data Set: K:\...\DS-15S_TheisHantush fit to obs well.aqt
Date: 08/19/20 Time: 15:08:35

PROJECT INFORMATION

Company: Holden
Test Well: DS-15S

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
DS-15S	0	0

Observation Wells

Well Name	X (ft)	Y (ft)
DS-15S	0	0
DS-15i	0	0

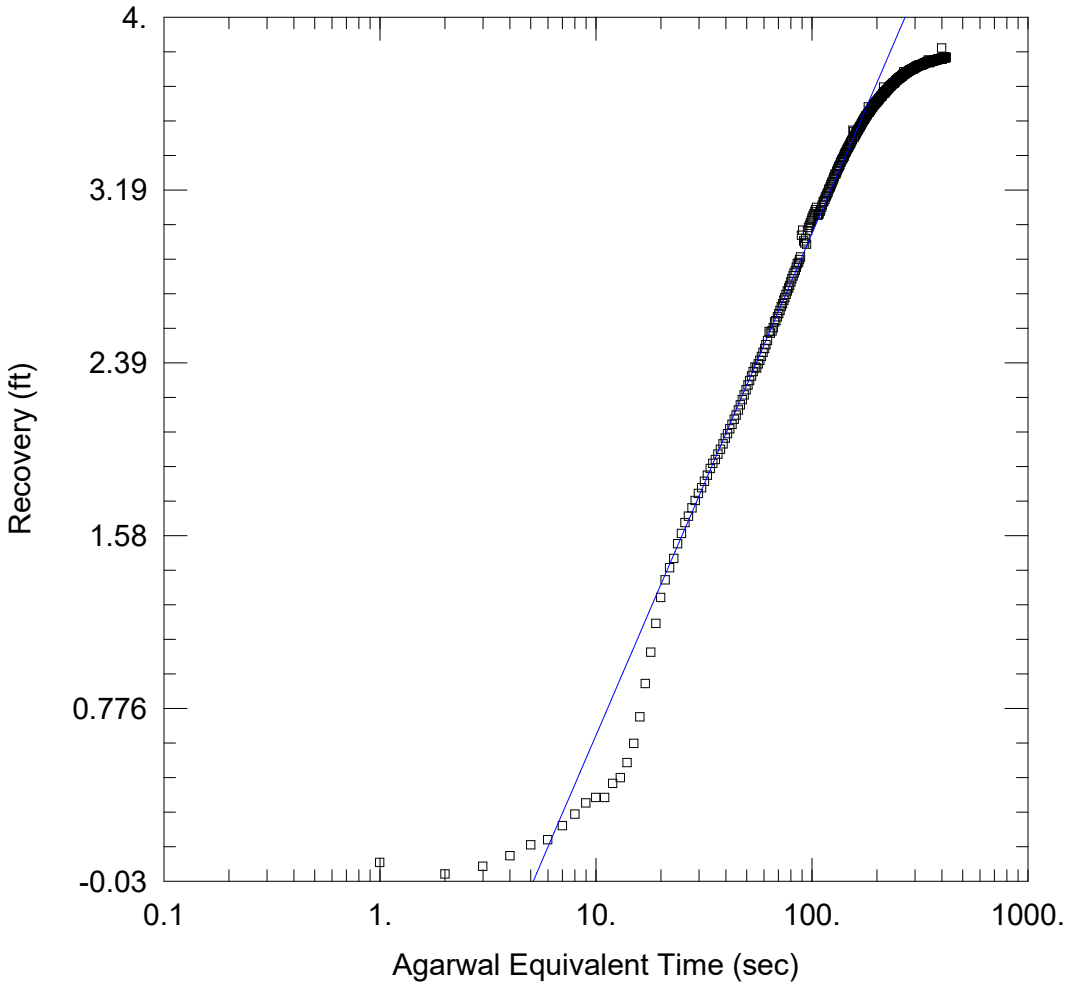
SOLUTION

Aquifer Model: Unconfined
Solution Method: Theis

T = 2629.3 ft^2/day
S = 0.001453
Kz/Kr = 0.1
b = 50. ft

Figure 21. Log-Log Plot for Well DS-15S Observation Well Fit

PgG



WELL TEST ANALYSIS

Data Set: K:\...\DS-15i_recovery fit- first 450 CJ unconfined.aqt
Date: 09/22/20 Time: 16:28:43

PROJECT INFORMATION

Company: Holden
Test Well: DS-15i

AQUIFER DATA

Saturated Thickness: 48. ft Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
DS-15i	0	0

Observation Wells

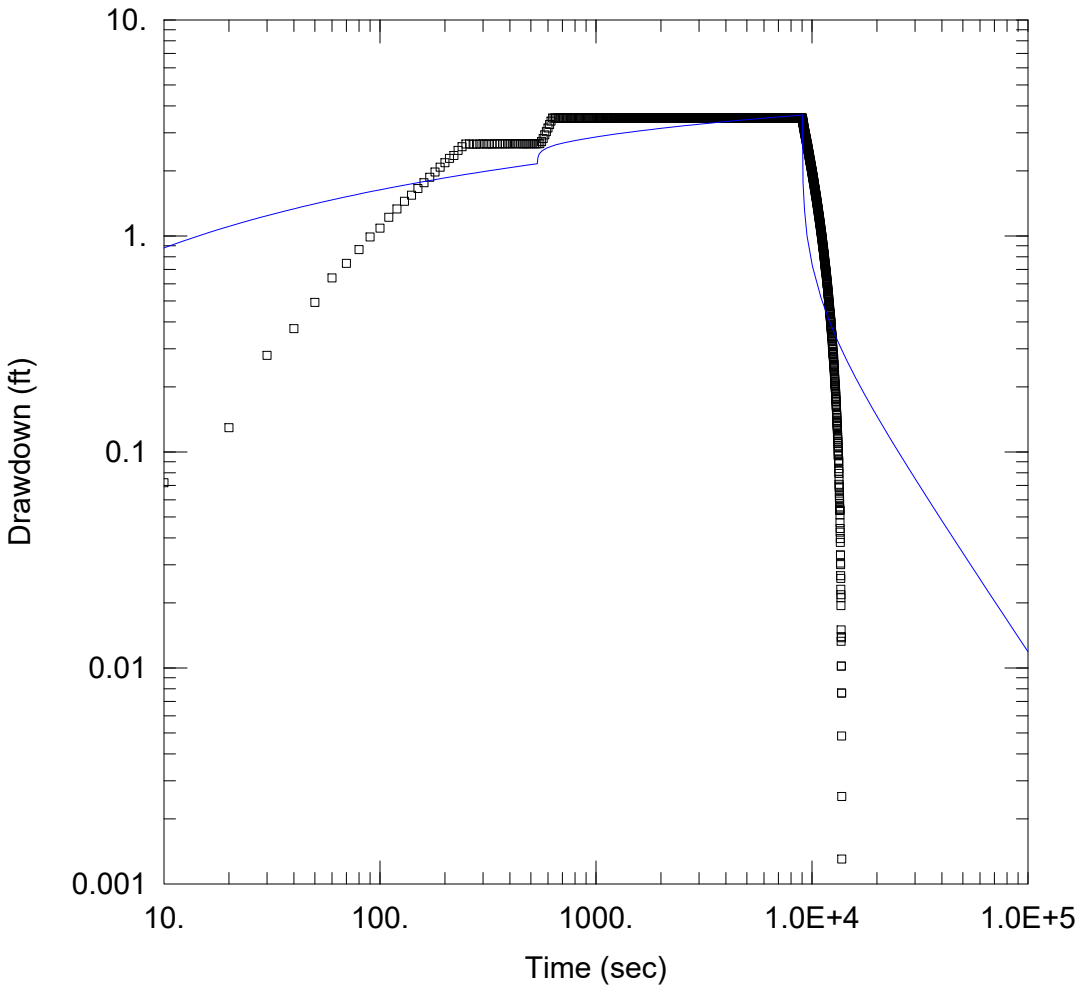
Well Name	X (ft)	Y (ft)
DS-15i	0	0

SOLUTION

Aquifer Model: Unconfined Solution Method: Cooper-Jacob

T = 7.535 ft^2/day S = 0.01655

Figure 22. Log-Log Plot for Well DS-15I Observation Well Fit



WELL TEST ANALYSIS

Data Set: K:\...\DS-16D_TheisHantush v2.aqt
Date: 08/19/20 Time: 14:28:02

PROJECT INFORMATION

Company: Holden
Test Well: DS-16D

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
DS-16D	0	0

Observation Wells

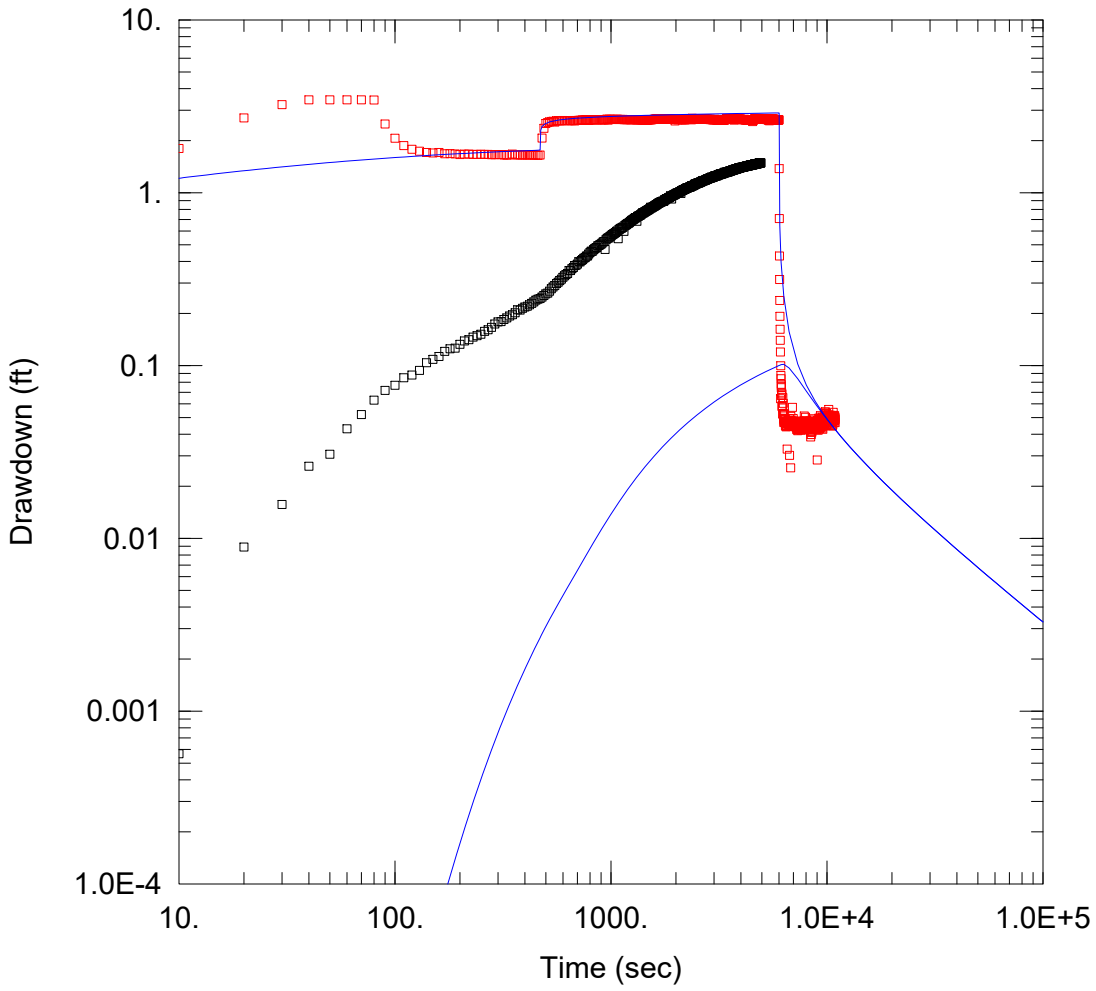
Well Name	X (ft)	Y (ft)
▫ DS-16D	0	0

SOLUTION

Aquifer Model: Unconfined
Solution Method: Theis

T = 21.15 ft^2/day
S = 0.00711
Kz/Kr = 0.1
b = 60. ft

Figure 23. Log-Log Plot for Well DS-16D



WELL TEST ANALYSIS

Data Set: K:\...\DS-16i_TheisHantush v2 p.well fit.aqt
Date: 08/19/20 Time: 14:40:31

PROJECT INFORMATION

Company: Holden
Test Well: DS-16i

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
DS-16i	0	0

Observation Wells

Well Name	X (ft)	Y (ft)
DS-16i	0	0
DS-16D	0	0

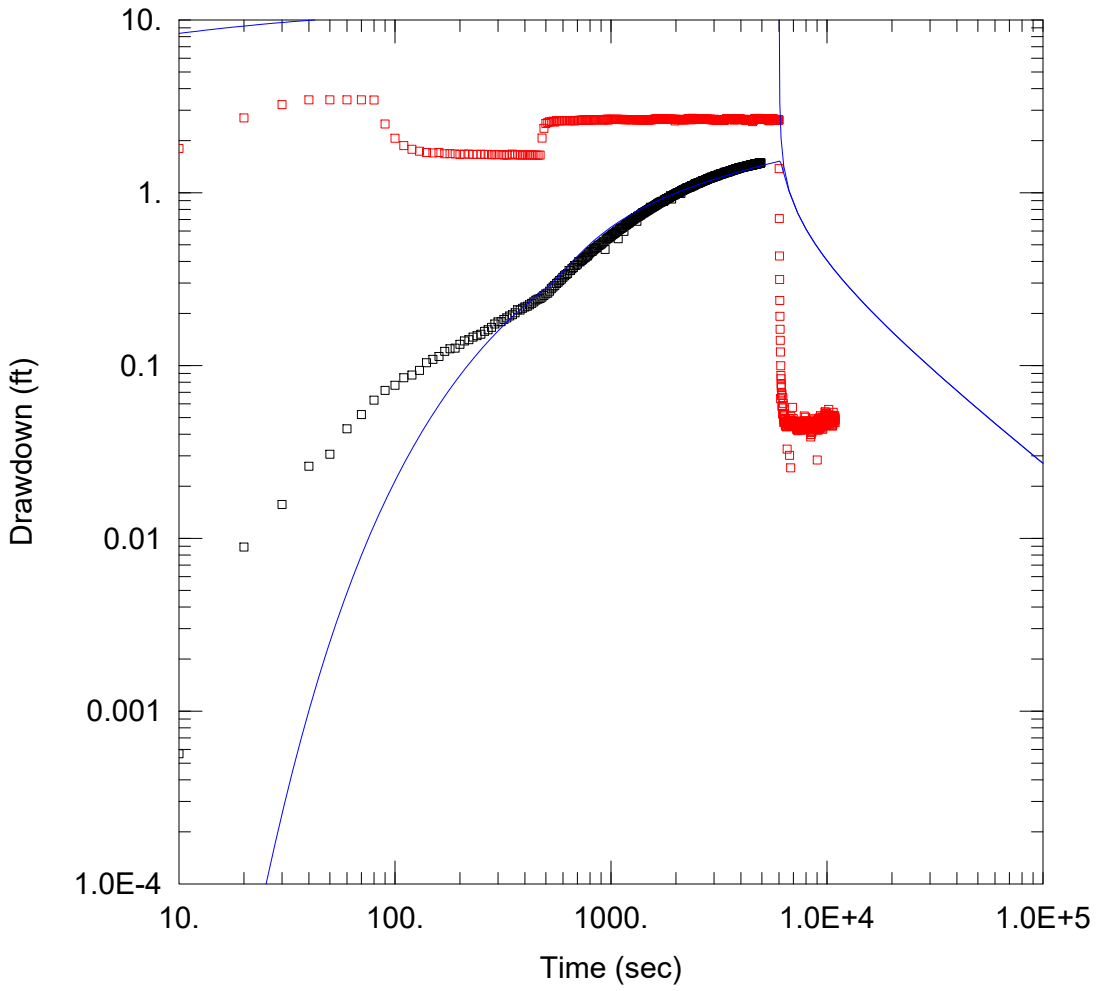
SOLUTION

Aquifer Model: Unconfined
Solution Method: Theis

T = 647.9 ft^2/day
S = 0.007289
Kz/Kr = 0.1
b = 60. ft

Figure 24. Log-Log Plot for Well DS-16I Pumping Well Fit

PgG



WELL TEST ANALYSIS

Data Set: K:\...\DS-16i_TheisHantush v2b obs.well fit.aqt
Date: 08/19/20 Time: 14:43:21

PROJECT INFORMATION

Company: Holden
Test Well: DS-16i

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
DS-16i	0	0

Observation Wells

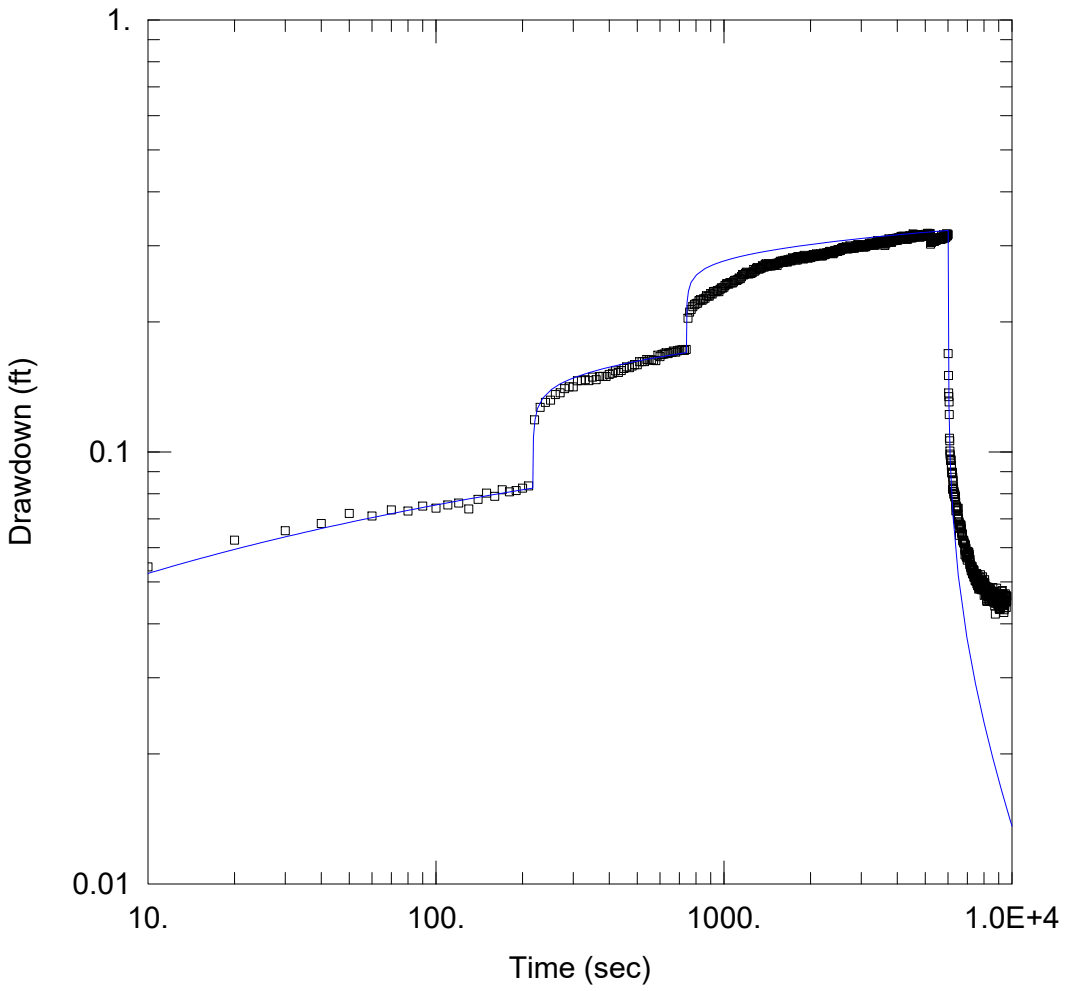
Well Name	X (ft)	Y (ft)
DS-16i	0	0
DS-16D	0	0

SOLUTION

Aquifer Model: Unconfined
Solution Method: Theis

T = 78.21 ft^2/day
S = 0.001826
Kz/Kr = 0.9661
b = 60. ft

Figure 25. Log-Log Plot for Well DS-16I Observation Well Fit



WELL TEST ANALYSIS

Data Set: K:\...\DS-17S_TheisHantush v2.aqt
Date: 08/19/20 Time: 14:22:41

PROJECT INFORMATION

Company: Holden
Test Well: DS-17S

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
DS-17S	0	0

Observation Wells

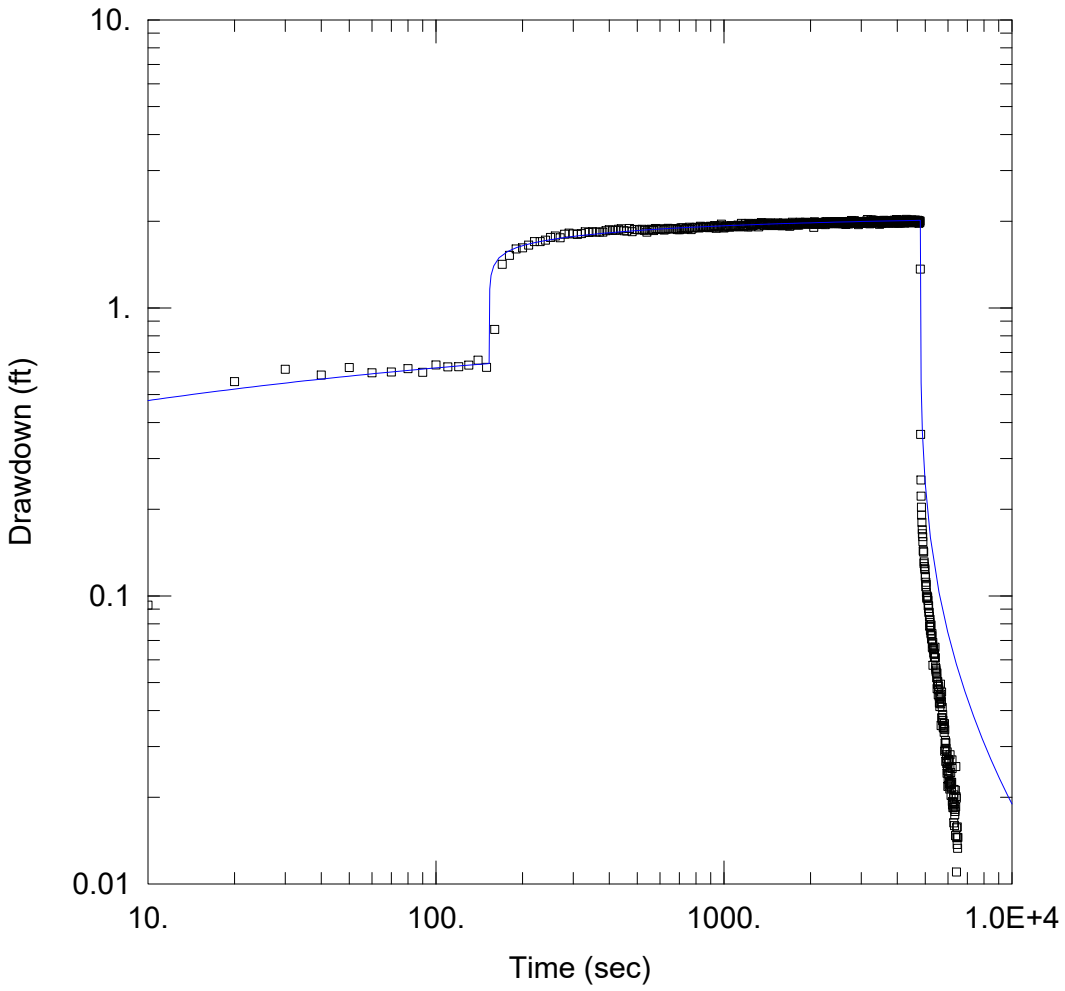
Well Name	X (ft)	Y (ft)
▫ DS-17S	0	0

SOLUTION

Aquifer Model: Unconfined
Solution Method: Theis

T = 8103.3 ft^2/day
S = 0.2612
Kz/Kr = 0.1
b = 62. ft

Figure 26. Log-Log Plot for Well DS-17S



WELL TEST ANALYSIS

Data Set: K:\...\DS-18D TheisHantush v2b.aqt
Date: 08/19/20 Time: 14:35:06

PROJECT INFORMATION

Company: Holden
Test Well: DS-18D

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
DS-18D	0	0

Observation Wells

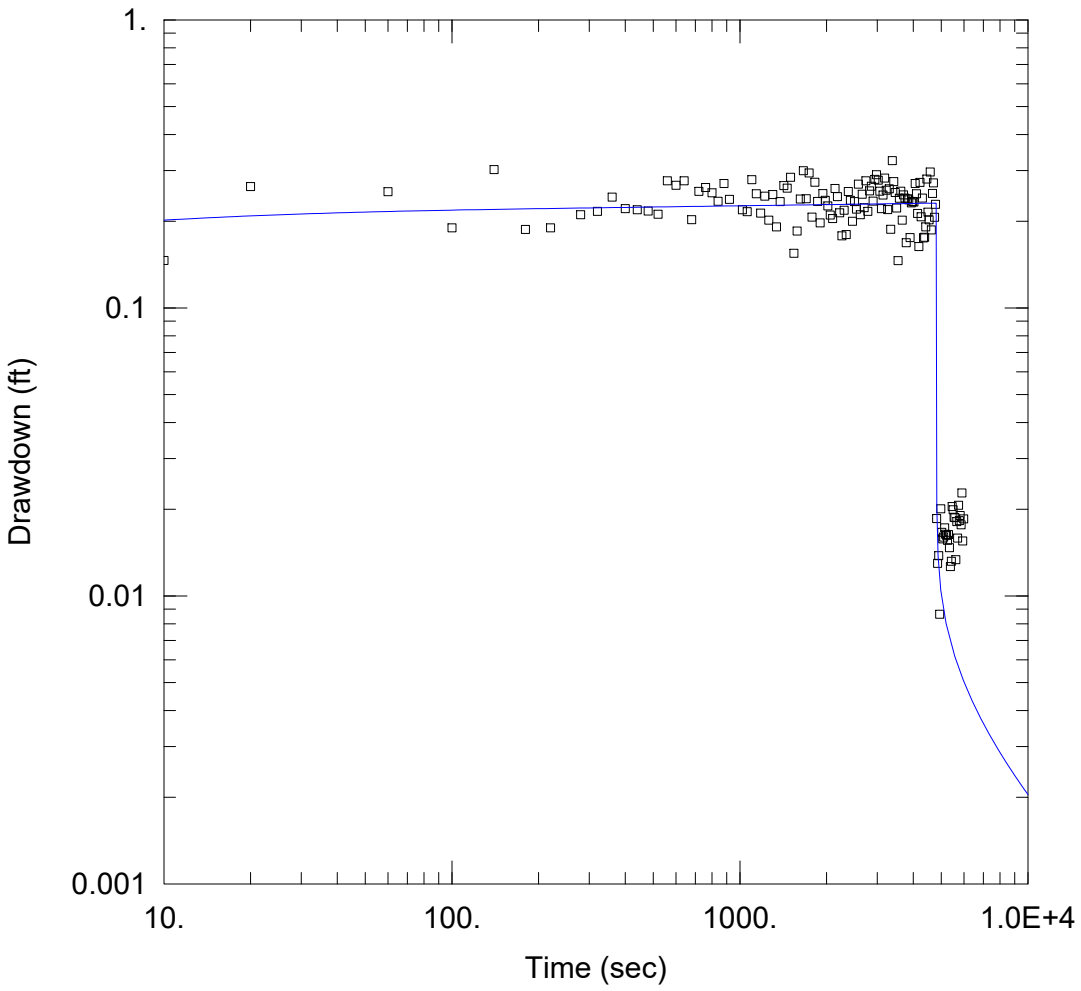
Well Name	X (ft)	Y (ft)
▫ DS-18D	0	0

SOLUTION

Aquifer Model: Unconfined
Solution Method: Theis

T = 2091.3 ft^2/day
S = 0.01101
Kz/Kr = 0.1
b = 80. ft

Figure 27. Log-Log Plot for Well DS-18D



WELL TEST ANALYSIS

Data Set: K:\...\DS-18I TheisHantush v2 - Copy.aqt
Date: 08/19/20 Time: 14:32:48

PROJECT INFORMATION

Company: Holden
Test Well: DS-18I

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
DS-18I	0	0

Observation Wells

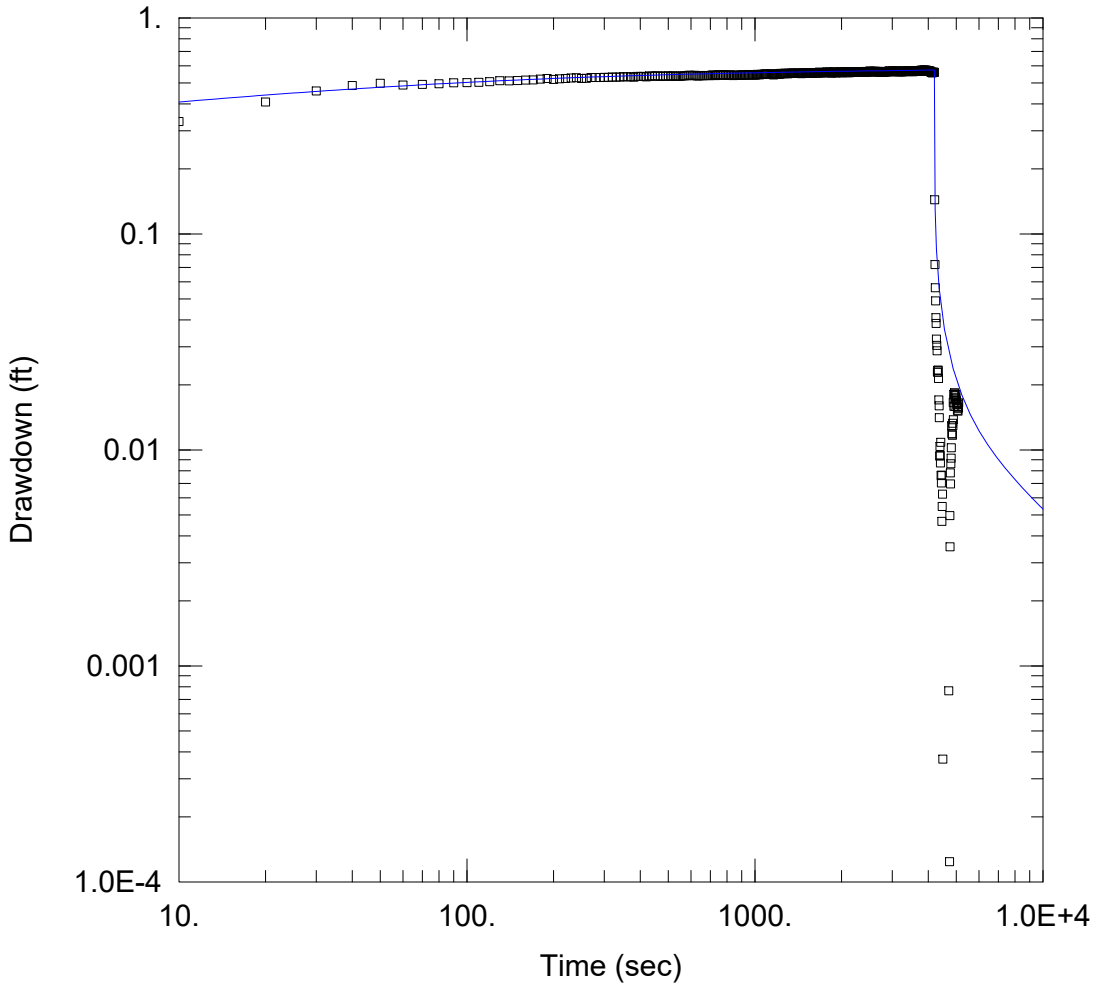
Well Name	X (ft)	Y (ft)
▫ DS-18I	0	0

SOLUTION

Aquifer Model: Unconfined
Solution Method: Theis

T = 2.502E+4 ft^2/day
S = 0.01
Kz/Kr = 0.1
b = 80. ft

Figure 28. Log-Log Plot for Well DS-18I



WELL TEST ANALYSIS

Data Set: K:\...\DS-18S TheisHantush v2.aqt
Date: 08/19/20 Time: 14:33:42

PROJECT INFORMATION

Company: Holden
Test Well: DS-18S

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
DS-18S	0	0

Observation Wells

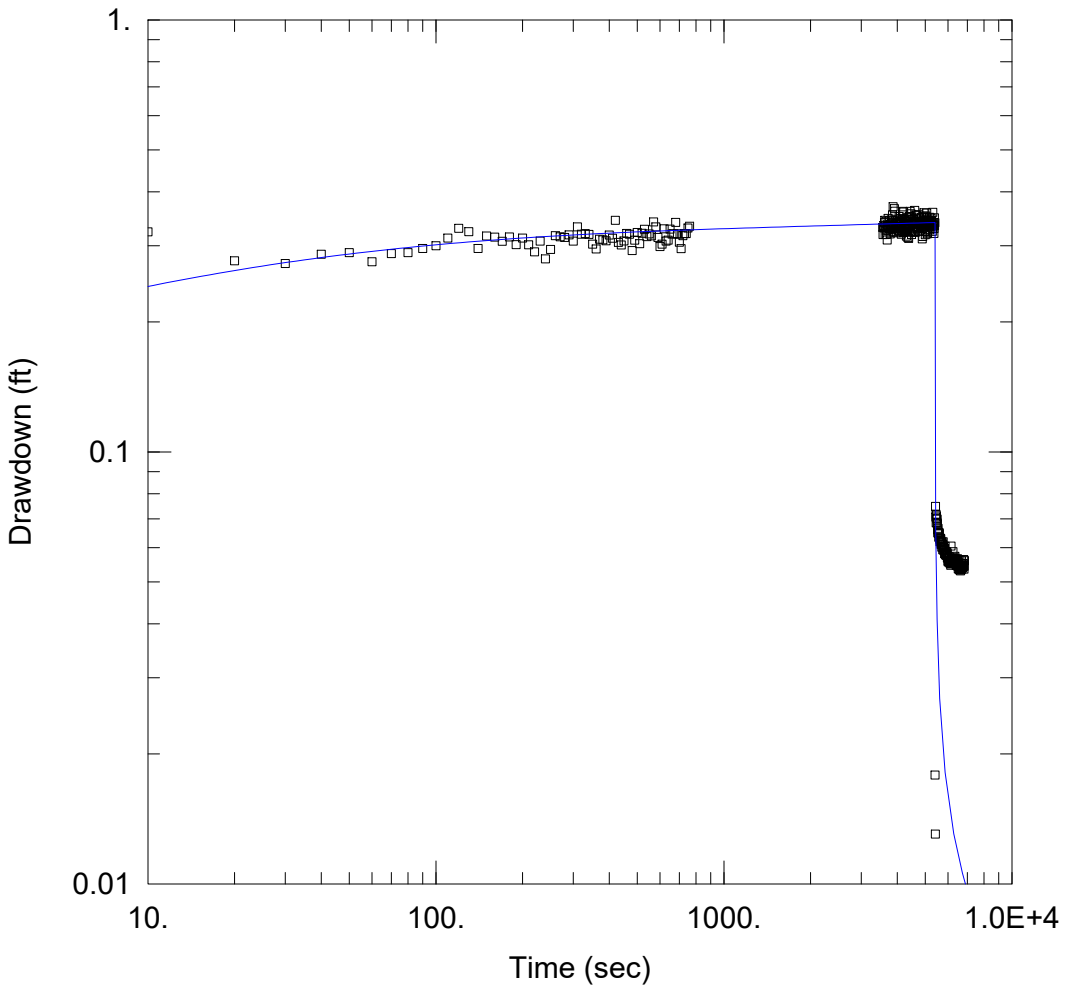
Well Name	X (ft)	Y (ft)
▫ DS-18S	0	0

SOLUTION

Aquifer Model: Unconfined
Solution Method: Theis

T = 7527.5 ft^2/day
S = 0.01
Kz/Kr = 0.1
b = 80. ft

Figure 29. Log-Log Plot for Well DS-18S



WELL TEST ANALYSIS

Data Set: K:\...\TP3-12D TheisHantush.aqt
Date: 08/19/20 Time: 14:21:59

PROJECT INFORMATION

Company: Holden
Test Well: TP3-12D

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
TP3-12D	0	0

Observation Wells

Well Name	X (ft)	Y (ft)
TP3-12D	0	0

SOLUTION

Aquifer Model: Unconfined
Solution Method: Theis

T = 6863.2 ft^2/day
S = 0.02714
Kz/Kr = 0.1
b = 62. ft

Figure 30. Log-Log Plot for Well DS-TP3-12D

Holden Mine Site

Performance Standards Verification
2020 Annual Compliance Assessment Report

Appendix L
Selected Boring Logs Supporting
Low-K Layer Interpretation

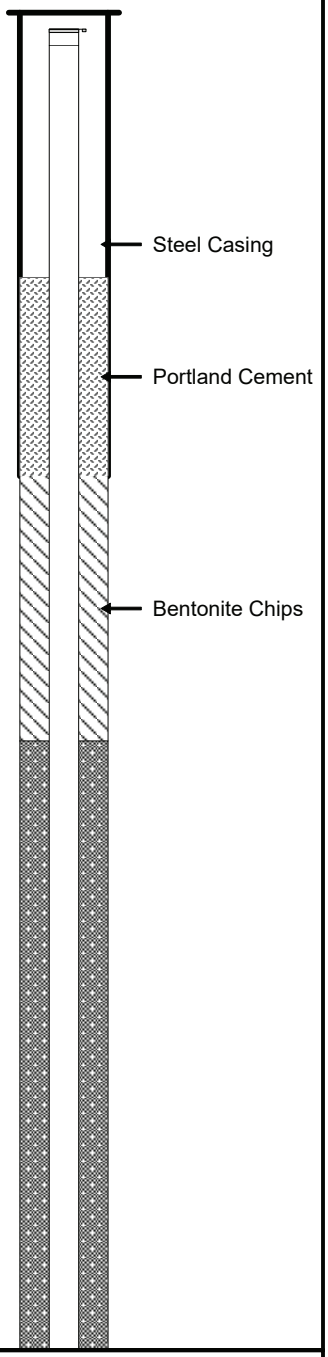
DRAFT

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PROJECT: **Holden Mine**	LOCATION: **Northeast toe of Tailings Pile 2**	WELL ID: **DS-15I**	
LOGGED BY: **G. Cisneros**	COORDINATE SYSTEM: **WA SP North feet; Feet AMSL**	ECOLOGY WELL ID: **BLW-311**	
DRILLED BY: **Cascade (J. Charlton)**	BORING DIAMETER: **6-inch**	NORTHING: **437211.1**	EASTING: **1656537.3**
DRILLING EQUIPMENT: **Limited Access Track Mounted**	SCREENED INTERVAL (ft bgs): **40-50**	GROUND SURFACE ELEV.: **3179.44**	TOC ELEVATION: **3182.13**
DRILLING METHOD: **Rotary Sonic**		TOTAL DEPTH (ft bgs): **57**	DEPTH TO WATER (ft bgs): **10.46**
SAMPLING METHOD: **Continuous 5 ft. and 10 ft. core barrels**		DRILL START DATE: **6/12/2019**	WELL COMPLETION DATE: **6/15/2019**

Depth (feet)	USCS Symbol	Description	Drive/ Recovery	Well Type/ Interval	pH (specified instrument)
0	GW	Brown, silty, sandy, angular gravel; road base **FILL**.			
2	GM	Light brown, silty, sandy, fine to large angular **GRAVEL and COBBLES** with 30% sand and 15% silt; no oxidation; dry.			
7	GW-GM	Brown to gray, sandy, fine to large **GRAVEL** with 30% fine to coarse sand and 10% silt; dry to moist; no orange oxidation.			
10	ML	Dark brown to black, gravelly **SILT** with low plasticity.			
11	GW	Gray, sandy, fine to large **GRAVEL** with 50% fine gravel, 15% medium to large gravel, 20% coarse sand, and 15% cobbles; moist; no orange oxidation.			
13	SP/GP	Brown, gravelly **SAND** to sandy **GRAVEL** with 40% fine to medium sand and 40% fine to medium gravel and 20% cobbles; wet.			
15	SP	Gray to brown, medium to coarse subrounded **SAND** with 10% gravel; wet to saturated; no orange oxidation.			

Well Construction



ABBREVIATIONS:
ft bgs = feet below ground surface
AMSL = above mean sea level
USCS = Unified Soil Classification System
▼ = denotes groundwater table

NOTES: Depth to water measured once water level stabilized. pH measured with an Oakton pH450 and Hanna HI98130

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PROJECT: **Holden Mine**	LOCATION: **Northeast toe of Tailings Pile 2**	WELL ID: **DS-15I**
LOGGED BY: **G. Cisneros**	COORDINATE SYSTEM: **WA SP North feet; Feet AMSL**	ECOLOGY WELL ID: **BLW-311**
DRILLED BY: **Cascade (J. Charlton)**	BORING DIAMETER: **6-inch**	NORTHING: **437211.1**	EASTING: **1656537.3**
DRILLING EQUIPMENT: **Limited Access Track Mounted**	SCREENED INTERVAL (ft bgs): **40-50**	GROUND SURFACE ELEV.: **3179.44**	TOC ELEVATION: **3182.13**
DRILLING METHOD: **Rotary Sonic**		TOTAL DEPTH (ft bgs): **57**	DEPTH TO WATER (ft bgs): **10.46**
SAMPLING METHOD: **Continuous 5 ft. and 10 ft. core barrels**		DRILL START DATE: **6/12/2019**	WELL COMPLETION DATE: **6/15/2019**

Depth (feet)	USCS Symbol	Description	Drive/ Recovery	Well Type/ Interval	pH (specified instrument)	Well Construction
17	GW	Gray, sandy, fine to large **GRAVEL** with 40% fine gravel, 30% medium to coarse gravel, and 30% sand; saturated; no orange oxidation.				
	OL	Dark brown to black, organic **SILT**; no orange oxidation.				
18		Gray, sandy, fine to large, subrounded to subangular **GRAVEL** with 30% coarse sand and 20% subrounded cobbles; saturated.				2" Sch. 40 PVC
19						
20						Portland Grout
21	GW	Orangish brown, sandy, fine to large, subrounded to subangular **GRAVEL** with 20% coarse sand; saturated; slight orange brown color.		Hydropunch	Hanna: 6.07 Oakton: 6.08	
22						
23						
24		Gray, sandy, fine to large, subrounded to subangular **GRAVEL** with 20% coarse sand and 10% silt; saturated.				
25						
26						
27	GW-GM					
28						
29						
30		Same as above: brown to gray in color.				
31	GM	Bluish gray, silty, sandy, fine to large subangular to subrounded **GRAVEL and COBBLES** with 30% silt and 15% fine to coarse sand; saturated.		Temporary Well	Hanna: 6.17 Oakton: 6.09	
32						
33	SM	Brown, silty, gravelly, fine to coarse **SAND** with 30% silt; moist.				
34		Gray, sandy, fine to large, subangular to subrounded **GRAVEL** with 40% fine gravel, 15% medium to large gravel, 15% coarse sand, 20% cobbles, and <10% silt; saturated. Gneiss boulder from 34 to 35 feet.				
35		Cobbles and boulders to 37 feet.				Bentonite Pellets
36	GW			Temporary Well	Hanna: 6.57 Oakton: 6.33	

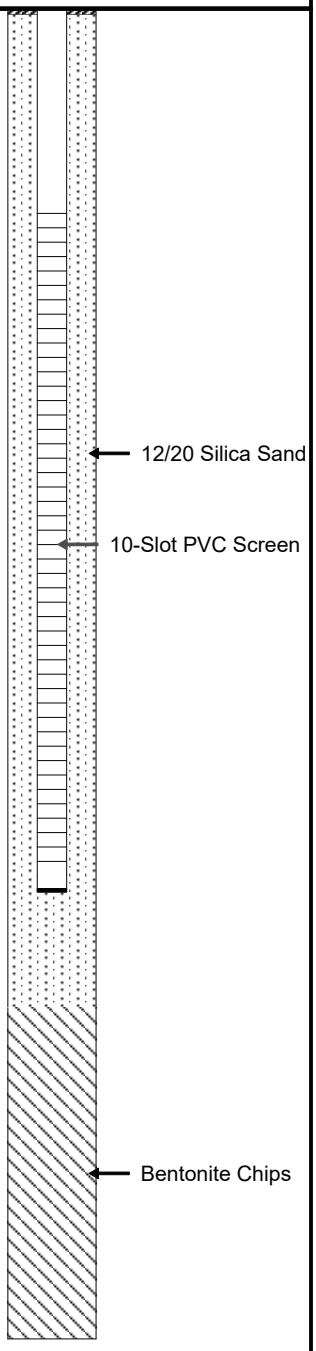
ABBREVIATIONS:
ft bgs = feet below ground surface
AMSL = above mean sea level
USCS = Unified Soil Classification System
▼ = denotes groundwater table

NOTES: Depth to water measured once water level stabilized. pH measured with an Oakton pH450 and Hanna HI98130

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PROJECT: **Holden Mine**	LOCATION: **Northeast toe of Tailings Pile 2**	WELL ID: **DS-15I**
LOGGED BY: **G. Cisneros**	COORDINATE SYSTEM: **WA SP North feet; Feet AMSL**	ECOLOGY WELL ID: **BLW-311**
DRILLED BY: **Cascade (J. Charlton)**	BORING DIAMETER: **6-inch**	NORTHING: **437211.1**	EASTING: **1656537.3**
DRILLING EQUIPMENT: **Limited Access Track Mounted**	SCREENED INTERVAL (ft bgs): **40-50**	GROUND SURFACE ELEV.: **3179.44**	TOC ELEVATION: **3182.13**
DRILLING METHOD: **Rotary Sonic**		TOTAL DEPTH (ft bgs): **57**	DEPTH TO WATER (ft bgs): **10.46**
SAMPLING METHOD: **Continuous 5 ft. and 10 ft. core barrels**		DRILL START DATE: **6/12/2019**	WELL COMPLETION DATE: **6/15/2019**

Depth (feet)	USCS Symbol	Description	Drive/ Recovery	Well Type/ Interval	pH (specified instrument)
37–39		Gray, sandy, fine to large, subrounded to subangular **GRAVEL** with 30% fine to coarse sand and 40% gneiss cobbles; increasing silt with depth.			
40–46	GM	Gray, silty, sandy, fine to large, subrounded to subangular **GRAVEL and COBBLES** with 15% silt and 15% fine to coarse sand.		Temporary Well	Hanna: 8.35 Oakton: 8.41
46		Fractured, angular large clasts of gneiss cobbles.		Temporary Well	Hanna: 6.50 Oakton: 6.20
47		Gneiss boulder from 47 to 50.5 feet.			
50–51	GW	Fine to large, subrounded to subangular **GRAVEL and COBBLES** with <5% silt and sand; fines may have washed away.		Temporary Well	Hanna: 7.55 Oakton: 7.66
55–56		Same as above; subangular gneiss **COBBLES and GRAVEL**; wet.		Temporary Well	Hanna: 8.56 Oakton: 8.40
57		Bottom of boring = 57 feet bgs.			



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NOTES: Depth to water measured once water level stabilized. pH measured with an Oakton pH450 and Hanna HI98130

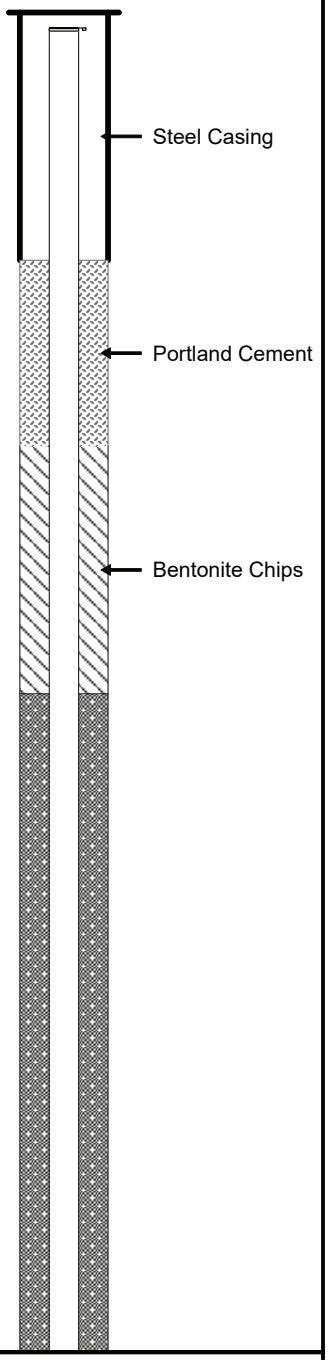
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PROJECT: **Holden Mine**	LOCATION: **Northwest toe of Tailings Pile 3**	WELL ID: **DS-16D**	
LOGGED BY: **G. Cisneros**	COORDINATE SYSTEM: **WA SP North feet; Feet AMSL**	ECOLOGY WELL ID: **BLW-314**	
DRILLED BY: **Cascade (J. Charlton)**	BORING DIAMETER: **6-inch**	NORTHING: **437183.4**	EASTING: **1657042**
DRILLING EQUIPMENT: **Limited Access Track Mounted**	SCREENED INTERVAL (ft bgs): **64-74**	GROUND SURFACE ELEV.: **3174.28**	TOC ELEVATION: **3177.27**
DRILLING METHOD: **Rotary Sonic**		TOTAL DEPTH (ft bgs): **83**	DEPTH TO WATER (ft bgs): **15.9**
SAMPLING METHOD: **Continuous 5 ft. and 10 ft. core barrels**		DRILL START DATE: **6/11/2019**	WELL COMPLETION DATE: **6/12/2019**

Depth (feet)	USCS Symbol	Description
0	GW	Brown, sandy, angular, crushed gravel; road base **FILL** top 1.5 feet.
2	GM	Light brown to gray, silty, sandy, fine to large **GRAVEL** with 15% silt, 20% fine to coarse **SAND**, and 15% cobbles; moist; no orange oxidation.
5	GM	Dark gray, silty, sandy, fine to large, angular **GRAVEL** with 40% silt and 15% fine to medium sand; increasing silt with depth; moist; no orange oxidation.
9	OL	Dark brown, organic **SILT** with woody debris and 15% fine gravel; moist.
10	GW	Brown, sandy, fine to large, subrounded to subangular **GRAVEL** with 15% fine to coarse sand and 5% silt; moist; no orange oxidation.
12	GM	Dark brown, silty, sandy, fine to large, subrounded to subangular **GRAVEL** with 30% silt and 15% fine to coarse sand; moist; no orange oxidation.
14	OL	Dark brown to black organic **SILT**.
15	GM	Dark brown, silty, sandy, fine to large, subangular **GRAVEL** with 30% silt and 20% fine to coarse sand; wet; no orange oxidation.
17	OL	Dark brown to black, very soft, organic **SILT** with woody debris and 10% gravel; wet to saturated; no orange oxidation.

Drive/Recovery | Well Type/Interval | pH (specified instrument)

Well Construction



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NOTES: Depth to water measured once water level stabilized.

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PROJECT: **Holden Mine**	LOCATION: **Northwest toe of Tailings Pile 3**	WELL ID: **DS-16D**
LOGGED BY: **G. Cisneros**	COORDINATE SYSTEM: **WA SP North feet; Feet AMSL**	ECOLOGY WELL ID: **BLW-314**
DRILLED BY: **Cascade (J. Charlton)**	BORING DIAMETER: **6-inch**	NORTHING: **437183.4**	EASTING: **1657042**
DRILLING EQUIPMENT: **Limited Access Track Mounted**	SCREENED INTERVAL (ft bgs): **64-74**	GROUND SURFACE ELEV.: **3174.28**	TOC ELEVATION: **3177.27**
DRILLING METHOD: **Rotary Sonic**		TOTAL DEPTH (ft bgs): **83**	DEPTH TO WATER (ft bgs): **15.9**
SAMPLING METHOD: **Continuous 5 ft. and 10 ft. core barrels**		DRILL START DATE: **6/11/2019**	WELL COMPLETION DATE: **6/12/2019**

Depth (feet)	USCS Symbol	Description	Drive/ Recovery	Well Type/ Interval	pH (specified instrument)	Well Construction
18	GM	Dark brown, silty, sandy, fine to large **GRAVEL**; saturated.				
19		Boulder at 18.5 feet.				
20						
21		Dark brown, silty, sandy, fine to large **GRAVEL**; saturated.				
22	GW	Brown to reddish, sandy, fine to large, subrounded to subangular **GRAVEL** with 15% coarse sand, 50% fine gravel, 20% medium gravel, and 15% large gravel and cobbles; saturated; no orange oxidation				
23						
24						
25						
26						
27						
28						
29	GM	Brown, silty, sandy, fine to large, subrounded **GRAVEL** with 20% silt and 20% sand.				
30	GW	Reddish brown, sandy, fine to large, subrounded to subangular **GRAVEL** with 30% medium to coarse sand, 5% fine sand, and 5% silt; saturated; no orange oxidation.				2" Sch. 40 PVC
31						
32						Portland Grout
33						
34	GM	Brown to light gray, silty, sandy, fine to large, subrounded to subangular **GRAVEL** with 20% fine to coarse sand and 15% silt; saturated; no oxidation.				
35						
36						
37		Gray, sandy, fine to large, subrounded to subangular **GRAVEL** with 20% medium to coarse sand, 40% small gravel, 20% medium gravel, and 20% large gravel and cobbles; saturated.				
38						
39						

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DRILLING METHOD: **Rotary Sonic**		TOTAL DEPTH (ft bgs): **83**	DEPTH TO WATER (ft bgs): **15.9**
SAMPLING METHOD: **Continuous 5 ft. and 10 ft. core barrels**		DRILL START DATE: **6/11/2019**	WELL COMPLETION DATE: **6/12/2019**

Depth (feet)	USCS Symbol	Description	Drive/ Recovery	Well Type/ Interval	pH (specified instrument)	Well Construction
40	GW					
41						
42						
43						
44		Dark gray, silty, sandy, fine to large, subrounded to subangular GRAVEL and COBBLES with 20% fine to coarse sand and 15% silt; saturated.				
45						
46						
47	GM	Orange mottled color 47 to 47.5 feet.				
48		Increasing silt with depth; up to 30% silt.				
49						
50		Boulder from 50 to 53.5 feet.				
51	Rock					
52						
53		Fractured Cobbles.				
54	GW					
55						
56		Boulder encountered between 56 and 58 feet.				
57	Rock					
58		Brown, sandy **GRAVEL and COBBLES** with 20% medium to coarse sand and 30% fine to large, subrounded to subangular gravel; wet.				
59						Bentonite Pellets
60						
61		Light brown, sandy, fine to large, subrounded to subangular **GRAVEL and COBBLES** with 30% fine to coarse sand and 5% silt; wet.				

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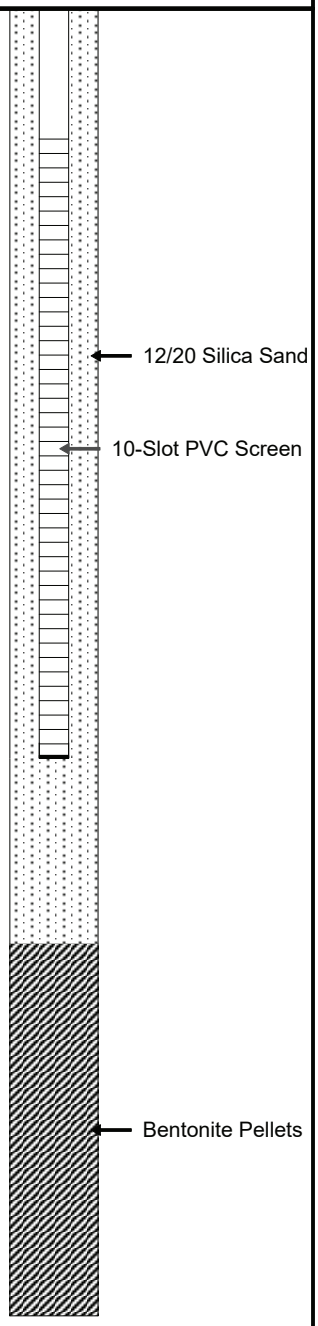
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PROJECT: **Holden Mine**	LOCATION: **Northwest toe of Tailings Pile 3**	WELL ID: **DS-16D**	
LOGGED BY: **G. Cisneros**	COORDINATE SYSTEM: **WA SP North feet; Feet AMSL**	ECOLOGY WELL ID: **BLW-314**	
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DRILLING EQUIPMENT: **Limited Access Track Mounted**	SCREENED INTERVAL (ft bgs): **64-74**	GROUND SURFACE ELEV.: **3174.28**	TOC ELEVATION: **3177.27**
DRILLING METHOD: **Rotary Sonic**		TOTAL DEPTH (ft bgs): **83**	DEPTH TO WATER (ft bgs): **15.9**
SAMPLING METHOD: **Continuous 5 ft. and 10 ft. core barrels**		DRILL START DATE: **6/11/2019**	WELL COMPLETION DATE: **6/12/2019**

Depth (feet)	USCS Symbol	Description
62–69	GW	
70–71	SW/GW	Light brown, gravelly, cobbly, fine to coarse **SAND** to sandy, fine to large **GRAVEL and COBBLES** with 40% subrounded to subangular gravel, 40% sand, and 20% cobbles; saturated.
72	GP	Cobbles between 71.5 and 72.5.
73	Rock	Boulder from 72.5 to 73.5
74	SW-SM	Light brown to light gray, gravelly, fine to coarse **SAND** with 15% fine to large, subrounded to subangular gravel and 10% silt; Wet; (Till).
75	SM	Bluish gray, silty **SAND** with increasing silt content with depth; (Till).
76–82	Bedrock	Orange mottled, fractured **BEDROCK** over banded gneiss with a granodiorite dike intrusion.
83		Bottom of boring = 83 feet bgs.

Drive/Recovery | Well Type/Interval | pH (specified instrument)

Well Construction



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PROJECT: **Holden Mine**	LOCATION: **North toe of Tailings Pile 3**	WELL ID: **DS-17I**
LOGGED BY: **G. Cisneros**	COORDINATE SYSTEM: **WA SP North feet; Feet AMSL**	ECOLOGY WELL ID: **BLW-316**
DRILLED BY: **Cascade (J. Charlton)**	BORING DIAMETER: **6-inch**	NORTHING: **437073.3**	EASTING: **1657552.6**
DRILLING EQUIPMENT: **Limited Access Track Mounted**	SCREENED INTERVAL (ft bgs): **50-60**	GROUND SURFACE ELEV.: **3165.21**	TOC ELEVATION: **3168.22**
DRILLING METHOD: **Rotary Sonic**		TOTAL DEPTH (ft bgs): **77**	DEPTH TO WATER (ft bgs): **13.05**
SAMPLING METHOD: **Continuous 5 ft. and 10 ft. core barrels**		DRILL START DATE: **6/17/2019**	WELL COMPLETION DATE: **6/17/2019**

Depth (feet)	USCS Symbol	Description	Drive/ Recovery	Well Type/ Interval	pH (specified instrument)	Well Construction
0	GW	Brown, sandy, angular gravel; road base **FILL**; dry.				
2	GM	Light brown to gray, silty, sandy, fine to large, subangular **GRAVEL** with 20% fine to coarse sand and 15% silt; dry to moist; no orange oxidation.				
9		Same as above; 30% silt; moist to wet; no orange oxidation.				
10	GW	Gray, sandy, fine to large, subrounded to subangular **GRAVEL and COBBLES** with 15% to 20% coarse sand; wet to saturated; no orange oxidation.				
14	GM	Brown, silty, sandy, fine to large, subrounded to subangular **GRAVEL and COBBLES**; wet; no orange oxidation.				
16		Gray to brown, sandy, fine to large, subrounded to subangular				

Steel Casing
Portland Cement
Bentonite Chips

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PROJECT: **Holden Mine**	LOCATION: **North toe of Tailings Pile 3**	WELL ID: **DS-17I**
LOGGED BY: **G. Cisneros**	COORDINATE SYSTEM: **WA SP North feet; Feet AMSL**	ECOLOGY WELL ID: **BLW-316**
DRILLED BY: **Cascade (J. Charlton)**	BORING DIAMETER: **6-inch**	NORTHING: **437073.3**	EASTING: **1657552.6**
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DRILLING METHOD: **Rotary Sonic**		TOTAL DEPTH (ft bgs): **77**	DEPTH TO WATER (ft bgs): **13.05**
SAMPLING METHOD: **Continuous 5 ft. and 10 ft. core barrels**		DRILL START DATE: **6/17/2019**	WELL COMPLETION DATE: **6/17/2019**

Depth (feet)	USCS Symbol	Description	Drive/ Recovery	Well Type/ Interval	pH (specified instrument)	Well Construction
17–18–19	GW	**GRAVEL** with 50% fine gravel, 20% coarse sand, 20% medium to large gravel, and 10% cobbles; saturated; orange brown color between 18.5 and 19.5 feet.				
20–21–22–23	GW	Same as above; saturated; gray color.				2" Sch. 40 PVC; Portland Grout
24–25–26	GM	Gray, silty, sandy, fine to large, subrounded to subangular **GRAVEL** with 15% silt and 15% fine to coarse sand, and 20% cobbles; wet.		Hydropunch	Hanna: 5.01 Oakton: 4.56	
27–28–29–30–31–32–33–34	GW-GM	Gray, sandy, fine to large, subrounded to subangular **GRAVEL and COBBLES** with 20% coarse sand and 10% silt; saturated; no orange oxidation.				
35–36		Gray, sandy, fine to large, subrounded to subangular **GRAVEL** with 15% coarse sand, 15% large to small cobbles, and <5% silt; saturated.		Hydropunch	Hanna: 5.65 Oakton: 5.37	

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PROJECT: **Holden Mine**	LOCATION: **North toe of Tailings Pile 3**	WELL ID: **DS-17I**
LOGGED BY: **G. Cisneros**	COORDINATE SYSTEM: **WA SP North feet; Feet AMSL**	ECOLOGY WELL ID: **BLW-316**
DRILLED BY: **Cascade (J. Charlton)**	BORING DIAMETER: **6-inch**	NORTHING: **437073.3**	EASTING: **1657552.6**
DRILLING EQUIPMENT: **Limited Access Track Mounted**	SCREENED INTERVAL (ft bgs): **50-60**	GROUND SURFACE ELEV.: **3165.21**	TOC ELEVATION: **3168.22**
DRILLING METHOD: **Rotary Sonic**		TOTAL DEPTH (ft bgs): **77**	DEPTH TO WATER (ft bgs): **13.05**
SAMPLING METHOD: **Continuous 5 ft. and 10 ft. core barrels**		DRILL START DATE: **6/17/2019**	WELL COMPLETION DATE: **6/17/2019**

Depth (feet)	USCS Symbol	Description	Drive/ Recovery	Well Type/ Interval	pH (specified instrument)	Well Construction
37–57	GW	Gray, sandy, fine to large, subrounded to subangular **GRAVEL** with 30% cobbles, 15% coarse sand, and 5% silt; saturated.		Temporary Well (46–55); Temporary Well (55–57)	Hanna: 4.73 Oakton: 4.58 (46–55); Hanna: 4.45 Oakton: 4.49 (55–57)	Bentonite Pellets; 12/20 Silica Sand; 10-Slot PVC Screen

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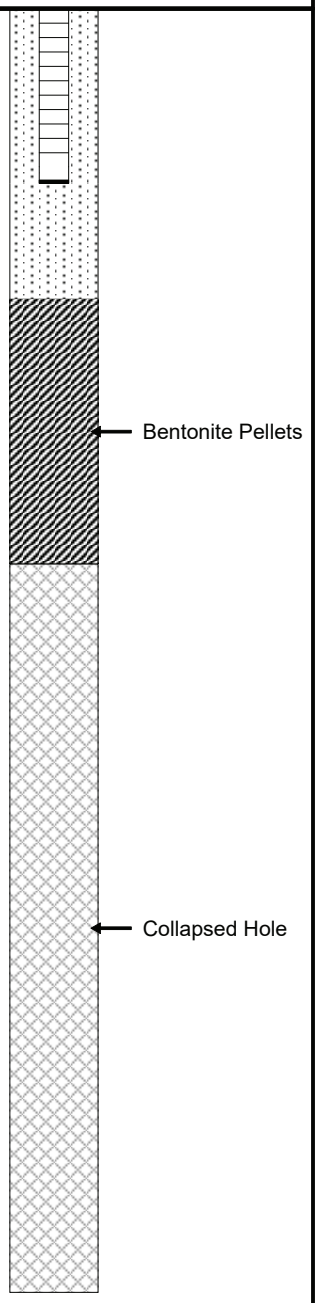
NOTES: Depth to water measured once water level stabilized.

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PROJECT: **Holden Mine**	LOCATION: **North toe of Tailings Pile 3**	WELL ID: **DS-17I**
LOGGED BY: **G. Cisneros**	COORDINATE SYSTEM: **WA SP North feet; Feet AMSL**	ECOLOGY WELL ID: **BLW-316**
DRILLED BY: **Cascade (J. Charlton)**	BORING DIAMETER: **6-inch**	NORTHING: **437073.3**	EASTING: **1657552.6**
DRILLING EQUIPMENT: **Limited Access Track Mounted**	SCREENED INTERVAL (ft bgs): **50-60**	GROUND SURFACE ELEV.: **3165.21**	TOC ELEVATION: **3168.22**
DRILLING METHOD: **Rotary Sonic**		TOTAL DEPTH (ft bgs): **77**	DEPTH TO WATER (ft bgs): **13.05**
SAMPLING METHOD: **Continuous 5 ft. and 10 ft. core barrels**		DRILL START DATE: **6/17/2019**	WELL COMPLETION DATE: **6/17/2019**

Depth (feet)	USCS Symbol	Description	Drive/ Recovery	Well Type/ Interval	pH (specified instrument)
58		Light brown to orange brown, sandy, fine to large, subrounded to subangular **GRAVEL and COBBLES** with 30% coarse sand; saturated.			
59					
60					
61				Temporary Well	Hanna: 4.32 Oakton: 4.43
62					
63					
64		Same as above with 15% coarse sand; saturated.			
65					
66				Temporary Well	Hanna: 5.15 Oakton: 5.22
67		Gray, sandy, fine to large, subrounded to subangular **GRAVEL** with 40% fine gravel, 30% medium coarse gravel and cobbles, and 30% medium to coarse sand; saturated.			
68					
69					
70					
71	Rock	Boulder between 70.5 and 72.25 feet.		Temporary Well	Hanna: 5.96 Oakton: 5.97
72					
73	SW	Gray, loose, gravelly, fine to coarse **SAND**; saturated.			
74		No recovery; 90% of the sample fell out of the core barrel due to loose, fine sand.			
75					
76		Fine to coarse **SAND**; saturated.		Temporary Well	Hanna:6.98 Oakton: 6.97
77		Bottom of boring = 77 feet bgs.			

Well Construction



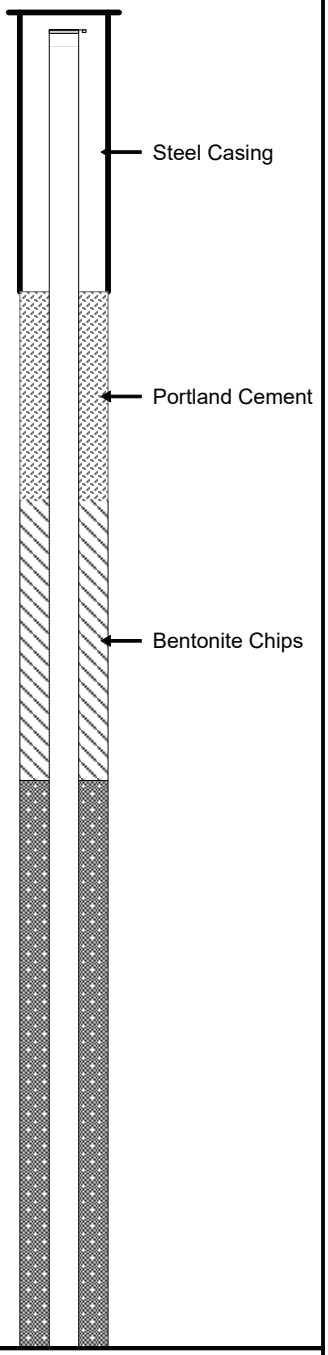
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PROJECT: **Holden Mine**	LOCATION: **North toe of Tailings Pile 3**	WELL ID: **DS-18D**
LOGGED BY: **G. Cisneros**	COORDINATE SYSTEM: **WA SP North feet; Feet AMSL**	ECOLOGY WELL ID: **BLW-319**
DRILLED BY: **Cascade (J. Charlton)**	BORING DIAMETER: **6-inch**	NORTHING: **436925**	EASTING: **1657906.3**
DRILLING EQUIPMENT: **Limited Access Track Mounted**	SCREENED INTERVAL (ft bgs): **110-120**	GROUND SURFACE ELEV.: **3161.24**	TOC ELEVATION: **3163.69**
DRILLING METHOD: **Rotary Sonic**		TOTAL DEPTH (ft bgs): **130**	DEPTH TO WATER (ft bgs): **24.30**
SAMPLING METHOD: **Continuous 5 ft. and 10 ft. core barrels**		DRILL START DATE: **6/18/2019**	WELL COMPLETION DATE: **6/19/2019**

Depth (feet)	USCS Symbol	Description	Drive/ Recovery	Well Type/ Interval	pH (specified instrument)	Well Construction
0	GM	Brown, silty, sandy, angular gravel; road base **FILL**; dry				
2	GM	Light brown, silty, sandy, fine to large, angular **GRAVEL and COBBLES**; no orange oxidation.				
8	ML	Dark brown, sandy, gravelly **SILT** with low plasticity; moist.				
9	GM	Brown to gray, silty, sandy, fine to large **GRAVEL and COBBLES** with 20% silt and 20% fine to coarse sand; no orange oxidation.				
10	ML	Gravelly **SILT**.				
11	GM	Brown to gray, silty, sandy, fine to large **GRAVEL and COBBLES** with 20% silt and 20% fine to coarse sand; no orange oxidation.				
12	ML	Brownish orange, sandy, gravelly **SILT** with low plasticity, 15% fine sand, and 15% fine to large gravel; saturated; orangish color.				
14		Brown to gray, gravelly, medium to coarse **SAND** with 15% gravel; saturated; no orange oxidation				



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PROJECT: **Holden Mine**	LOCATION: **North toe of Tailings Pile 3**	WELL ID: **DS-18D**
LOGGED BY: **G. Cisneros**	COORDINATE SYSTEM: **WA SP North feet; Feet AMSL**	ECOLOGY WELL ID: **BLW-319**
DRILLED BY: **Cascade (J. Charlton)**	BORING DIAMETER: **6-inch**	NORTHING: **436925**	EASTING: **1657906.3**
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DRILLING METHOD: **Rotary Sonic**		TOTAL DEPTH (ft bgs): **130**	DEPTH TO WATER (ft bgs): **24.30**
SAMPLING METHOD: **Continuous 5 ft. and 10 ft. core barrels**		DRILL START DATE: **6/18/2019**	WELL COMPLETION DATE: **6/19/2019**

Depth (feet)	USCS Symbol	Description	Drive/ Recovery	Well Type/ Interval	pH (specified instrument)	Well Construction
16	SP					
17						
18		Gray, sandy, fine to large, subrounded to subangular **GRAVEL** with 30% coarse sand, 40% fine gravel, 20% medium to large gravel, and 10% cobbles; saturated; no orange oxidation.				
19	GW					
20						
21						
22		Brown, silty, sandy, fine to large, subrounded to subangular **GRAVEL** with 30% silt and 15% sand; saturated.				
23	GM					
24 ▼						
25		Gray, sandy, fine to large, subrounded to subangular **GRAVEL** with 30% subangular cobbles and 20% coarse sand; saturated.				
26				Hydropunch	Hanna: 5.71 Oakton: 5.42	
27						
28	GW					
29						
30						
31		Gray, silty, sandy, fine to large, subrounded to subangular **GRAVEL** with 40% fine gravel, 20% coarse sand, 15% silt, and 25% medium to large gravel and cobbles; saturated.				
32	GM					
33						
34						

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PROJECT: **Holden Mine**	LOCATION: **North toe of Tailings Pile 3**	WELL ID: **DS-18D**
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SAMPLING METHOD: **Continuous 5 ft. and 10 ft. core barrels**		DRILL START DATE: **6/18/2019**	WELL COMPLETION DATE: **6/19/2019**

Depth (feet)	USCS Symbol	Description	Drive/ Recovery	Well Type/ Interval	pH (specified instrument)	Well Construction
35	SP	Gray to brown, gravelly, medium to coarse **SAND** with 15% fine gravel.				
36	GW-GM	Light gray, sandy, fine to large, subrounded to subangular **GRAVEL** with 30% fine to coarse sand and 10% silt; saturated.		Temporary Well	Hanna: 5.38 Oakton: 5.30	
37						
38	SP	Gray, gravelly, medium to coarse **SAND** with 20% fine gravel; saturated.				
39						
40	GW	Gray, sandy, fine to large, subrounded to subangular **GRAVEL** with 40% fine gravel, 20% medium gravel, 20% large gravel and cobbles, and 20% coarse sand; saturated.				
41						
42						
43	SP	Gray to brown, gravelly, medium to coarse **SAND** with 20% fine gravel; saturated; no orange oxidation.				
44						
45						
46	GW	Gray, sandy, fine to large, subrounded to subangular **GRAVEL** with 30% coarse sand and 20% cobbles; saturated.		Hydropunch	Hanna: 4.58 Oakton: 4.38	
47						
48	SP	Light brown, gravelly, medium to coarse **SAND** with 30% subrounded gravel and 10% cobbles; saturated.				
49						
50						
51	GW	Gray, sandy, fine to large, subrounded to subangular **GRAVEL** with 20% coarse sand and 15% subrounded cobbles; saturated.				
52						
53						2" Sch. 40 PVC
54						

ABBREVIATIONS:
ft bgs = feet below ground surface
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USCS = Unified Soil Classification System
▼ = denotes groundwater table

NOTES: Depth to water measured once water level stabilized.

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PROJECT: **Holden Mine**	LOCATION: **North toe of Tailings Pile 3**	WELL ID: **DS-18D**
LOGGED BY: **G. Cisneros**	COORDINATE SYSTEM: **WA SP North feet; Feet AMSL**	ECOLOGY WELL ID: **BLW-319**
DRILLED BY: **Cascade (J. Charlton)**	BORING DIAMETER: **6-inch**	NORTHING: **436925**	EASTING: **1657906.3**
DRILLING EQUIPMENT: **Limited Access Track Mounted**	SCREENED INTERVAL (ft bgs): **110-120**	GROUND SURFACE ELEV.: **3161.24**	TOC ELEVATION: **3163.69**
DRILLING METHOD: **Rotary Sonic**		TOTAL DEPTH (ft bgs): **130**	DEPTH TO WATER (ft bgs): **24.30**
SAMPLING METHOD: **Continuous 5 ft. and 10 ft. core barrels**		DRILL START DATE: **6/18/2019**	WELL COMPLETION DATE: **6/19/2019**

Depth (feet)	USCS Symbol	Description	Drive/ Recovery	Well Type/ Interval	pH (specified instrument)	Well Construction
55						
56	GW	Same as above with 70% large **GRAVEL and COBBLES**, 20% fine to medium gravel, and <10% sand.		Temporary Well	Hanna: 4.54 Oakton: 4.45	← Portland Grout
57						
58						
59		Gray, sandy, fine to large, subrounded to subangular **GRAVEL** with 30% coarse sand and 20% cobbles; saturated.				
60						
61	GW-GM	Same as above but with 10% silt.		Temporary Well	Hanna: 4.96 Oakton: 4.68	
62		Gray, gravelly, medium to coarse **SAND** with 15% subrounded to subangular gravel and 5% cobbles; saturated.				
63	SP					
64		Gray sandy, fine to large, subrounded to subangular **GRAVEL** with 30% coarse sand and 15% cobbles; saturated.				
65						
66	GW			Temporary Well	Hanna: 5.14 Oakton: 4.78	
67		Same as above; very cobbly with 15% sand and 5% silt.				
68						
69		Gray, silty, sandy, fine to large, subrounded to subangular **GRAVEL** with 30% coarse sand, 15% silt, and 10% cobbles; saturated.				
70	GM					
71		Gray, sandy, cobbly, fine to large, subrounded to subangular **GRAVEL** with 30% cobbles and 15% sand; saturated.		Temporary Well	Hanna: 5.30 Oakton: 4.89	
72	GW					
73		Gray, gravelly, medium to coarse **SAND** with 20% fine, subangular gravel; saturated.				
74	SP					

ABBREVIATIONS:
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▼ = denotes groundwater table

NOTES: Depth to water measured once water level stabilized.

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PROJECT: **Holden Mine**	LOCATION: **North toe of Tailings Pile 3**	WELL ID: **DS-18D**
LOGGED BY: **G. Cisneros**	COORDINATE SYSTEM: **WA SP North feet; Feet AMSL**	ECOLOGY WELL ID: **BLW-319**
DRILLED BY: **Cascade (J. Charlton)**	BORING DIAMETER: **6-inch**	NORTHING: **436925**	EASTING: **1657906.3**
DRILLING EQUIPMENT: **Limited Access Track Mounted**	SCREENED INTERVAL (ft bgs): **110-120**	GROUND SURFACE ELEV.: **3161.24**	TOC ELEVATION: **3163.69**
DRILLING METHOD: **Rotary Sonic**		TOTAL DEPTH (ft bgs): **130**	DEPTH TO WATER (ft bgs): **24.30**
SAMPLING METHOD: **Continuous 5 ft. and 10 ft. core barrels**		DRILL START DATE: **6/18/2019**	WELL COMPLETION DATE: **6/19/2019**

Depth (feet)	USCS Symbol	Description	Drive/ Recovery	Well Type/ Interval	pH (specified instrument)	Well Construction
75		Grades to fine to medium **SAND**.				
76	SM	Olive, silty, fine **SAND** with 40% silt with moderate plasticity; moist.		Temporary Well	Hanna: 5.03 Oakton: 4.72	
77	ML	Olive, stiff, sandy **SILT** with moderate plasticity and 15% fine sand.				
78	GW	Gray, sandy, fine to large, subrounded to subangular **GRAVEL** with 30% coarse sand; saturated.				
79	SP	Grades to gray, fine to medium **SAND**.				
80	ML	Olive gray, sandy **SILT** with moderate plasticity and 15% fine sand; moist.				
81				Temporary Well	Hanna: 7.65 Oakton: 7.72	
82	SP	Brown, fine to medium **SAND** with 5% silt and 5% gravel; saturated.				
83	SM	Gray to brown, silty, gravelly, fine to coarse **SAND** with 20% fine gravel and 15% silt; saturated.				
84		Gray to brown, silty, sandy, fine to large, subrounded **GRAVEL** with 50% fine gravel, 20% coarse sand, and 15% silt; saturated.				
85						
86						
87						
88	GM	Same as above; saturated.				
89						
90						
91						
92						
93	SW	Gray, fine to coarse **SAND** with 10% gravel and 10% cobbles; saturated.				

Probable Low-K interval. Note change in pH.

ABBREVIATIONS:
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NOTES: Depth to water measured once water level stabilized.

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PROJECT: **Holden Mine**	LOCATION: **North toe of Tailings Pile 3**	WELL ID: **DS-18D**
LOGGED BY: **G. Cisneros**	COORDINATE SYSTEM: **WA SP North feet; Feet AMSL**	ECOLOGY WELL ID: **BLW-319**
DRILLED BY: **Cascade (J. Charlton)**	BORING DIAMETER: **6-inch**	NORTHING: **436925**	EASTING: **1657906.3**
DRILLING EQUIPMENT: **Limited Access Track Mounted**	SCREENED INTERVAL (ft bgs): **110-120**	GROUND SURFACE ELEV.: **3161.24**	TOC ELEVATION: **3163.69**
DRILLING METHOD: **Rotary Sonic**		TOTAL DEPTH (ft bgs): **130**	DEPTH TO WATER (ft bgs): **24.30**
SAMPLING METHOD: **Continuous 5 ft. and 10 ft. core barrels**		DRILL START DATE: **6/18/2019**	WELL COMPLETION DATE: **6/19/2019**

Depth (feet)	USCS Symbol	Description
94	GM	Gray, brown, silty, sandy, fine to large, subrounded **GRAVEL** with 20% medium to coarse sand, 15% silt, and 10% cobbles; saturated.
95	SW	Gray, gravelly, fine to coarse **SAND**; saturated.
96		Gray, sandy, fine to large **GRAVEL and COBBLES**.
97		Very soft drilling; No Recovery from 97 to 103 feet.
98		
99	GW	
100		
101		
102		
103		Gray to brown, loose, sandy, fine to large, subrounded to subangular **GRAVEL** with 30% coarse sand, 15% subrounded cobbles, and 10% silt.
104		
105		
106		Loose gravel; no recovery from 107.5 to 112 feet; switched to an auger bit to hold soil in core barrel.
107	GW-GM	
108		
109		
110		
111		
112		Grayish brown, loose, sandy, fine to large, subrounded to subangular **GRAVEL** with 40% coarse sand and cobbles; saturated.
113		

Drive/Recovery | Well Type/Interval | pH (specified instrument) | Well Construction

Well Construction: Bentonite Pellets

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NOTES: Depth to water measured once water level stabilized.

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PROJECT: **Holden Mine**	LOCATION: **North toe of Tailings Pile 3**	WELL ID: **DS-18D**
LOGGED BY: **G. Cisneros**	COORDINATE SYSTEM: **WA SP North feet; Feet AMSL**	ECOLOGY WELL ID: **BLW-319**
DRILLED BY: **Cascade (J. Charlton)**	BORING DIAMETER: **6-inch**	NORTHING: **436925**	EASTING: **1657906.3**
DRILLING EQUIPMENT: **Limited Access Track Mounted**	SCREENED INTERVAL (ft bgs): **110-120**	GROUND SURFACE ELEV.: **3161.24**	TOC ELEVATION: **3163.69**
DRILLING METHOD: **Rotary Sonic**		TOTAL DEPTH (ft bgs): **130**	DEPTH TO WATER (ft bgs): **24.30**
SAMPLING METHOD: **Continuous 5 ft. and 10 ft. core barrels**		DRILL START DATE: **6/18/2019**	WELL COMPLETION DATE: **6/19/2019**

Depth (feet)	USCS Symbol	Description	Drive/ Recovery	Well Type/ Interval	pH (specified instrument)	Well Construction
114		No Recovery from 114 to 122 feet.				12/20 Silica Sand
115						10-Slot PVC Screen
116		Large cobbles in auger bit preventing soil from being collected.				
117	GW					
118						
119						
120						
121						
122		Olive gray, fine to coarse **SAND** with 5% gravel; saturated to moist.				
123	SW					
124		Fractured, angular gneiss **COBBLES**; very hard drilling to 130 feet.				
125						Collapsed Hole
126						
127	Bedrock					
128		Granodiorite **BEDROCK** to 130 feet.				
129						
130		Bottom of boring = 130 feet bgs.				

ABBREVIATIONS:
ft bgs = feet below ground surface
AMSL = above mean sea level
USCS = Unified Soil Classification System
▼ = denotes groundwater table

NOTES: Depth to water measured once water level stabilized.

Project: Holden Mine - 2008 Field Investigation
Project Location: Holden, Chelan County, Washington
Project Number: 33760997

Log of Boring DS-6DR

Date(s) Drilled	**6/14/2008 to 6/16/2008**	Logged By	**D. Coberly**	Checked By	**E. Lenz**
Drilling Method	**Rotosonic**	Drill Bit Size/Type	**6" Dia. Rotosonic**	Total Depth of Borehole	**118.0 feet**
Drill Rig Type	**Truck Mounted Rotosonic**	Drilling Contractor	**Boart Longyear**	Approximate Surface Elevation	**3147.0**
Groundwater Depth (ft)	**Not Measured/Recorded**	Sampling Method(s)	**Dames & Moore; Sonic Core**	Hammer Data	**300 lb Auto Hammer; 30-inch drop**
Borehole Completion	**Groundwater Monitoring Well Installed**			**Northing:** **Easting:**	

Elevation feet	Depth, feet	SAMPLES Type	Number	Blows/ 6in.	Recovery, %	Graphic Log	USCS	MATERIAL DESCRIPTION	Well Completion Schematic	Percent Passing #200 Sieve	Moisture Content, %	Dry Density, (pcf)	REMARKS AND OTHER TESTS
	0						SP	SAND with silt; sand medium to coarse, **loose?**; wet; dark yellowish-brown (Tailings)					
	5												
3140			1	2 3 11 N=14	89		SP/ SM	Poorly graded SAND with silt; **medium dense**; wet; black (Organic-Rich Overbank Deposits) - Becomes wet at 7.5 ft					
	10						GP/ GM	Poorly graded GRAVEL with silt and sand; gravel fine to coarse rounded to sub rounded, sand fine to coarse; **medium dense to dense**; wet; brown (Alluvium)					
3130	15												
			2	6 23 42 N=65	72								
	20												
							GM	Silty GRAVEL with sand; gravel sub angular to sub rounded; **dense**; moist to wet; brown (Alluvium)					
3120	25												
	30		3	50/5"	60					15.5	3		- In-situ permeability test at 27.5-37.5 ft. 3.8 ft of drawdown at 19 gpm. - Sample recovery not recorded at 30 ft - HA, SA: 30.5 ft
	35						SM	Silty SAND with gravel, clay, and cobbles; gravel sub angular to sub rounded, silt low-plasticity; **dense**; moist to wet; grayish-brown (Colluvium/Debris Flow Deposits)					
3110			4	50/5.5"	100					15.6			- HA, SA: 37.5 ft
	40												

URS

Figure C-2.4

GEO_SEA_WELL2_HOLDEN V:\WM&RD\HOLDEN\2008 FIELD SEASON\2-FIELD DATA COLLECTION\FIELD DATA\SOIL BORINGS\GINT BORING LOGS - HOLDEN 2008 RI FI.GPJ HOLDENMINE.GLB URSSEA3.GDT 11/5/08

Project: Holden Mine - 2008 Field Investigation
Project Location: Holden, Chelan County, Washington
Project Number: 33760997

Log of Boring DS-6DR

Sheet 2 of 3

Elevation feet	Depth, feet	SAMPLES Type	Number	Blows/ 6in.	Recovery, %	Graphic Log	USCS	MATERIAL DESCRIPTION	Well Completion Schematic	Percent Passing #200 Sieve	Moisture Content, %	Dry Density, (pcf)	REMARKS AND OTHER TESTS
	40						GM	Silty GRAVEL with sand and cobbles; gravel fine to coarse sub-angular; **dense**; wet; olive-brown; cobbles up to 6 inches, occasional boulders (Colluvium/Debris Flow Deposits)					
	45						GP	Sandy GRAVEL with silt; gravel sub-angular to sub-rounded, sand medium; **dense**; wet; olive-brown (Colluvium/Debris Flow Deposits)					
3100			5	50/3.5"	100					16.1			- In-situ permeability test at 47-57 ft. 27.5 ft of drawdown at 16.9 gpm. - HA, SA: 47.5 ft - Driller reports heaving conditions at 51 ft
	50						GM	Silty GRAVEL with sand and cobbles; gravel fine to coarse sub-angular; **dense**; wet; olive-brown; cobbles up to 6 inches, occasional boulders (Colluvium/Debris Flow Deposits)					
							GP	Sandy GRAVEL with silt; gravel sub-angular to sub-rounded, sand medium; **dense**; wet; olive-brown (Colluvium/Debris Flow Deposits)					
3090	55		6	50/3"	n/r								- Sample recovery not recorded
	60												
	65						GM	Silty GRAVEL with sand and cobbles; gravel sub-angular to sub-rounded; **medium dense to dense**; wet; dark grayish-brown (Colluvium/Debris Flow Deposits)					
3080			7	18 30 18 N=48	0								- No core recovery from 67 to 72 ft; Driller notes heaving conditions - In-situ permeability test at 68-78 ft. 10.6 ft of drawdown at 19.1 gpm.
	70						GP	Sandy GRAVEL with silt and cobbles; gravel sub-angular to sub-rounded, sand medium; **dense**; wet; olive-brown (Colluvium/Debris Flow Deposits)					
	75												
3070			8	8 39 50/4"	38					12.4			- Low core recovery from 78 to 88 ft - HA, SA: 78 ft
	80												
	85												

GEO_SEA_WELL2_HOLDEN V:\WM&RD\HOLDEN\2008 FIELD SEASON\2-FIELD DATA COLLECTION\FIELD DATA\SOIL BORINGS\GINT BORING LOGS - HOLDEN 2008 RI FI.GPJ HOLDENMINE.GLB URSSEA3.GDT 11/5/08

URS

Figure C-2.4

Project: Holden Mine - 2008 Field Investigation
Project Location: Holden, Chelan County, Washington
Project Number: 33760997

Log of Boring DS-6DR

Sheet 3 of 3

Elevation feet	Depth, feet	SAMPLES Type	SAMPLES Number	Blows/ 6in.	Recovery, %	Graphic Log	USCS	MATERIAL DESCRIPTION	Well Completion Schematic	Percent Passing #200 Sieve	Moisture Content, %	Dry Density, (pcf)	REMARKS AND OTHER TESTS
3060	90		9	1 2 30 N=32	33		GM	Silty GRAVEL with sand; gravel angular and rounded, sand fine to coarse; **medium dense?**; wet; olive-brown; occasional cobbles up to 6-inches (Glacial Drift)					- In-situ permeability test at 88-98 ft. 12.7 ft of drawdown at 18.4 gpm.
3050	100		10	15 50/4.5"	50		GP	Sandy GRAVEL with silt; gravel angular to rounded; **very dense**; wet; olive-gray; occasional cobbles (Glacial Drift)		13.5			- HA, SA: 98.5 ft
3040	105						ML	Gravelly SILT with sand and clay; gravel sub-angular to rounded; **hard?**; moist; gray (Glacial Till) - Becomes olive gray, mist to dry					
3030	115							Banded GNEISS (Bedrock)					
3020	130							Boring completed at 118 ft due to refusal.					

GEO_SEA_WELL2_HOLDEN V:\WM&RD\HOLDEN\2008 FIELD SEASON\2-FIELD DATA COLLECTION\FIELD DATA\SOIL BORINGS\GINT BORING LOGS - HOLDEN 2008 RI FI.GPJ HOLDENMINE.GLB URSSEA3.GDT 11/5/08

URS

Figure C-2.4

SOIL BORING / LITHOLOGY FORM

MWH

Project No: 10507002 Site ID: Holden Location ID: DS-12D

Drill Date: October 15, 2016 Field Geologist/Personnel: Joel Pierson

Drilling Company/Driller: Major/Larry Thoren

SOIL BORING

Total Boring Depth (feet): 65'

Depth Refusal: —

Borehole Diameter (inches): 8"

Borehole Angle Drilled: 90°

Borehole Azimuth *(degrees on compass)*: —

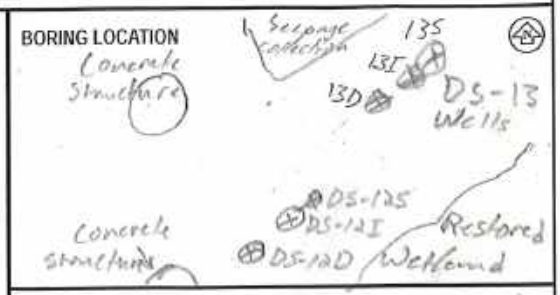
Cumulative Feet Drilled: —

Drill Method: Sonic

*C California Split Spoon Sampler (2.5" I.D.) c Cuttings

S Standard penetration test sampler ▼ Elevation of ground water

BORING LOCATION



LOCATION DESCRIPTION: Near seepage collection structure, South of DS-13 wells, adjacent to restored wetlands

DEPTH (FEET)	Grain Size: % Gravel	% Sand	% Fines	Max. PID Reading (ppm)	Blows (6 in.)	Sample Type	Sample Recovery	USCS/ASTM Classification	Graphic Log	LITHOLOGIC DESCRIPTION (USCS name; color; size and angularity of each component or plasticity; density; moisture content; additional facts)	ELEVATION (FEET)
0	95	5	0	-	-	-	4/10	GP		0'-2.5' Course gravel, poorly graded, angular to sub-angular clasts Gray N5 Very loose, very moist course gravel fill for pad — General Fill	3149.13
1											
2											
3	60	30	10	-	1	1		GW		2.5' well graded sandy gravel, sub rounded to angular clasts Brown 10YR5/3 to brownish yellow 10YR6/8 Medium dense, very moist, moderate; Cobble near 3.5'	
4										No recovery	
5											
6											
7											
8											
9											
10											3139

SOIL BORING / LITHOLOGY FORM *(Continued)*

MWH

Drill Date: October 15, 2016 Site ID: Holden Location ID: DS-120

DEPTH (FEET)	Grain Size: % Gravel	% Sand	% Fines	Max. PID Reading (ppm)	Blows/(6 in.)	Sample Type	Sample Recovery	USCS/ASTM Classification	Graphic Log	LITHOLOGIC DESCRIPTION (USCS name; color; size and angularity of each component or plasticity; density; moisture content; additional facts)	ELEVATION (FEET)
10	65	25	10	–	–	–	4.5/10	GW		Well-graded sandy gravel continues from 2.5'	3134
										Cobble at 10.5'	
11										Organic material roots from 11.0'-11.5'	
	60	35	5	–	–	–				11.5' Increased sand, decreased fines.	
12										Yellowish red 5YR 4/6 oxidation Alluvium	
										Mixture of granite, meta-granite, quartz, etc in gravels	
13											
14											
										No recovery	
15											
16											
17											
18											
19											
20	60	30	10	–	–	–	4.5/10	GW		Well-graded silty/sandy gravel continues from 2.5'	3129
										Wet Alluvium	
21											
22											
23											
24											
										No recovery	
25											
26											
27											
28											
29											
30											3119

SOIL BORING / LITHOLOGY FORM *(Continued)*

MWH

Drill Date: October 15, 2016 Site ID: Holden Location ID: DS-12D

DEPTH (FEET)	Grain Size: % Gravel	% Sand	% Fines	Max. PID Reading (ppm)	Blows/6 in.	Sample Type	Sample Recovery	USCS/ASTM Classification	Graphic Log	LITHOLOGIC DESCRIPTION (USCS name; color; size and angularity of each component or plasticity; density; moisture content; additional facts)	ELEVATION (FEET)
30	60	20	20	–	–	–	6.5/10	GW		Well-graded silty, sandy gravel continues from 2.5'	3119
31										Angular to sub angular clasts Alluvium	
32											
33											
34										Some oxidation in rock fractures	
35											
36											
37										No recovery	
38											
39											
40	60	15	25	–	–	–	4/10	GW		Well-graded silty, sandy gravel continues from 2.5'	3109
41											
42											
43											
44	50	20	30	–	–	–				Band of increased Fine weak to moderate; loose to medium dense	
45										No recovery	
46											
47											
48											
49											
50											3099

SOIL BORING / LITHOLOGY FORM *(Continued)*

MWH

Drill Date: October 15, 2016 Site ID: Holden Location ID: DS-12D

DEPTH (FEET)	Grain Size: % Gravel	% Sand	% Fines	Max. PID Reading (ppm)	Blows (6 in.)	Sample Type	Sample Recovery	USCS/ASTM Classification	Graphic Log	LITHOLOGIC DESCRIPTION (USCS name; color; size and angularity of each component or plasticity; density; moisture content; additional facts)	ELEVATION (FEET)
60	5	80	15	–	–	–	5/10	SM		50.0' Poorly-graded silty sand Light brown 10YR6/3 to brown 10YR5/3 Very loose, wet, weak; Angular to sub angular clasts	3099
51							1				
52	60	20	20	–	–	–		GW		51.5' Well-graded sandy gravel; Olive gray 5Y4/2; subrounded-angular Loose, very moist, weak	
	5	75	20	–	–	–		SM		52.0' Returns to wet silty sand from 50.0' to 51.5'	
53											
54											
55										No recovery	
56											
57											
58											
59											
60	60	20	20	–	–	–	4.5/5	GW		60.0' Well-graded silty, sandy gravel Light brown 10YR6/3 to brown 10YR5/3 Very loose, very moist to wet, weak	3089
61										Angular clasts	
62											
63										Some reddish brown 10R3/6 oxidation near 63' moist to very moist	
64											
65										TD at 65'	3084
66											
67											
68											
69											
70											

SOIL BORING / LITHOLOGY FORM

MWH

Project No: 10507002 Site ID: Hollow Baseline MN Location ID: DS-13D

Drill Date: October 9 2016 Field Geologist/Personnel: Roy Morlan

Drilling Company/Driller: Major Drilling / Larry Thoren

SOIL BORING

Total Boring Depth (feet): 110'

Depth Refusal: No Refusal

Borehole Diameter (inches): 8"

Borehole Angle Drilled: 0°

Borehole Azimuth *(degrees on compass)*: NA

Cumulative Feet Drilled: 110'

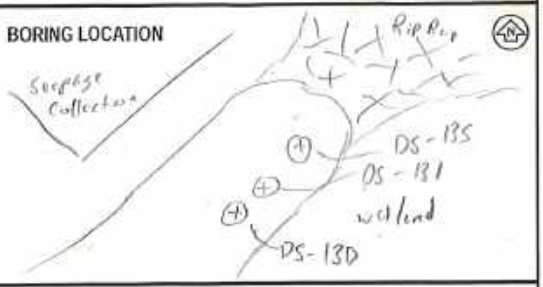
Drill Method: Sonic

Note. outer drill casing 8". Inner drill stem 6" Barrel Diameter 8"

*C California Split Spoon Sampler (2.5" I.D.) C Cuttings

S Standard penetration test sampler ▼ Elevation of ground water

BORING LOCATION



LOCATION DESCRIPTION Located at the toe of TP3 next to wetland area.

DEPTH (FEET)	Grain Size % Gravel	% Sand	% Fines	Max PID Reading (ppm)	Blows (6 in.)	Sample Type	Sample Recovery	USCS/ASTM Classification	Graphic Log	LITHOLOGIC DESCRIPTION (USCS name; color; size and angularity of each component or plasticity; density; moisture content; additional facts)	ELEVATION (FEET)
0	20	50	30	NA	NA	NA	2.75/60	SM		(0-3.2') Fill: well graded silty sand with gravel (50% sand 30% silt 20% gravel. Brown (10YR 2.5/2 7.5YR), loose, very moist, fine to medium grain sand, rounded to subrounded gravel up to 2" in diameter. No Recovery 2.75'-5'	
1											
2											
3											
4											
5	50	30	20	NA	NA	NA	2.1/5	GW		(5-7.1') Alluvium Sandy Gravel (>50% gravel, well graded range fine 0.1" to 3"). Brown (7.5YR 4/6), loose, wet. No recovery 7.1-10'	
6											
7											
8											
9											
10											

SOIL BORING / LITHOLOGY FORM *(Continued)*

MWH

Drill Date: October 9, 2016 Site ID: Holden Location ID: DS-130

DEPTH (FEET)	Grain Size: % Gravel	% Sand	% Fines	Max. PID Reading (ppm)	Blows (6 in.)	Sample Type	Sample Recovery	USCS/ASTM Classification	Graphic Log	LITHOLOGIC DESCRIPTION (USCS name; color; size and angularity of each component or plasticity; density; moisture content; additional facts)	ELEVATION (FEET)
10											
	20	50	30	NA	NA	NA	2.5/5	SM		(10 - 12.75) Over Black Silty sand with gravel, fine sand, fine gravel, some organic material present (roots, tree bark) wet, loose, Dark Brown to Black (2/1 10YR)	
11										Organic odor.	
12											
										No Recovery 12.75 - 15'	
13											
14											
15										cobbles	
	50	30	20	NA	NA	NA	2.5/5	GW		(15 - 17.5') Alluvium Sand, Gravelly, Fine to medium Sand, Gravel ranges from all - 3" Brown (4/6 10YR), wet, loose, gravel and cobbles are made of	
16										coarse grained granite, weathered, and fine grained meta granite.	
17										No Recovery 17.5' to 20'	
18											
19											
20											
	50	30	20	NA	NA	NA	5.5/10	GW		(20' - 25.5) same	
21											
22											
23											
24											
25										(24.8 - 25) Grades to grey brown (5/2 5Y)	
	50	20	30	NA	NA	NA	NA	GA		some clay present.	
26										(25.5 - 30) No Recovery	
27											
28											
29											
30											

SOIL BORING / LITHOLOGY FORM *(Continued)*

MWH

Drill Date: October 9, 2016 Site ID: Hilton Location ID: DS-13D

DEPTH (FEET)	Grain Size: % Gravel	Grain Size: % Sand	Grain Size: % Fines	Max. PID Reading (ppm)	Blows/(6 in.)	Sample Type	Sample Recovery	USCS/ASTM Classification	Graphic Log	LITHOLOGIC DESCRIPTION (USCS name; color; size and angularity of each component or plasticity; density; moisture content; additional facts)	ELEVATION (FEET)
30										(30-40) No Recovery	
31											
32											
33											
34											
35											
36											
37											
38											
39											
40										(40-50) No Recovery	
41											
42										Cuttings from elevation of 30' to 50'	
43										Majority glacial Moraine. Brown Grey (7/1 5YR), Sand, silt + Gravel, rounded gravel, highly disturbed sample.	
44											
45											
46											
47											
48											
49											
50											

SOIL BORING / LITHOLOGY FORM *(Continued)*

MWH

Drill Date: October 9, 2016 Site ID: H-18... Location ID: DS-13D

DEPTH (FEET)	Grain Size: % Gravel	% Sand	% Fines	Max. PID Reading (ppm)	Blows/(6 in.)	Sample Type	Sample Recovery	USCS/ASTM Classification	Graphic Log	LITHOLOGIC DESCRIPTION (USCS name; color; size and angularity of each component or plasticity; density; moisture content; additional facts)	ELEVATION (FEET)
50	40	40	20	NA	NA	NA	4.1/10	GM		(50-60) Glacial moraine, Well graded gravel w/ Cobbles and clay, dense, wet, round to sub angular clasts, 7.5 YR 6/1 grey-Brown, Cobbles ranging in size from 3" to 5"	
51										gravel and cobbles are mostly granite and metamorphic Fine grained, aphanitic rock	
52											
53											
54											
55										No Recovery 54.1 - 60	
56											
57											
58											
59											
60											
61	40	40	20	NA	NA	NA	1.5/10	GM		(60 - 63.2) Same	
62											
63											
64	20	20	60	NA	NA	NA	NA	mL		(63.2-64.5) Glacial Moraine, Very Stiff to hard 5.1Y 5/2 Sandy (Fines) Sandy gravel, moist, dense packed material, sub angular to round gravel, Low plasticity, tough Brown-Grey	
65								GW/GM/SM?		(2.5/2 5Y), Gravel mix of granite and meta-igneous rocks, some platey and flat, Foliated. This is likely a lense,	
66										No Recovery 64.5' - 70' Since there was no recovery below 64.5' Se is likely that material switched back to a coarser Moraine material (ie GW-GM-SM)	
67											
68											
69											
70											

SOIL BORING / LITHOLOGY FORM *(Continued)*

MWH

Drill Date: ~~DS-131~~ Oct. 10 Site ID: Holden Location ID: DS-131D

DEPTH (FEET)	Grain Size: % Gravel	% Sand	% Fines	Max. PID Reading (ppm)	Blows/6 in.	Sample Type	Sample Recovery	USCS/ASTM Classification	Graphic Log	LITHOLOGIC DESCRIPTION (USCS name; color; size and angularity of each component or plasticity; density; moisture content; additional facts)	ELEVATION (FEET)
70											
71	30%	60	10	NA	NA	NA	NA	GW		(70 - 73.8) Glacial Outwash Gravelly sand 60% coarse sand 30% gravel (1 to 3"), rounded to sub angular gravel, W, loose, 10% silt present (10%) gravel composed	
72							3.8/10	SW		of mostly granite and granodiorite, 60% coarse sand composed, granitic material (Quartz, Feldspars, mica)	
73										Very similar to material observed starting at an estimated 40'. However, larger sand grains and less silt.	
74										Similar sphreatic gravel and cobbles.	
75										No Recovery 73.8 - 80'	
76											
77											
78											
79											
80											
81	30	50	20 (@)	2.0			5.0/10	SW		(80-85') Glacial Outwash Coarse sand gravel and some cobbles and silt, moist to wet, Sand grains are composed of mix of quartz, Feldspar and mica, Gravel and cobbles are	
82								SW		round to sub angular and composed of a mix of granite and meta granite (foliated gneiss),	
83											
84											
85											
86										No Recovery (85-90)	
87											
88											
89											
90											

SOIL BORING / LITHOLOGY FORM *(Continued)*

MWH

Drill Date: October 11, 2016 Site ID: Holden Location ID: DS - 13D

DEPTH (FEET)	Grain Size: % Gravel	% Sand	% Fines	Max. PID Reading (ppm)	Blows/6 in.	Sample Type	Sample Recovery	USCS/ASTM Classification	Graphic Log	LITHOLOGIC DESCRIPTION (USCS name; color; size and angularity of each component or plasticity; density; moisture content; additional facts)	ELEVATION (FEET)
90											
91	/	/	/	NA	NA	NA	00/10	SW		No Recovery 90-100' Likely loose material (GM / GW / SW)	
92										Sand removed when cleaning the hole	
93											
94											
95											
96											
97											
98											
99											
100											
101	/	/	/	NA	NA	NA	18"/10'	SW		(100-101.5') Gravel and cobble sand likely mixed out during drilling, gravel size range from 1" to 7" composed of mainly granite & metamorphic, rounded to sub rounded. likely gravel and cobbles from a loose Saturated SW sand. Flowing sands encountered in	
102										No Recovery 101.5 to 110 feet	
103										this zone and sand was removed from the bottom of the casing while cleaning the hole.	
104											
105											
106											
107											
108											
109											
110										TD = 110	

Project: Holden Mine 2009 Field Program
Project Location: Holden, Chelan County, Washington
Project Number: 33760997

Log of Boring DS-4DD

Sheet 1 of 5

Date(s) Drilled	**5/30/09**	Logged By	**D. Coberley / B. Gray**	Checked By	**D. Coberley**
Drilling Method	**Sonic Coring w/o water**	Drill Bit Size/Type	**4" Barrel (straight bit), 6" Casing**	Total Depth of Borehole	**157 feet**
Drill Rig Type	**Tracked Sonic**	Drilling Contractor	**Boart Longyear, OR Div.**	Surface Elevation	**3147 feet**
Borehole Backfill	**Groundwater Monitoring Well Installed**	Sampling Method(s)	**Sonic core grab sample**	Hammer Data	**None**
Location	**Downstream of Tailings Pile 3, East of Well Cluster DS-6, Northing 436438, Easting 1658882**				

Elevation feet	Depth, feet	SAMPLES Type	SAMPLES Number	SAMPLES Blows/ 6in.	SAMPLES Recovery, %	Graphic Log	USCS	MATERIAL DESCRIPTION	Fines Content (%<#200 Sieve)	Dry Unit Weight, pcf	Moisture Content, %	REMARKS AND OTHER TESTS
	0						ML/ SM	SILT to sandy SILT, soft, dry to moist, dark brown, roots and small organic matter fragments throughout unit, occasional cobbles. (Alluvium)				
3145												
	5											
3140								- Gravel in silt matrix from 6.5 to 7 ft.				
							SP	Poorly-graded SAND with gravel, gravel fine to coarse angular to sub-angular, trace fines, loose, wet, olive-brown, occasional cobbles. (Alluvium)				3.8 ft of core recovery 0-7 ft, driller noted pushing of cobbles
	10											
3135							SP/ SM	Poorly-graded SAND with silt, sand fine to medium, silt non-plastic, loose, wet, olive-brown, occasional cobbles. (Alluvium)				
	15											
3130							GP/ GM	Poorly-graded sandy GRAVEL with silt, gravel fine to coarse sub-angular to sub-rounded, sand fine to coarse, loose to medium dense, wet, olive-brown, occasional cobbles. (Alluvium)				3.8 ft of core recovery 7-17 ft, driller noted pushing of cobbles
	20											
3125												
	25							26.5 ft ▼				Water level after lunch break 11:35 to 13:00 at 26.5 ft during time of drilling
3120							GP	Poorly-graded sandy GRAVEL, gravel fine to coarse sub-angular to sub-rounded, sand fine to coarse, loose to medium dense, wet, olive-brown, occasional cobbles. (Alluvium)				6 ft of core recovery 17-27 ft
							SP	Poorly-graded SAND, trace fine gravel, sand fine to medium, loose, wet, olive.				
	30											

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Figure B.2-11

Project: Holden Mine 2009 Field Program
Project Location: Holden, Chelan County, Washington
Project Number: 33760997

Log of Boring DS-4DD

Sheet 2 of 5

Elevation feet	Depth, feet	SAMPLES Type	SAMPLES Number	Blows/ 6in.	Recovery, %	Graphic Log	USCS	MATERIAL DESCRIPTION	Fines Content (%<#200 Sieve)	Dry Unit Weight, pcf	Moisture Content, %	REMARKS AND OTHER TESTS
	30							(Alluvium)				
								- Unit contact between 31.5 to 34 ft				
3115							GP	Poorly-graded GRAVEL with sand, gravel fine to coarse sub-angular, sand fine to coarse, trace to no fines, loose to medium dense, moist to wet, dark gray, occasional cobbles. (Alluvium)				
	35											
3110												4.8 ft of core recovery 27-37 ft
			#1						3.1		3	
	40											
3105								- Wet zone from 42 to 43 ft.				
	45							- Becomes moist to wet				
3100												5.5 ft of core recovery 37-47 ft
	50											
3095							GM	Silty GRAVEL, gravel fine to coarse sub-angular, silt non-plastic to low plasticity, dense, dry to moist, gray to greenish-gray. (Weathered glacial drift)				
	55							Boulder from 55 to 57 ft.				
3090							SM/ ML	Silty SAND to sandy SILT, sand fine to coarse, silt non-plastic to low plasticity, soft, wet. (Glacial outwash)				8.5 ft of core recovery 47-57 ft
	60						GM	Silty GRAVEL, gravel fine to coarse sub-angular, silt non-plastic to low plasticity, dense, dry to moist, gray to greenish-gray. (Glacial drift)				
3085												
	65											

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Figure B.2-12

Project: Holden Mine 2009 Field Program
Project Location: Holden, Chelan County, Washington
Project Number: 33760997

Log of Boring DS-4DD

Elevation feet	Depth, feet	SAMPLES Type	SAMPLES Number	Blows/ 6in.	Recovery, %	Graphic Log	USCS	MATERIAL DESCRIPTION	Fines Content (%<#200 Sieve)	Dry Unit Weight, pcf	Moisture Content, %	REMARKS AND OTHER TESTS
3080	65											10 ft of core recovery 57-67 ft
							GM	Silty GRAVEL with sand, gravel fine to coarse angular to sub-angular, sand fine to coarse, medium plasticity, medium dense, moist to wet, olive brown. (Glacial drift)				
	70							- Wet and loose zone from 70 to 75.5 ft				
3075												
	75							- Grades to decreasing sand, becomes moist				
3070								- Weathered plutonic rock clast at 78 ft (can be broken by hand) - Grades to increasing sand content, becomes loose and wet from 78.5 to 80 ft				
	80							- Grades decreasing sand content, becomes moist and dense				
3065			#2						18.5		9	
	85							- 6 in. thick fine sand interbed at 85.5 ft				
3060							SP	Poorly-graded SAND, sand fine, loose to medium dense, wet, dark grayish-brown (Glacial outwash)				10 ft of core recovery 77-87 ft
	90											
3055												
	95						GP/ GM	Poorly-graded GRAVEL with silt and sand, gravel fine to coarse angular to rounded, sand fine to coarse, medium dense to dense, moist to wet, dark grayish brown to olive-gray. (Glacial drift)				
3050								- No core recovery from 97 to 99 ft				4.5 ft of core recovery 97-107 ft
	100											

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Figure B.2-13

Project: Holden Mine 2009 Field Program
Project Location: Holden, Chelan County, Washington
Project Number: 33760997

Log of Boring DS-4DD

Elevation feet	Depth, feet	SAMPLES Type	SAMPLES Number	Blows/ 6in.	Recovery, %	Graphic Log	USCS	MATERIAL DESCRIPTION	Fines Content (%<#200 Sieve)	Dry Unit Weight, pcf	Moisture Content, %	REMARKS AND OTHER TESTS
3045	100							- No core recovery from 102 to 105 ft, pushed cobble in coring bit				
	105											
3040								- No core recovery from 107 to 111 ft, pushed cobble in coring bit				3.5 ft of core recovery 107-117 ft
	110											
3035												
	115											
3030							SP/ SM	Poorly-graded SAND with silt and gravel, gravel fine scattered coarse sub-rounded to sub-angular, sand fine to coarse, medium dense, wet, olive-gray. (Glacial outwash) - Gravel zone from 118.5 to 119 ft				9.5 ft of core recovery 117-127 ft Heaving during casing advance to 127 ft, 9ft of heave material in cleanout run
	120											
3025								- Grain size decreases in size from 122.5 to 125.5 ft				
	125		#3						8.2		11	
3020							SP	Poorly-graded SAND, sand fine, trace fines, soft to medium dense, wet. (Glacial outwash)				
							SP	Poorly-graded SAND, sand fine to coarse, trace fines, medium dense, wet, occasional fine and coarse gravel in unit. (Glacial outwash)				8 ft of core recovery 117-127 ft
	130							- Finer sand zones at 131 and 132.5 to 133 ft				
3015												
	135						GM	Silty GRAVEL, gravel fine to coarse angular, dense, moist. (Glacial till)				

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Figure B.2-14

Project: Holden Mine 2009 Field Program
Project Location: Holden, Chelan County, Washington
Project Number: 33760997

Log of Boring DS-4DD

Sheet 5 of 5

Elevation feet	Depth, feet	SAMPLES Type	SAMPLES Number	Blows/ 6in.	Recovery, %	Graphic Log	USCS	MATERIAL DESCRIPTION	Fines Content (%<#200 Sieve)	Dry Unit Weight, pcf	Moisture Content, %	REMARKS AND OTHER TESTS
3010	140							- Becomes mixed glacial till and fractured highly weathered bedrock				
3005	145							Dark, fine crystalline, igneous or high-grade metamorphic, highly fractured. (Bedrock) - Most of the core retained from 141 to 147 ft is mechanically fractured to size from 4 to 6 in.				Bedrock at 141 ft depth
3000	150							- Core pieces 6 to 12 from 147 to 157 ft				
2995	155											
2990	160							**Boring completed at 157 ft depth in bedrock on 5/30/2009. Groundwater monitoring well installed, see well construction log.**				
2985	165											
2980	170											

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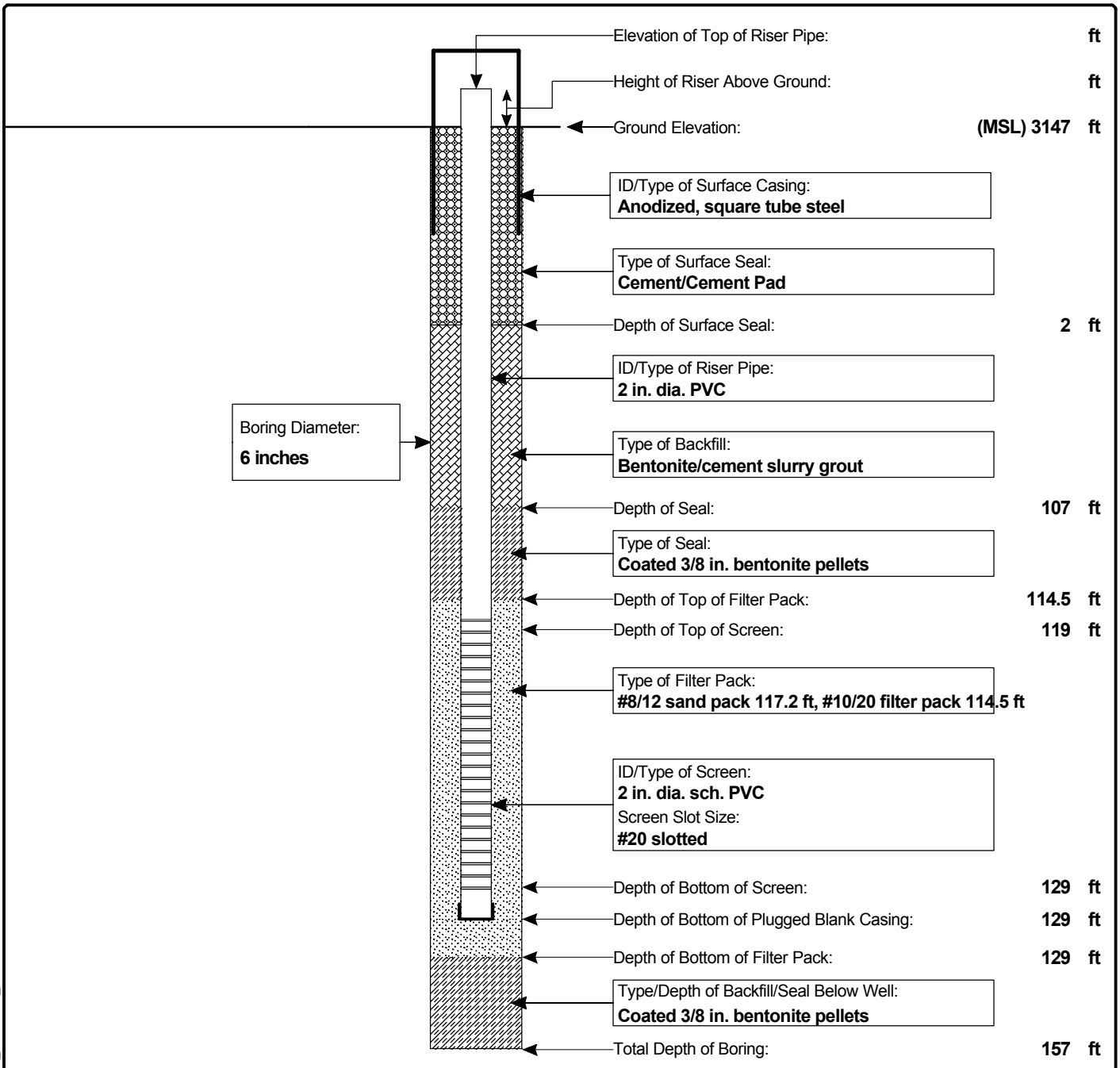
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Figure B.2-15

Project: Holden Mine 2009 Field Program
Project Location: Holden, Chelan County, Washington
Project Number: 33760997

MONITORING WELL CONSTRUCTION LOG FOR WELL DS-4DD

Well Location	**Downstream of Tailings Pile 3, East of Well Cluster DS-6, Northing 436438, Easting 1658882**		Date(s) Installed	**5/31/2009**	Time
Installed By	**Boart Longyear**	Observed By	**B. Gray**	Total Depth	**157 feet**
Method of Installation	**In-hole**				
Screened Interval	**119 to 129 ft**	Completion Zone	**129 to 114.5 ft**		
Remarks					



NOTE: DIAGRAM IS NOT TO SCALE

Figure B.2-16

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GWM_WELL_ABOVE_GROUND_HOLDEN Z:\2009 FIELD SEASON\FIELD DATA\GINT\TEST PIT AND BORING LOGS - HOLDEN 2009 FIELD SEASON 2009-12-22.GPJ HOLDENMINE.GLB URSSEA3B.GDT 1/12/10

Project: Holden Mine 2009 Field Program
Project Location: Holden, Chelan County, Washington
Project Number: 33760997

Log of Boring DS-9D

Sheet 1 of 4

Date(s) Drilled	**5/27/2009**	Logged By	**D. Coberley / B. Gray**	Checked By	**D. Coberley**
Drilling Method	**Sonic Coring w/o water**	Drill Bit Size/Type	**4" Barrel (straight bit), 6" Casing**	Total Depth of Borehole	**118 feet**
Drill Rig Type	**Tracked Sonic**	Drilling Contractor	**Boart Longyear, OR Div.**	Surface Elevation	**3134 feet**
Borehole Backfill	**Groundwater Monitoring Well Installed**	Sampling Method(s)	**Sonic core grab sample**	Hammer Data	**None**
Location	**Downstream of Tailings Pile 3, East of Well Cluster DS-4, Northing 436364, Easting 1659359**				

Elevation feet	Depth, feet	SAMPLES Type	SAMPLES Number	SAMPLES Blows/ 6in.	SAMPLES Recovery, %	Graphic Log	USCS	MATERIAL DESCRIPTION	Fines Content (%<#200 Sieve)	Dry Unit Weight, pcf	Moisture Content, %	REMARKS AND OTHER TESTS
	0						PT	Forest duff.				
							GP	Poorly-graded GRAVEL, gravel fine sub-rounded to sub-angular, loose to medium dense, dry to moist. (Alluvium)				
3130	5						ML/ SM	Sandy SILT to silty SAND, sand fine, silt low to medium plasticity, soft, dry to moist, occasional roots. (Alluvium)				
3125	10						GP	Poorly-graded GRAVEL with sand, gravel fine sub-angular to sub-rounded, sand medium to coarse, loose to medium dense, wet, dark yellowish-brown. (Alluvium) 10 ft ▼				Ground water at time of drilling at 10 ft depth
							SM	Silty SAND, sand fine, silt low to medium plasticity, soft, moist, olive-brown. (Alluvium)				Driller noted cobble at 11 ft
3120	15							- Becomes low plasticity at 13.5 ft				
							GP	Poorly-graded GRAVEL with sand, gravel fine subangular to subrounded, sand fine to coarse, loose to medium dense, moist to wet, dark grayish-brown. (Alluvium)				
3115								- Coarse gravel zone from 17.5 to 18 ft, color changes to olive gray				Driller noted moderate heaving at 18 ft
	20											Hole caved from 27 to 20 ft
3110	25							- Becomes coarse gravelly from 26 to 28 ft				Driller noted cobble or possible boulder at 26 ft, 4 ft of core loss from 17 to 27 ft
3105	30							- Grades to no coarse gravel at 28 ft, grades to increasing sand content				Hole caved at 28 ft depth

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Figure B.2-18

Project: Holden Mine 2009 Field Program
Project Location: Holden, Chelan County, Washington
Project Number: 33760997

Log of Boring DS-9D

Sheet 2 of 4

Elevation feet	Depth, feet	SAMPLES Type	SAMPLES Number	SAMPLES Blows/ 6in.	SAMPLES Recovery, %	Graphic Log	USCS	MATERIAL DESCRIPTION	Fines Content (%<#200 Sieve)	Dry Unit Weight, pcf	Moisture Content, %	REMARKS AND OTHER TESTS
	30											
3100												
	35											
3095												4 ft of core recovery 28-38 ft
	40							- Wet zone from 39 to 40 ft - Grades to dark olive gray				
			#1						3.6		3	
3090												
	45							- Becomes moist to dry, increasing fines content from 44 to 47.5 ft				
3085								- Increasing gravel size at 48.5 to 50.5 feet, becomes wet				6 ft of core recovery 38-48 ft
	50											
3080												
	55						GM	Silty GRAVEL with sand, gravel fine sub-angular, sand fine to coarse, fines medium plasticity, loose, wet, dark gray. (Alluvium)				
3075							GP	Poorly-graded GRAVEL with sand, gravel fine to coarse, sub-angular to sub rounded, sand medium to coarse, moist to wet, dark gray. (Alluvium)				8 ft of core recovery 48-58 ft
	60											
							GM	Silty GRAVEL with sand, gravel fine sub-angular, sand fine to coarse, loose, wet, dark gray. (Alluvium)				
3070							GP	Poorly-graded sandy GRAVEL, gravel fine with occasional coarse sub-rounded to sub-angular, sand medium to coarse, medium dense, moist to wet, brown. (Alluvium)				
	65											

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Figure B.2-19

Project: Holden Mine 2009 Field Program
Project Location: Holden, Chelan County, Washington
Project Number: 33760997

Log of Boring DS-9D

Elevation feet	Depth, feet	SAMPLES Type	SAMPLES Number	Blows/ 6in.	Recovery, %	Graphic Log	USCS	MATERIAL DESCRIPTION	Fines Content (%<#200 Sieve)	Dry Unit Weight, pcf	Moisture Content, %	REMARKS AND OTHER TESTS
	65						GP/ GM	Poorly-graded GRAVEL with silt and sand, gravel fine with occasional coarse sub-rounded to sub-angular, sand medium to coarse, medium dense, moist to wet, brown. (Alluvium)				
3065												7.5 ft of core recovery 58-68 ft
	70						SM	Silty SAND with gravel, gravel fine, sand fine to coarse, fines low to medium plasticity, loose, wet, dark grayish-brown. (Alluvium)				
3060												
	75						GM	Silty GRAVEL with sand, gravel fine subangular to angular, fines low to medium plasticity, medium dense, moist, dark grayish-brown, some gravel pieces frriable. (Glacial drift)				
3055							GP/ GM	Poorly-graded GRAVEL with silt and sand, gravel fine with occasional coarse angular to sub-angular, sand fine to coarse, loose, wet. (Glacial drift)				6 ft of core recovery 68-78 ft
	80											
3050							GP	Poorly-graded GRAVEL with sand, gravel fine subangular, sand fine to coarse, trace fines, medium dense, moist, dark olive-gray. (Glacial outwash)				
	85		#2						3.2		5	
3045												9 ft of core recovery 78-88 ft Hole bailed of water to 60 ft, quickly recovered to 15 ft
	90											
			#3				SP	Poorly-graded SAND with gravel, sand fine, loose to medium dense, wet, very dark grayish-brown. (Glacial outwash) - Grades to medium sand from 92 to 95 ft	2.4		9	
3040												
	95							- Grades to fine sand from 95 to 98 ft				
3035							GM	Silty GRAVEL, gravel fine, angular to sub-angular, loose to medium dense, wet. (Weathered glacial till)				6 ft of core recovery 88-98 ft Hole heaved to 85 ft
	100											

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Figure B.2-20

Project: Holden Mine 2009 Field Program
Project Location: Holden, Chelan County, Washington
Project Number: 33760997

Log of Boring DS-9D

Sheet 4 of 4

Elevation feet	Depth, feet	SAMPLES Type	SAMPLES Number	Blows/ 6in.	Recovery, %	Graphic Log	USCS	MATERIAL DESCRIPTION	Fines Content (%<#200 Sieve)	Dry Unit Weight, pcf	Moisture Content, %	REMARKS AND OTHER TESTS
							GM	Silty GRAVEL, gravel fine, angular to sub-angular, dense, dry. (Glacial till)				Moisture content understated due to heat of drilling.
3030	105							(Plutonic bedrock)				Bedrock contact at 103 ft depth
3025	110											
3020	115											
3015	120							**Boring completed at 118 ft depth in bedrock on 5/27/2009. Groundwater monitoring well installed, see well construction log.**				
3010	125											
3005	130											
3000	135											

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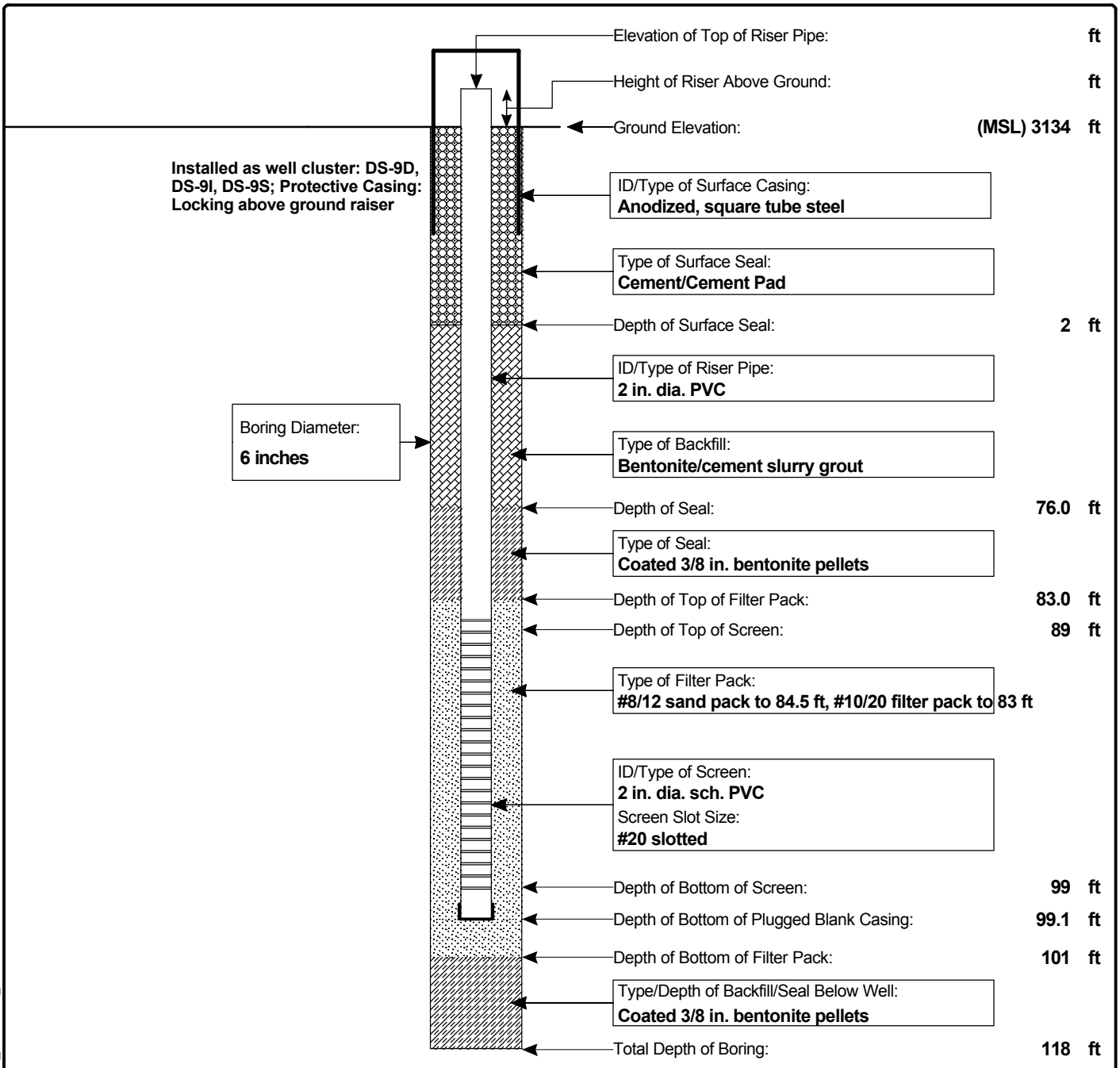
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Figure B.2-21

Project: Holden Mine 2009 Field Program
Project Location: Holden, Chelan County, Washington
Project Number: 33760997

MONITORING WELL CONSTRUCTION LOG FOR WELL DS-9D

Well Location	**Downstream of Tailings Pile 3, East of Well Cluster DS-4, Northing 436364, Easting 1659359**		Date(s) Installed	**5/28/2009**	Time
Installed By	**Boart Longyear**	Observed By	**D. Coberley**	Total Depth	**118 feet**
Method of Installation	**In-hole**				
Screened Interval	**89 to 99 ft**	Completion Zone	**83 to 101 ft**		
Remarks					



NOTE: DIAGRAM IS NOT TO SCALE

Figure B.2-22

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GWM_WELL_ABOVE_GROUND_HOLDEN Z:\2009 FIELD SEASON\FIELD DATA\GINT\TEST PIT AND BORING LOGS - HOLDEN 2009 FIELD SEASON 2009-12-22.GPJ HOLDENMINE.GLB URSSEA3B.GDT 1/12/10

Holden Mine Site

Performance Standards Verification
2020 Annual Compliance Assessment Report

Appendix M
Statistical Analysis Technical Memorandum

DRAFT

2020 ANNUAL COMPLIANCE ASSESSMENT REPORT
STATISTICAL EVALUATION
HOLDEN MINE

January 2021

2020ANNUAL COMPLIANCE ASSESSMENT REPORT
STATISTICAL EVALUATION
HOLDEN MINE

Prepared for:

Floyd | Snider
Two Union Square
601 Union Street, Suite 600
Seattle, WA 98101
(206) 292-2078
floydsnider.com

Prepared by:

Pacific Groundwater Group
2377 Eastlake Avenue East, Suite 200
Seattle, Washington 98102
206.329.0141
www.pgwg.com

January 11, 2021
JS1904
Statistical Assessment Report 2020.docx

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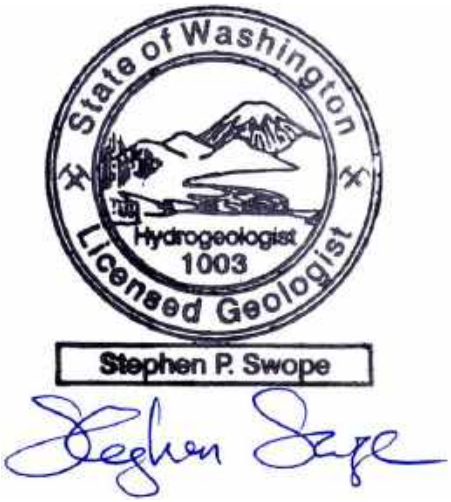
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SIGNATURE

This report, and Pacific Groundwater Group's work contributing to this report, were reviewed by the undersigned and approved for release.



Stephen Swope
Principal Hydrogeologist
Washington State Hydrogeologist No. 1003

1.0 INTRODUCTION

This report summarizes statistical analyses performed by PGG for the 2020 Annual Compliance Assessment Report. The statistical analyses are consistent with the plan presented in Section 4.4 of the Performance Standards Verification Plan (PVSP)(FS 2020). Specific methods used are consistent with the EPA guidance document "Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities, Unified Guidance, EPA, March 2009" (Unified Guidance).

Statistical analyses are conducted to evaluate plume stability and to compare groundwater plume concentrations to background. Additional data analysis and processing is performed in support of the core analyses to ensure that statistical significance is evaluated consistently within the project and conducted consistent with EPA guidance. Additional data analysis steps were taken to assess normality, seasonality, potential for false positives, and handling of non-detect results.

1.1 STATISTICAL SIGNIFICANCE IN THIS REPORT

Statistical significance is a measure of how likely a result is due to a hypothesized factor as opposed to being due to background variability in the dataset. P-values are used to evaluate whether a test is significant or not. Generally, a p-value of less than 0.05 is considered significant. However, the probability of identifying at least one significant result due to chance increases as more hypotheses are tested. As the number of tests increase, the number of tests found significant based on statistical variation alone will approach five percent. Since the number of tests was very large for this report, the p-values were corrected for the number of comparisons.

The Bonferroni correction is used to reduce the chances of obtaining false-positive results (type I errors) when multiple pair wise tests are performed on a single set of data. To perform a Bonferroni correction, the p-values were divided by the number of comparisons being made. In this case, 15 hypotheses are being tested, so the new critical p-value is $\alpha/15$. The statistical power of the study is then calculated based on this modified p-value.

The Bonferroni correction was applied to statistical tests for trend and comparison to background (Sections 2.5 and 3.6). The Bonferroni correction was not applied to assumption tests such as seasonality, stationarity, and normality.

2.0 PLUME STABILITY

The PVSP stipulates trend analysis to evaluate whether groundwater concentrations have stabilized. Selected analytes include the six constituents of concern (COCs): aluminum, cadmium, copper, iron, lead, and zinc. PGG performed statistical analysis on wells Floyd|Snider identified as representative of plume conditions.

2.1 TREATMENT OF NON-DETECTS

The Unified Guidance (Unified Guidance, 6.3.4) (EPA 2009) recommends the treating of non-detect values as follows:

- 0-15 percent non-detect: Simple substitution with half the reporting limit is permissible.
- 15-50 percent non-detect: Use censored estimation techniques like Kaplan-Meier or Robust Regression on Ordered Statistic (ROS).
- 50-100 percent non-detects: Use non-parametric methods.

Table 1 presents the percentage of non-detects for data sets with three or more analyses, where a data set is selected by common constituent, location, and season. Most constituent data sets fall in the first or third category (0-15 and 50-100 percent non-detects). Of the 388 data sets, only 81 (21 percent) fall in the 15-50 percent non-detect range, where Kaplan-Meier or ROS is recommended. Because of the low number of data sets requiring these methods, Kaplan-Meier and ROS were not applied and non-parametric methods were used with all data sets.

Non-detect values were replaced with half the method reporting limit for plotting, outlier testing, and normality testing for all constituent/well combinations. However, non-detect values were replaced with zero for all trend analyses because the variability in method reporting limits may result in false trends during trend testing.

2.2 OUTLIER REMOVAL

A statistical outlier is an observation that is numerically distant from and inconsistent with the rest of the data. Outliers sometimes result from typographical errors, inconsistent sampling and/or analytical methods such as turbidity or instrument calibration, a contaminant release, or a true but extreme background measurement (Unified Guidance, 6.3.3; EPA 2009). It is important to identify outliers and remove those associated with data collection errors or inconsistencies before conducting further analyses because these outliers can bias the determination of trends and normality. Outliers remain in the dataset if there is no technically compelling basis for removal.

Box plots were used to assess potential outliers in total metals data, shown in Figures[1] 1 through 36. Potential outliers were defined as results that were 1.5 times the interquartile range. No outliers were removed from the data set because a reasonable explanation could not be discerned for the elevated results. Non-parametric statistical methods will mitigate the effects of highly elevated outliers. Time series plots are also presented for comparison in Figures 37-72.

[1] Figures are divided into sets of station locations to allow data to fit on plots legibly.

2.3 DATA DISTRIBUTION

The data distribution refers to whether the data follow a normal (bell-shaped) distribution or other distribution that may be transformed to follow a normal distribution. The most common transformation for groundwater data is generally lognormal. The following procedure was used on selected constituents to evaluate data distribution:

- If the detection frequency was below 50 percent (Unified Guidance, p.6-36), or if the sample size was less than 8 (Unified Guidance, p. 10-5) normality testing was not performed and a non-parametric method was used for statistical evaluation.
- All other constituent/well combinations were tested for normality using the Shapiro-Wilk test as recommended by the Unified Guidance (p.10-13). Combinations with a p-value of less than 0.05 were rejected and not considered normally distributed. Those combinations that were not rejected as normal ($p>0.05$), were considered normal.
- All combinations rejected as normal were also log transformed and tested. Those combinations that were not rejected as log-normal ($p>0.05$), were considered log-normal.
- All combinations that were rejected as normal or log-normal were considered non-parametric.

Table 1 presents the results of the analysis for all constituent/well/season grouped datasets with more than 3 detections. Analyses were performed on all constituent/well/season combinations in anticipation of seasonality analysis below. In Table 1, W is the Shapiro-Wilk statistic and p is the resulting test significance. The null hypothesis of data normality was tested at the 0.05 level of significance. Therefore, any combinations with p values less than 0.05 were rejected as normal.

Of the 388 constituent/well/season combinations tested, 92 (23 percent) were considered non-parametric because they either had a detection rate below 50 percent or because they did not fit a normal or log-normal distribution. Although this percentage is low, non-parametric methods were used for further analysis to compensate for problems presented by comparing seasons with different distributions. Non-parametric methods also reduce the impact of single, extreme outliers. This use of non-parametric methods does not weaken the power of the statistical tests and is consistent with the Unified Guidance.

2.4 SEASONALITY

The large spring freshet has a significant impact on local hydrogeology, so the water quality data were evaluated for potential seasonality between spring and fall event sets. Water quality data from May and June were compared to data collected in September and October to assess any significant differences. Comparisons were made for data sets for which there were three or more results per season. Data collected during summer months of July and August were not included under the assumption that the spring/fall data would provide a stronger signal and because data has not been consistently collected during the summer months.

The Mann-Whitney test, a non-parametric equivalent of the t-test, was selected to evaluate whether spring versus fall data sets were significantly different. The null hypothesis, that no difference exists in the concentration of a constituent between spring and fall events, was applied with a 0.05 level of significance (p-level) on each of the comparisons. The hypothesis was rejected when the p-level was less than 0.05. A rejection of the null hypothesis is interpreted as indicating that there is a difference between the fall and spring concentrations.

Of the 153 comparisons with the Mann-Whitney test, 14 rejected the null hypothesis resulting in a rejection rate of about 10% (Table 2). This rate suggests a slight possible seasonal effect. However, if the metals concentration exhibited seasonality, one season should present a consistently higher concentration. In Table 2, the highest average concentration between spring and fall data was shaded for each data set showing a significant difference ($p<0.05$). Seasonality was observed at:

- SG-10-PW-6 and SG-10-PW-12, with higher concentrations occurring in the fall data sets and lower concentrations in the spring events.
- NRC-3-IR with higher concentrations occurring in the spring events and lower concentrations in the fall events.

Consistently high concentrations by season were not observed at other locations where the null hypothesis was rejected, indicating a general lack of seasonality.

The rejection rate was evaluated at other p values (0.1 and 0.2). While the rejection rates were slightly elevated (16% and 26%), they are not indicative of widespread seasonality.

The Mann-Whitney seasonality results do not indicate a systematic significant seasonality in the data set with the exception of changes noted above for SG-10-PW-6, SG-10-PW-12, and NRC-3I. Therefore, except for the stations noted above, spring and fall data can be combined for the trend analyses discussed in Section 2.5.

2.5 TREND ANALYSIS

The non-parametric Mann Kendall test for trend was used to evaluate concentration trends in the total metals plume. The Mann-Kendall statistic (tau) is computed by examining all possible pairs of measurements in the data set and scoring each pair as follows. An earlier measurement lower in magnitude than a later one is assigned a value of +1. If an earlier value is greater in magnitude than a later sample, it is scored as –1; two identical measurement values are assigned a value of 0. After scoring each pair in this way and adding up the total to get the Mann-Kendall statistic (tau), a positive value of tau implies that a majority of the differences between earlier and later measurements are positive, suggestive of an upward trend over time.

The Mann-Kendall test for trend was performed on all constituent-well combinations for which there are 8 or more analyses. Table 3 presents the results of the Mann-Kendall test for data sets that did not display seasonality. A total of 146 data sets had 8 or more analyses and were tested. Using the Bonferroni adjustment, none of the trends were statistically significant, suggesting that concentrations are stable within the resolution of the data sets.

Table 3a presents the results of the Mann-Kendall test for data sets that did display seasonality. A total of 24 tests were performed. Using the Bonferroni adjustment, two trends were statistically significant: total cadmium and copper in SG-10-PW-6 show increasing trends using fall data only. There was no trend for these constituent/well combinations in the spring.

The spatial variability of trends was evaluated but none was found. The three methods attempted included: mapping values of tau, mapping values of p, and mapping tau for $p<0.2$.

3.0 COMPARISON TO BACKGROUND CONCENTRATIONS

Site groundwater results were evaluated to determine whether COC concentrations are statistically different from background groundwater concentrations. Groundwater sampling has been conducted semiannually for a minimum of 4 years, providing four spring and fall samples at each location to test the null hypotheses that the concentration of each COC at each well location is not significantly different than background.

- Background groundwater wells stipulated in the Performance Standards Verification Plan (Floyd|Snider 2020) include: US-1S, US-1I, US-1D, HBKG-2, HV-3, and NRC-5.
- The background data set for this analysis also includes porewater samples RC-6-PW-6, RC-6-PW-12, and RC-6-WP-36, and wetlands surface water sample, SW-US-1 as stipulated in the PVSP Table 4.2.

3.1 TREATMENT OF NON-DETECTS

Table 4 presents the percentage of non-detects for data sets with greater than three detections per constituent, location, and season combination. Most constituent data sets fall in the first or third category. Of the 447 data sets, only 98 (22 percent) fall in the 15-50 percent non-detect range, where Kaplan-Meier or ROS is recommended. Because of the low number of data sets requiring these methods, Kaplan-Meier and ROS were not applied and non-parametric methods were used with all data sets.

Non-detect values were replaced with half the method reporting limit for plotting, outlier testing, and normality testing for all constituent/well combinations. However, the variability in method reporting limits may result in false trends during trend testing. Therefore, non-detect values were replaced with zero for all trend analyses.

3.2 REMOVAL OF OUTLIERS

In comparison of upgradient and downgradient datasets, removal of outliers in the upgradient data set is more important because a single high value can result in multiple false negative results in downgradient comparisons. However, as discussed above, use of non-parametric methods greatly reduces the impact of a small number of outliers.

Figures 31 through 36 present box plots of the upgradient data set (HBKG-2, HV-3, NRC-5D US-1D, US-1I, US-1S, RC-6-PW-6, RC-6-PW-12, RC-6-WP-36, and SW-US-1). A number of elevated values were identified including total aluminum, copper, lead, and iron in wells in monitoring wells RC-6-PW-12 and RC-6-WP-36. These were removed as a degree of conservatism while downgradient outliers were not removed.

3.3 UPGRADIENT DATA STATIONARITY

Stationarity is the lack of trend in data over time and space. Stationarity is a requirement for many statistical methods used to compare populations. Comparison tests should not be used if a well/parameter combination is found to have a sufficient trend.

Stationarity over time was evaluated using time series plots presented in Figures 37-72. Total aluminum, copper, and iron show decreasing trends over time, although both stabilize by 2014. These initial elevated concentrations may be due to issues relating to well installation, therefore only data after 2014 has been used. Total zinc in RC-6-PW-6 indicated an increasing trend over time and was removed from the background dataset.

3.4 DATA DISTRIBUTION

Data sets grouped by constituent, well, and season with three or greater detections were evaluated for distribution using the Shapiro Wilk test. Of the 447 constituent/well combinations tested in Table 4, 119 (27 percent) were considered non-parametric, either because they had a detection rate below 50 percent or because they did not fit a normal or log-normal distribution. Therefore, non-parametric methods were used, consistent with the plume stability analysis.

3.5 SEASONALITY

As with the plume stability analysis, the Mann-Whitney test was selected to evaluate whether spring versus fall data sets were significantly different. The null hypothesis, th at no difference exists in the concentration of a given constituent between spring and fall events, was applied with a 0.05 level of significance (p-level) on each of the comparisons. The hypothesis was rejected when the p-level was less than 0.05.

The Mann-Whitney seasonality results in Table 5 indicate 11 rejections of the null hypothesis out of 158 comparisons. However, if seasonality were present the season with higher concentrations should be consistent. For eight of the 11 significant comparisons, fall values were higher; for the remaining three, spring values are higher. Therefore, spring and fall data can be combined for trend analysis, as was the case for the downgradient well data.

3.6 COMPARISON TO BACKGROUND

Individual well/constituent combinations in the downgradient data set were compared to pooled upgradient data[2]. Data from the upgradient data set for the same constituent was pooled to provide a larger data set that is more representative of upgradient conditions. Downgradient data were not pooled because that approach can obscure wells with high concentrations if there are many low concentration wells. The null hypothesis that no difference exists between the upgradient and downgradient data sets was tested at the 0.05 level of significance using Bonferroni-corrected p-values.

Data were divided into groundwater (monitoring well and well point) and pore water data. Wetlands surface water was also evaluated but had insufficient background data to perform the analysis. Results include:

- For the groundwater dataset (Table 6), the null hypothesis was rejected for 61 of the 210 comparisons performed, suggesting down-gradient concentrations are significantly different.
- For the porewater dataset (Table 7), the null hypothesis was rejected for 21 of the 88 comparisons performed, suggesting downgradient concentrations are also significantly different.

4.0 RECOMMENDATIONS

This section includes recommendations for statistical analyses to be conducted in the 2021 ACAR report. Key recommendations include:

- Evaluate trends with respect to travel times.
- Continue evaluation of seasonality in datasets as the data set grows and resolving power increases. The larger data set available for the 2020 analysis was able to resolve seasonality at three locations that were not identified in the 2019 evaluation.
- Consider reevaluating statistical analyses to address specific questions raised by the conceptual model over the next year. For example, the Bonferroni correction was dropped for assumption tests.

5.0 REFERENCES

Floyd|Snider, 2020. Performance Standards Verification Plan.

USEPA. March 2009. Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities, Unified Guidance.

[2] This method was used for screening purposes to evaluate whether downgradient wells showed higher concentrations. Upgradient locations were not screened to confirm they geochemical similarity and it is unlikely they are. Since a large number of locations still fail using this pooled test, it is not necessary to refine the background dataset.

Table 1. Plume Stability Detection Rate and Normality Assessment

Holden 2020 ACAR Statistical Assessment

Well	Season	Number of Analyses	Number of Non-Detects	Non-Detect Rate	Non-Detect Range	Mean	ln(mean)	Stdev	ln(stdev)	W Statistic	p	ln(W) Statistic	ln(p)	Normality*
Aluminum, Total ug/L														
DS-6I/12I	F	5	0	1.00	0-15%	108.338	1.343	149.044	3.887	0.733	0.021	0.720	0.015	Ln
DS-6I/12I	S	5	0	1.00	0-15%	50.274	1.590	67.365	3.219	0.712	0.013	0.890	0.358	NP
DS-7D/13D	F	9	1	0.89	0-15%	68.071	1.874	94.242	3.594	0.777	0.011	0.861	0.099	NP
DS-7D/13D	S	8	4	0.50	50-100%	35.173	1.754	42.490	3.125	0.839	0.074	0.819	0.046	N
DS-7S/13S	F	9	0	1.00	0-15%	1963.657	6.064	2419.446	2.615	0.760	0.007	0.840	0.058	NP
DS-7S/13S	S	15	0	1.00	0-15%	1184.399	5.783	1677.319	2.369	0.672	0.000	0.816	0.006	Ln
DS-3D	F	10	0	1.00	0-15%	50.893	2.277	56.903	3.469	0.784	0.009	0.689	0.001	Ln
DS-3D	S	9	2	0.78	15-50%	27.111	2.595	16.932	2.164	0.947	0.660	0.609	0.000	N
DS-3S	F	9	3	0.67	15-50%	14.757	1.375	15.740	2.606	0.843	0.062	0.781	0.012	N
DS-3S	S	9	6	0.33	50-100%	29.622	2.374	24.278	2.320	0.702	0.001	0.729	0.003	NP-Nd
DS-4D	F	10	0	1.00	0-15%	104.293	2.486	93.659	3.917	0.918	0.338	0.684	0.001	N
DS-4D	S	8	0	1.00	0-15%	76.016	3.345	49.538	2.857	0.955	0.760	0.589	0.000	N
DS-4DD	F	10	4	0.60	15-50%	238.840	3.336	307.015	3.585	0.742	0.003	0.795	0.013	Ln
DS-4DD	S	9	2	0.78	15-50%	228.194	3.648	301.792	2.978	0.717	0.002	0.854	0.083	NP
DS-4I	F	4	0	1.00	0-15%	2922.920	5.218	3375.037	3.988	0.766	0.054	0.738	0.030	N
DS-4S	F	8	3	0.63	15-50%	17.846	1.026	21.221	3.233	0.792	0.024	0.845	0.085	NP
DS-4S	S	8	4	0.50	50-100%	22.020	1.984	23.363	2.295	0.736	0.006	0.809	0.036	Ln
DS-9D	F	11	4	0.64	15-50%	14.948	0.899	15.422	3.300	0.874	0.088	0.767	0.003	N
DS-9I	F	9	0	1.00	0-15%	3516.279	6.962	2487.551	2.782	0.944	0.627	0.653	0.000	N
DS-9I	S	9	0	1.00	0-15%	5650.692	7.329	4005.806	2.989	0.915	0.356	0.638	0.000	N
DS-9S	F	8	2	0.75	15-50%	20.433	1.411	19.780	3.240	0.849	0.093	0.741	0.007	N
DS-9S	S	9	2	0.78	15-50%	21.751	1.658	18.486	3.077	0.913	0.340	0.712	0.002	N
NRC-3D/R	F	7	0	1.00	0-15%	283.396	4.563	252.505	2.599	0.923	0.496	0.750	0.013	N
NRC-3D/R	S	6	0	1.00	0-15%	336.005	4.693	578.784	1.781	0.598	0.000	0.910	0.436	NP
NRC-3I/R	F	9	0	1.00	0-15%	3132.624	7.386	1366.661	2.295	0.871	0.127	0.473	0.000	N
NRC-3I/R	S	6	1	0.83	15-50%	5860.000	8.143	2909.955	1.736	0.727	0.012	0.552	0.000	Ln
NRC-3SR	F	4	1	0.75	15-50%	164.722	2.451	304.977	3.664	0.656	0.003	0.933	0.615	NP
RC-6-PW-6	F	11	3	0.73	15-50%	28.906	0.431	53.075	3.621	0.607	0.000	0.856	0.051	NP
RC-6-PW-6	S	10	3	0.70	15-50%	61.529	1.395	144.626	3.432	0.469	0.000	0.867	0.092	NP
SG-10-PW-12	F	9	0	1.00	0-15%	1316.789	5.318	1666.165	3.143	0.729	0.003	0.771	0.009	Ln
SG-10-PW-12	S	9	1	0.89	0-15%	358.831	3.692	633.853	3.102	0.642	0.000	0.915	0.355	NP
SG-10-PW-6	F	9	0	1.00	0-15%	1486.648	5.360	1799.293	3.218	0.819	0.034	0.780	0.012	Ln
SG-10-PW-6	S	10	1	0.90	0-15%	769.626	4.403	1514.215	3.340	0.569	0.000	0.890	0.170	NP
SG-10-WP	F	3	0	1.00	0-15%	2670.000	7.791	1247.437	0.585	0.771	0.046	0.763	0.029	Ln
SG-10-WP	S	8	0	1.00	0-15%	3055.000	7.801	2455.873	0.675	0.742	0.007	0.845	0.084	NP
SG-10-WP-36	F	9	0	1.00	0-15%	2413.877	5.874	2554.231	3.290	0.821	0.036	0.750	0.005	Ln
SG-10-WP-36	S	9	0	1.00	0-15%	2609.858	6.457	2772.793	2.645	0.873	0.131	0.811	0.027	N
SG-11-PW-12	F	4	1	0.75	15-50%	34.650	3.402	18.598	0.664	0.856	0.245	0.860	0.260	N
SG-11-PW-12	S	4	0	1.00	0-15%	48.225	3.759	28.395	0.544	0.848	0.218	0.939	0.647	N

Table 1. Plume Stability Detection Rate and Normality Assessment

Holden 2020 ACAR Statistical Assessment

Well	Season	Number of Analyses	Number of Non-Detects	Non-Detect Rate	Non-Detect Range	Mean	ln(mean)	Stdev	ln(stdev)	W Statistic	p	ln(W) Statistic	ln(p)	Normality*
SG-11-PW-6	F	4	0	1.00	0-15%	48.475	3.599	36.476	0.915	0.766	0.054	0.809	0.120	N
SG-11-PW-6	S	5	0	1.00	0-15%	32.567	2.248	23.577	3.126	0.998	0.999	0.669	0.004	N
SG-8-PW-12	F	4	1	0.75	15-50%	30.330	3.223	18.298	0.774	0.970	0.841	0.923	0.553	N
SG-8-PW-12	S	4	0	1.00	0-15%	42.400	3.671	19.626	0.446	0.897	0.415	0.956	0.751	N
SG-8-PW-6	F	5	0	1.00	0-15%	26.452	3.047	20.466	0.752	0.875	0.286	0.981	0.941	N
SG-8-PW-6	S	4	0	1.00	0-15%	33.700	3.334	25.026	0.679	0.842	0.201	0.955	0.749	N
SG-8-WP	F	3	0	1.00	0-15%	175.067	4.452	238.118	1.437	0.761	0.024	0.797	0.106	NP
SG-8-WP-36	F	4	0	1.00	0-15%	43.400	3.585	32.166	0.682	0.832	0.174	0.910	0.485	N
SG-8-WP-36	S	5	0	1.00	0-15%	34.644	2.959	35.105	1.296	0.782	0.057	0.830	0.140	N
SG-9-PW-12	F	5	0	1.00	0-15%	30.800	3.325	17.081	0.486	0.822	0.121	0.938	0.655	N
SG-9-PW-12	S	4	1	0.75	15-50%	32.650	3.322	19.251	0.698	0.852	0.233	0.876	0.322	N
SG-9-PW-6	F	6	1	0.83	15-50%	44.650	3.509	43.499	0.767	0.703	0.007	0.846	0.146	NP
SG-9-PW-6	S	4	0	1.00	0-15%	88.275	3.722	122.334	1.435	0.752	0.040	0.979	0.898	NP
SG-9-WP-36	F	5	1	0.80	15-50%	57.640	3.679	59.279	0.950	0.777	0.051	0.953	0.756	N
SG-9-WP-36	S	4	0	1.00	0-15%	119.150	4.241	118.807	1.297	0.894	0.401	0.911	0.490	N
TP2-12D	F	4	0	1.00	0-15%	375.213	3.477	447.772	3.610	0.848	0.220	0.760	0.048	N
TP2-12D	S	5	0	1.00	0-15%	682.464	4.279	626.761	3.772	0.773	0.048	0.701	0.010	Ln
TP3-12D	F	3	0	1.00	0-15%	627.834	4.334	547.586	4.349	0.850	0.240	0.764	0.032	N
TP3-12D	S	4	0	1.00	0-15%	486.268	3.724	617.005	3.602	0.864	0.276	0.829	0.164	N
TP3-13	F	3	0	1.00	0-15%	4429.987	6.628	3923.274	3.751	0.911	0.422	0.779	0.066	N
TP3-13	S	4	0	1.00	0-15%	2102.595	4.987	2458.809	3.868	0.818	0.139	0.760	0.048	N
TP3-14D	F	4	0	1.00	0-15%	2504.428	4.907	3160.839	4.118	0.864	0.276	0.771	0.059	N
DS-5	F	5	1	0.80	15-50%	61.812	1.038	94.591	4.538	0.724	0.017	0.843	0.173	NP
DS-6D/12D	F	6	2	0.67	15-50%	30.050	3.278	16.154	0.555	0.843	0.138	0.910	0.436	N
NRC-3S/R	S	3	0	1.00	0-15%	150.000	4.827	108.167	0.753	0.942	0.537	0.998	0.914	N
SG-11-WP-36	S	5	1	0.80	15-50%	25.576	0.941	24.348	3.827	0.832	0.144	0.728	0.018	N
TP2-12S	S	5	0	1.00	0-15%	20.743	-0.363	41.255	3.614	0.617	0.001	0.911	0.473	NP
TP2-14	S	5	0	1.00	0-15%	226.195	2.281	308.863	3.702	0.691	0.008	0.703	0.010	Ln
TP2-16D	S	3	0	1.00	0-15%	375.140	4.305	366.986	3.439	0.999	0.938	0.825	0.177	N
TP2-17	S	4	0	1.00	0-15%	1727.083	4.779	2035.975	3.877	0.833	0.175	0.759	0.047	N
Iron, Total ug/L														
DS-12D	F	4	1	0.75	15-50%	16.085	-0.057	26.131	3.753	0.748	0.037	0.858	0.255	NP
DS-12D	S	4	1	0.75	15-50%	6.673	-1.243	9.423	4.359	0.828	0.162	0.884	0.354	N
DS-6I/12I	F	5	0	1.00	0-15%	96.771	0.447	147.739	4.822	0.765	0.040	0.858	0.221	NP
DS-6I/12I	S	5	1	0.80	15-50%	6.944	-0.124	9.280	3.229	0.786	0.063	0.906	0.442	N
DS-7D/13D	F	9	2	0.78	15-50%	64.585	2.003	94.398	3.432	0.732	0.003	0.848	0.070	NP
DS-7D/13D	S	8	3	0.63	15-50%	42.003	1.594	49.486	3.963	0.828	0.056	0.755	0.009	N
DS-7S/13S	F	9	0	1.00	0-15%	161748.400	8.731	236870.925	4.346	0.736	0.004	0.868	0.116	NP
DS-7S/13S	S	15	0	1.00	0-15%	2326.875	4.217	6048.649	3.006	0.450	0.000	0.958	0.656	NP
DS-3D	F	10	7	0.30	50-100%	28.208	1.819	23.619	3.189	0.748	0.003	0.718	0.001	NP-Nd

Table 1. Plume Stability Detection Rate and Normality Assessment

Holden 2020 ACAR Statistical Assessment

Well	Season	Number of Analyses	Number of Non-Detects	Non-Detect Rate	Non-Detect Range	Mean	ln(mean)	Stdev	ln(stdev)	W Statistic	p	ln(W) Statistic	ln(p)	Normality*
DS-3D	S	9	4	0.56	15-50%	26.189	2.203	19.815	3.001	0.861	0.098	0.589	0.000	N
DS-3S	S	9	6	0.33	50-100%	32.074	2.440	21.879	2.882	0.758	0.007	0.589	0.000	NP-Nd
DS-4D	F	10	3	0.70	15-50%	13.652	0.519	15.232	3.743	0.835	0.039	0.770	0.006	Ln
DS-4D	S	8	4	0.50	50-100%	33.351	2.392	22.002	3.178	0.901	0.295	0.577	0.000	N
DS-4DD	F	10	4	0.60	15-50%	193.460	3.261	233.510	3.501	0.776	0.007	0.785	0.010	Ln
DS-4DD	S	9	2	0.78	15-50%	176.356	3.400	212.092	3.767	0.731	0.003	0.688	0.001	Ln
DS-4I	F	4	0	1.00	0-15%	12042.925	6.833	13881.936	3.757	0.759	0.046	0.734	0.027	Ln
DS-4S	F	9	5	0.44	50-100%	24.853	1.666	20.913	3.295	0.857	0.090	0.715	0.002	NP-Nd
DS-9D	F	11	4	0.64	15-50%	19.890	1.281	18.413	3.249	0.890	0.138	0.730	0.001	N
DS-9D	S	9	4	0.56	15-50%	30.823	1.605	22.782	3.949	0.892	0.207	0.626	0.000	N
DS-9I	F	9	1	0.89	0-15%	5328.949	4.465	10673.250	3.265	0.568	0.000	0.748	0.005	Ln
DS-9I	S	9	0	1.00	0-15%	4292.433	6.681	4888.220	2.828	0.832	0.047	0.794	0.017	Ln
DS-9S	F	9	6	0.33	50-100%	24.539	1.506	21.283	3.515	0.848	0.072	0.731	0.003	NP-Nd
DS-9S	S	9	5	0.44	50-100%	22.170	1.538	21.769	3.146	0.805	0.023	0.755	0.006	NP-Nd
NRC-3D/R	F	7	0	1.00	0-15%	1903.165	5.756	1896.617	3.700	0.900	0.329	0.771	0.021	N
NRC-3D/R	S	6	0	1.00	0-15%	3476.383	6.594	5674.142	2.490	0.638	0.001	0.897	0.357	NP
NRC-3I/R	F	9	3	0.67	15-50%	4595.333	5.847	6808.000	2.779	0.632	0.000	0.716	0.002	Ln
NRC-3I/R	S	6	0	1.00	0-15%	14371.667	8.370	15429.518	2.060	0.778	0.037	0.785	0.043	Ln
NRC-3SR	F	4	0	1.00	0-15%	95.969	1.970	180.075	3.382	0.653	0.003	0.961	0.785	NP
RC-6-PW-6	F	11	3	0.73	15-50%	33.281	0.000	64.796	4.182	0.573	0.000	0.874	0.088	NP
RC-6-PW-6	S	10	3	0.70	15-50%	69.209	1.117	142.616	4.470	0.502	0.000	0.779	0.008	Ln
SG-10-PW-12	F	9	3	0.67	15-50%	18.224	0.931	19.993	3.258	0.827	0.042	0.788	0.015	Ln
SG-10-PW-12	S	9	0	1.00	0-15%	34.693	1.917	27.203	3.457	0.801	0.021	0.666	0.001	Ln
SG-10-PW-6	F	9	3	0.67	15-50%	19.164	0.876	18.478	3.581	0.902	0.266	0.751	0.006	N
SG-10-PW-6	S	10	2	0.80	15-50%	79.566	2.686	136.972	2.772	0.592	0.000	0.861	0.078	NP
SG-10-WP	S	8	1	0.88	0-15%	1118.900	4.505	2889.280	2.119	0.452	0.000	0.824	0.051	NP
SG-10-WP-36	F	9	0	1.00	0-15%	904.373	2.836	1792.001	4.924	0.596	0.000	0.869	0.119	NP
SG-10-WP-36	S	9	1	0.89	0-15%	557.277	2.932	1221.754	4.062	0.540	0.000	0.909	0.310	NP
SG-11-PW-12	F	4	1	0.75	15-50%	65.550	4.159	16.878	0.252	0.933	0.610	0.948	0.702	N
SG-11-PW-12	S	4	0	1.00	0-15%	69.300	4.107	45.962	0.553	0.706	0.014	0.766	0.054	NP
SG-11-PW-6	F	4	0	1.00	0-15%	154.450	4.533	175.905	1.172	0.819	0.140	0.967	0.821	N
SG-11-PW-6	S	5	0	1.00	0-15%	51.472	2.699	39.395	3.098	0.949	0.730	0.676	0.005	N
SG-8-PW-12	F	4	0	1.00	0-15%	53.800	3.600	52.646	1.055	0.856	0.246	0.986	0.934	N
SG-8-PW-12	S	4	0	1.00	0-15%	69.700	4.220	17.258	0.262	0.952	0.730	0.930	0.596	N
SG-8-PW-6	F	5	0	1.00	0-15%	172.860	4.633	155.066	1.271	0.827	0.131	0.833	0.148	N
SG-8-PW-6	S	4	0	1.00	0-15%	65.600	3.932	52.492	0.840	0.901	0.434	0.992	0.969	N
SG-8-WP	F	3	0	1.00	0-15%	690.667	6.415	425.405	0.601	0.911	0.421	0.972	0.680	N
SG-8-WP-36	F	4	1	0.75	15-50%	89.075	4.126	78.597	1.062	0.934	0.621	0.989	0.950	N
SG-8-WP-36	S	5	1	0.80	15-50%	60.268	3.589	57.592	1.231	0.850	0.193	0.934	0.625	N
SG-9-PW-12	F	5	0	1.00	0-15%	101.160	4.483	58.467	0.571	0.752	0.031	0.772	0.047	Ln
SG-9-PW-12	S	4	1	0.75	15-50%	31.300	3.346	14.826	0.532	0.978	0.889	0.953	0.732	N

Table 1. Plume Stability Detection Rate and Normality Assessment

Holden 2020 ACAR Statistical Assessment

Well	Season	Number of Analyses	Number of Non-Detects	Non-Detect Rate	Non-Detect Range	Mean	ln(mean)	Stdev	ln(stdev)	W Statistic	p	ln(W) Statistic	ln(p)	Normality*
SG-9-PW-6	F	6	0	1.00	0-15%	98.650	4.291	72.909	0.924	0.954	0.772	0.957	0.795	N
SG-9-PW-6	S	4	0	1.00	0-15%	70.850	3.352	106.778	1.538	0.720	0.019	0.925	0.565	NP
SG-9-WP-36	F	5	1	0.80	15-50%	57.680	3.175	96.477	1.323	0.601	0.001	0.790	0.067	NP
SG-9-WP-36	S	4	0	1.00	0-15%	95.558	3.642	143.637	1.586	0.720	0.019	0.971	0.847	NP
TP2-12D	F	4	0	1.00	0-15%	5201.195	5.573	6717.055	4.183	0.861	0.265	0.803	0.108	N
TP2-12D	S	5	0	1.00	0-15%	1040.839	2.276	2280.421	4.671	0.561	0.000	0.949	0.733	NP
TP2-13D	F	4	0	1.00	0-15%	1427.800	4.780	1642.541	3.688	0.742	0.032	0.792	0.088	NP
TP2-15	F	3	0	1.00	0-15%	1087.113	5.013	1003.333	4.093	0.972	0.681	0.795	0.102	N
TP3-12D	F	3	0	1.00	0-15%	210.773	1.667	354.454	5.235	0.765	0.033	0.981	0.733	NP
TP3-12D	S	4	1	0.75	15-50%	24.125	0.384	28.594	4.034	0.840	0.195	0.804	0.110	N
TP3-12S	S	3	0	1.00	0-15%	26910.633	8.155	29152.225	4.090	0.985	0.766	0.842	0.218	N
TP3-13	F	3	0	1.00	0-15%	153418.333	10.077	132948.317	3.928	0.806	0.129	0.759	0.019	N
TP3-13	S	4	0	1.00	0-15%	765.079	2.522	1295.070	5.127	0.725	0.022	0.827	0.159	NP
TP3-14D	F	4	0	1.00	0-15%	524.125	4.528	895.327	2.376	0.704	0.013	0.865	0.278	NP
DS-5	F	5	1	0.80	15-50%	46.214	0.850	83.136	4.029	0.647	0.002	0.868	0.257	NP
DS-6D/12D	F	6	1	0.83	15-50%	18.483	2.648	16.414	0.772	0.783	0.041	0.962	0.838	NP
SG-11-WP-36	S	5	0	1.00	0-15%	21.479	0.798	25.449	3.578	0.857	0.217	0.792	0.070	N
TP2-12S	S	5	0	1.00	0-15%	9173.060	5.847	12759.470	3.822	0.755	0.033	0.732	0.020	Ln
TP2-14	S	5	0	1.00	0-15%	9.423	-0.787	14.404	3.554	0.763	0.039	0.793	0.071	NP
TP2-16D	S	3	0	1.00	0-15%	22.081	2.212	19.707	2.182	0.972	0.678	0.829	0.186	N
TP2-17	S	4	0	1.00	0-15%	27.087	0.582	39.660	3.768	0.808	0.118	0.845	0.209	N
TP3-14S	S	3	0	1.00	0-15%	65712.800	8.871	59492.416	4.527	0.950	0.569	0.783	0.076	N
Cadmium, Total ug/L														
DS-12D	F	4	0	1.00	0-15%	1.087	-0.116	0.667	0.796	0.962	0.789	0.917	0.520	N
DS-12D	S	4	0	1.00	0-15%	0.839	-0.366	0.555	0.730	0.861	0.264	0.843	0.203	N
DS-6I/12I	F	5	0	1.00	0-15%	3.908	1.342	0.947	0.226	0.884	0.326	0.928	0.582	N
DS-6I/12I	S	5	0	1.00	0-15%	3.894	1.327	0.983	0.300	0.826	0.130	0.777	0.052	N
DS-7D/13D	F	9	1	0.89	0-15%	0.130	-2.237	0.079	0.701	0.883	0.168	0.884	0.172	N
DS-7D/13D	S	8	0	1.00	0-15%	0.139	-2.204	0.094	0.758	0.902	0.299	0.922	0.450	N
DS-7S/13S	F	9	0	1.00	0-15%	1.149	-0.539	1.190	1.379	0.842	0.061	0.874	0.135	N
DS-7S/13S	S	15	0	1.00	0-15%	1.591	0.181	1.327	0.753	0.774	0.002	0.884	0.055	NP
DS-3D	F	10	0	1.00	0-15%	0.308	-1.319	0.171	0.577	0.866	0.091	0.941	0.565	N
DS-3D	S	9	0	1.00	0-15%	0.157	-1.994	0.082	0.585	0.876	0.142	0.880	0.157	N
DS-3S	F	9	0	1.00	0-15%	0.219	-1.676	0.140	0.574	0.811	0.027	0.918	0.373	NP
DS-3S	S	9	2	0.78	15-50%	0.111	-2.287	0.053	0.435	0.774	0.010	0.862	0.101	NP
DS-4D	F	10	0	1.00	0-15%	0.262	-1.414	0.104	0.413	0.881	0.135	0.913	0.305	N
DS-4D	S	8	0	1.00	0-15%	0.212	-1.651	0.099	0.485	0.912	0.365	0.944	0.648	N
DS-4DD	F	10	0	1.00	0-15%	0.107	-2.327	0.046	0.452	0.893	0.183	0.915	0.316	N
DS-4DD	S	9	2	0.78	15-50%	0.102	-2.371	0.045	0.444	0.852	0.078	0.892	0.211	N
DS-4I	F	4	0	1.00	0-15%	3.018	1.091	0.565	0.187	0.868	0.290	0.864	0.274	N

Table 1. Plume Stability Detection Rate and Normality Assessment

Holden 2020 ACAR Statistical Assessment

Well	Season	Number of Analyses	Number of Non-Detects	Non-Detect Rate	Non-Detect Range	Mean	ln(mean)	Stdev	ln(stdev)	W Statistic	p	ln(W) Statistic	ln(p)	Normality*
DS-4S	F	9	0	1.00	0-15%	0.178	-1.775	0.060	0.327	0.867	0.114	0.900	0.250	N
DS-4S	S	8	1	0.88	0-15%	0.106	-2.297	0.040	0.317	0.673	0.001	0.769	0.013	Ln
DS-9D	F	11	1	0.91	0-15%	0.090	-2.455	0.027	0.309	0.890	0.140	0.881	0.107	N
DS-9D	S	9	1	0.89	0-15%	0.078	-2.616	0.029	0.376	0.955	0.744	0.987	0.990	N
DS-9I	F	9	0	1.00	0-15%	1.888	0.442	1.153	0.690	0.905	0.285	0.939	0.577	N
DS-9I	S	9	0	1.00	0-15%	2.401	0.830	0.723	0.336	0.955	0.747	0.904	0.276	N
DS-9S	F	9	0	1.00	0-15%	0.177	-1.751	0.035	0.228	0.784	0.013	0.754	0.006	Ln
DS-9S	S	9	0	1.00	0-15%	0.167	-1.836	0.048	0.342	0.709	0.002	0.714	0.002	Ln
NRC-3D/R	F	7	0	1.00	0-15%	1.270	-0.800	1.168	1.984	0.815	0.058	0.784	0.028	N
NRC-3D/R	S	6	0	1.00	0-15%	1.315	-0.269	0.876	1.526	0.747	0.019	0.718	0.010	Ln
NRC-3I/R	F	9	0	1.00	0-15%	1.474	0.173	1.009	0.700	0.838	0.055	0.851	0.077	N
NRC-3I/R	S	6	0	1.00	0-15%	2.477	0.721	1.514	0.691	0.836	0.121	0.852	0.164	N
RC-6-PW-6	F	10	5	0.50	50-100%	0.069	-2.817	0.034	0.627	0.801	0.015	0.821	0.026	Ln
RC-6-PW-6	S	10	5	0.50	50-100%	0.060	-3.129	0.042	0.895	0.709	0.001	0.770	0.006	Ln
SG-10-PW-12	F	9	0	1.00	0-15%	1.956	0.480	1.377	0.635	0.822	0.036	0.927	0.453	NP
SG-10-PW-12	S	9	0	1.00	0-15%	0.927	-1.180	1.222	1.834	0.773	0.010	0.941	0.594	NP
SG-10-PW-6	F	9	0	1.00	0-15%	1.922	0.508	1.139	0.566	0.875	0.137	0.938	0.557	N
SG-10-PW-6	S	10	1	0.90	0-15%	1.295	-0.836	1.910	1.661	0.701	0.001	0.939	0.543	NP
SG-10-WP	F	3	0	1.00	0-15%	2.837	0.901	1.550	0.705	0.924	0.467	0.863	0.276	N
SG-10-WP	S	8	0	1.00	0-15%	1.971	0.546	1.221	0.518	0.729	0.005	0.815	0.041	Ln
SG-10-WP-36	F	9	0	1.00	0-15%	2.671	0.776	1.777	0.683	0.799	0.020	0.818	0.032	Ln
SG-10-WP-36	S	9	0	1.00	0-15%	3.256	0.887	2.460	0.838	0.858	0.092	0.891	0.206	N
SG-11-PW-12	F	4	1	0.75	15-50%	0.073	-2.731	0.037	0.554	0.827	0.161	0.829	0.165	N
SG-11-PW-12	S	4	0	1.00	0-15%	0.033	-3.493	0.018	0.482	0.821	0.146	0.903	0.444	N
SG-11-PW-6	F	4	1	0.75	15-50%	0.076	-2.666	0.034	0.477	0.814	0.131	0.806	0.113	N
SG-11-PW-6	S	5	0	1.00	0-15%	0.038	-3.294	0.009	0.226	0.958	0.796	0.966	0.848	N
SG-8-PW-12	F	4	0	1.00	0-15%	0.105	-2.602	0.088	1.022	0.826	0.158	0.788	0.083	N
SG-8-PW-12	S	4	0	1.00	0-15%	0.071	-2.760	0.035	0.607	0.862	0.267	0.854	0.240	N
SG-8-PW-6	F	5	0	1.00	0-15%	0.115	-2.488	0.086	0.993	0.824	0.126	0.797	0.077	N
SG-8-PW-6	S	4	0	1.00	0-15%	0.075	-2.658	0.030	0.424	0.818	0.139	0.843	0.204	N
SG-8-WP-36	F	4	0	1.00	0-15%	0.130	-2.216	0.081	0.702	0.752	0.040	0.772	0.061	NP
SG-8-WP-36	S	5	0	1.00	0-15%	0.105	-2.285	0.028	0.259	0.866	0.252	0.897	0.394	N
SG-9-PW-12	F	5	0	1.00	0-15%	0.137	-2.270	0.111	0.850	0.881	0.314	0.938	0.650	N
SG-9-PW-12	S	4	0	1.00	0-15%	0.375	-1.474	0.306	1.416	0.981	0.906	0.867	0.285	N
SG-9-PW-6	F	6	0	1.00	0-15%	0.127	-2.137	0.057	0.419	0.756	0.023	0.808	0.069	NP
SG-9-PW-6	S	4	0	1.00	0-15%	0.381	-1.468	0.317	1.428	0.976	0.878	0.871	0.303	N
SG-9-WP-36	F	5	0	1.00	0-15%	0.239	-1.553	0.142	0.529	0.761	0.038	0.864	0.244	NP
SG-9-WP-36	S	4	0	1.00	0-15%	0.560	-1.171	0.585	1.469	0.850	0.226	0.907	0.465	N
TP2-12D	F	4	0	1.00	0-15%	2.895	0.865	2.315	0.686	0.760	0.048	0.875	0.318	NP
TP2-12D	S	5	0	1.00	0-15%	2.406	0.606	2.149	0.796	0.776	0.051	0.906	0.445	N
TP3-12D	F	3	0	1.00	0-15%	7.350	1.973	1.826	0.256	0.999	0.937	0.989	0.800	N

Table 1. Plume Stability Detection Rate and Normality Assessment

Holden 2020 ACAR Statistical Assessment

Well	Season	Number of Analyses	Number of Non-Detects	Non-Detect Rate	Non-Detect Range	Mean	ln(mean)	Stdev	ln(stdev)	W Statistic	p	ln(W) Statistic	ln(p)	Normality*
TP3-12D	S	4	0	1.00	0-15%	5.603	1.623	2.852	0.524	0.968	0.828	1.000	0.999	N
TP3-13	F	3	0	1.00	0-15%	2.287	0.797	0.722	0.296	0.774	0.053	0.781	0.069	N
TP3-13	S	4	0	1.00	0-15%	2.873	1.051	0.292	0.101	0.973	0.858	0.975	0.873	N
TP3-14D	F	4	0	1.00	0-15%	10.948	2.371	2.566	0.251	0.864	0.275	0.862	0.267	N
DS-5	F	5	2	0.60	15-50%	0.067	-2.798	0.032	0.513	0.877	0.297	0.909	0.464	N
DS-6D/12D	F	6	0	1.00	0-15%	0.317	-1.186	0.098	0.291	0.770	0.031	0.820	0.088	NP
DS-6D/12D	S	5	0	1.00	0-15%	0.240	-1.447	0.055	0.222	0.684	0.006	0.684	0.006	Ln
NRC-3S/R	F	4	0	1.00	0-15%	0.150	-1.956	0.058	0.400	0.729	0.024	0.729	0.024	Ln
NRC-3S/R	S	3	0	1.00	0-15%	0.400	-0.973	0.173	0.400	0.750	0.000	0.750	0.000	Ln
TP2-12S	S	5	0	1.00	0-15%	0.089	-2.557	0.050	0.614	0.913	0.483	0.933	0.617	N
TP2-14	S	5	0	1.00	0-15%	1.217	0.187	0.182	0.152	0.965	0.846	0.962	0.823	N
TP2-16D	S	3	0	1.00	0-15%	1.483	0.368	0.415	0.285	0.998	0.907	0.999	0.937	N
TP2-17	S	4	0	1.00	0-15%	0.709	-0.346	0.052	0.073	0.964	0.803	0.965	0.808	N
TP3-14S	S	3	0	1.00	0-15%	0.330	-1.222	0.201	0.566	0.833	0.195	0.880	0.325	N
Copper, Total ug/L														
DS-6I/12I	F	5	0	1.00	0-15%	5.014	1.325	3.881	0.879	0.814	0.105	0.880	0.307	N
DS-6I/12I	S	5	0	1.00	0-15%	15.284	1.611	19.269	1.824	0.770	0.045	0.831	0.142	NP
DS-7D/13D	F	9	5	0.44	50-100%	0.733	-0.463	0.589	0.494	0.452	0.000	0.524	0.000	NP-Nd
DS-7D/13D	S	8	5	0.38	50-100%	0.538	-0.634	0.106	0.166	0.418	0.000	0.418	0.000	NP-Nd
DS-7S/13S	F	9	1	0.89	0-15%	20.733	1.856	22.237	1.988	0.821	0.035	0.837	0.054	NP
DS-7S/13S	S	15	0	1.00	0-15%	18.333	2.617	15.101	0.777	0.804	0.004	0.899	0.093	NP
DS-3D	F	10	3	0.70	15-50%	0.708	-0.756	0.977	0.794	0.503	0.000	0.810	0.019	Ln
DS-3D	S	9	3	0.67	15-50%	0.472	-0.854	0.233	0.482	0.904	0.276	0.961	0.808	N
DS-3S	F	9	5	0.44	50-100%	0.440	-0.844	0.092	0.238	0.691	0.001	0.686	0.001	NP-Nd
DS-3S	S	9	5	0.44	50-100%	0.463	-0.801	0.109	0.283	0.755	0.006	0.709	0.002	NP-Nd
DS-4D	F	10	4	0.60	15-50%	0.679	-0.495	0.418	0.439	0.598	0.000	0.705	0.001	Ln
DS-4D	S	8	3	0.63	15-50%	0.458	-0.795	0.082	0.179	0.920	0.430	0.924	0.464	N
DS-4DD	F	10	1	0.90	0-15%	0.922	-0.583	0.812	1.197	0.896	0.197	0.917	0.336	N
DS-4DD	S	9	2	0.78	15-50%	0.998	-0.339	0.880	0.857	0.773	0.010	0.871	0.125	NP
DS-4I	F	4	0	1.00	0-15%	35.350	3.565	1.088	0.031	0.968	0.827	0.971	0.850	N
DS-4S	F	9	5	0.44	50-100%	0.437	-0.850	0.089	0.232	0.775	0.011	0.756	0.006	NP-Nd
DS-4S	S	8	2	0.75	15-50%	0.432	-0.879	0.134	0.294	0.905	0.323	0.958	0.794	N
DS-9D	F	11	5	0.55	15-50%	0.544	-0.752	0.314	0.564	0.783	0.006	0.882	0.111	NP
DS-9D	S	9	4	0.56	15-50%	0.428	-0.907	0.138	0.384	0.887	0.185	0.826	0.040	N
DS-9I	F	9	0	1.00	0-15%	15.611	2.522	10.518	0.725	0.779	0.012	0.794	0.018	Ln
DS-9I	S	9	0	1.00	0-15%	15.367	2.680	5.623	0.335	0.885	0.175	0.958	0.777	N
DS-9S	F	9	5	0.44	50-100%	0.376	-1.076	0.154	0.497	0.758	0.007	0.774	0.010	NP-Nd
DS-9S	S	9	5	0.44	50-100%	0.386	-1.021	0.138	0.408	0.750	0.005	0.777	0.011	NP-Nd
NRC-3D/R	F	7	0	1.00	0-15%	3.647	1.027	2.392	0.924	0.935	0.595	0.857	0.142	N
NRC-3D/R	S	6	1	0.83	15-50%	2.755	0.603	2.707	1.018	0.840	0.129	0.971	0.901	N

Table 1. Plume Stability Detection Rate and Normality Assessment

Holden 2020 ACAR Statistical Assessment

Well	Season	Number of Analyses	Number of Non-Detects	Non-Detect Rate	Non-Detect Range	Mean	ln(mean)	Stdev	ln(stdev)	W Statistic	p	ln(W) Statistic	ln(p)	Normality*
NRC-3I/R	F	9	0	1.00	0-15%	21.378	3.054	2.856	0.133	0.869	0.119	0.870	0.123	N
NRC-3I/R	S	6	0	1.00	0-15%	34.617	3.540	3.506	0.107	0.847	0.150	0.820	0.089	N
RC-6-PW-6	F	11	2	0.82	15-50%	0.598	-0.556	0.199	0.289	0.807	0.012	0.893	0.151	NP
RC-6-PW-6	S	10	1	0.90	0-15%	0.667	-0.532	0.475	0.455	0.518	0.000	0.663	0.000	Ln
SG-10-PW-12	F	9	0	1.00	0-15%	14.333	2.555	7.388	0.490	0.869	0.121	0.956	0.751	N
SG-10-PW-12	S	9	0	1.00	0-15%	4.593	1.067	4.457	1.053	0.846	0.068	0.959	0.787	N
SG-10-PW-6	F	9	0	1.00	0-15%	16.333	2.641	9.874	0.583	0.884	0.174	0.968	0.879	N
SG-10-PW-6	S	10	0	1.00	0-15%	6.331	1.274	7.538	1.102	0.709	0.001	0.918	0.344	NP
SG-10-WP	F	3	0	1.00	0-15%	21.033	2.994	7.485	0.413	0.789	0.089	0.778	0.064	N
SG-10-WP	S	8	0	1.00	0-15%	22.638	2.955	15.191	0.584	0.771	0.014	0.818	0.044	Ln
SG-10-WP-36	F	9	0	1.00	0-15%	13.367	2.532	4.974	0.371	0.942	0.607	0.966	0.855	N
SG-10-WP-36	S	9	0	1.00	0-15%	13.578	2.534	5.428	0.416	0.913	0.340	0.932	0.497	N
SG-11-PW-12	F	4	0	1.00	0-15%	1.124	0.022	0.494	0.536	0.951	0.724	0.895	0.405	N
SG-11-PW-12	S	4	0	1.00	0-15%	1.761	0.468	0.959	0.493	0.851	0.231	0.940	0.652	N
SG-11-PW-6	F	4	0	1.00	0-15%	3.150	1.056	1.500	0.503	0.962	0.795	0.970	0.840	N
SG-11-PW-6	S	5	0	1.00	0-15%	1.996	0.642	0.660	0.364	0.939	0.657	0.922	0.546	N
SG-8-PW-12	F	4	0	1.00	0-15%	1.639	0.403	0.724	0.521	0.978	0.889	0.929	0.588	N
SG-8-PW-12	S	4	0	1.00	0-15%	3.088	1.050	1.434	0.450	0.891	0.388	0.946	0.694	N
SG-8-PW-6	F	5	0	1.00	0-15%	1.867	0.515	0.855	0.560	0.958	0.795	0.909	0.459	N
SG-8-PW-6	S	4	0	1.00	0-15%	3.428	1.179	1.278	0.375	0.937	0.637	0.947	0.699	N
SG-8-WP	F	3	0	1.00	0-15%	1.241	-0.312	1.523	1.222	0.756	0.014	0.771	0.048	Ln
SG-8-WP-36	F	4	0	1.00	0-15%	3.973	1.211	2.810	0.651	0.838	0.191	0.915	0.508	N
SG-8-WP-36	S	5	0	1.00	0-15%	3.990	1.286	2.164	0.473	0.791	0.068	0.902	0.423	N
SG-9-PW-12	F	5	0	1.00	0-15%	1.633	0.416	0.643	0.454	0.972	0.891	0.919	0.521	N
SG-9-PW-12	S	4	0	1.00	0-15%	2.730	0.956	0.872	0.381	0.883	0.351	0.822	0.147	N
SG-9-PW-6	F	6	0	1.00	0-15%	1.666	0.468	0.493	0.334	0.890	0.318	0.858	0.181	N
SG-9-PW-6	S	4	0	1.00	0-15%	2.960	1.063	0.699	0.248	0.996	0.984	0.976	0.875	N
SG-9-WP-36	F	5	0	1.00	0-15%	2.098	0.703	0.673	0.305	0.868	0.259	0.919	0.523	N
SG-9-WP-36	S	4	0	1.00	0-15%	3.310	1.069	1.611	0.642	0.959	0.775	0.868	0.292	N
TP2-12D	F	4	0	1.00	0-15%	16.450	2.767	4.868	0.302	0.979	0.896	0.984	0.925	N
TP2-12D	S	5	0	1.00	0-15%	28.980	3.277	15.716	0.438	0.682	0.006	0.759	0.036	Ln
TP3-12D	F	3	0	1.00	0-15%	88.933	4.477	15.618	0.187	0.758	0.018	0.757	0.016	Ln
TP3-12D	S	4	0	1.00	0-15%	212.650	5.163	155.904	0.728	0.870	0.298	0.966	0.816	N
TP3-13	F	3	0	1.00	0-15%	47.800	3.842	13.582	0.269	0.833	0.197	0.853	0.250	N
TP3-13	S	4	0	1.00	0-15%	19.850	2.976	3.590	0.184	0.864	0.275	0.869	0.293	N
TP3-14D	F	4	0	1.00	0-15%	136.000	4.906	18.111	0.128	0.866	0.284	0.889	0.378	N
DS-5	F	5	1	0.80	15-50%	0.458	-0.827	0.161	0.342	0.925	0.563	0.951	0.742	N
DS-6D/12D	F	6	2	0.67	15-50%	0.328	-1.209	0.152	0.486	0.845	0.144	0.864	0.204	N
DS-6D/12D	S	5	2	0.60	15-50%	0.330	-1.226	0.168	0.557	0.831	0.142	0.834	0.150	N
NRC-3S/R	F	4	0	1.00	0-15%	0.548	-0.666	0.212	0.427	0.998	0.993	0.966	0.819	N
NRC-3S/R	S	3	0	1.00	0-15%	0.933	-0.126	0.404	0.400	0.750	0.000	0.750	0.000	Ln

Table 1. Plume Stability Detection Rate and Normality Assessment

Holden 2020 ACAR Statistical Assessment

Well	Season	Number of Analyses	Number of Non-Detects	Non-Detect Rate	Non-Detect Range	Mean	ln(mean)	Stdev	ln(stdev)	W Statistic	p	ln(W) Statistic	ln(p)	Normality*
SG-11-WP-36	S	5	0	1.00	0-15%	0.945	-0.193	0.514	0.607	0.897	0.395	0.927	0.575	N
TP2-12S	S	5	0	1.00	0-15%	1.372	-0.068	1.593	0.878	0.638	0.002	0.745	0.027	Ln
TP2-14	S	5	0	1.00	0-15%	20.320	3.004	2.858	0.139	0.875	0.286	0.884	0.328	N
TP2-16D	S	3	0	1.00	0-15%	12.713	2.519	3.185	0.275	0.790	0.090	0.782	0.072	N
TP2-17	S	4	0	1.00	0-15%	19.925	2.987	2.377	0.120	0.850	0.227	0.854	0.239	N
Zinc, Total ug/L														
DS-12D	F	4	1	0.75	15-50%	5.085	1.537	2.750	0.460	0.720	0.019	0.774	0.063	NP
DS-12D	S	4	0	1.00	0-15%	2.900	1.048	0.599	0.210	0.873	0.308	0.876	0.320	N
DS-6I/12I	F	5	0	1.00	0-15%	67.240	4.183	16.290	0.257	0.986	0.964	0.964	0.837	N
DS-6I/12I	S	5	0	1.00	0-15%	146.860	4.354	161.853	1.328	0.838	0.158	0.906	0.444	N
DS-7D/13D	F	9	2	0.78	15-50%	3.408	1.135	1.476	0.467	0.965	0.847	0.968	0.878	N
DS-7D/13D	S	8	0	1.00	0-15%	2.883	0.791	2.928	0.690	0.592	0.000	0.821	0.047	Ln
DS-7S/13S	F	9	0	1.00	0-15%	259.778	4.978	255.254	1.257	0.822	0.036	0.856	0.086	NP
DS-7S/13S	S	15	0	1.00	0-15%	168.400	4.715	168.403	0.906	0.748	0.001	0.843	0.014	Ln
DS-3D	F	10	0	1.00	0-15%	25.190	3.071	13.711	0.623	0.929	0.441	0.943	0.590	N
DS-3D	S	9	0	1.00	0-15%	14.282	2.525	7.289	0.570	0.923	0.415	0.923	0.416	N
DS-3S	F	9	1	0.89	0-15%	20.143	2.666	16.295	0.916	0.867	0.114	0.932	0.497	N
DS-3S	S	9	0	1.00	0-15%	10.318	2.191	6.108	0.560	0.879	0.153	0.948	0.672	N
DS-4D	F	10	0	1.00	0-15%	23.290	3.092	8.368	0.349	0.924	0.394	0.965	0.836	N
DS-4D	Other	3	0	1.00	0-15%	9.667	2.241	2.887	0.280	0.750	0.000	0.750	0.000	Ln
DS-4D	S	8	0	1.00	0-15%	21.850	3.028	8.154	0.356	0.923	0.453	0.982	0.972	N
DS-4DD	F	10	1	0.90	0-15%	9.243	1.750	8.961	1.076	0.842	0.046	0.940	0.553	NP
DS-4DD	S	9	1	0.89	0-15%	4.690	1.360	3.465	0.612	0.766	0.008	0.932	0.496	NP
DS-4I	F	4	0	1.00	0-15%	507.750	6.222	72.794	0.146	0.948	0.705	0.945	0.683	N
DS-4S	F	9	1	0.89	0-15%	20.089	2.841	9.725	0.675	0.878	0.149	0.825	0.039	N
DS-4S	S	8	0	1.00	0-15%	12.269	2.452	4.813	0.336	0.796	0.026	0.890	0.235	NP
DS-9D	F	11	2	0.82	15-50%	5.795	1.577	3.551	0.639	0.865	0.066	0.931	0.423	N
DS-9D	S	9	0	1.00	0-15%	3.746	1.211	1.894	0.496	0.900	0.255	0.949	0.674	N
DS-9I	F	9	0	1.00	0-15%	281.111	5.387	197.473	0.780	0.858	0.091	0.907	0.294	N
DS-9I	S	9	0	1.00	0-15%	356.444	5.802	146.550	0.413	0.913	0.340	0.956	0.756	N
DS-9S	F	9	1	0.89	0-15%	12.056	2.425	3.756	0.426	0.890	0.201	0.758	0.007	N
DS-9S	S	9	0	1.00	0-15%	14.599	2.642	4.194	0.299	0.904	0.274	0.890	0.198	N
NRC-3D/R	F	7	1	0.86	0-15%	27.384	2.732	22.810	1.347	0.836	0.090	0.809	0.051	N
NRC-3D/R	S	6	0	1.00	0-15%	24.915	2.596	18.970	1.562	0.879	0.263	0.791	0.049	N
NRC-3I/R	F	9	0	1.00	0-15%	223.111	5.233	138.857	0.625	0.802	0.021	0.789	0.015	Ln
NRC-3I/R	S	6	0	1.00	0-15%	360.333	5.729	209.287	0.629	0.817	0.082	0.818	0.084	N
NRC-3SR	F	4	0	1.00	0-15%	11.994	1.871	11.100	1.503	0.871	0.300	0.895	0.406	N
RC-6-PW-6	F	11	0	1.00	0-15%	152.082	3.775	160.904	2.106	0.859	0.055	0.842	0.034	N
RC-6-PW-6	S	10	0	1.00	0-15%	37.650	3.377	20.915	0.935	0.956	0.742	0.774	0.007	N
SG-10-PW-12	F	9	0	1.00	0-15%	180.667	5.044	116.476	0.563	0.819	0.034	0.943	0.614	NP

Table 1. Plume Stability Detection Rate and Normality Assessment

Holden 2020 ACAR Statistical Assessment

Well	Season	Number of Analyses	Number of Non-Detects	Non-Detect Rate	Non-Detect Range	Mean	ln(mean)	Stdev	ln(stdev)	W Statistic	p	ln(W) Statistic	ln(p)	Normality*
SG-10-PW-12	S	9	0	1.00	0-15%	94.057	3.447	137.931	1.764	0.700	0.001	0.935	0.528	NP
SG-10-PW-6	F	9	0	1.00	0-15%	191.000	5.117	108.318	0.549	0.897	0.235	0.963	0.830	N
SG-10-PW-6	S	10	0	1.00	0-15%	123.475	3.603	186.408	1.873	0.698	0.001	0.964	0.832	NP
SG-10-WP	F	3	0	1.00	0-15%	243.000	5.379	121.173	0.631	0.877	0.317	0.832	0.195	N
SG-10-WP	S	8	0	1.00	0-15%	168.125	5.009	95.717	0.484	0.684	0.001	0.759	0.010	Ln
SG-10-WP-36	F	9	0	1.00	0-15%	249.444	5.358	146.427	0.606	0.826	0.040	0.846	0.067	NP
SG-10-WP-36	S	9	0	1.00	0-15%	309.444	5.414	245.408	0.871	0.841	0.059	0.870	0.124	N
SG-11-PW-12	F	4	0	1.00	0-15%	11.080	2.311	5.302	0.510	0.920	0.534	0.923	0.555	N
SG-11-PW-12	S	4	0	1.00	0-15%	6.340	1.817	1.709	0.290	0.988	0.949	0.957	0.760	N
SG-11-PW-6	F	4	0	1.00	0-15%	16.975	2.812	3.729	0.233	0.964	0.801	0.942	0.665	N
SG-11-PW-6	S	5	0	1.00	0-15%	7.582	2.011	1.496	0.186	0.882	0.319	0.915	0.499	N
SG-8-PW-12	F	4	0	1.00	0-15%	17.678	2.563	13.698	0.965	0.792	0.089	0.834	0.177	N
SG-8-PW-12	S	4	0	1.00	0-15%	13.283	2.460	6.659	0.626	0.963	0.801	0.905	0.459	N
SG-8-PW-6	F	5	0	1.00	0-15%	23.394	2.810	16.846	1.034	0.841	0.167	0.805	0.089	N
SG-8-PW-6	S	4	0	1.00	0-15%	14.925	2.652	5.430	0.371	0.870	0.299	0.863	0.270	N
SG-8-WP	F	3	0	1.00	0-15%	5.803	1.596	3.862	0.714	0.968	0.658	1.000	0.965	N
SG-8-WP-36	F	4	0	1.00	0-15%	23.650	3.124	7.454	0.326	0.870	0.296	0.875	0.318	N
SG-8-WP-36	S	5	0	1.00	0-15%	32.120	3.414	11.196	0.384	0.792	0.069	0.764	0.040	N
SG-9-PW-12	F	5	0	1.00	0-15%	23.228	2.891	17.797	0.812	0.894	0.378	0.950	0.736	N
SG-9-PW-12	S	4	0	1.00	0-15%	39.780	3.351	23.543	1.174	0.775	0.065	0.689	0.008	N
SG-9-PW-6	F	6	0	1.00	0-15%	25.033	3.044	18.926	0.602	0.723	0.011	0.858	0.181	NP
SG-9-PW-6	S	4	0	1.00	0-15%	38.843	3.303	23.700	1.224	0.843	0.204	0.717	0.018	N
SG-9-WP-36	F	5	0	1.00	0-15%	31.420	3.360	12.859	0.505	0.880	0.310	0.811	0.099	N
SG-9-WP-36	S	4	0	1.00	0-15%	50.410	3.467	37.962	1.370	0.954	0.741	0.817	0.136	N
TP2-12D	F	4	0	1.00	0-15%	170.250	5.117	39.660	0.236	0.784	0.076	0.780	0.071	N
TP2-12D	S	5	0	1.00	0-15%	126.980	4.813	35.530	0.275	0.902	0.419	0.906	0.443	N
TP2-13D	F	4	1	0.75	15-50%	2.478	0.848	1.051	0.387	0.854	0.240	0.925	0.566	N
TP3-12D	F	3	0	1.00	0-15%	1014.000	6.899	265.249	0.264	0.994	0.856	1.000	0.999	N
TP3-12D	S	4	0	1.00	0-15%	830.750	6.637	374.947	0.496	0.954	0.742	0.939	0.648	N
TP3-12S	S	3	0	1.00	0-15%	24.500	3.149	8.839	0.401	0.969	0.661	0.932	0.495	N
TP3-13	F	3	0	1.00	0-15%	412.667	5.991	131.721	0.304	0.893	0.365	0.925	0.470	N
TP3-13	S	4	0	1.00	0-15%	462.500	6.117	100.417	0.237	0.939	0.647	0.899	0.427	N
TP3-14D	F	4	0	1.00	0-15%	1187.000	7.053	292.294	0.276	0.892	0.390	0.853	0.237	N
DS-5	F	5	1	0.80	15-50%	5.710	1.686	2.222	0.368	0.846	0.181	0.862	0.237	N
DS-6D/12D	F	6	1	0.83	15-50%	2.595	0.919	0.792	0.281	0.863	0.200	0.910	0.437	N
DS-6D/12D	S	5	1	0.80	15-50%	3.060	0.963	1.936	0.616	0.882	0.319	0.930	0.597	N
NRC-3S/R	F	4	0	1.00	0-15%	15.750	2.589	8.995	0.724	0.957	0.760	0.913	0.500	N
NRC-3S/R	S	3	0	1.00	0-15%	29.667	3.347	10.970	0.355	0.916	0.439	0.953	0.584	N
SG-11-WP-36	F	3	0	1.00	0-15%	6.700	1.892	1.212	0.173	0.750	0.000	0.750	0.000	Ln
SG-11-WP-36	S	5	0	1.00	0-15%	3.704	1.273	1.055	0.309	0.940	0.668	0.918	0.517	N
TP2-12S	S	5	0	1.00	0-15%	429.744	4.260	742.107	2.356	0.687	0.007	0.911	0.472	NP

Table 1. Plume Stability Detection Rate and Normality Assessment

Holden 2020 ACAR Statistical Assessment

Well	Season	Number of Analyses	Number of Non-Detects	Non-Detect Rate	Non-Detect Range	Mean	ln(mean)	Stdev	ln(stdev)	W Statistic	p	ln(W) Statistic	ln(p)	Normality*
TP2-14	S	5	0	1.00	0-15%	145.800	4.968	27.390	0.186	0.874	0.284	0.879	0.303	N
TP2-16D	S	3	0	1.00	0-15%	154.000	5.004	46.293	0.321	0.987	0.785	0.963	0.631	N
TP2-17	S	4	0	1.00	0-15%	89.125	4.486	9.095	0.102	0.935	0.626	0.937	0.633	N
TP3-14S	S	3	0	1.00	0-15%	95.467	4.388	69.187	0.706	0.889	0.353	0.964	0.634	N
Lead, Total ug/L														
DS-7D/13D	F	9	6	0.33	50-100%	0.233	-1.848	0.296	0.801	0.539	0.000	0.667	0.001	NP-Nd
DS-7D/13D	S	8	5	0.38	50-100%	0.123	-2.157	0.048	0.347	0.665	0.001	0.711	0.003	NP-Nd
DS-7S/13S	F	9	3	0.67	15-50%	0.201	-2.081	0.301	0.850	0.492	0.000	0.769	0.009	Ln
DS-7S/13S	S	15	7	0.53	15-50%	0.104	-2.300	0.029	0.275	0.821	0.007	0.842	0.014	Ln
DS-4DD	F	10	2	0.80	15-50%	0.187	-2.310	0.209	1.370	0.755	0.004	0.879	0.126	NP
DS-4DD	S	9	4	0.56	15-50%	0.153	-1.979	0.075	0.471	0.823	0.038	0.852	0.079	NP
DS-9D	F	11	8	0.27	50-100%	0.201	-1.968	0.269	0.721	0.455	0.000	0.604	0.000	NP-Nd
DS-9I	F	9	3	0.67	15-50%	0.206	-2.035	0.299	0.830	0.489	0.000	0.765	0.008	Ln
DS-9I	S	9	0	1.00	0-15%	0.133	-2.079	0.048	0.371	0.860	0.095	0.881	0.160	N
NRC-3D/R	F	7	2	0.71	15-50%	0.337	-1.342	0.306	0.718	0.700	0.004	0.902	0.345	NP
NRC-3D/R	S	6	2	0.67	15-50%	0.278	-1.847	0.405	1.011	0.581	0.000	0.756	0.023	Ln
NRC-3I/R	F	9	1	0.89	0-15%	0.128	-2.093	0.041	0.284	0.682	0.001	0.725	0.003	Ln
NRC-3I/R	S	6	0	1.00	0-15%	0.196	-1.660	0.056	0.266	0.868	0.216	0.931	0.590	N
SG-10-PW-12	F	8	5	0.38	50-100%	0.103	-2.335	0.043	0.382	0.743	0.007	0.832	0.062	NP-Nd
SG-10-PW-6	F	8	3	0.63	15-50%	0.103	-2.326	0.033	0.344	0.864	0.130	0.854	0.104	N
SG-10-PW-6	S	10	5	0.50	50-100%	0.131	-2.249	0.129	0.572	0.463	0.000	0.632	0.000	Ln
SG-10-WP	F	3	0	1.00	0-15%	0.095	-2.426	0.039	0.494	0.823	0.171	0.800	0.115	N
SG-10-WP	S	8	0	1.00	0-15%	0.773	-1.684	1.792	1.463	0.462	0.000	0.718	0.004	Ln
SG-10-WP-36	F	8	4	0.50	50-100%	0.126	-2.223	0.083	0.549	0.761	0.011	0.874	0.166	NP
SG-10-WP-36	S	9	3	0.67	15-50%	0.092	-2.469	0.045	0.422	0.786	0.014	0.908	0.305	NP
SG-11-PW-12	S	4	1	0.75	15-50%	0.099	-2.352	0.027	0.319	0.909	0.476	0.856	0.246	N
SG-8-WP	F	3	0	1.00	0-15%	0.226	-1.854	0.238	1.016	0.794	0.100	0.860	0.268	N
TP3-13	F	3	0	1.00	0-15%	0.254	-1.411	0.094	0.345	0.794	0.101	0.810	0.138	N
TP3-13	S	4	0	1.00	0-15%	0.239	-1.594	0.170	0.623	0.795	0.093	0.889	0.381	N
TP2-12S	S	5	2	0.60	15-50%	0.123	-2.128	0.037	0.267	0.720	0.015	0.759	0.036	Ln

*F = Fall; S = Spring; N = Normal; NP = Nonparametric; NP-ND = Insufficient Data; Ln = Lognormal

Table 2. Plume Stability Mann-Whitney Seasonality Results

Holden 2020 ACAR Statistical Assessment

Well	Number of Analyses Spring	Number of Analyses Fall	Average Result Spring	Average Result Fall	p.value	W Statistic
Aluminum, Total, µg/L						
NRC-3I/R	6	9	5860.00	3132.62	**0.03**	46
DS-9D	9	11	31.01	14.95	0.12	70.5
DS-9I	9	9	5650.69	3516.28	0.22	55
DS-3S	9	9	29.62	14.76	0.26	53.5
SG-10-PW-12	9	9	358.83	1316.79	0.39	30
SG-8-WP-36	5	4	34.64	43.40	0.41	6
SG-10-PW-6	10	9	769.63	1486.65	0.45	35
DS-4D	8	10	76.02	104.29	0.50	32
DS-4S	8	8	22.02	17.85	0.59	37.5
NRC-3D/R	6	7	336.01	283.40	0.62	17
DS-3D	9	10	27.11	50.89	0.62	38.5
SG-10-WP-36	9	9	2609.86	2413.88	0.63	46.5
RC-6-PW-6	10	11	61.53	28.91	0.67	61.5
DS-7S/13S	15	9	1184.40	1963.66	0.68	60
SG-8-PW-12	4	4	42.40	30.33	0.69	10
SG-11-PW-6	5	4	32.57	48.48	0.71	8
SG-8-PW-6	4	5	33.70	26.45	0.73	12
SG-9-WP-36	4	5	119.15	57.64	0.73	12
TP2-12D	5	4	682.46	375.21	0.73	12
SG-9-PW-6	4	6	88.28	44.65	0.76	14
DS-12D	4	4	1.80	26.40	0.88	7
SG-11-PW-12	4	4	48.23	34.65	0.88	9
DS-4DD	9	10	228.19	238.84	0.90	43
SG-9-PW-12	4	5	32.65	30.80	0.90	9
DS-6D/12D	5	6	35.48	30.05	0.92	16
DS-9S	9	8	21.75	20.43	0.96	37
D-6I/12I	5	5	50.27	108.34	1.00	12
DS-7D/13D	8	9	35.17	68.07	1.00	35.5
Iron, Total, µg/L						
SG-9-PW-12	4	5	31.30	101.16	**0.02**	0
DS-7S/13S	15	9	2326.87	161748.40	**0.02**	28
NRC-3I/R	6	9	14371.67	4595.33	**0.04**	45
DS-4D	8	10	33.35	13.65	0.07	61
DS-6D/12D	5	6	38.60	18.48	0.13	23.5
SG-10-PW-6	10	9	79.57	19.16	0.15	63
SG-10-PW-12	9	9	34.69	18.22	0.18	56

Table 2. Plume Stability Mann-Whitney Seasonality Results

Holden 2020 ACAR Statistical Assessment

Well	Number of Analyses Spring	Number of Analyses Fall	Average Result Spring	Average Result Fall	p.value	W Statistic
DS-9I	9	9	4292.43	5328.95	0.30	53
SG-11-PW-12	4	4	69.30	65.55	0.34	4
SG-8-PW-12	4	4	69.70	53.80	0.34	12
SG-9-PW-6	4	6	70.85	98.65	0.35	7
SG-11-PW-6	5	4	51.47	154.45	0.41	6
TP2-12D	5	4	1040.84	5201.20	0.41	6
DS-9D	9	11	30.82	19.89	0.42	60.5
SG-8-PW-6	4	5	65.60	172.86	0.46	6.5
RC-6-PW-6	10	11	69.21	33.28	0.48	65.5
DS-12D	4	4	6.67	16.09	0.49	5
SG-9-WP-36	4	5	95.56	57.68	0.56	13
D-6I/12I	5	5	6.94	96.77	0.69	10
DS-4S	8	9	31.46	24.85	0.73	40
SG-8-WP-36	5	4	60.27	89.08	0.73	8
SG-10-WP-36	9	9	557.28	904.37	0.76	36.5
DS-3S	9	9	32.07	28.06	0.85	43
DS-9S	9	9	22.17	24.54	0.86	38
DS-3D	9	10	26.19	28.21	0.97	44
DS-4DD	9	10	176.36	193.46	0.97	44
DS-7D/13D	8	9	42.00	64.58	1.00	36.5
NRC-3D/R	6	7	3476.38	1903.16	1.00	21
Cadmium, Total, µg/L						
DS-4S	8	9	0.11	0.18	**0.00**	6
DS-3S	9	9	0.11	0.22	**0.02**	15
DS-3D	9	10	0.16	0.31	**0.03**	18.5
SG-11-PW-6	5	4	0.04	0.08	0.06	2
SG-10-PW-6	10	9	1.30	1.92	0.07	22
SG-10-PW-12	9	9	0.93	1.96	0.07	19.5
SG-11-PW-12	4	4	0.03	0.07	0.11	2
NRC-3I/R	6	9	2.48	1.47	0.14	40
DS-6D/12D	5	6	0.24	0.32	0.15	7.5
SG-9-PW-6	4	6	0.38	0.13	0.24	18
SG-9-PW-12	4	5	0.37	0.14	0.33	14.5
DS-9I	9	9	2.40	1.89	0.33	52
DS-7S/13S	15	9	1.59	1.15	0.37	83
DS-9D	9	11	0.08	0.09	0.47	39.5
DS-4D	8	10	0.21	0.26	0.47	31.5
RC-6-PW-6	10	10	0.06	0.07	0.52	41.5
SG-9-WP-36	4	5	0.56	0.24	0.53	13

Table 2. Plume Stability Mann-Whitney Seasonality Results

Holden 2020 ACAR Statistical Assessment

Well	Number of Analyses Spring	Number of Analyses Fall	Average Result Spring	Average Result Fall	p.value	W Statistic
SG-10-WP-36	9	9	3.26	2.67	0.59	47
SG-8-PW-12	4	4	0.07	0.11	0.66	6
DS-9S	9	9	0.17	0.18	0.67	35.5
SG-8-PW-6	4	5	0.07	0.12	0.71	8
TP2-12D	5	4	2.41	2.90	0.73	8
NRC-3D/R	6	7	1.32	1.27	0.77	18.5
D-6I/12I	5	5	3.89	3.91	0.84	14
DS-12D	4	4	0.84	1.09	0.89	7
DS-7D/13D	8	9	0.14	0.13	0.92	37.5
DS-4DD	9	10	0.10	0.11	0.97	44
SG-8-WP-36	5	4	0.10	0.13	1.00	10
Copper, Total, µg/L						
NRC-3I/R	6	9	34.62	21.38	**0.00**	54
SG-10-PW-12	9	9	4.59	14.33	**0.00**	8
SG-10-PW-6	10	9	6.33	16.33	**0.01**	13
SG-9-PW-6	4	6	2.96	1.67	**0.04**	22
TP2-12D	5	4	28.98	16.45	0.06	18
DS-4D	8	10	0.46	0.68	0.08	20.5
SG-8-PW-6	4	5	3.43	1.87	0.11	17
SG-8-PW-12	4	4	3.09	1.64	0.11	14
SG-9-PW-12	4	5	2.73	1.63	0.19	16
DS-7D/13D	8	9	0.54	0.73	0.23	25.5
DS-12D	4	4	0.46	0.62	0.26	4.5
DS-3S	9	9	0.46	0.44	0.37	50
SG-11-PW-6	5	4	2.00	3.15	0.41	6
SG-9-WP-36	4	5	3.31	2.10	0.41	14
NRC-3D/R	6	7	2.75	3.65	0.45	15
DS-9D	9	11	0.43	0.54	0.52	41
SG-11-PW-12	4	4	1.76	1.12	0.56	10.5
DS-9I	9	9	15.37	15.61	0.60	47
DS-4DD	9	10	1.00	0.92	0.65	51
DS-7S/13S	15	9	18.33	20.73	0.68	75
DS-4S	8	9	0.43	0.44	0.73	32
RC-6-PW-6	10	11	0.67	0.60	0.75	50
DS-9S	9	9	0.39	0.38	0.85	43
DS-6D/12D	5	6	0.33	0.33	0.85	13.5
DS-3D	9	10	0.47	0.71	0.97	46
D-6I/12I	5	5	15.28	5.01	1.00	13
SG-10-WP-36	9	9	13.58	13.37	1.00	41

Table 2. Plume Stability Mann-Whitney Seasonality Results

Holden 2020 ACAR Statistical Assessment

Well	Number of Analyses Spring	Number of Analyses Fall	Average Result Spring	Average Result Fall	p.value	W Statistic
SG-8-WP-36	5	4	3.99	3.97	1.00	10
Zinc, Total, µg/L						
SG-11-PW-6	5	4	7.58	16.98	**0.02**	0
SG-10-PW-12	9	9	94.06	180.67	**0.04**	16.5
SG-10-PW-6	10	9	123.48	191.00	0.05	21
DS-12D	4	4	2.90	5.09	0.06	1
DS-4S	8	9	12.27	20.09	0.07	17
DS-7D/13D	8	9	2.88	3.41	0.09	18
DS-3D	9	10	14.28	25.19	0.09	24
NRC-3I/R	6	9	360.33	223.11	0.11	41
SG-8-WP-36	5	4	32.12	23.65	0.18	16
TP2-12D	5	4	126.98	170.25	0.19	4
DS-9D	9	11	3.75	5.80	0.20	32
SG-9-WP-36	4	5	50.41	31.42	0.26	15
DS-9S	9	9	14.60	12.06	0.31	52.5
DS-9I	9	9	356.44	281.11	0.34	52
SG-11-PW-12	4	4	6.34	11.08	0.34	4
DS-3S	9	9	10.32	20.14	0.35	29.5
SG-9-PW-12	4	5	39.78	23.23	0.41	14
DS-4DD	9	10	4.69	9.24	0.46	35.5
NRC-3D/R	6	7	24.92	27.38	0.47	15.5
RC-6-PW-6	10	11	37.65	152.08	0.60	47
SG-9-PW-6	4	6	38.84	25.03	0.61	15
DS-4D	8	10	21.85	23.29	0.69	35
SG-8-PW-6	4	5	14.93	23.39	0.73	8
DS-7S/13S	15	9	168.40	259.78	0.79	62.5
DS-6D/12D	5	6	3.06	2.60	0.85	13.5
SG-8-PW-12	4	4	13.28	17.68	0.89	7
SG-10-WP-36	9	9	309.44	249.44	0.93	42
D-6I/12I	5	5	146.86	67.24	1.00	12
Lead, Total, µg/L						
NRC-3I/R	6	9	0.20	0.13	**0.03**	46
NRC-3D/R	6	7	0.28	0.34	0.15	10.5
SG-8-PW-6	4	4	0.09	0.13	0.26	4.5
DS-7D/13D	8	9	0.12	0.23	0.40	28
SG-10-WP-36	9	8	0.09	0.13	0.40	27
DS-12D	4	4	0.10	0.21	0.41	5
SG-10-PW-6	10	8	0.13	0.10	0.60	34

Table 2. Plume Stability Mann-Whitney Seasonality Results

Holden 2020 ACAR Statistical Assessment

Well	Number of Analyses Spring	Number of Analyses Fall	Average Result Spring	Average Result Fall	p.value	W Statistic
DS-9D	9	11	0.10	0.20	0.62	44
DS-9I	9	9	0.13	0.21	0.66	46
DS-9S	9	9	0.10	0.19	0.68	37
DS-7S/13S	15	9	0.10	0.20	0.71	61
DS-4DD	9	10	0.15	0.19	0.83	48
SG-10-PW-12	9	8	0.09	0.10	0.90	34.5

MW= Monitoring Well, PW= Pore Water

Bold, shaded p-values are less than 0.05 and the null hypothesis is rejected.

Shaded fall and winter concentrations are the higher value for the dataset where $p<0.05$.

Table 3. Plume Stability Mann-Kendall Trend Analysis Results, Non-Seasonal

Holden 2020 ACAR Statistical Assessment

Well	Number of Analyses	Standard Deviation	p	Tau	Bonferroni p
Aluminum, Total, µg/L					
DS-3D	21	43.546	0.448	-0.126	1.00
DS-3S	20	7.477	0.568	0.106	1.00
DS-4D	21	76.007	0.586	-0.091	1.00
DS-4S	18	6.120	0.167	0.262	1.00
DS-5	9	74.400	0.584	0.183	1.00
DS-9D	20	14.849	0.046	-0.356	1.00
DS-9I	18	3416.016	0.940	-0.020	1.00
DS-9S	17	16.049	0.184	-0.249	1.00
SG-9-PW-12	9	18.272	0.602	0.167	1.00
SG-9-PW-6	10	83.257	0.371	-0.244	1.00
DS-4DD	19	303.585	0.021	-0.404	1.00
SG-10-WP-36	18	2588.125	0.471	0.131	1.00
SG-11-PW-12	8	27.141	0.536	-0.214	1.00
SG-11-PW-6	9	29.106	0.208	-0.366	1.00
SG-11-WP-36	8	135.164	0.212	0.400	1.00
SG-8-PW-12	8	21.631	0.536	-0.214	1.00
SG-8-PW-6	9	21.422	0.029	-0.611	1.00
SG-8-WP-36	9	32.023	0.602	-0.167	1.00
SG-9-WP-36	9	93.894	0.602	-0.167	1.00
DS-12S	8	1067.910	0.063	0.571	1.00
DS-13I	10	1544.823	0.002	0.778	0.34
DS-7S/13S	9	2845.042	0.076	0.500	1.00
DS-7D/13D	8	1.966	0.042	0.643	1.00
D-6I/12I	10	113.253	0.210	0.333	1.00
TP2-12D	9	545.734	0.076	0.500	1.00
Iron, Total, µg/L					
DS-3D	21	7.758	0.509	0.120	1.00
DS-3S	20	3.947	0.439	0.150	1.00
DS-4D	21	14.438	0.898	0.027	1.00
DS-4S	19	7.711	0.864	0.040	1.00
DS-5	9	63.634	0.324	0.304	1.00
DS-9D	20	16.254	0.480	-0.125	1.00
DS-9I	18	8072.527	0.173	0.242	1.00
DS-9S	18	7.097	0.363	-0.180	1.00
SG-9-PW-12	9	60.634	1.000	0.000	1.00
SG-9-PW-6	10	83.425	0.152	-0.378	1.00
DS-4DD	19	227.168	0.054	-0.338	1.00
SG-10-WP-36	18	1499.886	0.519	0.118	1.00
SG-11-PW-12	8	39.911	0.386	0.286	1.00

Table 3. Plume Stability Mann-Kendall Trend Analysis Results, Non-Seasonal

Holden 2020 ACAR Statistical Assessment

Well	Number of Analyses	Standard Deviation	p	Tau	Bonferroni p
SG-11-PW-6	9	123.795	0.348	-0.278	1.00
SG-11-WP-36	8	175.721	0.711	0.143	1.00
SG-8-PW-12	8	37.252	0.174	-0.429	1.00
SG-8-PW-6	9	127.482	0.003	-0.817	0.49
SG-8-WP-36	9	71.089	0.834	0.085	1.00
SG-9-WP-36	9	114.483	0.602	-0.167	1.00
DS-12S	8	8905.583	0.063	0.571	1.00
DS-13I	10	3839.507	0.049	0.511	1.00
DS-7S/13S	9	7550.248	0.029	0.611	1.00
DS-7D/13D	8	3.604	0.352	-0.322	1.00
D-6I/12I	10	110.281	0.592	0.156	1.00
TP2-12D	9	4932.307	0.076	0.500	1.00
Cadmium, Total, µg/L					
DS-3D	21	0.163	0.446	-0.128	1.00
DS-3S	20	0.129	0.554	-0.105	1.00
DS-4D	21	0.127	0.807	0.045	1.00
DS-4S	19	0.080	1.000	0.006	1.00
DS-5	9	0.161	0.913	-0.061	1.00
DS-9D	20	0.038	0.001	0.552	0.13
DS-9I	18	0.970	0.037	0.367	1.00
DS-9S	18	0.041	0.038	-0.390	1.00
SG-9-PW-12	9	0.239	0.295	-0.310	1.00
SG-9-PW-6	10	0.229	0.471	-0.205	1.00
DS-4DD	19	0.055	0.622	0.090	1.00
SG-10-WP-36	18	2.103	0.000	0.633	0.05
SG-11-PW-12	8	0.033	1.000	0.000	1.00
SG-11-PW-6	9	0.029	0.754	-0.111	1.00
SG-11-WP-36	8	0.039	0.507	0.242	1.00
SG-8-PW-12	8	0.064	0.013	-0.764	1.00
SG-8-PW-6	9	0.067	0.015	-0.686	1.00
SG-8-WP-36	9	0.055	0.114	-0.457	1.00
SG-9-WP-36	9	0.409	0.748	-0.118	1.00
DS-12S	8	4.784	0.063	-0.571	1.00
DS-13I	10	0.909	0.127	0.405	1.00
DS-7S/13S	9	1.200	0.670	-0.145	1.00
DS-7D/13D	8	0.044	0.063	0.571	1.00
D-6I/12I	10	0.910	0.592	0.156	1.00
TP2-12D	9	2.094	0.251	-0.333	1.00
Copper, Total, µg/L					
DS-3D	21	0.750	0.618	0.087	1.00

Table 3. Plume Stability Mann-Kendall Trend Analysis Results, Non-Seasonal

Holden 2020 ACAR Statistical Assessment

Well	Number of Analyses	Standard Deviation	p	Tau	Bonferroni p
DS-3S	20	0.211	0.113	-0.287	1.00
DS-4D	21	0.439	0.058	-0.320	1.00
DS-4S	19	0.217	0.373	-0.165	1.00
DS-5	9	0.257	0.100	0.487	1.00
DS-9D	20	0.353	0.094	-0.292	1.00
DS-9I	18	8.182	0.001	0.564	0.19
DS-9S	18	0.124	0.001	-0.617	0.16
SG-9-PW-12	9	0.909	0.754	-0.111	1.00
SG-9-PW-6	10	0.863	0.718	-0.114	1.00
DS-4DD	19	0.887	0.004	-0.494	0.58
SG-10-WP-36	18	5.052	0.001	0.569	0.16
SG-11-PW-12	8	0.784	0.803	-0.109	1.00
SG-11-PW-6	9	1.196	0.118	0.444	1.00
SG-11-WP-36	8	0.576	0.536	0.214	1.00
SG-8-PW-12	8	1.306	0.108	-0.500	1.00
SG-8-PW-6	9	1.286	0.251	-0.333	1.00
SG-8-WP-36	9	2.303	0.118	0.444	1.00
SG-9-WP-36	9	1.268	0.348	-0.278	1.00
DS-12S	8	44.244	0.386	-0.286	1.00
DS-13I	10	14.368	0.020	0.600	1.00
DS-7S/13S	9	10.581	0.251	0.333	1.00
DS-7D/13D	8	0.000	1.000	1.000	1.00
D-6I/12I	10	14.178	0.001	-0.822	0.19
TP2-12D	9	13.266	0.251	-0.333	1.00
Zinc, Total, µg/L					
DS-3D	21	11.822	0.238	-0.192	1.00
DS-3S	20	12.584	0.018	-0.394	1.00
DS-4D	21	8.818	0.785	0.048	1.00
DS-4S	19	8.559	0.033	-0.364	1.00
DS-5	9	3.001	0.402	-0.254	1.00
DS-9D	20	3.390	0.559	0.101	1.00
DS-9I	18	173.089	0.002	0.529	0.36
DS-9S	18	4.681	0.005	-0.497	0.72
SG-9-PW-12	9	21.031	0.118	-0.444	1.00
SG-9-PW-6	10	20.906	0.371	-0.244	1.00
DS-4DD	19	7.435	0.008	-0.453	1.00
SG-10-WP-36	18	198.454	0.001	0.603	0.08
SG-11-PW-12	8	4.441	0.536	-0.214	1.00
SG-11-PW-6	9	5.554	0.602	-0.167	1.00
SG-11-WP-36	8	1.860	0.454	0.255	1.00
SG-8-PW-12	8	10.244	0.009	-0.786	1.00

Table 3. Plume Stability Mann-Kendall Trend Analysis Results, Non-Seasonal

Holden 2020 ACAR Statistical Assessment

Well	Number of Analyses	Standard Deviation	p	Tau	Bonferroni p
SG-8-PW-6	9	13.148	0.016	-0.667	1.00
SG-8-WP-36	9	10.171	0.834	0.085	1.00
SG-9-WP-36	9	26.894	0.395	-0.261	1.00
DS-12S	8	565.304	0.266	-0.357	1.00
DS-13I	10	143.543	0.049	0.511	1.00
DS-7S/13S	9	185.118	0.754	-0.111	1.00
DS-7D/13D	8	0.899	0.711	-0.143	1.00
D-6I/12I	10	116.283	0.007	-0.689	1.00
TP2-12D	9	41.727	0.048	-0.556	1.00
Lead, Total, µg/L					
DS-3D	19	0.005	0.927	0.036	1.00
DS-3S	18	0.020	0.674	-0.099	1.00
DS-4D	18	0.005	1.000	-0.020	1.00
DS-4S	17	0.026	0.766	-0.077	1.00
DS-9D	20	0.068	0.607	0.104	1.00
DS-9I	18	0.062	0.073	0.321	1.00
DS-9S	18	0.014	0.779	-0.070	1.00
SG-9-PW-12	8	0.021	1.000	-0.071	1.00
SG-9-PW-6	8	0.000	1.000	1.000	1.00
DS-4DD	19	0.178	0.001	-0.566	0.21
SG-10-WP-36	17	0.073	0.966	0.016	1.00
SG-11-PW-6	8	0.066	0.012	0.806	1.00
SG-8-PW-6	8	0.021	0.190	-0.500	1.00
SG-8-WP-36	8	0.323	0.690	0.161	1.00
SG-9-WP-36	8	0.046	0.243	-0.436	1.00
DS-12S	8	0.037	0.188	0.472	1.00
DS-13I	10	0.025	0.296	-0.348	1.00
DS-7S/13S	9	0.033	1.000	-0.028	1.00
DS-7D/13D	8	0.000	1.000	1.000	1.00
D-6I/12I	10	0.085	0.038	-0.615	1.00
TP2-12D	9	0.000	1.000	1.000	1.00

Table 3a. Plume Stability Mann-Kendall Trend Analysis Results, Seasonal

Holden 2020 ACAR Statistical Assessment

Well	Season	Number of Analyses	Standard Deviation	p	Tau	Bonferroni p
Aluminum, Total, µg/L						
SG-10-PW-12	F	9	1666.17	0.602	0.167	1.00
SG-10-PW-12	S	9	633.86	0.348	-0.278	1.00
SG-10-PW-6	F	9	1799.29	0.348	0.278	1.00
SG-10-PW-6	S	10	1516.93	0.721	0.111	1.00
Iron, Total, µg/L						
SG-10-PW-12	F	9	13.60	0.395	-0.261	1.00
SG-10-PW-12	S	9	27.20	0.670	-0.145	1.00
SG-10-PW-6	F	9	12.15	0.670	-0.145	1.00
SG-10-PW-6	S	10	140.94	1.000	0.000	1.00
Cadmium, Total, µg/L						
SG-10-PW-12	F	9	1.38	0.012	0.704	0.28
SG-10-PW-12	S	9	1.22	1.000	0.000	1.00
SG-10-PW-6	F	9	1.14	0.002	0.873	0.04
SG-10-PW-6	S	10	1.92	0.650	0.138	1.00
Copper, Total, µg/L						
SG-10-PW-12	F	9	7.39	0.029	0.611	0.69
SG-10-PW-12	S	9	4.46	0.754	-0.111	1.00
SG-10-PW-6	F	9	9.87	0.001	0.944	0.01
SG-10-PW-6	S	10	7.54	0.323	0.270	1.00
Zinc, Total, µg/L						
SG-10-PW-12	F	9	116.48	0.029	0.611	0.69
SG-10-PW-12	S	9	137.93	1.000	-0.028	1.00
SG-10-PW-6	F	9	108.32	0.002	0.833	0.06

Table 3a. Plume Stability Mann-Kendall Trend Analysis Results, Seasonal

Holden 2020 ACAR Statistical Assessment

Well	Season	Number of Analyses	Standard Deviation	p	Tau	Bonferroni p
SG-10-PW-6	S	10	186.41	0.371	0.244	1.00
Lead, Total, µg/L						
SG-10-PW-12	F	8	0.04	0.474	0.267	1.00
SG-10-PW-12	S	9	0.03	0.247	-0.387	1.00
SG-10-PW-6	F	8	0.06	0.300	0.355	1.00
SG-10-PW-6	S	10	0.15	0.337	0.277	1.00

S= Spring, F= Fall

Table 4. Background Assessment Detection Rate and Normality Results

Holden 2020 ACAR Statistical Assessment

Well	Gradient Location	Season	Analyses	Non-Detects	Non-Detect Rate	Non-Detect Range	Mean	ln(Mean)	stdev	ln(stdev)	W	p	ln(W)	ln(p)	Normality*
Lead, Total, µg/L															
DS-13S	D	F	4	0	1.00	0-15%	0.12	-2.12	0.03	0.25	0.92	0.51	0.95	0.72	N
DS-13S	D	S	5	0	1.00	0-15%	0.13	-2.11	0.04	0.30	0.91	0.45	0.91	0.49	N
DS-4DD	D	F	10	2	0.80	15-50%	0.19	-2.31	0.21	1.37	0.75	0.00	0.88	0.13	NP
DS-4DD	D	S	9	4	0.56	15-50%	0.15	-1.98	0.08	0.47	0.82	0.04	0.85	0.08	NP
DS-9D	D	F	11	8	0.27	50-100%	0.20	-1.97	0.27	0.72	0.45	0.00	0.60	0.00	NP-Nd
DS-9I	D	F	9	3	0.67	15-50%	0.21	-2.03	0.30	0.83	0.49	0.00	0.77	0.01	Ln
DS-9I	D	S	9	0	1.00	0-15%	0.13	-2.08	0.05	0.37	0.86	0.10	0.88	0.16	N
NRC-3IR	D	F	4	1	0.75	15-50%	0.11	-2.22	0.01	0.08	0.94	0.67	0.95	0.71	N
NRC-3IR	D	S	3	0	1.00	0-15%	0.16	-1.84	0.02	0.14	0.83	0.18	0.82	0.16	N
RC-6-WP-36	U	F	10	7	0.30	50-100%	0.12	-2.18	0.04	0.31	0.58	0.00	0.62	0.00	NP-Nd
SG-10-PW-12	D	F	8	5	0.38	50-100%	0.10	-2.34	0.04	0.38	0.74	0.01	0.83	0.06	NP-Nd
SG-10-PW-6	D	F	8	3	0.63	15-50%	0.10	-2.33	0.03	0.34	0.86	0.13	0.85	0.10	N
SG-10-PW-6	D	S	10	5	0.50	50-100%	0.13	-2.25	0.13	0.57	0.46	0.00	0.63	0.00	Ln
SG-10-WP	D	F	3	0	1.00	0-15%	0.10	-2.43	0.04	0.49	0.82	0.17	0.80	0.12	N
SG-10-WP	D	S	8	0	1.00	0-15%	0.77	-1.68	1.79	1.46	0.46	0.00	0.72	0.00	Ln
SG-10-WP-36	D	F	8	4	0.50	50-100%	0.13	-2.22	0.08	0.55	0.76	0.01	0.87	0.17	NP
SG-10-WP-36	D	S	9	3	0.67	15-50%	0.09	-2.47	0.05	0.42	0.79	0.01	0.91	0.31	NP
SG-11-PW-12	D	S	4	1	0.75	15-50%	0.10	-2.35	0.03	0.32	0.91	0.48	0.86	0.25	N
SG-7-PW-12	D	S	4	1	0.75	15-50%	0.08	-2.57	0.02	0.33	0.87	0.31	0.87	0.31	N
SG-7-WP-36	D	S	6	3	0.50	50-100%	0.08	-2.57	0.02	0.31	0.81	0.07	0.83	0.11	N
SG-8-WP	D	F	3	0	1.00	0-15%	0.23	-1.85	0.24	1.02	0.79	0.10	0.86	0.27	N
Copper, Total, µg/L															
DS-12I	D	F	5	0	1.00	0-15%	5.01	1.32	3.88	0.88	0.81	0.11	0.88	0.31	N
DS-12I	D	S	5	0	1.00	0-15%	15.28	1.61	19.27	1.82	0.77	0.04	0.83	0.14	NP
DS-12S	D	F	4	0	1.00	0-15%	41.60	3.69	12.15	0.35	0.76	0.05	0.73	0.02	Ln
DS-12S	D	S	4	0	1.00	0-15%	72.25	4.05	61.59	0.75	0.78	0.08	0.90	0.42	N
DS-13I	D	F	5	0	1.00	0-15%	22.78	2.83	16.91	0.93	0.85	0.18	0.88	0.31	N
DS-13I	D	S	5	0	1.00	0-15%	14.11	2.33	11.46	0.92	0.78	0.06	0.87	0.27	N
DS-13S	D	F	4	0	1.00	0-15%	43.15	3.75	9.46	0.23	0.99	0.93	0.97	0.85	N
DS-13S	D	S	5	0	1.00	0-15%	36.68	3.56	11.55	0.32	0.88	0.31	0.90	0.44	N
DS-16I	D	F	3	0	1.00	0-15%	1.08	0.06	0.23	0.23	0.88	0.33	0.86	0.27	N
DS-17I	D	S	3	0	1.00	0-15%	71.13	4.22	25.88	0.34	0.78	0.07	0.79	0.10	N
DS-17S	D	S	3	0	1.00	0-15%	44.87	3.77	15.88	0.33	0.76	0.01	0.76	0.02	Ln
DS-3D	D	F	10	3	0.70	15-50%	0.71	-0.76	0.98	0.79	0.50	0.00	0.81	0.02	Ln
DS-3D	D	S	9	3	0.67	15-50%	0.47	-0.85	0.23	0.48	0.90	0.28	0.96	0.81	N

Table 4. Background Assessment Detection Rate and Normality Results

Holden 2020 ACAR Statistical Assessment

Well	Gradient Location	Season	Analyses	Non-Detects	Non-Detect Rate	Non-Detect Range	Mean	ln(Mean)	stdev	ln(stdev)	W	p	ln(W)	ln(p)	Normality*
DS-3S	D	F	9	5	0.44	50-100%	0.44	-0.84	0.09	0.24	0.69	0.00	0.69	0.00	NP-Nd
DS-3S	D	S	9	5	0.44	50-100%	0.46	-0.80	0.11	0.28	0.76	0.01	0.71	0.00	NP-Nd
DS-4D	D	F	10	4	0.60	15-50%	0.68	-0.50	0.42	0.44	0.60	0.00	0.70	0.00	Ln
DS-4D	D	S	8	3	0.63	15-50%	0.46	-0.79	0.08	0.18	0.92	0.43	0.92	0.46	N
DS-4DD	D	F	10	1	0.90	0-15%	0.92	-0.58	0.81	1.20	0.90	0.20	0.92	0.34	N
DS-4DD	D	S	9	2	0.78	15-50%	1.00	-0.34	0.88	0.86	0.77	0.01	0.87	0.12	NP
DS-4I	D	F	4	0	1.00	0-15%	35.35	3.56	1.09	0.03	0.97	0.83	0.97	0.85	N
DS-4S	D	F	9	5	0.44	50-100%	0.44	-0.85	0.09	0.23	0.78	0.01	0.76	0.01	NP-Nd
DS-4S	D	S	8	2	0.75	15-50%	0.43	-0.88	0.13	0.29	0.91	0.32	0.96	0.79	N
DS-9D	D	F	11	5	0.55	15-50%	0.54	-0.75	0.31	0.56	0.78	0.01	0.88	0.11	NP
DS-9D	D	S	9	4	0.56	15-50%	0.43	-0.91	0.14	0.38	0.89	0.18	0.83	0.04	N
DS-9I	D	F	9	0	1.00	0-15%	15.61	2.52	10.52	0.72	0.78	0.01	0.79	0.02	Ln
DS-9I	D	S	9	0	1.00	0-15%	15.37	2.68	5.62	0.34	0.88	0.18	0.96	0.78	N
DS-9S	D	F	9	5	0.44	50-100%	0.38	-1.08	0.15	0.50	0.76	0.01	0.77	0.01	NP-Nd
DS-9S	D	S	9	5	0.44	50-100%	0.39	-1.02	0.14	0.41	0.75	0.01	0.78	0.01	NP-Nd
HV-3	U	F	5	2	0.60	15-50%	0.75	-0.33	0.25	0.35	0.89	0.37	0.86	0.24	N
HV-3	U	S	4	1	0.75	15-50%	0.65	-0.47	0.23	0.32	0.77	0.06	0.81	0.13	N
MW-1	D	F	8	0	1.00	0-15%	0.63	-0.62	0.34	0.66	0.91	0.37	0.90	0.29	N
MW-1	D	S	7	0	1.00	0-15%	1.84	0.56	0.60	0.35	0.98	0.97	0.97	0.90	N
MW-2	D	F	8	0	1.00	0-15%	8.63	2.15	1.24	0.14	0.88	0.20	0.88	0.21	N
MW-2	D	S	8	0	1.00	0-15%	9.98	2.29	1.86	0.19	0.88	0.20	0.90	0.28	N
MW-3	D	F	7	0	1.00	0-15%	102.99	3.76	192.98	1.17	0.50	0.00	0.76	0.01	Ln
MW-3	D	S	7	0	1.00	0-15%	59.47	4.04	18.97	0.32	0.95	0.71	0.96	0.80	N
NRC-3DR	D	F	3	0	1.00	0-15%	2.94	0.66	2.39	1.32	0.99	0.82	0.89	0.35	N
NRC-3IR	D	F	4	0	1.00	0-15%	20.60	3.02	3.42	0.16	0.73	0.02	0.74	0.03	Ln
NRC-3IR	D	S	3	0	1.00	0-15%	33.03	3.49	4.19	0.13	0.78	0.07	0.78	0.06	N
RC-6-PW-12	U	F	10	1	0.90	0-15%	0.57	-0.62	0.23	0.33	0.71	0.00	0.80	0.01	Ln
RC-6-PW-12	U	S	10	1	0.90	0-15%	0.64	-0.52	0.30	0.39	0.77	0.01	0.90	0.24	NP
RC-6-PW-6	U	F	11	2	0.82	15-50%	0.60	-0.56	0.20	0.29	0.81	0.01	0.89	0.15	NP
RC-6-PW-6	U	S	10	1	0.90	0-15%	0.67	-0.53	0.48	0.46	0.52	0.00	0.66	0.00	Ln
RC-6-WP-36	U	F	10	3	0.70	15-50%	0.87	-0.39	0.82	0.68	0.64	0.00	0.78	0.01	Ln
RC-6-WP-36	U	S	10	0	1.00	0-15%	0.68	-0.44	0.24	0.33	0.87	0.11	0.94	0.57	N
SG-10-PW-12	D	F	9	0	1.00	0-15%	14.33	2.55	7.39	0.49	0.87	0.12	0.96	0.75	N
SG-10-PW-12	D	S	9	0	1.00	0-15%	4.59	1.07	4.46	1.05	0.85	0.07	0.96	0.79	N
SG-10-PW-6	D	F	9	0	1.00	0-15%	16.33	2.64	9.87	0.58	0.88	0.17	0.97	0.88	N
SG-10-PW-6	D	S	10	0	1.00	0-15%	6.33	1.27	7.54	1.10	0.71	0.00	0.92	0.34	NP
SG-10-WP	D	F	3	0	1.00	0-15%	21.03	2.99	7.48	0.41	0.79	0.09	0.78	0.06	N
SG-10-WP	D	S	8	0	1.00	0-15%	22.64	2.96	15.19	0.58	0.77	0.01	0.82	0.04	Ln

Table 4. Background Assessment Detection Rate and Normality Results

Holden 2020 ACAR Statistical Assessment

Well	Gradient Location	Season	Analyses	Non-Detects	Non-Detect Rate	Non-Detect Range	Mean	ln(Mean)	stdev	ln(stdev)	W	p	ln(W)	ln(p)	Normality*
SG-10-WP-36	D	F	9	0	1.00	0-15%	13.37	2.53	4.97	0.37	0.94	0.61	0.97	0.86	N
SG-10-WP-36	D	S	9	0	1.00	0-15%	13.58	2.53	5.43	0.42	0.91	0.34	0.93	0.50	N
SG-11-PW-12	D	F	4	0	1.00	0-15%	1.12	0.02	0.49	0.54	0.95	0.72	0.89	0.41	N
SG-11-PW-12	D	S	4	0	1.00	0-15%	1.76	0.47	0.96	0.49	0.85	0.23	0.94	0.65	N
SG-11-PW-6	D	F	4	0	1.00	0-15%	3.15	1.06	1.50	0.50	0.96	0.79	0.97	0.84	N
SG-11-PW-6	D	S	5	0	1.00	0-15%	2.00	0.64	0.66	0.36	0.94	0.66	0.92	0.55	N
SG-7-PW-12	D	F	4	0	1.00	0-15%	1.32	0.20	0.66	0.42	0.71	0.01	0.75	0.04	Ln
SG-7-PW-12	D	S	4	0	1.00	0-15%	4.14	1.21	2.56	0.82	0.98	0.89	0.90	0.44	N
SG-7-PW-6	D	F	4	0	1.00	0-15%	5.71	0.98	8.24	1.36	0.71	0.01	0.87	0.28	NP
SG-7-PW-6	D	S	5	0	1.00	0-15%	7.71	1.58	9.83	0.97	0.64	0.00	0.77	0.04	Ln
SG-7-WP-36	D	F	3	0	1.00	0-15%	1.50	0.34	0.62	0.45	1.00	0.91	0.97	0.68	N
SG-7-WP-36	D	S	6	0	1.00	0-15%	2.62	0.74	1.82	0.75	0.88	0.29	0.95	0.73	N
SG-8-PW-12	D	F	4	0	1.00	0-15%	1.64	0.40	0.72	0.52	0.98	0.89	0.93	0.59	N
SG-8-PW-12	D	S	4	0	1.00	0-15%	3.09	1.05	1.43	0.45	0.89	0.39	0.95	0.69	N
SG-8-PW-6	D	F	5	0	1.00	0-15%	1.87	0.52	0.86	0.56	0.96	0.80	0.91	0.46	N
SG-8-PW-6	D	S	4	0	1.00	0-15%	3.43	1.18	1.28	0.37	0.94	0.64	0.95	0.70	N
SG-8-WP	D	F	3	0	1.00	0-15%	1.24	-0.31	1.52	1.22	0.76	0.01	0.77	0.05	Ln
SG-8-WP-36	D	F	4	0	1.00	0-15%	3.97	1.21	2.81	0.65	0.84	0.19	0.91	0.51	N
SG-8-WP-36	D	S	5	0	1.00	0-15%	3.99	1.29	2.16	0.47	0.79	0.07	0.90	0.42	N
SG-9-PW-12	D	F	5	0	1.00	0-15%	1.63	0.42	0.64	0.45	0.97	0.89	0.92	0.52	N
SG-9-PW-12	D	S	4	0	1.00	0-15%	2.73	0.96	0.87	0.38	0.88	0.35	0.82	0.15	N
SG-9-PW-6	D	F	6	0	1.00	0-15%	1.67	0.47	0.49	0.33	0.89	0.32	0.86	0.18	N
SG-9-PW-6	D	S	4	0	1.00	0-15%	2.96	1.06	0.70	0.25	1.00	0.98	0.98	0.88	N
SG-9-WP-36	D	F	5	0	1.00	0-15%	2.10	0.70	0.67	0.30	0.87	0.26	0.92	0.52	N
SG-9-WP-36	D	S	4	0	1.00	0-15%	3.31	1.07	1.61	0.64	0.96	0.78	0.87	0.29	N
US-1D	U	F	10	6	0.40	50-100%	0.43	-0.89	0.12	0.34	0.66	0.00	0.66	0.00	NP-Nd
US-1D	U	S	9	5	0.44	50-100%	0.45	-0.82	0.11	0.28	0.82	0.03	0.78	0.01	NP-Nd
US-1I	U	F	10	6	0.40	50-100%	0.64	-0.73	0.59	0.79	0.66	0.00	0.85	0.06	NP-Nd
US-1I	U	S	9	5	0.44	50-100%	0.48	-0.77	0.09	0.25	0.73	0.00	0.65	0.00	NP-Nd
US-1S	U	F	9	4	0.56	15-50%	0.44	-0.87	0.14	0.33	0.91	0.34	0.92	0.41	N
US-1S	U	S	9	3	0.67	15-50%	0.45	-0.81	0.06	0.13	0.81	0.03	0.81	0.03	Ln
DS-5	D	F	5	1	0.80	15-50%	0.46	-0.83	0.16	0.34	0.93	0.56	0.95	0.74	N
SG-11-WP-36	D	S	5	0	1.00	0-15%	0.94	-0.19	0.51	0.61	0.90	0.39	0.93	0.58	N
Zinc, Total, µg/L															
DS-12D	D	F	4	1	0.75	15-50%	5.09	1.54	2.75	0.46	0.72	0.02	0.77	0.06	NP
DS-12D	D	S	4	0	1.00	0-15%	2.90	1.05	0.60	0.21	0.87	0.31	0.88	0.32	N
DS-12I	D	F	5	0	1.00	0-15%	67.24	4.18	16.29	0.26	0.99	0.96	0.96	0.84	N

Table 4. Background Assessment Detection Rate and Normality Results

Holden 2020 ACAR Statistical Assessment

Well	Gradient Location	Season	Analyses	Non-Detects	Non-Detect Rate	Non-Detect Range	Mean	ln(Mean)	stdev	ln(stdev)	W	p	ln(W)	ln(p)	Normality*
DS-12I	D	S	5	0	1.00	0-15%	146.86	4.35	161.85	1.33	0.84	0.16	0.91	0.44	N
DS-12S	D	F	4	0	1.00	0-15%	785.00	6.66	129.95	0.17	0.91	0.51	0.92	0.51	N
DS-12S	D	S	4	0	1.00	0-15%	1063.75	6.77	822.78	0.70	0.81	0.13	0.94	0.65	N
DS-13D	D	F	4	1	0.75	15-50%	2.90	1.04	0.81	0.27	0.87	0.31	0.89	0.39	N
DS-13D	D	S	4	0	1.00	0-15%	2.06	0.70	0.41	0.22	0.73	0.02	0.71	0.02	Ln
DS-13I	D	F	5	0	1.00	0-15%	318.80	5.60	170.73	0.68	0.78	0.06	0.79	0.07	N
DS-13I	D	S	5	0	1.00	0-15%	188.00	5.16	80.73	0.42	0.81	0.09	0.84	0.16	N
DS-13S	D	F	4	0	1.00	0-15%	458.00	6.05	235.75	0.44	0.74	0.03	0.80	0.11	NP
DS-13S	D	S	5	0	1.00	0-15%	367.00	5.84	149.18	0.40	0.83	0.14	0.85	0.19	N
DS-16I	D	F	3	0	1.00	0-15%	50.00	3.90	7.09	0.15	0.87	0.28	0.85	0.25	N
DS-17I	D	S	3	0	1.00	0-15%	928.67	6.81	235.15	0.24	0.78	0.07	0.79	0.09	N
DS-17S	D	S	3	0	1.00	0-15%	457.00	6.08	182.14	0.37	0.80	0.10	0.81	0.15	N
DS-3D	D	F	10	0	1.00	0-15%	25.19	3.07	13.71	0.62	0.93	0.44	0.94	0.59	N
DS-3D	D	S	9	0	1.00	0-15%	14.28	2.53	7.29	0.57	0.92	0.42	0.92	0.42	N
DS-3S	D	F	9	1	0.89	0-15%	20.14	2.67	16.30	0.92	0.87	0.11	0.93	0.50	N
DS-3S	D	S	9	0	1.00	0-15%	10.32	2.19	6.11	0.56	0.88	0.15	0.95	0.67	N
DS-4D	D	F	10	0	1.00	0-15%	23.29	3.09	8.37	0.35	0.92	0.39	0.96	0.84	N
DS-4D	D	Other	3	0	1.00	0-15%	9.67	2.24	2.89	0.28	0.75	0.00	0.75	0.00	Ln
DS-4D	D	S	8	0	1.00	0-15%	21.85	3.03	8.15	0.36	0.92	0.45	0.98	0.97	N
DS-4DD	D	F	10	1	0.90	0-15%	9.24	1.75	8.96	1.08	0.84	0.05	0.94	0.55	NP
DS-4DD	D	S	9	1	0.89	0-15%	4.69	1.36	3.47	0.61	0.77	0.01	0.93	0.50	NP
DS-4I	D	F	4	0	1.00	0-15%	507.75	6.22	72.79	0.15	0.95	0.70	0.94	0.68	N
DS-4S	D	F	9	1	0.89	0-15%	20.09	2.84	9.73	0.68	0.88	0.15	0.82	0.04	N
DS-4S	D	S	8	0	1.00	0-15%	12.27	2.45	4.81	0.34	0.80	0.03	0.89	0.23	NP
DS-9D	D	F	11	2	0.82	15-50%	5.80	1.58	3.55	0.64	0.86	0.07	0.93	0.42	N
DS-9D	D	S	9	0	1.00	0-15%	3.75	1.21	1.89	0.50	0.90	0.25	0.95	0.67	N
DS-9I	D	F	9	0	1.00	0-15%	281.11	5.39	197.47	0.78	0.86	0.09	0.91	0.29	N
DS-9I	D	S	9	0	1.00	0-15%	356.44	5.80	146.55	0.41	0.91	0.34	0.96	0.76	N
DS-9S	D	F	9	1	0.89	0-15%	12.06	2.43	3.76	0.43	0.89	0.20	0.76	0.01	N
DS-9S	D	S	9	0	1.00	0-15%	14.60	2.64	4.19	0.30	0.90	0.27	0.89	0.20	N
HV-3	U	F	5	2	0.60	15-50%	2.30	0.64	1.56	0.71	0.77	0.05	0.83	0.13	NP
HV-3	U	S	4	0	1.00	0-15%	1.63	0.37	0.83	0.61	0.98	0.88	0.94	0.64	N
MW-1	D	F	8	0	1.00	0-15%	45.39	3.57	30.28	0.80	0.90	0.32	0.91	0.33	N
MW-1	D	S	7	0	1.00	0-15%	65.47	4.14	19.13	0.31	0.96	0.78	0.95	0.77	N
MW-2	D	F	8	0	1.00	0-15%	88.76	4.47	14.94	0.17	0.95	0.72	0.97	0.86	N
MW-2	D	S	8	0	1.00	0-15%	80.54	4.36	21.23	0.25	0.87	0.16	0.91	0.33	N
MW-3	D	F	7	0	1.00	0-15%	527.29	5.57	918.82	1.03	0.48	0.00	0.60	0.00	Ln
MW-3	D	S	7	0	1.00	0-15%	466.43	6.10	177.43	0.32	0.77	0.02	0.86	0.15	NP

Table 4. Background Assessment Detection Rate and Normality Results

Holden 2020 ACAR Statistical Assessment

Well	Gradient Location	Season	Analyses	Non-Detects	Non-Detect Rate	Non-Detect Range	Mean	ln(Mean)	stdev	ln(stdev)	W	p	ln(W)	ln(p)	Normality*
NRC-3IR	D	F	4	0	1.00	0-15%	362.25	5.88	70.04	0.18	0.86	0.25	0.89	0.37	N
NRC-3IR	D	S	3	0	1.00	0-15%	545.00	6.29	83.07	0.16	0.86	0.27	0.85	0.23	N
NRC-3SR	D	F	4	0	1.00	0-15%	11.99	1.87	11.10	1.50	0.87	0.30	0.89	0.41	N
RC-6-PW-12	U	F	11	1	0.91	0-15%	55.67	2.54	108.15	1.80	0.57	0.00	0.96	0.78	NP
RC-6-PW-12	U	S	10	0	1.00	0-15%	11.22	1.88	9.75	1.31	0.90	0.24	0.89	0.18	N
RC-6-PW-6	U	F	11	0	1.00	0-15%	152.08	3.77	160.90	2.11	0.86	0.06	0.84	0.03	N
RC-6-PW-6	U	S	10	0	1.00	0-15%	37.65	3.38	20.92	0.93	0.96	0.74	0.77	0.01	N
RC-6-WP-36	U	F	11	1	0.91	0-15%	16.29	2.49	16.92	0.76	0.63	0.00	0.94	0.47	NP
RC-6-WP-36	U	S	10	0	1.00	0-15%	35.22	3.15	20.61	1.37	0.92	0.34	0.68	0.00	N
SG-10-PW-12	D	F	9	0	1.00	0-15%	180.67	5.04	116.48	0.56	0.82	0.03	0.94	0.61	NP
SG-10-PW-12	D	S	9	0	1.00	0-15%	94.06	3.45	137.93	1.76	0.70	0.00	0.93	0.53	NP
SG-10-PW-6	D	F	9	0	1.00	0-15%	191.00	5.12	108.32	0.55	0.90	0.23	0.96	0.83	N
SG-10-PW-6	D	S	10	0	1.00	0-15%	123.48	3.60	186.41	1.87	0.70	0.00	0.96	0.83	NP
SG-10-WP	D	F	3	0	1.00	0-15%	243.00	5.38	121.17	0.63	0.88	0.32	0.83	0.19	N
SG-10-WP	D	S	8	0	1.00	0-15%	168.13	5.01	95.72	0.48	0.68	0.00	0.76	0.01	Ln
SG-10-WP-36	D	F	9	0	1.00	0-15%	249.44	5.36	146.43	0.61	0.83	0.04	0.85	0.07	NP
SG-10-WP-36	D	S	9	0	1.00	0-15%	309.44	5.41	245.41	0.87	0.84	0.06	0.87	0.12	N
SG-11-PW-12	D	F	4	0	1.00	0-15%	11.08	2.31	5.30	0.51	0.92	0.53	0.92	0.55	N
SG-11-PW-12	D	S	4	0	1.00	0-15%	6.34	1.82	1.71	0.29	0.99	0.95	0.96	0.76	N
SG-11-PW-6	D	F	4	0	1.00	0-15%	16.98	2.81	3.73	0.23	0.96	0.80	0.94	0.66	N
SG-11-PW-6	D	S	5	0	1.00	0-15%	7.58	2.01	1.50	0.19	0.88	0.32	0.92	0.50	N
SG-7-PW-12	D	F	4	0	1.00	0-15%	10.50	2.22	6.94	0.55	0.68	0.01	0.72	0.02	Ln
SG-7-PW-12	D	S	4	0	1.00	0-15%	31.35	2.97	29.05	1.28	0.94	0.68	0.96	0.78	N
SG-7-PW-6	D	F	4	0	1.00	0-15%	20.94	2.67	18.30	1.06	0.92	0.52	0.94	0.67	N
SG-7-PW-6	D	S	5	0	1.00	0-15%	63.47	3.59	52.23	1.47	0.93	0.63	0.87	0.26	N
SG-7-WP-36	D	F	3	0	1.00	0-15%	13.53	2.42	10.03	0.73	0.89	0.36	0.97	0.66	N
SG-7-WP-36	D	S	6	0	1.00	0-15%	61.25	3.01	80.00	1.75	0.71	0.01	0.83	0.11	NP
SG-8-PW-12	D	F	4	0	1.00	0-15%	17.68	2.56	13.70	0.97	0.79	0.09	0.83	0.18	N
SG-8-PW-12	D	S	4	0	1.00	0-15%	13.28	2.46	6.66	0.63	0.96	0.80	0.91	0.46	N
SG-8-PW-6	D	F	5	0	1.00	0-15%	23.39	2.81	16.85	1.03	0.84	0.17	0.81	0.09	N
SG-8-PW-6	D	S	4	0	1.00	0-15%	14.93	2.65	5.43	0.37	0.87	0.30	0.86	0.27	N
SG-8-WP	D	F	3	0	1.00	0-15%	5.80	1.60	3.86	0.71	0.97	0.66	1.00	0.97	N
SG-8-WP-36	D	F	4	0	1.00	0-15%	23.65	3.12	7.45	0.33	0.87	0.30	0.88	0.32	N
SG-8-WP-36	D	S	5	0	1.00	0-15%	32.12	3.41	11.20	0.38	0.79	0.07	0.76	0.04	N
SG-9-PW-12	D	F	5	0	1.00	0-15%	23.23	2.89	17.80	0.81	0.89	0.38	0.95	0.74	N
SG-9-PW-12	D	S	4	0	1.00	0-15%	39.78	3.35	23.54	1.17	0.78	0.06	0.69	0.01	N
SG-9-PW-6	D	F	6	0	1.00	0-15%	25.03	3.04	18.93	0.60	0.72	0.01	0.86	0.18	NP
SG-9-PW-6	D	S	4	0	1.00	0-15%	38.84	3.30	23.70	1.22	0.84	0.20	0.72	0.02	N

Table 4. Background Assessment Detection Rate and Normality Results

Holden 2020 ACAR Statistical Assessment

Well	Gradient Location	Season	Analyses	Non-Detects	Non-Detect Rate	Non-Detect Range	Mean	ln(Mean)	stdev	ln(stdev)	W	p	ln(W)	ln(p)	Normality*
SG-9-WP-36	D	F	5	0	1.00	0-15%	31.42	3.36	12.86	0.50	0.88	0.31	0.81	0.10	N
SG-9-WP-36	D	S	4	0	1.00	0-15%	50.41	3.47	37.96	1.37	0.95	0.74	0.82	0.14	N
US-1D	U	F	10	3	0.70	15-50%	2.51	0.80	1.22	0.53	0.85	0.06	0.87	0.10	N
US-1D	U	S	9	1	0.89	0-15%	2.34	0.68	1.53	0.62	0.87	0.11	0.96	0.82	N
US-1I	U	F	10	2	0.80	15-50%	9.36	1.19	20.93	1.22	0.43	0.00	0.81	0.02	Ln
US-1I	U	S	9	3	0.67	15-50%	2.31	0.68	1.35	0.60	0.80	0.02	0.87	0.11	NP
US-1S	U	F	9	3	0.67	15-50%	3.51	0.94	2.78	0.92	0.82	0.03	0.90	0.26	NP
US-1S	U	S	9	2	0.78	15-50%	1.63	0.25	1.36	0.68	0.66	0.00	0.77	0.01	Ln
DS-5	D	F	5	1	0.80	15-50%	5.71	1.69	2.22	0.37	0.85	0.18	0.86	0.24	N
SG-11-WP-36	D	F	3	0	1.00	0-15%	6.70	1.89	1.21	0.17	0.75	0.00	0.75	0.00	Ln
SG-11-WP-36	D	S	5	0	1.00	0-15%	3.70	1.27	1.06	0.31	0.94	0.67	0.92	0.52	N
Aluminum, Total, µg/L															
DS-12I	D	F	5	0	1.00	0-15%	108.34	1.34	149.04	3.89	0.73	0.02	0.72	0.02	Ln
DS-12I	D	S	5	0	1.00	0-15%	50.27	1.59	67.37	3.22	0.71	0.01	0.89	0.36	NP
DS-12S	D	F	4	0	1.00	0-15%	1138.52	4.19	1325.09	4.09	0.80	0.11	0.78	0.07	N
DS-12S	D	S	4	0	1.00	0-15%	789.18	4.24	907.62	3.62	0.74	0.03	0.78	0.08	NP
DS-13D	D	F	4	0	1.00	0-15%	1.91	-1.28	2.35	2.98	0.86	0.28	0.79	0.09	N
DS-13I	D	F	5	0	1.00	0-15%	1912.12	4.32	1841.23	5.11	0.82	0.12	0.72	0.02	N
DS-13I	D	S	5	0	1.00	0-15%	840.15	3.13	1123.06	4.78	0.70	0.01	0.83	0.15	NP
DS-13S	D	F	4	0	1.00	0-15%	2745.73	5.22	3200.13	3.91	0.81	0.12	0.77	0.06	N
DS-13S	D	S	5	0	1.00	0-15%	1999.20	4.30	2863.27	3.86	0.77	0.05	0.78	0.05	NP
DS-16I	D	F	3	0	1.00	0-15%	13.70	2.60	2.75	0.20	0.96	0.64	0.98	0.73	N
DS-17I	D	S	3	0	1.00	0-15%	5853.33	8.66	1166.93	0.19	0.78	0.07	0.78	0.08	N
DS-17S	D	S	3	0	1.00	0-15%	6983.33	8.79	3046.02	0.40	0.77	0.03	0.77	0.05	Ln
DS-3D	D	F	10	0	1.00	0-15%	50.89	2.28	56.90	3.47	0.78	0.01	0.69	0.00	Ln
DS-3D	D	S	9	2	0.78	15-50%	27.11	2.60	16.93	2.16	0.95	0.66	0.61	0.00	N
DS-3S	D	F	9	3	0.67	15-50%	14.76	1.37	15.74	2.61	0.84	0.06	0.78	0.01	N
DS-3S	D	S	9	6	0.33	50-100%	29.62	2.37	24.28	2.32	0.70	0.00	0.73	0.00	NP-Nd
DS-4D	D	F	10	0	1.00	0-15%	104.29	2.49	93.66	3.92	0.92	0.34	0.68	0.00	N
DS-4D	D	S	8	0	1.00	0-15%	76.02	3.35	49.54	2.86	0.95	0.76	0.59	0.00	N
DS-4DD	D	F	10	4	0.60	15-50%	238.84	3.34	307.02	3.58	0.74	0.00	0.80	0.01	Ln
DS-4DD	D	S	9	2	0.78	15-50%	228.19	3.65	301.79	2.98	0.72	0.00	0.85	0.08	NP
DS-4I	D	F	4	0	1.00	0-15%	2922.92	5.22	3375.04	3.99	0.77	0.05	0.74	0.03	N
DS-4S	D	F	8	3	0.63	15-50%	17.85	1.03	21.22	3.23	0.79	0.02	0.85	0.09	NP
DS-4S	D	S	8	4	0.50	50-100%	22.02	1.98	23.36	2.29	0.74	0.01	0.81	0.04	Ln
DS-9D	D	F	11	4	0.64	15-50%	14.95	0.90	15.42	3.30	0.87	0.09	0.77	0.00	N
DS-9I	D	F	9	0	1.00	0-15%	3516.28	6.96	2487.55	2.78	0.94	0.63	0.65	0.00	N

Table 4. Background Assessment Detection Rate and Normality Results

Holden 2020 ACAR Statistical Assessment

Well	Gradient Location	Season	Analyses	Non-Detects	Non-Detect Rate	Non-Detect Range	Mean	ln(Mean)	stdev	ln(stdev)	W	p	ln(W)	ln(p)	Normality*
DS-9I	D	S	9	0	1.00	0-15%	5650.69	7.33	4005.81	2.99	0.92	0.36	0.64	0.00	N
DS-9S	D	F	8	2	0.75	15-50%	20.43	1.41	19.78	3.24	0.85	0.09	0.74	0.01	N
DS-9S	D	S	9	2	0.78	15-50%	21.75	1.66	18.49	3.08	0.91	0.34	0.71	0.00	N
HV-3	U	F	5	0	1.00	0-15%	94.05	2.03	127.30	3.84	0.78	0.05	0.89	0.35	N
HV-3	U	S	4	1	0.75	15-50%	150.48	4.55	145.03	1.22	0.92	0.56	0.99	0.93	N
MW-1	D	F	8	4	0.50	50-100%	16.87	1.30	20.85	2.77	0.73	0.00	0.78	0.02	Ln
MW-1	D	S	7	1	0.86	0-15%	18.08	1.24	18.23	3.13	0.91	0.38	0.76	0.02	N
MW-2	D	F	8	2	0.75	15-50%	27.40	1.25	44.58	3.20	0.68	0.00	0.88	0.19	NP
MW-2	D	S	8	1	0.88	0-15%	11.23	0.65	16.45	3.13	0.68	0.00	0.79	0.02	Ln
MW-3	D	F	7	1	0.86	0-15%	204.94	1.92	487.86	3.87	0.49	0.00	0.89	0.30	NP
MW-3	D	S	7	1	0.86	0-15%	27.76	1.72	20.86	3.27	0.87	0.18	0.68	0.00	N
NRC-3DR	D	F	3	0	1.00	0-15%	201.26	3.09	304.82	3.72	0.82	0.16	0.96	0.62	N
NRC-3IR	D	F	4	0	1.00	0-15%	2110.91	6.28	1410.97	3.33	0.71	0.01	0.64	0.00	Ln
NRC-3SR	D	F	4	1	0.75	15-50%	164.72	2.45	304.98	3.66	0.66	0.00	0.93	0.61	NP
RC-6-PW-12	U	F	10	2	0.80	15-50%	22.19	0.67	48.95	2.98	0.49	0.00	0.87	0.10	NP
RC-6-PW-12	U	S	10	4	0.60	15-50%	22.56	1.97	17.85	2.66	0.92	0.32	0.67	0.00	N
RC-6-PW-6	U	F	11	3	0.73	15-50%	28.91	0.43	53.08	3.62	0.61	0.00	0.86	0.05	NP
RC-6-PW-6	U	S	10	3	0.70	15-50%	61.53	1.39	144.63	3.43	0.47	0.00	0.87	0.09	NP
RC-6-WP-36	U	F	10	3	0.70	15-50%	66.72	0.29	175.05	3.55	0.45	0.00	0.89	0.15	NP
RC-6-WP-36	U	S	10	4	0.60	15-50%	32.42	2.16	30.25	2.81	0.87	0.09	0.72	0.00	N
SG-10-PW-12	D	F	9	0	1.00	0-15%	1316.79	5.32	1666.17	3.14	0.73	0.00	0.77	0.01	Ln
SG-10-PW-12	D	S	9	1	0.89	0-15%	358.83	3.69	633.85	3.10	0.64	0.00	0.92	0.36	NP
SG-10-PW-6	D	F	9	0	1.00	0-15%	1486.65	5.36	1799.29	3.22	0.82	0.03	0.78	0.01	Ln
SG-10-PW-6	D	S	10	1	0.90	0-15%	769.63	4.40	1514.21	3.34	0.57	0.00	0.89	0.17	NP
SG-10-WP	D	F	3	0	1.00	0-15%	2670.00	7.79	1247.44	0.59	0.77	0.05	0.76	0.03	Ln
SG-10-WP	D	S	8	0	1.00	0-15%	3055.00	7.80	2455.87	0.67	0.74	0.01	0.84	0.08	NP
SG-10-WP-36	D	F	9	0	1.00	0-15%	2413.88	5.87	2554.23	3.29	0.82	0.04	0.75	0.01	Ln
SG-10-WP-36	D	S	9	0	1.00	0-15%	2609.86	6.46	2772.79	2.64	0.87	0.13	0.81	0.03	N
SG-11-PW-12	D	F	4	1	0.75	15-50%	34.65	3.40	18.60	0.66	0.86	0.25	0.86	0.26	N
SG-11-PW-12	D	S	4	0	1.00	0-15%	48.23	3.76	28.40	0.54	0.85	0.22	0.94	0.65	N
SG-11-PW-6	D	F	4	0	1.00	0-15%	48.48	3.60	36.48	0.91	0.77	0.05	0.81	0.12	N
SG-11-PW-6	D	S	5	0	1.00	0-15%	32.57	2.25	23.58	3.13	1.00	1.00	0.67	0.00	N
SG-7-PW-12	D	F	4	0	1.00	0-15%	13.46	2.34	12.45	0.78	0.72	0.02	0.80	0.10	NP
SG-7-PW-12	D	S	4	0	1.00	0-15%	55.64	3.69	35.52	1.13	0.89	0.39	0.78	0.07	N
SG-7-PW-6	D	F	4	0	1.00	0-15%	103.98	3.86	145.27	1.48	0.75	0.04	0.98	0.93	NP
SG-7-PW-6	D	S	5	0	1.00	0-15%	103.36	3.93	140.25	1.36	0.72	0.02	0.98	0.94	NP
SG-7-WP-36	D	F	3	0	1.00	0-15%	26.97	3.19	15.62	0.53	0.76	0.03	0.77	0.05	NP
SG-7-WP-36	D	S	6	0	1.00	0-15%	48.82	3.63	36.85	0.79	0.84	0.13	0.93	0.59	N

Table 4. Background Assessment Detection Rate and Normality Results

Holden 2020 ACAR Statistical Assessment

Well	Gradient Location	Season	Analyses	Non-Detects	Non-Detect Rate	Non-Detect Range	Mean	ln(Mean)	stdev	ln(stdev)	W	p	ln(W)	ln(p)	Normality*
SG-8-PW-12	D	F	4	1	0.75	15-50%	30.33	3.22	18.30	0.77	0.97	0.84	0.92	0.55	N
SG-8-PW-12	D	S	4	0	1.00	0-15%	42.40	3.67	19.63	0.45	0.90	0.41	0.96	0.75	N
SG-8-PW-6	D	F	5	0	1.00	0-15%	26.45	3.05	20.47	0.75	0.87	0.29	0.98	0.94	N
SG-8-PW-6	D	S	4	0	1.00	0-15%	33.70	3.33	25.03	0.68	0.84	0.20	0.96	0.75	N
SG-8-WP	D	F	3	0	1.00	0-15%	175.07	4.45	238.12	1.44	0.76	0.02	0.80	0.11	NP
SG-8-WP-36	D	F	4	0	1.00	0-15%	43.40	3.59	32.17	0.68	0.83	0.17	0.91	0.48	N
SG-8-WP-36	D	S	5	0	1.00	0-15%	34.64	2.96	35.10	1.30	0.78	0.06	0.83	0.14	N
SG-9-PW-12	D	F	5	0	1.00	0-15%	30.80	3.32	17.08	0.49	0.82	0.12	0.94	0.65	N
SG-9-PW-12	D	S	4	1	0.75	15-50%	32.65	3.32	19.25	0.70	0.85	0.23	0.88	0.32	N
SG-9-PW-6	D	F	6	1	0.83	15-50%	44.65	3.51	43.50	0.77	0.70	0.01	0.85	0.15	NP
SG-9-PW-6	D	S	4	0	1.00	0-15%	88.28	3.72	122.33	1.44	0.75	0.04	0.98	0.90	NP
SG-9-WP-36	D	F	5	1	0.80	15-50%	57.64	3.68	59.28	0.95	0.78	0.05	0.95	0.76	N
SG-9-WP-36	D	S	4	0	1.00	0-15%	119.15	4.24	118.81	1.30	0.89	0.40	0.91	0.49	N
US-1D	U	F	9	3	0.67	15-50%	21.69	1.43	27.08	2.76	0.78	0.01	0.85	0.07	NP
US-1D	U	S	9	6	0.33	50-100%	30.40	2.07	23.53	2.93	0.88	0.15	0.68	0.00	NP-Nd
US-1I	U	F	10	4	0.60	15-50%	36.57	1.09	77.09	3.11	0.54	0.00	0.89	0.15	NP
US-1I	U	S	9	5	0.44	50-100%	25.05	1.75	23.94	2.85	0.87	0.13	0.77	0.01	NP-Nd
US-1S	U	F	9	5	0.44	50-100%	22.97	1.72	21.90	2.80	0.82	0.04	0.75	0.01	NP-Nd
US-1S	U	S	9	4	0.56	15-50%	21.33	1.41	22.57	3.06	0.79	0.01	0.81	0.02	Ln
DS-5	D	F	5	1	0.80	15-50%	61.81	1.04	94.59	4.54	0.72	0.02	0.84	0.17	NP
SG-11-WP-36	D	S	5	1	0.80	15-50%	25.58	0.94	24.35	3.83	0.83	0.14	0.73	0.02	N
Iron, Total, µg/L															
DS-12D	D	F	4	1	0.75	15-50%	16.09	-0.06	26.13	3.75	0.75	0.04	0.86	0.25	NP
DS-12D	D	S	4	1	0.75	15-50%	6.67	-1.24	9.42	4.36	0.83	0.16	0.88	0.35	N
DS-12I	D	F	5	0	1.00	0-15%	96.77	0.45	147.74	4.82	0.76	0.04	0.86	0.22	NP
DS-12I	D	S	5	1	0.80	15-50%	6.94	-0.12	9.28	3.23	0.79	0.06	0.91	0.44	N
DS-12S	D	F	4	0	1.00	0-15%	9554.68	5.13	11167.40	5.82	0.81	0.13	0.87	0.31	N
DS-12S	D	S	4	0	1.00	0-15%	41.08	-0.19	73.54	4.74	0.69	0.01	0.90	0.41	NP
DS-13I	D	F	5	1	0.80	15-50%	3653.22	3.16	4987.46	6.06	0.70	0.01	0.82	0.12	NP
DS-13I	D	S	5	0	1.00	0-15%	10.33	-0.08	11.37	3.92	0.88	0.29	0.78	0.06	N
DS-13S	D	F	4	0	1.00	0-15%	858.90	4.55	1647.49	2.48	0.64	0.00	0.85	0.24	NP
DS-13S	D	S	5	0	1.00	0-15%	6601.42	4.17	9677.63	5.07	0.77	0.05	0.79	0.07	NP
DS-16I	D	F	3	0	1.00	0-15%	14.63	2.67	3.10	0.20	0.82	0.15	0.83	0.18	N
DS-17I	D	S	3	0	1.00	0-15%	30100.00	9.91	33255.38	1.06	0.75	0.00	0.75	0.00	Ln
DS-17S	D	S	3	0	1.00	0-15%	279.00	5.34	270.20	0.91	0.75	0.01	0.76	0.02	Ln
DS-3D	D	F	10	7	0.30	50-100%	28.21	1.82	23.62	3.19	0.75	0.00	0.72	0.00	NP-Nd
DS-3D	D	S	9	4	0.56	15-50%	26.19	2.20	19.82	3.00	0.86	0.10	0.59	0.00	N

Table 4. Background Assessment Detection Rate and Normality Results

Holden 2020 ACAR Statistical Assessment

Well	Gradient Location	Season	Analyses	Non-Detects	Non-Detect Rate	Non-Detect Range	Mean	ln(Mean)	stdev	ln(stdev)	W	p	ln(W)	ln(p)	Normality*
DS-3S	D	S	9	6	0.33	50-100%	32.07	2.44	21.88	2.88	0.76	0.01	0.59	0.00	NP-Nd
DS-4D	D	F	10	3	0.70	15-50%	13.65	0.52	15.23	3.74	0.84	0.04	0.77	0.01	Ln
DS-4D	D	S	8	4	0.50	50-100%	33.35	2.39	22.00	3.18	0.90	0.30	0.58	0.00	N
DS-4DD	D	F	10	4	0.60	15-50%	193.46	3.26	233.51	3.50	0.78	0.01	0.79	0.01	Ln
DS-4DD	D	S	9	2	0.78	15-50%	176.36	3.40	212.09	3.77	0.73	0.00	0.69	0.00	Ln
DS-4I	D	F	4	0	1.00	0-15%	12042.93	6.83	13881.94	3.76	0.76	0.05	0.73	0.03	Ln
DS-4S	D	F	9	5	0.44	50-100%	24.85	1.67	20.91	3.29	0.86	0.09	0.71	0.00	NP-Nd
DS-9D	D	F	11	4	0.64	15-50%	19.89	1.28	18.41	3.25	0.89	0.14	0.73	0.00	N
DS-9D	D	S	9	4	0.56	15-50%	30.82	1.61	22.78	3.95	0.89	0.21	0.63	0.00	N
DS-9I	D	F	9	1	0.89	0-15%	5328.95	4.47	10673.25	3.26	0.57	0.00	0.75	0.01	Ln
DS-9I	D	S	9	0	1.00	0-15%	4292.43	6.68	4888.22	2.83	0.83	0.05	0.79	0.02	Ln
DS-9S	D	F	9	6	0.33	50-100%	24.54	1.51	21.28	3.51	0.85	0.07	0.73	0.00	NP-Nd
DS-9S	D	S	9	5	0.44	50-100%	22.17	1.54	21.77	3.15	0.81	0.02	0.76	0.01	NP-Nd
HV-3	U	F	5	2	0.60	15-50%	72.17	2.52	85.69	3.32	0.80	0.08	0.84	0.16	N
HV-3	U	S	4	1	0.75	15-50%	103.55	4.23	103.22	1.08	0.88	0.32	0.99	0.97	N
MW-1	D	F	8	4	0.50	50-100%	13.83	0.91	16.56	3.28	0.80	0.03	0.80	0.03	Ln
MW-2	D	F	8	3	0.63	15-50%	21.64	1.33	23.46	3.19	0.87	0.13	0.81	0.04	N
MW-2	D	S	8	5	0.38	50-100%	21.25	1.01	19.59	4.07	0.85	0.10	0.68	0.00	NP-Nd
MW-3	D	F	7	2	0.71	15-50%	59.24	0.95	132.92	4.02	0.51	0.00	0.91	0.41	NP
MW-3	D	S	7	4	0.43	50-100%	28.29	0.84	21.77	4.77	0.85	0.12	0.66	0.00	NP-Nd
NRC-3DR	D	F	3	0	1.00	0-15%	180.72	2.77	266.66	4.17	0.83	0.20	0.93	0.51	N
NRC-3IR	D	F	4	0	1.00	0-15%	10257.00	7.97	6831.22	3.10	0.68	0.01	0.64	0.00	Ln
NRC-3IR	D	S	3	0	1.00	0-15%	28000.00	10.22	6148.98	0.24	0.76	0.02	0.76	0.01	Ln
NRC-3SR	D	F	4	0	1.00	0-15%	95.97	1.97	180.07	3.38	0.65	0.00	0.96	0.79	NP
RC-6-PW-12	U	F	10	2	0.80	15-50%	26.62	0.61	48.74	3.67	0.59	0.00	0.88	0.13	NP
RC-6-PW-12	U	S	10	1	0.90	0-15%	18.27	1.43	15.42	3.31	0.93	0.42	0.65	0.00	N
RC-6-PW-6	U	F	11	3	0.73	15-50%	33.28	0.00	64.80	4.18	0.57	0.00	0.87	0.09	NP
RC-6-PW-6	U	S	10	3	0.70	15-50%	69.21	1.12	142.62	4.47	0.50	0.00	0.78	0.01	Ln
RC-6-WP-36	U	F	10	1	0.90	0-15%	52.56	-0.24	137.36	4.03	0.45	0.00	0.91	0.27	NP
RC-6-WP-36	U	S	10	1	0.90	0-15%	28.06	1.64	30.13	3.45	0.85	0.06	0.72	0.00	N
SG-10-PW-12	D	F	9	3	0.67	15-50%	18.22	0.93	19.99	3.26	0.83	0.04	0.79	0.01	Ln
SG-10-PW-12	D	S	9	0	1.00	0-15%	34.69	1.92	27.20	3.46	0.80	0.02	0.67	0.00	Ln
SG-10-PW-6	D	F	9	3	0.67	15-50%	19.16	0.88	18.48	3.58	0.90	0.27	0.75	0.01	N
SG-10-PW-6	D	S	10	2	0.80	15-50%	79.57	2.69	136.97	2.77	0.59	0.00	0.86	0.08	NP
SG-10-WP	D	S	8	1	0.88	0-15%	1118.90	4.50	2889.28	2.12	0.45	0.00	0.82	0.05	NP
SG-10-WP-36	D	F	9	0	1.00	0-15%	904.37	2.84	1792.00	4.92	0.60	0.00	0.87	0.12	NP
SG-10-WP-36	D	S	9	1	0.89	0-15%	557.28	2.93	1221.75	4.06	0.54	0.00	0.91	0.31	NP
SG-11-PW-12	D	F	4	1	0.75	15-50%	65.55	4.16	16.88	0.25	0.93	0.61	0.95	0.70	N

Table 4. Background Assessment Detection Rate and Normality Results

Holden 2020 ACAR Statistical Assessment

Well	Gradient Location	Season	Analyses	Non-Detects	Non-Detect Rate	Non-Detect Range	Mean	ln(Mean)	stdev	ln(stdev)	W	p	ln(W)	ln(p)	Normality*
SG-11-PW-12	D	S	4	0	1.00	0-15%	69.30	4.11	45.96	0.55	0.71	0.01	0.77	0.05	NP
SG-11-PW-6	D	F	4	0	1.00	0-15%	154.45	4.53	175.91	1.17	0.82	0.14	0.97	0.82	N
SG-11-PW-6	D	S	5	0	1.00	0-15%	51.47	2.70	39.40	3.10	0.95	0.73	0.68	0.01	N
SG-7-PW-12	D	F	4	0	1.00	0-15%	171.28	3.46	319.15	2.02	0.63	0.00	0.69	0.01	Ln
SG-7-PW-12	D	S	4	0	1.00	0-15%	153.17	4.25	184.85	1.67	0.85	0.24	0.98	0.92	N
SG-7-PW-6	D	F	4	0	1.00	0-15%	1479.30	5.82	2283.80	2.32	0.76	0.05	0.98	0.89	NP
SG-7-PW-6	D	S	5	0	1.00	0-15%	697.62	4.89	1361.00	2.07	0.59	0.00	0.95	0.72	NP
SG-7-WP-36	D	F	3	0	1.00	0-15%	202.30	3.83	327.11	2.20	0.76	0.02	0.84	0.21	NP
SG-7-WP-36	D	S	6	0	1.00	0-15%	69.66	3.73	71.08	1.15	0.78	0.04	0.91	0.45	NP
SG-8-PW-12	D	F	4	0	1.00	0-15%	53.80	3.60	52.65	1.05	0.86	0.25	0.99	0.93	N
SG-8-PW-12	D	S	4	0	1.00	0-15%	69.70	4.22	17.26	0.26	0.95	0.73	0.93	0.60	N
SG-8-PW-6	D	F	5	0	1.00	0-15%	172.86	4.63	155.07	1.27	0.83	0.13	0.83	0.15	N
SG-8-PW-6	D	S	4	0	1.00	0-15%	65.60	3.93	52.49	0.84	0.90	0.43	0.99	0.97	N
SG-8-WP	D	F	3	0	1.00	0-15%	690.67	6.41	425.40	0.60	0.91	0.42	0.97	0.68	N
SG-8-WP-36	D	F	4	1	0.75	15-50%	89.08	4.13	78.60	1.06	0.93	0.62	0.99	0.95	N
SG-8-WP-36	D	S	5	1	0.80	15-50%	60.27	3.59	57.59	1.23	0.85	0.19	0.93	0.63	N
SG-9-PW-12	D	F	5	0	1.00	0-15%	101.16	4.48	58.47	0.57	0.75	0.03	0.77	0.05	Ln
SG-9-PW-12	D	S	4	1	0.75	15-50%	31.30	3.35	14.83	0.53	0.98	0.89	0.95	0.73	N
SG-9-PW-6	D	F	6	0	1.00	0-15%	98.65	4.29	72.91	0.92	0.95	0.77	0.96	0.79	N
SG-9-PW-6	D	S	4	0	1.00	0-15%	70.85	3.35	106.78	1.54	0.72	0.02	0.92	0.57	NP
SG-9-WP-36	D	F	5	1	0.80	15-50%	57.68	3.17	96.48	1.32	0.60	0.00	0.79	0.07	NP
SG-9-WP-36	D	S	4	0	1.00	0-15%	95.56	3.64	143.64	1.59	0.72	0.02	0.97	0.85	NP
US-1D	U	F	10	2	0.80	15-50%	20.05	1.57	19.09	3.07	0.86	0.07	0.73	0.00	N
US-1D	U	S	9	5	0.44	50-100%	31.15	1.79	22.98	3.68	0.89	0.19	0.67	0.00	NP-Nd
US-1I	U	F	10	5	0.50	50-100%	30.79	1.17	42.78	3.64	0.73	0.00	0.80	0.02	Ln
US-1I	U	S	9	5	0.44	50-100%	31.34	1.73	31.51	3.60	0.87	0.11	0.72	0.00	NP-Nd
US-1S	U	F	9	4	0.56	15-50%	22.85	1.58	21.42	3.21	0.82	0.04	0.74	0.00	Ln
US-1S	U	S	9	6	0.33	50-100%	25.56	1.65	20.36	3.52	0.87	0.11	0.68	0.00	NP-Nd
DS-5	D	F	5	1	0.80	15-50%	46.21	0.85	83.14	4.03	0.65	0.00	0.87	0.26	NP
SG-11-WP-36	D	S	5	0	1.00	0-15%	21.48	0.80	25.45	3.58	0.86	0.22	0.79	0.07	N
Cadmium, Total, µg/L															
DS-12D	D	F	4	0	1.00	0-15%	1.09	-0.12	0.67	0.80	0.96	0.79	0.92	0.52	N
DS-12D	D	S	4	0	1.00	0-15%	0.84	-0.37	0.56	0.73	0.86	0.26	0.84	0.20	N
DS-12I	D	F	5	0	1.00	0-15%	3.91	1.34	0.95	0.23	0.88	0.33	0.93	0.58	N
DS-12I	D	S	5	0	1.00	0-15%	3.89	1.33	0.98	0.30	0.83	0.13	0.78	0.05	N
DS-12S	D	F	4	0	1.00	0-15%	8.31	2.10	1.75	0.22	0.96	0.76	0.94	0.68	N
DS-12S	D	S	4	0	1.00	0-15%	11.48	2.34	6.61	0.51	0.80	0.11	0.89	0.40	N

Table 4. Background Assessment Detection Rate and Normality Results

Holden 2020 ACAR Statistical Assessment

Well	Gradient Location	Season	Analyses	Non-Detects	Non-Detect Rate	Non-Detect Range	Mean	ln(Mean)	stdev	ln(stdev)	W	p	ln(W)	ln(p)	Normality*
DS-13D	D	F	4	0	1.00	0-15%	0.21	-1.58	0.03	0.15	0.97	0.83	0.95	0.69	N
DS-13D	D	S	4	0	1.00	0-15%	0.22	-1.55	0.06	0.28	0.98	0.87	0.97	0.83	N
DS-13I	D	F	5	0	1.00	0-15%	2.76	0.94	1.06	0.47	0.80	0.08	0.79	0.07	N
DS-13I	D	S	5	0	1.00	0-15%	2.11	0.70	0.68	0.35	0.93	0.62	0.92	0.55	N
DS-13S	D	F	4	0	1.00	0-15%	2.16	0.69	1.04	0.43	0.79	0.08	0.86	0.25	N
DS-13S	D	S	5	0	1.00	0-15%	2.89	0.98	1.33	0.46	0.79	0.07	0.81	0.10	N
DS-16I	D	F	3	0	1.00	0-15%	0.38	-0.97	0.06	0.14	0.89	0.34	0.90	0.38	N
DS-17I	D	S	3	0	1.00	0-15%	7.87	2.05	1.59	0.19	0.76	0.02	0.76	0.03	Ln
DS-17S	D	S	3	0	1.00	0-15%	3.39	1.19	1.08	0.30	0.84	0.22	0.87	0.29	N
DS-3D	D	F	10	0	1.00	0-15%	0.31	-1.32	0.17	0.58	0.87	0.09	0.94	0.57	N
DS-3D	D	S	9	0	1.00	0-15%	0.16	-1.99	0.08	0.58	0.88	0.14	0.88	0.16	N
DS-3S	D	F	9	0	1.00	0-15%	0.22	-1.68	0.14	0.57	0.81	0.03	0.92	0.37	NP
DS-3S	D	S	9	2	0.78	15-50%	0.11	-2.29	0.05	0.44	0.77	0.01	0.86	0.10	NP
DS-4D	D	F	10	0	1.00	0-15%	0.26	-1.41	0.10	0.41	0.88	0.13	0.91	0.30	N
DS-4D	D	S	8	0	1.00	0-15%	0.21	-1.65	0.10	0.49	0.91	0.37	0.94	0.65	N
DS-4DD	D	F	10	0	1.00	0-15%	0.11	-2.33	0.05	0.45	0.89	0.18	0.91	0.32	N
DS-4DD	D	S	9	2	0.78	15-50%	0.10	-2.37	0.04	0.44	0.85	0.08	0.89	0.21	N
DS-4I	D	F	4	0	1.00	0-15%	3.02	1.09	0.56	0.19	0.87	0.29	0.86	0.27	N
DS-4S	D	F	9	0	1.00	0-15%	0.18	-1.78	0.06	0.33	0.87	0.11	0.90	0.25	N
DS-4S	D	S	8	1	0.88	0-15%	0.11	-2.30	0.04	0.32	0.67	0.00	0.77	0.01	Ln
DS-9D	D	F	11	1	0.91	0-15%	0.09	-2.46	0.03	0.31	0.89	0.14	0.88	0.11	N
DS-9D	D	S	9	1	0.89	0-15%	0.08	-2.62	0.03	0.38	0.95	0.74	0.99	0.99	N
DS-9I	D	F	9	0	1.00	0-15%	1.89	0.44	1.15	0.69	0.91	0.29	0.94	0.58	N
DS-9I	D	S	9	0	1.00	0-15%	2.40	0.83	0.72	0.34	0.96	0.75	0.90	0.28	N
DS-9S	D	F	9	0	1.00	0-15%	0.18	-1.75	0.04	0.23	0.78	0.01	0.75	0.01	Ln
DS-9S	D	S	9	0	1.00	0-15%	0.17	-1.84	0.05	0.34	0.71	0.00	0.71	0.00	Ln
HV-3	U	S	4	1	0.75	15-50%	0.04	-3.49	0.04	0.87	0.80	0.09	0.95	0.72	N
MW-1	D	F	8	0	1.00	0-15%	0.25	-1.66	0.19	0.83	0.85	0.10	0.85	0.09	N
MW-1	D	S	7	0	1.00	0-15%	0.29	-1.26	0.06	0.23	0.93	0.53	0.93	0.52	N
MW-2	D	F	8	0	1.00	0-15%	0.66	-0.42	0.09	0.13	0.95	0.75	0.95	0.72	N
MW-2	D	S	8	0	1.00	0-15%	0.57	-0.57	0.11	0.18	0.87	0.15	0.92	0.39	N
MW-3	D	F	7	0	1.00	0-15%	3.38	0.63	5.35	0.96	0.51	0.00	0.69	0.00	Ln
MW-3	D	S	7	0	1.00	0-15%	2.48	0.87	0.77	0.30	0.92	0.44	0.97	0.89	N
NRC-3DR	D	F	3	0	1.00	0-15%	0.06	-2.89	0.04	0.58	0.94	0.52	0.99	0.80	N
NRC-3IR	D	F	4	0	1.00	0-15%	2.45	0.87	0.62	0.23	0.72	0.02	0.74	0.03	Ln
NRC-3IR	D	S	3	0	1.00	0-15%	3.82	1.33	0.51	0.14	0.86	0.26	0.85	0.24	N
RC-6-PW-12	U	F	10	4	0.60	15-50%	0.06	-3.19	0.04	0.91	0.78	0.01	0.83	0.03	Ln
RC-6-PW-12	U	S	10	6	0.40	50-100%	0.07	-3.06	0.04	0.99	0.67	0.00	0.73	0.00	NP-Nd

Table 4. Background Assessment Detection Rate and Normality Results

Holden 2020 ACAR Statistical Assessment

Well	Gradient Location	Season	Analyses	Non-Detects	Non-Detect Rate	Non-Detect Range	Mean	ln(Mean)	stdev	ln(stdev)	W	p	ln(W)	ln(p)	Normality*
RC-6-PW-6	U	F	10	5	0.50	50-100%	0.07	-2.82	0.03	0.63	0.80	0.02	0.82	0.03	Ln
RC-6-PW-6	U	S	10	5	0.50	50-100%	0.06	-3.13	0.04	0.90	0.71	0.00	0.77	0.01	Ln
RC-6-WP-36	U	F	11	6	0.45	50-100%	0.08	-2.98	0.05	1.12	0.83	0.02	0.79	0.01	NP-Nd
RC-6-WP-36	U	S	10	6	0.40	50-100%	0.07	-2.97	0.04	0.93	0.70	0.00	0.75	0.00	NP-Nd
SG-10-PW-12	D	F	9	0	1.00	0-15%	1.96	0.48	1.38	0.63	0.82	0.04	0.93	0.45	NP
SG-10-PW-12	D	S	9	0	1.00	0-15%	0.93	-1.18	1.22	1.83	0.77	0.01	0.94	0.59	NP
SG-10-PW-6	D	F	9	0	1.00	0-15%	1.92	0.51	1.14	0.57	0.87	0.14	0.94	0.56	N
SG-10-PW-6	D	S	10	1	0.90	0-15%	1.30	-0.84	1.91	1.66	0.70	0.00	0.94	0.54	NP
SG-10-WP	D	F	3	0	1.00	0-15%	2.84	0.90	1.55	0.71	0.92	0.47	0.86	0.28	N
SG-10-WP	D	S	8	0	1.00	0-15%	1.97	0.55	1.22	0.52	0.73	0.00	0.82	0.04	Ln
SG-10-WP-36	D	F	9	0	1.00	0-15%	2.67	0.78	1.78	0.68	0.80	0.02	0.82	0.03	Ln
SG-10-WP-36	D	S	9	0	1.00	0-15%	3.26	0.89	2.46	0.84	0.86	0.09	0.89	0.21	N
SG-11-PW-12	D	F	4	1	0.75	15-50%	0.07	-2.73	0.04	0.55	0.83	0.16	0.83	0.17	N
SG-11-PW-12	D	S	4	0	1.00	0-15%	0.03	-3.49	0.02	0.48	0.82	0.15	0.90	0.44	N
SG-11-PW-6	D	F	4	1	0.75	15-50%	0.08	-2.67	0.03	0.48	0.81	0.13	0.81	0.11	N
SG-11-PW-6	D	S	5	0	1.00	0-15%	0.04	-3.29	0.01	0.23	0.96	0.80	0.97	0.85	N
SG-7-PW-12	D	F	4	0	1.00	0-15%	0.06	-2.90	0.04	0.58	0.70	0.01	0.76	0.05	Ln
SG-7-PW-12	D	S	4	0	1.00	0-15%	0.10	-2.57	0.07	0.78	0.90	0.44	0.98	0.91	N
SG-7-PW-6	D	F	4	0	1.00	0-15%	0.10	-2.58	0.08	0.94	0.89	0.39	0.89	0.40	N
SG-7-PW-6	D	S	5	0	1.00	0-15%	0.14	-2.40	0.15	0.97	0.73	0.02	0.94	0.66	NP
SG-7-WP-36	D	F	3	0	1.00	0-15%	0.06	-3.35	0.08	1.28	0.79	0.08	0.87	0.30	N
SG-7-WP-36	D	S	6	0	1.00	0-15%	0.37	-2.14	0.49	1.74	0.68	0.00	0.82	0.09	NP
SG-8-PW-12	D	F	4	0	1.00	0-15%	0.11	-2.60	0.09	1.02	0.83	0.16	0.79	0.08	N
SG-8-PW-12	D	S	4	0	1.00	0-15%	0.07	-2.76	0.04	0.61	0.86	0.27	0.85	0.24	N
SG-8-PW-6	D	F	5	0	1.00	0-15%	0.12	-2.49	0.09	0.99	0.82	0.13	0.80	0.08	N
SG-8-PW-6	D	S	4	0	1.00	0-15%	0.07	-2.66	0.03	0.42	0.82	0.14	0.84	0.20	N
SG-8-WP-36	D	F	4	0	1.00	0-15%	0.13	-2.22	0.08	0.70	0.75	0.04	0.77	0.06	NP
SG-8-WP-36	D	S	5	0	1.00	0-15%	0.10	-2.29	0.03	0.26	0.87	0.25	0.90	0.39	N
SG-9-PW-12	D	F	5	0	1.00	0-15%	0.14	-2.27	0.11	0.85	0.88	0.31	0.94	0.65	N
SG-9-PW-12	D	S	4	0	1.00	0-15%	0.37	-1.47	0.31	1.42	0.98	0.91	0.87	0.28	N
SG-9-PW-6	D	F	6	0	1.00	0-15%	0.13	-2.14	0.06	0.42	0.76	0.02	0.81	0.07	NP
SG-9-PW-6	D	S	4	0	1.00	0-15%	0.38	-1.47	0.32	1.43	0.98	0.88	0.87	0.30	N
SG-9-WP-36	D	F	5	0	1.00	0-15%	0.24	-1.55	0.14	0.53	0.76	0.04	0.86	0.24	NP
SG-9-WP-36	D	S	4	0	1.00	0-15%	0.56	-1.17	0.58	1.47	0.85	0.23	0.91	0.47	N
US-1D	U	F	10	1	0.90	0-15%	0.04	-3.22	0.02	0.37	0.65	0.00	0.78	0.01	Ln
US-1D	U	S	9	1	0.89	0-15%	0.04	-3.19	0.02	0.38	0.67	0.00	0.80	0.02	Ln
US-1I	U	F	10	2	0.80	15-50%	0.05	-3.18	0.03	0.53	0.75	0.00	0.85	0.06	NP
US-1I	U	S	9	2	0.78	15-50%	0.05	-3.14	0.03	0.50	0.68	0.00	0.78	0.01	Ln

Table 4. Background Assessment Detection Rate and Normality Results

Holden 2020 ACAR Statistical Assessment

Well	Gradient Location	Season	Analyses	Non-Detects	Non-Detect Rate	Non-Detect Range	Mean	ln(Mean)	stdev	ln(stdev)	W	p	ln(W)	ln(p)	Normality*
US-1S	U	F	9	1	0.89	0-15%	0.05	-3.10	0.03	0.45	0.81	0.03	0.87	0.13	NP
US-1S	U	S	9	2	0.78	15-50%	0.04	-3.35	0.03	0.65	0.70	0.00	0.80	0.02	Ln
DS-5	D	F	5	2	0.60	15-50%	0.07	-2.80	0.03	0.51	0.88	0.30	0.91	0.46	N

D= Downgradient, U= Upgradient, S= Spring, F= Fall, N= Normal, NP= Nonparametric, NP-ND= Insufficient Data, Ln= Lognormal

Table 5. Background Assessment Mann-Whitney Seasonality Results

Holden 2020 ACAR Statistical Assessment

Well	Location Type	Gradient	Number of Analyses Spring	Number of Analyses Fall	Average Result Spring	Average Result Fall	W Statistic	p-value
Lead, Total, µg/L								
SG-10-WP-36	PW	D	9	8	0.09	0.13	27.00	0.40
SG-10-PW-6	PW	D	10	8	0.13	0.10	34.00	0.60
DS-9I	MW	D	9	9	0.13	0.21	46.00	0.66
DS-4DD	MW	D	9	10	0.15	0.19	48.00	0.83
DS-13S	MW	D	5	4	0.13	0.12	10.50	1.00
Copper, Total, µg/L								
MW-1	MW	D	7	8	1.84	0.63	55.00	**0.00**
SG-10-PW-12	PW	D	9	9	4.59	14.33	8.00	**0.00**
SG-10-PW-6	PW	D	10	9	6.33	16.33	13.00	**0.01**
SG-9-PW-6	PW	D	4	6	2.96	1.67	22.00	**0.04**
SG-7-PW-12	PW	D	4	4	4.14	1.32	15.00	0.06
MW-3	MW	D	7	7	59.47	102.99	39.00	0.07
DS-4D	MW	D	8	10	0.46	0.68	20.50	0.08
SG-8-PW-6	PW	D	4	5	3.43	1.87	17.00	0.11
SG-8-PW-12	PW	D	4	4	3.09	1.64	14.00	0.11
SG-9-PW-12	PW	D	4	5	2.73	1.63	16.00	0.19
MW-2	MW	D	8	8	9.98	8.63	44.00	0.23
DS-3S	MW	D	9	9	0.46	0.44	50.00	0.37
SG-11-PW-6	PW	D	5	4	2.00	3.15	6.00	0.41
SG-7-PW-6	PW	D	5	4	7.71	5.71	14.00	0.41
SG-9-WP-36	PW	D	4	5	3.31	2.10	14.00	0.41
DS-13I	MW	D	5	5	14.11	22.78	8.00	0.42
RC-6-WP-36	PW	U	10	10	0.68	0.87	61.00	0.43
DS-9D	MW	D	9	11	0.43	0.54	41.00	0.52
DS-13S	MW	D	5	4	36.68	43.15	7.00	0.56

Table 5. Background Assessment Mann-Whitney Seasonality Results

Holden 2020 ACAR Statistical Assessment

Well	Location Type	Gradient	Number of Analyses Spring	Number of Analyses Fall	Average Result Spring	Average Result Fall	W Statistic	p-value
SG-11-PW-12	PW	D	4	4	1.76	1.12	10.50	0.56
RC-6-PW-12	PW	U	10	10	0.64	0.57	57.50	0.60
DS-9I	MW	D	9	9	15.37	15.61	47.00	0.60
DS-4DD	MW	D	9	10	1.00	0.92	51.00	0.65
DS-12S	MW	D	4	4	72.25	41.60	10.00	0.69
DS-4S	MW	D	8	9	0.43	0.44	32.00	0.73
US-1D	MW	U	9	10	0.45	0.43	49.00	0.74
RC-6-PW-6	PW	U	10	11	0.67	0.60	50.00	0.75
US-1I	MW	U	9	10	0.48	0.64	42.00	0.81
DS-9S	MW	D	9	9	0.39	0.38	43.00	0.85
US-1S	MW	U	9	9	0.45	0.44	42.50	0.89
DS-3D	MW	D	9	10	0.47	0.71	46.00	0.97
DS-12I	MW	D	5	5	15.28	5.01	13.00	1.00
SG-10-WP-36	PW	D	9	9	13.58	13.37	41.00	1.00
SG-8-WP-36	PW	D	5	4	3.99	3.97	10.00	1.00
Zinc, Total, µg/L								
SG-11-PW-6	PW	D	5	4	7.58	16.98	0.00	**0.02**
MW-3	MW	D	7	7	466.43	527.29	42.00	**0.03**
RC-6-WP-36	PW	U	10	11	35.22	16.29	85.50	**0.03**
SG-10-PW-12	PW	D	9	9	94.06	180.67	16.50	**0.04**
SG-10-PW-6	PW	D	10	9	123.48	191.00	21.00	0.05
DS-4S	MW	D	8	9	12.27	20.09	17.00	0.07
DS-3D	MW	D	9	10	14.28	25.19	24.00	0.09
US-1S	MW	U	9	9	1.63	3.51	22.00	0.11
SG-8-WP-36	PW	D	5	4	32.12	23.65	16.00	0.18
DS-9D	MW	D	9	11	3.75	5.80	32.00	0.20

Table 5. Background Assessment Mann-Whitney Seasonality Results

Holden 2020 ACAR Statistical Assessment

Well	Location Type	Gradient	Number of Analyses Spring	Number of Analyses Fall	Average Result Spring	Average Result Fall	W Statistic	p-value
SG-9-WP-36	PW	D	4	5	50.41	31.42	15.00	0.26
MW-2	MW	D	8	8	80.54	88.76	21.00	0.28
DS-9S	MW	D	9	9	14.60	12.06	52.50	0.31
DS-13I	MW	D	5	5	188.00	318.80	7.00	0.31
MW-1	MW	D	7	8	65.47	45.39	37.00	0.34
DS-9I	MW	D	9	9	356.44	281.11	52.00	0.34
SG-11-PW-12	PW	D	4	4	6.34	11.08	4.00	0.34
DS-3S	MW	D	9	9	10.32	20.14	29.50	0.35
DS-13S	MW	D	5	4	367.00	458.00	6.00	0.41
SG-7-PW-6	PW	D	5	4	63.47	20.94	14.00	0.41
SG-9-PW-12	PW	D	4	5	39.78	23.23	14.00	0.41
US-1I	MW	U	9	10	2.31	9.36	35.00	0.43
DS-4DD	MW	D	9	10	4.69	9.24	35.50	0.46
SG-7-PW-12	PW	D	4	4	31.35	10.50	11.00	0.49
RC-6-PW-12	PW	U	10	11	11.22	55.67	47.00	0.60
RC-6-PW-6	PW	U	10	11	37.65	152.08	47.00	0.60
SG-9-PW-6	PW	D	4	6	38.84	25.03	15.00	0.61
US-1D	MW	U	9	10	2.34	2.51	39.50	0.68
DS-4D	MW	D	8	10	21.85	23.29	35.00	0.69
SG-8-PW-6	PW	D	4	5	14.93	23.39	8.00	0.73
SG-8-PW-12	PW	D	4	4	13.28	17.68	7.00	0.89
SG-10-WP-36	PW	D	9	9	309.44	249.44	42.00	0.93
DS-12I	MW	D	5	5	146.86	67.24	12.00	1.00
DS-12S	MW	D	4	4	1063.75	785.00	8.00	1.00
Aluminum, Total, µg/L								
SG-7-PW-12	PW	D	4	4	55.64	13.46	14.00	0.11

Table 5. Background Assessment Mann-Whitney Seasonality Results

Holden 2020 ACAR Statistical Assessment

Well	Location Type	Gradient	Number of Analyses Spring	Number of Analyses Fall	Average Result Spring	Average Result Fall	W Statistic	p-value
RC-6-WP-36	PW	U	10	10	32.42	66.72	68.50	0.17
DS-13I	MW	D	5	5	840.15	1912.12	6.00	0.22
DS-9I	MW	D	9	9	5650.69	3516.28	55.00	0.22
RC-6-PW-12	PW	U	10	10	22.56	22.19	65.50	0.25
SG-10-PW-12	PW	D	9	9	358.83	1316.79	30.00	0.39
SG-8-WP-36	PW	D	5	4	34.64	43.40	6.00	0.41
SG-10-PW-6	PW	D	10	9	769.63	1486.65	35.00	0.45
DS-4D	MW	D	8	10	76.02	104.29	32.00	0.50
US-1I	MW	U	9	10	25.05	36.57	53.00	0.54
DS-4S	MW	D	8	8	22.02	17.85	37.50	0.59
DS-3D	MW	D	9	10	27.11	50.89	38.50	0.62
SG-10-WP-36	PW	D	9	9	2609.86	2413.88	46.50	0.63
RC-6-PW-6	PW	U	10	11	61.53	28.91	61.50	0.67
MW-2	MW	D	8	8	11.23	27.40	27.50	0.67
MW-3	MW	D	7	7	27.76	204.94	28.00	0.70
SG-11-PW-6	PW	D	5	4	32.57	48.48	8.00	0.71
DS-13S	MW	D	5	4	1999.20	2745.73	8.00	0.73
SG-8-PW-6	PW	D	4	5	33.70	26.45	12.00	0.73
SG-9-WP-36	PW	D	4	5	119.15	57.64	12.00	0.73
US-1S	MW	U	9	9	21.33	22.97	36.50	0.75
SG-9-PW-6	PW	D	4	6	88.28	44.65	14.00	0.76
DS-12S	MW	D	4	4	789.18	1138.52	7.00	0.89
DS-4DD	MW	D	9	10	228.19	238.84	43.00	0.90
SG-7-PW-6	PW	D	5	4	103.36	103.98	11.00	0.90
MW-1	MW	D	7	8	18.08	16.87	29.00	0.95
DS-9S	MW	D	9	8	21.75	20.43	37.00	0.96
DS-12I	MW	D	5	5	50.27	108.34	12.00	1.00

Table 5. Background Assessment Mann-Whitney Seasonality Results

Holden 2020 ACAR Statistical Assessment

Well	Location Type	Gradient	Number of Analyses Spring	Number of Analyses Fall	Average Result Spring	Average Result Fall	W Statistic	p-value
Iron, Total, µg/L								
DS-4D	MW	D	8	10	33.35	13.65	61.00	0.07
SG-10-PW-6	PW	D	10	9	79.57	19.16	63.00	0.15
SG-10-PW-12	PW	D	9	9	34.69	18.22	56.00	0.18
DS-12S	MW	D	4	4	41.08	9554.68	3.00	0.20
DS-13I	MW	D	5	5	10.33	3653.22	6.00	0.22
RC-6-WP-36	PW	U	10	10	28.06	52.56	66.00	0.24
DS-9I	MW	D	9	9	4292.43	5328.95	53.00	0.30
US-1D	MW	U	9	10	31.15	20.05	57.50	0.32
SG-8-PW-12	PW	D	4	4	69.70	53.80	12.00	0.34
SG-9-PW-6	PW	D	4	6	70.85	98.65	7.00	0.35
SG-11-PW-6	PW	D	5	4	51.47	154.45	6.00	0.41
DS-9D	MW	D	9	11	30.82	19.89	60.50	0.42
SG-8-PW-6	PW	D	4	5	65.60	172.86	6.50	0.46
RC-6-PW-6	PW	U	10	11	69.21	33.28	65.50	0.48
SG-7-PW-6	PW	D	5	4	697.62	1479.30	7.00	0.56
SG-9-WP-36	PW	D	4	5	95.56	57.68	13.00	0.56
RC-6-PW-12	PW	U	10	10	18.27	26.62	56.50	0.65
DS-12I	MW	D	5	5	6.94	96.77	10.00	0.69
DS-13S	MW	D	5	4	6601.42	858.90	8.00	0.73
SG-10-WP-36	PW	D	9	9	557.28	904.37	36.50	0.76
US-1I	MW	U	9	10	31.34	30.79	48.50	0.80
SG-7-PW-12	PW	D	4	4	153.17	171.28	9.00	0.89
DS-4DD	MW	D	9	10	176.36	193.46	44.00	0.97

Table 5. Background Assessment Mann-Whitney Seasonality Results

Holden 2020 ACAR Statistical Assessment

Well	Location Type	Gradient	Number of Analyses Spring	Number of Analyses Fall	Average Result Spring	Average Result Fall	W Statistic	p-value
Cadmium, Total, µg/L								
DS-4S	MW	D	8	9	0.11	0.18	6.00	**0.00**
DS-3S	MW	D	9	9	0.11	0.22	15.00	**0.02**
DS-3D	MW	D	9	10	0.16	0.31	18.50	**0.03**
MW-3	MW	D	7	7	2.48	3.38	40.00	0.05
MW-2	MW	D	8	8	0.57	0.66	13.50	0.06
SG-10-PW-6	PW	D	10	9	1.30	1.92	22.00	0.07
SG-10-PW-12	PW	D	9	9	0.93	1.96	19.50	0.07
SG-9-PW-6	PW	D	4	6	0.38	0.13	18.00	0.24
US-1S	MW	U	9	9	0.04	0.05	27.00	0.25
SG-9-PW-12	PW	D	4	5	0.37	0.14	14.50	0.33
DS-9I	MW	D	9	9	2.40	1.89	52.00	0.33
DS-13I	MW	D	5	5	2.11	2.76	7.50	0.35
DS-13S	MW	D	5	4	2.89	2.16	14.00	0.38
DS-9D	MW	D	9	11	0.08	0.09	39.50	0.47
DS-4D	MW	D	8	10	0.21	0.26	31.50	0.47
DS-12S	MW	D	4	4	11.48	8.31	11.00	0.49
RC-6-PW-6	PW	U	10	10	0.06	0.07	41.50	0.52
SG-9-WP-36	PW	D	4	5	0.56	0.24	13.00	0.53
SG-10-WP-36	PW	D	9	9	3.26	2.67	47.00	0.59
RC-6-PW-12	PW	U	10	10	0.07	0.06	56.00	0.66
SG-8-PW-12	PW	D	4	4	0.07	0.11	6.00	0.66
DS-9S	MW	D	9	9	0.17	0.18	35.50	0.67
MW-1	MW	D	7	8	0.29	0.25	32.00	0.68
SG-7-PW-12	PW	D	4	4	0.10	0.06	10.00	0.69
US-1I	MW	U	9	10	0.05	0.05	50.00	0.71
SG-8-PW-6	PW	D	4	5	0.07	0.12	8.00	0.71

Table 5. Background Assessment Mann-Whitney Seasonality Results

Holden 2020 ACAR Statistical Assessment

Well	Location Type	Gradient	Number of Analyses Spring	Number of Analyses Fall	Average Result Spring	Average Result Fall	W Statistic	p-value
DS-12I	MW	D	5	5	3.89	3.91	14.00	0.84
RC-6-WP-36	PW	U	10	11	0.07	0.08	52.00	0.85
DS-12D	MW	D	4	4	0.84	1.09	7.00	0.89
DS-13D	MW	D	4	4	0.22	0.21	9.00	0.89
SG-7-PW-6	PW	D	5	4	0.14	0.10	11.00	0.90
US-1D	MW	U	9	10	0.04	0.04	46.00	0.97
DS-4DD	MW	D	9	10	0.10	0.11	44.00	0.97
SG-8-WP-36	PW	D	5	4	0.10	0.13	10.00	1.00

MW= Monitoring Well, PW= Pore Water, D= Down Gradient, U= Up Gradient

Bold, shaded p-values are less than 0.05 and the null hypothesis is rejected.

Table 6. Background Assessment Upgradient/Downgradient Mann-Whitney Results - Groundwater

Holden 2020 ACAR Statistical Assessment

Well	Number of Analyses Upgradient	Number of Analyses Downgradient	W Statistic	p.value	Bonferroni p
Lead, Total, µg/L					
DS-12D	65	8	169.50	0.02	1.00
DS-12I	65	10	260.00	0.12	1.00
DS-12S	65	8	307.00	0.20	1.00
DS-13I	65	10	342.50	0.67	1.00
DS-13S	65	9	201.00	0.05	1.00
DS-16D	65	4	153.50	0.35	1.00
DS-17I	65	5	157.50	0.88	1.00
DS-18D	65	4	67.00	0.02	1.00
DS-18I	65	4	98.50	0.21	1.00
DS-3D	65	19	604.00	0.82	1.00
DS-3S	65	18	597.00	0.84	1.00
DS-4D	65	18	570.50	0.80	1.00
DS-4DD	65	19	500.50	0.11	1.00
DS-4I	65	6	271.50	0.02	1.00
DS-4S	65	17	537.50	0.79	1.00
DS-9D	65	20	545.50	0.10	1.00
DS-9I	65	18	375.50	0.00	0.72
DS-9S	65	18	599.50	0.81	1.00
MW-1	65	15	538.00	0.32	1.00
MW-2	65	16	537.50	0.73	1.00
MW-3	65	14	418.00	0.47	1.00
NRC-3DR	65	5	102.50	0.04	1.00
NRC-3IR	65	7	55.50	0.00	0.00
SG-10-WP	65	11	291.00	0.21	1.00
SG-18-WP	65	4	94.50	0.16	1.00
SG-8-WP	65	5	102.50	0.05	1.00
DS-5	65	7	163.50	0.06	1.00
Copper, Total, µg/L					
DS-12D	65	8	228.00	0.54	1.00
DS-12I	65	10	9.00	0.00	0.00
DS-12S	65	8	0.00	0.00	0.00
DS-13I	65	10	0.00	0.00	0.00
DS-13S	65	9	0.00	0.00	0.00
DS-15I	65	4	131.50	0.98	1.00
DS-15S	65	4	19.00	0.00	0.49

Table 6. Background Assessment Upgradient/Downgradient Mann-Whitney Results - Groundwater

Holden 2020 ACAR Statistical Assessment

Well	Number of Analyses Upgradient	Number of Analyses Downgradient	W Statistic	p.value	Bonferroni p
DS-16I	65	5	16.00	0.00	0.08
DS-16S	65	4	7.00	0.00	0.16
DS-17I	65	5	0.00	0.00	0.02
DS-17S	65	5	0.00	0.00	0.02
DS-18D	65	4	107.00	0.53	1.00
DS-18I	65	4	0.00	0.00	0.08
DS-18S	65	4	48.00	0.02	1.00
DS-3D	65	21	765.50	0.38	1.00
DS-3S	65	20	706.50	0.52	1.00
DS-4D	65	21	610.50	0.44	1.00
DS-4DD	65	19	507.50	0.22	1.00
DS-4I	65	6	1.00	0.00	0.00
DS-4S	65	19	743.50	0.15	1.00
DS-9D	65	20	698.00	0.59	1.00
DS-9I	65	18	0.00	0.00	0.00
DS-9S	65	18	769.50	0.03	1.00
MW-1	65	15	234.00	0.00	0.24
MW-2	65	16	0.00	0.00	0.00
MW-3	65	14	0.00	0.00	0.00
NRC-3DR	65	5	84.50	0.06	1.00
NRC-3IR	65	7	0.00	0.00	0.00
NRC-3SR	65	6	186.50	0.86	1.00
SG-10-WP	65	11	0.00	0.00	0.00
SG-17-WP	65	4	6.00	0.00	0.14
SG-18-WP	65	4	64.00	0.07	1.00
SG-8-WP	65	5	167.00	0.92	1.00
SG-9-WP	65	4	0.00	0.00	0.08
DS-5	65	9	329.00	0.52	1.00
Zinc, Total, µg/L					
DS-12D	65	8	156.00	0.07	1.00
DS-12I	65	10	6.00	0.00	0.00
DS-12S	65	8	0.00	0.00	0.00
DS-13D	65	8	223.50	0.52	1.00
DS-13I	65	10	0.00	0.00	0.00
DS-13S	65	9	0.00	0.00	0.00
DS-15I	65	4	151.00	0.60	1.00

Table 6. Background Assessment Upgradient/Downgradient Mann-Whitney Results - Groundwater

Holden 2020 ACAR Statistical Assessment

Well	Number of Analyses Upgradient	Number of Analyses Downgradient	W Statistic	p.value	Bonferroni p
DS-15S	65	4	2.00	0.00	0.21
DS-16D	65	4	147.00	0.67	1.00
DS-16I	65	5	5.00	0.00	0.07
DS-16S	65	4	2.00	0.00	0.21
DS-17I	65	5	0.00	0.00	0.04
DS-17S	65	5	1.00	0.00	0.05
DS-18D	65	4	113.00	0.67	1.00
DS-18I	65	4	0.00	0.00	0.17
DS-18S	65	4	36.00	0.02	1.00
DS-3D	65	21	26.00	0.00	0.00
DS-3S	65	20	45.00	0.00	0.00
DS-4D	65	21	23.00	0.00	0.00
DS-4DD	65	19	286.00	0.00	0.08
DS-4I	65	6	0.00	0.00	0.01
DS-4S	65	19	33.00	0.00	0.00
DS-9D	65	20	314.00	0.00	0.10
DS-9I	65	18	1.00	0.00	0.00
DS-9S	65	18	31.00	0.00	0.00
MW-1	65	15	10.00	0.00	0.00
MW-2	65	16	2.50	0.00	0.00
MW-3	65	14	0.00	0.00	0.00
NRC-3DR	65	5	114.50	0.28	1.00
NRC-3IR	65	7	0.00	0.00	0.00
NRC-3SR	65	6	62.00	0.01	1.00
SG-10-WP	65	11	0.00	0.00	0.00
SG-17-WP	65	4	2.00	0.00	0.21
SG-18-WP	65	4	8.00	0.00	0.36
SG-8-WP	65	5	65.00	0.03	1.00
SG-9-WP	65	4	4.00	0.00	0.25
DS-5	65	9	59.50	0.00	0.02
Aluminum, Total, µg/L					
DS-12D	64	8	368.50	0.04	1.00
DS-12I	64	10	314.00	0.93	1.00
DS-12S	64	8	192.00	0.25	1.00
DS-13D	64	8	406.50	0.01	1.00
DS-13I	64	10	207.00	0.07	1.00

Table 6. Background Assessment Upgradient/Downgradient Mann-Whitney Results - Groundwater

Holden 2020 ACAR Statistical Assessment

Well	Number of Analyses Upgradient	Number of Analyses Downgradient	W Statistic	p.value	Bonferroni p
DS-13S	64	9	210.00	0.19	1.00
DS-15I	64	4	126.00	0.97	1.00
DS-15S	64	4	63.00	0.09	1.00
DS-16D	64	4	68.50	0.12	1.00
DS-16I	64	5	143.00	0.70	1.00
DS-16S	64	4	65.00	0.10	1.00
DS-17I	64	5	0.00	0.00	0.04
DS-17S	64	5	0.00	0.00	0.04
DS-18D	64	4	83.00	0.24	1.00
DS-18I	64	4	0.00	0.00	0.17
DS-18S	64	4	40.00	0.02	1.00
DS-3D	64	21	571.00	0.30	1.00
DS-3S	64	20	638.00	0.99	1.00
DS-4D	64	21	378.00	0.00	0.56
DS-4DD	64	19	374.50	0.01	1.00
DS-4I	64	6	81.00	0.02	1.00
DS-4S	64	18	602.50	0.77	1.00
DS-9D	64	20	694.00	0.57	1.00
DS-9I	64	18	147.00	0.00	0.00
DS-9S	64	17	581.50	0.67	1.00
MW-1	64	15	555.00	0.35	1.00
MW-2	64	16	628.00	0.16	1.00
MW-3	64	14	434.50	0.86	1.00
NRC-3DR	64	5	104.00	0.20	1.00
NRC-3IR	64	7	51.00	0.00	0.17
NRC-3SR	64	6	189.50	0.97	1.00
SG-10-WP	64	11	0.00	0.00	0.00
SG-17-WP	64	4	18.50	0.00	0.89
SG-18-WP	64	4	91.00	0.34	1.00
SG-8-WP	64	5	85.00	0.08	1.00
SG-9-WP	64	4	122.00	0.89	1.00
DS-5	64	9	282.00	0.93	1.00
Iron, Total, µg/L					
DS-12D	65	8	371.50	0.05	1.00
DS-12I	65	10	410.00	0.19	1.00
DS-12S	65	8	252.50	0.90	1.00

Table 6. Background Assessment Upgradient/Downgradient Mann-Whitney Results - Groundwater

Holden 2020 ACAR Statistical Assessment

Well	Number of Analyses Upgradient	Number of Analyses Downgradient	W Statistic	p.value	Bonferroni p
DS-13D	65	8	378.50	0.04	1.00
DS-13I	65	10	370.50	0.48	1.00
DS-13S	65	9	243.00	0.42	1.00
DS-15I	65	4	91.00	0.32	1.00
DS-15S	65	4	0.00	0.00	0.17
DS-16D	65	4	54.00	0.05	1.00
DS-16I	65	5	160.00	0.96	1.00
DS-16S	65	4	14.00	0.00	0.59
DS-17I	65	5	51.00	0.01	1.00
DS-17S	65	5	96.00	0.13	1.00
DS-18D	65	4	12.00	0.00	0.50
DS-18I	65	4	56.00	0.06	1.00
DS-18S	65	4	54.00	0.05	1.00
DS-3D	65	21	649.50	0.74	1.00
DS-3S	65	20	571.00	0.41	1.00
DS-4D	65	21	700.50	0.86	1.00
DS-4DD	65	19	352.00	0.00	0.90
DS-4I	65	6	48.00	0.00	0.48
DS-4S	65	19	556.50	0.51	1.00
DS-9D	65	20	684.00	0.73	1.00
DS-9I	65	18	343.00	0.01	1.00
DS-9S	65	18	636.00	0.57	1.00
MW-1	65	15	585.00	0.23	1.00
MW-2	65	16	590.50	0.40	1.00
MW-3	65	14	515.50	0.44	1.00
NRC-3DR	65	5	104.00	0.18	1.00
NRC-3IR	65	7	25.50	0.00	0.02
NRC-3SR	65	6	243.00	0.32	1.00
SG-10-WP	65	11	201.00	0.02	1.00
SG-17-WP	65	4	95.00	0.37	1.00
SG-18-WP	65	4	107.00	0.56	1.00
SG-8-WP	65	5	0.00	0.00	0.04
SG-9-WP	65	4	120.00	0.81	1.00
DS-5	65	9	290.50	0.98	1.00
Cadmium, Total, µg/L					
DS-12D	65	8	0.00	0.00	0.00

Table 6. Background Assessment Upgradient/Downgradient Mann-Whitney Results - Groundwater

Holden 2020 ACAR Statistical Assessment

Well	Number of Analyses Upgradient	Number of Analyses Downgradient	W Statistic	p.value	Bonferroni p
DS-12I	65	10	0.00	0.00	0.00
DS-12S	65	8	0.00	0.00	0.00
DS-13D	65	8	3.00	0.00	0.00
DS-13I	65	10	0.00	0.00	0.00
DS-13S	65	9	0.00	0.00	0.00
DS-15I	65	4	105.00	0.53	1.00
DS-15S	65	4	3.00	0.00	0.23
DS-16D	65	4	254.00	0.00	0.30
DS-16I	65	5	0.00	0.00	0.04
DS-16S	65	4	0.00	0.00	0.17
DS-17I	65	5	0.00	0.00	0.04
DS-17S	65	5	0.00	0.00	0.04
DS-18D	65	4	149.00	0.63	1.00
DS-18I	65	4	0.00	0.00	0.17
DS-18S	65	4	44.00	0.03	1.00
DS-3D	65	21	68.00	0.00	0.00
DS-3S	65	20	91.50	0.00	0.00
DS-4D	65	21	22.00	0.00	0.00
DS-4DD	65	19	161.50	0.00	0.00
DS-4I	65	6	1.00	0.00	0.01
DS-4S	65	19	64.50	0.00	0.00
DS-9D	65	20	210.50	0.00	0.00
DS-9I	65	18	0.00	0.00	0.00
DS-9S	65	18	24.50	0.00	0.00
MW-1	65	15	41.50	0.00	0.00
MW-2	65	16	0.00	0.00	0.00
MW-3	65	14	0.00	0.00	0.00
NRC-3DR	65	5	74.50	0.04	1.00
NRC-3IR	65	7	0.00	0.00	0.00
NRC-3SR	65	6	149.00	0.34	1.00
SG-10-WP	65	11	0.00	0.00	0.00
SG-17-WP	65	4	0.00	0.00	0.17
SG-18-WP	65	4	44.00	0.03	1.00
SG-8-WP	65	5	227.50	0.14	1.00
SG-9-WP	65	4	0.00	0.00	0.17
DS-5	65	9	116.50	0.00	0.73

Shaded cells reflect results with p<=0.05 (rejection of the null hypotheses)

Table 7. Background Assessment Upgradient/Downgradient Mann Whitney
Results - Porewater

Holden 2020 ACAR Statistical Assessment

Well	Number of Analyses Upgradient	Number of Analyses Downgradient	W Statistic	p.value	Bonferroni p
Aluminum, Total, µg/L					
SG-10-PW-12	61	18	267.00	0.00	0.09
SG-10-PW-6	61	19	248.00	0.00	0.02
SG-10-WP-36	61	18	188.00	0.00	0.00
SG-11-PW-12	61	8	119.50	0.02	1.00
SG-11-PW-6	61	9	172.00	0.07	1.00
SG-7-PW-12	61	8	179.50	0.23	1.00
SG-7-PW-6	61	9	131.00	0.01	1.00
SG-7-WP-36	61	9	146.50	0.02	1.00
SG-8-PW-12	61	8	132.50	0.04	1.00
SG-8-PW-6	61	9	179.00	0.09	1.00
SG-8-WP-36	61	9	169.50	0.07	1.00
SG-9-PW-12	61	9	157.50	0.04	1.00
SG-9-PW-6	61	10	152.50	0.01	1.00
SG-9-WP-36	61	9	122.50	0.01	0.67
SG-11-WP-36	61	8	169.00	0.16	1.00
Lead, Total, µg/L					
SG-10-PW-12	60	17	619.00	0.05	1.00
SG-10-PW-6	60	18	598.50	0.35	1.00
SG-10-WP-36	60	17	672.00	0.01	0.89
SG-11-PW-12	60	7	136.00	0.03	1.00
SG-11-PW-6	60	8	200.50	0.28	1.00
SG-7-PW-12	60	8	305.50	0.07	1.00
SG-7-PW-6	60	9	195.00	0.06	1.00

Table 7. Background Assessment Upgradient/Downgradient Mann Whitney
Results - Porewater

Holden 2020 ACAR Statistical Assessment

Well	Number of Analyses Upgradient	Number of Analyses Downgradient	W Statistic	p.value	Bonferroni p
SG-7-WP-36	60	9	314.00	0.27	1.00
SG-8-PW-12	60	7	219.50	0.77	1.00
SG-8-PW-6	60	8	252.00	0.73	1.00
SG-8-WP-36	60	8	186.00	0.14	1.00
SG-9-PW-12	60	8	280.50	0.22	1.00
SG-11-WP-36	60	7	190.00	0.52	1.00
Iron, Total, µg/L					
SG-10-PW-12	61	18	463.00	0.32	1.00
SG-10-PW-6	61	19	459.50	0.18	1.00
SG-10-WP-36	61	18	318.50	0.01	0.63
SG-11-PW-12	61	8	72.00	0.00	0.11
SG-11-PW-6	61	9	123.00	0.01	0.71
SG-7-PW-12	61	8	141.00	0.05	1.00
SG-7-PW-6	61	9	67.50	0.00	0.03
SG-7-WP-36	61	9	154.50	0.04	1.00
SG-8-PW-12	61	8	97.50	0.01	0.54
SG-8-PW-6	61	9	93.50	0.00	0.13
SG-8-WP-36	61	9	130.50	0.01	1.00
SG-9-PW-12	61	9	99.00	0.00	0.19
SG-9-PW-6	61	10	144.00	0.01	0.70
SG-9-WP-36	61	9	194.50	0.16	1.00
SG-11-WP-36	61	8	157.50	0.11	1.00

Table 7. Background Assessment Upgradient/Downgradient Mann Whitney
Results - Porewater

Holden 2020 ACAR Statistical Assessment

Well	Number of Analyses Upgradient	Number of Analyses Downgradient	W Statistic	p.value	Bonferroni p
Cadmium, Total, µg/L					
SG-10-PW-12	61	18	117.50	0.00	0.00
SG-10-PW-6	61	19	88.00	0.00	0.00
SG-10-WP-36	61	18	0.00	0.00	0.00
SG-11-PW-12	61	8	255.00	0.83	1.00
SG-11-PW-6	61	9	277.50	0.96	1.00
SG-7-PW-12	61	8	199.00	0.38	1.00
SG-7-PW-6	61	9	188.00	0.11	1.00
SG-7-WP-36	61	9	237.50	0.50	1.00
SG-8-PW-12	61	8	186.50	0.25	1.00
SG-8-PW-6	61	9	190.00	0.12	1.00
SG-8-WP-36	61	9	138.00	0.01	0.98
SG-9-PW-12	61	9	146.00	0.02	1.00
SG-9-PW-6	61	10	142.00	0.00	0.39
SG-9-WP-36	61	9	37.00	0.00	0.00
SG-11-WP-36	61	8	178.00	0.18	1.00
Copper, Total, µg/L					
SG-10-PW-12	61	18	30.50	0.00	0.00
SG-10-PW-6	61	19	22.50	0.00	0.00
SG-10-WP-36	61	18	0.00	0.00	0.00
SG-11-PW-12	61	8	68.00	0.00	0.09
SG-11-PW-6	61	9	15.50	0.00	0.00
SG-7-PW-12	61	8	30.00	0.00	0.01
SG-7-PW-6	61	9	18.50	0.00	0.00

Table 7. Background Assessment Upgradient/Downgradient Mann Whitney
Results - Porewater

Holden 2020 ACAR Statistical Assessment

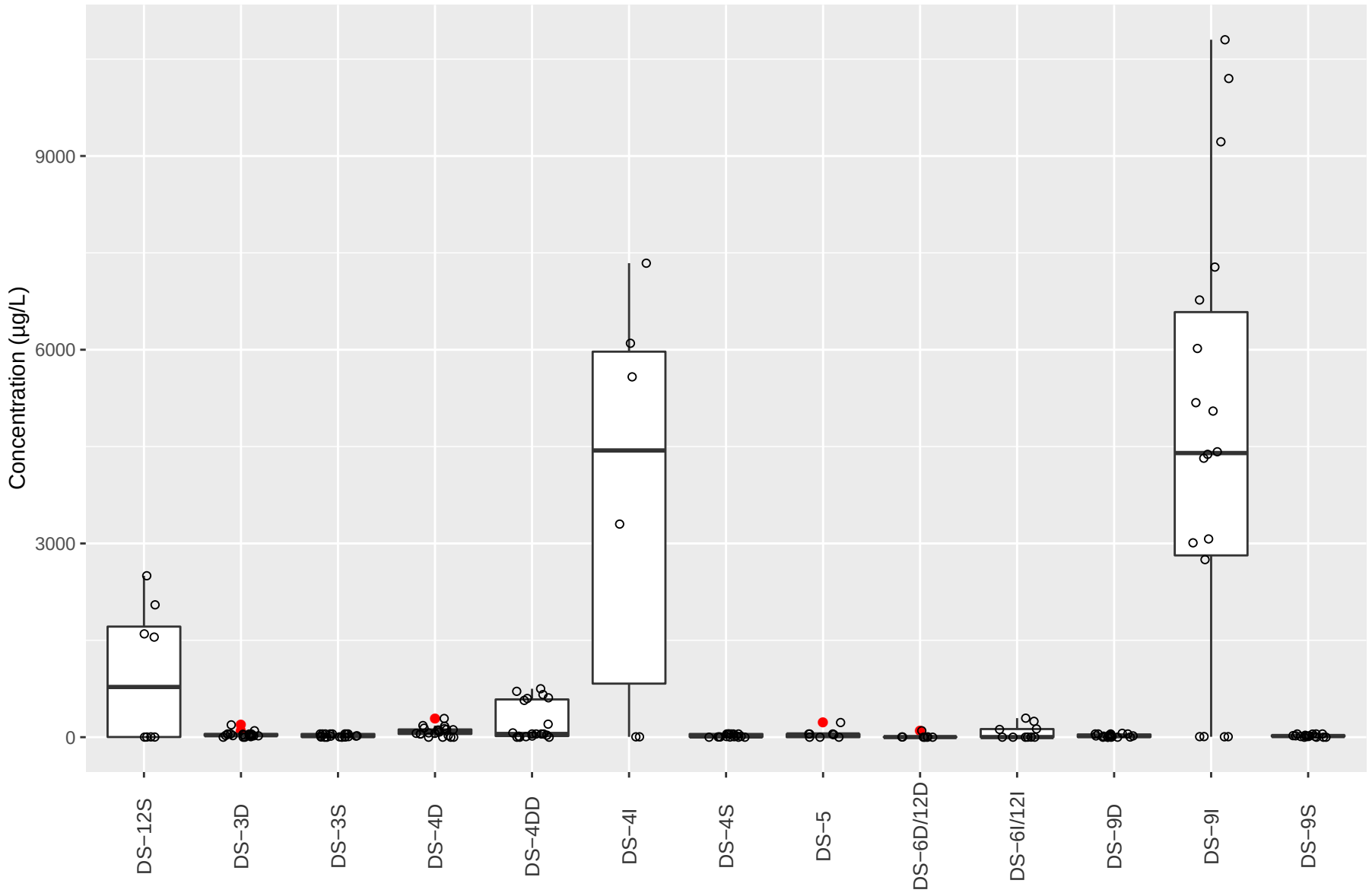
Well	Number of Analyses Upgradient	Number of Analyses Downgradient	W Statistic	p.value	Bonferroni p
SG-7-WP-36	61	9	32.00	0.00	0.00
SG-8-PW-12	61	8	22.50	0.00	0.00
SG-8-PW-6	61	9	22.50	0.00	0.00
SG-8-WP-36	61	9	4.00	0.00	0.00
SG-9-PW-12	61	9	25.00	0.00	0.00
SG-9-PW-6	61	10	18.00	0.00	0.00
SG-9-WP-36	61	9	13.50	0.00	0.00
SG-11-WP-36	61	8	140.00	0.05	1.00
Zinc, Total, µg/L					
SG-10-PW-12	63	18	285.50	0.00	0.12
SG-10-PW-6	63	19	288.00	0.00	0.06
SG-10-WP-36	63	18	80.50	0.00	0.00
SG-11-PW-12	63	8	356.50	0.06	1.00
SG-11-PW-6	63	9	359.00	0.20	1.00
SG-7-PW-12	63	8	283.00	0.58	1.00
SG-7-PW-6	63	9	243.00	0.50	1.00
SG-7-WP-36	63	9	305.00	0.72	1.00
SG-8-PW-12	63	8	294.50	0.44	1.00
SG-8-PW-6	63	9	304.50	0.73	1.00
SG-8-WP-36	63	9	218.00	0.27	1.00
SG-9-PW-12	63	9	251.00	0.59	1.00
SG-9-PW-6	63	10	265.00	0.43	1.00
SG-9-WP-36	63	9	210.00	0.21	1.00
SG-11-WP-36	63	8	411.00	0.00	0.35

Table 7. Background Assessment Upgradient/Downgradient Mann Whitney
Results - Porewater

Holden 2020 ACAR Statistical Assessment

Well	Number of Analyses Upgradient	Number of Analyses Downgradient	W Statistic	p.value	Bonferroni p

Shaded cells reflect results with p<=0.05 (rejection of the null hypotheses)



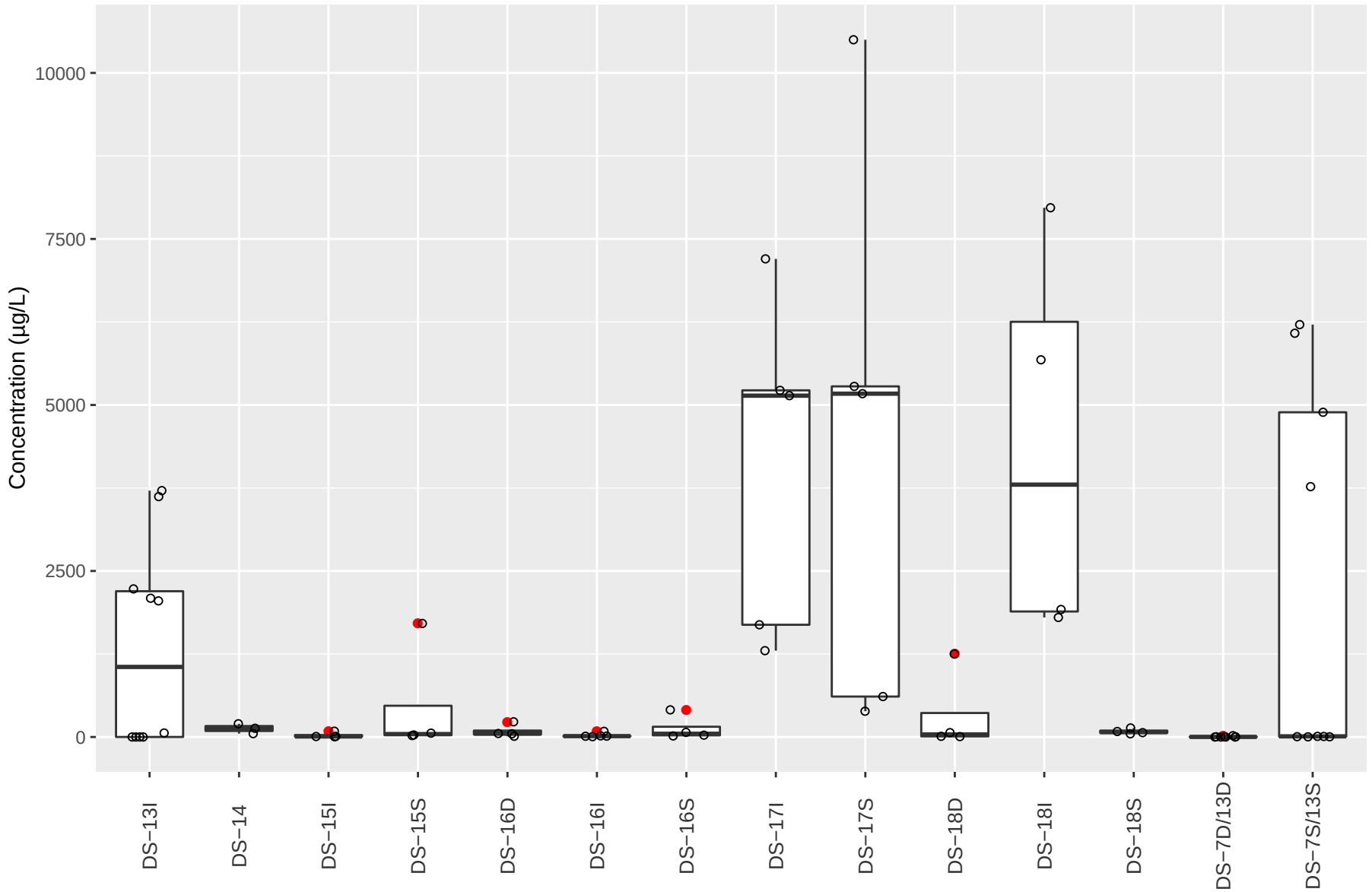
Non−detect values plotted at one half the Method Reporting Limit value
red dots = 1.5*Interquartile Range (IQR), which are potential outliers

Dissolved concentration results not included
Prepared 01/10/2021

Figure 1. Box Plot
Aluminum, Total, µg/L
DS Designated Stations, Set 1

2020 Holden ACAR Statistical Assessment
JS1904

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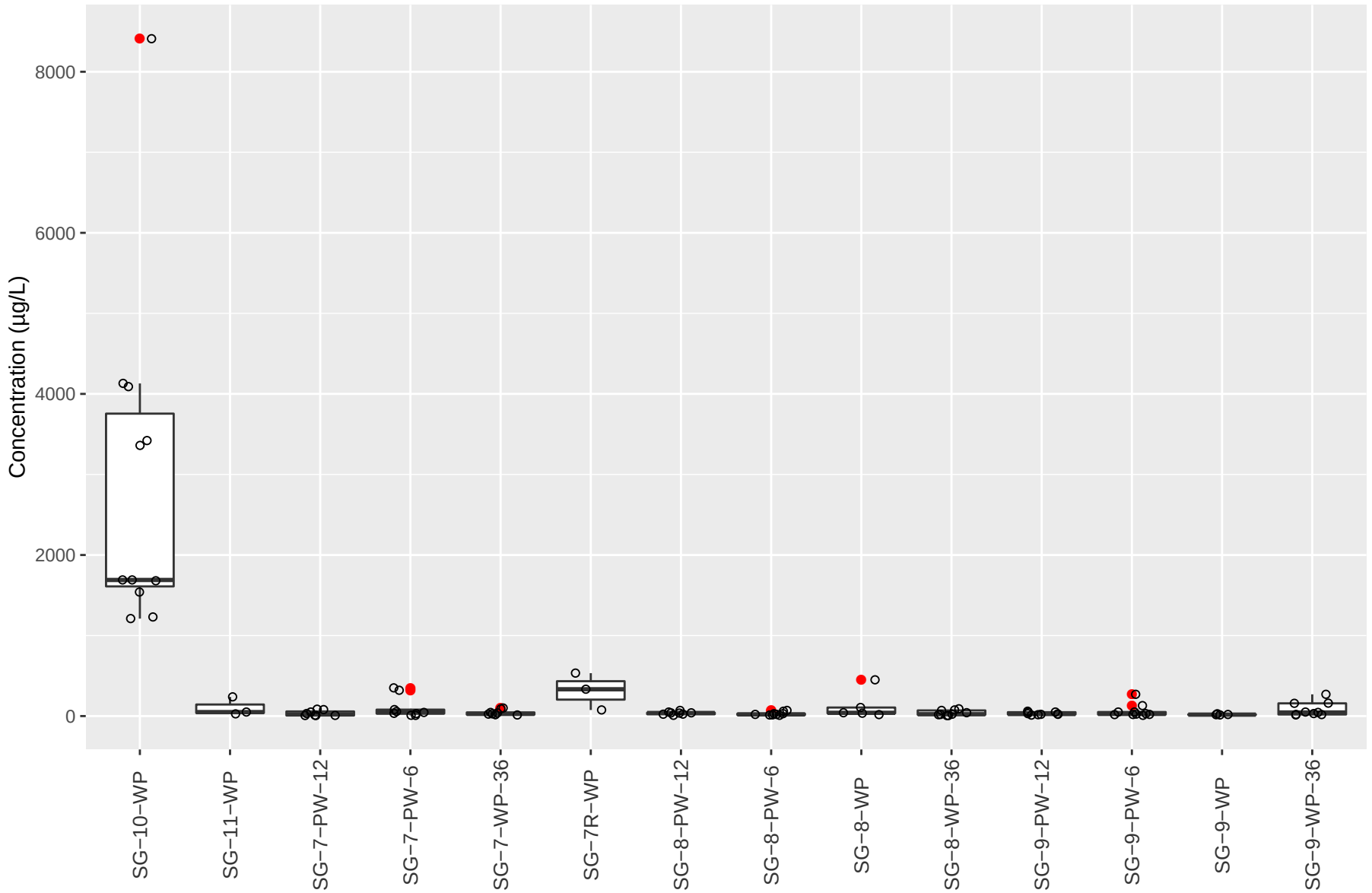
Non−detect values plotted at one half the Method Reporting Limit value
red dots = 1.5*Interquartile Range (IQR), which are potential outliers

Dissolved concentration results not included
Prepared 01/10/2021

Figure 2. Box Plot
Aluminum, Total, µg/L
DS Designated Stations, Set 2

2020 Holden ACAR Statistical Assessment
JS1904

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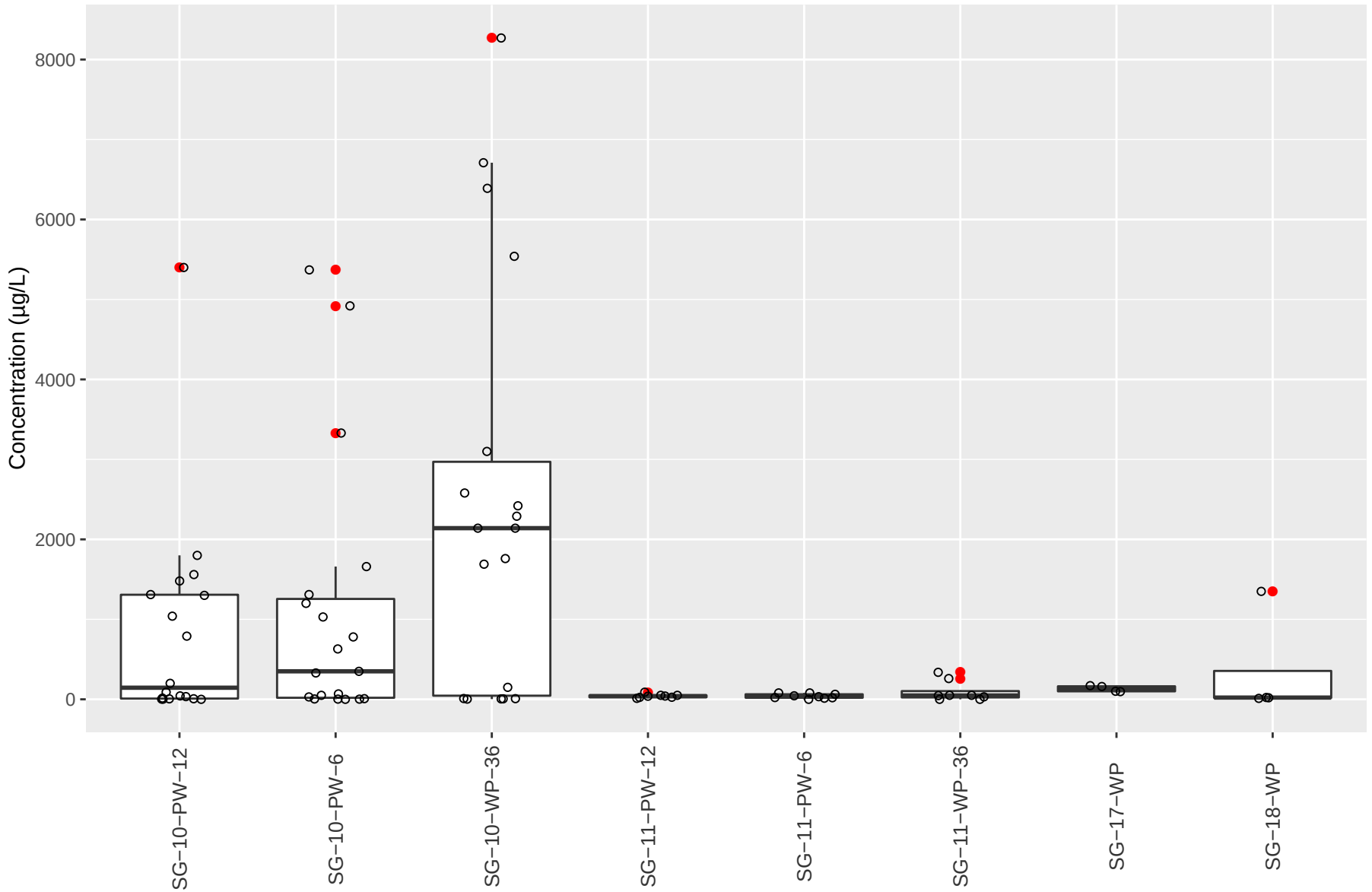
Non−detect values plotted at one half the Method Reporting Limit value
red dots = 1.5*Interquartile Range (IQR), which are potential outliers

Dissolved concentration results not included
Prepared 01/10/2021

Figure 3. Box Plot
Aluminum, Total, µg/L
SG Designated Stations, Set 1

2020 Holden ACAR Statistical Assessment
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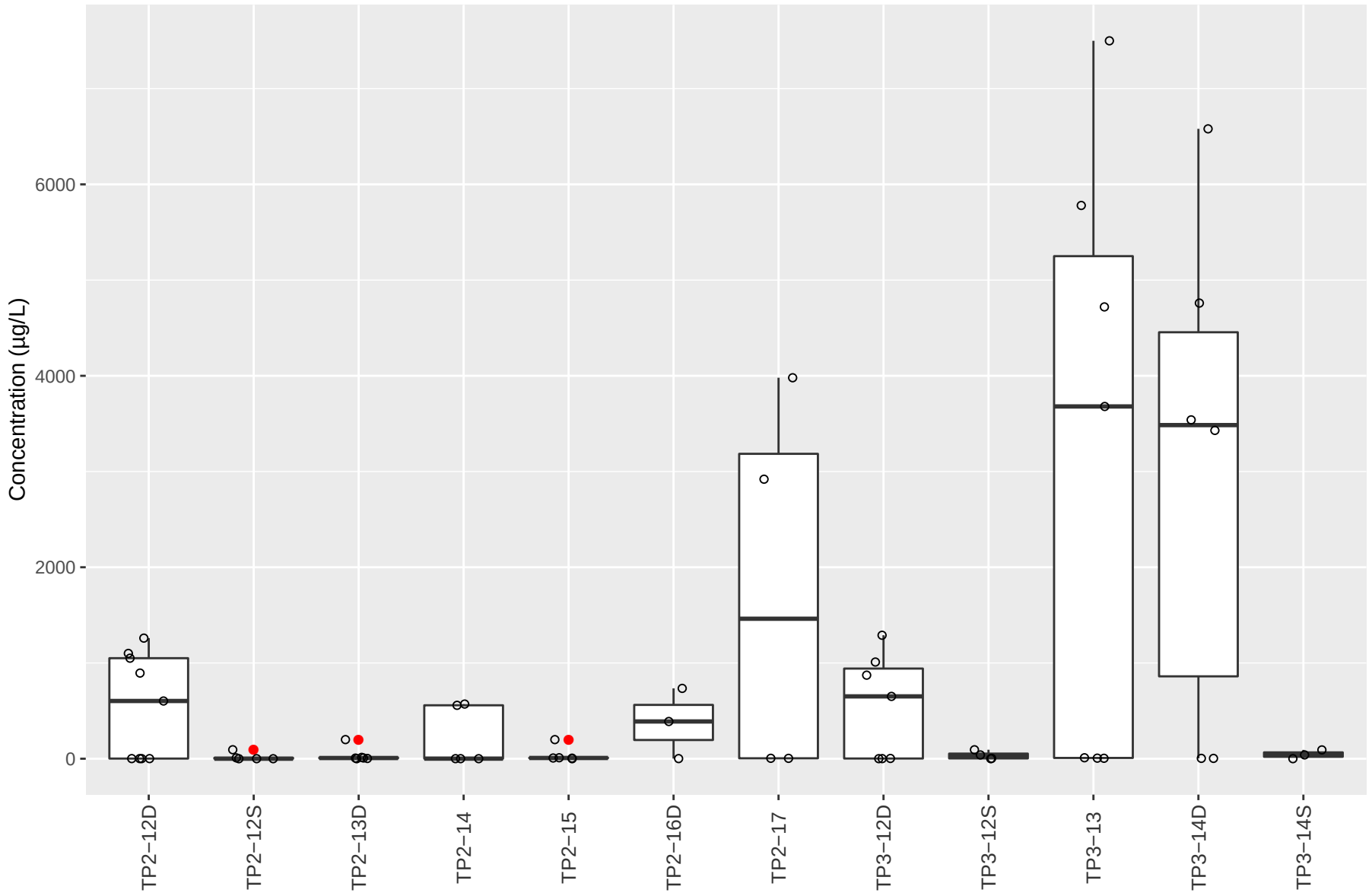
Non−detect values plotted at one half the Method Reporting Limit value
red dots = 1.5*Interquartile Range (IQR), which are potential outliers

Dissolved concentration results not included
Prepared 01/10/2021

Figure 4. Box Plot
Aluminum, Total, µg/L
SG Designated Stations, Set 2

2020 Holden ACAR Statistical Assessment
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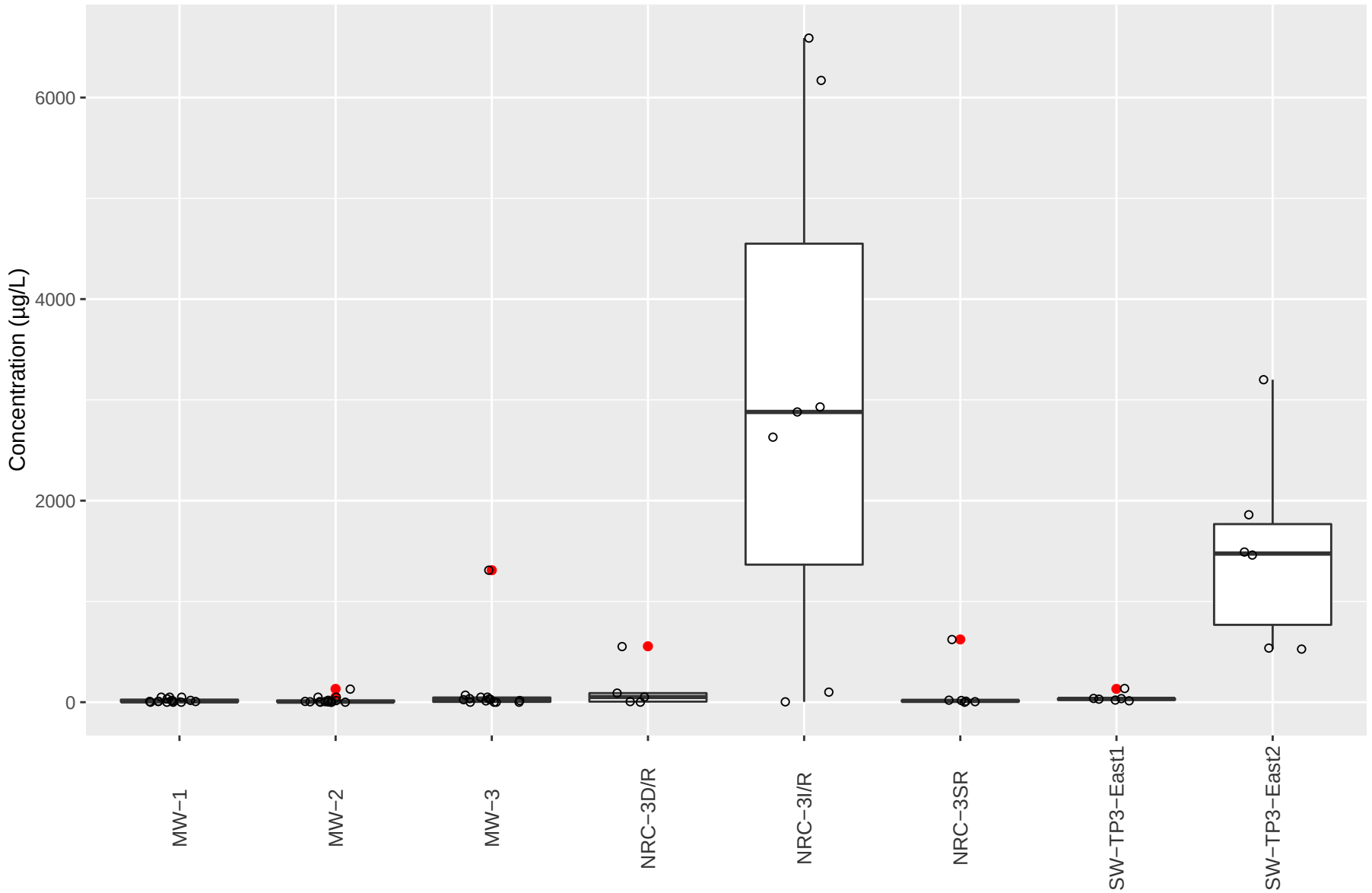
Non−detect values plotted at one half the Method Reporting Limit value
red dots = 1.5*Interquartile Range (IQR), which are potential outliers

Dissolved concentration results not included
Prepared 01/10/2021

Figure 5. Box Plot
Aluminum, Total, µg/L
TP Designated Stations

2020 Holden ACAR Statistical Assessment
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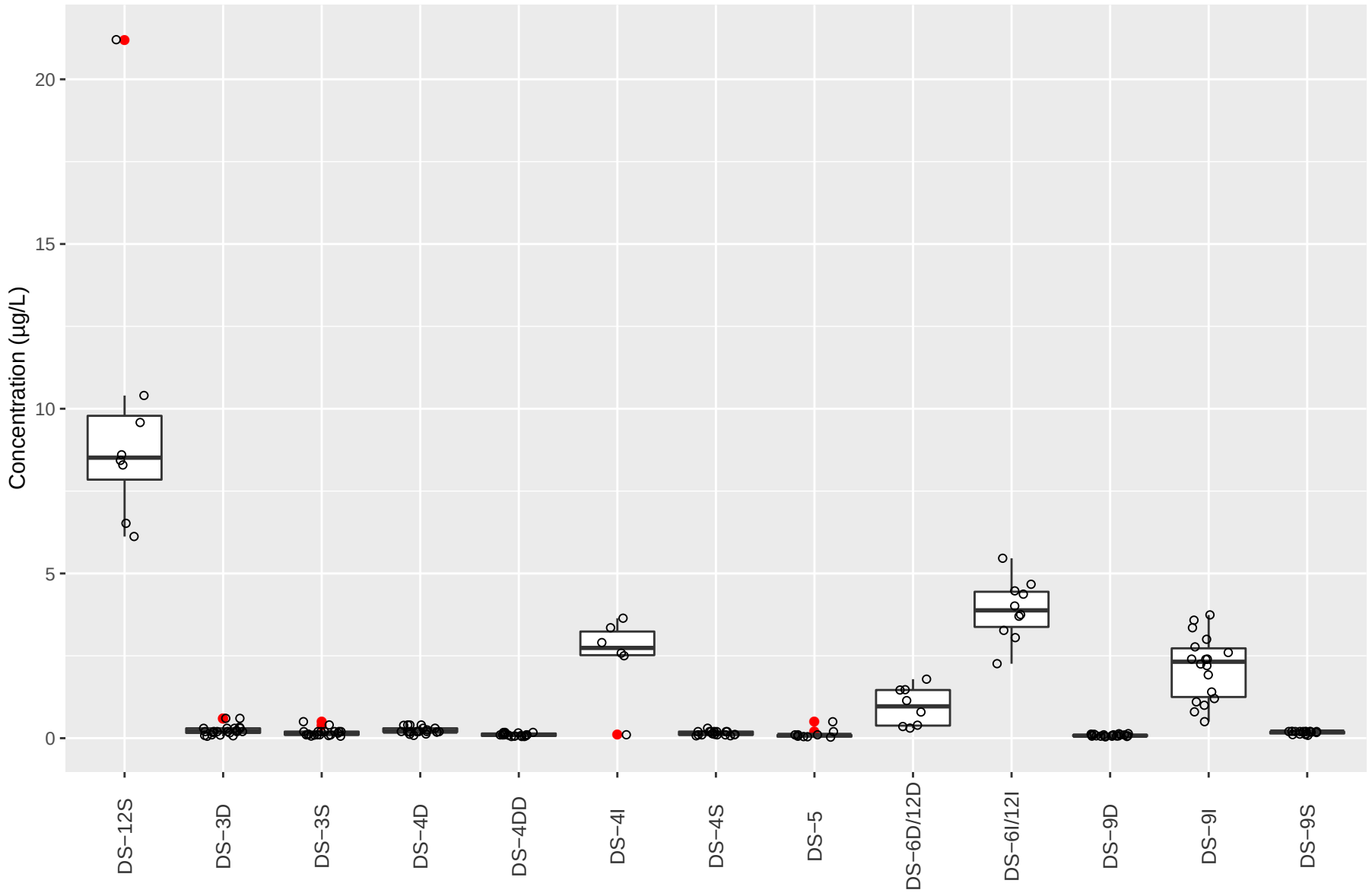
Non−detect values plotted at one half the Method Reporting Limit value
red dots = 1.5*Interquartile Range (IQR), which are potential outliers

Dissolved concentration results not included
Prepared 01/10/2021

Figure 6. Box Plot
Aluminum, Total, µg/L
SW/NRC/MW Designated Stations

2020 Holden ACAR Statistical Assessment
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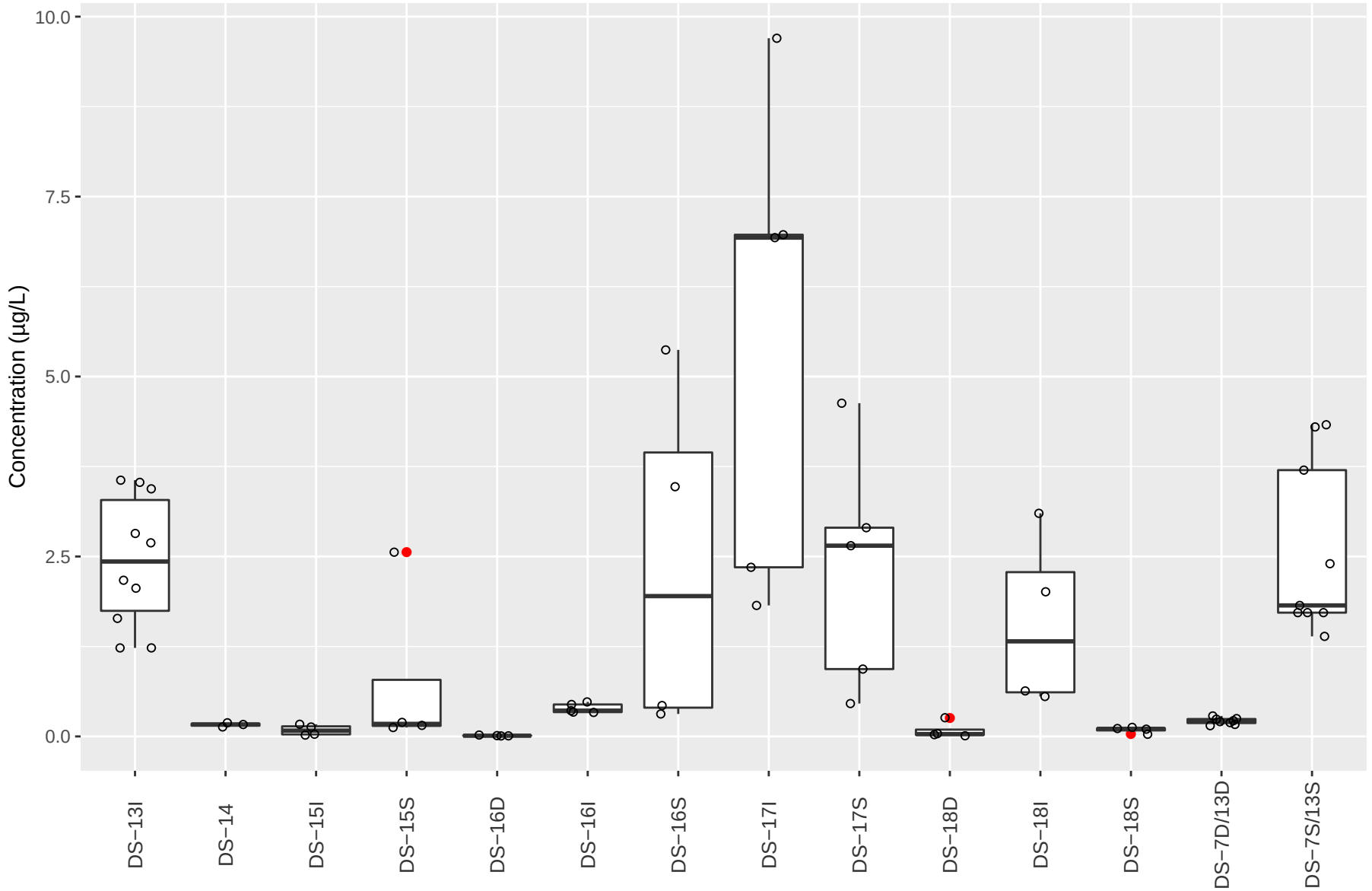
Non−detect values plotted at one half the Method Reporting Limit value
red dots = 1.5*Interquartile Range (IQR), which are potential outliers

Dissolved concentration results not included
Prepared 01/10/2021

Figure 7. Box Plot
Cadmium, Total, µg/L
DS Designated Stations, Set 1

2020 Holden ACAR Statistical Assessment
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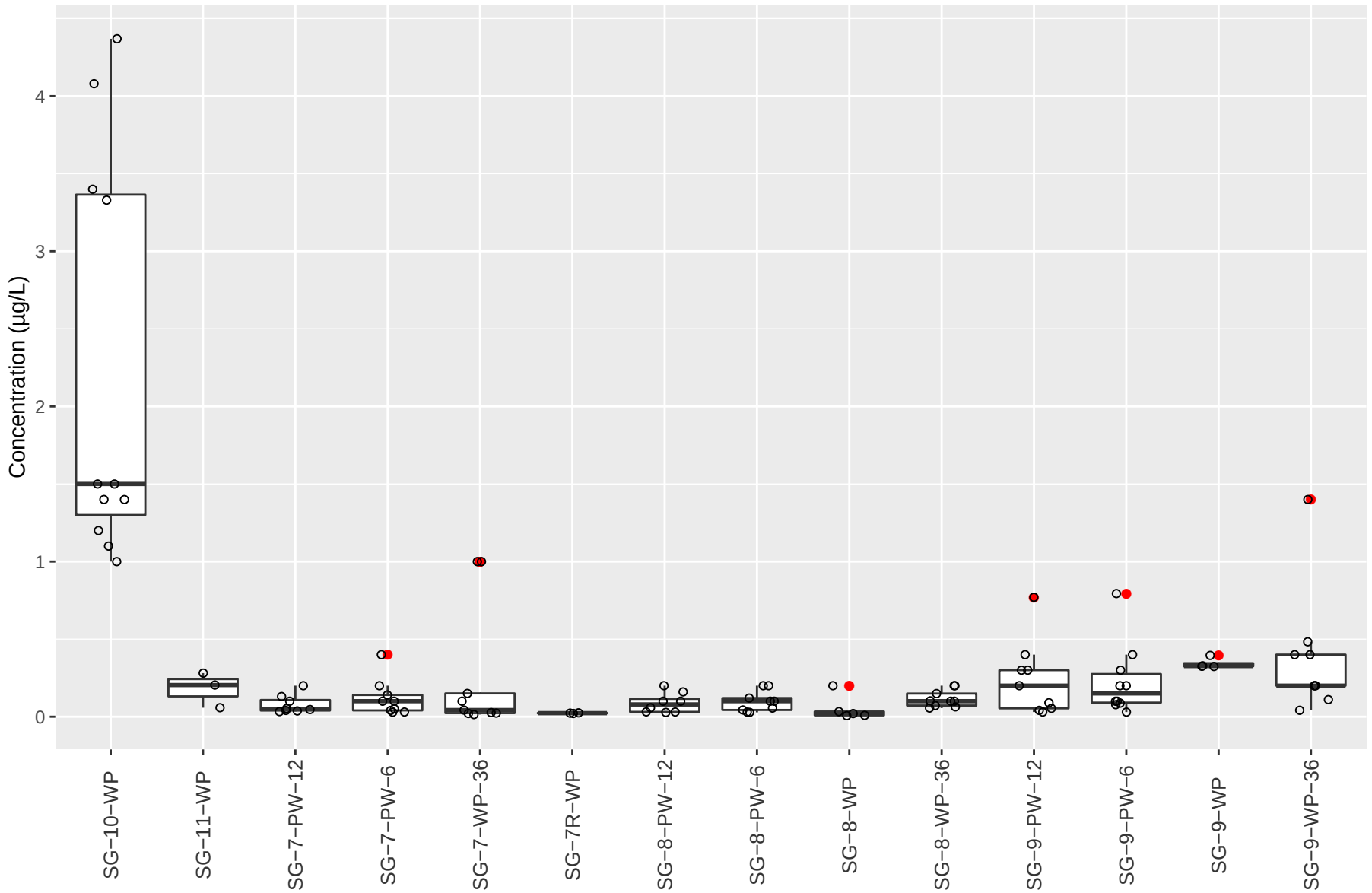
Non−detect values plotted at one half the Method Reporting Limit value
red dots = 1.5*Interquartile Range (IQR), which are potential outliers

Dissolved concentration results not included
Prepared 01/10/2021

Figure 8. Box Plot
Cadmium, Total, µg/L
DS Designated Stations, Set 2

2020 Holden ACAR Statistical Assessment
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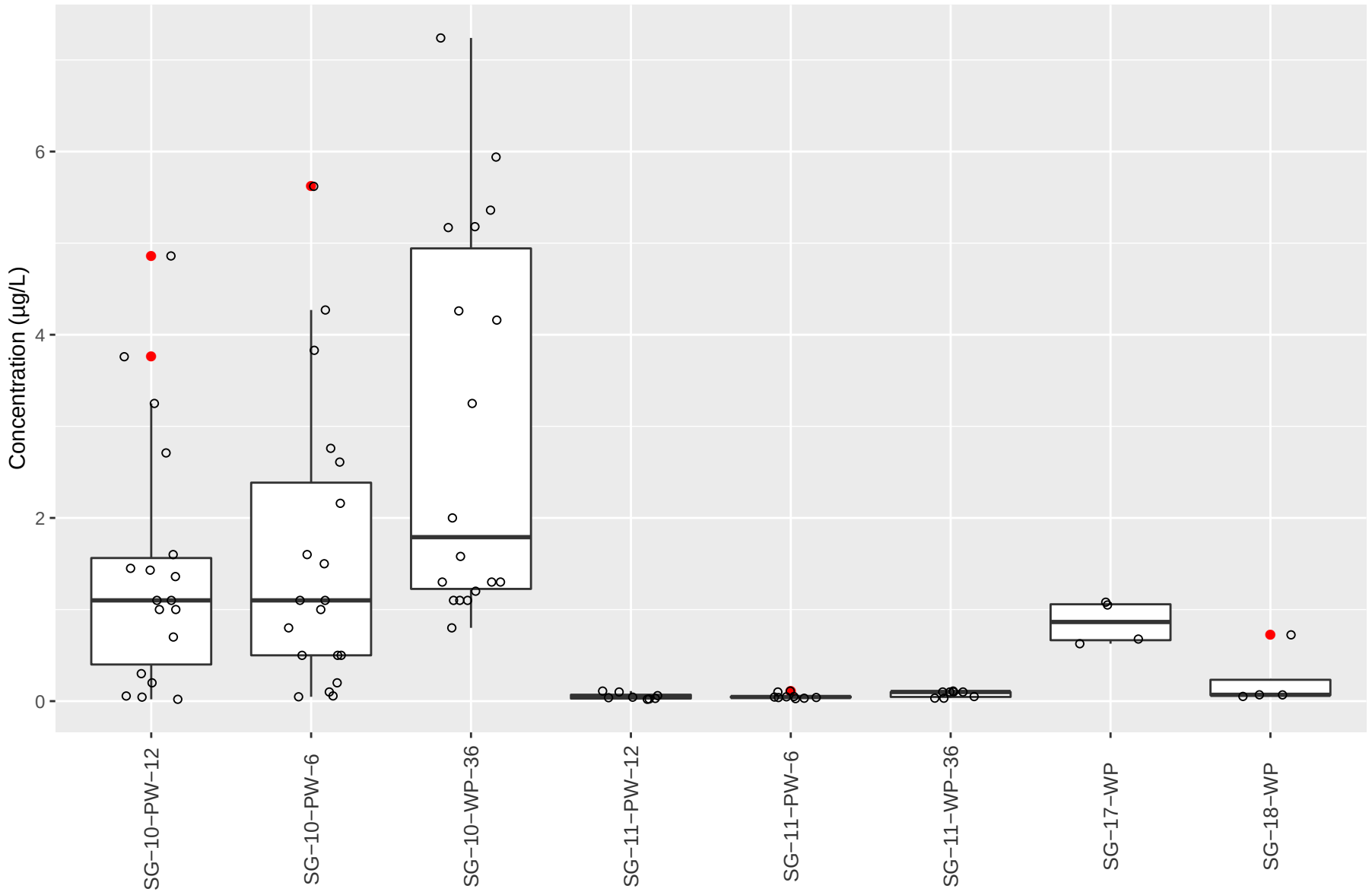
Non−detect values plotted at one half the Method Reporting Limit value
red dots = 1.5*Interquartile Range (IQR), which are potential outliers

Dissolved concentration results not included
Prepared 01/10/2021

Figure 9. Box Plot
Cadmium, Total, µg/L
SG Designated Stations, Set 1

2020 Holden ACAR Statistical Assessment
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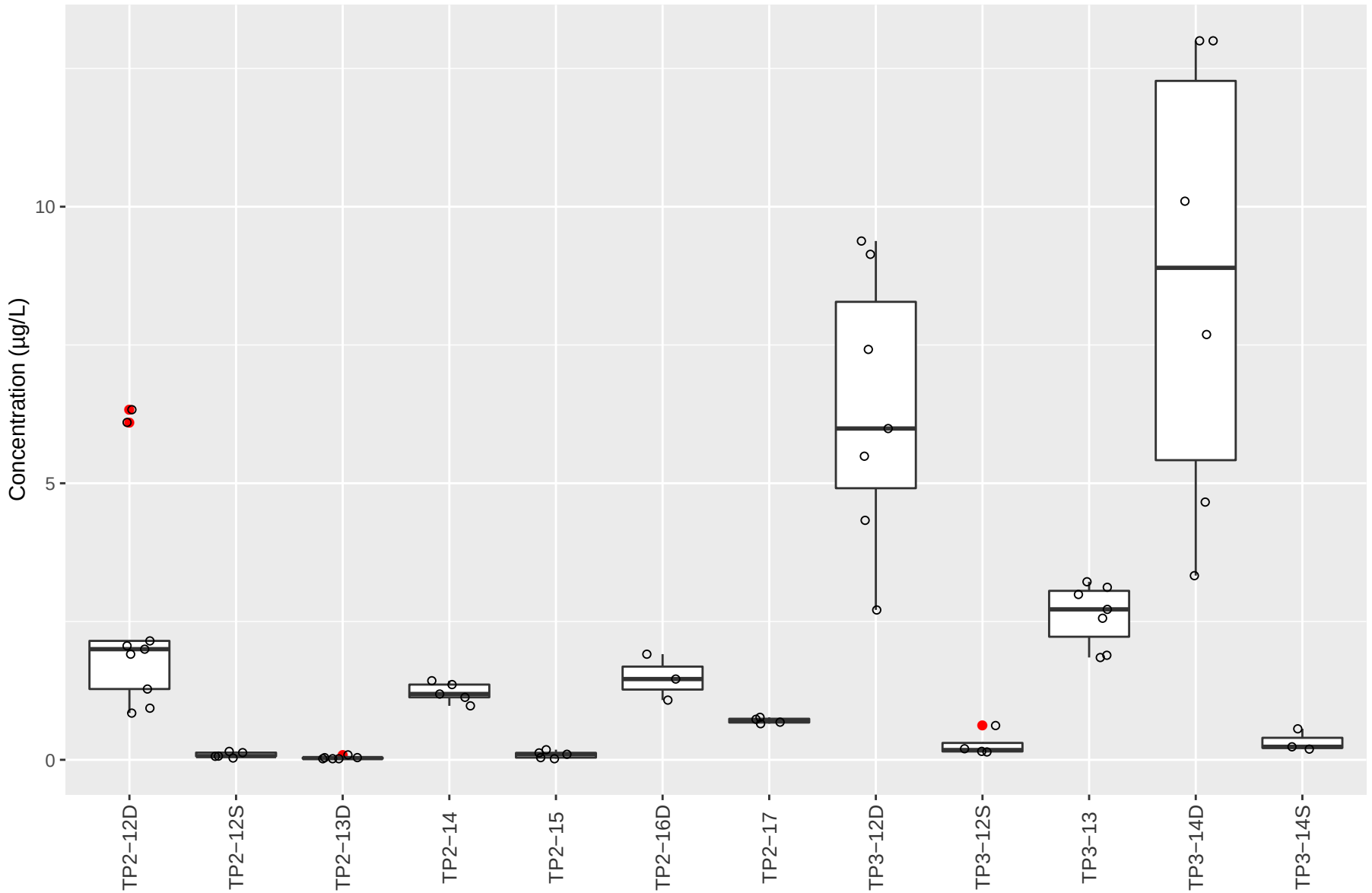
Non−detect values plotted at one half the Method Reporting Limit value
red dots = 1.5*Interquartile Range (IQR), which are potential outliers

Dissolved concentration results not included
Prepared 01/10/2021

Figure 10. Box Plot
Cadmium, Total, µg/L
SG Designated Stations, Set 2

2020 Holden ACAR Statistical Assessment
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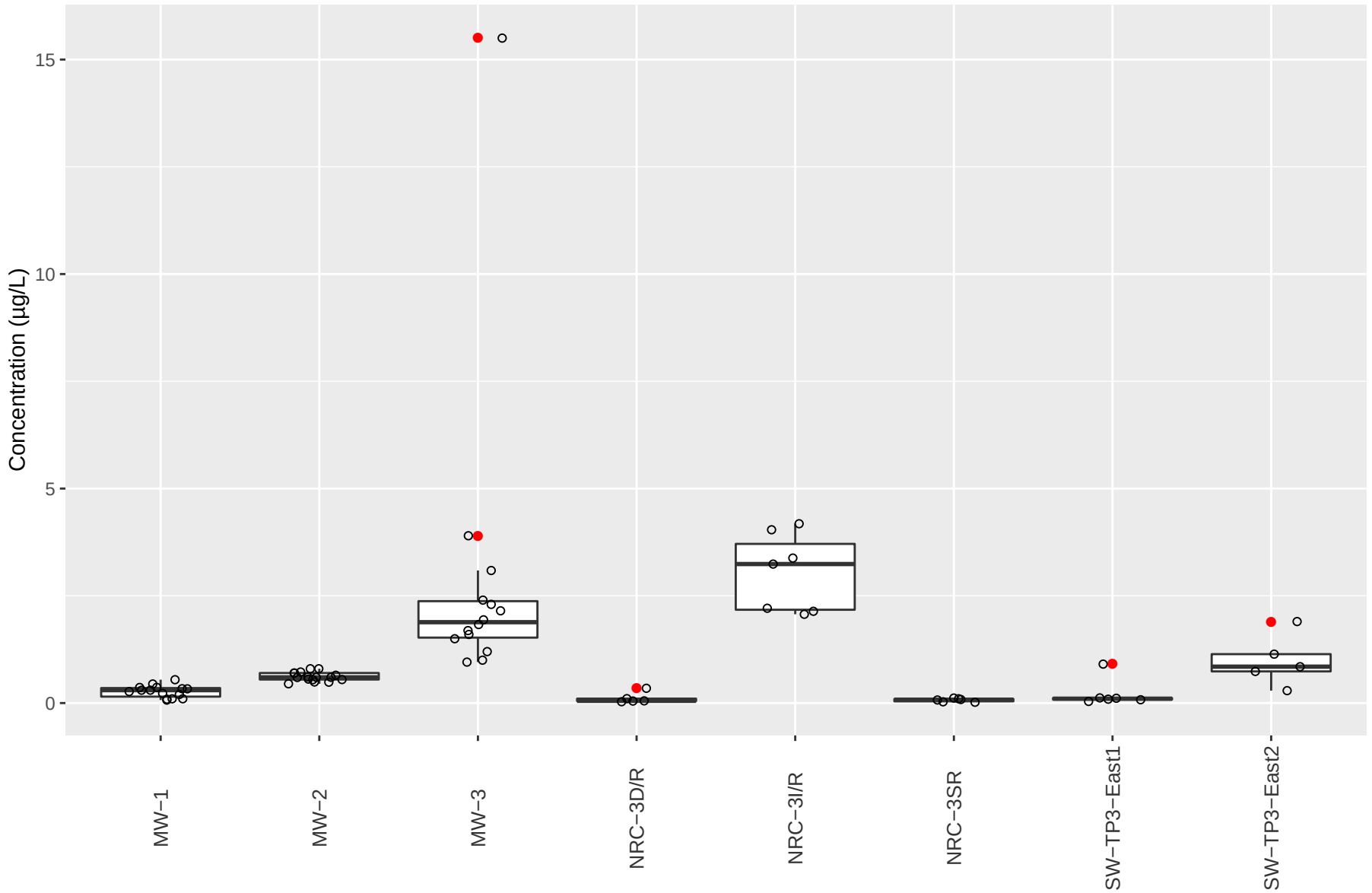
Non−detect values plotted at one half the Method Reporting Limit value
red dots = 1.5*Interquartile Range (IQR), which are potential outliers

Dissolved concentration results not included
Prepared 01/10/2021

Figure 11. Box Plot
Cadmium, Total, µg/L
TP Designated Stations

2020 Holden ACAR Statistical Assessment
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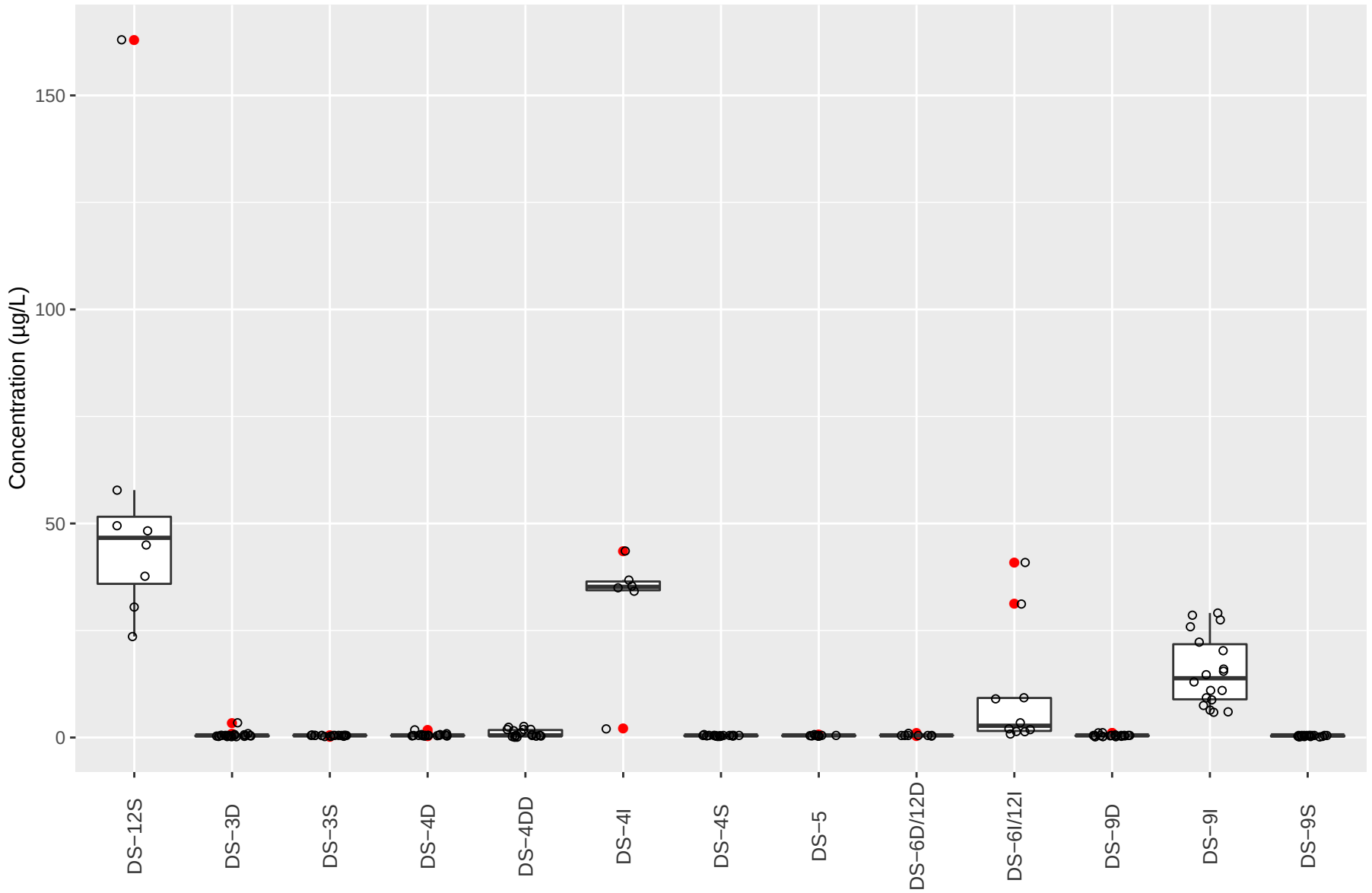
Non−detect values plotted at one half the Method Reporting Limit value
red dots = 1.5*Interquartile Range (IQR), which are potential outliers

Dissolved concentration results not included
Prepared 01/10/2021

Figure 12. Box Plot
Cadmium, Total, µg/L
SW/NRC/MW Designated Stations

2020 Holden ACAR Statistical Assessment
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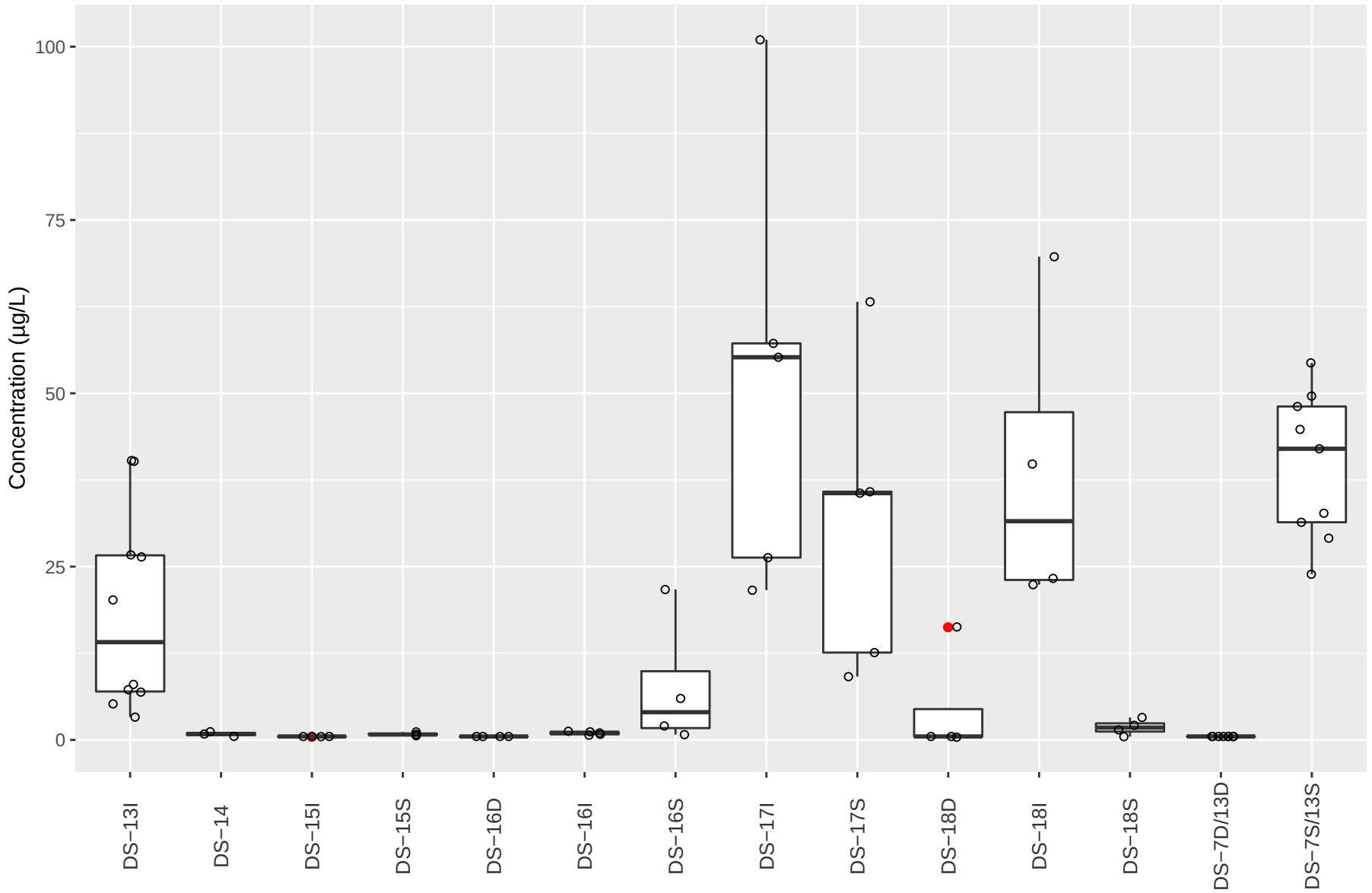
Non−detect values plotted at one half the Method Reporting Limit value
red dots = 1.5*Interquartile Range (IQR), which are potential outliers

Dissolved concentration results not included
Prepared 01/10/2021

Figure 13. Box Plot
Copper, Total, µg/L
DS Designated Stations, Set 1

2020 Holden ACAR Statistical Assessment
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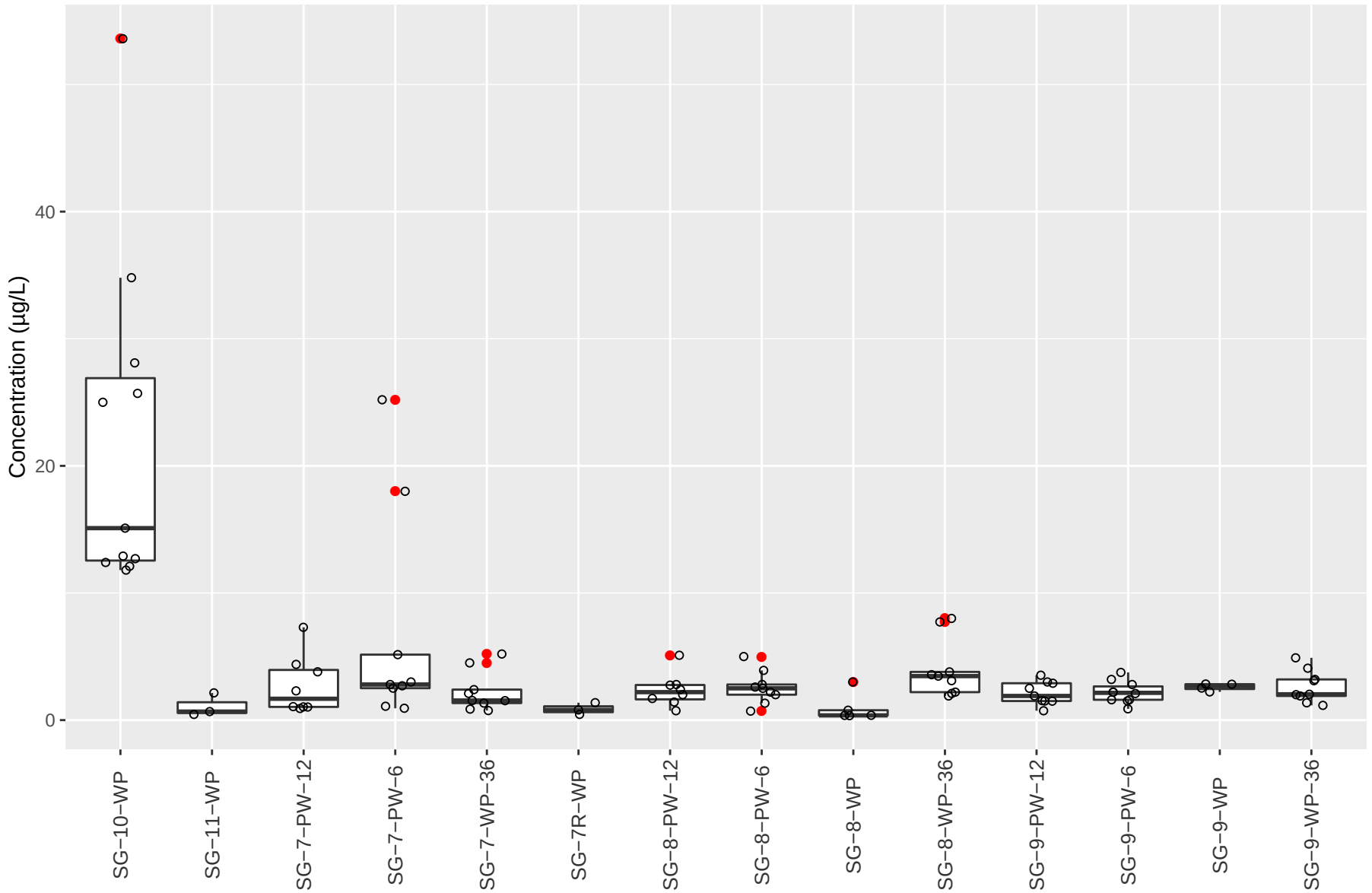
Non−detect values plotted at one half the Method Reporting Limit value
red dots = 1.5*Interquartile Range (IQR), which are potential outliers

Dissolved concentration results not included
Prepared 01/10/2021

Figure 14. Box Plot
Copper, Total, µg/L
DS Designated Stations, Set 2

2020 Holden ACAR Statistical Assessment
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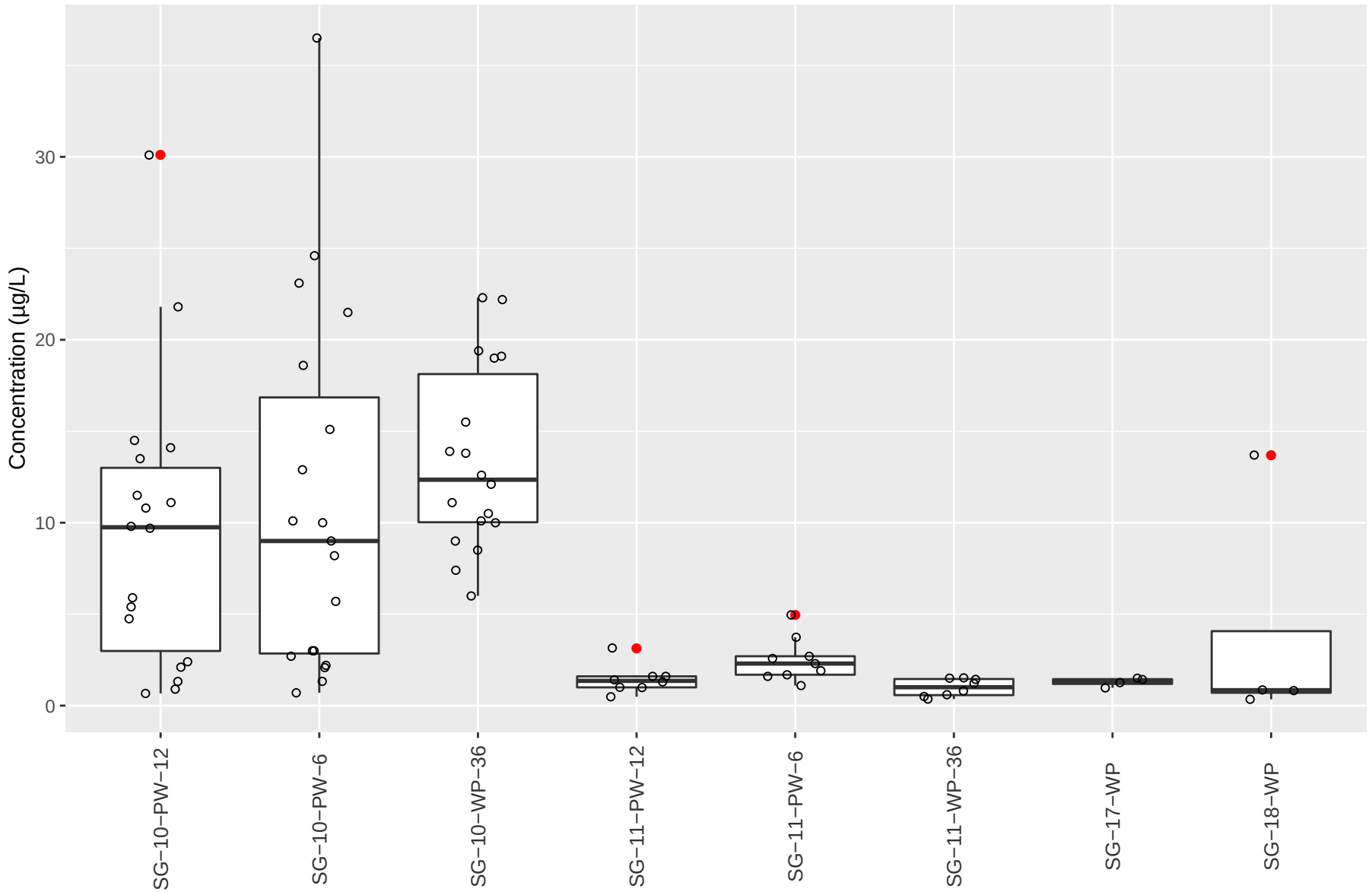
Non−detect values plotted at one half the Method Reporting Limit value
red dots = 1.5*Interquartile Range (IQR), which are potential outliers

Dissolved concentration results not included
Prepared 01/10/2021

Figure 15. Box Plot
Copper, Total, µg/L
SG Designated Stations, Set 1

2020 Holden ACAR Statistical Assessment
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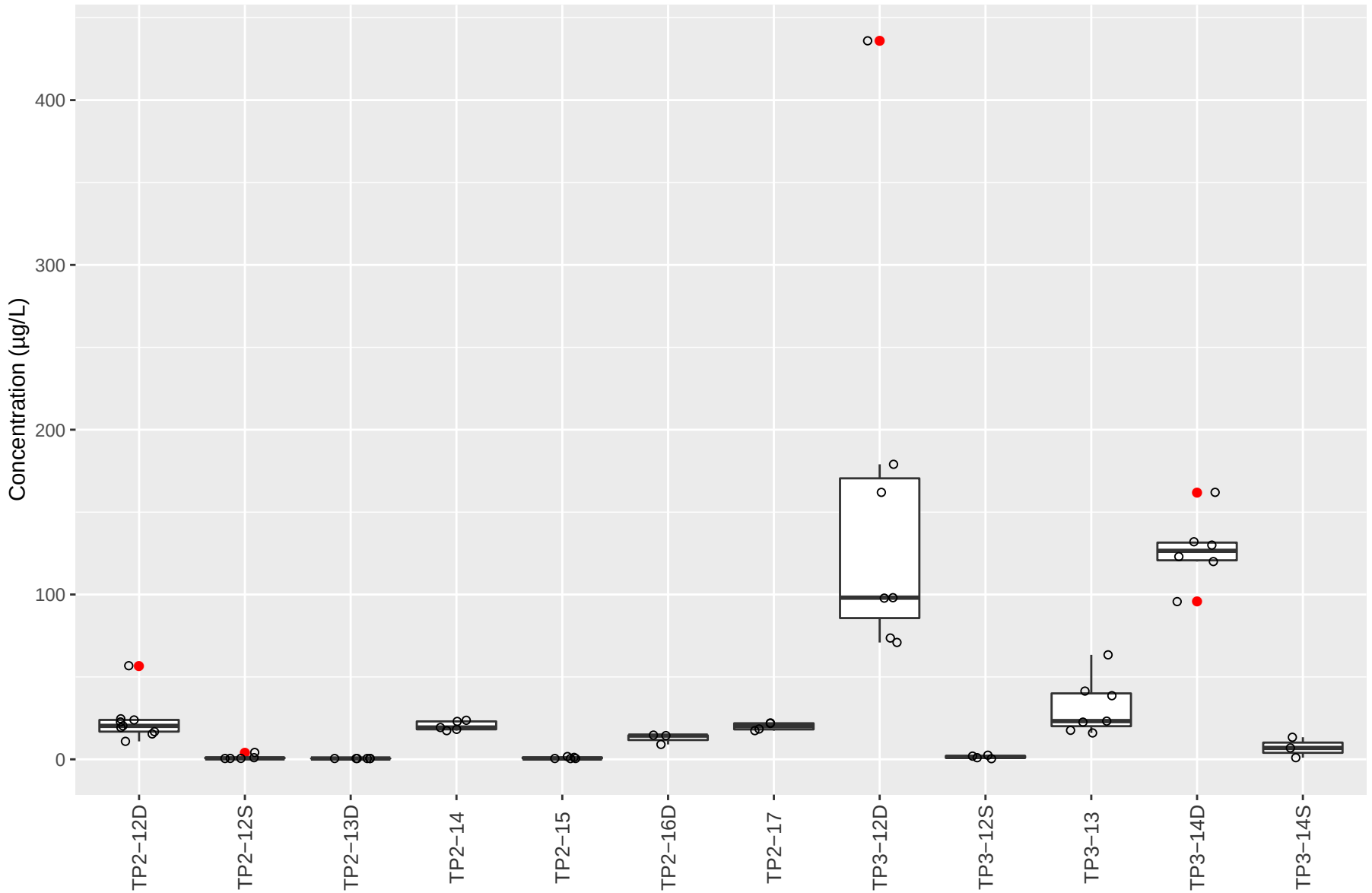
Non−detect values plotted at one half the Method Reporting Limit value
red dots = 1.5*Interquartile Range (IQR), which are potential outliers

Dissolved concentration results not included
Prepared 01/10/2021

Figure 16. Box Plot
Copper, Total, µg/L
SG Designated Stations, Set 2

2020 Holden ACAR Statistical Assessment
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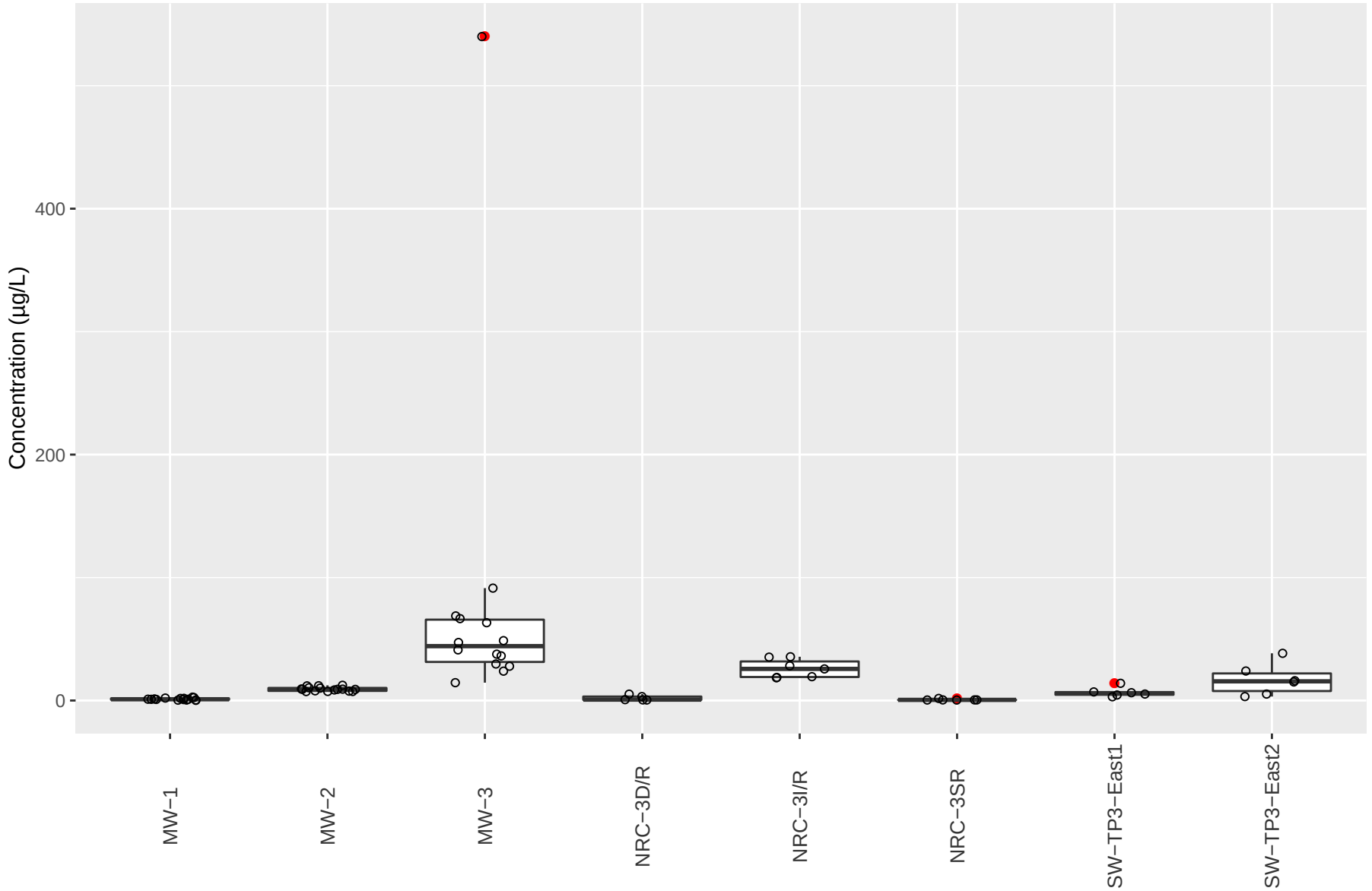
Non−detect values plotted at one half the Method Reporting Limit value
red dots = 1.5*Interquartile Range (IQR), which are potential outliers

Dissolved concentration results not included
Prepared 01/10/2021

Figure 17. Box Plot
Copper, Total, µg/L
TP Designated Stations

2020 Holden ACAR Statistical Assessment
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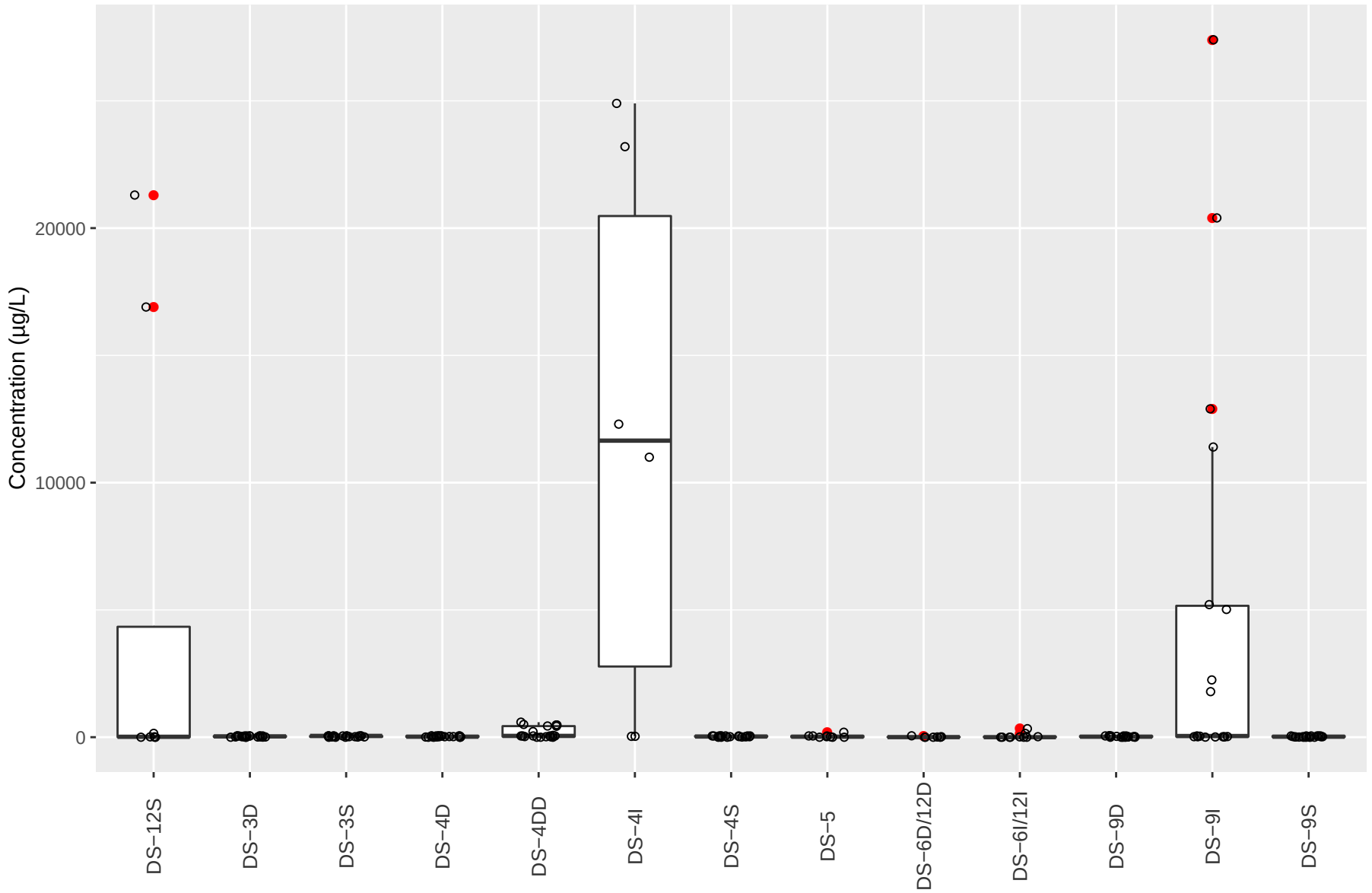
Non−detect values plotted at one half the Method Reporting Limit value
red dots = 1.5*Interquartile Range (IQR), which are potential outliers

Dissolved concentration results not included
Prepared 01/10/2021

Figure 18. Box Plot
Copper, Total, µg/L
SW/NRC/MW Designated Stations

2020 Holden ACAR Statistical Assessment
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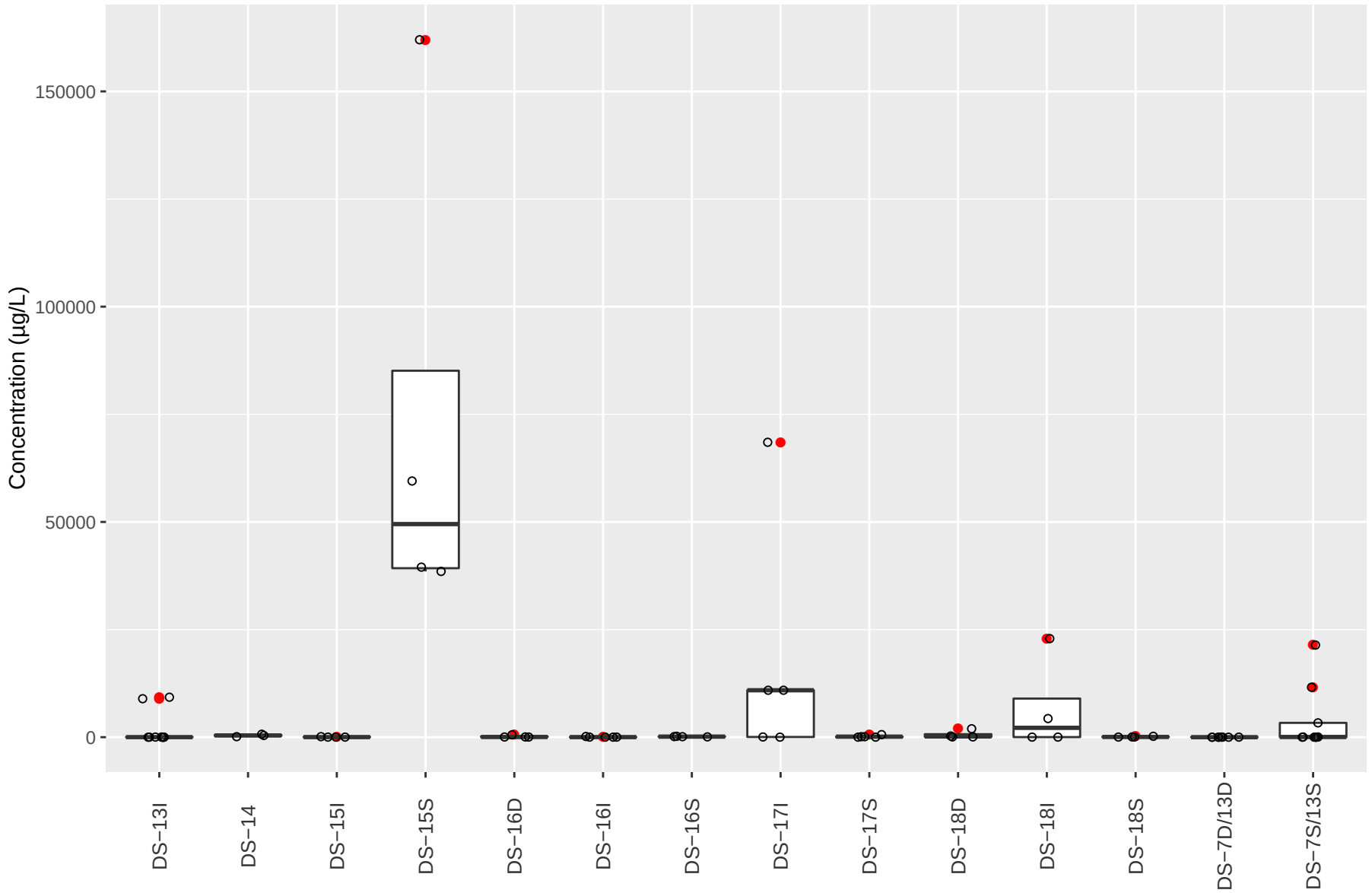
Non−detect values plotted at one half the Method Reporting Limit value
red dots = 1.5*Interquartile Range (IQR), which are potential outliers

Dissolved concentration results not included
Prepared 01/10/2021

Figure 19. Box Plot
Iron, Total, µg/L
DS Designated Stations, Set 1

2020 Holden ACAR Statistical Assessment
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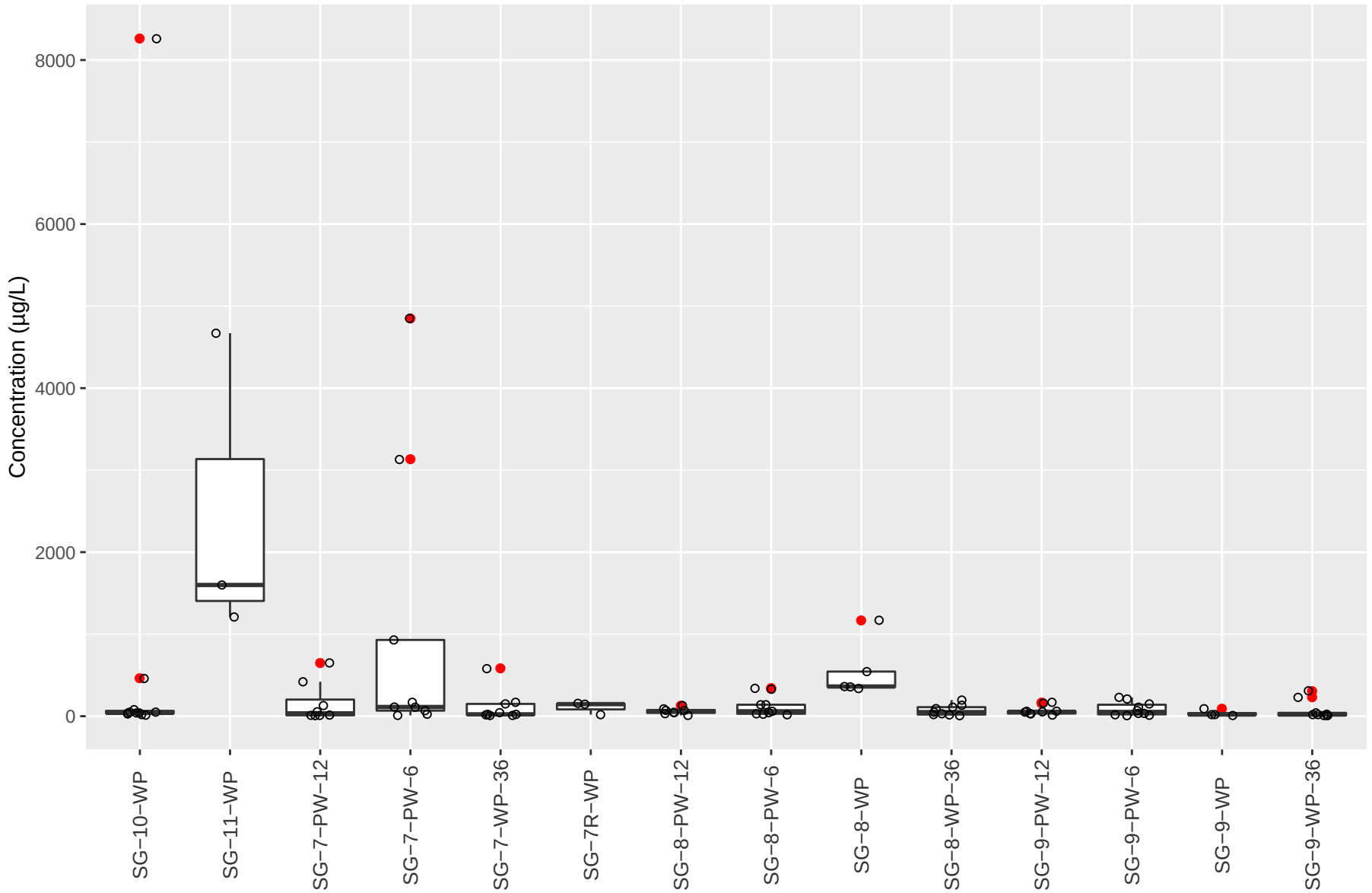
Non−detect values plotted at one half the Method Reporting Limit value
red dots = 1.5*Interquartile Range (IQR), which are potential outliers

Dissolved concentration results not included
Prepared 01/10/2021

Figure 20. Box Plot
Iron, Total, µg/L
DS Designated Stations, Set 2

2020 Holden ACAR Statistical Assessment
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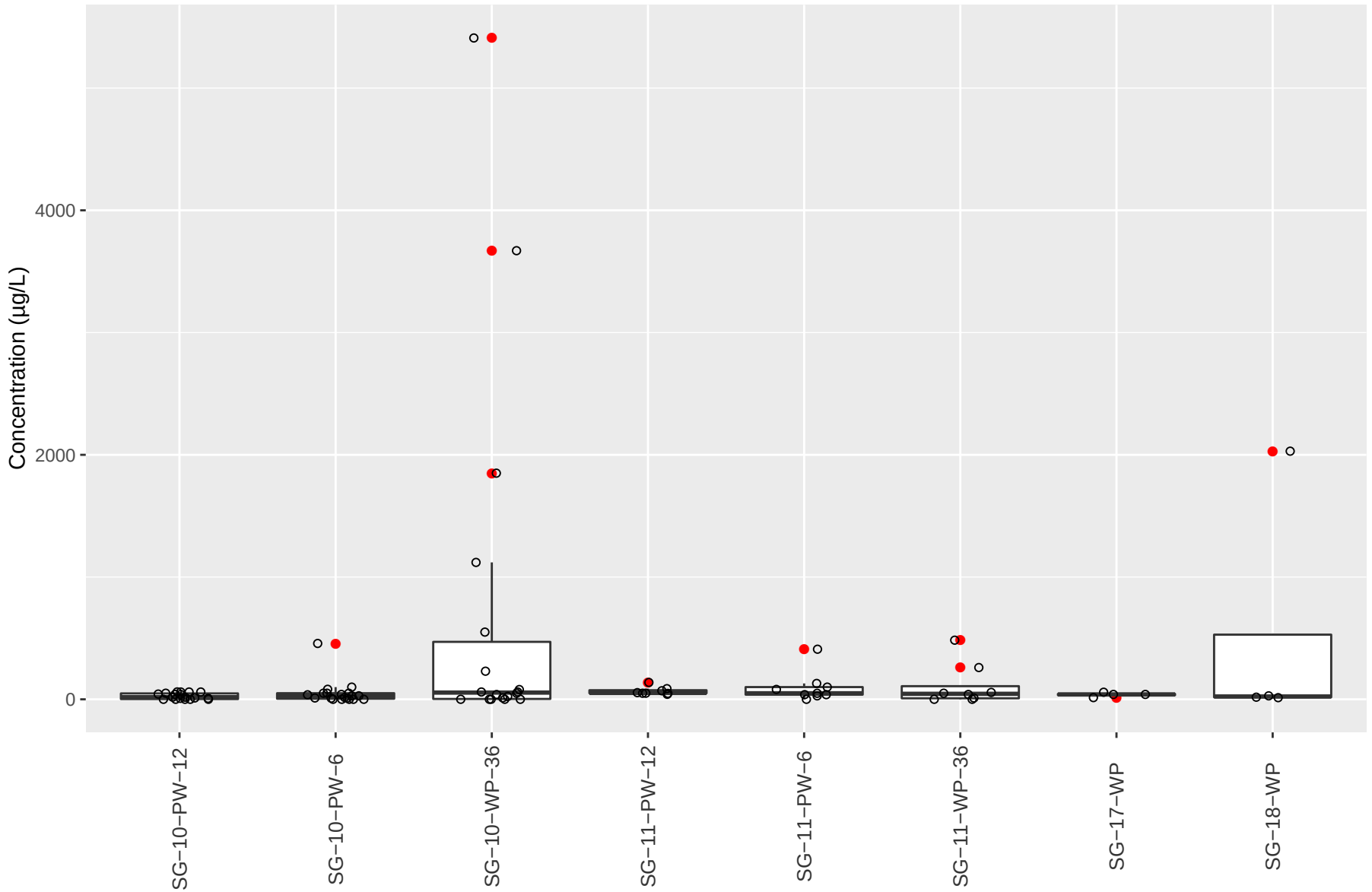
Non−detect values plotted at one half the Method Reporting Limit value
red dots = 1.5*Interquartile Range (IQR), which are potential outliers

Dissolved concentration results not included
Prepared 01/10/2021

Figure 21. Box Plot
Iron, Total, µg/L
SG Designated Stations, Set 1

2020 Holden ACAR Statistical Assessment
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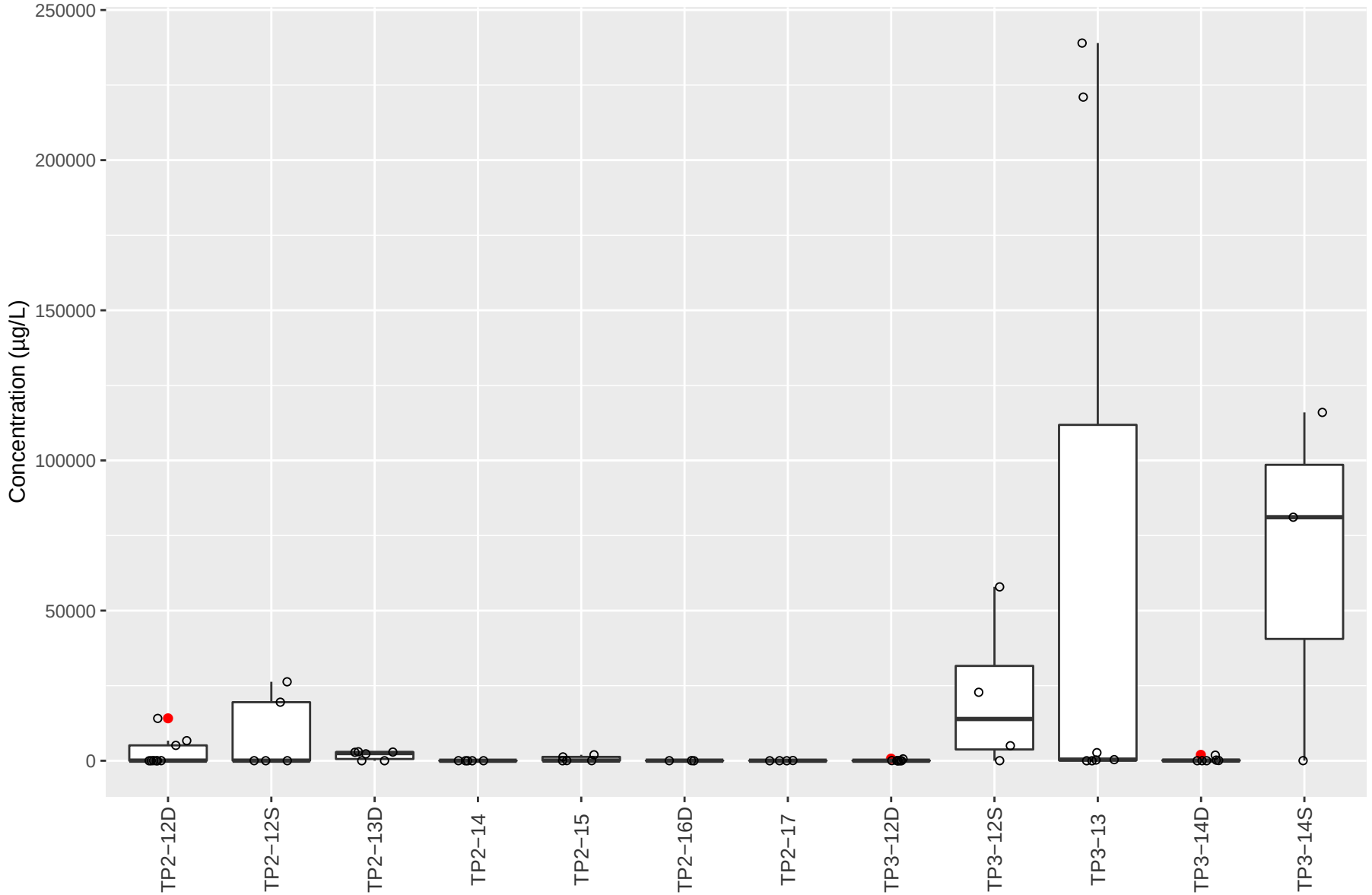
Non−detect values plotted at one half the Method Reporting Limit value
red dots = 1.5*Interquartile Range (IQR), which are potential outliers

Dissolved concentration results not included
Prepared 01/10/2021

Figure 22. Box Plot
Iron, Total, µg/L
SG Designated Stations, Set 2

2020 Holden ACAR Statistical Assessment
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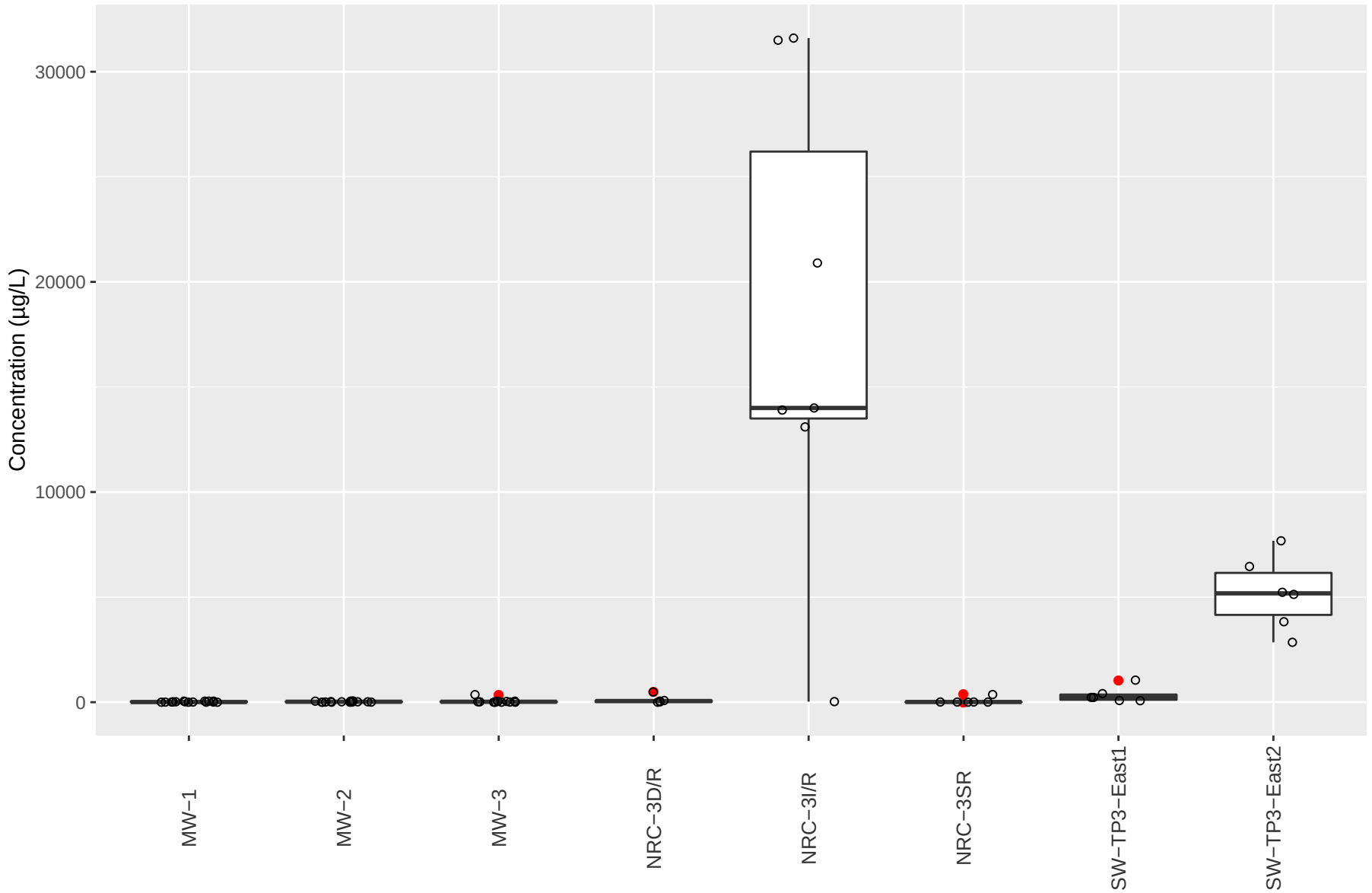
Non−detect values plotted at one half the Method Reporting Limit value
red dots = 1.5*Interquartile Range (IQR), which are potential outliers

Dissolved concentration results not included
Prepared 01/10/2021

Figure 23. Box Plot
Iron, Total, µg/L
TP Designated Stations

2020 Holden ACAR Statistical Assessment
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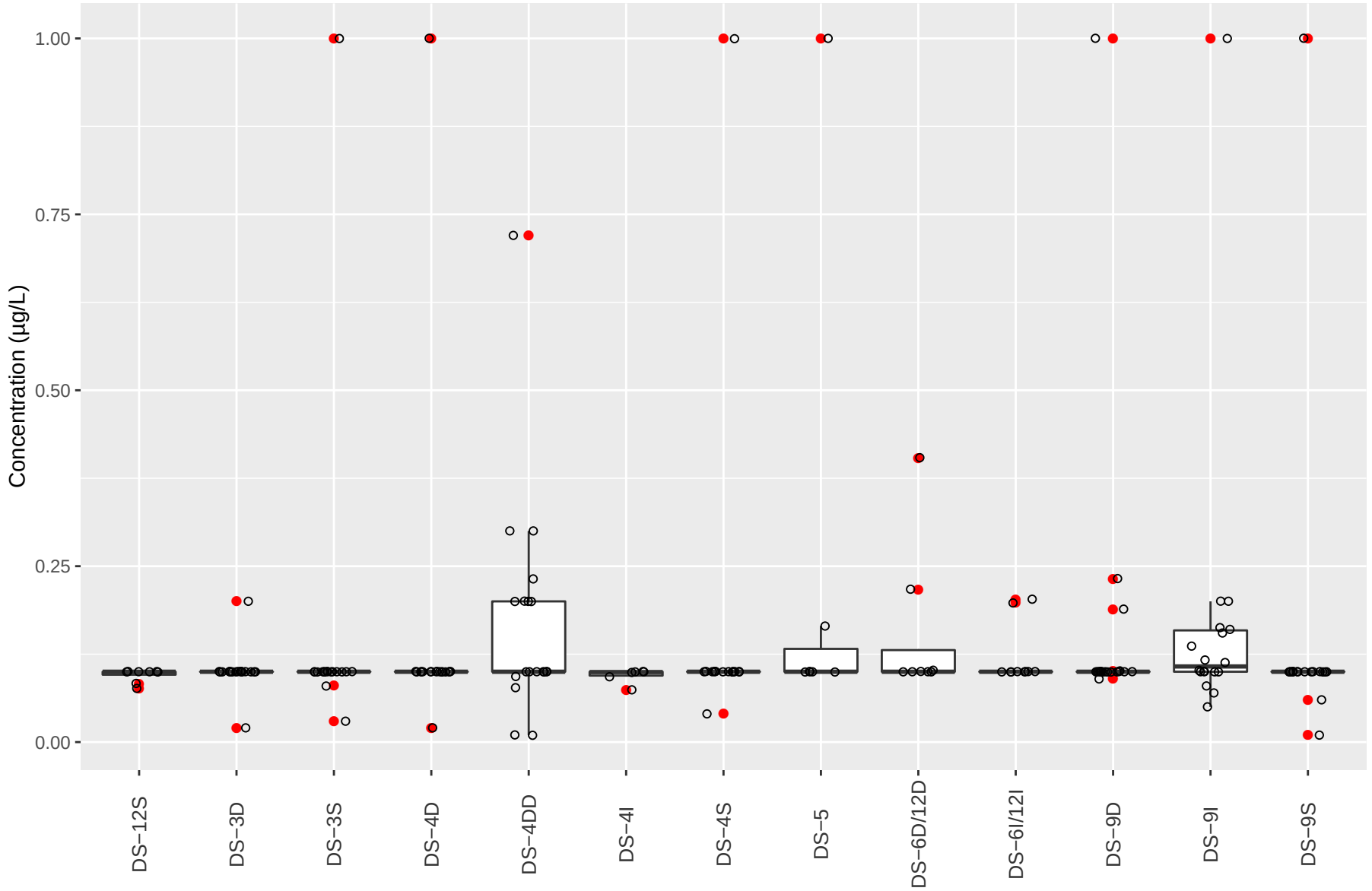
Non−detect values plotted at one half the Method Reporting Limit value
red dots = 1.5*Interquartile Range (IQR), which are potential outliers

Dissolved concentration results not included
Prepared 01/10/2021

Figure 24. Box Plot
Iron, Total, µg/L
SW/NRC/MW Designated Stations

2020 Holden ACAR Statistical Assessment
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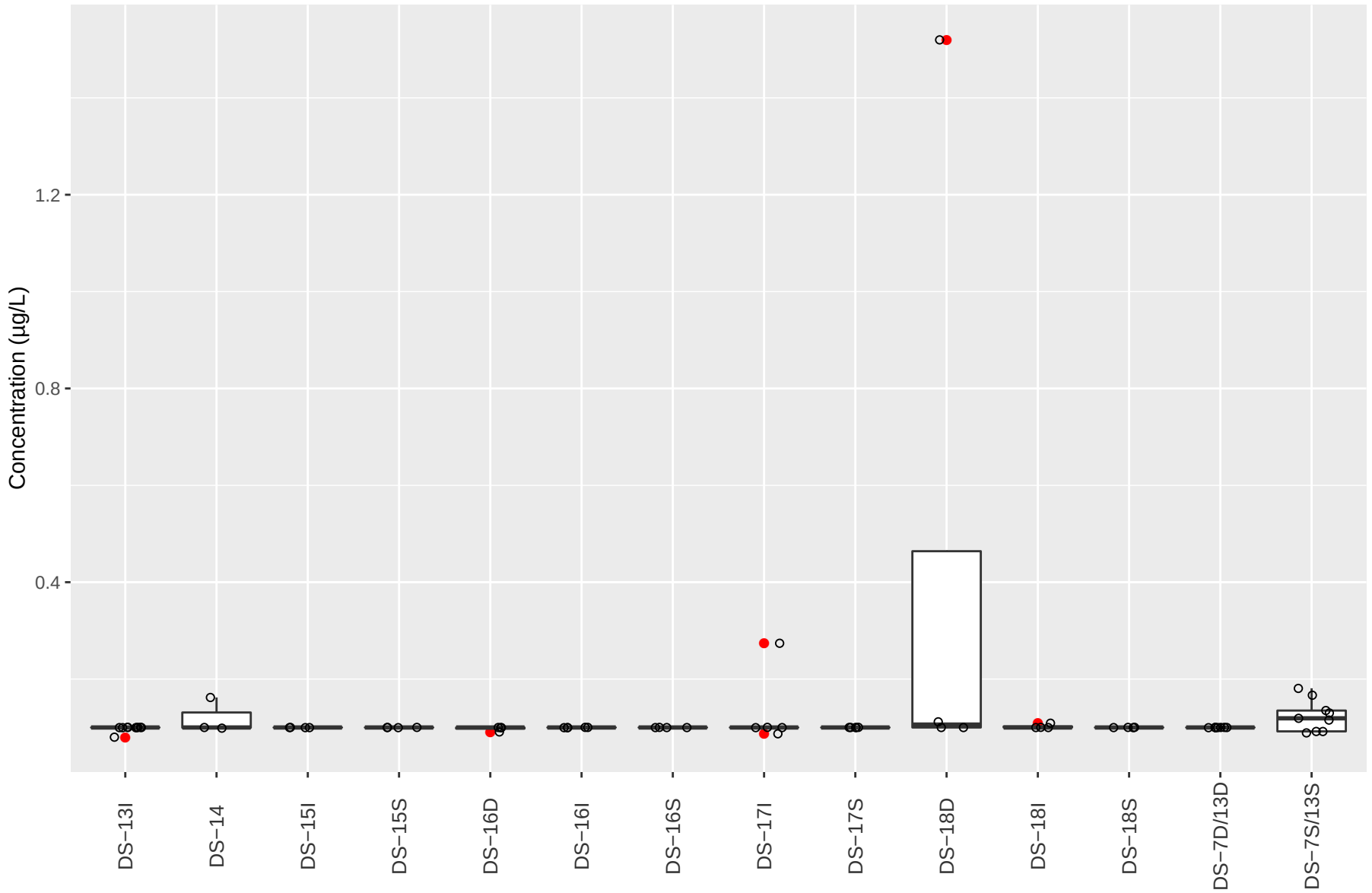
Non−detect values plotted at one half the Method Reporting Limit value
red dots = 1.5*Interquartile Range (IQR), which are potential outliers

Dissolved concentration results not included
Prepared 01/10/2021

Figure 25. Box Plot
Lead, Total, µg/L
DS Designated Stations, Set 1

2020 Holden ACAR Statistical Assessment
JS1904

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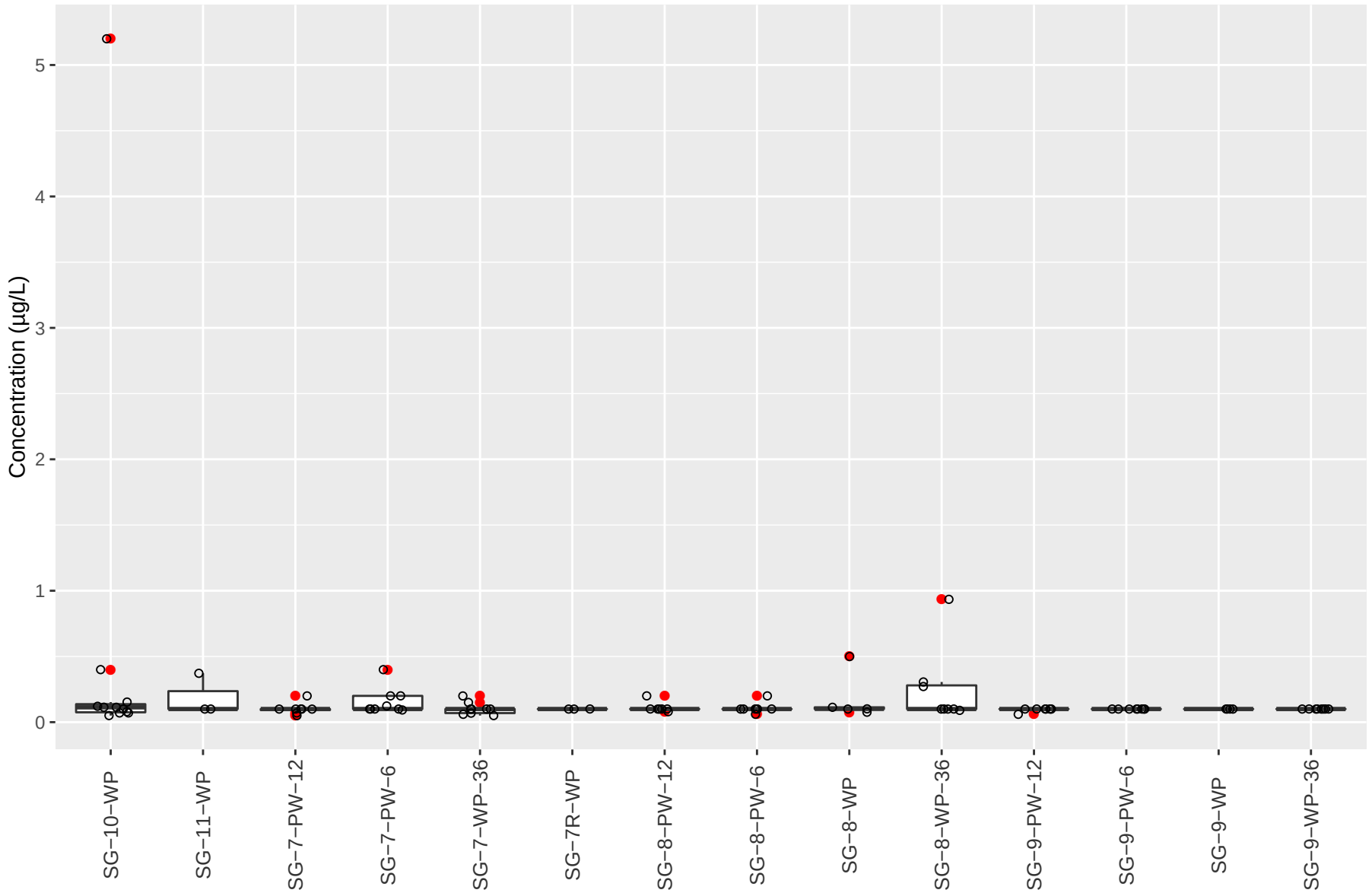
Non−detect values plotted at one half the Method Reporting Limit value
red dots = 1.5*Interquartile Range (IQR), which are potential outliers

Dissolved concentration results not included
Prepared 01/10/2021

Figure 26. Box Plot
Lead, Total, µg/L
DS Designated Stations, Set 2

2020 Holden ACAR Statistical Assessment
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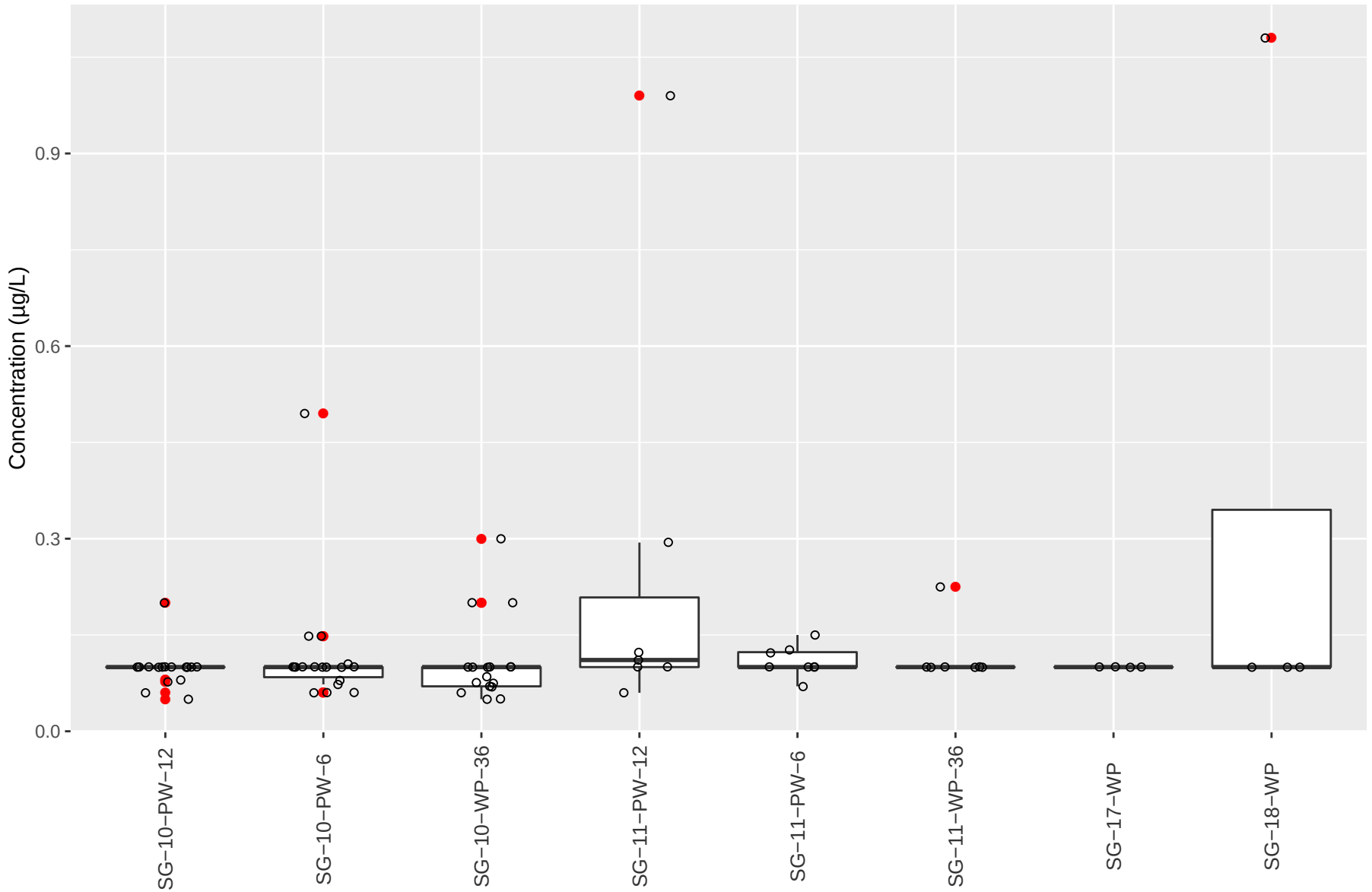
Non−detect values plotted at one half the Method Reporting Limit value
red dots = 1.5*Interquartile Range (IQR), which are potential outliers

Dissolved concentration results not included
Prepared 01/10/2021

Figure 27. Box Plot
Lead, Total, µg/L
SG Designated Stations, Set 1

2020 Holden ACAR Statistical Assessment
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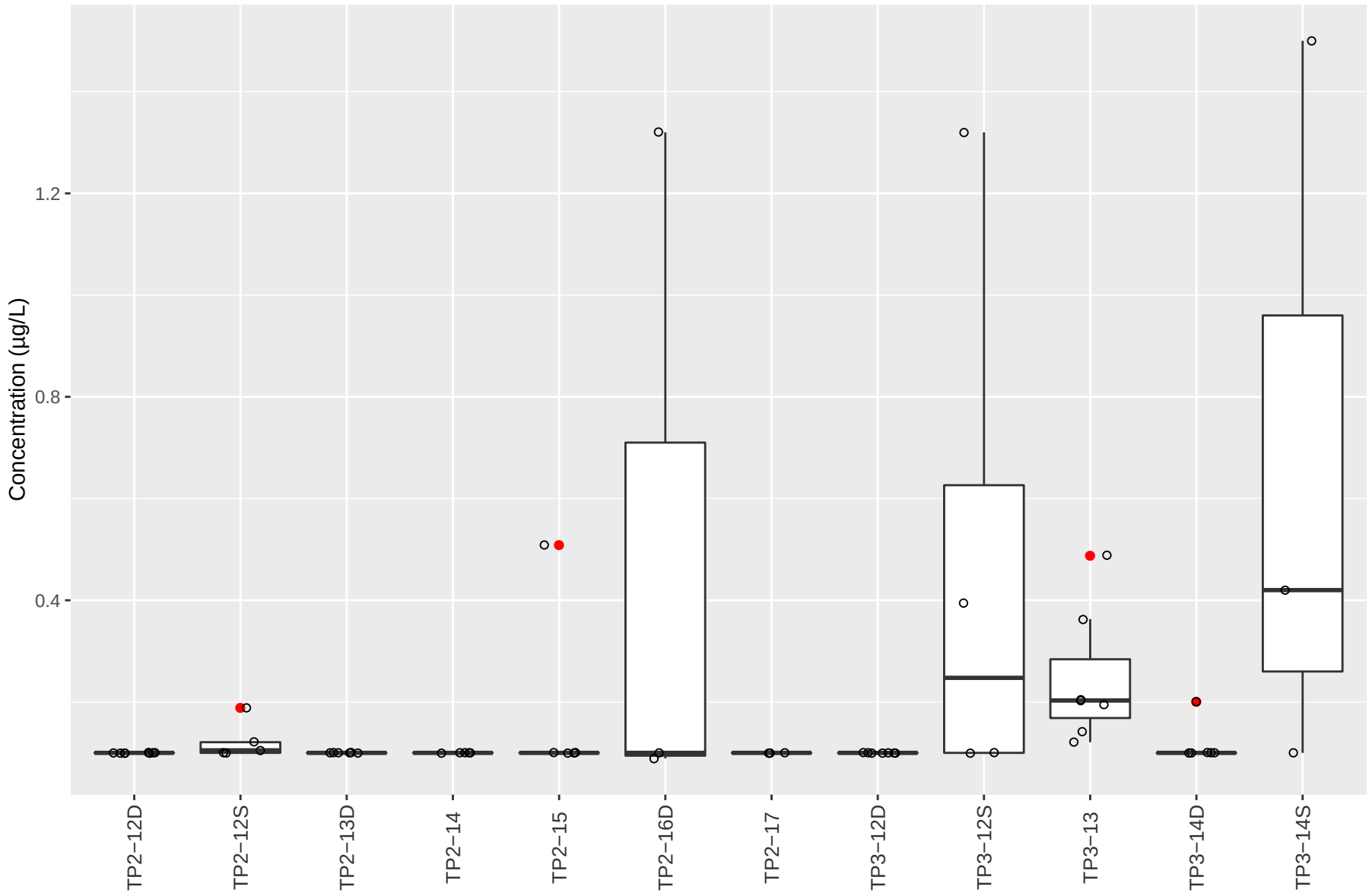
Non−detect values plotted at one half the Method Reporting Limit value
red dots = 1.5*Interquartile Range (IQR), which are potential outliers

Dissolved concentration results not included
Prepared 01/10/2021

Figure 28. Box Plot
Lead, Total, µg/L
SG Designated Stations, Set 2

2020 Holden ACAR Statistical Assessment
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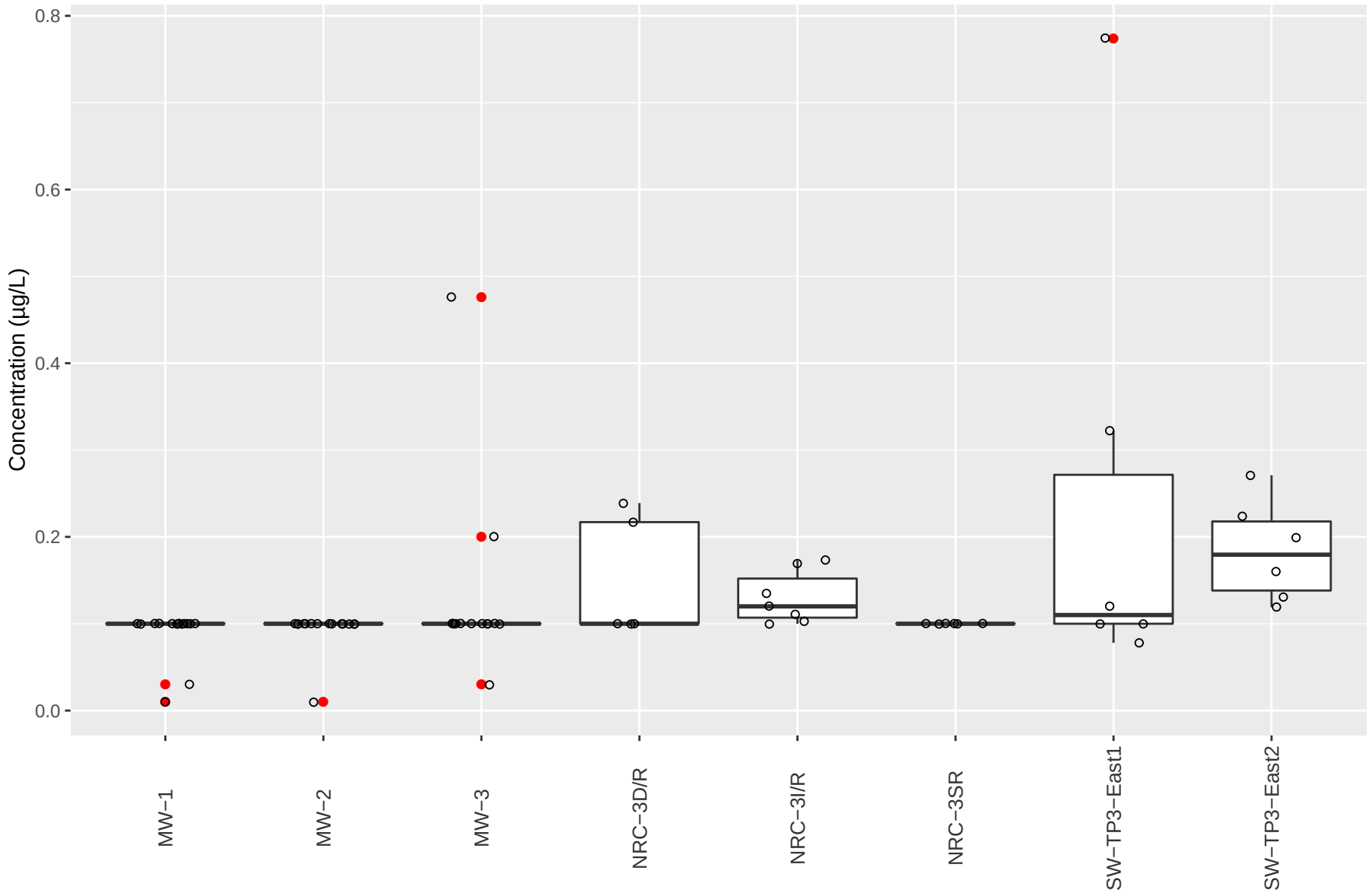
Non−detect values plotted at one half the Method Reporting Limit value
red dots = 1.5*Interquartile Range (IQR), which are potential outliers

Dissolved concentration results not included
Prepared 01/10/2021

Figure 29. Box Plot
Lead, Total, µg/L
TP Designated Stations

2020 Holden ACAR Statistical Assessment
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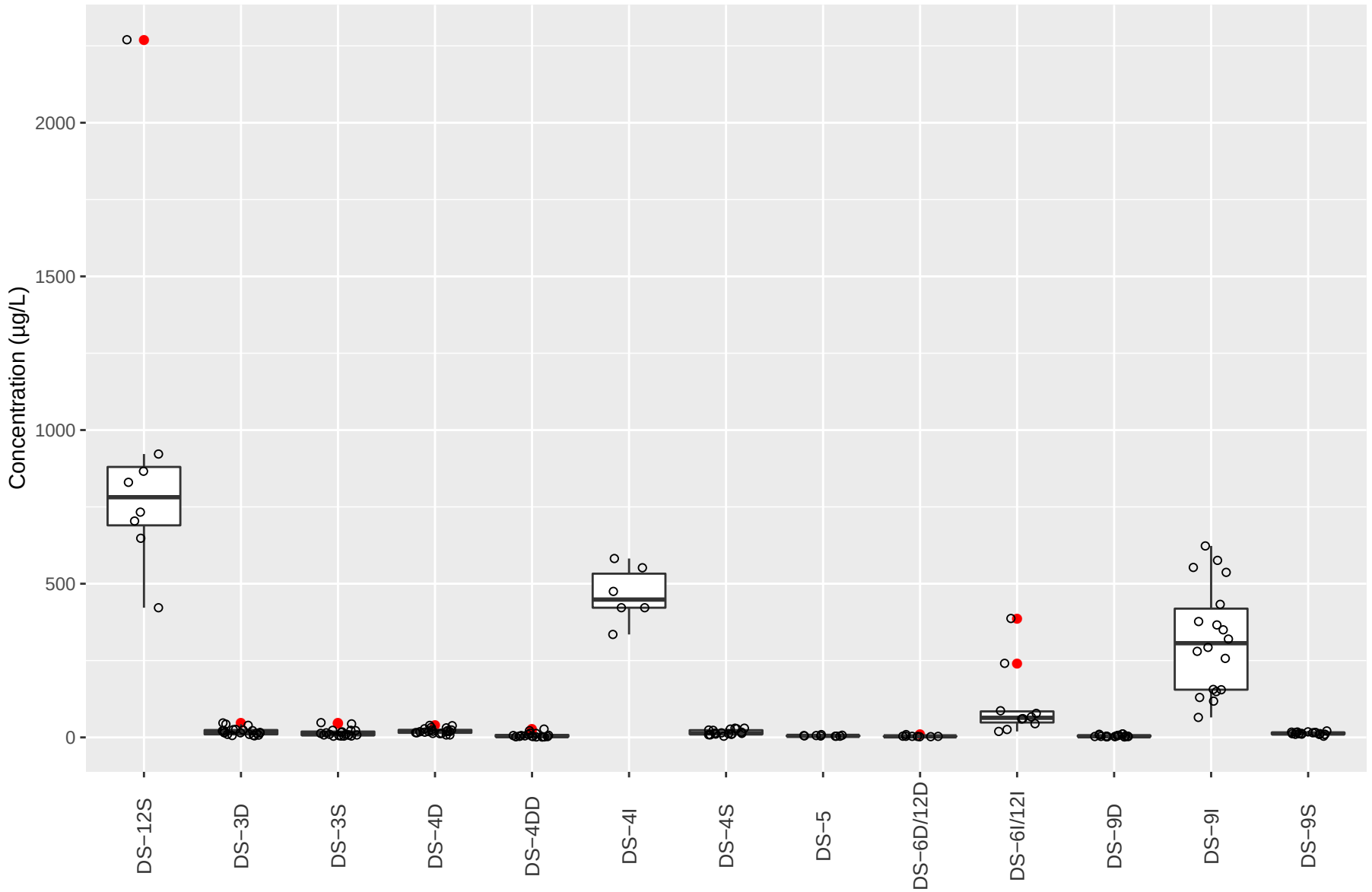
Non−detect values plotted at one half the Method Reporting Limit value
red dots = 1.5*Interquartile Range (IQR), which are potential outliers

Dissolved concentration results not included
Prepared 01/10/2021

Figure 30. Box Plot
Lead, Total, µg/L
SW/NRC/MW Designated Stations

2020 Holden ACAR Statistical Assessment
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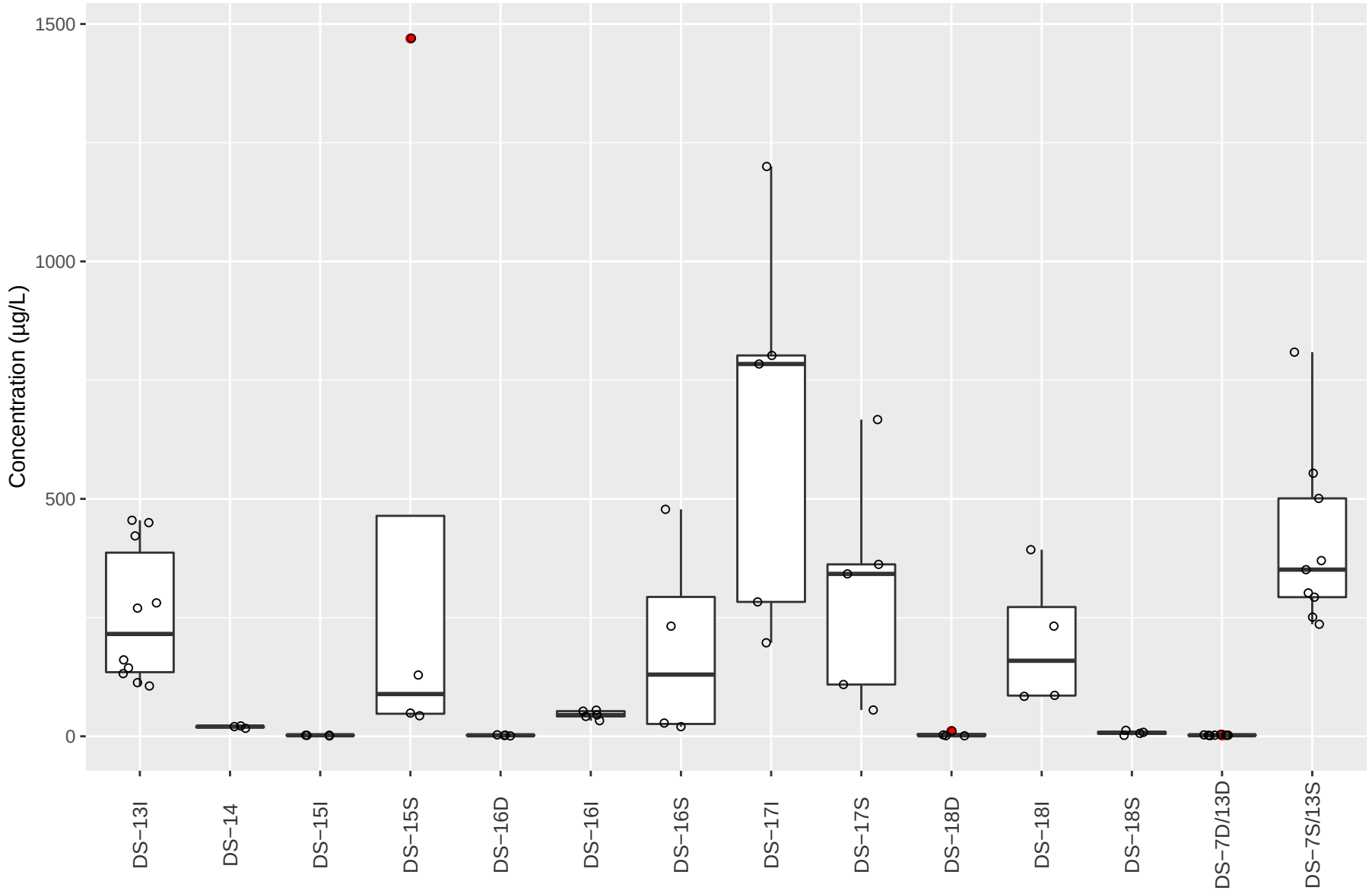
Non−detect values plotted at one half the Method Reporting Limit value
red dots = 1.5*Interquartile Range (IQR), which are potential outliers

Dissolved concentration results not included
Prepared 01/10/2021

Figure 31. Box Plot
Zinc, Total, µg/L
DS Designated Stations, Set 1

2020 Holden ACAR Statistical Assessment
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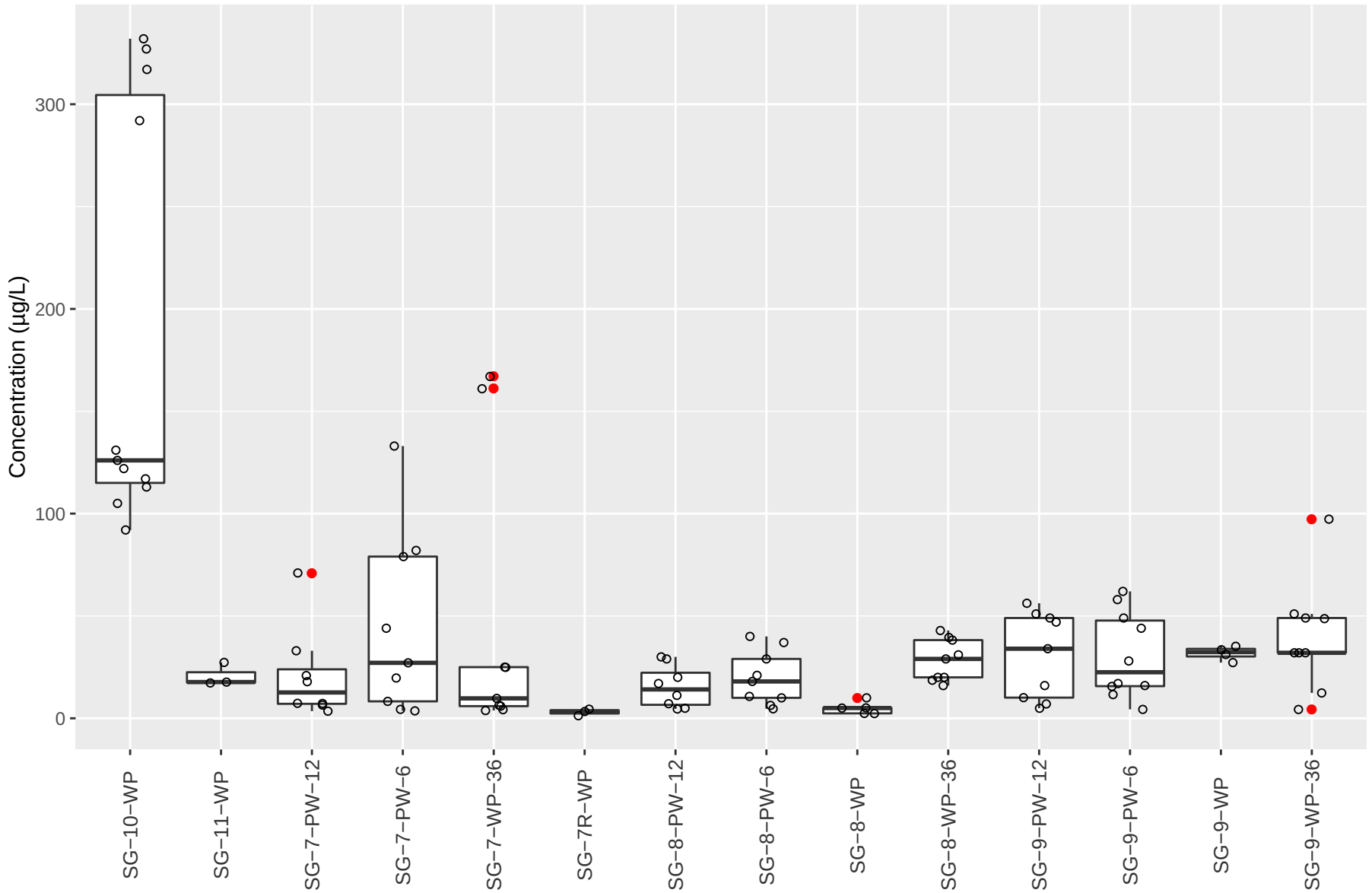
Non−detect values plotted at one half the Method Reporting Limit value
red dots = 1.5*Interquartile Range (IQR), which are potential outliers

Dissolved concentration results not included
Prepared 01/10/2021

Figure 32. Box Plot
Zinc, Total, µg/L
DS Designated Stations, Set 2

2020 Holden ACAR Statistical Assessment
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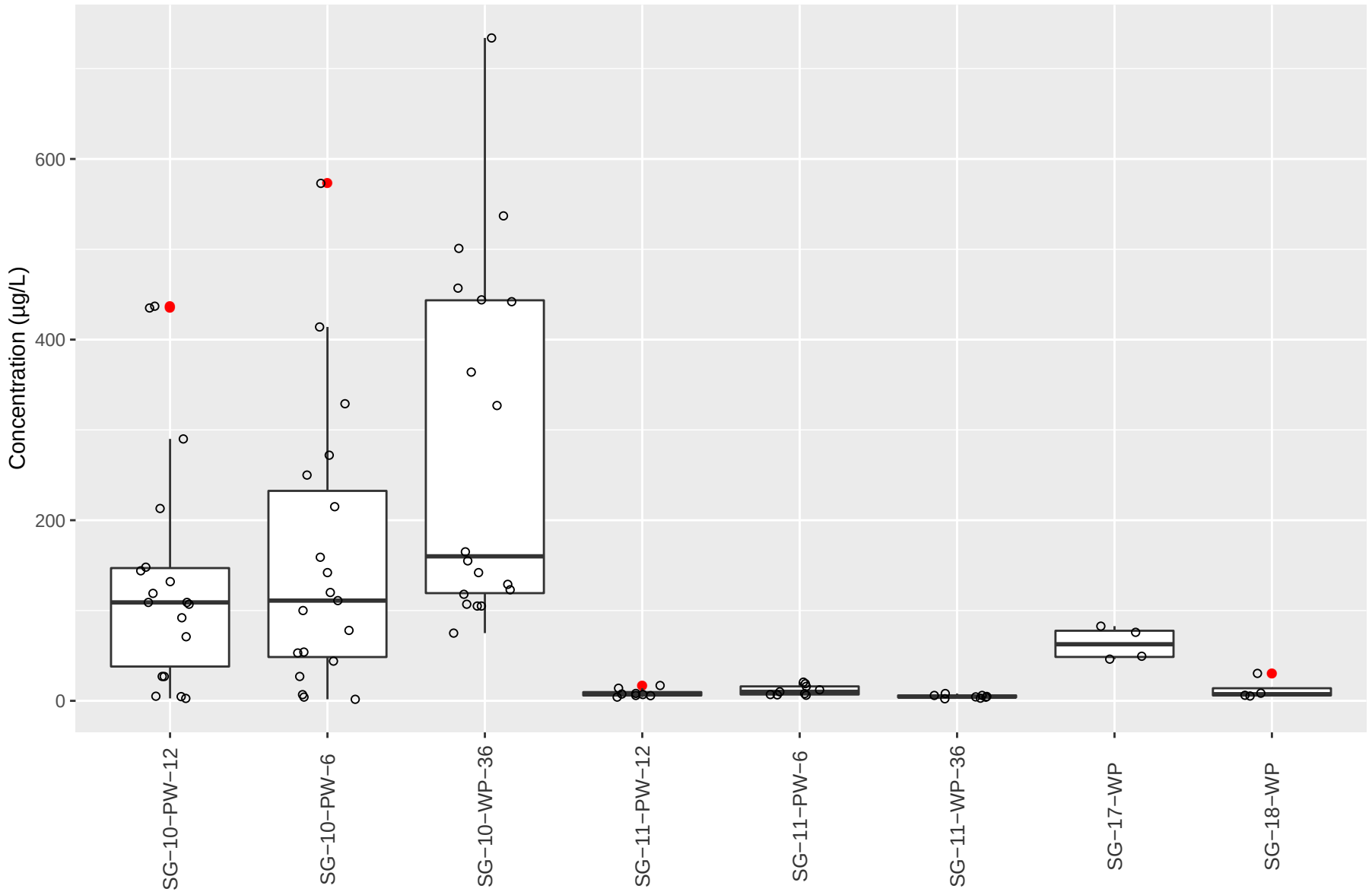
Non−detect values plotted at one half the Method Reporting Limit value
red dots = 1.5*Interquartile Range (IQR), which are potential outliers

Dissolved concentration results not included
Prepared 01/10/2021

Figure 33. Box Plot
Zinc, Total, µg/L
SG Designated Stations, Set 1

2020 Holden ACAR Statistical Assessment
JS1904

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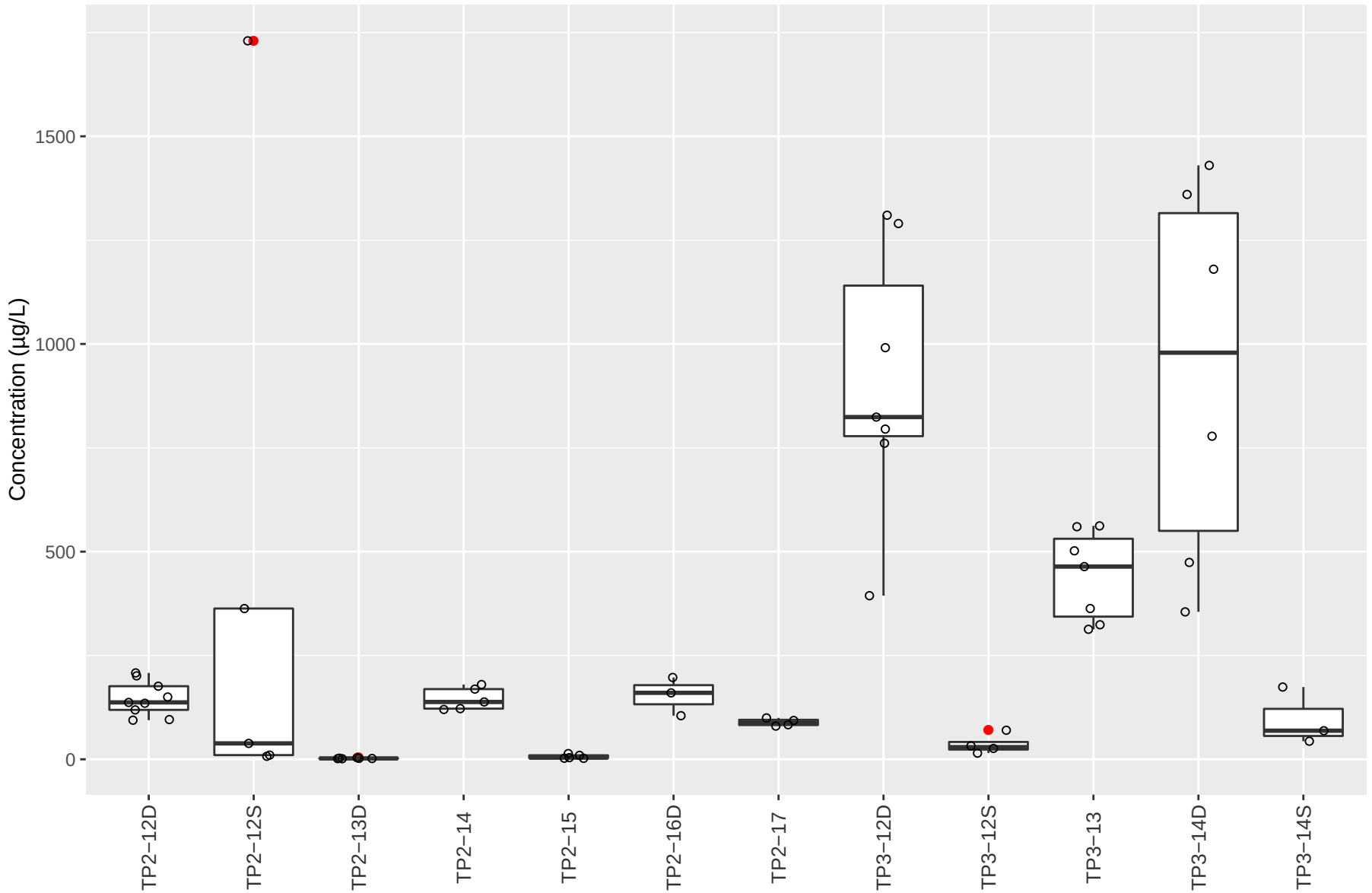
Non−detect values plotted at one half the Method Reporting Limit value
red dots = 1.5*Interquartile Range (IQR), which are potential outliers

Dissolved concentration results not included
Prepared 01/10/2021

Figure 34. Box Plot
Zinc, Total, µg/L
SG Designated Stations, Set 2

2020 Holden ACAR Statistical Assessment
JS1904

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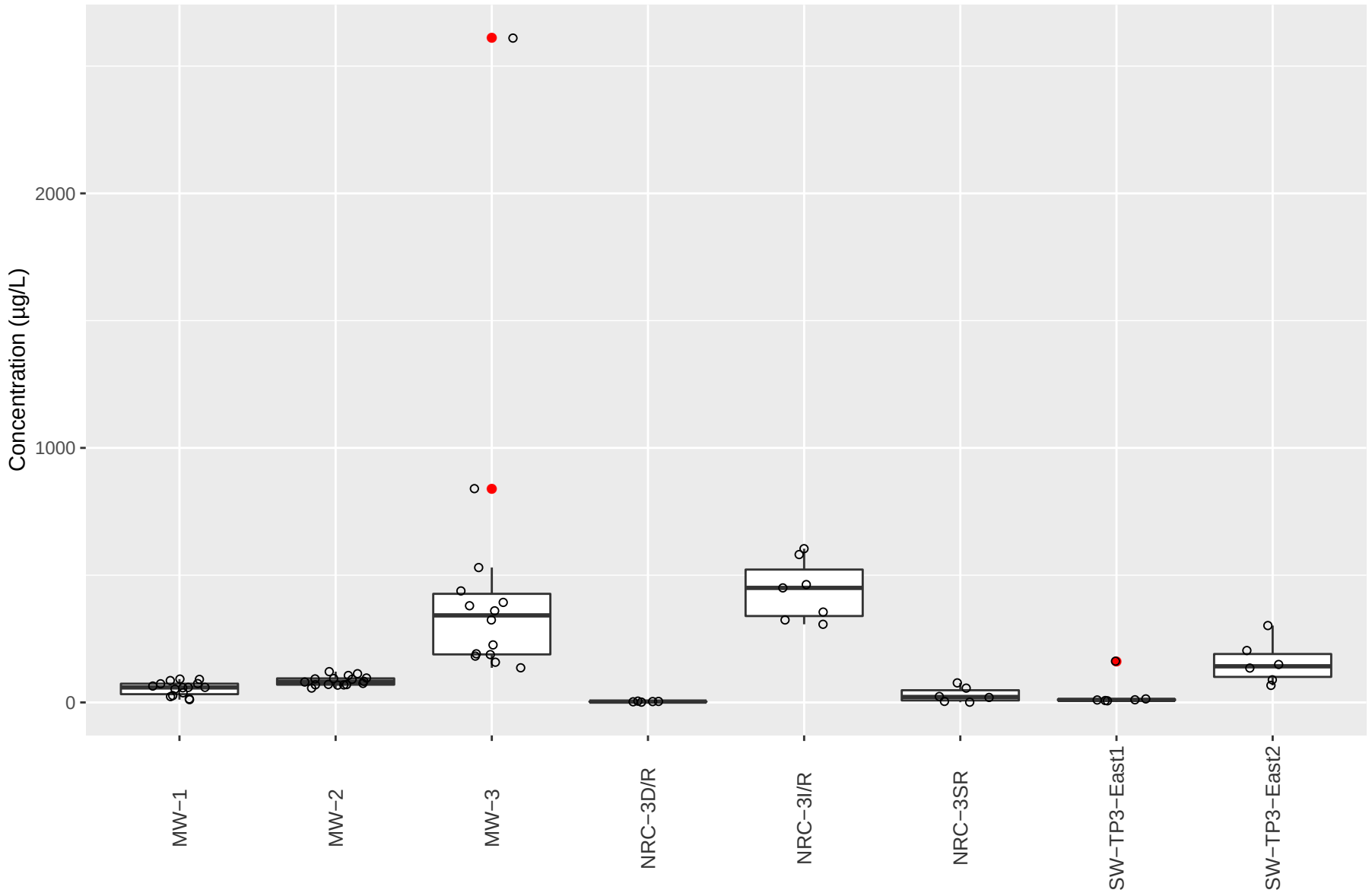
Non−detect values plotted at one half the Method Reporting Limit value
red dots = 1.5*Interquartile Range (IQR), which are potential outliers

Dissolved concentration results not included
Prepared 01/10/2021

Figure 35. Box Plot
Zinc, Total, µg/L
TP Designated Stations

2020 Holden ACAR Statistical Assessment
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Non−detect values plotted at one half the Method Reporting Limit value
red dots = 1.5*Interquartile Range (IQR), which are potential outliers

Dissolved concentration results not included
Prepared 01/10/2021

Figure 36. Box Plot
Zinc, Total, µg/L
SW/NRC/MW Designated Stations

2020 Holden ACAR Statistical Assessment
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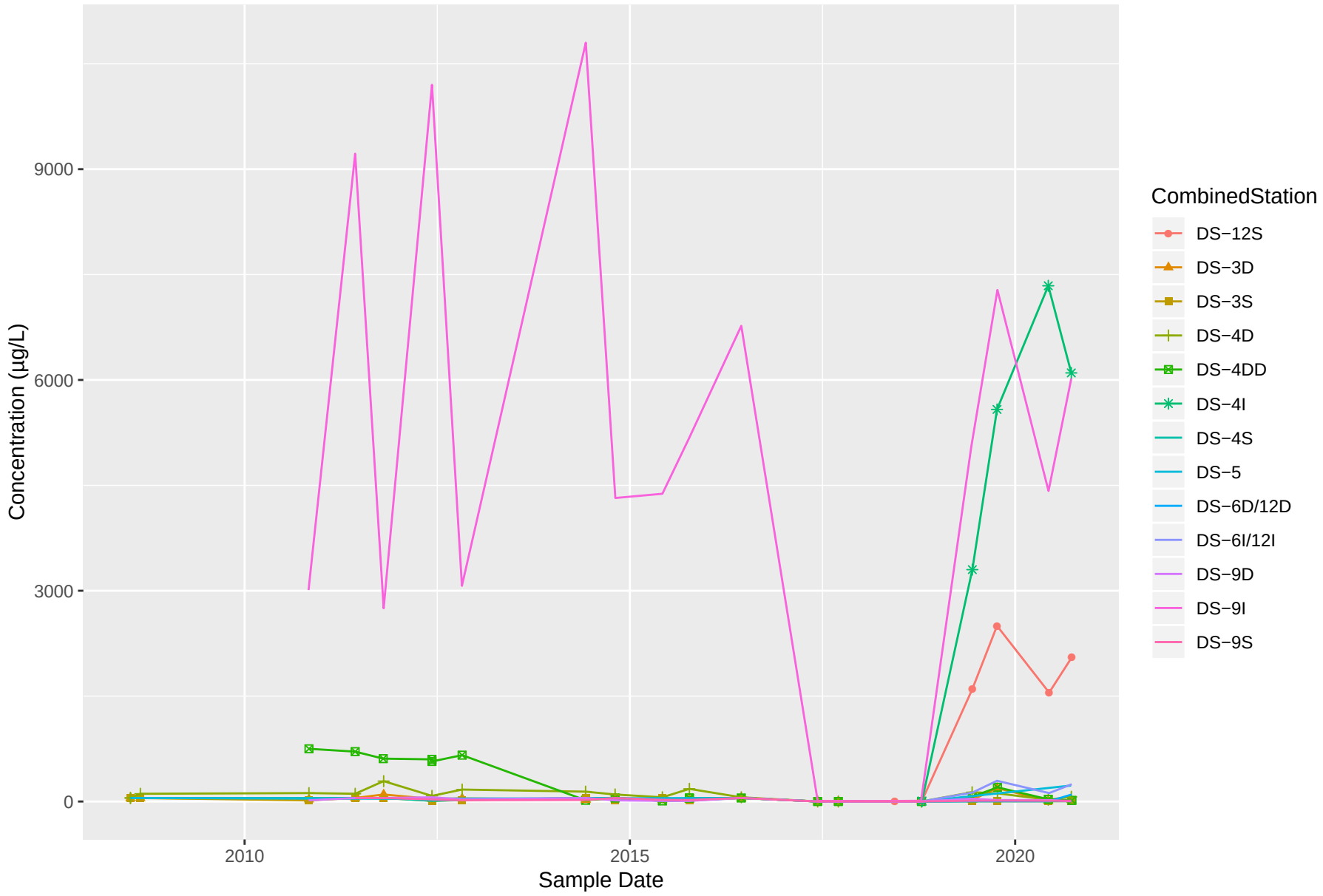
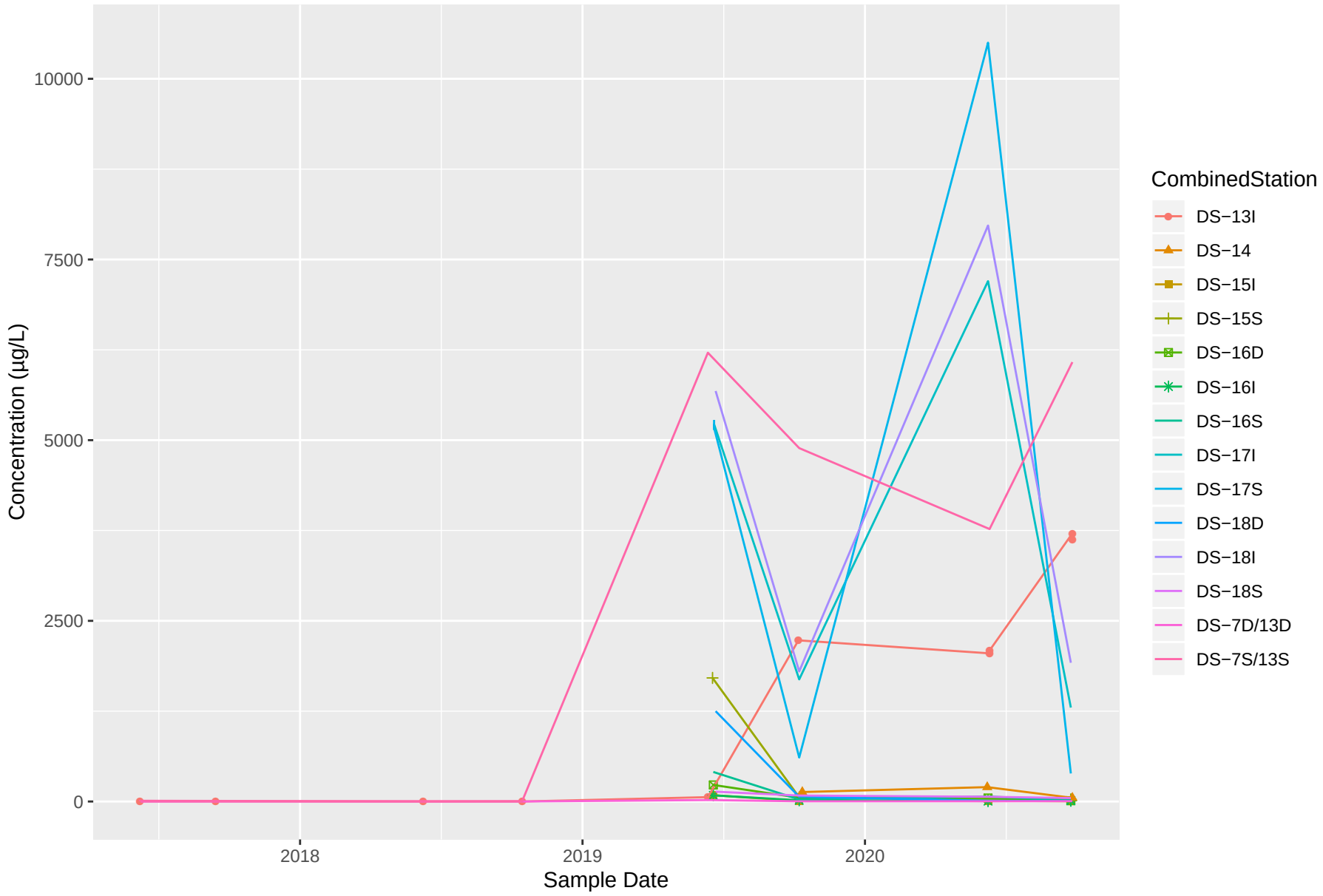


Figure 37. Time Series
Aluminum, Total, µg/L
DS Designated Stations, Set 1

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JS1904

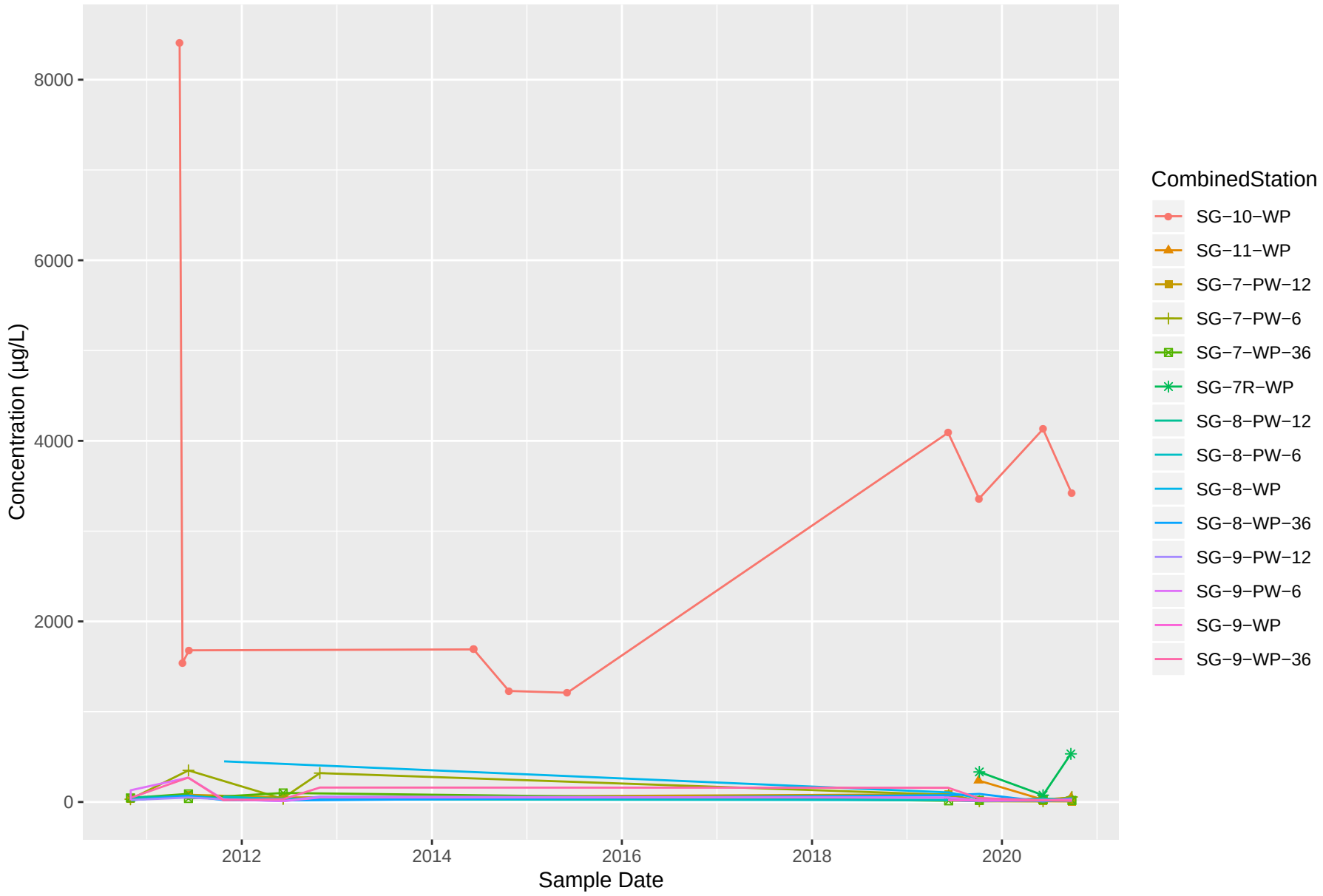
Dissolved concentration results not included
Prepared 01/10/2021



Dissolved concentration results not included
Prepared 01/10/2021

Figure 38. Time Series
Aluminum, Total, µg/L
DS Designated Stations, Set 2
2020 Holden ACAR Statistical Assessment
JS1904

PgG



Dissolved concentration results not included
Prepared 01/10/2021

Figure 39. Time Series
Aluminum, Total, µg/L
SG Designated Stations, Set 1
2020 Holden ACAR Statistical Assessment
JS1904

PgG

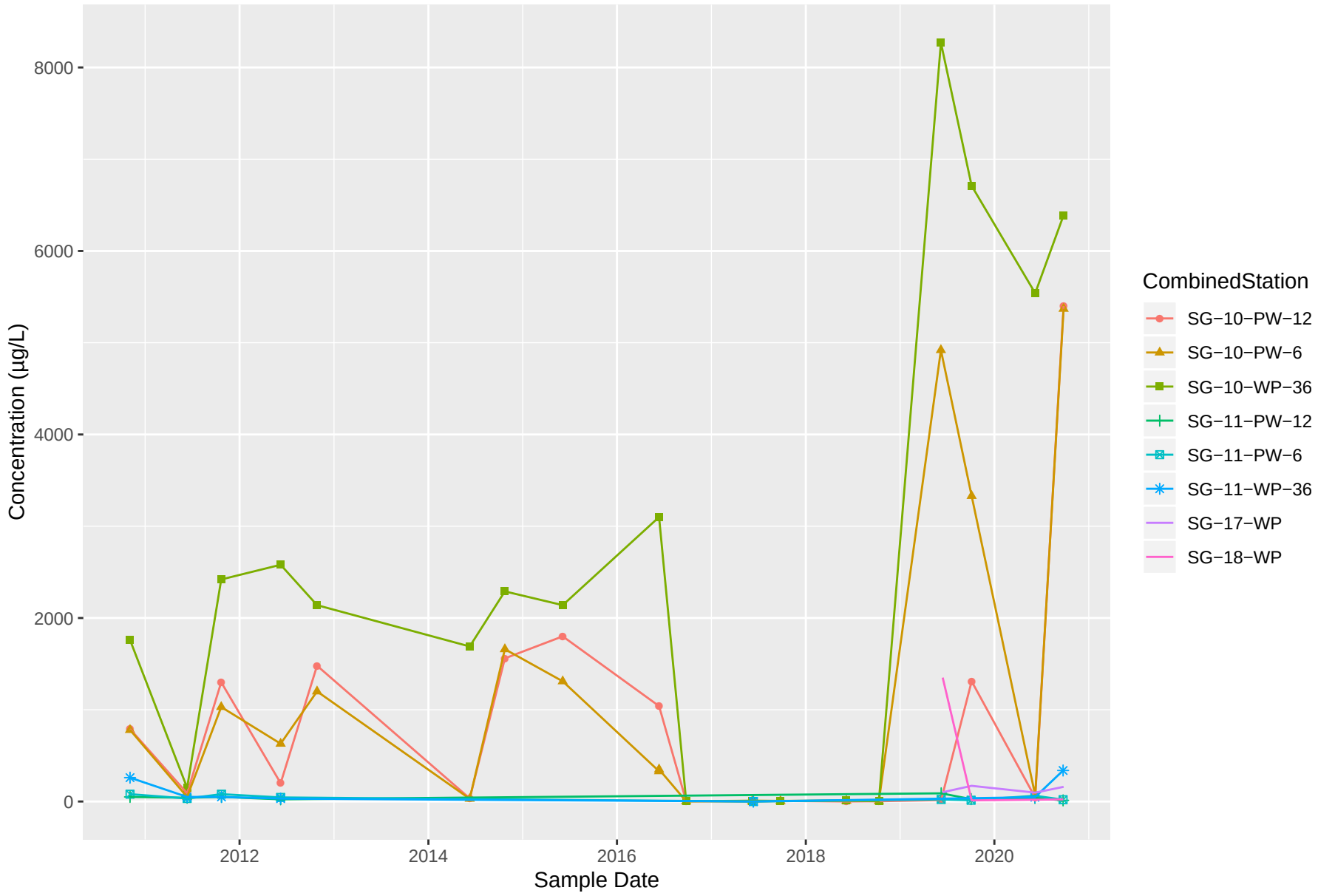
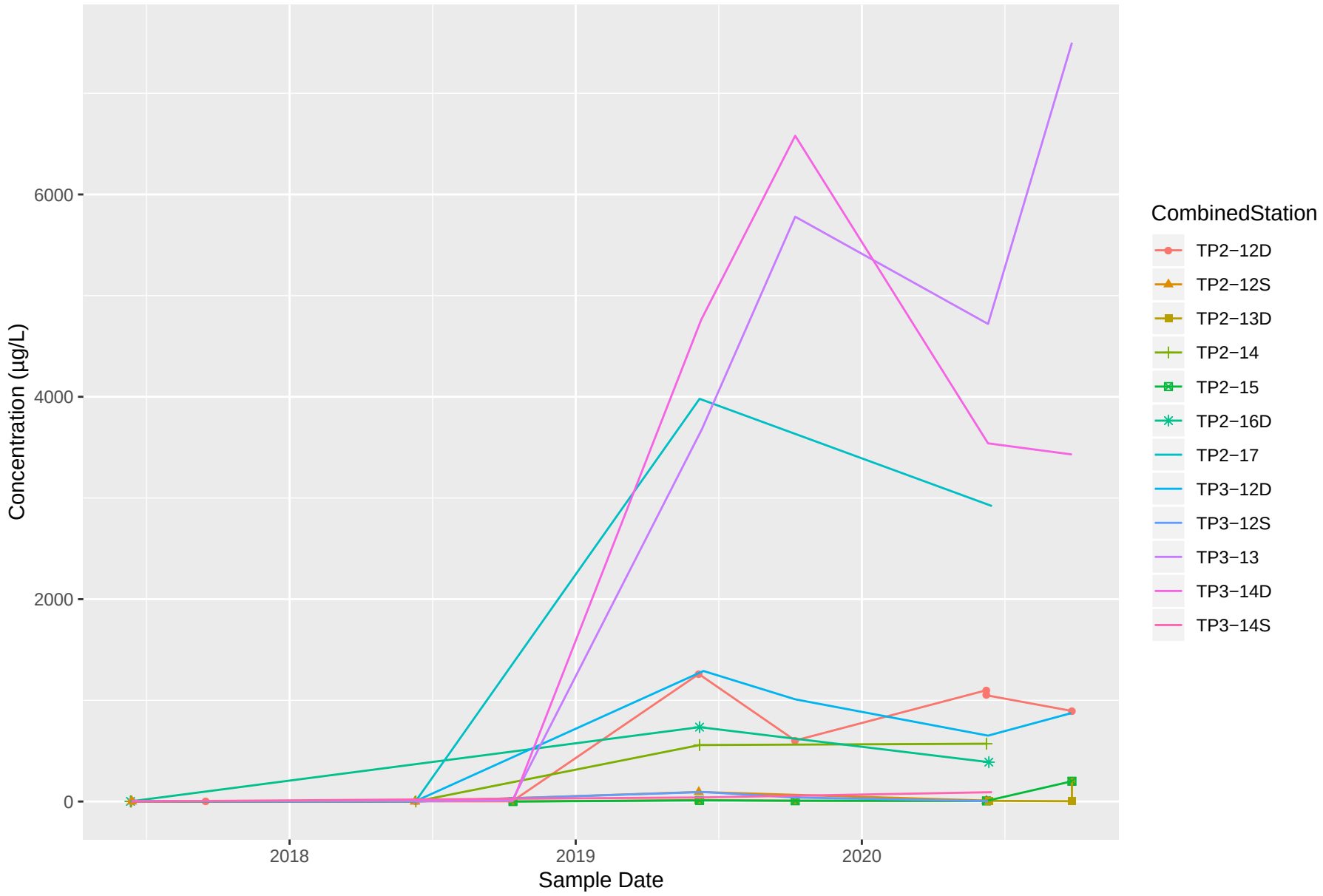


Figure 40. Time Series
Aluminum, Total, µg/L
SG Designated Stations, Set 2
2020 Holden ACAR Statistical Assessment
JS1904

Dissolved concentration results not included
Prepared 01/10/2021



Dissolved concentration results not included
Prepared 01/10/2021

Figure 41. Time Series
Aluminum, Total, µg/L
TP Designated Stations
2020 Holden ACAR Statistical Assessment
JS1904

PgG

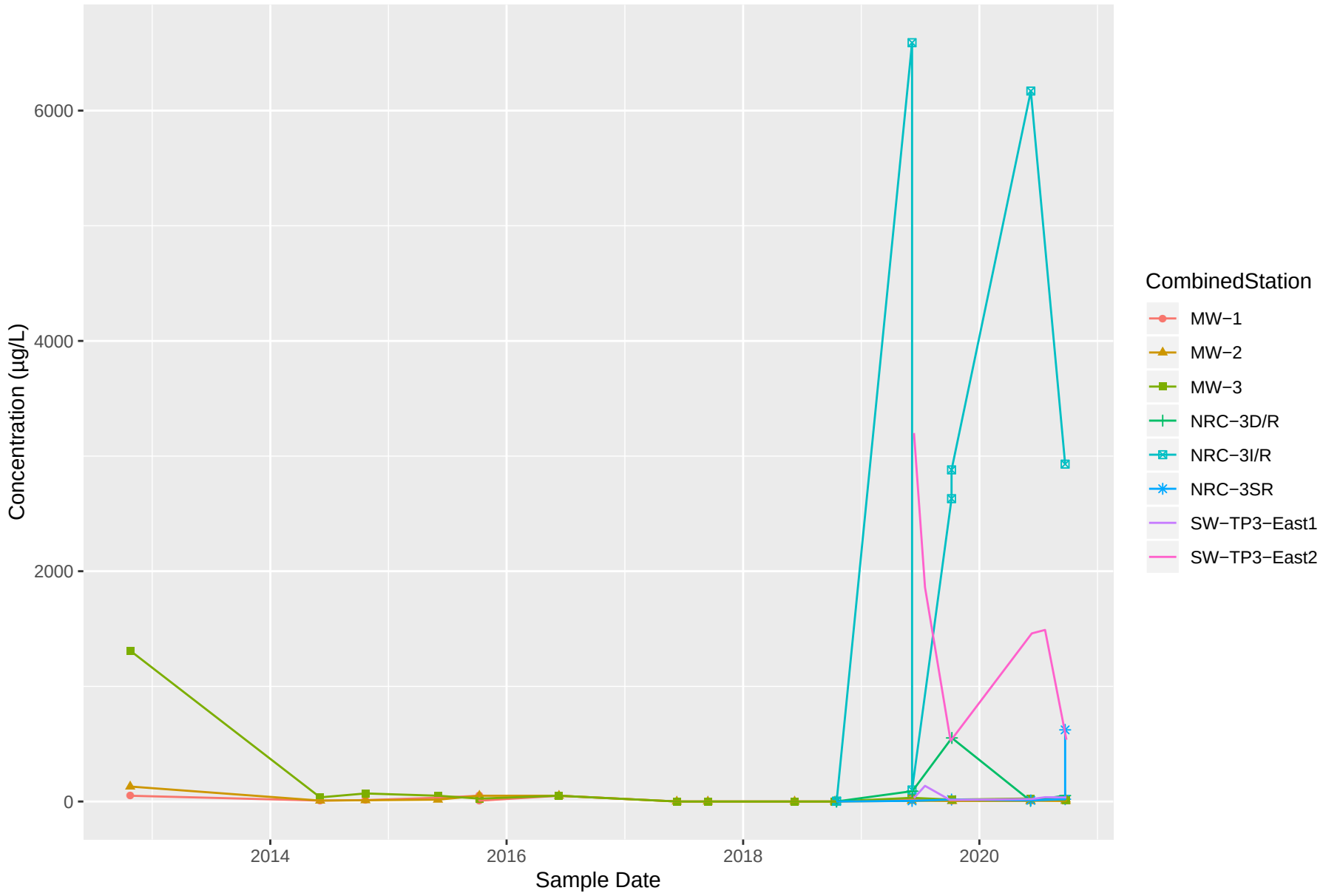


Figure 42. Time Series
Aluminum, Total, µg/L
SW/NRC/MW Designated Stations
2020 Holden ACAR Statistical Assessment
JS1904

Dissolved concentration results not included
Prepared 01/10/2021

PgG

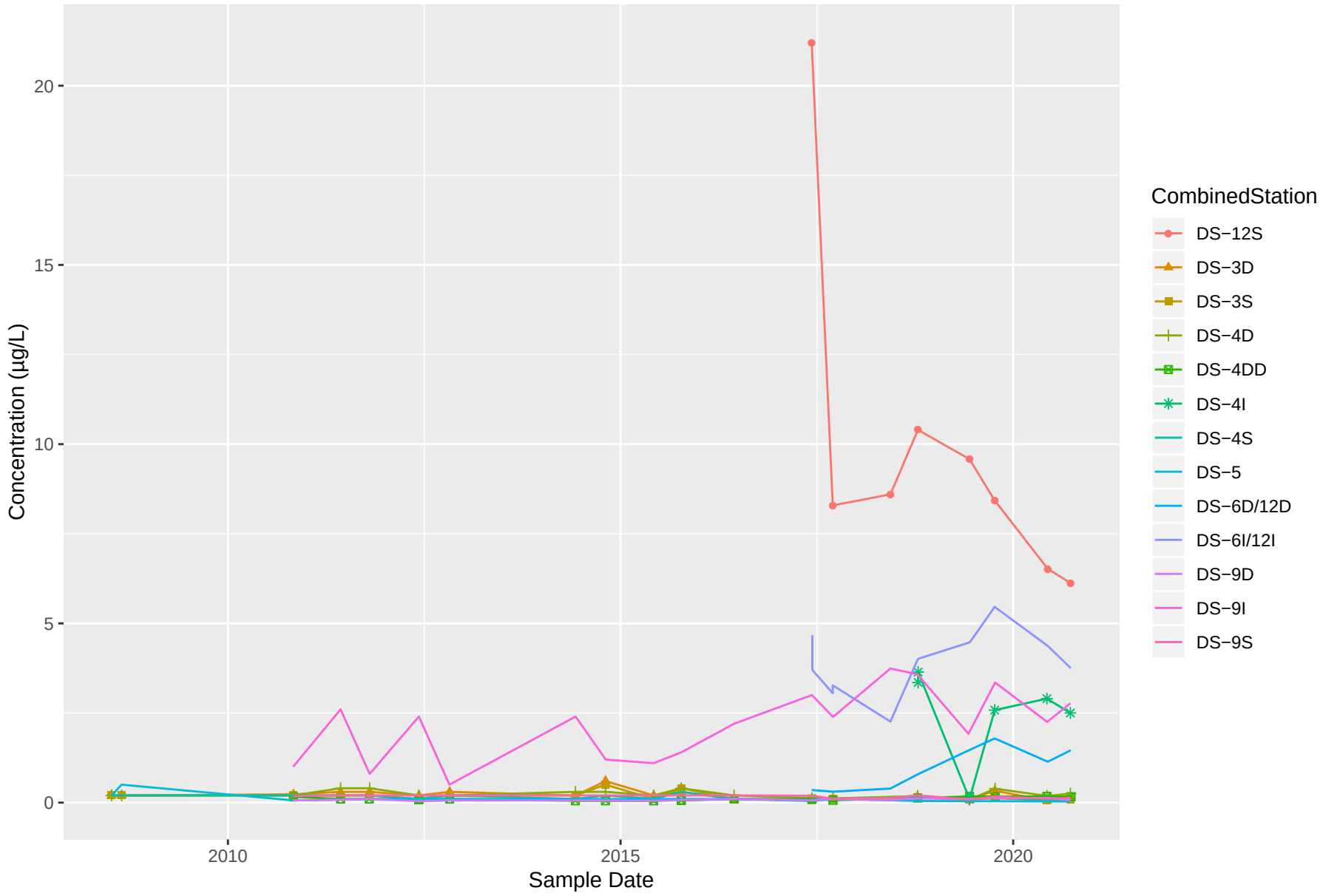


Figure 43. Time Series
Cadmium, Total, µg/L
DS Designated Stations, Set 1

2020 Holden ACAR Statistical Assessment
JS1904

Dissolved concentration results not included
Prepared 01/10/2021

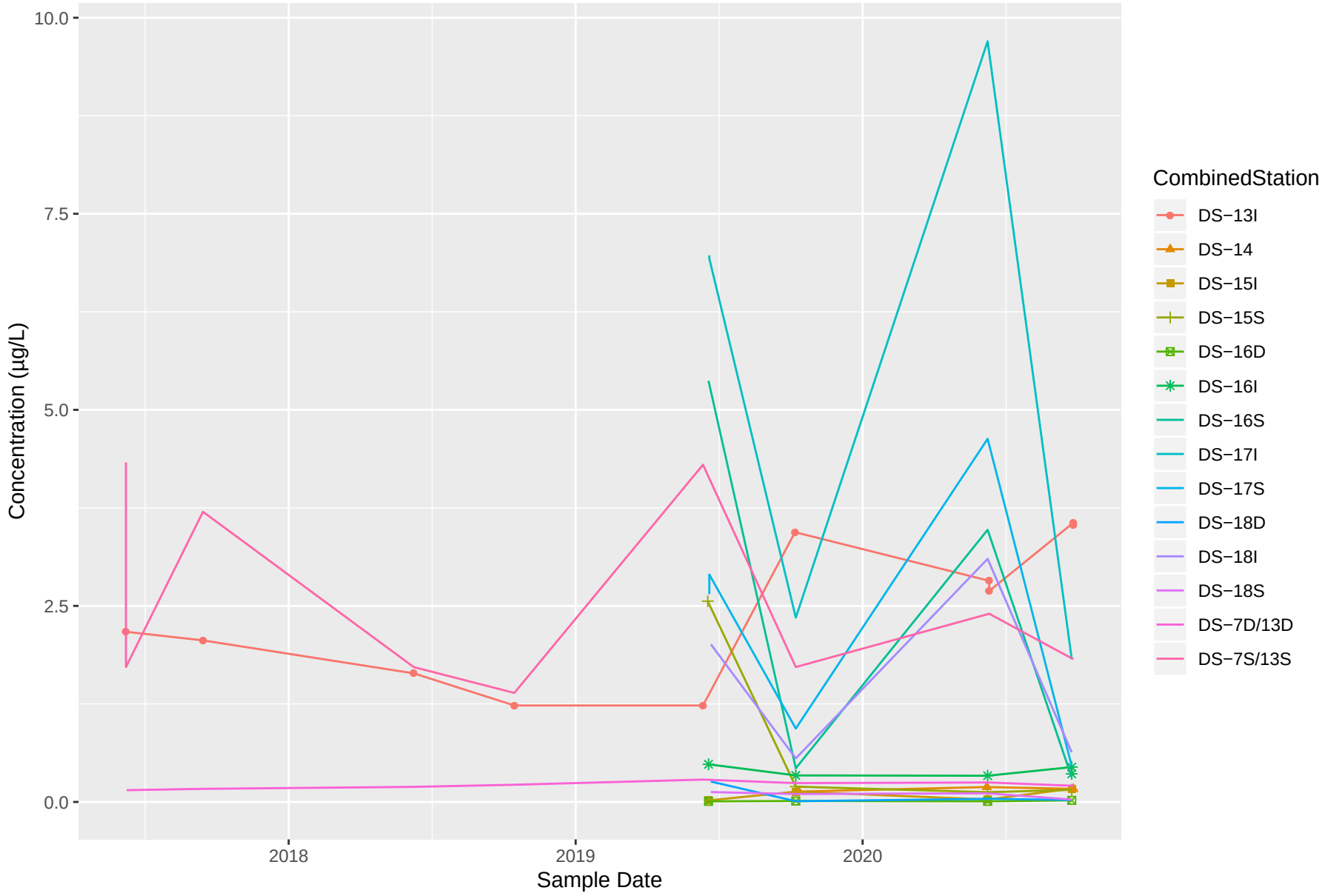
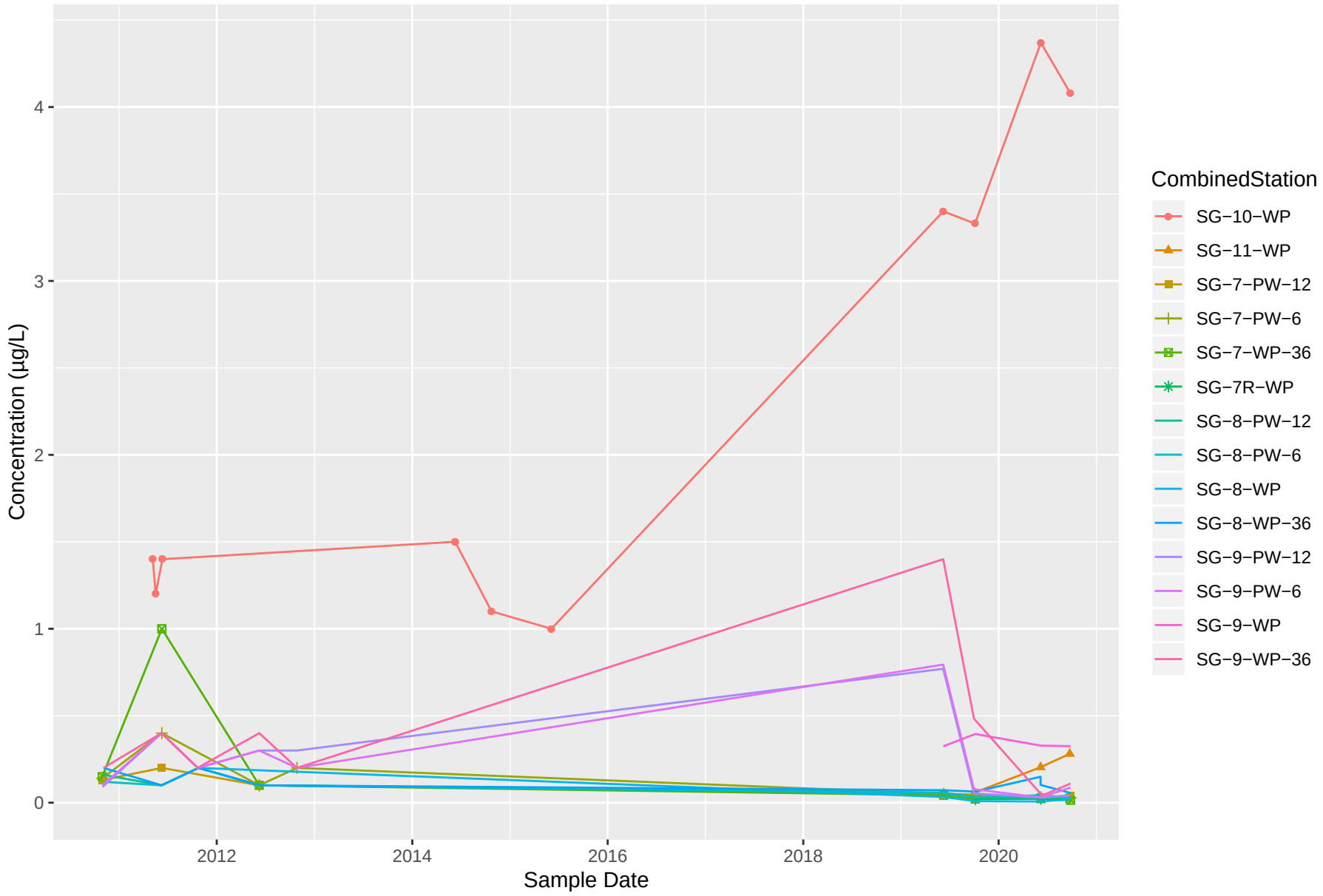


Figure 44. Time Series
Cadmium, Total, µg/L
DS Designated Stations, Set 2
2020 Holden ACAR Statistical Assessment
JS1904

Dissolved concentration results not included
Prepared 01/10/2021



Dissolved concentration results not included
Prepared 01/10/2021

Figure 45. Time Series
Cadmium, Total, µg/L
SG Designated Stations, Set 1
2020 Holden ACAR Statistical Assessment
JS1904

PgG

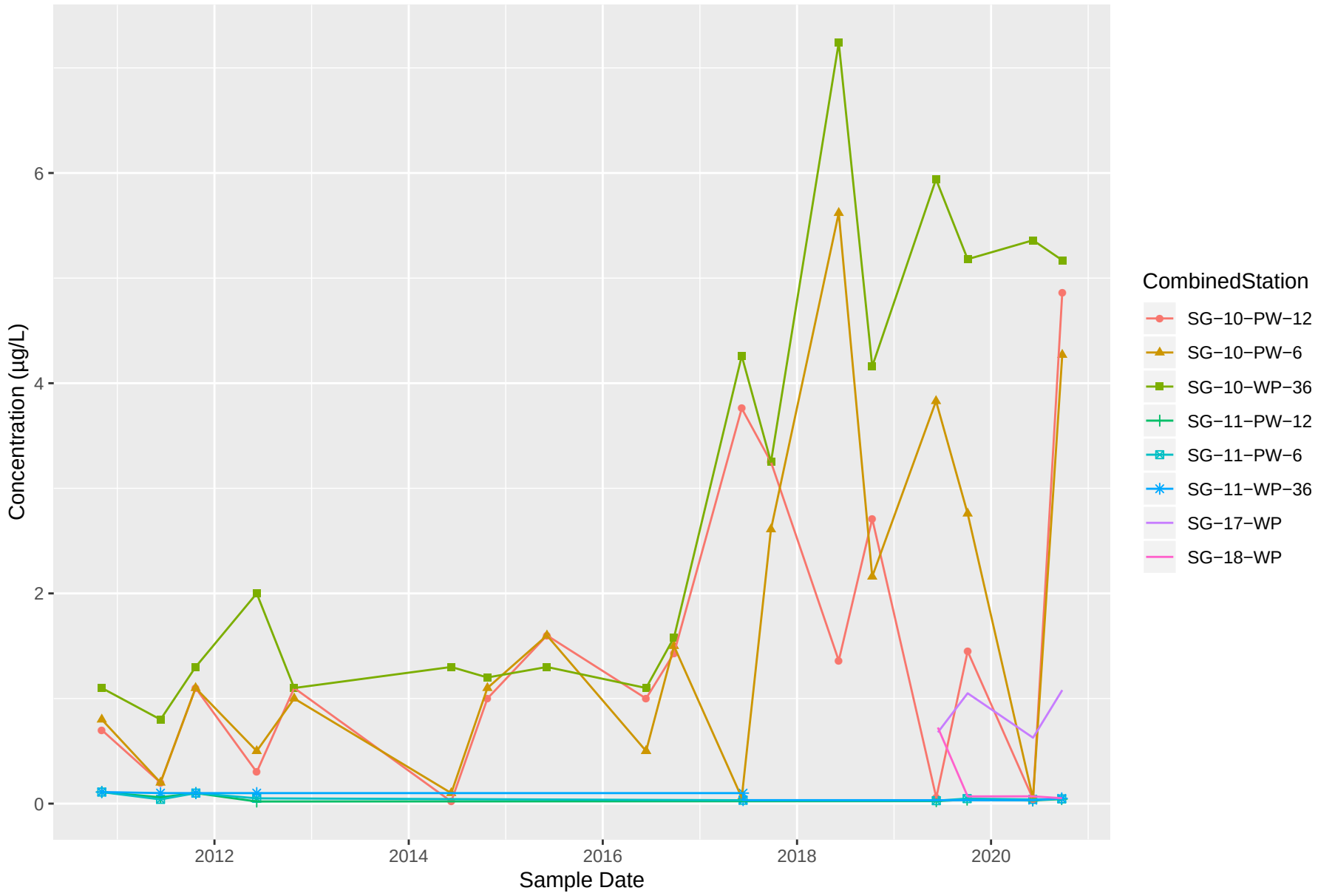


Figure 46. Time Series
Cadmium, Total, µg/L
SG Designated Stations, Set 2

2020 Holden ACAR Statistical Assessment
JS1904

Dissolved concentration results not included
Prepared 01/10/2021

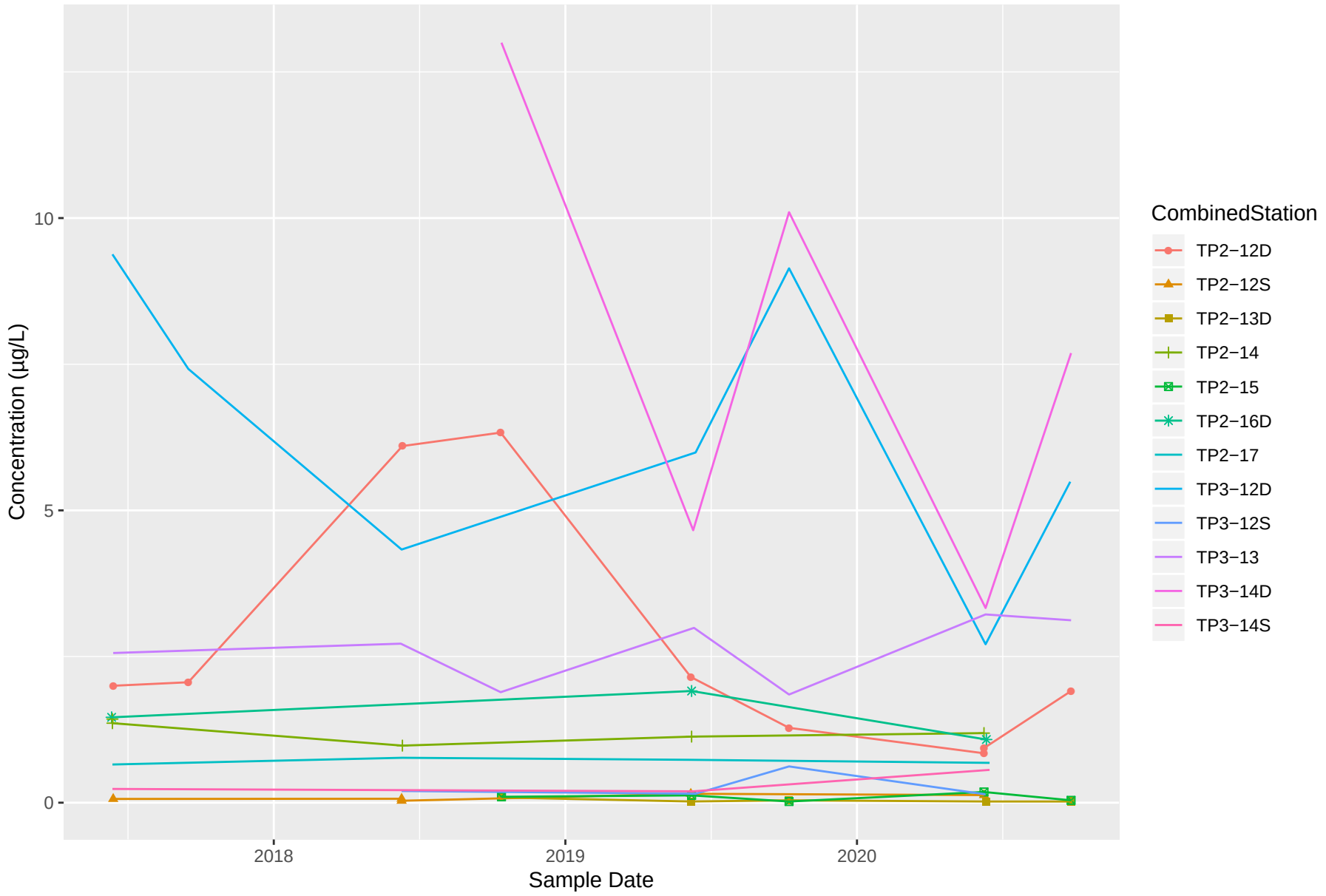


Figure 47. Time Series
Cadmium, Total, µg/L
TP Designated Stations

2020 Holden ACAR Statistical Assessment
JS1904

Dissolved concentration results not included
Prepared 01/10/2021

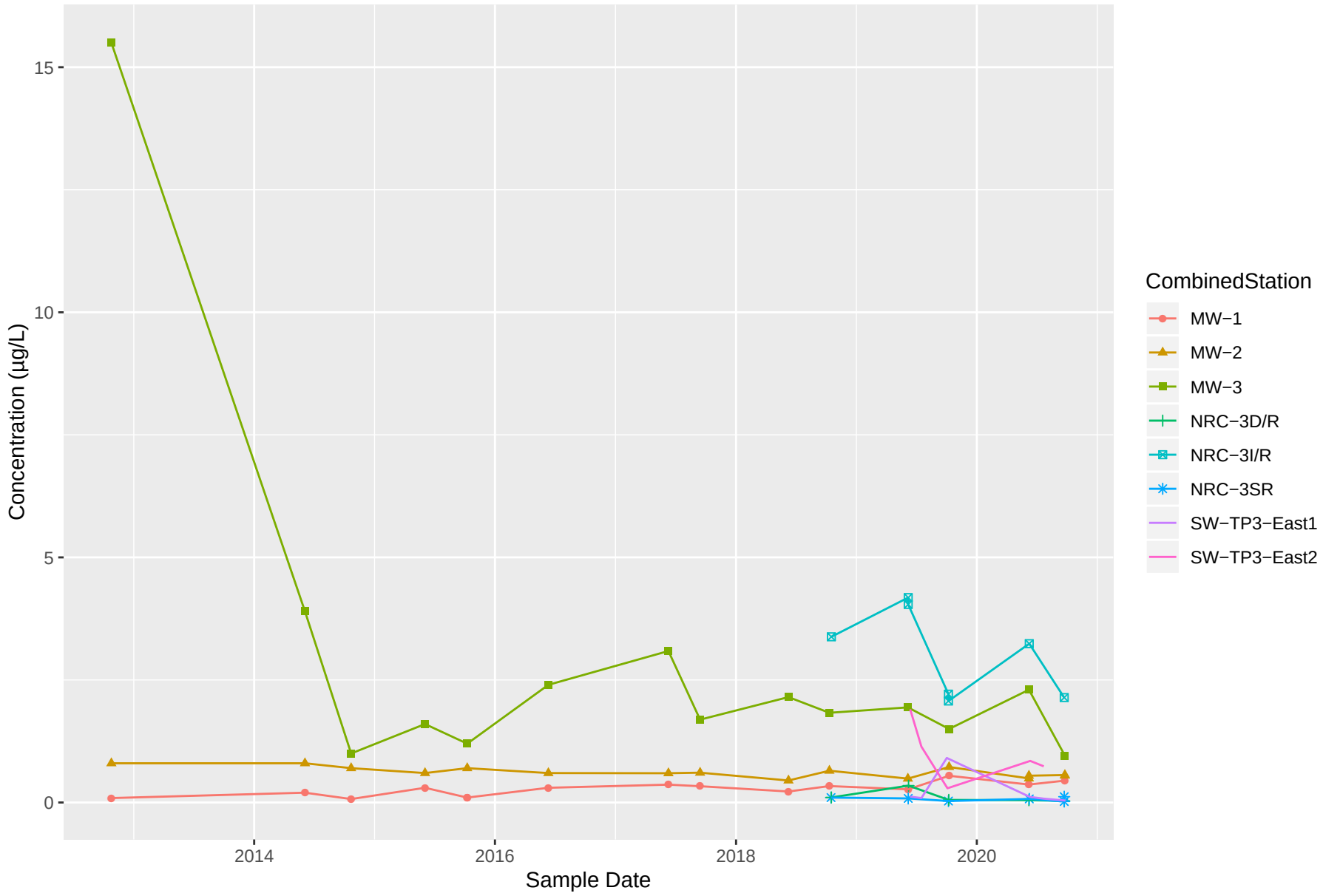


Figure 48. Time Series
Cadmium, Total, µg/L
SW/NRC/MW Designated Stations

2020 Holden ACAR Statistical Assessment
JS1904

Dissolved concentration results not included
Prepared 01/10/2021

PgG

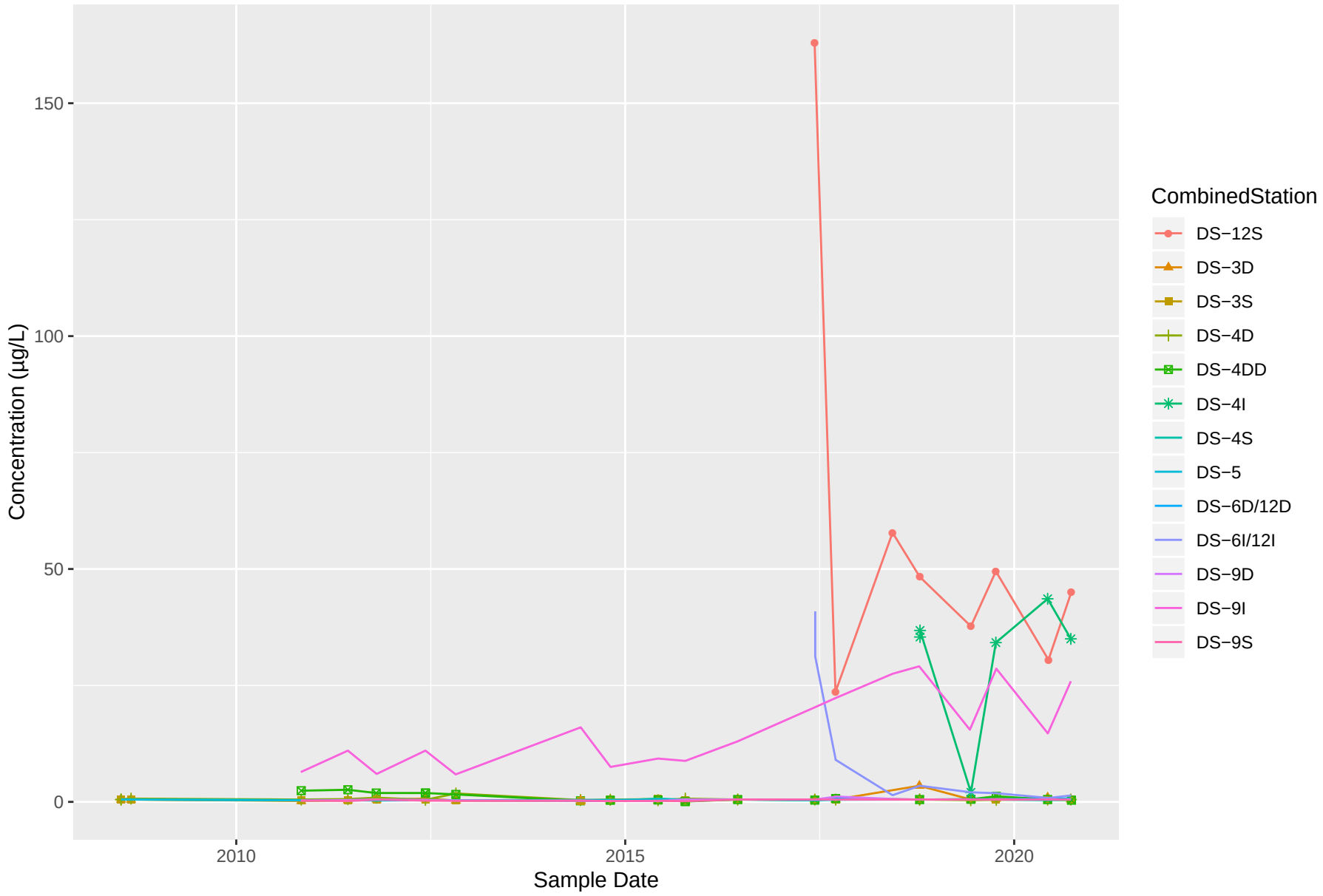
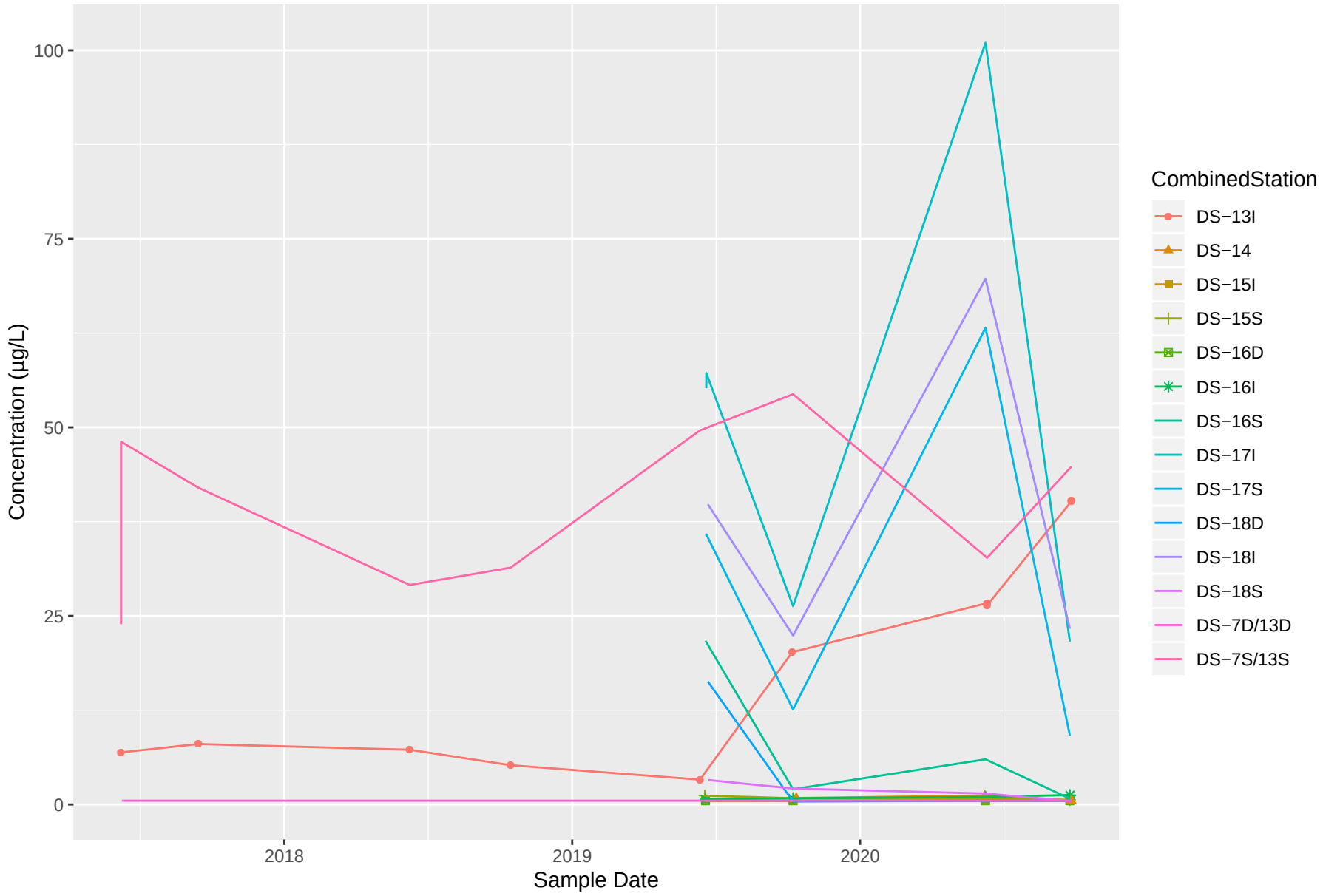


Figure 49. Time Series
Copper, Total, µg/L
DS Designated Stations, Set 1

2020 Holden ACAR Statistical Assessment
JS1904

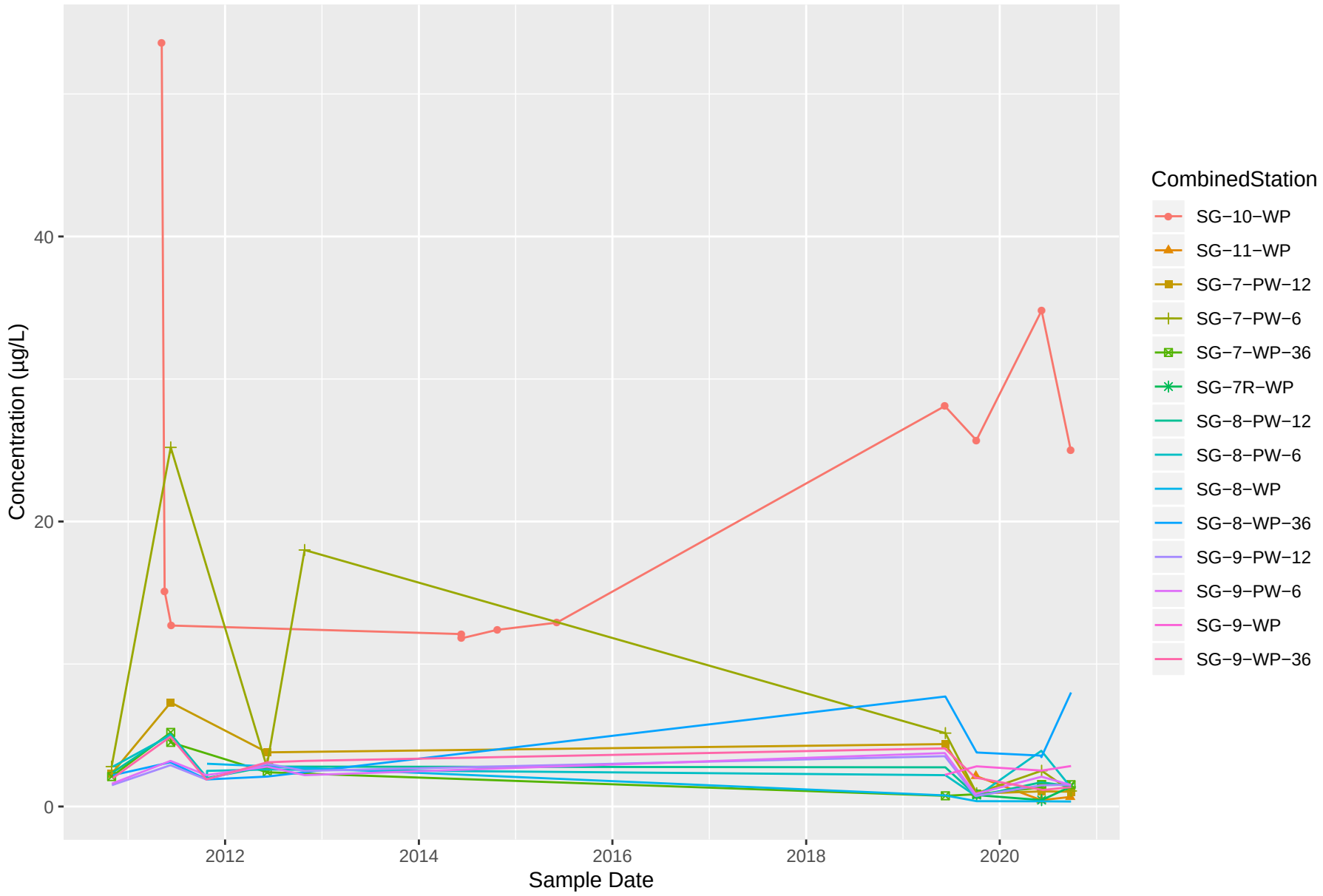
Dissolved concentration results not included
Prepared 01/10/2021



Dissolved concentration results not included
Prepared 01/10/2021

Figure 50. Time Series
Copper, Total, µg/L
DS Designated Stations, Set 2
2020 Holden ACAR Statistical Assessment
JS1904

PgG



Dissolved concentration results not included
Prepared 01/10/2021

Figure 51. Time Series
Copper, Total, µg/L
SG Designated Stations, Set 1
2020 Holden ACAR Statistical Assessment
JS1904

PgG

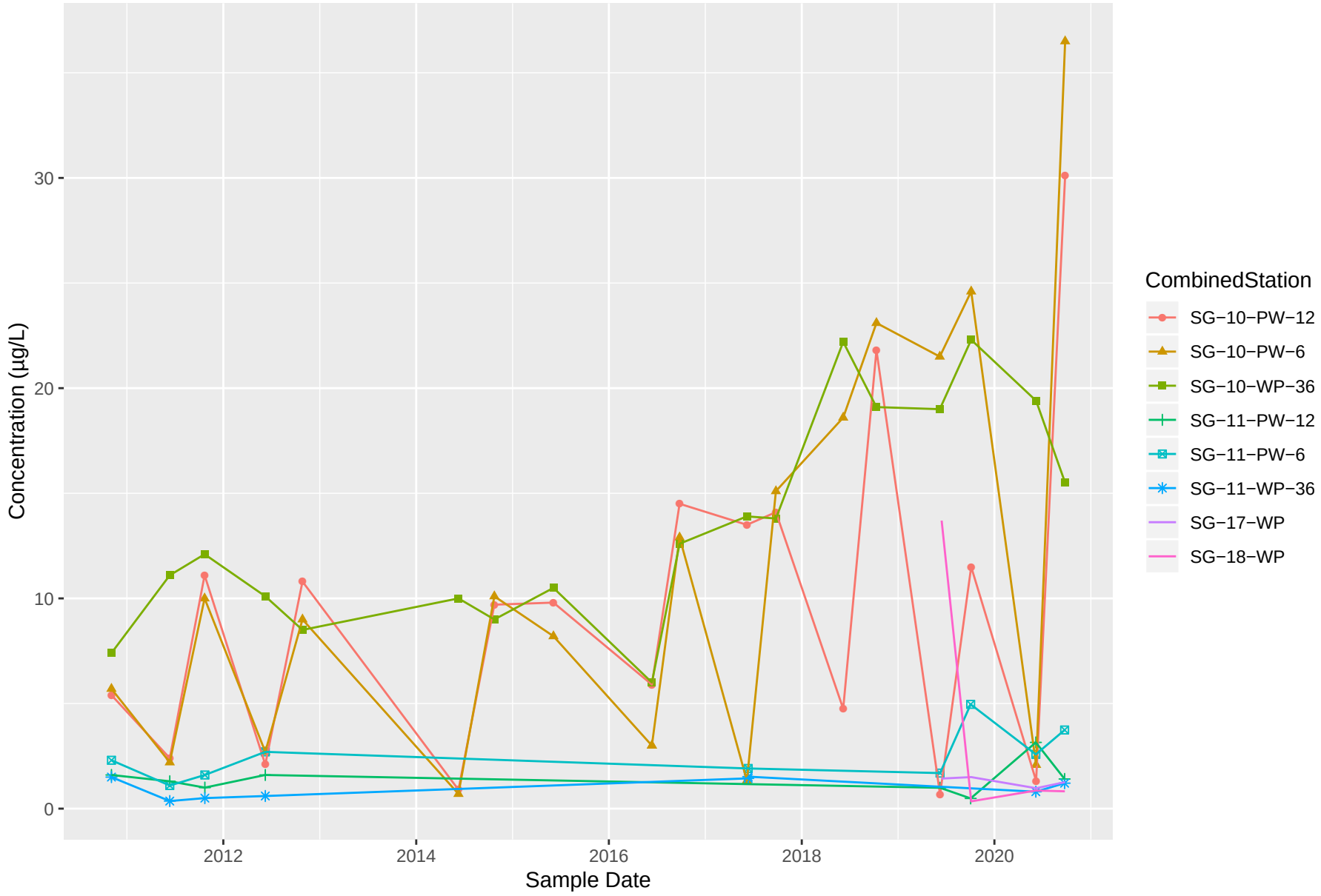
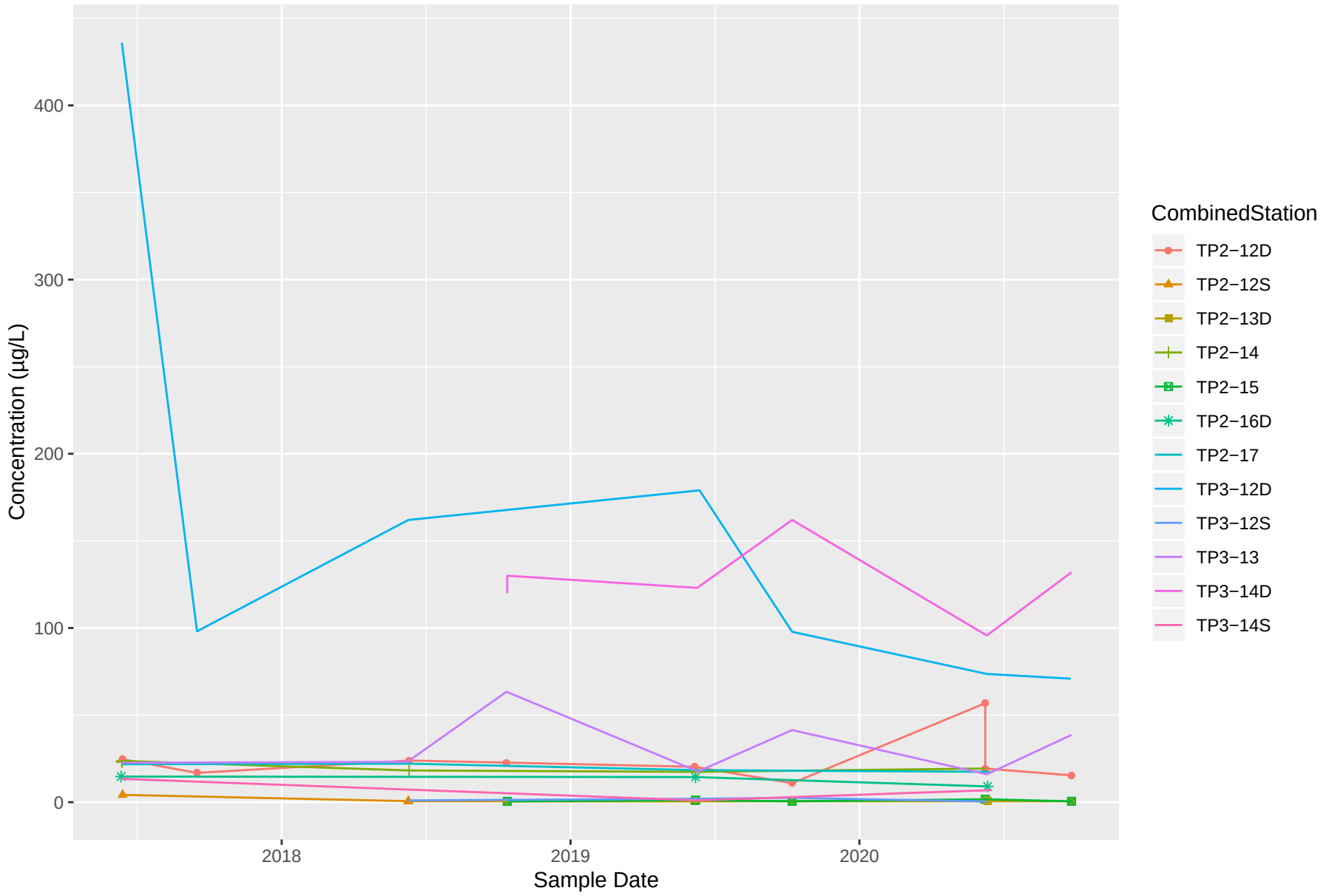


Figure 52. Time Series
Copper, Total, µg/L
SG Designated Stations, Set 2
2020 Holden ACAR Statistical Assessment
JS1904

Dissolved concentration results not included
Prepared 01/10/2021



Dissolved concentration results not included
Prepared 01/10/2021

Figure 53. Time Series
Copper, Total, µg/L
TP Designated Stations

2020 Holden ACAR Statistical Assessment
JS1904

PgG

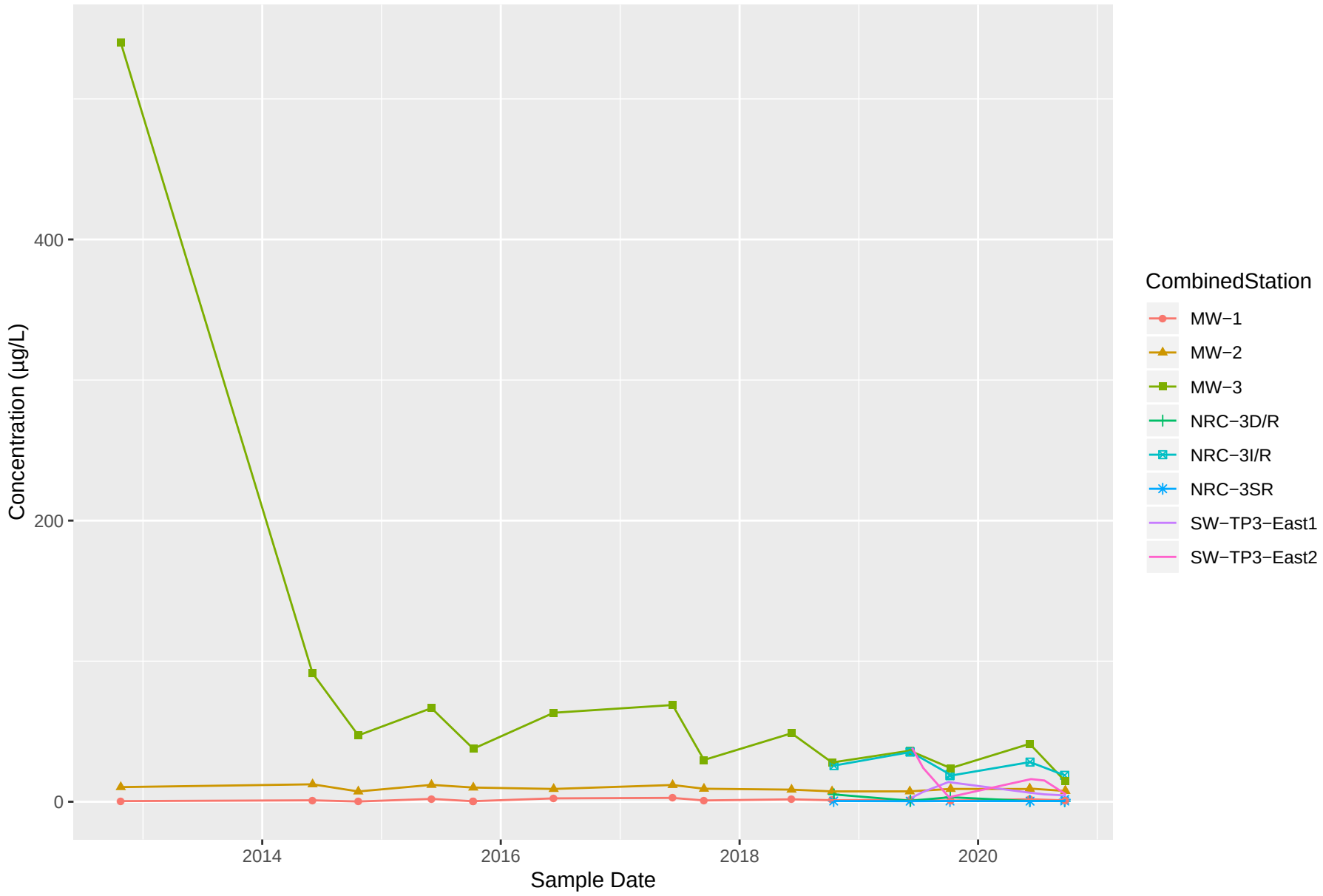


Figure 54. Time Series
Copper, Total, µg/L
SW/NRC/MW Designated Stations
2020 Holden ACAR Statistical Assessment
JS1904

Dissolved concentration results not included
Prepared 01/10/2021

PgG

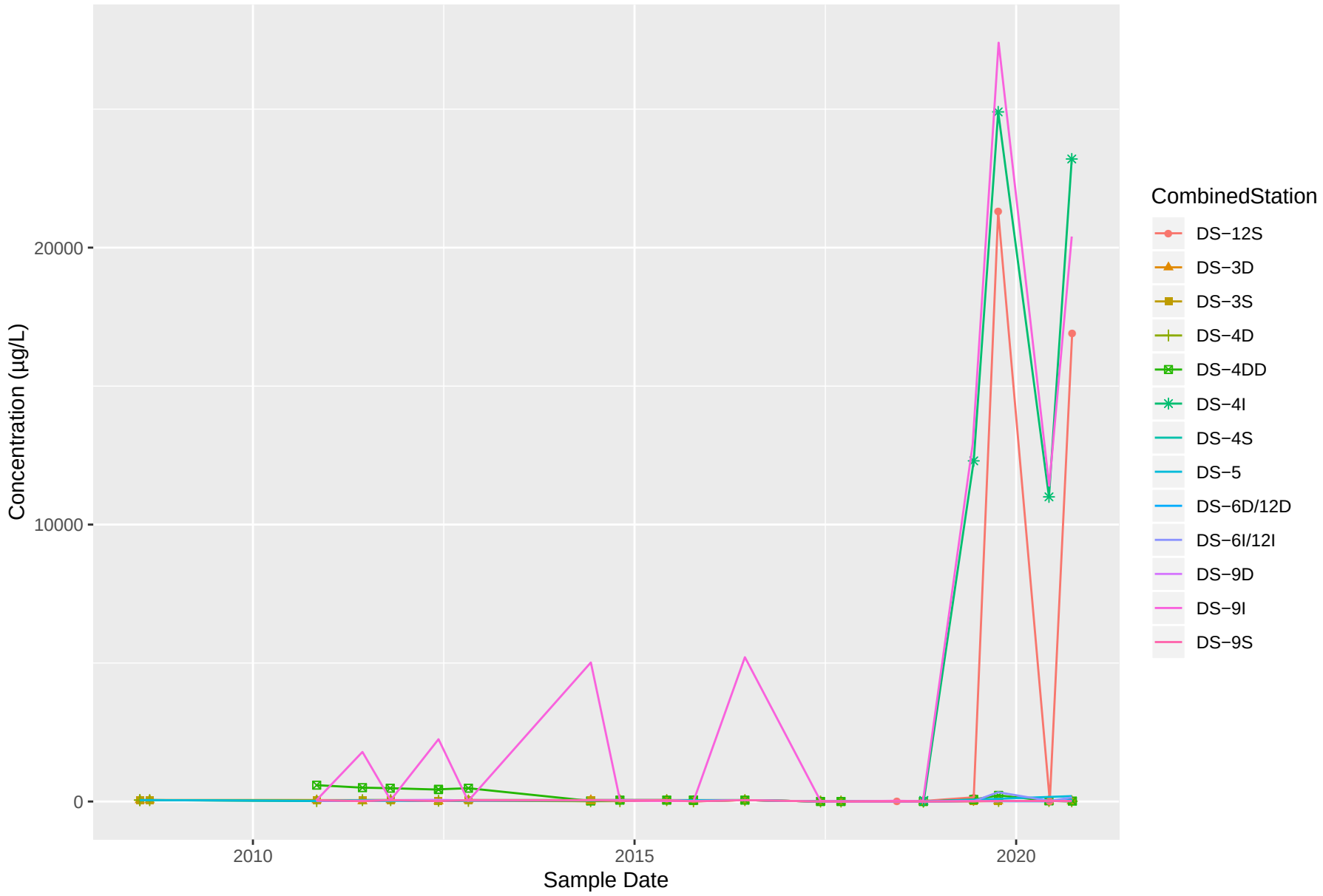


Figure 55. Time Series
Iron, Total, µg/L
DS Designated Stations, Set 1

2020 Holden ACAR Statistical Assessment
JS1904

Dissolved concentration results not included
Prepared 01/10/2021

PgG

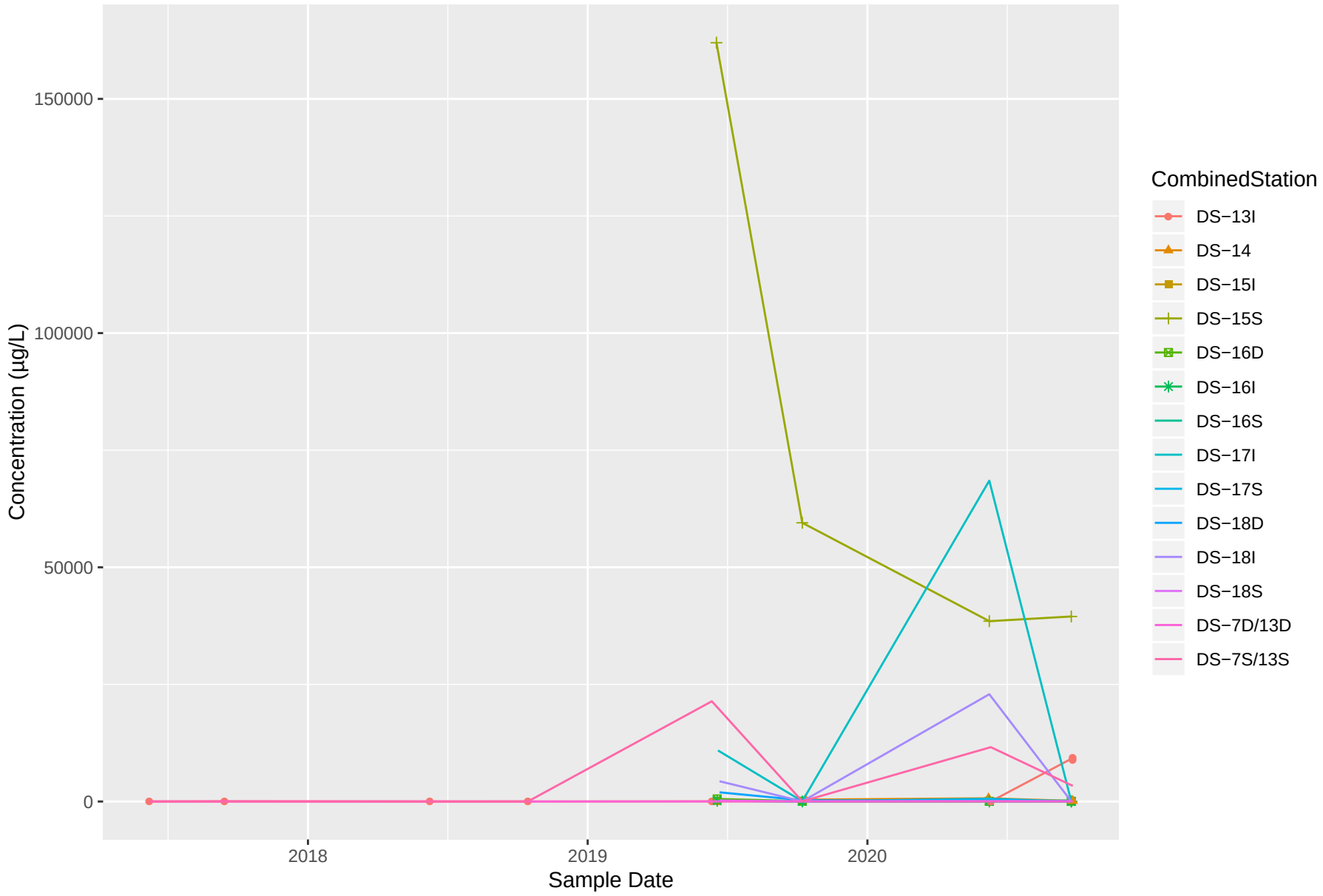


Figure 56. Time Series
Iron, Total, µg/L
DS Designated Stations, Set 2
2020 Holden ACAR Statistical Assessment
JS1904

Dissolved concentration results not included
Prepared 01/10/2021

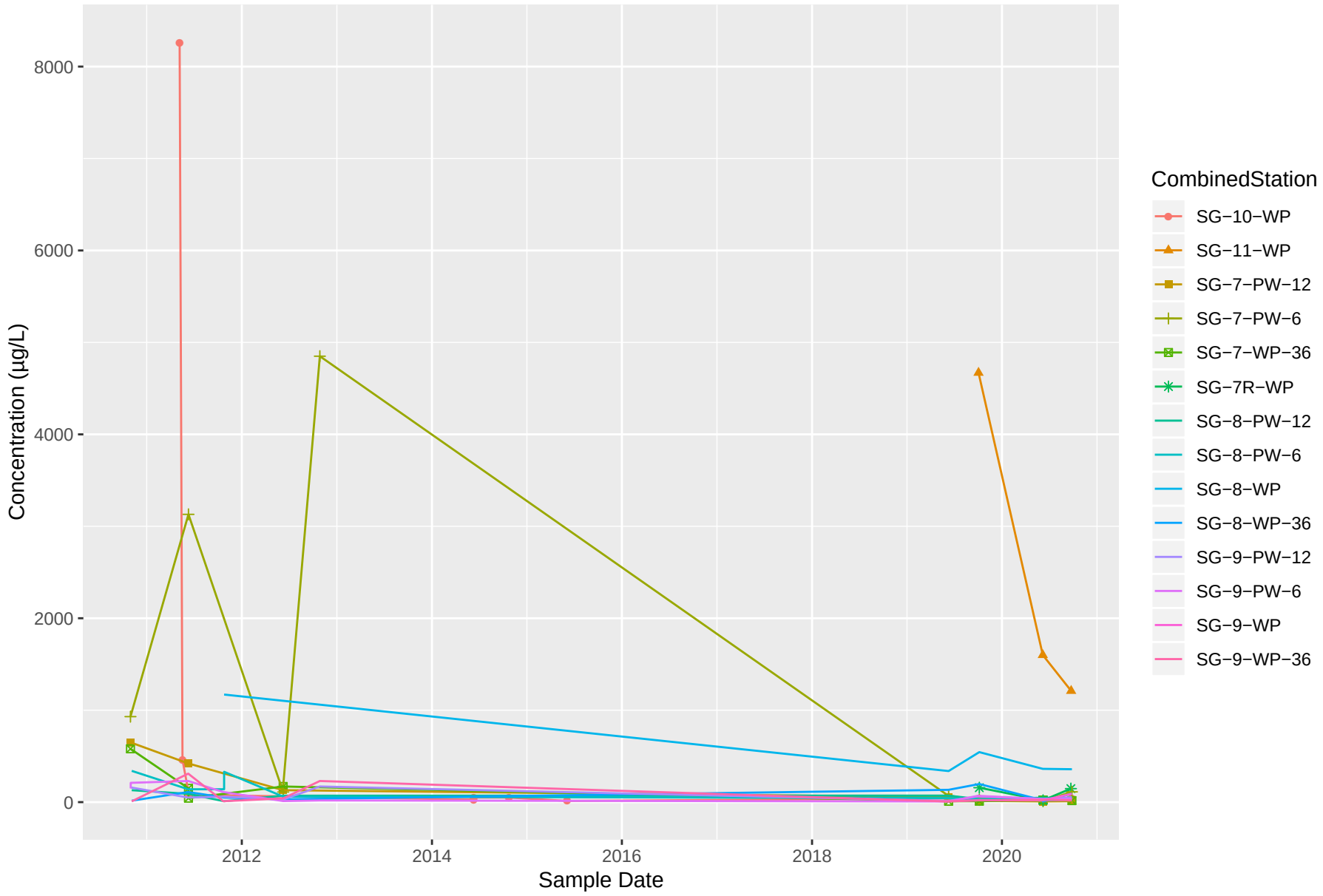


Figure 57. Time Series
Iron, Total, µg/L
SG Designated Stations, Set 1
2020 Holden ACAR Statistical Assessment
JS1904

Dissolved concentration results not included
Prepared 01/10/2021

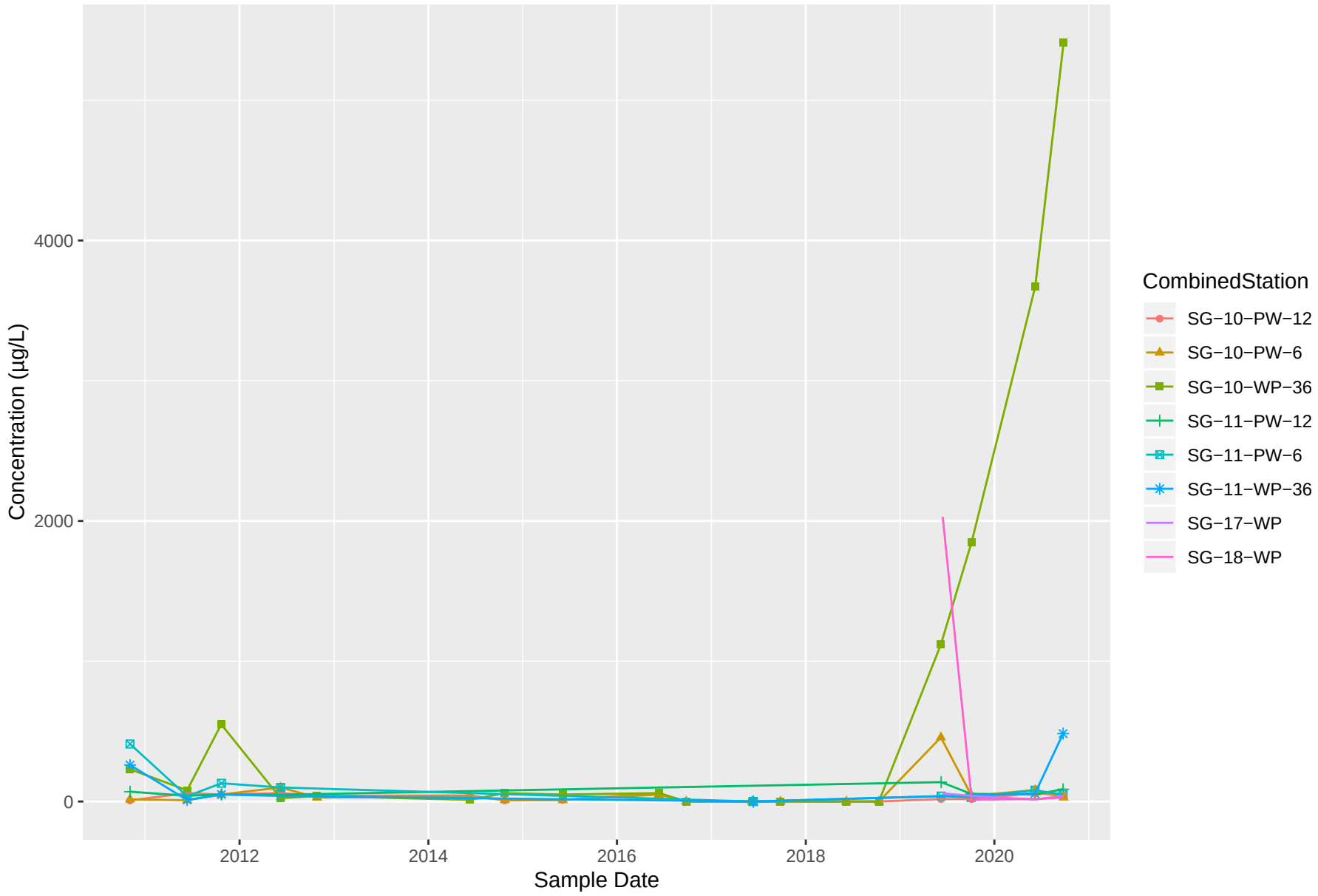
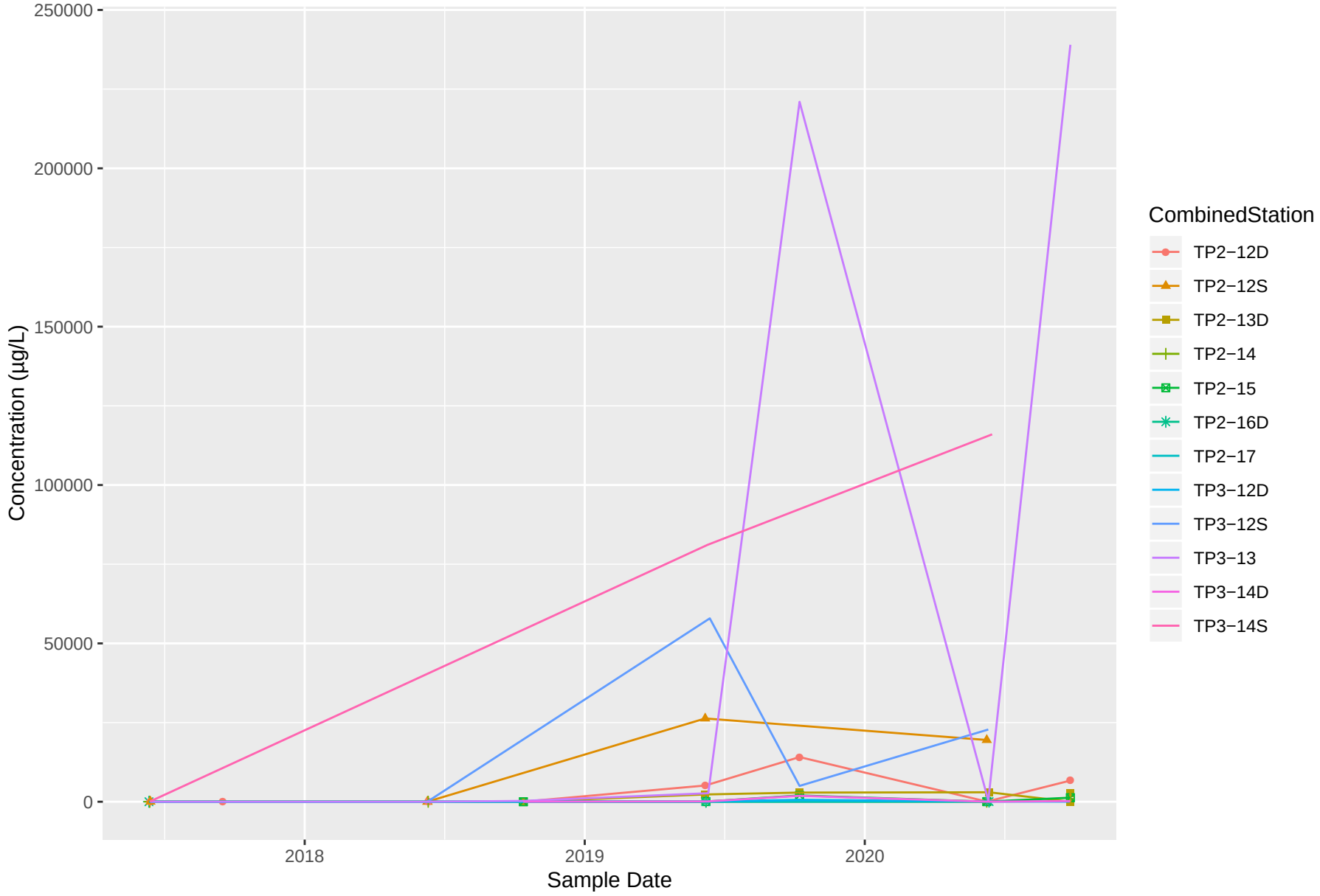


Figure 58. Time Series
Iron, Total, µg/L
SG Designated Stations, Set 2
2020 Holden ACAR Statistical Assessment
JS1904

Dissolved concentration results not included
Prepared 01/10/2021



Dissolved concentration results not included
Prepared 01/10/2021

Figure 59. Time Series
Iron, Total, µg/L
TP Designated Stations
2020 Holden ACAR Statistical Assessment
JS1904

PgG

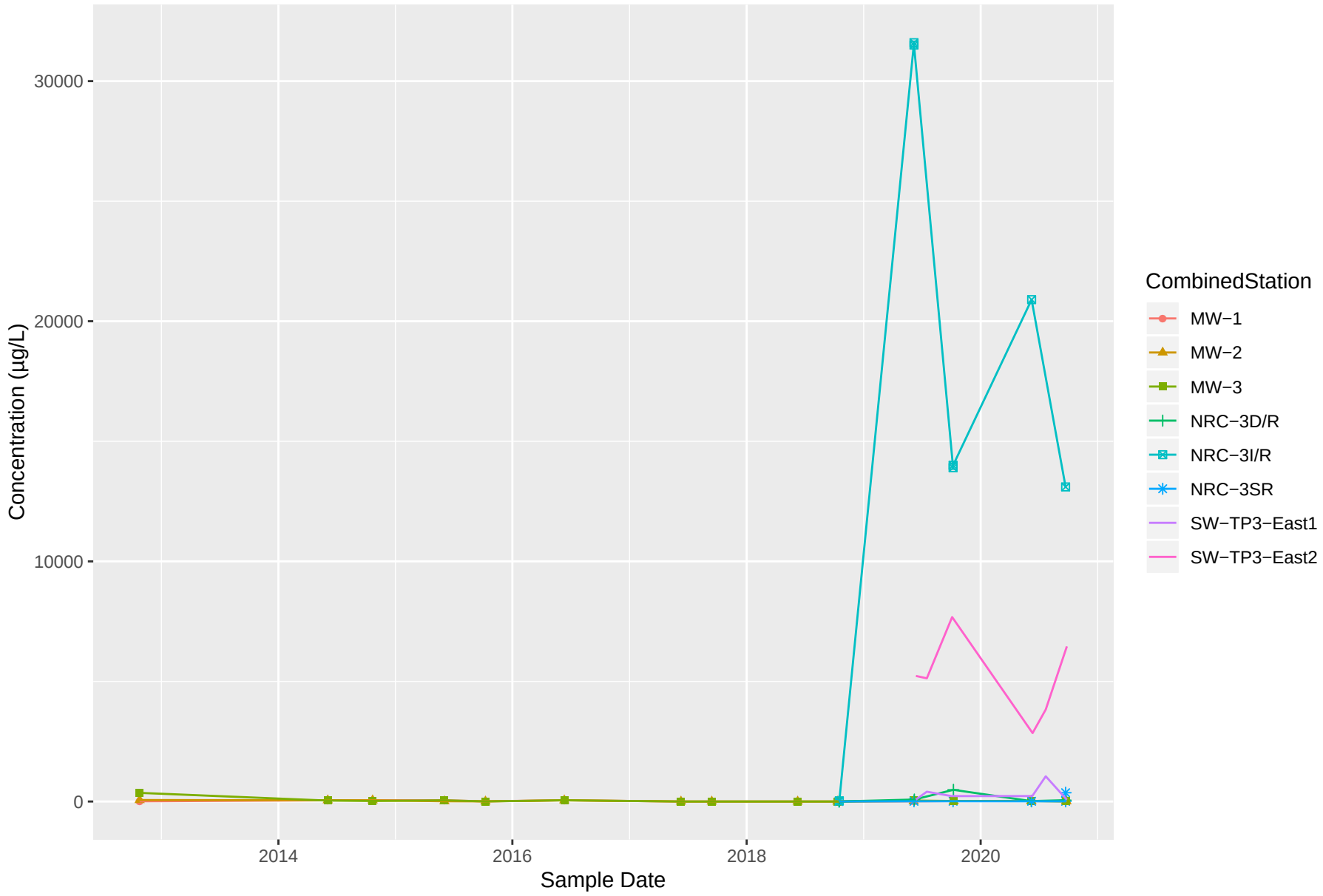
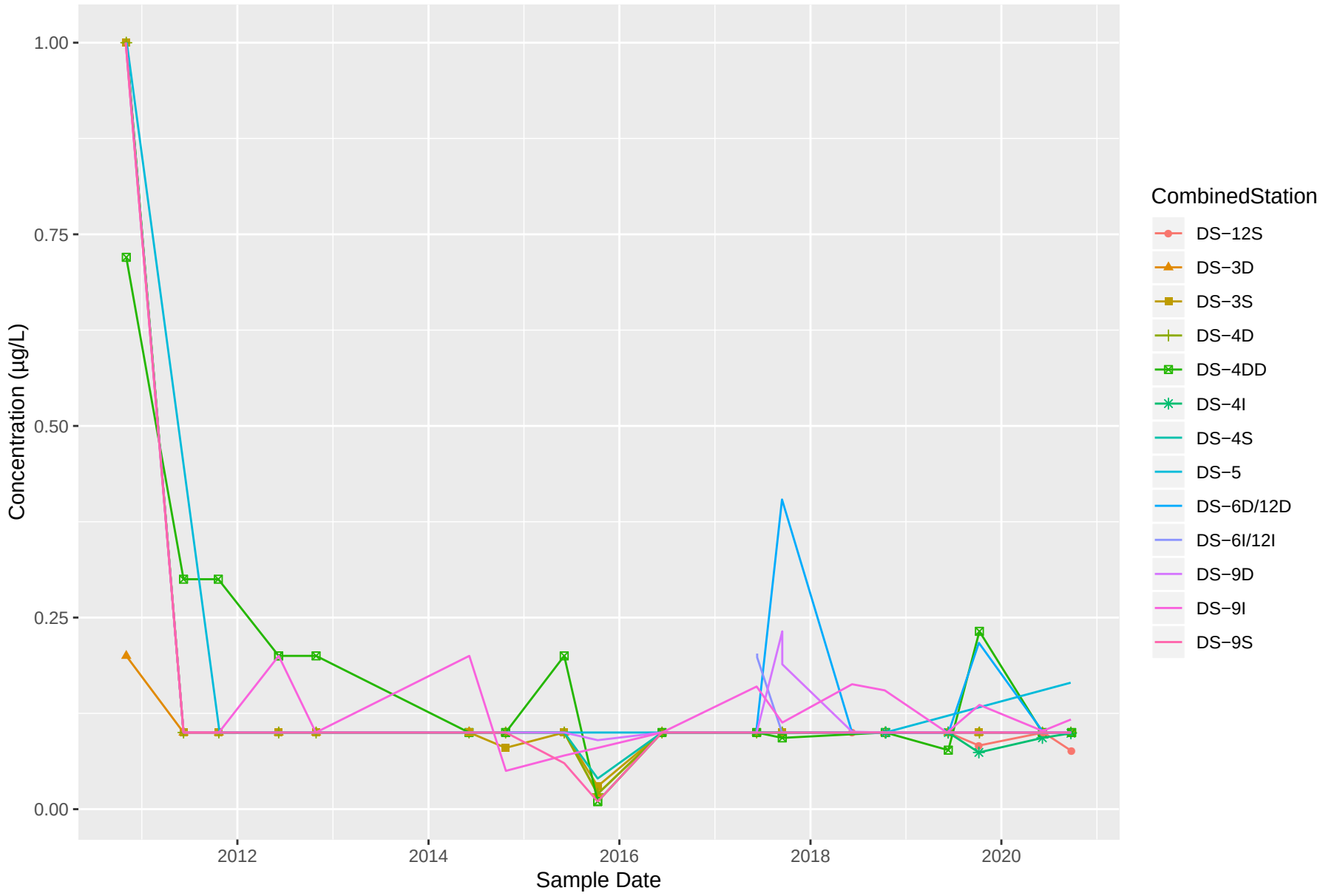


Figure 60. Time Series
Iron, Total, µg/L
SW/NRC/MW Designated Stations
2020 Holden ACAR Statistical Assessment
JS1904

Dissolved concentration results not included
Prepared 01/10/2021

PgG



Dissolved concentration results not included
Prepared 01/10/2021

Figure 61. Time Series
Lead, Total, µg/L
DS Designated Stations, Set 1
2020 Holden ACAR Statistical Assessment
JS1904

PgG

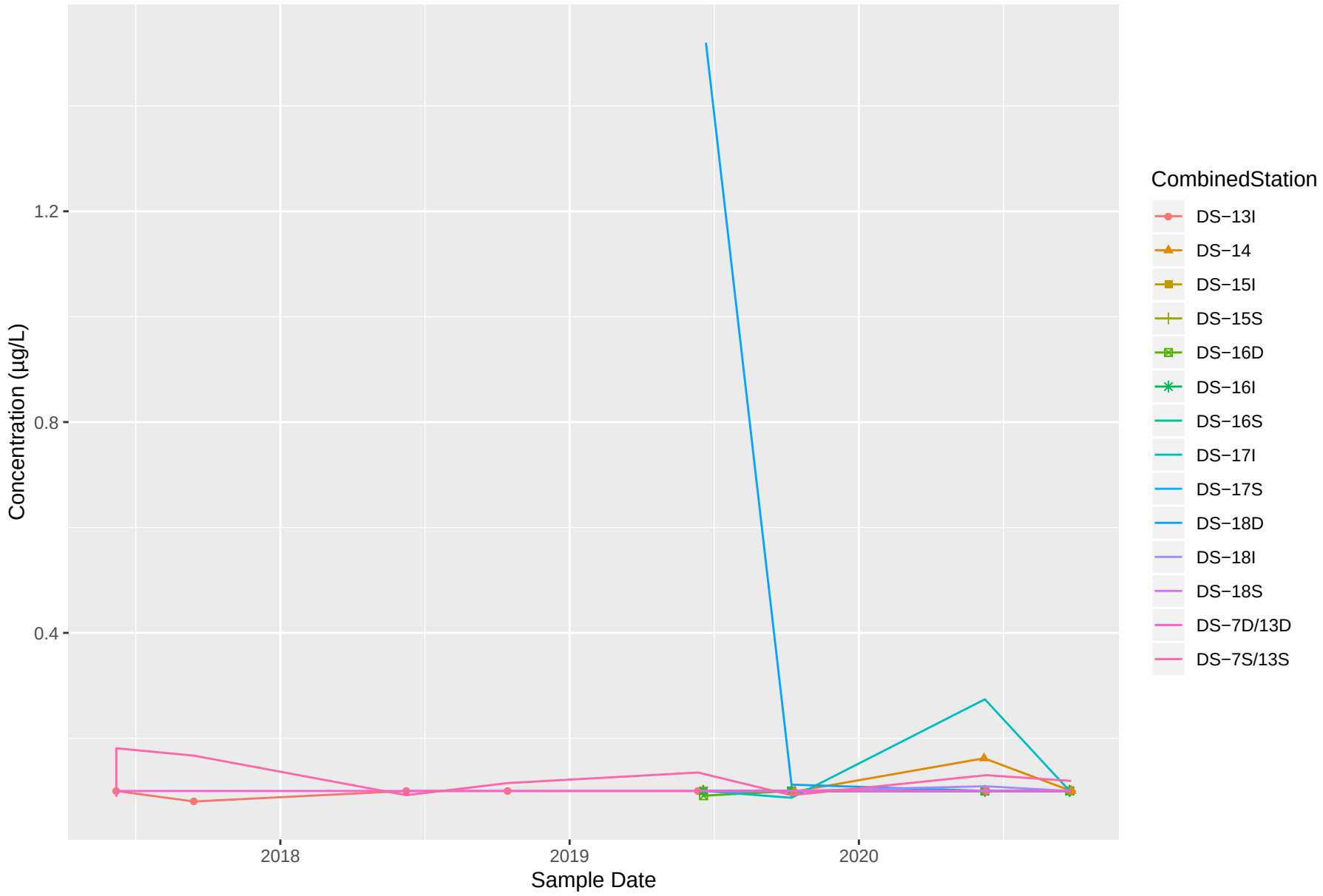


Figure 62. Time Series
Lead, Total, µg/L
DS Designated Stations, Set 2
2020 Holden ACAR Statistical Assessment
JS1904

Dissolved concentration results not included
Prepared 01/10/2021

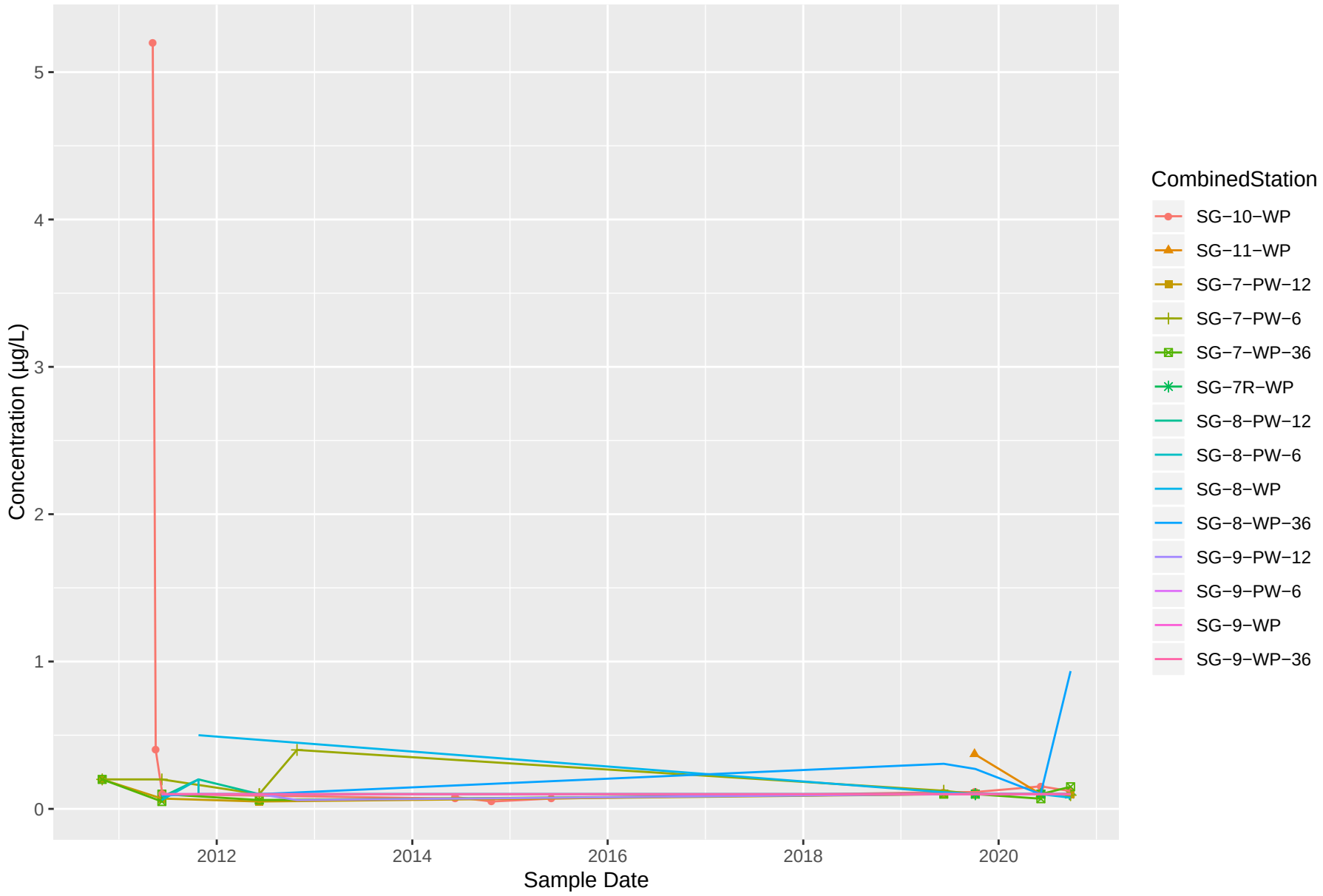


Figure 63. Time Series
Lead, Total, µg/L
SG Designated Stations, Set 1

2020 Holden ACAR Statistical Assessment
JS1904

Dissolved concentration results not included
Prepared 01/10/2021

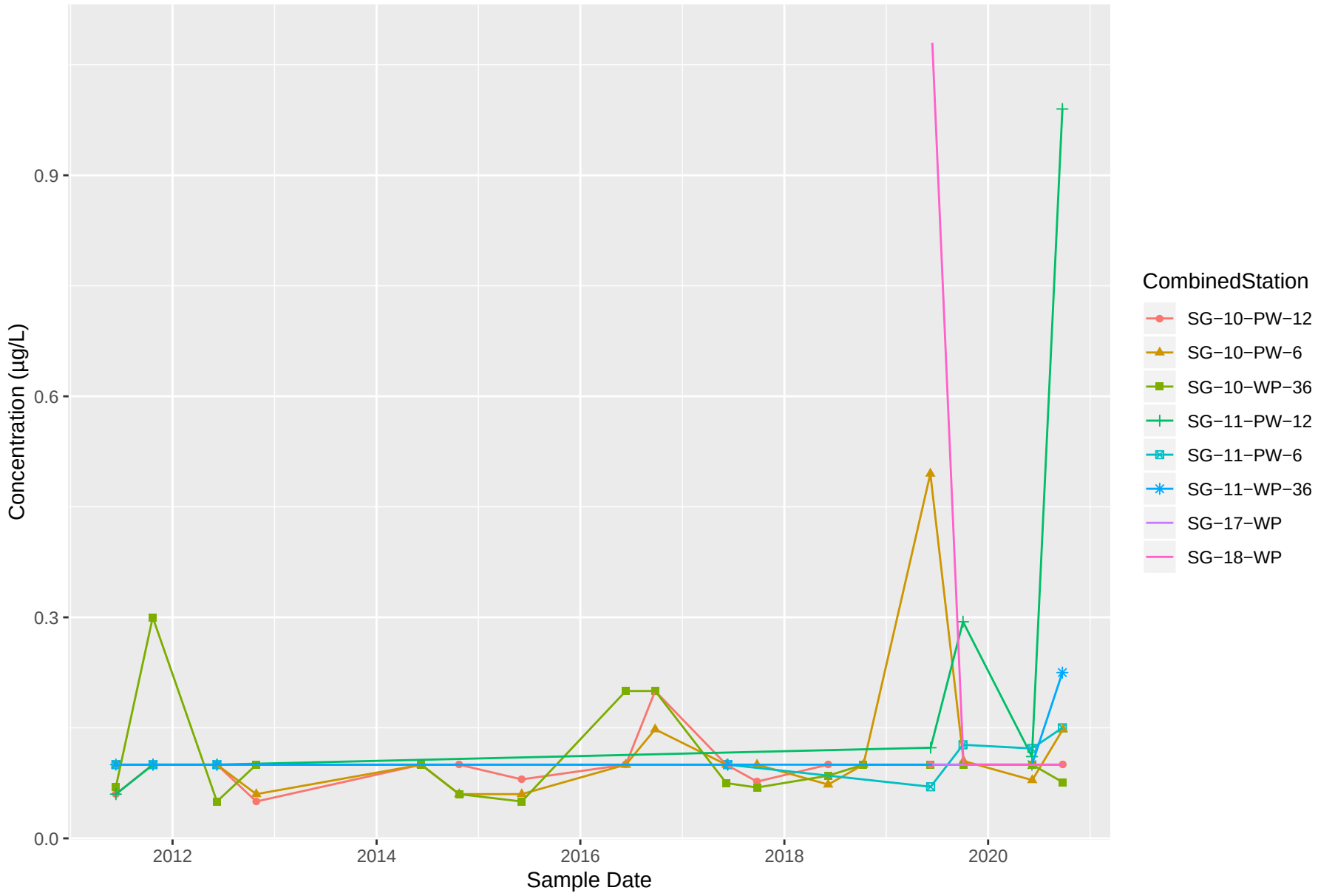
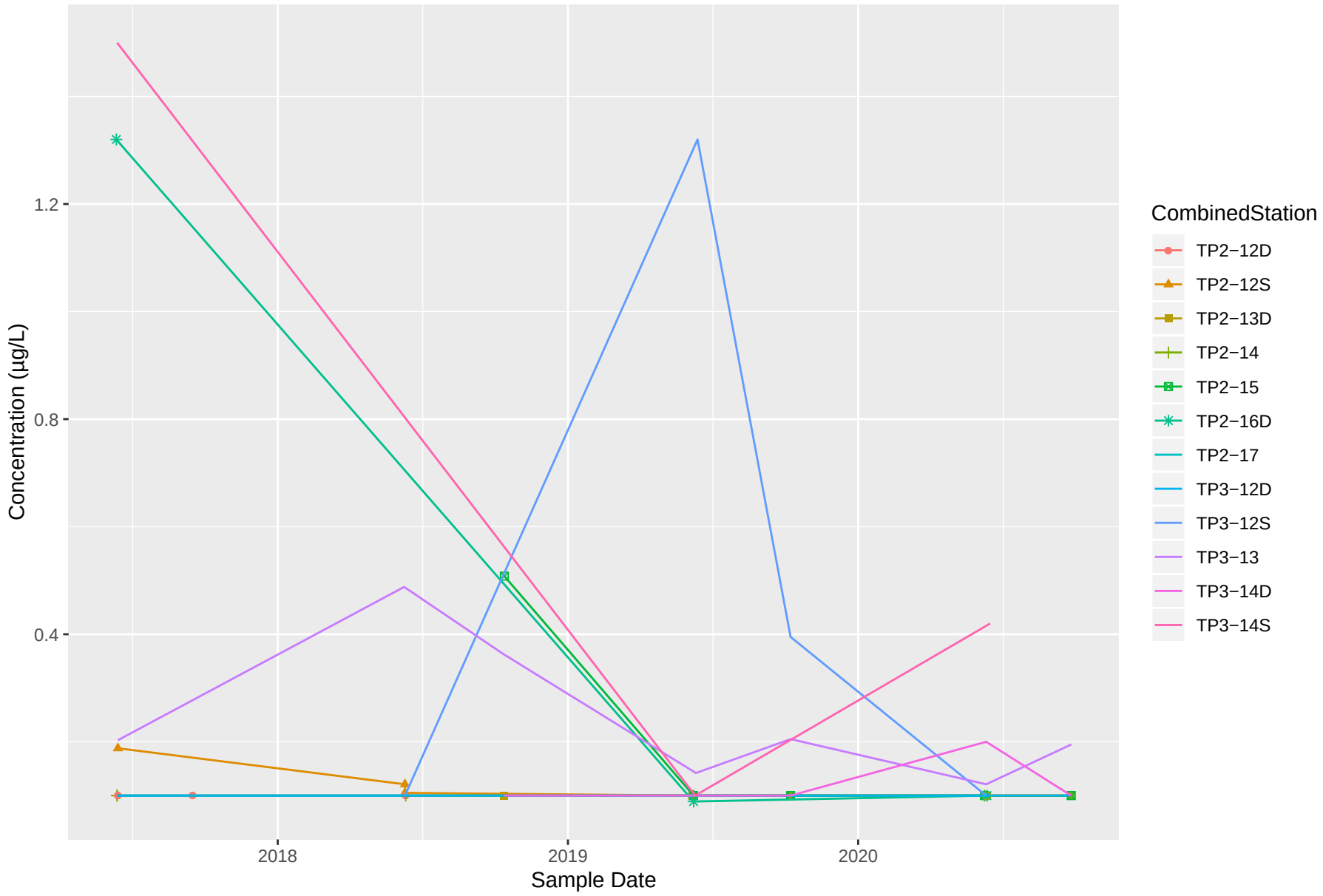


Figure 64. Time Series
Lead, Total, µg/L
SG Designated Stations, Set 2
2020 Holden ACAR Statistical Assessment
JS1904

Dissolved concentration results not included
Prepared 01/10/2021



Dissolved concentration results not included
Prepared 01/10/2021

Figure 65. Time Series
Lead, Total, µg/L
TP Designated Stations
2020 Holden ACAR Statistical Assessment
JS1904

PgG

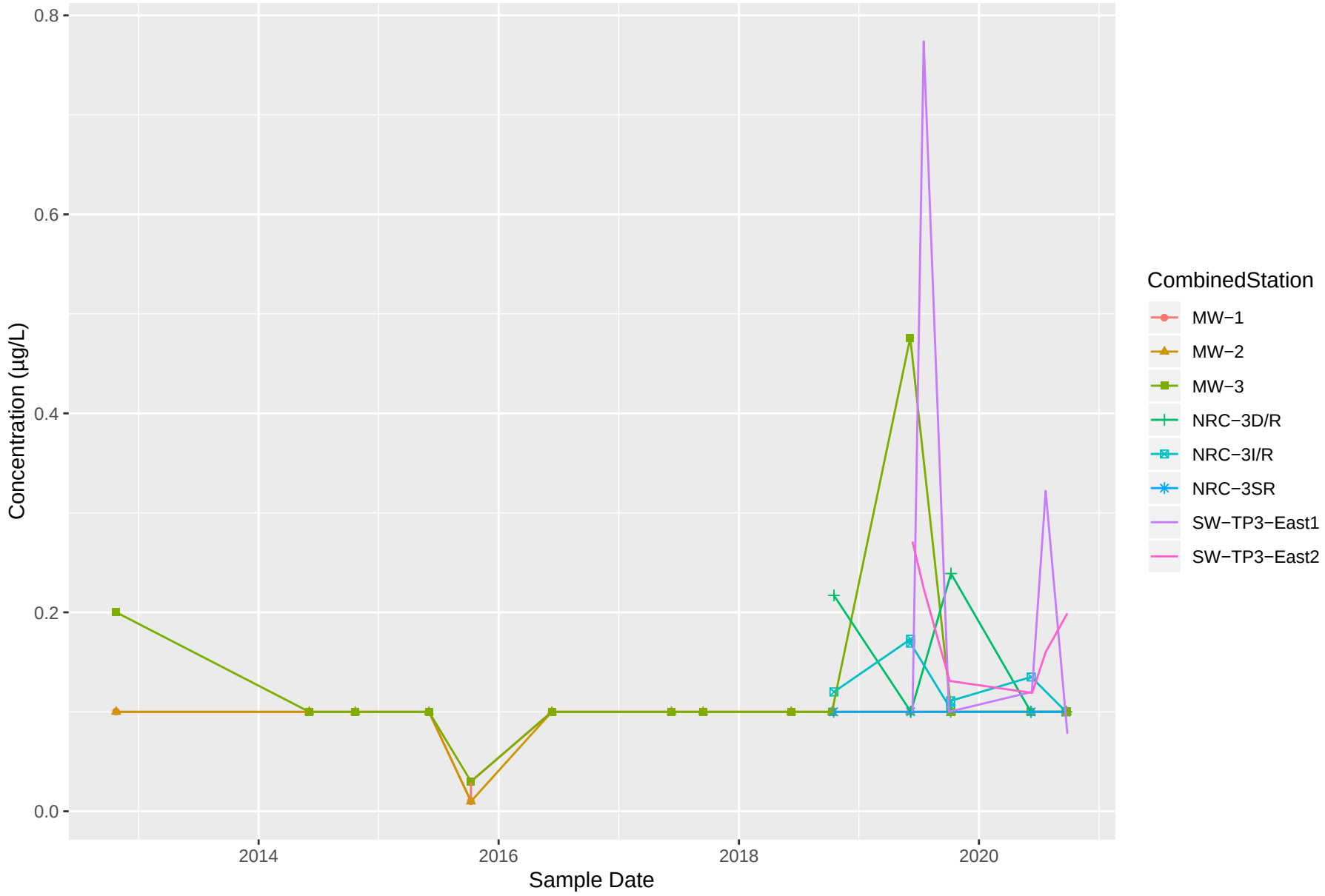


Figure 66. Time Series
Lead, Total, µg/L
SW/NRC/MW Designated Stations
2020 Holden ACAR Statistical Assessment
JS1904

Dissolved concentration results not included
Prepared 01/10/2021

PgG

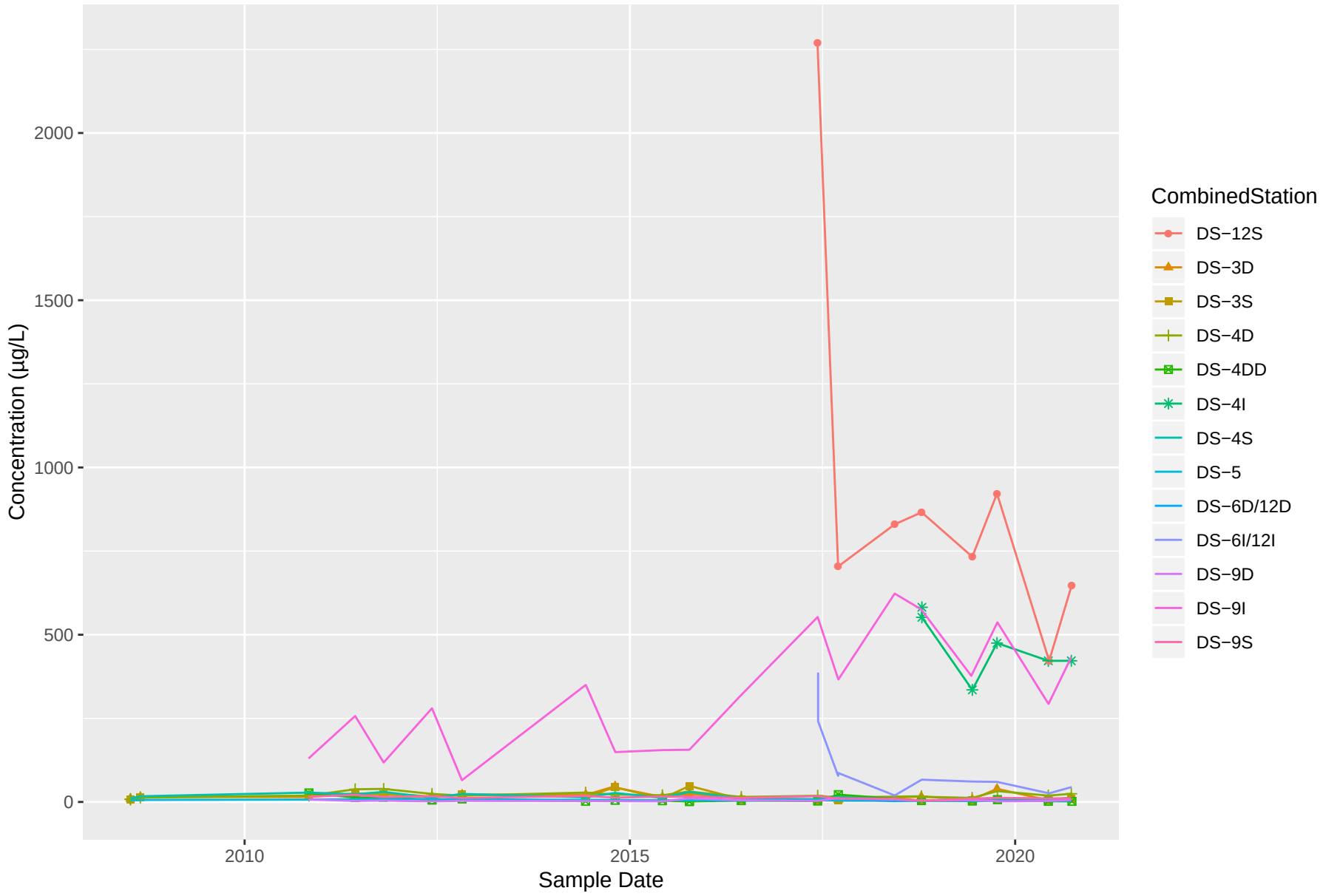


Figure 67. Time Series
Zinc, Total, µg/L
DS Designated Stations, Set 1
2020 Holden ACAR Statistical Assessment
JS1904

Dissolved concentration results not included
Prepared 01/10/2021

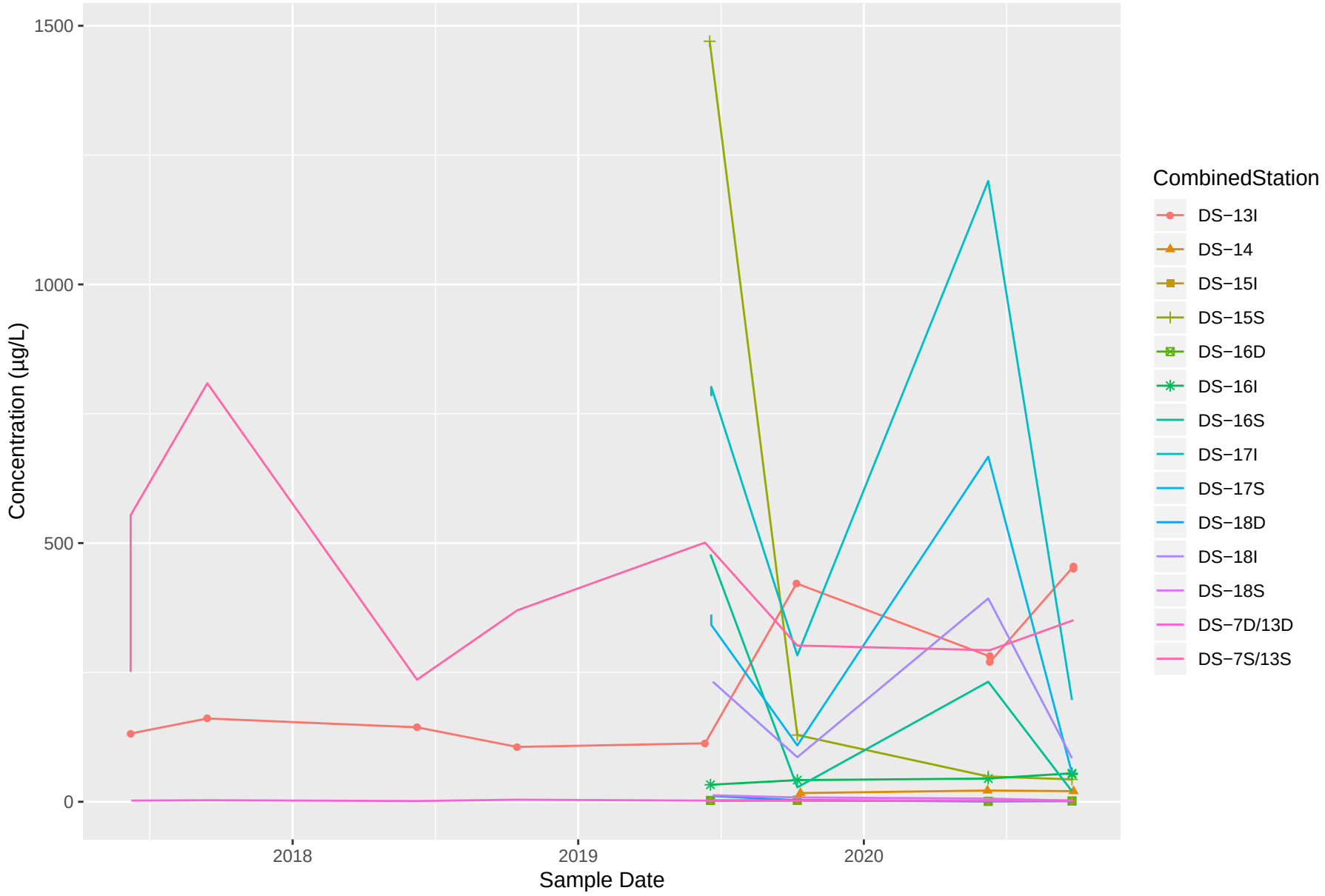


Figure 68. Time Series
Zinc, Total, µg/L
DS Designated Stations, Set 2

2020 Holden ACAR Statistical Assessment
JS1904

Dissolved concentration results not included
Prepared 01/10/2021

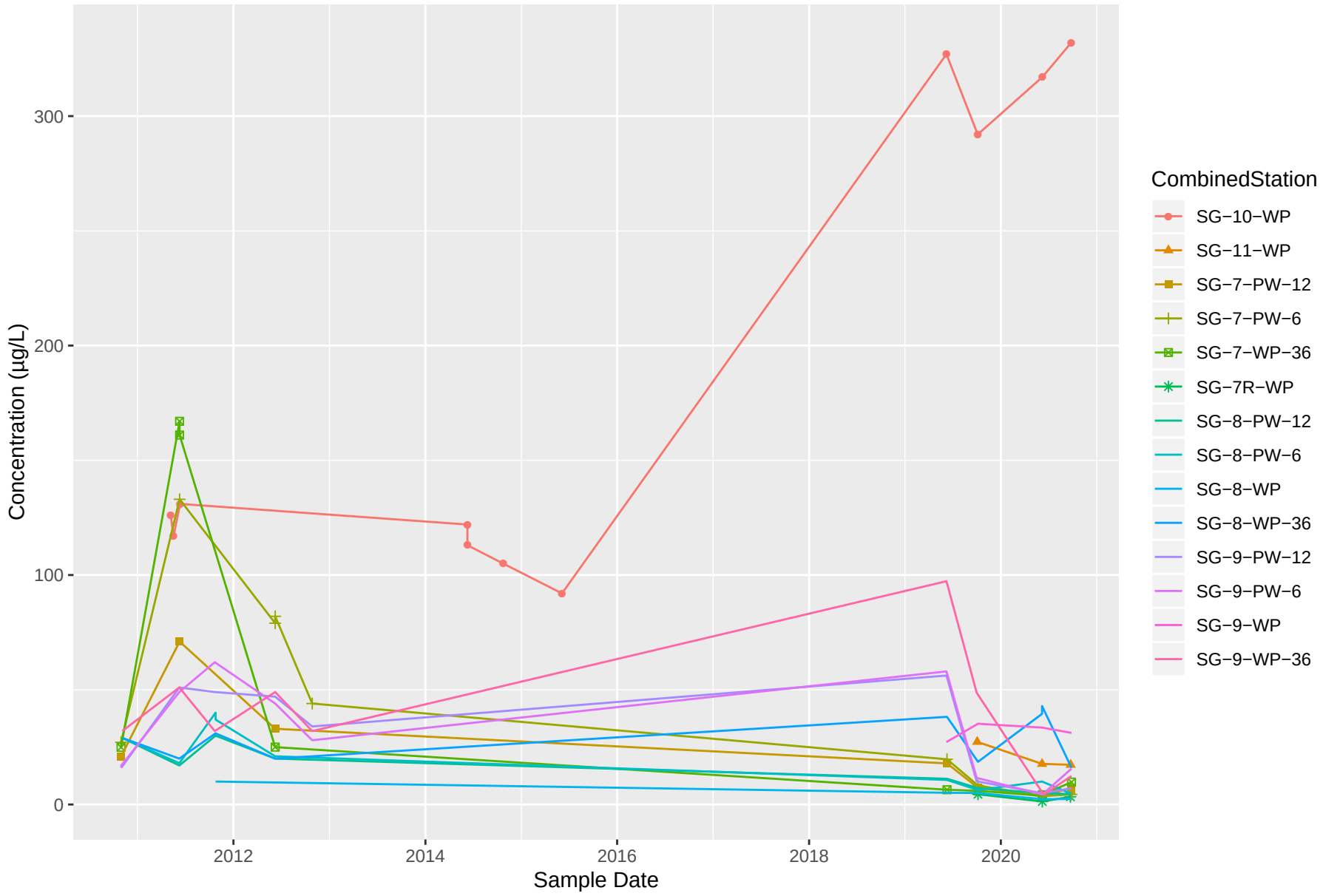
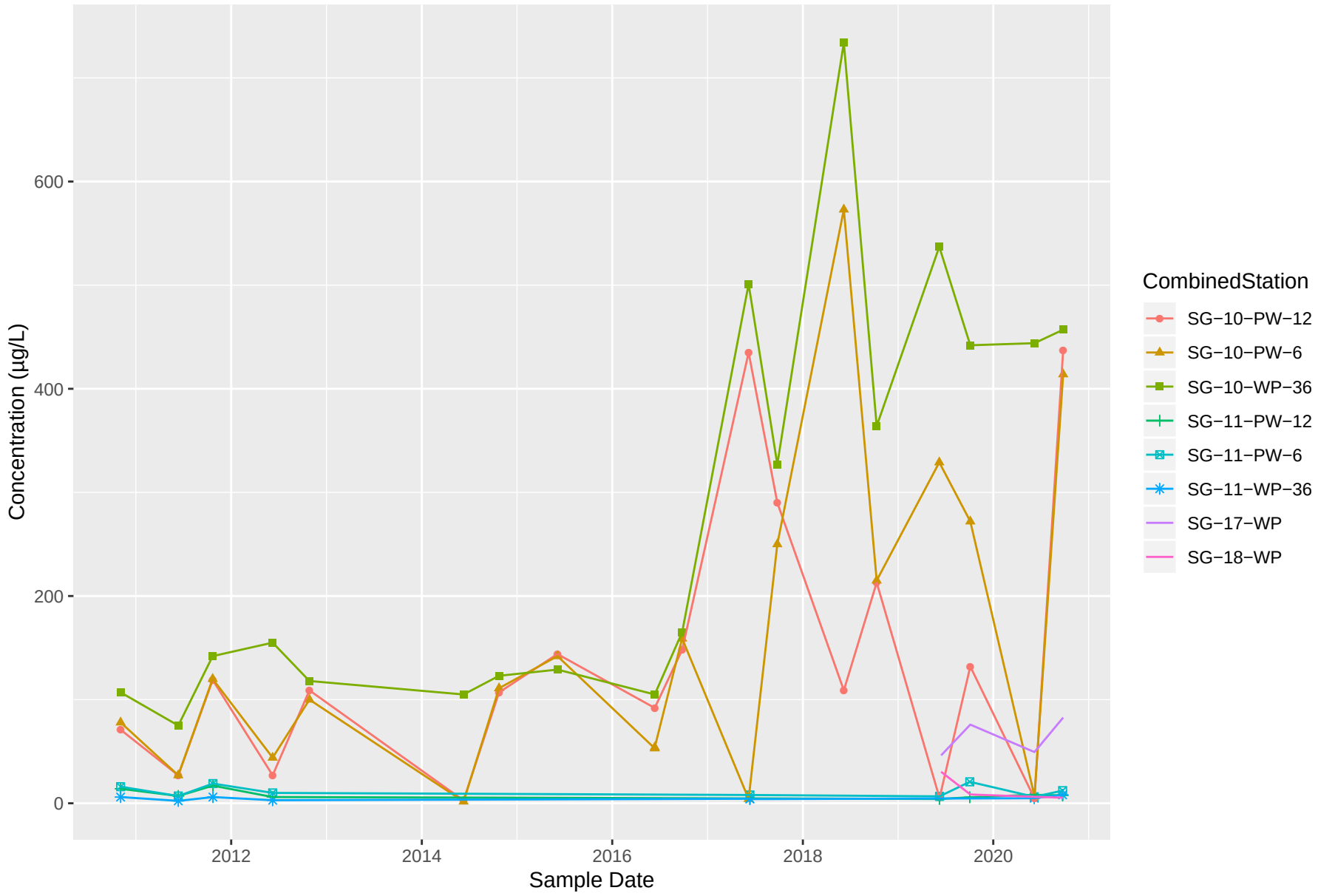


Figure 69. Time Series
Zinc, Total, µg/L
SG Designated Stations, Set 1
2020 Holden ACAR Statistical Assessment
JS1904

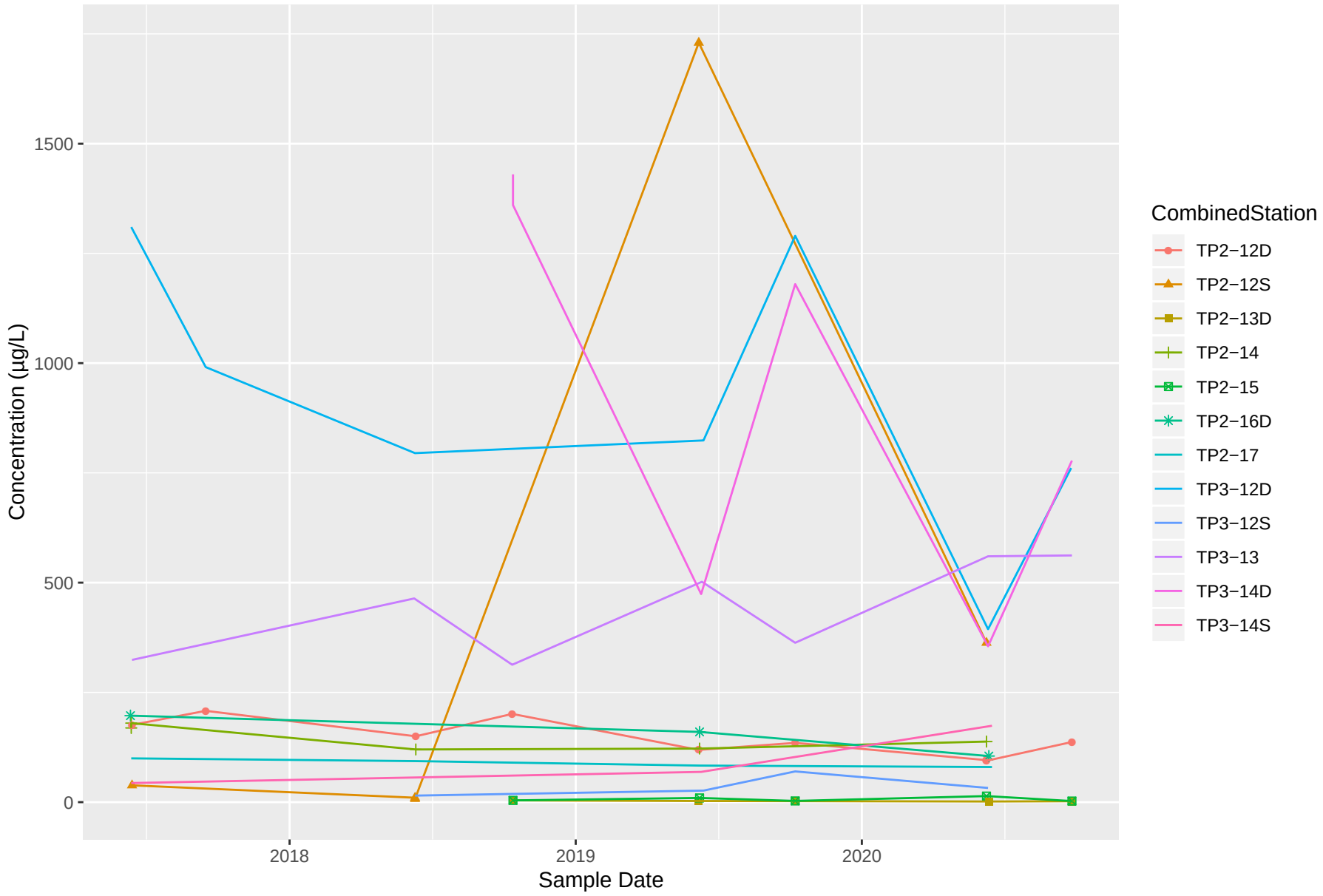
Dissolved concentration results not included
Prepared 01/10/2021



Dissolved concentration results not included
Prepared 01/10/2021

Figure 70. Time Series
Zinc, Total, µg/L
SG Designated Stations, Set 2
2020 Holden ACAR Statistical Assessment
JS1904

PgG



Dissolved concentration results not included
Prepared 01/10/2021

Figure 71. Time Series
Zinc, Total, µg/L
TP Designated Stations
2020 Holden ACAR Statistical Assessment
JS1904

PgG

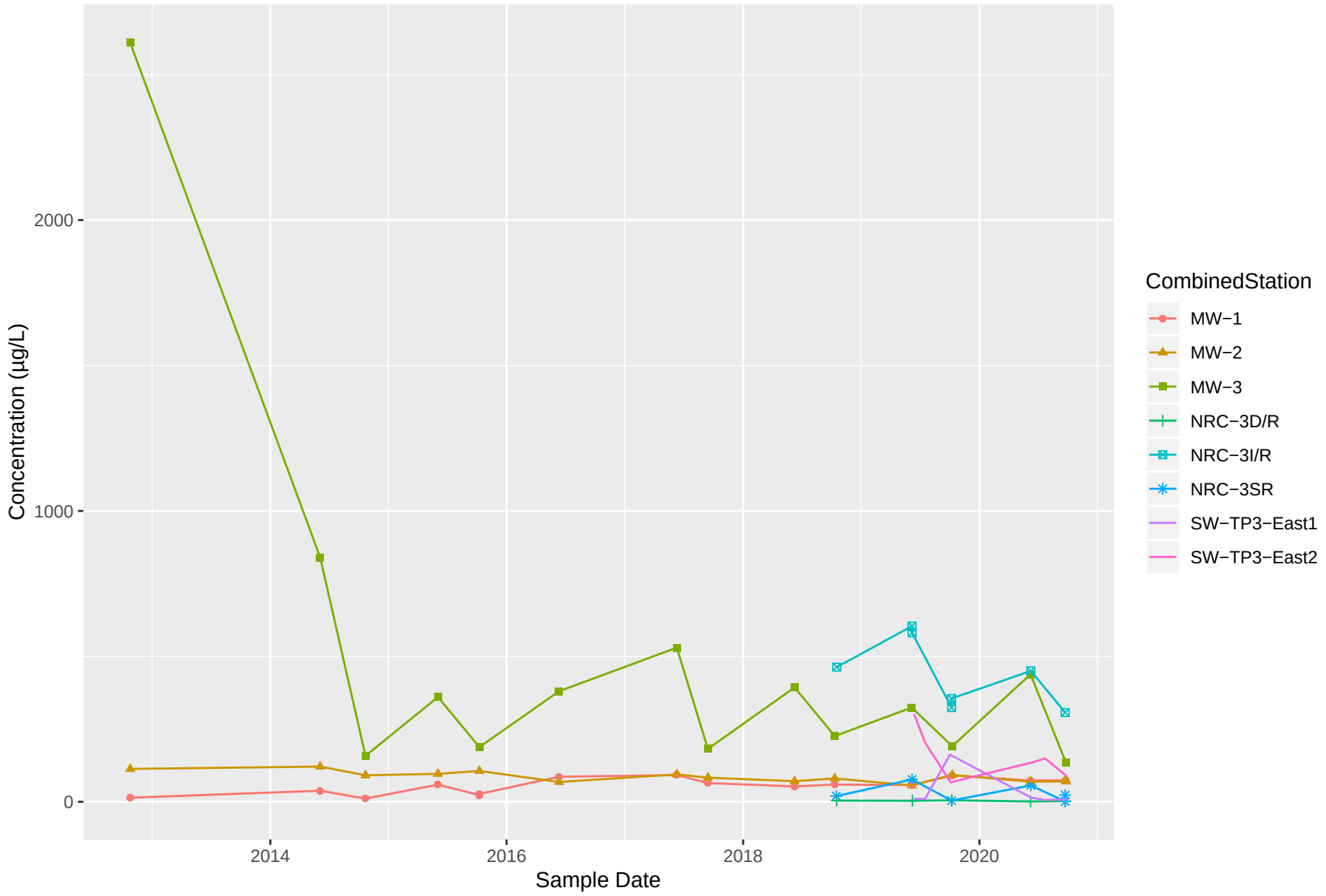


Figure 72. Time Series
Zinc, Total, µg/L
SW/NRC/MW Designated Stations
2020 Holden ACAR Statistical Assessment
JS1904

Dissolved concentration results not included
Prepared 01/10/2021