BNSF Railway Company

2023 Annual Long-Term Monitoring Report

Former Maintenance and Fueling Facility
Skykomish, Washington

May 22, 2024

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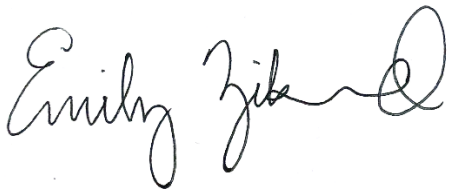

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Acronyms and Abbreviations

95 UCL	95th percentile Upper Confidence Limit
µg/L	microgram per liter
Arcadis	Arcadis U.S., Inc.
BNSF	BNSF Railway Company
CPOC	conditional point of compliance
CUL	cleanup level
DRO	diesel-range organics
Ecology	Washington State Department of Ecology
Farallon	Farallon Consulting, L.L.C.
HCC	hydraulic control and containment
HWF	hot water flushing
LNAPL	light non-aqueous phase liquid
LTM	long-term monitoring
RL	remediation level
Site	Former Maintenance and Fueling Facility in Skykomish, Washington
USEPA	United States Environmental Protection Agency

Executive Summary

This 2023 Annual Long-Term Monitoring Report summarizes groundwater monitoring activities conducted in 2023 at the BNSF Railway Company (BNSF) Former Maintenance and Fueling Facility in Skykomish, Washington (the Site). The Site is being remediated in accordance with the Washington State Department of Ecology (Ecology) October 2007 Consent Decree No. 07-2-33672-9 SEA and Cleanup Action Plan. Site-wide groundwater monitoring was conducted in March and September 2023 in accordance with the November 9, 2020 Final Long-Term Monitoring Plan prepared for the Site by Farallon Consulting, L.L.C. (Farallon).

Site Groundwater Criteria

The Site-specific groundwater cleanup level (CUL) established in the 2007 Cleanup Action Plan for total petroleum hydrocarbon concentrations—defined as the sum of total petroleum hydrocarbons as diesel range organics (DRO) and heavy oil (HO) analyzed using Northwest Method NWTPH-Dx (referred to as "combined DRO/HO")—is 208 micrograms per liter (µg/L) and the absence of sheen. The CUL is applicable at the groundwater conditional point of compliance (CPOC), which is defined as the surface water boundary where groundwater enters the Skykomish River and Former Maloney Creek. The CUL was determined to be protective of sediments from being adversely impacted by groundwater. Compliance with the CUL currently is assessed using monitoring wells in the Levee Zone adjacent to the Skykomish River.

The Site-specific groundwater remediation level (RL) for combined DRO/HO is 477 µg/L and absence of sheen. The RL is applicable from the BNSF railyard boundary to the groundwater CPOC, except for the Skykomish School property, and is used to assess groundwater quality in areas of the Site north of the BNSF railyard boundary and outside the Levee Zone. Neither the CUL nor the RL are applicable to the Skykomish School property.

Groundwater Monitoring Objectives

Groundwater monitoring is intended to confirm the long-term effectiveness of Site cleanup actions by demonstrating compliance with the Site-specific combined DRO/HO groundwater CUL at the CPOC monitoring wells located within the Levee Zone, and that the Site-specific RL is being met at monitoring wells between the BNSF railyard boundary and the CPOC wells, with the exception of monitoring wells located at the Skykomish School property. Site groundwater monitoring includes the following:

- Collection of groundwater samples for analysis of NWTPH-Dx and assessment of the presence of sheen;
- Collection of Light non-aqueous phase liquid (LNAPL) data (presence and thickness) to characterize the extent of LNAPL at the Site;
- Measurement of groundwater elevations to characterize hydraulic gradients and groundwater flow directions; and
- Statistical analysis of groundwater analytical data to evaluate CUL compliance.

2023 Groundwater Monitoring Results

Groundwater flow direction in 2023 was generally consistent with prior years. South (i.e., upgradient) and north (i.e. downgradient) of the hydraulic control and containment (HCC) system barrier wall, the groundwater flow direction is predominantly toward the west-northwest.

LNAPL was observed in recovery wells upgradient and adjacent to the HCC barrier system barrier wall, between the West Gate and Center Gate, which is consistent with prior years; measured LNAPL observations ranged from

a sheen to 0.02-foot thickness. Measured LNAPL thickness have exhibited an overall decreasing trend over the since the cleanup action was implemented.

Combined DRO/HO concentrations in groundwater samples collected from monitoring wells north of the BNSF railyard and outside the Levee Zone were less than the RL, except for the sample collected from HCC system monitoring well 2A-W-41 in September 2023. Combined DRO/HO was detected at 520 µg/L, which exceeds the RL in the non-silica gel-prepared groundwater sample collected from monitoring well 2A-W-41 in September 2023. Combined DRO/HO was detected at an estimated concentration of 319 µg/L, which is less than the RL in the non-silica gel-prepared groundwater sample collected in March 2023.

Combined DRO/HO was detected at an estimated concentration of 630 µg/L, which exceeds the RL, in the non-silica gel-prepared groundwater sample collected from gate well GW-3 in March 2023. Combined DRO/HO was detected at 259 µg/L, which is less than the RL, in the non-silica gel-prepared groundwater sample collected in September 2023. The combined DRO/HO concentration at gate well GW-4 was 820 µg/L in September 2023. This location was inaccessible during the fourth quarter HCC sampling event due to surface water ponding at the location. This location is intermittently flooded and will be assessed for integrity during the March 2024 monitoring event. Combined DRO/HO concentrations in all silica gel-prepared samples were less than the RL. Biofouling observations have been noted proximate to gate well GW-3 and upgradient of monitoring well 2A-W-41 for nearly 10 years, and results of the analyses performed with and without silica gel cleanup demonstrate that the non-silica gel-prepared samples are biased high due to biogenic or petroleum metabolite interferences and that breakthrough of groundwater containing combined DRO/HO greater than the RL is not occurring. Groundwater samples collected from gate well GW-3 and monitoring well 2A-W-41 will continue to be analyzed both with and without silica gel cleanup to gain additional perspective on biogenic or petroleum metabolite interference. Additional wells may also be added to this evaluation.

Statistical analysis of the groundwater analytical data was performed to evaluate whether cleanup actions are meeting the objectives established in the Consent Decree and whether modifications to the long-term monitoring program are warranted. The statistical evaluation consisted of calculating the combined DRO/HO concentration 95th percentile Upper Confidence Limit and the Mann-Kendall Trend Test for Plume Stability. The statistical evaluation was conducted in accordance with Section 720(9) of Chapter 173-430 of the Washington Administrative Code. Statistical analysis of the analytical results indicates that the cleanup objectives for the Site are being met.

Based on the statistical analysis presented in the 2022 Annual Long-Term Monitoring Report dated March 30, 2023 prepared by Farallon and the 2023 statistical analysis presented herein, groundwater sampling at monitoring wells 1C-W-7 and MW-4 are proposed to be discontinued in 2024 in accordance with the applicable Decision Rules presented in the Final Long-Term Monitoring Plan.

1 Introduction

Arcadis U.S., Inc (Arcadis) has prepared this 2023 Annual Long-Term Monitoring Report on behalf of BNSF Railway Company (BNSF) to summarize long-term groundwater monitoring activities conducted in 2023 at the Former Maintenance and Fueling Facility in Skykomish, Washington (the Site; Figure 1). Site-wide groundwater monitoring was conducted in March and September 2023 in accordance with the Final Long-Term Monitoring Plan (Farallon Consulting, L.L.C. [Farallon] 2020).

1.1 Site Description

The Site includes BNSF property and private properties in the town of Skykomish, Washington, and encompasses an area of approximately 40 acres (Figure 1). The Site is bounded by the Skykomish River to the north, the town of Skykomish city limits to the east, Old Cascade Highway to the south, and Former Maloney Creek to the west. Railroad Avenue separates the BNSF railyard from the main commercial district of the town of Skykomish (Figure 1). Additional Site history and background information are presented in the Supplemental Remedial Investigation, Volume 1 (The RETEC Group, Inc. 2002); 2007 Cleanup Action Plan (Washington State Department of Ecology [Ecology] 2007a); and 2017 Hot Water Flushing Remediation Performance Report (Farallon 2018).

1.2 Summary of Cleanup Actions

In 1991, BNSF initiated a Remedial Investigation/Feasibility Study of the Skykomish railyard in accordance with the Washington State Model Toxics Control Act Cleanup Regulations. From 1993 to 2006, three agreed orders were signed by Ecology and BNSF as summarized in the Final Long-Term Monitoring Plan (Farallon 2020). In October 2007, BNSF and Ecology signed Consent Decree No. 07-2-33672-9 SEA (Ecology 2007b), which finalized the 2007 Cleanup Action Plan (Ecology 2007a). In 2008, BNSF initiated cleanup actions pursuant to the Consent Decree. Cleanup actions consisted of the following activities:

- Excavation of contaminated soil from most of the Town of Skykomish north of the BNSF railyard and areas south and west of the railyard (including moving structures to excavate soil beneath them);
- Excavation of a minimum of 7,500 cubic yards of contaminated soil from the BNSF railyard;
- Operation of an air sparging system north of the northeastern portion of the BNSF railyard;
- Operation of a hydraulic control and containment (HCC) system that included installation of a sheet pile barrier wall with treatment gates separating the BNSF railyard from the Town of Skykomish to the north;
- Operation of recovery wells in the BNSF railyard and around the Skykomish School property to remove LNAPL; and
- Operation of a hot water flushing (HWF) system at the Skykomish School property.

From 2010 to 2020, quarterly or semiannual groundwater monitoring were performed at the Site in accordance with the 2010 Compliance Monitoring Plan (AECOM 2010) with a network of 104 monitoring wells. The Site transitioned to semiannual groundwater monitoring in 2020 with a reduced monitoring well network of 38 wells. As part of implementation of the Final Long-Term Monitoring Plan (Farallon 2020), 25 wells were decommissioned in 2021.

Detailed information about cleanup actions completed under the Consent Decree is presented in applicable as-built completion reports, HCC operations reports, HCC optimization reports, HWF operations reports, and groundwater monitoring reports submitted to Ecology from 2006 through 2020.

1.3 Cleanup Levels and Remediation Levels

The Site-specific groundwater cleanup level (CUL) established in the 2007 Cleanup Action Plan (Ecology 2007a) for total petroleum hydrocarbon concentrations—defined as the sum of total petroleum hydrocarbons as diesel range organics (DRO) and heavy oil (HO) analyzed using Ecology Method NWTPH-Dx and referred to was "combined DRO/HO" —is 208 micrograms per liter (µg/L) and the absence of sheen. The CUL is applicable at the groundwater conditional point of compliance (CPOC), defined as the surface water boundary where groundwater enters the Skykomish River and Former Maloney Creek. The basis for the CUL is protection of sediments from being adversely impacted by groundwater. Compliance with the CUL currently is assessed using monitoring wells in the Levee Zone adjacent to the Skykomish River (Figure 1). Based on historical groundwater elevation and hydraulic gradient data, groundwater does not flow toward or discharge to Former Maloney Creek (Farallon 2020).

The Site-specific groundwater remediation level (RL) for combined DRO/HO is 477 µg/L and absence of sheen. The RL is applicable from the BNSF railyard boundary to the groundwater CPOC, except for the Skykomish School property, and is used to assess groundwater quality in areas of the Site north of the BNSF railyard boundary and outside the Levee Zone (Figure 1).

Per the Consent Decree (Ecology 2007b), there may be isolated areas outside of the BNSF railyard boundary where the RL cannot be achieved: "Ecology will not require the remediation level be met beneath and down-gradient of such isolated areas" (e.g., the Skykomish School property); however, the CUL must still be met at the CPOC in the Levee Zone (Figure 1). Contingency treatment methods will be employed at the groundwater CPOC if a sheen or combined DRO/HO concentrations exceeding 208 µg/L are reported in groundwater samples at the CPOC.

1.4 System Operations, Maintenance and Monitoring

The HCC system and monitoring locations used to assess the operation and performance of the HCC system are described in the 2011 Operation and Maintenance Manual for the Hydraulic Control and Containment System (AECOM 2011) and the 2014 Addendum to the Operation and Maintenance Manual for the Hydraulic Control and Containment System (Farallon 2014). The 2023 Addendum to the Operation and Maintenance Manual for the Hydraulic Control and Containment System (Arcadis 2023) is currently in Ecology review. HCC system monitoring locations include 11 HCC system monitoring wells (gate wells GW-1 through GW-4; end wells EW-1 and EW-2A; and monitoring wells 5-W-43, 2A-W-40, 2A-W-41, 1B-W-23, and 2A-W-42), 20 sentry wells, 14 piezometers, and several HCC system gate vaults. HCC system monitoring locations have been monitored in accordance with the 2011 Operation and Maintenance Manual and the 2014 Addendum (AECOM 2011; Farallon 2014) pending 2023 Addendum approval. HCC system monitoring wells, sentry wells, and piezometers were sampled quarterly in March, June, September, and December 2023. On July 18, 2023, the pump-and-treat component of the HCC system was turned off and the system was transitioned into passive mode in accordance with the fourth amendment of the Consent Decree (Ecology 2023). Results of HCC system groundwater monitoring and details on the HCC system transition are provided in the 2023 Annual HCC System Operations Report (Arcadis 2024).

2 Groundwater Monitoring Activities

The objective of groundwater monitoring and sampling under the Final Long-Term Monitoring Plan (Farallon 2020) is to confirm the long-term effectiveness of the cleanup actions by demonstrating compliance with the Site-specific combined DRO/HO groundwater CUL at the CPOC monitoring wells located within the Levee Zone, and that the Site-specific RL is being met at monitoring wells between the BNSF railyard boundary and the CPOC wells, with the exception of monitoring wells located at the Skykomish School property (Ecology 2007a).

To meet this objective, the long-term monitoring (LTM) program consists of the following activities:

- Collection of groundwater samples for analysis of NWTPH-Dx and assessment of the presence of sheen to confirm that Site groundwater quality complies with the CUL and the RL at the respective points of compliance (i.e., Levee Zone and areas north of the BNSF railyard boundary, respectively);
- Collection of LNAPL data (presence and thickness) to characterize the extent of LNAPL at the Site;
- Measurement of groundwater elevations to characterize hydraulic gradients and groundwater flow directions at the Site; and
- Statistical analysis of groundwater analytical data to evaluate compliance that the CUL is being met at the CPOC.

Groundwater elevations and LNAPL thicknesses, as well as groundwater quality parameters measured during the 2023 groundwater monitoring events, are summarized in Tables 1 and 2, respectively. Table 3 includes the DRO, HO and combined DRO/HO groundwater analytical results. Groundwater elevation contour maps for the monitoring events are presented on Figures 2 and 3. NWTPH-Dx results and LNAPL thickness (where observed) are presented on Figures 4 and 5 .

2.1 Groundwater Elevations and Gradient

Groundwater and LNAPL gauging were conducted at the Site during the March and September events in 2023 in accordance with the Final Long-Term Monitoring Plan (Farallon 2020). During the March and September 2023 events, 38 monitoring locations, including the surface water elevation of the Skykomish River, were gauged. Depth to water measurements were subtracted from the surveyed well top-of-casing elevations (where available) to obtain the groundwater elevation at each monitoring location during the gauging events. When LNAPL was present, a site-specific LNAPL density of 0.974 grams per cubic centimeter was applied to the LNAPL-water interface elevation to correct for the depression of the water table. Depth to groundwater, groundwater elevations, and LNAPL thicknesses are included in Table 1. Groundwater contours and approximate flow direction for the annual monitoring event are presented on Figures 2 and 3. Seasonal groundwater-level fluctuations of 1.34 to 4.45 feet occurred in wells on the southern (i.e., upgradient) side of the HCC system barrier wall. Seasonal groundwater level fluctuations in wells and piezometers on the northern (i.e., downgradient) side of the HCC system barrier wall were similar in magnitude, ranging from 0.58 to 5.94 feet. The HCC system barrier wall restricts groundwater flow, generally causing groundwater mounding on the southern side of the barrier wall and accentuating a westerly component to groundwater flow near the wall.

Interpreted hydraulic gradients in 2023 were generally consistent with prior years. South of the HCC system barrier wall, the gradient direction was predominantly toward the northwest. North of the HCC system barrier wall, the gradient direction was predominantly toward the west-northwest, and roughly parallel to the Skykomish River flow direction. Gradient magnitudes on the southern side of the HCC system barrier wall were approximately

0.005 foot per foot. Gradient magnitudes on the northern side of the HCC system barrier wall were approximately 0.006 to 0.008 foot per foot.

2.2 Groundwater Analytical Results

Groundwater sampling was conducted at the Site in March and September 2023 in accordance with the Final Long-Term Monitoring Plan (Farallon 2020) and the groundwater analytical results are summarized in the subsections below. Table 3 includes groundwater analytical results the DRO, HO and combined DRO/HO concentrations. Figures 4 and 5 present the combined DRO/HO results for each groundwater monitoring event. Laboratory analytical reports and data validation reports are included as Appendices A and B, respectively. NWTPH-Dx trend plots are included as Appendix C.

2.2.1 Compliance Monitoring – Levee Zone Monitoring Wells

Levee zone monitoring wells (5-W-14 and 5-W-16 through 5-W-19) were gauged, assessed for the absence of sheen, and sampled for NWTPH-Dx in March and September 2023 to verify compliance with the CUL at the CPOC. DRO and HO were non-detect at all Levee Zone monitoring wells during the March and September 2023 monitoring events. LNAPL or sheen was not observed in any of the Levee Zone monitoring wells.

2.2.2 Remediation Performance Monitoring – North of Railyard

Wells north of the railyard including GW-1 through GW-4, 1B-W-23, 1C-W-4, 1C-W-7, 1C-W-8, 2A-W-40 through 2A-W-42, and 5-W-43 and were gauged, assessed for the absence of sheen, and sampled for NWTPH-Dx in March and September 2023 to demonstrate that the RL is being met north of the BNSF railyard boundary and outside the Levee Zone, and to assess the effectiveness of the HCC system.

Combined DRO/HO concentrations were 630 µg/L in GW-3 (estimated concentration; March 2023), 820 µg/L in GW-4 (September 2023), and 520 µg/L in 2A-W-41 (September 2023), which exceeded the RL of 477 µg/L. The March 2023 sample from GW-3 was also analyzed following a silica gel cleanup preparation process, with a reported estimated concentration of 168 µg/L. The results at well GW-4 may have been influenced by surface water intrusion as the area is intermittently flooded and the well combined DRO/HO has not historically exceeded the RL in this location. The integrity of this well will be reassessed in March 2024 and any observed deficiencies will be addressed. The March and September 2023 samples from 2A-W-41 were analyzed using silica gel cleanup, with combined DRO/HO estimated concentrations of 119 µg/L and 249 µg/L, respectively.

Combined DRO/HO was detected at concentrations less than the RL of 477 µg/L or was not detected in groundwater samples collected from the remaining nine monitoring wells during the March and September 2023 monitoring events (see Table 3 and Figures 4 and 5).

Monitoring well 2A-W-41 is downgradient of gate well GW-3, which is immediately north and downgradient of the Center Gate, where substantial biofouling by iron bacteria has been observed. DRO and HO concentrations in groundwater at this location has been variable since biofouling was first observed in 2014. Groundwater samples from gate well GW-3 and monitoring well 2A-W-41 were analyzed with and without silica gel cleanup to further assess sample interference. Combined DRO/HO concentrations in all silica gel–prepared samples were less than the RL, and notably less than the combined DRO/HO concentrations in non-silica gel–prepared samples (see Appendix C). The lower combined DRO/HO concentrations reported in the silica gel–prepared samples from gate

well GW-3 and monitoring well 2A-W-41 indicate that reported concentrations in the non-silica gel–prepared samples are biased high due to biogenic interference and that the DRO and HO concentrations reported at gate well GW-3 and monitoring well 2A-W-41 do not indicate that breakthrough of groundwater containing combined DRO/HO greater than the RL is occurring.

Skykomish School monitoring wells 5-W-51, 5-W-55, 5-W-56, and RW-10 were gauged, assessed for the absence of sheen, and sampled (except RW-10) for NWTPH-Dx to assess the effectiveness of the HWF remediation system. Combined DRO/HO was detected at a concentration of 390 µg/L (estimated) and 750 µg/L (parent sample) / 880 µg/L (duplicate sample) in well 5-W-51 during the March and September 2023 monitoring events, respectively. DRO and HO were non-detect in the March and September 2023 samples collected from 5-W-55. Combined DRO/HO concentrations of 4,600 µg/L and 2,110 µg/L (both estimated values) were recorded in well 5-W-56 during the March and September 2023 monitoring events, respectively.

The combined DRO/HO concentrations detected in 5-W-51 and 5-W-55 are consistent with combined DRO/HO concentrations reported in those wells following completion of HWF activities in 2018. The combined DRO/HO concentrations detected in 5-W-56 have increased compared to combined DRO/HO concentrations reported for the well following completion of HWF activities in 2018. As noted in Section 1.3, the Skykomish School monitoring wells are not required to meet the RL per the Consent Decree.

LNAPL or sheen was not observed in any wells downgradient of the HCC wall, including the Levee Zone or Skykomish School property, in 2023.

2.2.3 Remediation Performance Monitoring – Within the Railyard

Monitoring wells MW-4 and 2A-W-9 were gauged, assessed for sheen, and sampled for DRO and HO to evaluate upgradient groundwater conditions. Combined DRO/HO was detected at an estimated concentration of 570 µg/L during the March 2023 monitoring event in the groundwater sample collected from monitoring well 2A-W-9 and concentrations of 300 µg/L (estimated) and 390 µg/L during the March and September 2023 events in the groundwater samples collected from MW-4. LNAPL or sheen was not observed in monitoring wells MW-4 and 2A-W-9.

The following occurrences of measurable LNAPL were observed in 2023 (Table 1):

- Recovery well RW-07: LNAPL sheen was observed in March 2023. Measurable LNAPL was recorded in September 2023 (0.02 foot). LNAPL thicknesses decreased from March 2022 (0.81 foot); however in October 2022 only a sheen was recorded at RW-07.
- Recovery well RW-08: LNAPL sheen was observed in March 2023. Measurable LNAPL was recorded in September 2023 (0.01 foot). LNAPL thickness decreased from the March 2022 (7.10 feet) and October 2022 (2.12 feet) thicknesses.

LNAPL thickness trend plots for recovery wells that historically contained measurable LNAPL are included as Appendix D.

3 Data Validation and Usability

Quality assurance and quality control samples were collected and analyzed for both field and laboratory operations to monitor overall precision and accuracy throughout the groundwater monitoring period in accordance with the Final Long-Term Monitoring Plan (Farallon 2020). Field quality assurance and quality control samples

included field duplicate and field blank samples. Field duplicate samples were collected at a frequency of one duplicate sample per 10 samples, or one duplicate sample per batch of samples if less than 10 samples were collected. Duplicate samples were treated as separate samples from the originals (assigned unique sample numbers) and not identified to the laboratory as duplicate samples. Field duplicate samples were documented on the field sampling form. At least one field blank sample was collected during each groundwater sampling event. Matrix spike and matrix spike duplicate samples were also collected at a frequency of one per 20 samples collected, or one per batch if less than 20 samples were collected. Data validation was conducted in accordance with the following guidance documents:

- United States Environmental Protection Agency (USEPA) – Contract Laboratory Program National Functional Guidelines for Organic Superfund Methods Data Review (2020a), with reference to the historical Contract Laboratory Program National Functional Guidelines for Organic Data Review (USEPA 1999), as appropriate.
- USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Methods Data Review (2020b), with reference to the historical Contract Laboratory Program National Functional Guidelines for Inorganic Data Review (USEPA 2002), as appropriate.

Quality assurance and quality control sample results are discussed in the data validation reports included as Appendix B. The laboratory quality control criteria were met, unless otherwise noted, and all data were deemed usable. The qualified validated laboratory analytical reports are included as Appendix B.

4 Statistical Analysis

The groundwater monitoring data were evaluated against the decision rules provided in Section 7 of the Final Long-Term Monitoring Plan to determine whether the cleanup actions are meeting the objectives established in the Consent Decree, and whether any modifications to the LTM program are warranted (Farallon 2020). The decision rules specify the criteria for continuing, modifying, or terminating the LTM program.

The dataset used for the statistical evaluation included the last 3 years of sampling data for each monitoring location, or the most recent 10 data points for locations with fewer than 10 data points within the last 3 years. To verify compliance with the appropriate target, the data were evaluated to determine whether they met the required three-part statistical test in accordance with Section 720[9] of Chapter 173-340 of the Washington Administrative Code:

- The 95th percentile Upper Confidence Limit (95 UCL) on the true mean of the combined DRO/HO concentration from the monitoring point must be less than the groundwater CUL or RL (whichever is applicable at the specific monitoring location);
- Fewer than 10 percent of the samples may exceed the applicable groundwater CUL or RL; and
- No single sample may be greater than two times the applicable groundwater CUL or RL.

U.S. Environmental Protection Agency ProUCL statistical software was used to calculate the combined DRO/HO concentration 95 UCL using the appropriate statistical method (based on the data distribution) for comparison with the monitoring location target (i.e., CUL or RL).

Mann-Kendall Trend Tests for Plume Stability were completed using available historical groundwater monitoring data as summarized in previous long-term monitoring reports. Groundwater monitoring data collected from 2018 through 2023 from monitoring wells that are currently sampled as part of the groundwater monitoring program

were screened for analysis of primary constituent of concern (i.e., NWTPH-Dx) concentration trends. Trends were not evaluated at monitoring locations where any of the following criteria applied:

- Constituent concentrations did not exceed the CUL or RL in the 10 previous data points.
- Greater than 50 percent of the results were below reporting limits.

The Mann-Kendall trend test is a non-parametric test that determines trends based on ranked data; the test is useful where large variations in the magnitude of concentrations may be present and otherwise influence a time-series trend analysis. The basic Mann-Kendall trend test involves listing the concentrations in temporal order and computing all differences that may be formed between a given measurement and earlier measurements (Gilbert 1987). The test statistic (sum of trend) is the difference between the number of strictly positive differences and the number of strictly negative differences. If there is an underlying upward trend, these differences are typically positive, indicated by a sufficiently large positive value of the test statistic. The p-value of the correlation provides a measure of the level of significance of the statistical test. Correlations were accepted as significant for p-values less than or equal to 0.05 (i.e., 95 UCL). The statistical analysis results are summarized in Table E-1 and E-2 of Appendix E; supporting ProUCL and Mann-Kendall analyses data are also included in Appendix E.

The statistical evaluation confirms that the cleanup objectives for the Levee Zone wells (CUL of 208 µg/L) and monitoring wells north of the BNSF railyard and outside of the Levee Zone and Skykomish School property (RL of 477 µg/L) are being met, with the exception of monitoring well 2A-W-41 and gate well GW-3, where the results are biased high due to biofouling (Farallon 2023). However, combined DRO/HO concentrations indicate stable (non-statistically significant) trends at wells 2A-W-41 and GW-3. NWTPH-Dx concentrations in all silica gel–prepared samples were less than the RL.

Skykomish School monitoring wells 5-W-51 and 5-W-56, which are not required to meet the RL (see Section 1.3), contain concentrations of DRO and HO that exceed the RL; the concentrations are exhibiting a stable trend at monitoring well 5-W-56 and a statistically significant downward trend at monitoring well 5-W-51 (Appendix E).

5 Long-Term Monitoring Program Optimization, Modification, and Termination

The LTM program is intended to be adaptive to changing conditions at the Site. Data are evaluated against the decision rules provided in Section 7.1 of the Final Long-Term Monitoring Plan to determine whether the cleanup actions are meeting the objectives established in the Consent Decree, and whether any modifications to the LTM program are warranted. The decision rules specify the criteria for continuing, modifying, or terminating the LTM program. The decision rules also identify Site conditions that may warrant contingency measures.

Statistical analysis data are used to optimize the LTM program while ensuring that sufficient data are collected to verify that DRO/HO concentrations in groundwater are not endangering potential receptors (e.g., the Skykomish River). The following LTM program optimization recommendations, which are based on the statistical evaluation of data presented in Section 4.0 are presented below:

- Per Section 3.1.2 and Decision Rule 2 in Section 7.1 of the Final Long-Term Monitoring Plan (Farallon 2020), Former Air Sparge Area monitoring well 1C-W-7 remains eligible for removal from the LTM program, as the statistical analysis of NTWPH-Dx results indicates the 95 UCL for combined DRO/HO is less than the RL, spatial coverage of the area around 1C-W-7 is achieved by monitoring well 1C-W-8, and further monitoring of

1C-W-7 would provide redundant information. However, due to the recent Combined DRO/HO detection at GW-4, 1C-W-7 will continue to be monitored in 2024.

- Per Section 3.1.2 and Decision Rule 1 in Section 7.1 of the Final Long-Term Monitoring Plan (Farallon 2020), monitoring well MW-4 remains eligible for removal from the LTM program, as the statistical analysis of NWTPH-Dx results indicates that the 95 UCL for combined DRO/HO is less than the RL, and monitoring well MW-4 is not under the influence of an engineering control. Furthermore, the groundwater flow direction at MW-4 is consistently to the northwest toward the BNSF railyard. Therefore, groundwater monitoring at monitoring well MW-4 does not provide data useful for the evaluation of whether cleanup actions are meeting the objectives, and NWTPH-Dx sampling at monitoring well MW-4 should be discontinued and the well decommissioned.

6 Conclusions

Groundwater monitoring data indicate that LNAPL thicknesses in decreased in 2023 and concentrations of DRO/HO in groundwater remained generally stable in 2023. DRO and HO were not detected in any of the Levee Zone monitoring wells during the March and September 2023 monitoring events and no LNAPL was observed north (downgradient) of the HCC barrier wall.

LNAPL was observed in monitoring wells and piezometers up-gradient of and adjacent to the HCC system barrier wall, between the West Gate and Center Gate, which is consistent with prior years. LNAPL observations ranged from a sheen to 0.02 foot thick. LNAPL thicknesses have exhibited an overall decreasing trend, with minor variability since LNAPL gauging began in 2012 (Appendix D).

Combined DRO/HO concentrations were below the CUL or RL in all but three locations in 2023 (2A-W-41, GW-3, and GW-4). In wells 2A-W-41 and GW-3, both of which are downgradient of an area of known biofouling and subject to biogenic interferences, the combined DRO/HO concentrations of the silica gel–prepared samples were less than the RL. The detections at well GW-4 may be attributable to surface water intrusion and the integrity of this well will be thoroughly assessed, and remedied as needed, in March 2024. Samples collected from GW-4 will also be analyzed with and without silica gel cleanup in 2024 to further assess the potential for biogenic interference in the sample results.

Statistical analysis of the analytical results indicates that the cleanup objectives for the Site are being met. Additionally, based on the statistical analysis, groundwater sampling at monitoring wells 1C-W-7 and MW-4 may be discontinued in accordance with the applicable Decision Rules presented in the Final Long-Term Monitoring Plan (Farallon 2020). While 1C-W-7 is eligible to be removed from the sampling network based on the Decision Rules presented in the Final Long-Term Monitoring Plan, this monitoring well will continue to be monitored until GW-4 is confirmed to provide continued delineation downgradient of the east gate. It is recommended for LTM program optimization that groundwater sampling at monitoring well MW-4 be discontinued moving forward. As discussed in the 2022 Annual Long-Term Monitoring Report (Farallon 2023), monitoring well MW-4 should be decommissioned.

7 References

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Tables

Table 1
2023 Groundwater Elevations and LNAPL Thicknesses
2023 Annual Long-Term Monitoring Report
BNSF Railway Company
Former Maintenance and Fueling Facility, Skykomish, WA

Zone	Location	Measuring Point Elevation Q1 and Q2 (ft NAVD88)[1]	Measuring Point Elevation Q3 and Q4 (ft NAVD88)	Date	Depth to Groundwater (ft btoc)	Depth to LNAPL (ft btoc)	LNAPL Thickness (ft)	Groundwater Elevation (ft NAVD88)[2]
Gate Wells	GW-1	928.24	--	3/27/2023	10.85	--	--	917.39
				10/17/2023	11.18	--	--	917.06
	GW-2	930.29	930.14	3/27/2023	12.85	--	--	917.44
				9/26/2023	10.57	--	--	919.57
	GW-3	935.82	--	3/27/2023	14.10	--	--	921.72
				9/25/2023	15.30	--	--	920.52
	GW-4	934.68	934.58	3/27/2023	10.82	--	--	923.86
				9/25/2023	12.50	--	--	922.08
Recovery Wells	RW-01	932.84	936.20	3/27/2023	9.15	--	--	923.69
				9/25/2023	10.88	--	--	925.32
	RW-02	933.84	936.85	3/27/2023	10.25	--	--	923.59
				9/25/2023	14.48	--	--	922.37
	RW-03	933.80	936.81	3/27/2023	10.18	--	Sheen	923.62
				9/26/2023	12.51	--	Sheen	924.30
	RW-04	931.86	934.91	3/31/2023	8.84	--	--	923.02
				9/28/2023	--	--	Sheen	Sheen
	RW-05	928.53	931.85	3/27/2023	16.78	--	--	911.75
				9/26/2023	14.14	--	--	917.71
	RW-06	928.53	931.55	3/27/2023	16.17	--	--	912.36
				9/25/2023	13.79	--	--	917.76
	RW-07	933.06	--	3/31/2023	7.33	--	Sheen	925.73
				9/26/2023	11.45	11.43	0.02	921.63
	RW-08	931.85	--	3/28/2023	7.49	--	Sheen	924.36
				9/26/2023	10.44	10.43	0.01	921.42
	RW-09	933.96	937.01	3/27/2023	NM[4]	--	--	NM[4]
				9/25/2023	10.97	--	Sheen	926.04
Levee Zone Wells	5-W-14	926.59	--	3/27/2023	9.94	--	--	916.65
				9/25/2023	10.90	--	--	915.69
	5-W-16	925.20	--	3/27/2023	8.67	--	--	916.53
				9/25/2023	9.64	--	--	915.56
	5-W-17	924.60	--	3/27/2023	8.07	--	--	916.53
				9/25/2023	9.05	--	--	915.55
	5-W-18	924.64	--	3/27/2023	8.09	--	--	916.55
				9/25/2023	9.05	--	--	915.59
	5-W-19	924.35	--	3/27/2023	7.93	--	--	916.42
				9/25/2023	8.85	--	--	915.50
Schoolyard Property Wells	5-W-51	925.08	--	3/27/2023	7.96	--	--	917.12
				9/25/2023	9.15	--	--	915.93
	5-W-55	923.92	--	3/27/2023	7.52	--	--	916.40
				9/25/2023	8.10	--	--	915.82
	5-W-56	924.76	--	3/27/2023	6.91	--	--	917.85
				9/25/2023	8.63	--	--	916.13
	RW-10	925.11	--	3/27/2023	7.52	--	--	917.59
				9/28/2023	8.86	--	--	916.25

Table 1
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2023 Annual Long-Term Monitoring Report
BNSF Railway Company
Former Maintenance and Fueling Facility, Skykomish, WA

Zone	Location	Measuring Point Elevation Q1 and Q2 (ft NAVD88)[1]	Measuring Point Elevation Q3 and Q4 (ft NAVD88)	Date	Depth to Groundwater (ft btoc)	Depth to LNAPL (ft btoc)	LNAPL Thickness (ft)	Groundwater Elevation (ft NAVD88)[2]
Site Wide Wells	1A-W-4	929.07	--	3/27/2023	9.47	--	--	919.60
				9/25/2023	11.00	--	--	918.07
	2A-W-3	934.43	--	3/31/2023	9.79	--	--	924.64
				9/26/2023	13.81	--	--	920.62
	2A-W-9	936.58	--	3/27/2023	9.00	--	--	927.58
				9/26/2023	NM[4]	--	--	NM[4]
	2A-W-40	933.34	933.03	3/27/2023	12.50	--	--	920.84
				9/27/2023	13.41	--	--	919.62
	2A-W-41	935.22	934.90	3/27/2023	17.61	--	--	917.61
				9/26/2023	18.49	--	--	916.41
	2A-W-42	935.37	935.04	3/27/2023	13.33	--	--	922.04
				9/28/2023	14.22	--	--	920.82
	1B-W-2	935.81	--	3/27/2023	14.01	--	--	921.80
				9/26/2023	14.70	--	--	921.11
	1B-W-23	936.25	930.39	3/27/2023	15.58	--	--	920.67
				9/26/2023	16.57	--	--	913.82
	1C-W-4	932.74	--	3/27/2023	10.76	--	--	921.98
				9/26/2023	11.95	--	--	920.79
	1C-W-7	935.04	934.70	3/27/2023	12.70	--	--	922.34
				9/25/2023	14.10	--	--	920.60
	1C-W-8	935.70	--	3/27/2023	13.46	--	--	922.24
				9/26/2023	14.80	--	--	920.90
	5-W-43	926.18	--	3/27/2023	8.29	--	--	917.89
				9/26/2023	9.60	--	--	916.58
	MW-4	936.95	--	3/27/2023	9.35	--	--	927.60
				9/26/2023	13.46	--	--	923.49
	MW-11	939.20	--	3/28/2023	12.98	--	Sheen	926.22
				9/26/2023	15.99	--	--	923.21
	MW-14	936.80	--	3/27/2023	11.91	--	--	924.89
				9/26/2023	Dry	--	--	Dry
	MW-47	932.61	--	3/27/2023	8.48	--	--	924.13
				9/25/2023	12.93	--	--	919.68
	BRIDGE	943.09	--	3/27/2023	25.30	--	--	917.79
				9/26/2023	25.68	--	--	917.41

Footnotes:

[1] 2015 survey measuring point elevations used for groundwater elevation calculations prior to third quarter of 2023 or if well not resurveyed in 2023.

[2] Survey was performed on October 6, 2023 by Otak, Inc.

[3] Groundwater elevation corrected where LNAPL present. LNAPL density estimated at 0.974 grams per cubic centimeter.

[4] Well inavertandly missed during gauging event.

Acronyms and Abbreviations:

-- = not applicable

btoc = below top of casing

DRO = diesel range organics

ft = feet

HO = heavy oil

LNAPL = light non-aqueous phase liquid

NAVD 88 = North American Vertical Datum of 1988

NM = not measured

Q1, Q2, Q3, Q4 = first quarter, second quarter, third quarter, fourth quarter

Table 2
2023 Stabilized Groundwater Field Parameter Values
2023 Annual Long-Term Monitoring Report
BNSF Railway Company
Former Maintenance and Fueling Facility, Skykomish, WA

Monitoring Well	Sample Date	Dissolved Oxygen (milligrams per liter)	Oxidation-Reduction Potential (millivolts)	pH (Standard Units)	Specific Conductivity (milliSiemens per centimeter)	Temperature (degrees Celsius)
1B-W-23	3/29/2023	10.71	230.9	6.27	0.106	8.62
	9/27/2023	6.08	211.2	6.09	0.090	18.40
1C-W-4	3/28/2023	7.71	94.7	5.87	0.066	6.86
1C-W-7	3/29/2023	4.59	232.5	5.77	0.074	8.16
	9/27/2023	3.36	179.1	6.08	0.099	12.14
1C-W-8	3/28/2023	7.60	103.2	6.01	0.066	6.44
	9/27/2023	5.13	48.8	6.12	0.235	9.81
2A-W-40	3/29/2023	9.58	12.8	6.56	0.052	7.69
	9/28/2023	6.96	183.6	6.44	0.057	9.07
2A-W-41	3/29/2023	4.20	4.2	6.47	0.144	8.41
	9/28/2023	3.67	26.1	6.35	0.171	10.93
2A-W-42	3/30/2023	3.20	45.1	6.07	0.132	7.31
	9/28/2023	3.40	209.8	5.90	0.116	10.60
2A-W-9	3/29/2023	0.56	95.3	6.29	0.052	8.26
5-W-14	3/28/2023	5.65	203.0	6.71	0.078	9.21
	9/26/2023	6.19	160.2	6.44	0.074	10.44
5-W-16	3/28/2023	7.59	197.8	6.74	0.073	7.75
	9/26/2023	8.06	137.8	6.71	0.061	12.75
5-W-17	3/28/2023	5.77	207.0	6.46	0.072	8.55
	9/29/2023	6.19	128.8	6.28	0.726	9.22
5-W-18	3/28/2023	6.31	208.4	6.64	0.066	8.71
	9/29/2023	5.89	144.6	6.47	0.094	10.05
5-W-19	3/28/2023	7.50	203.6	6.72	0.059	9.12
	9/29/2023	6.34	126.0	6.68	0.072	11.21
5-W-43	3/29/2023	5.03	104.7	6.11	0.086	8.04
	9/29/2023	0.98	207.7	6.13	0.073	10.63
5-W-51	3/29/2023	0.24	219.0	5.81	0.106	8.14
	9/29/2023	0.15	48.8	6.22	0.095	11.59
5-W-55	3/28/2023	5.81	29.0	6.40	0.110	8.75
	9/28/2023	0.94	140.5	6.28	0.102	14.46
5-W-56	3/28/2023	0.19	-163.5	6.27	0.590	10.33
	9/28/2023	0.27	-199.3	6.37	0.776	16.56
EW-1	3/29/2023	3.22	99.2	6.04	0.087	7.96
	9/28/2023	0.53	196.3	6.01	0.058	8.84
EW-2A	3/29/2023	6.49	246.4	6.10	0.046	8.10
	9/27/2023	5.20	192.0	5.94	0.062	9.79

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2023 Annual Long-Term Monitoring Report
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Former Maintenance and Fueling Facility, Skykomish, WA

Monitoring Well	Sample Date	Dissolved Oxygen (milligrams per liter)	Oxidation-Reduction Potential (millivolts)	pH (Standard Units)	Specific Conductivity (milliSiemens per centimeter)	Temperature (degrees Celsius)
GW-1	3/29/2023	2.50	59.2	6.34	0.117	7.58
	10/17/2023	0.84	-68.8	6.16	0.121	11.48
GW-2	3/29/2023	117.71	-35.9	6.24	0.118	7.61
	9/28/2023	1.02	18.7	6.27	0.119	11.49
GW-3	3/29/2023	1.58	-59.7	6.23	0.102	8.67
	9/27/2023	2.92	56.4	6.05	0.088	10.85
GW-4	3/30/2023	1.84	-47.7	6.61	0.089	7.45
	9/27/2023	3.00	112.4	6.35	0.087	10.09
MW-4	3/29/2023	2.28	230.8	5.51	0.070	5.93
	9/29/2023	0.07	175.8	5.34	0.090	10.64

Table 3
2023 Groundwater Analytical Results
2023 Annual Long-Term Monitoring Report
BNSF Railway Company
Former Maintenance and Fueling Facility, Skykomish, WA

Well	Date	Sample Identification	Sample Type	Diesel Range Organics (µg/L)	Heavy Oil (µg/L)	Combined DRO/HO (µg/L)
Site-Specific Groundwater Cleanup Level						**208**
5-W-14	3/28/2023	5-W-14	N	<100 UJ	<100 UJ	16.5 UJ
	3/28/2023	DUP-1	FD	<100 UJ	<100 UJ	16.5 UJ
	9/26/2023	5-W-14_092623	N	<100 U	<100 U	16.5 U
5-W-16	3/28/2023	5-W-16	N	<100 UJ	<100 UJ	16 UJ
	9/26/2023	5-W-16_092623	N	<100 U	<100 U	16.5 U
5-W-17	3/28/2023	5-W-17	N	<100 UJ	<100 UJ	15.5 UJ
	9/29/2023	5-W-17_092923	N	<100 U	<100 U	16.5 U
5-W-18	3/28/2023	5-W-18	N	<100 UJ	<100 UJ	16.5 UJ
	9/29/2023	5-W-18_092923	N	<100 U	<100 U	16.5 U
5-W-19	3/28/2023	5-W-19	N	<100 UJ	<100 UJ	16.5 UJ
	9/29/2023	5-W-19_092923	N	<100 U	<100 U	16.5 U
Site-Specific Groundwater Remediation Level						**477**
1B-W-23	3/29/2023	1B-W-23	N	<100 UJ	<100 UJ	16.5 UJ
	9/27/2023	1B-W-23_092723	N	<100 U	<100 U	16.5 U
1C-W-4	3/28/2023	1C-W-4	N	**100 J**	<100 UJ	**109 J**
1C-W-7	3/29/2023	1C-W-7	N	**100 J**	<100 UJ	**109 J**
	9/27/2023	1C-W-7_092723	N	**120**	<100 U	**129**
1C-W-8	3/28/2023	1C-W-8	N	<100 UJ	<100 UJ	15.5 UJ
	9/27/2023	1C-W-8_092723	N	<100 U	<100 U	17.5 U
2A-W-40	3/29/2023	2-A-W-40	N	<100 UJ	**280 J**	**288 J**
	3/29/2023	DUP-2	FD	<100 UJ	**330 J**	**338 J**
	9/28/2023	2A-W-40_092823	N	<100 U	<100 U	16.5 U
2A-W-41	3/29/2023	2A-W-41	N	**310 J [110 J]**	<100 UJ [<100 UJ]	**319 J [119 J]**
	9/28/2023	2A-W-41_092823	N	**400 [240 J]**	**120** [<100 U]	**520 [249 J]**
2A-W-42	3/30/2023	2A-W-42	N	<100 UJ	<100 UJ	**16.5 UJ**
	9/28/2023	2A-W-42_092823	N	**120**	<100 U	**129**
5-W-43	3/29/2023	5-W-43	N	<100 UJ	<100 UJ	15.5 UJ
	9/29/2023	5-W-43_092923	N	<100 U	<100 U	17.5 U
	9/29/2023	FD-4_092923	FD	<100 U	<100 U	16.5 U
GW-1	3/29/2023	GW-1	N	<100 UJ	<100 UJ	15.5 UJ
	10/17/2023	GW-1_101723	N	**150**	**110**	**260**
	10/17/2023	DUP-1_101723	FD	**140**	**130**	**270**
GW-2	3/29/2023	GW-2	N	<100 UJ	<100 UJ	15.5 UJ
	9/28/2023	GW-2_092823	N	<100 U	<100 U	16.5 U
GW-3	3/29/2023	GW-3	N	**490 J [160 J]**	**140 J** [<100 UJ]	**630 J [168 J]**
	9/27/2023	GW-3_092723	N	**250 [110]**	<100 U [<100 U]	**259 [119]**
GW-4	3/30/2023	GW-4	N	<100 UJ	<100 UJ	16 UJ
	9/27/2023	GW-4_092723	N	**130**	**690**	**820**

Table 3
2023 Groundwater Analytical Results
2023 Annual Long-Term Monitoring Report
BNSF Railway Company
Former Maintenance and Fueling Facility, Skykomish, WA

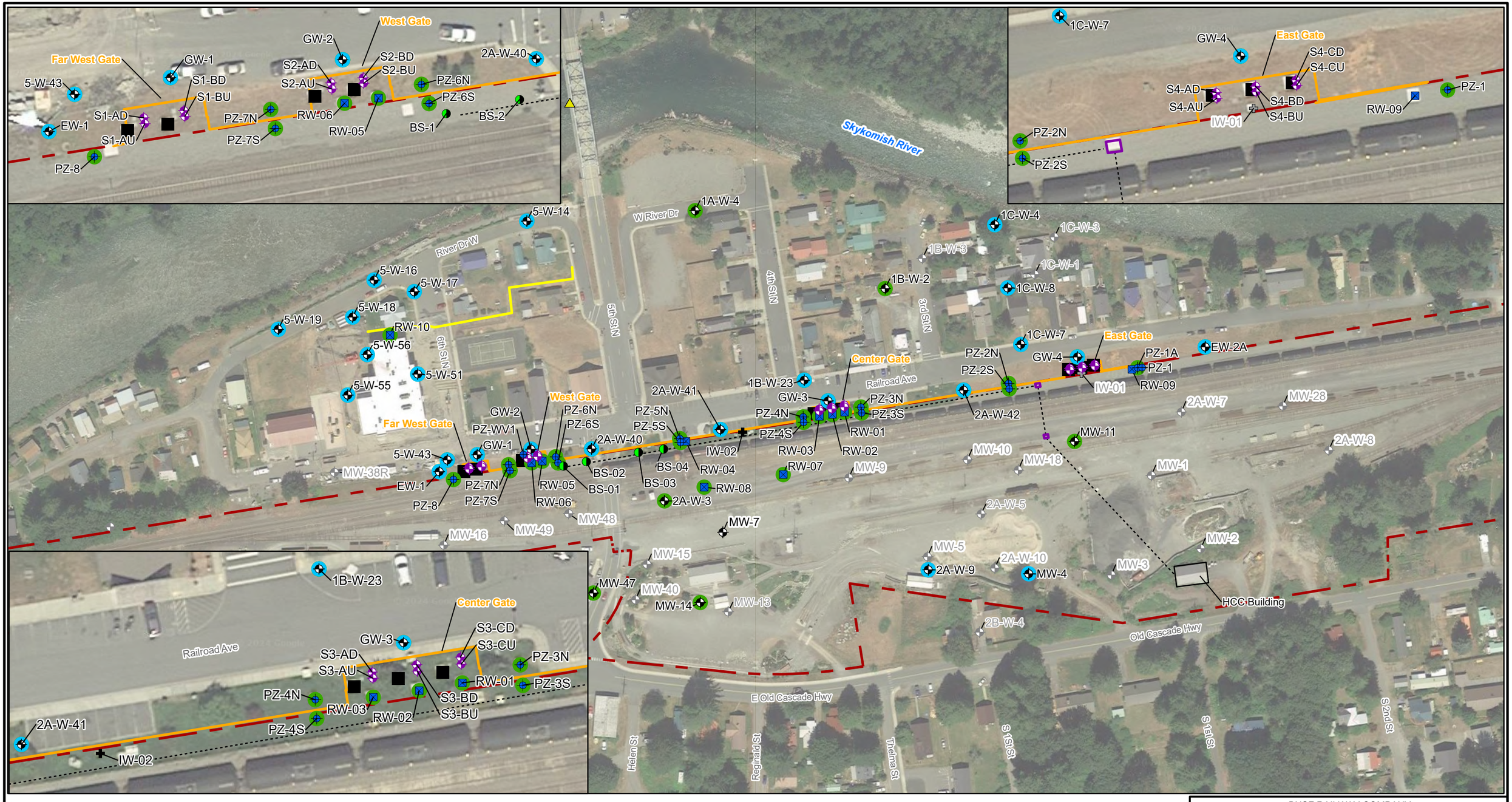
Well	Date	Sample Identification	Sample Type	Diesel Range Organics (µg/L)	Heavy Oil (µg/L)	Combined DRO/HO (µg/L)
No Target Remediation or Cleanup Level						
2A-W-9	3/29/2023	2A-W-9	N	**350 J**	**220 J**	**570 J**
5-W-51	3/29/2023	5-W-51	N	**270 J**	**120 J**	**390 J**
	9/29/2023	5-W-51_092923	N	**530**	**220**	**750**
	9/29/2023	FD-3_092923	FD	**590**	**290**	**880**
5-W-55	3/28/2023	5-W-55	N	<100 UJ	<100 UJ	16.5 UJ
	9/28/2023	5-W-55_092823	N	<100 U	<100 U	16.5 U
5-W-56	3/28/2023	5-W-56	N	**2,800 J**	**1,800 J**	**4,600 J**
	9/28/2023	5-W-56_092823	N	**1,400**	**710**	**2,110**
MW-4	3/29/2023	MW-4	N	**140 J**	**160 J**	**300 J**
	9/29/2023	MW-4_092923	N	**290**	**100**	**390**

Notes:
1. Results in **bold** font indicate the compound was detected at a concentration greater than the laboratory reporting limit.
2. Results in **bold** font and shaded gray indicate the compound was detected at a concentration greater than the Site-specific remediation level. The remediation level is not applicable to vaults in the barrier wall treatment gates.
3. Analyzed by Northwest Method NWTPH-Dx without silica gel cleanup, unless otherwise noted.
4. Calculated NWTPH-Dx is the sum of diesel range organics and heavy oil, using half the method detection limit for non-detect results.

Acronyms and Abbreviations:
-- = not applicable
< = Denotes analyte not reported as detected at or exceeding the listed laboratory reporting limit.
[ ] = Sample analyzed by Northwest Method NWTPH-Dx with silica gel cleanup.
µg/L = microgram per liter
FD = field duplicate
N = parent sample

Data Qualifiers:
J = compound was positively identified and the associated numerical value is an estimate
U = compound was analyzed for but not detected and the associated value is the compound quantitation limit
UJ = compound was not detected above the reported sample quantitation limit and the reported limit is approximate

Figures



Legend

- Monitoring Well
- Injection Well
- Recovery Well
- Piezometer
- Bridge Gauge
- Abandoned Monitoring Well
- Abandoned Injection Well
- Sentry Well
- Biosparge Well
- Barrier Wall Gate Vault
- Location Sampled for NWTPH-Dx
- Location Gauged Only
- Mechanically Stabilized Earth Wall
- Hydraulic Control and Containment System Sheet Pile Barrier Wall and Gates
- Biosparge Air Conveyance Line
- BNSF Railyard Boundary
- Utility Vault

0 80 160 240 320
MAIN MAPSCALE IN FEET

0 25 50 75 100
INSET MAP SCALE IN FEET

Notes:
1) Aerial Imagery from Google Earth

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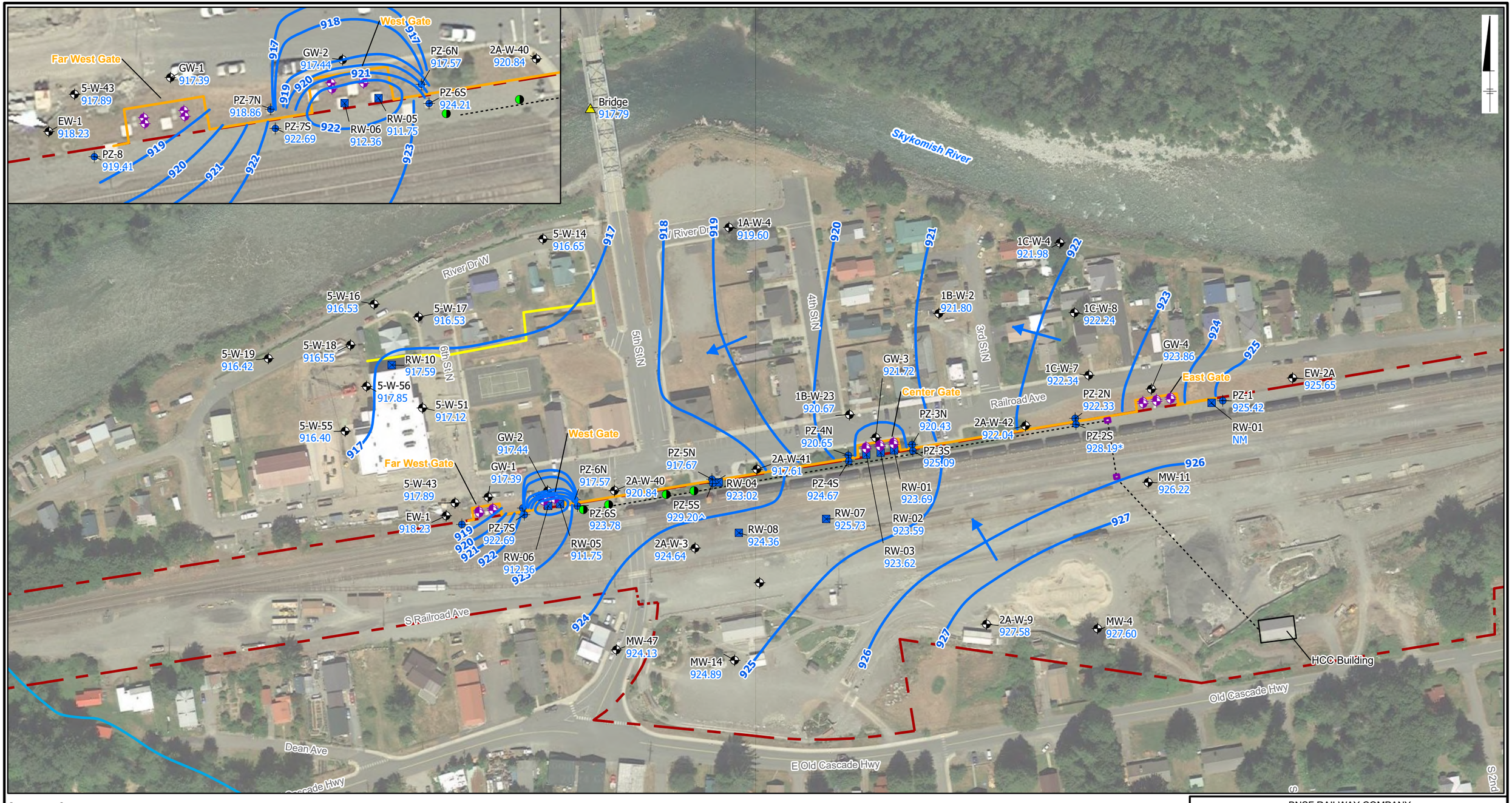
SKYKOMISH, WASHINGTON
2023 ANNUAL LONG-TERM MONITORING REPORT

SITE PLAN

ARCADIS

FIGURE
1

CITY:(DEN-TECH) DIV/GROUP:(ENV/GIS) DB: ACARLONE LD: PIC: PM: TM:
PROJECT: PATH: T:_ENV\BNSF\BNSF_Skykomish_WA\ArcPro_Project\Files\2023\2023_LTM_Report\2023_LTM_Report.aprx



Legend

- Monitoring Well
- Recovery Well
- Piezometer
- Bridge Gauge
- Sentry Well
- Biosparge Well
- Mechanically Stabilized Earth Wall
- Hydraulic Control and Containment System Sheet Pile Barrier Wall and Gates
- Biosparge Air Conveyance Line
- BNSF Railyard Boundary
- Utility Vault
- Groundwater Elevation Contour
- Approximate Groundwater Flow Direction
- 924.89 Groundwater Elevation (Feet NAVD 88)

0 140 280

MAIN MAPSCALE IN FEET

Notes:
1) Aerial Imagery from Google Earth
2) NAVD 88 = North American Vertical Datum of 1988
3) ^ = Groundwater elevation corrected where LNAPL present. LNAPL density estimated at 0.974 grams per cubic centimeter
4) * = Groundwater elevation not used in contouring.
LNAPL = Light Non-Aqueous Phase Liquid
NM = Not Measured

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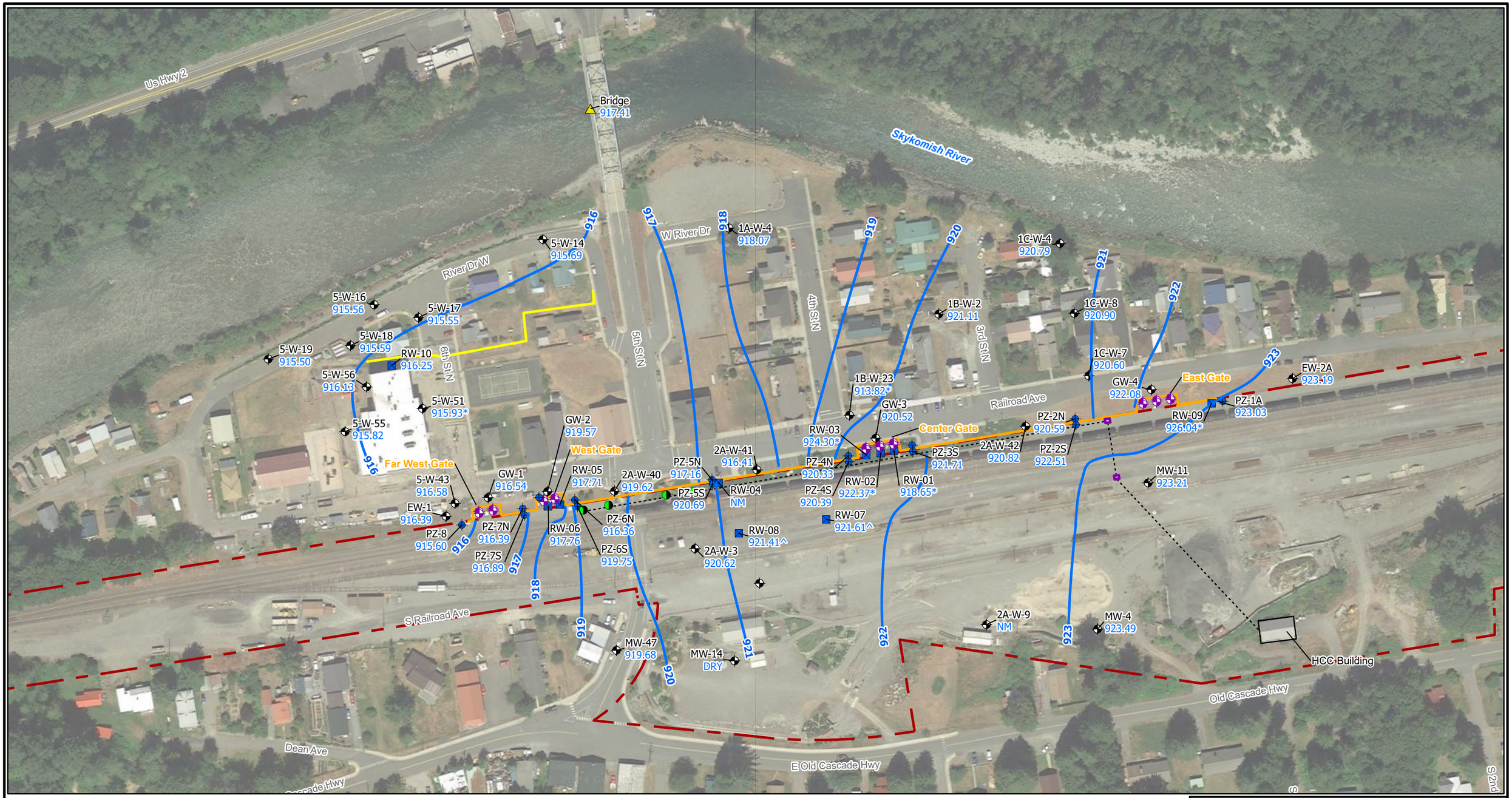
SKYKOMISH, WASHINGTON
2023 ANNUAL LONG-TERM MONITORING REPORT

MARCH 2023 POTENTIOMETRIC SURFACE MAP

ARCADIS

FIGURE 2

CITY:(DEN-TECH) DIV/GROUP:(ENV/GIS) DB: ACARLONE LD: PIC: PM: TM:
PROJECT: PATH: T:_ENV\BNSF\BNSF_Skykomish_WA\ArcPro_ProjectFiles\2023\2023_LTM_Report\2023_LTM_Report.aprx



Legend

- Monitoring Well
- Recovery Well
- Piezometer
- Bridge Gauge
- Sentry Well
- Biosparge Well
- Groundwater Elevation Contour
- Approximate Groundwater Flow Direction
- Biosparge Air Conveyance Line
- Mechanically Stabilized Earth Wall
- Hydraulic Control and Containment System Sheet Pile Barrier Wall and Gates
- BNSF Railyard Boundary
- Utility Vault

0 140 280
MAIN MAP SCALE IN FEET

Notes:
1) Aerial Imagery from Google Earth
2) * = Not included in contouring
3) ^ = Groundwater elevation corrected where LNAPL present. LNAPL density estimated at 0.974 grams per cubic centimeter
4) Hydraulic Control and Containment system in passive mode. Biosparge system is active.
LNAPL = Light Non-Aqueous Phase Liquid
NM = Not Monitored

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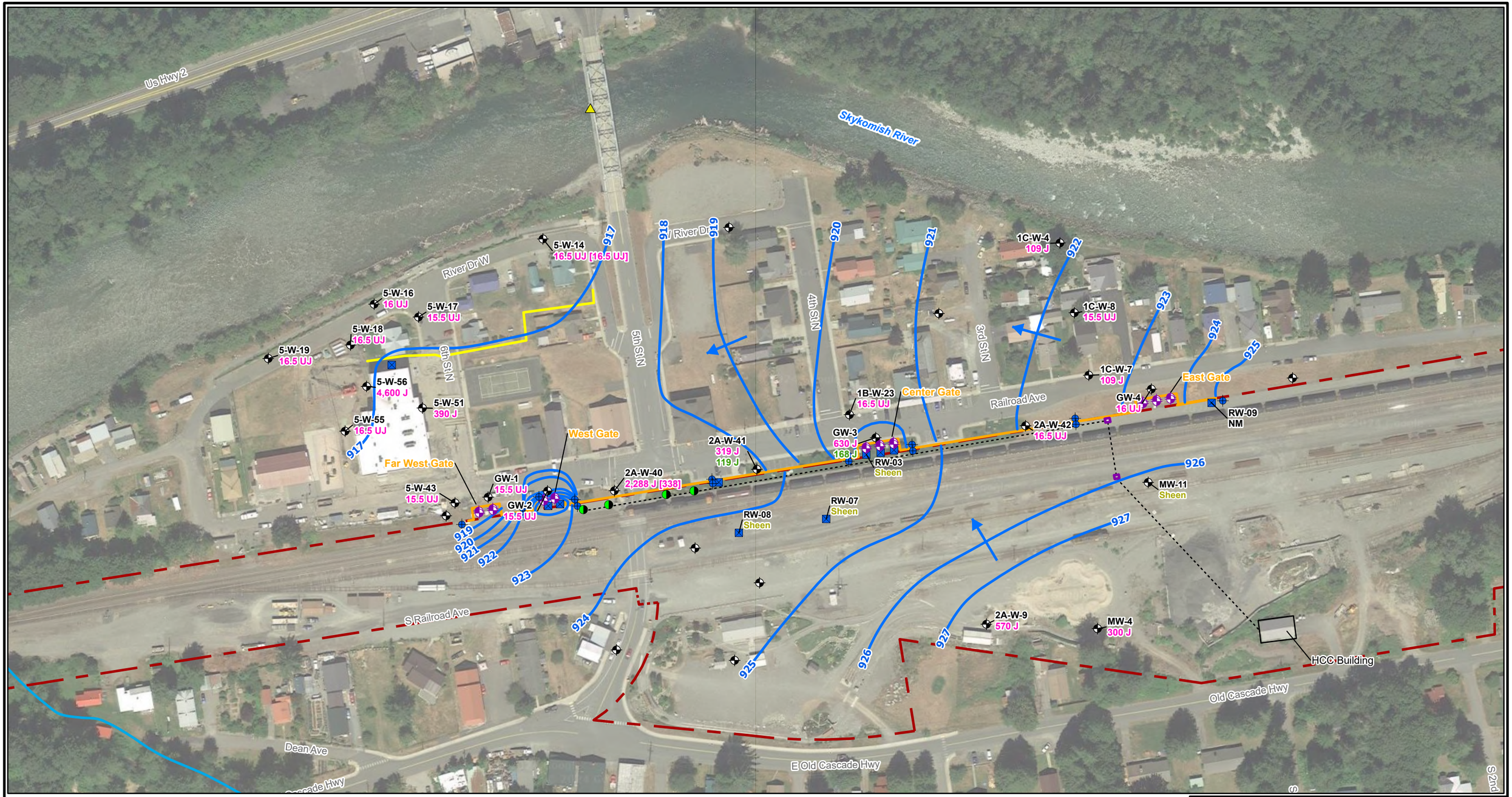
SKYKOMISH, WASHINGTON
2023 LONG-TERM MONITORING REPORT

SEPTEMBER 2023 POTENTIOMETRIC SURFACE MAP

ARCADIS

FIGURE 3

CITY:(DEN-TECH) DIV/GROUP:(ENV/GIS) DB: ACARLONE LD: PIC: PM: TM:
PROJECT: PATH: T:_ENV\BNSF\BNSF_Skykomish_WA\ArcPro_Project\Files\2023\2023_LTM_Report\2023_LTM_Report.aprx



Legend

- Monitoring Well
- Recovery Well
- Piezometer
- Bridge Gauge
- Sentry Well
- Biosparge Well
- Biosparge Air Conveyance Line
- Mechanically Stabilized Earth Wall
- Hydraulic Control and Containment System Sheet Pile Barrier Wall and Gates
- Groundwater Elevation Contour
- Approximate Groundwater Flow Direction
- BNSF Railyard Boundary
- 318.5 J — Combined DRO/HO Concentration (microgram per liter)
- 118.5 J — Combined DRO/HO Concentration with Silica Gel Cleanup (microgram per liter)
- Sheen — LNAPL Measurement (thickness in feet)

0 140 280

MAIN MAP SCALE IN FEET

Notes:
1) Aerial Imagery from Google Earth
2) DRO = Diesel Range Organics
3) HO = Heavy Oil
4) J = Compound was positively identified and the associated numerical value is an estimate
5) UJ = Compound was not detected above the reported sample quantitation limit and the reported limit is approximate
6) LNAPL = Light Non-Aqueous Phase Liquid
7) NM = Not Monitored
8) [ ] = Duplicate Result

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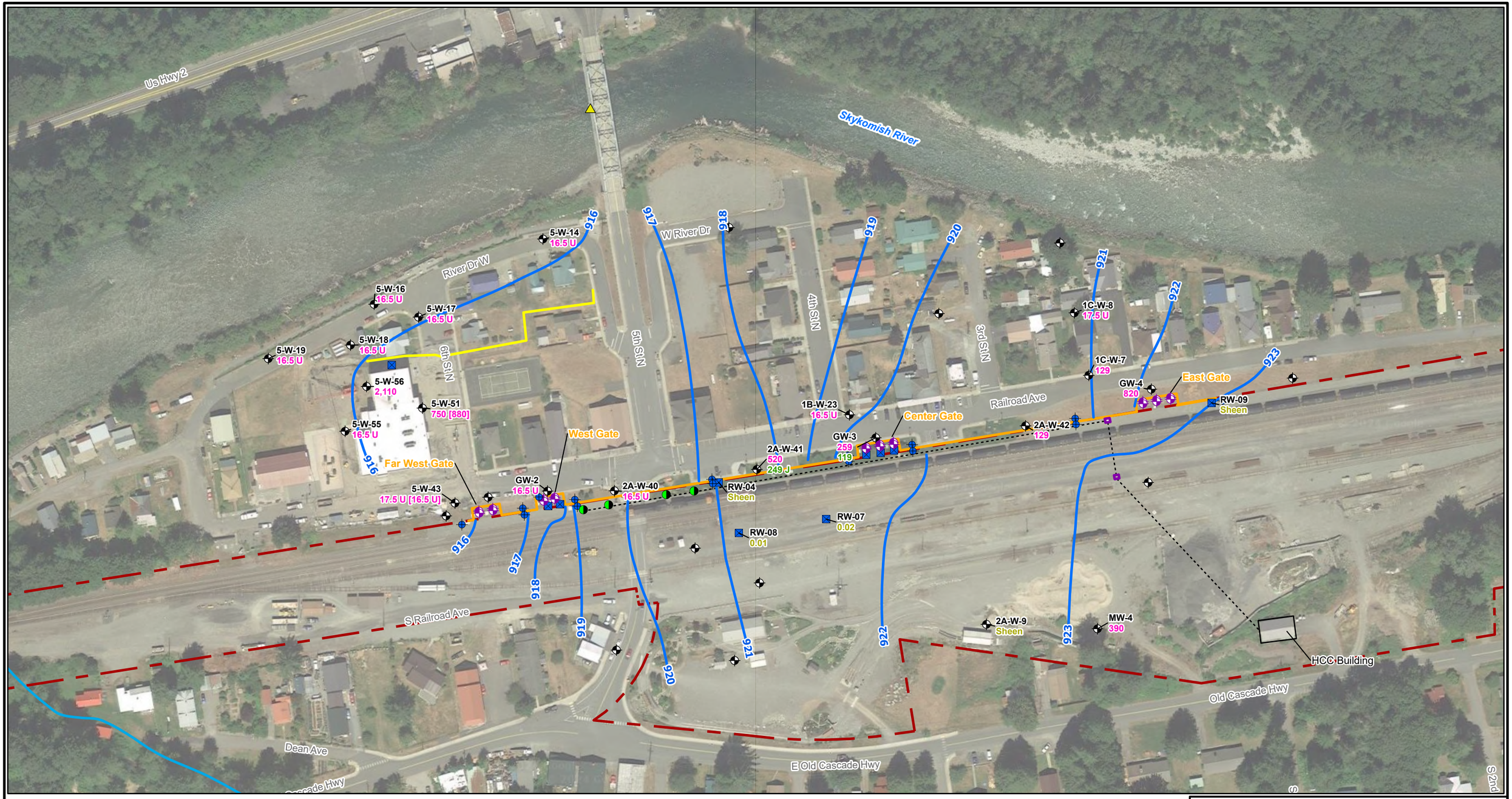
SKYKOMISH, WASHINGTON
2023 ANNUAL LONG-TERM MONITORING REPORT

MARCH 2023 TOTAL PETROLEUM HYDROCARBONS IN GROUNDWATER

ARCADIS

FIGURE 4

CITY:(DEN-TECH) DIV/GROUP:(ENV/GIS) DB: ACARLONE LD: PIC: PM: TM:
PROJECT: PATH: T:_ENV\BNSF\BNSF_Skykomish_WA\ArcPro_ProjectFiles\2023\2023_LTM_Report\2023_LTM_Report.aprx



Legend

- Monitoring Well
- Recovery Well
- Piezometer
- Bridge Gauge
- Sentry Well
- Biosparge Well
- Biosparge Air Conveyance Line
- Mechanically Stabilized Earth Wall
- Maloney Creek
- Hydraulic Control and Containment System Sheet Pile Barrier Wall and Gates
- Groundwater Elevation Contour
- Approximate Groundwater Flow Direction
- BNSF Railyard Boundary
- MonitoringWellZones

510 Combined DRO/HO Concentration (microgram per liter)

158 Combined DRO/HO Concentration with Silica Gel Cleanup (microgram per liter)

0.01 LNAPL Measurement (thickness in feet)

0 140 280

MAIN MAP SCALE IN FEET

Notes:
1) Aerial Imagery from Google Earth
2) DRO = Diesel Range Organics
3) HO = Heavy Oil
4) J = Compound was positively identified and the associated numerical value is an estimate
5) U = Compound was analyzed for but not detected and the associated value is the compound quantitation limit.
6) LNAPL = Light Non-Aqueous Phase Liquid
7) [ ] = Duplicate Result

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SKYKOMISH, WASHINGTON
2023 ANNUAL LONG-TERM MONITORING REPORT

SEPTEMBER 2023 TOTAL PETROLEUM HYDROCARBONS IN GROUNDWATER

ARCADIS

FIGURE 5

CITY:(DEN-TECH) DIV/GROUP:(ENV/GIS) DB: ACARLONE LD: PIC: PM: TM:
PROJECT: PATH: T:_ENV\BNSF\BNSF_Skykomish_WA\ArcPro_ProjectFiles\2023\2023_LTM_Report\2023_LTM_Report.aprx

Appendix A

Laboratory Analytical Reports

April 12, 2023

Mr. Kyle Haslam
Arcadis U.S., Inc.
1100 Olive Way, Suite 800
Seattle, WA 98101

Dear Mr. Haslam,

On March 31st, 49 samples were received by our laboratory and assigned our laboratory project number EV23040003. The project was identified as your BNSF Skykomish. The sample identification and requested analyses are outlined on the attached chain of custody record.

No abnormalities or nonconformances were observed during the analyses of the project samples.

Please do not hesitate to call me if you have any questions or if I can be of further assistance.

Sincerely,

ALS Laboratory Group

Rob Greer
Laboratory Director

ADDRESS 8620 Holly Drive, Suite 100, Everett, WA 9820 | PHONE 425-356-2600 | FAX 425-356-2626
ALS Group USA, Corp dba ALS Environmental

ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1100 Olive Way, Suite 800 Seattle, WA 98101	DATE:	4/12/2023
		ALS JOB#:	EV23040003
		ALS SAMPLE#:	EV23040003-01
CLIENT CONTACT:	Kyle Haslam	DATE RECEIVED:	03/31/2023
CLIENT PROJECT:	BNSF Skykomish	COLLECTION DATE:	3/28/2023 9:45:00 AM
CLIENT SAMPLE ID	1C-W-8	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U	100	1	UG/L	04/07/2023	DHM
TPH-Oil Range	NWTPH-DX	U	100	1	UG/L	04/07/2023	DHM

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**103**	04/07/2023	DHM

U - Analyte analyzed for but not detected at level above reporting limit.

ADDRESS 8620 Holly Drive, Suite 100, Everett, WA 9820 | PHONE 425-356-2600 | FAX 425-356-2626
ALS Group USA, Corp dba ALS Environmental

ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1100 Olive Way, Suite 800 Seattle, WA 98101	DATE: ALS JOB#: ALS SAMPLE#:	4/12/2023 EV23040003 EV23040003-02
CLIENT CONTACT:	Kyle Haslam	DATE RECEIVED:	03/31/2023
CLIENT PROJECT:	BNSF Skykomish	COLLECTION DATE:	3/28/2023 9:50:00 AM
CLIENT SAMPLE ID	5-W-17	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U	100	1	UG/L	04/07/2023	DHM
TPH-Oil Range	NWTPH-DX	U	100	1	UG/L	04/07/2023	DHM

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**116**	04/07/2023	DHM

U - Analyte analyzed for but not detected at level above reporting limit.

ADDRESS 8620 Holly Drive, Suite 100, Everett, WA 9820 | PHONE 425-356-2600 | FAX 425-356-2626
ALS Group USA, Corp dba ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1100 Olive Way, Suite 800 Seattle, WA 98101	DATE:	4/12/2023
		ALS JOB#:	EV23040003
		ALS SAMPLE#:	EV23040003-03
CLIENT CONTACT:	Kyle Haslam	DATE RECEIVED:	03/31/2023
CLIENT PROJECT:	BNSF Skykomish	COLLECTION DATE:	3/28/2023 11:15:00 AM
CLIENT SAMPLE ID	5-W-16	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U	100	1	UG/L	04/07/2023	DHM
TPH-Oil Range	NWTPH-DX	U	100	1	UG/L	04/07/2023	DHM

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**100**	04/07/2023	DHM

U - Analyte analyzed for but not detected at level above reporting limit.

ADDRESS 8620 Holly Drive, Suite 100, Everett, WA 9820 | PHONE 425-356-2600 | FAX 425-356-2626
ALS Group USA, Corp dba ALS Environmental

ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1100 Olive Way, Suite 800 Seattle, WA 98101	DATE: ALS JOB#: ALS SAMPLE#:	4/12/2023 EV23040003 EV23040003-04
CLIENT CONTACT:	Kyle Haslam	DATE RECEIVED:	03/31/2023
CLIENT PROJECT:	BNSF Skykomish	COLLECTION DATE:	3/28/2023 4:10:00 PM
CLIENT SAMPLE ID	5-W-55	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U	100	1	UG/L	04/07/2023	DHM
TPH-Oil Range	NWTPH-DX	U	100	1	UG/L	04/07/2023	DHM

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**108**	04/07/2023	DHM

U - Analyte analyzed for but not detected at level above reporting limit..

ADDRESS 8620 Holly Drive, Suite 100, Everett, WA 9820 | PHONE 425-356-2600 | FAX 425-356-2626
ALS Group USA, Corp dba ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1100 Olive Way, Suite 800 Seattle, WA 98101	DATE:	4/12/2023
		ALS JOB#:	EV23040003
		ALS SAMPLE#:	EV23040003-05
CLIENT CONTACT:	Kyle Haslam	DATE RECEIVED:	03/31/2023
CLIENT PROJECT:	BNSF Skykomish	COLLECTION DATE:	3/28/2023 11:00:00 AM
CLIENT SAMPLE ID	1C-W-4	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	**100**	100	1	UG/L	04/07/2023	DHM
TPH-Oil Range	NWTPH-DX	U	100	1	UG/L	04/07/2023	DHM

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**104**	04/07/2023	DHM

U - Analyte analyzed for but not detected at level above reporting limit.
Chromatogram indicates that it is likely that sample contains an unidentified diesel range product.

ADDRESS 8620 Holly Drive, Suite 100, Everett, WA 9820 | PHONE 425-356-2600 | FAX 425-356-2626
ALS Group USA, Corp dba ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1100 Olive Way, Suite 800 Seattle, WA 98101	DATE:	4/12/2023
		ALS JOB#:	EV23040003
		ALS SAMPLE#:	EV23040003-06
CLIENT CONTACT:	Kyle Haslam	DATE RECEIVED:	03/31/2023
CLIENT PROJECT:	BNSF Skykomish	COLLECTION DATE:	3/28/2023 4:05:00 PM
CLIENT SAMPLE ID	5-W-56	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	**2800**	500	5	UG/L	04/09/2023	DHM
TPH-Oil Range	NWTPH-DX	**1800**	500	5	UG/L	04/09/2023	DHM

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25 5X Dilution	NWTPH-DX	**87.6**	04/09/2023	DHM

Chromatogram indicates that it is likely that sample contains an unidentified diesel range product and an unidentified oil range product.

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ALS Group USA, Corp dba ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1100 Olive Way, Suite 800 Seattle, WA 98101	DATE:	4/12/2023
		ALS JOB#:	EV23040003
		ALS SAMPLE#:	EV23040003-07
CLIENT CONTACT:	Kyle Haslam	DATE RECEIVED:	03/31/2023
CLIENT PROJECT:	BNSF Skykomish	COLLECTION DATE:	3/28/2023 12:40:00 PM
CLIENT SAMPLE ID	5-W-14	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U	100	1	UG/L	04/08/2023	DHM
TPH-Oil Range	NWTPH-DX	U	100	1	UG/L	04/08/2023	DHM

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**99.6**	04/08/2023	DHM

U - Analyte analyzed for but not detected at level above reporting limit.

ADDRESS 8620 Holly Drive, Suite 100, Everett, WA 9820 | PHONE 425-356-2600 | FAX 425-356-2626
ALS Group USA, Corp dba ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1100 Olive Way, Suite 800 Seattle, WA 98101	DATE:	4/12/2023
		ALS JOB#:	EV23040003
		ALS SAMPLE#:	EV23040003-08
CLIENT CONTACT:	Kyle Haslam	DATE RECEIVED:	03/31/2023
CLIENT PROJECT:	BNSF Skykomish	COLLECTION DATE:	3/28/2023 2:08:00 PM
CLIENT SAMPLE ID	5-W-19	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U	100	1	UG/L	04/08/2023	DHM
TPH-Oil Range	NWTPH-DX	U	100	1	UG/L	04/08/2023	DHM

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**109**	04/08/2023	DHM

U - Analyte analyzed for but not detected at level above reporting limit.

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ALS Group USA, Corp dba ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1100 Olive Way, Suite 800 Seattle, WA 98101	DATE:	4/12/2023
		ALS JOB#:	EV23040003
		ALS SAMPLE#:	EV23040003-09
CLIENT CONTACT:	Kyle Haslam	DATE RECEIVED:	03/31/2023
CLIENT PROJECT:	BNSF Skykomish	COLLECTION DATE:	3/28/2023 3:10:00 PM
CLIENT SAMPLE ID	5-W-18	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U	100	1	UG/L	04/08/2023	DHM
TPH-Oil Range	NWTPH-DX	U	100	1	UG/L	04/08/2023	DHM

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**106**	04/08/2023	DHM

U - Analyte analyzed for but not detected at level above reporting limit

ADDRESS 8620 Holly Drive, Suite 100, Everett, WA 9820 | PHONE 425-356-2600 | FAX 425-356-2626
ALS Group USA, Corp dba ALS Environmental

ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1100 Olive Way, Suite 800 Seattle, WA 98101	DATE: ALS JOB#: ALS SAMPLE#:	4/12/2023 EV23040003 EV23040003-10
CLIENT CONTACT:	Kyle Haslam	DATE RECEIVED:	03/31/2023
CLIENT PROJECT:	BNSF Skykomish	COLLECTION DATE:	3/28/2023
CLIENT SAMPLE ID	DUP-1	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U	100	1	UG/L	04/08/2023	DHM
TPH-Oil Range	NWTPH-DX	U	100	1	UG/L	04/08/2023	DHM

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**107**	04/08/2023	DHM

U - Analyte analyzed for but not detected at level above reporting limit.

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ALS Group USA, Corp dba ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1100 Olive Way, Suite 800 Seattle, WA 98101	DATE:	4/12/2023
		ALS JOB#:	EV23040003
		ALS SAMPLE#:	EV23040003-11
CLIENT CONTACT:	Kyle Haslam	DATE RECEIVED:	03/31/2023
CLIENT PROJECT:	BNSF Skykomish	COLLECTION DATE:	3/29/2023 5:02:00 PM
CLIENT SAMPLE ID	EW-2A	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U	100	1	UG/L	04/08/2023	DHM
TPH-Oil Range	NWTPH-DX	U	100	1	UG/L	04/08/2023	DHM

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**150 SUR01**	04/08/2023	DHM

SUR01 -One or more surrogate recoveries were above the upper control limits. The sample results may be biased high.
U - Analyte analyzed for but not detected at level above reporting limit.

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ALS Group USA, Corp dba ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1100 Olive Way, Suite 800 Seattle, WA 98101	DATE:	4/12/2023
		ALS JOB#:	EV23040003
		ALS SAMPLE#:	EV23040003-12
CLIENT CONTACT:	Kyle Haslam	DATE RECEIVED:	03/31/2023
CLIENT PROJECT:	BNSF Skykomish	COLLECTION DATE:	3/29/2023 10:15:00 AM
CLIENT SAMPLE ID	MW-4	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	**140**	100	1	UG/L	04/08/2023	DHM
TPH-Oil Range	NWTPH-DX	**160**	100	1	UG/L	04/08/2023	DHM

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**105**	04/08/2023	DHM

Chromatogram indicates that it is likely that sample contains an unidentified diesel range product and light oil.
Diesel range product results biased high due to oil range product overlap.

ADDRESS 8620 Holly Drive, Suite 100, Everett, WA 9820 | PHONE 425-356-2600 | FAX 425-356-2626
ALS Group USA, Corp dba ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1100 Olive Way, Suite 800 Seattle, WA 98101	DATE:	4/12/2023
		ALS JOB#:	EV23040003
		ALS SAMPLE#:	EV23040003-13
CLIENT CONTACT:	Kyle Haslam	DATE RECEIVED:	03/31/2023
CLIENT PROJECT:	BNSF Skykomish	COLLECTION DATE:	3/29/2023 12:20:00 PM
CLIENT SAMPLE ID	EW-1	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U	100	1	UG/L	04/08/2023	DHM
TPH-Oil Range	NWTPH-DX	U	100	1	UG/L	04/08/2023	DHM

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**110**	04/08/2023	DHM

U - Analyte analyzed for but not detected at level above reporting limit..

ADDRESS 8620 Holly Drive, Suite 100, Everett, WA 9820 | PHONE 425-356-2600 | FAX 425-356-2626
ALS Group USA, Corp dba ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1100 Olive Way, Suite 800 Seattle, WA 98101	DATE:	4/12/2023
		ALS JOB#:	EV23040003
		ALS SAMPLE#:	EV23040003-14
CLIENT CONTACT:	Kyle Haslam	DATE RECEIVED:	03/31/2023
CLIENT PROJECT:	BNSF Skykomish	COLLECTION DATE:	3/29/2023 12:50:00 PM
CLIENT SAMPLE ID	5-W-43	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U	100	1	UG/L	04/08/2023	DHM
TPH-Oil Range	NWTPH-DX	U	100	1	UG/L	04/08/2023	DHM

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**111**	04/08/2023	DHM

U - Analyte analyzed for but not detected at level above reporting limit.

ADDRESS 8620 Holly Drive, Suite 100, Everett, WA 9820 | PHONE 425-356-2600 | FAX 425-356-2626
ALS Group USA, Corp dba ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1100 Olive Way, Suite 800 Seattle, WA 98101	DATE:	4/12/2023
		ALS JOB#:	EV23040003
		ALS SAMPLE#:	EV23040003-15
CLIENT CONTACT:	Kyle Haslam	DATE RECEIVED:	03/31/2023
CLIENT PROJECT:	BNSF Skykomish	COLLECTION DATE:	3/29/2023 2:45:00 PM
CLIENT SAMPLE ID	2-A-W-40	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U	100	1	UG/L	04/08/2023	DHM
TPH-Oil Range	NWTPH-DX	**280**	100	1	UG/L	04/08/2023	DHM

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**106**	04/08/2023	DHM

U - Analyte analyzed for but not detected at level above reporting limit.
Chromatogram indicates that it is likely that sample contains weathered lube oil.

ADDRESS 8620 Holly Drive, Suite 100, Everett, WA 9820 | PHONE 425-356-2600 | FAX 425-356-2626
ALS Group USA, Corp dba ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1100 Olive Way, Suite 800 Seattle, WA 98101	DATE:	4/12/2023
		ALS JOB#:	EV23040003
		ALS SAMPLE#:	EV23040003-16
CLIENT CONTACT:	Kyle Haslam	DATE RECEIVED:	03/31/2023
CLIENT PROJECT:	BNSF Skykomish	COLLECTION DATE:	3/29/2023 12:10:00 PM
CLIENT SAMPLE ID	GW-1	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U	100	1	UG/L	04/08/2023	DHM
TPH-Oil Range	NWTPH-DX	U	100	1	UG/L	04/08/2023	DHM

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**161 SUR01**	04/08/2023	DHM

U - Analyte analyzed for but not detected at level above reporting limit.
SUR01 -One or more surrogate recoveries were above the upper control limits. The sample results may be biased high.

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CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1100 Olive Way, Suite 800 Seattle, WA 98101	DATE:	4/12/2023
		ALS JOB#:	EV23040003
		ALS SAMPLE#:	EV23040003-17
CLIENT CONTACT:	Kyle Haslam	DATE RECEIVED:	03/31/2023
CLIENT PROJECT:	BNSF Skykomish	COLLECTION DATE:	3/29/2023 5:00:00 PM
CLIENT SAMPLE ID	GW-3	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX w/ SGA	**160**	100	1	UG/L	04/09/2023	DHM
TPH-Oil Range	NWTPH-DX w/ SGA	U	100	1	UG/L	04/09/2023	DHM
TPH-Diesel Range	NWTPH-DX	**490**	100	1	UG/L	04/08/2023	DHM
TPH-Oil Range	NWTPH-DX	**140**	100	1	UG/L	04/08/2023	DHM

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX w/ SGA	**105**	04/09/2023	DHM
C25	NWTPH-DX	**106**	04/08/2023	DHM

U - Analyte analyzed for but not detected at level above reporting limit.
Chromatogram indicates that it is likely that sample contains highly weathered diesel and an unidentified oil range product.
Oil range product results biased high due to diesel range product overlap.

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ALS Group USA, Corp dba ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1100 Olive Way, Suite 800 Seattle, WA 98101	DATE:	4/12/2023
		ALS JOB#:	EV23040003
		ALS SAMPLE#:	EV23040003-18
CLIENT CONTACT:	Kyle Haslam	DATE RECEIVED:	03/31/2023
CLIENT PROJECT:	BNSF Skykomish	COLLECTION DATE:	3/29/2023 1:45:00 PM
CLIENT SAMPLE ID	GW-2	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U	100	1	UG/L	04/08/2023	DHM
TPH-Oil Range	NWTPH-DX	U	100	1	UG/L	04/08/2023	DHM

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**106**	04/08/2023	DHM

U - Analyte analyzed for but not detected at level above reporting limit.

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CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1100 Olive Way, Suite 800 Seattle, WA 98101	DATE: ALS JOB#: ALS SAMPLE#:	4/12/2023 EV23040003 EV23040003-19
CLIENT CONTACT:	Kyle Haslam	DATE RECEIVED:	03/31/2023
CLIENT PROJECT:	BNSF Skykomish	COLLECTION DATE:	3/29/2023 1:00:00 PM
CLIENT SAMPLE ID	5W-51	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	**270**	100	1	UG/L	04/08/2023	DHM
TPH-Oil Range	NWTPH-DX	**120**	100	1	UG/L	04/08/2023	DHM

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**95.7**	04/08/2023	DHM

Chromatogram indicates that it is likely that sample contains highly weathered an unidentified diesel range product and an unidentified oil range product.
Oil range product results biased high due to diesel range product overlap.

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CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1100 Olive Way, Suite 800 Seattle, WA 98101	DATE:	4/12/2023
		ALS JOB#:	EV23040003
		ALS SAMPLE#:	EV23040003-20
CLIENT CONTACT:	Kyle Haslam	DATE RECEIVED:	03/31/2023
CLIENT PROJECT:	BNSF Skykomish	COLLECTION DATE:	3/29/2023 3:35:00 PM
CLIENT SAMPLE ID	1B-W-23	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U	100	1	UG/L	04/08/2023	DHM
TPH-Oil Range	NWTPH-DX	U	100	1	UG/L	04/08/2023	DHM

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**95.1**	04/08/2023	DHM

U - Analyte analyzed for but not detected at level above reporting limit.

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CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1100 Olive Way, Suite 800 Seattle, WA 98101	DATE:	4/12/2023
		ALS JOB#:	EV23040003
		ALS SAMPLE#:	EV23040003-21
CLIENT CONTACT:	Kyle Haslam	DATE RECEIVED:	03/31/2023
CLIENT PROJECT:	BNSF Skykomish	COLLECTION DATE:	3/29/2023 11:55:00 AM
CLIENT SAMPLE ID	2A-W-9	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	**350**	100	1	UG/L	04/08/2023	DHM
TPH-Oil Range	NWTPH-DX	**220**	100	1	UG/L	04/08/2023	DHM

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**91.9**	04/08/2023	DHM

Chromatogram indicates that it is likely that sample contains highly weathered diesel and lube oil.

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CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1100 Olive Way, Suite 800 Seattle, WA 98101	DATE:	4/12/2023
		ALS JOB#:	EV23040003
		ALS SAMPLE#:	EV23040003-22
CLIENT CONTACT:	Kyle Haslam	DATE RECEIVED:	03/31/2023
CLIENT PROJECT:	BNSF Skykomish	COLLECTION DATE:	3/29/2023 2:10:00 PM
CLIENT SAMPLE ID	1C-W-7	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	**100**	100	1	UG/L	04/08/2023	DHM
TPH-Oil Range	NWTPH-DX	U	100	1	UG/L	04/08/2023	DHM

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**89.9**	04/08/2023	DHM

U - Analyte analyzed for but not detected at level above reporting limit.
Chromatogram indicates that it is likely that sample contains an unidentified diesel range product.

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CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1100 Olive Way, Suite 800 Seattle, WA 98101	DATE:	4/12/2023
		ALS JOB#:	EV23040003
		ALS SAMPLE#:	EV23040003-23
CLIENT CONTACT:	Kyle Haslam	DATE RECEIVED:	03/31/2023
CLIENT PROJECT:	BNSF Skykomish	COLLECTION DATE:	3/29/2023 4:00:00 PM
CLIENT SAMPLE ID	2A-W-41	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX w/ SGA	**110**	100	1	UG/L	04/09/2023	DHM
TPH-Oil Range	NWTPH-DX w/ SGA	U	100	1	UG/L	04/09/2023	DHM
TPH-Diesel Range	NWTPH-DX	**310**	100	1	UG/L	04/08/2023	DHM
TPH-Oil Range	NWTPH-DX	U	100	1	UG/L	04/08/2023	DHM

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX w/ SGA	**91.1**	04/09/2023	DHM
C25	NWTPH-DX	**92.9**	04/08/2023	DHM

U - Analyte analyzed for but not detected at level above reporting limit.
Chromatogram indicates that it is likely that sample contains highly weathered diesel.

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CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1100 Olive Way, Suite 800 Seattle, WA 98101	DATE:	4/12/2023
		ALS JOB#:	EV23040003
		ALS SAMPLE#:	EV23040003-24
CLIENT CONTACT:	Kyle Haslam	DATE RECEIVED:	03/31/2023
CLIENT PROJECT:	BNSF Skykomish	COLLECTION DATE:	3/30/2023 5:50:00 PM
CLIENT SAMPLE ID	GW-4	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U	100	1	UG/L	04/08/2023	DHM
TPH-Oil Range	NWTPH-DX	U	100	1	UG/L	04/08/2023	DHM

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**92.1**	04/08/2023	DHM

U - Analyte analyzed for but not detected at level above reporting limit.

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CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1100 Olive Way, Suite 800 Seattle, WA 98101	DATE:	4/12/2023
		ALS JOB#:	EV23040003
		ALS SAMPLE#:	EV23040003-25
CLIENT CONTACT:	Kyle Haslam	DATE RECEIVED:	03/31/2023
CLIENT PROJECT:	BNSF Skykomish	COLLECTION DATE:	3/30/2023 2:49:00 PM
CLIENT SAMPLE ID	S3-CD	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U	100	1	UG/L	04/08/2023	DHM
TPH-Oil Range	NWTPH-DX	U	100	1	UG/L	04/08/2023	DHM

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**88.6**	04/08/2023	DHM

U - Analyte analyzed for but not detected at level above reporting limit.

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CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1100 Olive Way, Suite 800 Seattle, WA 98101	DATE: ALS JOB#: ALS SAMPLE#:	4/12/2023 EV23040003 EV23040003-26
CLIENT CONTACT:	Kyle Haslam	DATE RECEIVED:	03/31/2023
CLIENT PROJECT:	BNSF Skykomish	COLLECTION DATE:	3/30/2023 4:55:00 PM
CLIENT SAMPLE ID	S4-CD	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U	100	1	UG/L	04/08/2023	DHM
TPH-Oil Range	NWTPH-DX	U	100	1	UG/L	04/08/2023	DHM

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**90.9**	04/08/2023	DHM

U - Analyte analyzed for but not detected at level above reporting limit.

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CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1100 Olive Way, Suite 800 Seattle, WA 98101	DATE:	4/12/2023
		ALS JOB#:	EV23040003
		ALS SAMPLE#:	EV23040003-27
CLIENT CONTACT:	Kyle Haslam	DATE RECEIVED:	03/31/2023
CLIENT PROJECT:	BNSF Skykomish	COLLECTION DATE:	3/30/2023 3:49:00 PM
CLIENT SAMPLE ID	S4-AD	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U	100	1	UG/L	04/08/2023	DHM
TPH-Oil Range	NWTPH-DX	U	100	1	UG/L	04/08/2023	DHM

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**94.2**	04/08/2023	DHM

U - Analyte analyzed for but not detected at level above reporting limit.

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CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1100 Olive Way, Suite 800 Seattle, WA 98101	DATE: ALS JOB#: ALS SAMPLE#:	4/12/2023 EV23040003 EV23040003-28
CLIENT CONTACT:	Kyle Haslam	DATE RECEIVED:	03/31/2023
CLIENT PROJECT:	BNSF Skykomish	COLLECTION DATE:	3/29/2023 4:24:00 PM
CLIENT SAMPLE ID	S4-BD	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U	100	1	UG/L	04/08/2023	DHM
TPH-Oil Range	NWTPH-DX	U	100	1	UG/L	04/08/2023	DHM

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**95.2**	04/08/2023	DHM

U - Analyte analyzed for but not detected at level above reporting limit.

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ALS Group USA, Corp dba ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1100 Olive Way, Suite 800 Seattle, WA 98101	DATE:	4/12/2023
		ALS JOB#:	EV23040003
		ALS SAMPLE#:	EV23040003-29
CLIENT CONTACT:	Kyle Haslam	DATE RECEIVED:	03/31/2023
CLIENT PROJECT:	BNSF Skykomish	COLLECTION DATE:	3/30/2023 1:16:00 PM
CLIENT SAMPLE ID	S3-AD	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U	100	1	UG/L	04/08/2023	DHM
TPH-Oil Range	NWTPH-DX	U	100	1	UG/L	04/08/2023	DHM

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**91.4**	04/08/2023	DHM

U - Analyte analyzed for but not detected at level above reporting limit.

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CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1100 Olive Way, Suite 800 Seattle, WA 98101	DATE:	4/12/2023
		ALS JOB#:	EV23040003
		ALS SAMPLE#:	EV23040003-30
CLIENT CONTACT:	Kyle Haslam	DATE RECEIVED:	03/31/2023
CLIENT PROJECT:	BNSF Skykomish	COLLECTION DATE:	3/30/2023 12:05:00 PM
CLIENT SAMPLE ID	S1-BU	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U	100	1	UG/L	04/08/2023	DHM
TPH-Oil Range	NWTPH-DX	U	100	1	UG/L	04/08/2023	DHM

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**94.0**	04/08/2023	DHM

U - Analyte analyzed for but not detected at level above reporting limit.

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CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1100 Olive Way, Suite 800 Seattle, WA 98101	DATE:	4/12/2023
		ALS JOB#:	EV23040003
		ALS SAMPLE#:	EV23040003-31
CLIENT CONTACT:	Kyle Haslam	DATE RECEIVED:	03/31/2023
CLIENT PROJECT:	BNSF Skykomish	COLLECTION DATE:	3/30/2023 3:50:00 PM
CLIENT SAMPLE ID	S4-AU	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U	100	1	UG/L	04/08/2023	DHM
TPH-Oil Range	NWTPH-DX	U	100	1	UG/L	04/08/2023	DHM

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**80.4**	04/08/2023	DHM

U - Analyte analyzed for but not detected at level above reporting limit.

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ALS Group USA, Corp dba ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1100 Olive Way, Suite 800 Seattle, WA 98101	DATE:	4/12/2023
		ALS JOB#:	EV23040003
		ALS SAMPLE#:	EV23040003-32
CLIENT CONTACT:	Kyle Haslam	DATE RECEIVED:	03/31/2023
CLIENT PROJECT:	BNSF Skykomish	COLLECTION DATE:	3/30/2023 12:35:00 PM
CLIENT SAMPLE ID	S1-AU	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U	100	1	UG/L	04/08/2023	DHM
TPH-Oil Range	NWTPH-DX	U	100	1	UG/L	04/08/2023	DHM

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**92.7**	04/08/2023	DHM

U - Analyte analyzed for but not detected at level above reporting limit.

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ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1100 Olive Way, Suite 800 Seattle, WA 98101	DATE:	4/12/2023
		ALS JOB#:	EV23040003
		ALS SAMPLE#:	EV23040003-33
CLIENT CONTACT:	Kyle Haslam	DATE RECEIVED:	03/31/2023
CLIENT PROJECT:	BNSF Skykomish	COLLECTION DATE:	3/30/2023 1:55:00 PM
CLIENT SAMPLE ID	S3-BD	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U	100	1	UG/L	04/08/2023	DHM
TPH-Oil Range	NWTPH-DX	U	100	1	UG/L	04/08/2023	DHM

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**95.3**	04/08/2023	DHM

U - Analyte analyzed for but not detected at level above reporting limit.

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CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1100 Olive Way, Suite 800 Seattle, WA 98101	DATE:	4/12/2023
		ALS JOB#:	EV23040003
		ALS SAMPLE#:	EV23040003-34
CLIENT CONTACT:	Kyle Haslam	DATE RECEIVED:	03/31/2023
CLIENT PROJECT:	BNSF Skykomish	COLLECTION DATE:	3/30/2023 5:00:00 PM
CLIENT SAMPLE ID	S4-CU	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	**130**	100	1	UG/L	04/08/2023	DHM
TPH-Oil Range	NWTPH-DX	U	100	1	UG/L	04/08/2023	DHM

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**93.0**	04/08/2023	DHM

U - Analyte analyzed for but not detected at level above reporting limit.
Chromatogram indicates that it is likely that sample contains an unidentified diesel range product.

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CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1100 Olive Way, Suite 800 Seattle, WA 98101	DATE:	4/12/2023
		ALS JOB#:	EV23040003
		ALS SAMPLE#:	EV23040003-35
CLIENT CONTACT:	Kyle Haslam	DATE RECEIVED:	03/31/2023
CLIENT PROJECT:	BNSF Skykomish	COLLECTION DATE:	3/30/2023 2:48:00 PM
CLIENT SAMPLE ID	S3-CU	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U	100	1	UG/L	04/08/2023	DHM
TPH-Oil Range	NWTPH-DX	U	100	1	UG/L	04/08/2023	DHM

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**90.7**	04/08/2023	DHM

U - Analyte analyzed for but not detected at level above reporting limit.

ADDRESS 8620 Holly Drive, Suite 100, Everett, WA 9820 | PHONE 425-356-2600 | FAX 425-356-2626
ALS Group USA, Corp dba ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1100 Olive Way, Suite 800 Seattle, WA 98101	DATE:	4/12/2023
		ALS JOB#:	EV23040003
		ALS SAMPLE#:	EV23040003-36
CLIENT CONTACT:	Kyle Haslam	DATE RECEIVED:	03/31/2023
CLIENT PROJECT:	BNSF Skykomish	COLLECTION DATE:	3/30/2023 4:30:00 PM
CLIENT SAMPLE ID	S4-BU	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U	100	1	UG/L	04/08/2023	DHM
TPH-Oil Range	NWTPH-DX	U	100	1	UG/L	04/08/2023	DHM

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**93.1**	04/08/2023	DHM

U - Analyte analyzed for but not detected at level above reporting limit.

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ALS Group USA, Corp dba ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1100 Olive Way, Suite 800 Seattle, WA 98101	DATE:	4/12/2023
		ALS JOB#:	EV23040003
		ALS SAMPLE#:	EV23040003-37
CLIENT CONTACT:	Kyle Haslam	DATE RECEIVED:	03/31/2023
CLIENT PROJECT:	BNSF Skykomish	COLLECTION DATE:	3/29/2023
CLIENT SAMPLE ID	DUP-2	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U	100	1	UG/L	04/08/2023	DHM
TPH-Oil Range	NWTPH-DX	**330**	100	1	UG/L	04/08/2023	DHM

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**101**	04/08/2023	DHM

U - Analyte analyzed for but not detected at level above reporting limit.
Chromatogram indicates that it is likely that sample contains weathered lube oil.

ADDRESS 8620 Holly Drive, Suite 100, Everett, WA 9820 | PHONE 425-356-2600 | FAX 425-356-2626
ALS Group USA, Corp dba ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1100 Olive Way, Suite 800 Seattle, WA 98101	DATE:	4/12/2023
		ALS JOB#:	EV23040003
		ALS SAMPLE#:	EV23040003-38
CLIENT CONTACT:	Kyle Haslam	DATE RECEIVED:	03/31/2023
CLIENT PROJECT:	BNSF Skykomish	COLLECTION DATE:	3/29/2023
CLIENT SAMPLE ID	DUP-3	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U	100	1	UG/L	04/08/2023	DHM
TPH-Oil Range	NWTPH-DX	U	100	1	UG/L	04/08/2023	DHM

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**96.9**	04/08/2023	DHM

U - Analyte analyzed for but not detected at level above reporting limit.

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ALS Group USA, Corp dba ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1100 Olive Way, Suite 800 Seattle, WA 98101	DATE:	4/12/2023
		ALS JOB#:	EV23040003
		ALS SAMPLE#:	EV23040003-39
CLIENT CONTACT:	Kyle Haslam	DATE RECEIVED:	03/31/2023
CLIENT PROJECT:	BNSF Skykomish	COLLECTION DATE:	3/30/2023 11:20:00 AM
CLIENT SAMPLE ID	S1-BD	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U	100	1	UG/L	04/08/2023	DHM
TPH-Oil Range	NWTPH-DX	U	100	1	UG/L	04/08/2023	DHM

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**101**	04/08/2023	DHM

U - Analyte analyzed for but not detected at level above reporting limit.

ADDRESS 8620 Holly Drive, Suite 100, Everett, WA 9820 | PHONE 425-356-2600 | FAX 425-356-2626
ALS Group USA, Corp dba ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1100 Olive Way, Suite 800 Seattle, WA 98101	DATE:	4/12/2023
		ALS JOB#:	EV23040003
		ALS SAMPLE#:	EV23040003-40
CLIENT CONTACT:	Kyle Haslam	DATE RECEIVED:	03/31/2023
CLIENT PROJECT:	BNSF Skykomish	COLLECTION DATE:	3/30/2023 9:55:00 AM
CLIENT SAMPLE ID	S2-BU	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	**360**	100	1	UG/L	04/08/2023	DHM
TPH-Oil Range	NWTPH-DX	**110**	100	1	UG/L	04/08/2023	DHM

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**91.4**	04/08/2023	DHM

Chromatogram indicates that it is likely that sample contains highly weathered diesel and an unidentified oil range product.
Oil range product results biased high due to diesel range product overlap.

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ALS Group USA, Corp dba ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1100 Olive Way, Suite 800 Seattle, WA 98101	DATE:	4/12/2023
		ALS JOB#:	EV23040003
		ALS SAMPLE#:	EV23040003-41
CLIENT CONTACT:	Kyle Haslam	DATE RECEIVED:	03/31/2023
CLIENT PROJECT:	BNSF Skykomish	COLLECTION DATE:	3/30/2023 9:07:00 AM
CLIENT SAMPLE ID	S2-BD	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U	100	1	UG/L	04/08/2023	DHM
TPH-Oil Range	NWTPH-DX	U	100	1	UG/L	04/08/2023	DHM

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**94.5**	04/08/2023	DHM

U - Analyte analyzed for but not detected at level above reporting limit.

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CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1100 Olive Way, Suite 800 Seattle, WA 98101	DATE:	4/12/2023
		ALS JOB#:	EV23040003
		ALS SAMPLE#:	EV23040003-42
CLIENT CONTACT:	Kyle Haslam	DATE RECEIVED:	03/31/2023
CLIENT PROJECT:	BNSF Skykomish	COLLECTION DATE:	3/30/2023 1:56:00 PM
CLIENT SAMPLE ID	S3-AU	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	**160**	100	1	UG/L	04/08/2023	DHM
TPH-Oil Range	NWTPH-DX	U	100	1	UG/L	04/08/2023	DHM

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**98.7**	04/08/2023	DHM

U - Analyte analyzed for but not detected at level above reporting limit.
Chromatogram indicates that it is likely that sample contains an unidentified diesel range product.

ADDRESS 8620 Holly Drive, Suite 100, Everett, WA 9820 | PHONE 425-356-2600 | FAX 425-356-2626
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CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1100 Olive Way, Suite 800 Seattle, WA 98101	DATE:	4/12/2023
		ALS JOB#:	EV23040003
		ALS SAMPLE#:	EV23040003-43
CLIENT CONTACT:	Kyle Haslam	DATE RECEIVED:	03/31/2023
CLIENT PROJECT:	BNSF Skykomish	COLLECTION DATE:	3/30/2023 11:26:00 AM
CLIENT SAMPLE ID	S1-AD	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U	100	1	UG/L	04/09/2023	DHM
TPH-Oil Range	NWTPH-DX	U	100	1	UG/L	04/09/2023	DHM

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**100**	04/09/2023	DHM

U - Analyte analyzed for but not detected at level above reporting limit.

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ALS Group USA, Corp dba ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1100 Olive Way, Suite 800 Seattle, WA 98101	DATE:	4/12/2023
		ALS JOB#:	EV23040003
		ALS SAMPLE#:	EV23040003-44
CLIENT CONTACT:	Kyle Haslam	DATE RECEIVED:	03/31/2023
CLIENT PROJECT:	BNSF Skykomish	COLLECTION DATE:	3/30/2023 1:21:00 PM
CLIENT SAMPLE ID	S3-BU	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U	100	1	UG/L	04/09/2023	DHM
TPH-Oil Range	NWTPH-DX	U	100	1	UG/L	04/09/2023	DHM

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**93.0**	04/09/2023	DHM

U - Analyte analyzed for but not detected at level above reporting limit.

ADDRESS 8620 Holly Drive, Suite 100, Everett, WA 9820 | PHONE 425-356-2600 | FAX 425-356-2626
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CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1100 Olive Way, Suite 800 Seattle, WA 98101	DATE:	4/12/2023
		ALS JOB#:	EV23040003
		ALS SAMPLE#:	EV23040003-45
CLIENT CONTACT:	Kyle Haslam	DATE RECEIVED:	03/31/2023
CLIENT PROJECT:	BNSF Skykomish	COLLECTION DATE:	3/30/2023 9:05:00 AM
CLIENT SAMPLE ID	S2-AD	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U	100	1	UG/L	04/09/2023	DHM
TPH-Oil Range	NWTPH-DX	U	100	1	UG/L	04/09/2023	DHM

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**93.8**	04/09/2023	DHM

U - Analyte analyzed for but not detected at level above reporting limit.

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CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1100 Olive Way, Suite 800 Seattle, WA 98101	DATE:	4/12/2023
		ALS JOB#:	EV23040003
		ALS SAMPLE#:	EV23040003-46
CLIENT CONTACT:	Kyle Haslam	DATE RECEIVED:	03/31/2023
CLIENT PROJECT:	BNSF Skykomish	COLLECTION DATE:	3/30/2023 6:18:00 PM
CLIENT SAMPLE ID	2A-W-42	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U	100	1	UG/L	04/09/2023	DHM
TPH-Oil Range	NWTPH-DX	U	100	1	UG/L	04/09/2023	DHM

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**96.9**	04/09/2023	DHM

U - Analyte analyzed for but not detected at level above reporting limit.

ADDRESS 8620 Holly Drive, Suite 100, Everett, WA 9820 | PHONE 425-356-2600 | FAX 425-356-2626
ALS Group USA, Corp dba ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1100 Olive Way, Suite 800 Seattle, WA 98101	DATE:	4/12/2023
		ALS JOB#:	EV23040003
		ALS SAMPLE#:	EV23040003-47
CLIENT CONTACT:	Kyle Haslam	DATE RECEIVED:	03/31/2023
CLIENT PROJECT:	BNSF Skykomish	COLLECTION DATE:	3/30/2023 9:45:00 AM
CLIENT SAMPLE ID	S2-AU	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U	100	1	UG/L	04/09/2023	DHM
TPH-Oil Range	NWTPH-DX	U	100	1	UG/L	04/09/2023	DHM

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**96.1**	04/09/2023	DHM

U - Analyte analyzed for but not detected at level above reporting limit.

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ALS Group USA, Corp dba ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1100 Olive Way, Suite 800 Seattle, WA 98101	DATE:	4/12/2023
		ALS JOB#:	EV23040003
		ALS SAMPLE#:	EV23040003-48
CLIENT CONTACT:	Kyle Haslam	DATE RECEIVED:	03/31/2023
CLIENT PROJECT:	BNSF Skykomish	COLLECTION DATE:	3/30/2023
CLIENT SAMPLE ID	DUP-4	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	**170**	100	1	UG/L	04/09/2023	DHM
TPH-Oil Range	NWTPH-DX	U	100	1	UG/L	04/09/2023	DHM

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**96.7**	04/09/2023	DHM

U - Analyte analyzed for but not detected at level above reporting limit.
Chromatogram indicates that it is likely that sample contains an unidentified diesel range product.

ADDRESS 8620 Holly Drive, Suite 100, Everett, WA 9820 | PHONE 425-356-2600 | FAX 425-356-2626
ALS Group USA, Corp dba ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1100 Olive Way, Suite 800 Seattle, WA 98101	DATE: ALS JOB#: ALS SAMPLE#:	4/12/2023 EV23040003 EV23040003-49
CLIENT CONTACT:	Kyle Haslam	DATE RECEIVED:	03/31/2023
CLIENT PROJECT:	BNSF Skykomish	COLLECTION DATE:	3/30/2023 1:00:00 PM
CLIENT SAMPLE ID	EQUIPMENT BLANK	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U	100	1	UG/L	04/09/2023	DHM
TPH-Oil Range	NWTPH-DX	U	100	1	UG/L	04/09/2023	DHM

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**92.9**	04/09/2023	DHM

U - Analyte analyzed for but not detected at level above reporting limit.

ADDRESS 8620 Holly Drive, Suite 100, Everett, WA 9820 | PHONE 425-356-2600 | FAX 425-356-2626
ALS Group USA, Corp dba ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1100 Olive Way, Suite 800 Seattle, WA 98101	DATE:	4/12/2023
		ALS SDG#:	EV23040003
		WDOE ACCREDITATION:	C601
CLIENT CONTACT:	Kyle Haslam		
CLIENT PROJECT:	BNSF Skykomish		

LABORATORY BLANK RESULTS

MB-040423W - Batch 192046 - Water by NWTPH-DX

ANALYTE	METHOD	RESULTS	UNITS	REPORTING LIMITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U	UG/L	100	04/07/2023	DHM
TPH-Oil Range	NWTPH-DX	U	UG/L	100	04/07/2023	DHM

U - Analyte analyzed for but not detected at level above reporting limit.

MB-040523W - Batch 192064 - Water by NWTPH-DX

ANALYTE	METHOD	RESULTS	UNITS	REPORTING LIMITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U	UG/L	100	04/08/2023	DHM
TPH-Oil Range	NWTPH-DX	U	UG/L	100	04/08/2023	DHM

U - Analyte analyzed for but not detected at level above reporting limit.

MB2-040523W - Batch 192065 - Water by NWTPH-DX

ANALYTE	METHOD	RESULTS	UNITS	REPORTING LIMITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U	UG/L	100	04/08/2023	DHM
TPH-Oil Range	NWTPH-DX	U	UG/L	100	04/08/2023	DHM

U - Analyte analyzed for but not detected at level above reporting limit.

ADDRESS 8620 Holly Drive, Suite 100, Everett, WA 9820 | PHONE 425-356-2600 | FAX 425-356-2626
ALS Group USA, Corp dba ALS Environmental

ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT: Arcadis U.S., Inc.
1100 Olive Way, Suite 800
Seattle, WA 98101

CLIENT CONTACT: Kyle Haslam

CLIENT PROJECT: BNSF Skykomish

DATE: 4/12/2023

ALS SDG#: EV23040003

WDOE ACCREDITATION: C601

LABORATORY CONTROL SAMPLE RESULTS

ALS Test Batch ID: 192046 - Water by NWTPH-DX

SPIKED COMPOUND	METHOD	%REC	RPD	QUAL	LIMITS MIN	LIMITS MAX	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range - BS	NWTPH-DX	**85.9**			67	125	04/07/2023	DHM
TPH-Diesel Range - BSD	NWTPH-DX	**95.0**	**10**		67	125	04/07/2023	DHM

ALS Test Batch ID: 192064 - Water by NWTPH-DX

SPIKED COMPOUND	METHOD	%REC	RPD	QUAL	LIMITS MIN	LIMITS MAX	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range - BS	NWTPH-DX	**119**			67	125	04/08/2023	DHM
TPH-Diesel Range - BSD	NWTPH-DX	**117**	**2**		67	125	04/08/2023	DHM

ALS Test Batch ID: 192065 - Water by NWTPH-DX

SPIKED COMPOUND	METHOD	%REC	RPD	QUAL	LIMITS MIN	LIMITS MAX	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range - BS	NWTPH-DX	**101**			67	125	04/08/2023	DHM
TPH-Diesel Range - BSD	NWTPH-DX	**110**	**8**		67	125	04/05/2023	DHM

ADDRESS 8620 Holly Drive, Suite 100, Everett, WA 9820 | PHONE 425-356-2600 | FAX 425-356-2626
ALS Group USA, Corp dba ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1100 Olive Way, Suite 800 Seattle, WA 98101	DATE:	4/12/2023
		ALS SDG#:	EV23040003
		WDOE ACCREDITATION:	C601
CLIENT CONTACT:	Kyle Haslam		
CLIENT PROJECT:	BNSF Skykomish		

MATRIX SPIKE RESULTS

ALS Test Batch ID: 192064 - Water
Parent Sample: S4-AU

SPIKED COMPOUND	METHOD	%REC	RPD	QUAL	SPIKE ADDED	PARENT SAMPLE RESULT	RESULT	LIMITS MIN	LIMITS MAX	RPD	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range - MS	NWTPH-DX	**102**			500	29.0	510	67	125		04/08/2023	DHM
TPH-Diesel Range - MSD	NWTPH-DX	**101**	**0**		500	29.0	500	67	125	15.2	04/08/2023	DHM

APPROVED BY

Rob Greer
Laboratory Director

ADDRESS 8620 Holly Drive, Suite 100, Everett, WA 9820 | PHONE 425-356-2600 | FAX 425-356-2626
ALS Group USA, Corp dba ALS Environmental

EV2304 0003

Company Name/Addr:
Arcadis - ~~Chevron - WA~~

1100 Olive Way
Suite 800
Seattle. WA 98101

Billing Information:
Attn: Accounts Payable
630 Plaza Dr., Ste. 600
Highlands Ranch, CO 80129

Pres Chk

Report to:
~~James O'Connell/Sydney Clark~~ KYLE HASLAM

Email To: KYLE.HASLAM@ARCADIS.COM
~~Sydney.Clark@arcadis.com;Amanda.Bowring@a~~

Project Description:
~~200410~~ BNSF SKYKOMISH

City/State Collected: SKYKOMISH, WA

Please Circle: PT MT CT ET

Phone: ~~206-325-5254~~ 206 726 4753

Client Project # 30144053
~~30063829.25.21~~ BNSF SKYKOMISH

Lab Project #
~~CHEVARCWA 200410~~

Collected by (print):
~~ELIZABETH~~ SCHELLER

Site/Facility ID #
~~15510 AURORA AVE N~~

P.O. #

Collected by (signature):

Immediately
Packed on Ice N ___ Y X

Rush? (Lab MUST Be Notified)
___ Same Day ___ Five Day
___ Next Day ___ 5 Day (Rad Only)
___ Two Day ___ 10 Day (Rad Only)
___ Three Day

Date Results Needed

Quote #

No. of Cntrs

Analysis / Container / Preservative

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	BTEXM,EDB,EDC 8260D 40mlAmb/MeOH10ml/Syr	NWTPHDX no silica ~~8ozClr-NoPres~~	NWTPHGX 40mlAmb/MeOH10ml/Syr	Total Lead 6010 8ozClr-NoPres						Remarks	Sample # (lab only)
IC-W-8	G	~~GW~~ SS		3-28-23	0945	1		X							1		
S-W-17		GW ~~SS~~			0950	1		X							2		
S-W-16		~~SS~~			1115	1		X							3		
S-W-55		~~SS~~			1610	1		X							4		
IC-W-4		SS			1100	1		X							5		
S-W-56		~~SS~~			1605	1		X							6		
S-W-14		~~SS~~			1240	1		X							7		
S-W-19		~~SS~~			1408	1		X							8		
S-W-18		~~SS~~			~~1510~~	1		X							9		
DUP-1		~~SS~~			—	1		X							10		

Chain of Custody Page 1 of 1

Pace
PEOPLE ADVANCING SCIENCE

MT JULIET, TN

12065 Lebanon Rd Mount Juliet, TN 37122
Submitting a sample via this chain of custody constitutes acknowledgment and acceptance of the Pace Terms and Conditions found at: https://info.pacelabs.com/hubfs/pas-standard-terms.pdf

SDG # EV2304 0003

Table #

Acctnum: ~~CHEVARCWA~~

Template: ~~T220745~~

Prelogin: ~~P967072~~

~~PM: 110 - Brian Ford~~

PB:

Shipped Via:

* Matrix:
SS - Soil **AIR** - Air **F** - Filter
GW - Groundwater **B** - Bioassay
WW - WasteWater
DW - Drinking Water
OT - Other_____

Remarks:
STD TAT

pH _____ Temp _____
Flow _____ Other _____

Samples returned via:
___ UPS ___ FedEx ___ Courier

Tracking #

Sample Receipt Checklist
COC Seal Present/Intact: ___NP ___Y ___N
COC Signed/Accurate: ___Y ___N
Bottles arrive intact: ___Y ___N
Correct bottles used: ___Y ___N
Sufficient volume sent: ___Y ___N
If Applicable
VOA Zero Headspace: ___Y ___N
Preservation Correct/Checked: ___Y ___N
RAD Screen <0.5 mR/hr: ___Y ___N

Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Trip Blank Received: Yes / No HCL / MeoH TBR	If preservation required by Login: Date/Time
	3-31-23	1520	3-31-23 15:20		
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Temp: °C Bottles Received:	
Relinquished by: (Signature)	Date:	Time:	Received for lab by: (Signature)	Date: Time:	Hold: Condition: NCF / OK

EV23040003

Company Name/Address:
Arcadis ~~Chevron - WA~~
1100 Olive Way
Suite 800
Seattle, WA 98101

Billing Information:
Attn: Accounts Payable
630 Plaza Dr., Ste. 600
Highlands Ranch, CO 80129

Pres Chk

Report to: James O'Connell/Sydney Clark

Email To: Sydney.Clark@arcadis.com;Amanda.Bowring@a

Project Description: ~~200410~~

City/State Collected:

Please Circle: PT MT CT ET

Phone: ~~206-325-5254~~

Client Project # ~~30063829.25.21~~ BNSF SKY Kent

Lab Project # ~~CHEVARCWA-200410~~

Collected by (print):

Site/Facility ID # ~~15510 AURORA AVE N~~

P.O. #

Collected by (signature):

Immediately Packed on Ice N____ Y____

Rush? (Lab MUST Be Notified)
____ Same Day ____ Five Day
____ Next Day ____ 5 Day (Rad Only)
____ Two Day ____ 10 Day (Rad Only)
____ Three Day

Quote #

Date Results Needed

Analysis / Container / Preservative

Chain of Custody Page 2 of 6

Pace PEOPLE ADVANCING SCIENCE

MT JULIET, TN
12065 Lebanon Rd Mount Juliet, TN 37122
Submitting a sample via this chain of custody constitutes acknowledgment and acceptance of the Pace Terms and Conditions found at: https://info.pacelabs.com/hubfs/pas-standard-terms.pdf

SDG # EV23040003

Table #

Acctnum: CHEVARCWA
Template: T220745
Prelogin: P967072
PM: 110 - Brian Ford
PB:

Shipped Via:

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	BTEXM,EDB,EDC 8260D 40mlAmb/MeOH10ml/Syr	NWTPHDX no silica ~~6ozClr-NoPres~~	NWTPHGX 40mlAmb/MeOH10ml/Syr	Total Lead 6010 8ozClr-NoPres	NWTPH-Dx W/SGC					Remarks	Sample # (lab only)
EW-2A	G	~~SS~~ GW		3-29-23	1702	1		X							11		
MW-4		~~SS~~			1015	1		X							12		
EW-1		~~SS~~			1220	1		X							13		
5-W-43		~~SS~~			1250	1		X							14		
2-A-W-40		~~SS~~			1445	1		X							15		
GW-1		~~SS~~			1210	1		X							16		
GW-3		~~SS~~			1700	2		X			X				17		
GW-2		~~SS~~			1345	1		X							18		
SW-51		~~SS~~			1300	1		X							19		
IB-W-23	↓	~~SS~~ ↓		↓	1535	1		X							20		

* Matrix:
SS - Soil **AIR** - Air **F** - Filter
GW - Groundwater **B** - Bioassay
WW - WasteWater
DW - Drinking Water
OT - Other_____

Remarks: STD TAT

pH _____ Temp _____

Flow _____ Other _____

Samples returned via:
__ UPS __ FedEx __ Courier _____

Tracking #

Sample Receipt Checklist
COC Seal Present/Intact: __NP __Y __N
COC Signed/Accurate: __Y __N
Bottles arrive intact: __Y __N
Correct bottles used: __Y __N
Sufficient volume sent: __Y __N
If Applicable
VOA Zero Headspace: __Y __N
Preservation Correct/Checked: __Y __N
RAD Screen <0.5 mR/hr: __Y __N

Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Trip Blank Received: Yes / No HCL / MeoH TBR	If preservation required by Login: Date/Time
	3-31-23	1520	3-31-23 17:20		
Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Temp: °C Bottles Received:	
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature)	Date: Time:	Hold: Condition: NCF / OK

EV2304003

Chain of Custody Page 3 of 6

Company Name/Address:
Arcadis - Chevron - WA

1100 Olive Way
Suite 800
Seattle, WA 98101

Billing Information:
Attn: Accounts Payable
630 Plaza Dr., Ste. 600
Highlands Ranch, CO 80129

Pres Chk

Report to:
~~James O'Connell/Sydney Clark~~

Email To:
~~Sydney.Clark@arcadis.com,Amanda.Bowring@a~~

Project Description:
~~208410~~

City/State Collected:

Please Circle: PT MT CT ET

Phone: ~~206-325-5254~~

Client Project #
~~30063829.25.21~~
BNSF SKYKOMISH

Lab Project #
~~CHEVARCWA-200410~~

Collected by (print):

Site/Facility ID #
~~15510 AURORA AVE N~~

P.O. #

Collected by (signature):

Immediately
Packed on Ice N____ Y____

Rush? (Lab MUST Be Notified)
____ Same Day ____ Five Day
____ Next Day ____ 5 Day (Rad Only)
____ Two Day ____ 10 Day (Rad Only)
____ Three Day

Quote #

Date Results Needed

No. of Cntrs

Analysis / Container / Preservative

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	BTEXM,EDB,EDC 8260D 40mlAmb/MeOH10ml/Syr	NWTPHDX no silica 8ozClr-NoPres	NWTPHGX 40mlAmb/MeOH10ml/Syr	Total Lead 6010 8ozClr-NoPres	NWTPHDX SGC				
2A-W-9	G	~~SS~~ GW		3-29-23	1155	1		X							21
1C-W-7		~~SS~~			1410	1		X							22
2A-W-41		~~SS~~			1600	2		X			X				23
GW-4		~~SS~~		3-30-23	1750	1		X							24
S3-CD		~~SS~~			1449	1		X							25
S4-CD		~~SS~~			1655	1		X							26
S4-AD		~~SS~~			1549	1		X							27
S4-BD		~~SS~~			1624	1		X							28
S3-AD		~~SS~~			1316	1		X							29
S1-BU		~~SS~~			1205	1		X							30

Remarks | Sample # (lab only)

* Matrix:
SS - Soil **AIR** - Air **F** - Filter
GW - Groundwater **B** - Bioassay
WW - WasteWater
DW - Drinking Water
OT - Other_____

Remarks: STD TAT

pH _____ Temp _____
Flow _____ Other _____

Samples returned via:
__ UPS __ FedEx __ Courier _____

Tracking #

Sample Receipt Checklist
COC Seal Present/Intact: __NP __Y __N
COC Signed/Accurate: __Y __N
Bottles arrive intact: __Y __N
Correct bottles used: __Y __N
Sufficient volume sent: __Y __N
If Applicable
VOA Zero Headspace: __Y __N
Preservation Correct/Checked: __Y __N
RAD Screen <0.5 mR/hr: __Y __N

Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Trip Blank Received: Yes / No HCL / MeoH TBR
	3-31-23	1520	3-31-23 15:20	
Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Temp: °C Bottles Received:
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature)	Date: Time:

If preservation required by Login: Date/Time

Hold: Condition: NCF / OK

Pace
PEOPLE ADVANCING SCIENCE

MT JULIET, TN
12065 Lebanon Rd Mount Juliet, TN 37122
Submitting a sample via this chain of custody constitutes acknowledgment and acceptance of the Pace Terms and Conditions found at: https://info.pacelabs.com/hubfs/pas-standard-terms.pdf

SDG #

Table #

Acctnum: CHEVARCWA
Template: T220745
Prelogin: P967072
PM: 110 - Brian Ford
PB:

Shipped Via:

EV2304003

Company Name/Address:
Arcadis - Chevron - WA

1100 Olive Way
Suite 800
Seattle, WA 98101

Billing Information:
Attn: Accounts Payable
630 Plaza Dr., Ste. 600
Highlands Ranch, CO 80129

Pres Chk

Report to:
James O'Connell/Sydney Clark

Email To:
Sydney.Clark@arcadis.com;Amanda.Bowring@a

Project Description:
200410

City/State Collected:

Please Circle: PT MT CT ET

Phone: 206-325-5254

Client Project #
30063829.25.21
BNSF SKYKOMISH

Lab Project #
CHEVARCWA-200410

Collected by (print):

Site/Facility ID #
15510 AURORA AVE N

P.O. #

Collected by (signature):

Immediately
Packed on Ice N____ Y____

Rush? (Lab MUST Be Notified)
____ Same Day ____ Five Day
____ Next Day ____ 5 Day (Rad Only)
____ Two Day ____ 10 Day (Rad Only)
____ Three Day

Quote #

Date Results Needed

Analysis / Container / Preservative

Chain of Custody Page 4 of 6

Pace
PEOPLE ADVANCING SCIENCE

MT JULIET, TN
12065 Lebanon Rd Mount Juliet, TN 37122
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SDG #

Table #

Acctnum: CHEVARCWA
Template: T220745
Prelogin: P967072
PM: 110 - Brian Ford
PB:

Shipped Via:

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	BTEXM,EDB,EDC 8260D 40mlAmb/MeOH10ml/Syr	NWTPHDX no silica 8ozClr-NoPres	NWTPHGX 40mlAmb/MeOH10ml/Syr	Total Lead 6010 8ozClr-NoPres						Remarks	Sample # (lab only)
S4-AU	G	GW SS		3-30-23	1550	3		X							31	MS/MSD	
~~MS~~		SS			1550	1		X							32		
~~MSD~~		SS			1550	1		X							33		
S1-AU		SS			1235	1		X							34	32	
S3-BD		SS			1355	1		X							35	33	
S4-CU		SS			1700	1		X							36	34	
S3-CU		SS			1448	1		X							37	35	
S4-BU		SS			1630	1		X							38	36	
DUP-2		SS		3-29-23	—	1		X							39	37	
DUP-3	X	X SS		3-29-23	—	1		X							40	38	

* Matrix:
SS - Soil AIR - Air F - Filter
GW - Groundwater B - Bioassay
WW - WasteWater
DW - Drinking Water
OT - Other_____

Remarks: STD TAT

pH _____ Temp _____
Flow _____ Other _____

Sample Receipt Checklist
COC Seal Present/Intact: __NP __Y __N
COC Signed/Accurate: __Y __N
Bottles arrive intact: __Y __N
Correct bottles used: __Y __N
Sufficient volume sent: __Y __N
If Applicable
VOA Zero Headspace: __Y __N
Preservation Correct/Checked: __Y __N
RAD Screen <0.5 mR/hr: __Y __N

Samples returned via:
__ UPS __ FedEx __ Courier _____

Tracking #

Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Trip Blank Received: Yes / No HCL / MeoH TBR	If preservation required by Login: Date/Time
	3-31-23	1520	3-31-23 15:20		
Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Temp: °C Bottles Received:	
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature)	Date: Time:	Hold: Condition: NCF / OK

EV2304 0003

Company Name/Address:
Arcadis ~~Chevron - WA~~

1100 Olive Way
Suite 800
Seattle. WA 98101

Billing Information:
Attn: Accounts Payable
630 Plaza Dr., Ste. 600
Highlands Ranch, CO 80129

Pres Chk

Report to:
James O'Connell/Sydney Clark

Email To:
Sydney.Clark@arcadis.com;Amanda.Bowring@a

Project Description:
200410

City/State Collected:

Please Circle: PT MT CT ET

Phone: **~~206-325-5254~~**

Client Project #
30063829.25.21
BNSF Skykomish

Lab Project #
~~CHEVARCWA-200410~~

Collected by (print):

Site/Facility ID #
~~15510 AURORA~~ AVE N

P.O. #

Collected by (signature):

Immediately
Packed on Ice N____ Y____

Rush? (Lab MUST Be Notified)
____ Same Day ____ Five Day
____ Next Day ____ 5 Day (Rad Only)
____ Two Day ____ 10 Day (Rad Only)
____ Three Day

Quote #

Date Results Needed

No. of Cntrs

Analysis / Container / Preservative

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	BTEXM,EDB,EDC 8260D 40mlAmb/MeOH10ml/Syr	NWTPHDX no silica ~~8ozCl-NoPres~~	NWTPHGX 40mlAmb/MeOH10ml/Syr	Total Lead 6010 8ozCl-NoPres						Remarks	Sample # (lab only)
~~S1-BU~~	G	~~GW~~ SS		~~3-30-23~~	1205	1		X							~~41~~	NOT RECEIVED	
S1-BD		SS			1120	1		X							~~42~~	39	
S2-BU		~~SS~~			0955	1		X							~~43~~	40	
S2-BD		~~SS~~			0907	1		X							~~44~~	41	
S3-AU		~~SS~~			1356	1		X							~~45~~	42	
S1-AD		~~SS~~			1126	1		X							~~46~~	43	
S3-BU		~~SS~~			1321	1		X							~~47~~	44	
S2-AD		~~SS~~			0905	1		X							~~48~~	45	
2A-W-42		~~SS~~			1818	1		X							~~49~~	46	
S2-AU	↓	~~SS~~		↓	0945	1		X							~~50~~	47	

Chain of Custody Page ~~5~~ 6 of ~~6~~

Pace
PEOPLE ADVANCING SCIENCE

MT JULIET, TN
12065 Lebanon Rd Mount Juliet, TN 37122
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SDG #

Table #

Acctnum: **CHEVARCWA**
Template: **T220745**
Prelogin: **P967072**
PM: **110 - Brian Ford**
PB:

Shipped Via:

* Matrix:
SS - Soil **AIR** - Air **F** - Filter
GW - Groundwater **B** - Bioassay
WW - WasteWater
DW - Drinking Water
OT - Other_____

Remarks:
STD TAT

pH _____ Temp _____
Flow _____ Other _____

Samples returned via:
__ UPS __ FedEx __ Courier _____

Tracking #

Sample Receipt Checklist
COC Seal Present/Intact: __NP __Y __N
COC Signed/Accurate: __Y __N
Bottles arrive intact: __Y __N
Correct bottles used: __Y __N
Sufficient volume sent: __Y __N
If Applicable
VOA Zero Headspace: __Y __N
Preservation Correct/Checked: __Y __N
RAD Screen <0.5 mR/hr: __Y __N

Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Trip Blank Received: Yes / No HCL / MeoH TBR	If preservation required by Login: Date/Time
	3-31-23	1520	3-31-23 15:20		
Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Temp: °C Bottles Received:	
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature)	Date: Time:	Hold: Condition: NCF / OK

EV23040003

Company Name/Address:
Arcadis - ~~Chevron~~ - WA

1100 Olive Way
Suite 800
Seattle, WA 98101

Billing Information:
Attn: Accounts Payable
630 Plaza Dr., Ste. 600
Highlands Ranch, CO 80129

Pres Chk

Report to:
James O'Connell/Sydney Clark

Email To:
~~Sydney.Clark@arcadis.com~~;Amanda.Bowring@a

Project Description:
~~200410~~

City/State Collected:

Please Circle: PT MT CT ET

Phone: ~~206-325-5254~~

Client Project #
~~30063829.25.21~~
BNSF SKYLONTST

Lab Project #
CHEVARCWA-200410

Collected by (print):

Site/Facility ID #
~~15510 AURORA AVE N~~

P.O. #

Collected by (signature):

Immediately Packed on Ice N____ Y____

Rush? (Lab MUST Be Notified)
____ Same Day ____ Five Day
____ Next Day ____ 5 Day (Rad Only)
____ Two Day ____ 10 Day (Rad Only)
____ Three Day

Quote #

Date Results Needed

No. of Cntrs

Analysis / Container / Preservative

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	BTEXM,EDB,EDC 8260D 40mlAmb/MeOH10ml/Syr	NWTPHDX no silica ~~8ozClr-NoPres~~	NWTPHGX 40mlAmb/MeOH10ml/Syr	Total Lead 6010 ~~8ozClr-NoPres~~						
DUP- 4	G	~~GW~~ SS		3-30-23	—	1		X							~~51~~ 48	
EQUIPMENT BLANK	—	~~GW~~ SS		3-30-23	~~1300~~ 1320	1		X							~~52~~ 49	
		SS														
		SS														
		SS														
		SS														
		SS														
		SS														
		SS														
		SS														

* Matrix:
SS - Soil **AIR** - Air **F** - Filter
GW - Groundwater **B** - Bioassay
WW - WasteWater
DW - Drinking Water
OT - Other_____

Remarks: STD TAT

pH _____ Temp _____
Flow _____ Other _____

Samples returned via:
__UPS __FedEx __Courier

Tracking #

Sample Receipt Checklist
COC Seal Present/Intact: __NP __Y __N
COC Signed/Accurate: __Y __N
Bottles arrive intact: __Y __N
Correct bottles used: __Y __N
Sufficient volume sent: __Y __N
If Applicable
VOA Zero Headspace: __Y __N
Preservation Correct/Checked: __Y __N
RAD Screen <0.5 mR/hr: __Y __N

Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Trip Blank Received: Yes / No HCL / MeoH TBR	If preservation required by Login: Date/Time
	3-31-23	1520	3:31-23 15:20		
Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Temp: °C Bottles Received:	
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature)	Date: Time:	Hold: Condition: NCF / OK

Chain of Custody Page 6 of 6

Pace
PEOPLE ADVANCING SCIENCE

MT JULIET, TN
12065 Lebanon Rd Mount Juliet, TN 37122
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SDG #

Table #

Acctnum: **CHEVARCWA**
Template: **T220745**
Prelogin: **P967072**
PM: **110 - Brian Ford**
PB:

Shipped Via:

Remarks | Sample # (lab only)

ALS ENVIRONMENTAL

Sample Receiving Checklist

Client: ARCADIS ALS Job #: EV2304 0003

Project: BNSF SKYKOMISH

Received Date: 3/31/23 Received Time: 15:20 By: BF

Type of shipping container: Cooler ✓ Box ____ Other ____

Shipped via: FedEx Ground ____ UPS ____ Mail ____ Courier ✓ Hand Delivered ✓ On Ice
FedEx Express ____

	Yes	No	N/A
Were custody seals on outside of shipping container?	____	✓	____
If yes, how many? ____ Where? ____			
Custody seal date: ____ Seal name: ____			
Was Chain of Custody properly filled out (ink, signed, dated, etc.)?	✓	____	____
Did all bottles have labels?	✓	____	____
Did all bottle labels and tags agree with Chain of Custody?	✓	____	____
Were samples received within hold time?	✓	____	____
Did all bottles arrive in good condition (unbroken, etc.)?	✓	____	____
Was sufficient amount of sample sent for the tests indicated?	✓	____	____
Was correct preservation added to samples?	____	____	____

If no, Sample Control added preservative to the following:

Sample Number	Reagent	Analyte

Were VOA vials checked for absence of air bubbles?	____	____	✓
Bubbles present in sample #: ____			

Temperature of cooler upon receipt: 6.4°C (Cold) Cool Ambient N/A

Explain any discrepancies: ____

Was client contacted? ____ Who was called? ____ By whom? ____ Date: ____

Outcome of call: ____

October 16, 2023

Ms. Michelle Nguyen
Arcadis U.S., Inc.
1420 - 5th Ave , Unit 2400
Seattle, WA 98101

Dear Ms. Nguyen,

On October 2nd, 46 samples were received by our laboratory and assigned our laboratory project number EV23100004. The project was identified as your BNSF Skykomish PN 30159457.01. The sample identification and requested analyses are outlined on the attached chain of custody record.

No abnormalities or nonconformances were observed during the analyses of the project samples.

Please do not hesitate to call me if you have any questions or if I can be of further assistance.

Sincerely,

ALS Laboratory Group

Rob Greer
Laboratory Director

ADDRESS 8620 Holly Drive, Suite 100, Everett, WA 9820 | PHONE 425-356-2600 | FAX 425-356-2626
ALS Group USA, Corp dba ALS Environmental

ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1420 - 5th Ave , Unit 2400 Seattle, WA 98101	DATE:	10/16/2023
		ALS JOB#:	EV23100004
		ALS SAMPLE#:	EV23100004-01
CLIENT CONTACT:	Michelle Nguyen	DATE RECEIVED:	10/02/2023
CLIENT PROJECT:	BNSF Skykomish PN 30159457.01	COLLECTION DATE:	9/28/2023 2:05:00 PM
CLIENT SAMPLE ID	GW-2_092823	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U	100	1	UG/L	10/09/2023	DHM
CAS: ARC-DRO							
TPH-Oil Range	NWTPH-DX	U	100	1	UG/L	10/09/2023	DHM
CAS: ARC-TPH-ORO							

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**93.8**	10/09/2023	DHM
CAS: 629-99-2				

U - Analyte analyzed for but not detected at level above reporting limit.

ADDRESS 8620 Holly Drive, Suite 100, Everett, WA 9820 | PHONE 425-356-2600 | FAX 425-356-2626
ALS Group USA, Corp dba ALS Environmental

ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1420 - 5th Ave , Unit 2400 Seattle, WA 98101	DATE: ALS JOB#: ALS SAMPLE#:	10/16/2023 EV23100004 EV23100004-02
CLIENT CONTACT:	Michelle Nguyen	DATE RECEIVED:	10/02/2023
CLIENT PROJECT:	BNSF Skykomish PN 30159457.01	COLLECTION DATE:	9/27/2023 5:55:00 PM
CLIENT SAMPLE ID	GW-3_092723	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	**250**	100	1	UG/L	10/09/2023	DHM
CAS: ARC-DRO							
TPH-Diesel Range	NWTPH-DX w/ SGA	**110**	100	1	UG/L	10/16/2023	DHM
CAS: ARC-DRO							
TPH-Oil Range	NWTPH-DX	U	100	1	UG/L	10/09/2023	DHM
CAS: ARC-TPH-ORO							
TPH-Oil Range	NWTPH-DX w/ SGA	U	100	1	UG/L	10/16/2023	DHM
CAS: ARC-TPH-ORO							

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**90.4**	10/09/2023	DHM
CAS: 629-99-2				
C25	NWTPH-DX w/ SGA	**101**	10/16/2023	DHM
CAS: 629-99-2				

U - Analyte analyzed for but not detected at level above reporting limit.
Chromatogram indicates that it is likely that sample contains highly weathered diesel.

ADDRESS 8620 Holly Drive, Suite 100, Everett, WA 9820 | PHONE 425-356-2600 | FAX 425-356-2626
ALS Group USA, Corp dba ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1420 - 5th Ave , Unit 2400 Seattle, WA 98101	DATE: ALS JOB#: ALS SAMPLE#:	10/16/2023 EV23100004 EV23100004-03
CLIENT CONTACT:	Michelle Nguyen	DATE RECEIVED:	10/02/2023
CLIENT PROJECT:	BNSF Skykomish PN 30159457.01	COLLECTION DATE:	9/27/2023 12:30:00 PM
CLIENT SAMPLE ID	GW-4_092723	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	**130**	100	1	UG/L	10/09/2023	DHM
CAS: ARC-DRO							
TPH-Oil Range	NWTPH-DX	**690**	100	1	UG/L	10/09/2023	DHM
CAS: ARC-TPH-ORO							

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**93.8**	10/09/2023	DHM
CAS: 629-99-2				

Chromatogram indicates that it is likely that sample contains an unidentified diesel range product and an unidentified oil range product.

ADDRESS 8620 Holly Drive, Suite 100, Everett, WA 9820 | PHONE 425-356-2600 | FAX 425-356-2626
ALS Group USA, Corp dba ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1420 - 5th Ave , Unit 2400 Seattle, WA 98101	DATE:	10/16/2023
		ALS JOB#:	EV23100004
		ALS SAMPLE#:	EV23100004-04
CLIENT CONTACT:	Michelle Nguyen	DATE RECEIVED:	10/02/2023
CLIENT PROJECT:	BNSF Skykomish PN 30159457.01	COLLECTION DATE:	9/28/2023 4:42:00 PM
CLIENT SAMPLE ID	EW-1_092823	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U	100	1	UG/L	10/09/2023	DHM
CAS: ARC-DRO							
TPH-Oil Range	NWTPH-DX	U	100	1	UG/L	10/09/2023	DHM
CAS: ARC-TPH-ORO							

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**95.0**	10/09/2023	DHM
CAS: 629-99-2				

U - Analyte analyzed for but not detected at level above reporting limit.

ADDRESS 8620 Holly Drive, Suite 100, Everett, WA 9820 | PHONE 425-356-2600 | FAX 425-356-2626
ALS Group USA, Corp dba ALS Environmental

ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1420 - 5th Ave , Unit 2400 Seattle, WA 98101	DATE: ALS JOB#: ALS SAMPLE#:	10/16/2023 EV23100004 EV23100004-05
CLIENT CONTACT:	Michelle Nguyen	DATE RECEIVED:	10/02/2023
CLIENT PROJECT:	BNSF Skykomish PN 30159457.01	COLLECTION DATE:	9/27/2023 1:50:00 PM
CLIENT SAMPLE ID	EW-2A_092723	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U	100	1	UG/L	10/09/2023	DHM
CAS: ARC-DRO							
TPH-Oil Range	NWTPH-DX	**250**	100	1	UG/L	10/09/2023	DHM
CAS: ARC-TPH-ORO							

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**115**	10/09/2023	DHM
CAS: 629-99-2				

U - Analyte analyzed for but not detected at level above reporting limit.
Chromatogram indicates that it is likely that sample contains an unidentified oil range product.

ADDRESS 8620 Holly Drive, Suite 100, Everett, WA 9820 | PHONE 425-356-2600 | FAX 425-356-2626
ALS Group USA, Corp dba ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1420 - 5th Ave , Unit 2400 Seattle, WA 98101	DATE: ALS JOB#: ALS SAMPLE#:	10/16/2023 EV23100004 EV23100004-06
CLIENT CONTACT:	Michelle Nguyen	DATE RECEIVED:	10/02/2023
CLIENT PROJECT:	BNSF Skykomish PN 30159457.01	COLLECTION DATE:	9/28/2023 5:25:00 PM
CLIENT SAMPLE ID	S1-AD_092823	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U	100	1	UG/L	10/09/2023	DHM
CAS: ARC-DRO							
TPH-Oil Range	NWTPH-DX	U	100	1	UG/L	10/09/2023	DHM
CAS: ARC-TPH-ORO							

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**93.0**	10/09/2023	DHM
CAS: 629-99-2				

U - Analyte analyzed for but not detected at level above reporting limit.

ADDRESS 8620 Holly Drive, Suite 100, Everett, WA 9820 | PHONE 425-356-2600 | FAX 425-356-2626
ALS Group USA, Corp dba ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1420 - 5th Ave , Unit 2400 Seattle, WA 98101	DATE: ALS JOB#: ALS SAMPLE#:	10/16/2023 EV23100004 EV23100004-07
CLIENT CONTACT:	Michelle Nguyen	DATE RECEIVED:	10/02/2023
CLIENT PROJECT:	BNSF Skykomish PN 30159457.01	COLLECTION DATE:	9/28/2023 5:25:00 PM
CLIENT SAMPLE ID	S1-AU_092823	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U	100	1	UG/L	10/09/2023	DHM
CAS: ARC-DRO							
TPH-Oil Range	NWTPH-DX	U	100	1	UG/L	10/09/2023	DHM
CAS: ARC-TPH-ORO							

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**82.6**	10/09/2023	DHM
CAS: 629-99-2				

U - Analyte analyzed for but not detected at level above reporting limit.

ADDRESS 8620 Holly Drive, Suite 100, Everett, WA 9820 | PHONE 425-356-2600 | FAX 425-356-2626
ALS Group USA, Corp dba ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1420 - 5th Ave , Unit 2400 Seattle, WA 98101	DATE:	10/16/2023
		ALS JOB#:	EV23100004
		ALS SAMPLE#:	EV23100004-08
CLIENT CONTACT:	Michelle Nguyen	DATE RECEIVED:	10/02/2023
CLIENT PROJECT:	BNSF Skykomish PN 30159457.01	COLLECTION DATE:	9/28/2023 5:50:00 PM
CLIENT SAMPLE ID	S1-BD_092823	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U	100	1	UG/L	10/09/2023	DHM
CAS: ARC-DRO							
TPH-Oil Range	NWTPH-DX	U	100	1	UG/L	10/09/2023	DHM
CAS: ARC-TPH-ORO							

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**93.3**	10/09/2023	DHM
CAS: 629-99-2				

U - Analyte analyzed for but not detected at level above reporting limit.

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ALS Group USA, Corp dba ALS Environmental

ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1420 - 5th Ave , Unit 2400 Seattle, WA 98101	DATE: ALS JOB#: ALS SAMPLE#:	10/16/2023 EV23100004 EV23100004-09
CLIENT CONTACT:	Michelle Nguyen	DATE RECEIVED:	10/02/2023
CLIENT PROJECT:	BNSF Skykomish PN 30159457.01	COLLECTION DATE:	9/28/2023 5:55:00 PM
CLIENT SAMPLE ID	S1-BU_092823	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U	100	1	UG/L	10/09/2023	DHM
CAS: ARC-DRO							
TPH-Oil Range	NWTPH-DX	U	100	1	UG/L	10/09/2023	DHM
CAS: ARC-TPH-ORO							

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**86.3**	10/09/2023	DHM
CAS: 629-99-2				

U - Analyte analyzed for but not detected at level above reporting limit.

ADDRESS 8620 Holly Drive, Suite 100, Everett, WA 9820 | PHONE 425-356-2600 | FAX 425-356-2626
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CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1420 - 5th Ave , Unit 2400 Seattle, WA 98101	DATE: ALS JOB#: ALS SAMPLE#:	10/16/2023 EV23100004 EV23100004-10
CLIENT CONTACT:	Michelle Nguyen	DATE RECEIVED:	10/02/2023
CLIENT PROJECT:	BNSF Skykomish PN 30159457.01	COLLECTION DATE:	9/29/2023 3:42:00 PM
CLIENT SAMPLE ID	S2-AD_092923	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U	100	1	UG/L	10/09/2023	DHM
CAS: ARC-DRO							
TPH-Oil Range	NWTPH-DX	U	100	1	UG/L	10/09/2023	DHM
CAS: ARC-TPH-ORO							

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**96.9**	10/09/2023	DHM
CAS: 629-99-2				

U - Analyte analyzed for but not detected at level above reporting limit.

ADDRESS 8620 Holly Drive, Suite 100, Everett, WA 9820 | PHONE 425-356-2600 | FAX 425-356-2626
ALS Group USA, Corp dba ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1420 - 5th Ave , Unit 2400 Seattle, WA 98101	DATE: ALS JOB#: ALS SAMPLE#:	10/16/2023 EV23100004 EV23100004-11
CLIENT CONTACT:	Michelle Nguyen	DATE RECEIVED:	10/02/2023
CLIENT PROJECT:	BNSF Skykomish PN 30159457.01	COLLECTION DATE:	9/29/2023 3:18:00 PM
CLIENT SAMPLE ID	S2-AU_092923	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U	100	1	UG/L	10/09/2023	DHM
CAS: ARC-DRO							
TPH-Oil Range	NWTPH-DX	U	100	1	UG/L	10/09/2023	DHM
CAS: ARC-TPH-ORO							

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**94.5**	10/09/2023	DHM
CAS: 629-99-2				

U - Analyte analyzed for but not detected at level above reporting limit.

ADDRESS 8620 Holly Drive, Suite 100, Everett, WA 9820 | PHONE 425-356-2600 | FAX 425-356-2626
ALS Group USA, Corp dba ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1420 - 5th Ave , Unit 2400 Seattle, WA 98101	DATE: ALS JOB#: ALS SAMPLE#:	10/16/2023 EV23100004 EV23100004-12
CLIENT CONTACT:	Michelle Nguyen	DATE RECEIVED:	10/02/2023
CLIENT PROJECT:	BNSF Skykomish PN 30159457.01	COLLECTION DATE:	9/29/2023 12:42:00 PM
CLIENT SAMPLE ID	S2-BD_092923	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U	100	1	UG/L	10/09/2023	DHM
CAS: ARC-DRO							
TPH-Oil Range	NWTPH-DX	**140**	100	1	UG/L	10/09/2023	DHM
CAS: ARC-TPH-ORO							

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**93.7**	10/09/2023	DHM
CAS: 629-99-2				

U - Analyte analyzed for but not detected at level above reporting limit.
Chromatogram indicates that it is likely that sample contains an unidentified oil range product.

ADDRESS 8620 Holly Drive, Suite 100, Everett, WA 9820 | PHONE 425-356-2600 | FAX 425-356-2626
ALS Group USA, Corp dba ALS Environmental

ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1420 - 5th Ave , Unit 2400 Seattle, WA 98101	DATE: ALS JOB#: ALS SAMPLE#:	10/16/2023 EV23100004 EV23100004-13
CLIENT CONTACT:	Michelle Nguyen	DATE RECEIVED:	10/02/2023
CLIENT PROJECT:	BNSF Skykomish PN 30159457.01	COLLECTION DATE:	9/29/2023 12:03:00 PM
CLIENT SAMPLE ID	S2-BU_092923 MS/MSD	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	**1000**	100	1	UG/L	10/09/2023	DHM
CAS: ARC-DRO							
TPH-Oil Range	NWTPH-DX	**200**	100	1	UG/L	10/09/2023	DHM
CAS: ARC-TPH-ORO							

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**97.6**	10/09/2023	DHM
CAS: 629-99-2				

Chromatogram indicates that it is likely that sample contains weathered diesel and an unidentified oil range product.
Oil range product results biased high due to diesel range product overlap.

ADDRESS 8620 Holly Drive, Suite 100, Everett, WA 9820 | PHONE 425-356-2600 | FAX 425-356-2626
ALS Group USA, Corp dba ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1420 - 5th Ave , Unit 2400 Seattle, WA 98101	DATE: ALS JOB#: ALS SAMPLE#:	10/16/2023 EV23100004 EV23100004-14
CLIENT CONTACT:	Michelle Nguyen	DATE RECEIVED:	10/02/2023
CLIENT PROJECT:	BNSF Skykomish PN 30159457.01	COLLECTION DATE:	9/27/2023 4:51:00 PM
CLIENT SAMPLE ID	S3-AD_092723	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U	100	1	UG/L	10/09/2023	DHM
CAS: ARC-DRO							
TPH-Oil Range	NWTPH-DX	U	100	1	UG/L	10/09/2023	DHM
CAS: ARC-TPH-ORO							

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**92.8**	10/09/2023	DHM
CAS: 629-99-2				

U - Analyte analyzed for but not detected at level above reporting limit.

ADDRESS 8620 Holly Drive, Suite 100, Everett, WA 9820 | PHONE 425-356-2600 | FAX 425-356-2626
ALS Group USA, Corp dba ALS Environmental

ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1420 - 5th Ave , Unit 2400 Seattle, WA 98101	DATE: ALS JOB#: ALS SAMPLE#:	10/16/2023 EV23100004 EV23100004-15
CLIENT CONTACT:	Michelle Nguyen	DATE RECEIVED:	10/02/2023
CLIENT PROJECT:	BNSF Skykomish PN 30159457.01	COLLECTION DATE:	9/27/2023 4:26:00 PM
CLIENT SAMPLE ID	S3-AU_092723	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U	100	1	UG/L	10/09/2023	DHM
CAS: ARC-DRO							
TPH-Oil Range	NWTPH-DX	U	100	1	UG/L	10/09/2023	DHM
CAS: ARC-TPH-ORO							

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**95.0**	10/09/2023	DHM
CAS: 629-99-2				

U - Analyte analyzed for but not detected at level above reporting limit.

ADDRESS 8620 Holly Drive, Suite 100, Everett, WA 9820 | PHONE 425-356-2600 | FAX 425-356-2626
ALS Group USA, Corp dba ALS Environmental

ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1420 - 5th Ave , Unit 2400 Seattle, WA 98101	DATE:	10/16/2023
		ALS JOB#:	EV23100004
		ALS SAMPLE#:	EV23100004-16
CLIENT CONTACT:	Michelle Nguyen	DATE RECEIVED:	10/02/2023
CLIENT PROJECT:	BNSF Skykomish PN 30159457.01	COLLECTION DATE:	9/28/2023 9:30:00 AM
CLIENT SAMPLE ID	S3-BD_092823	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U	100	1	UG/L	10/09/2023	DHM
CAS: ARC-DRO							
TPH-Oil Range	NWTPH-DX	U	100	1	UG/L	10/09/2023	DHM
CAS: ARC-TPH-ORO							

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**91.7**	10/09/2023	DHM
CAS: 629-99-2				

U - Analyte analyzed for but not detected at level above reporting limit.

ADDRESS 8620 Holly Drive, Suite 100, Everett, WA 9820 | PHONE 425-356-2600 | FAX 425-356-2626
ALS Group USA, Corp dba ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1420 - 5th Ave , Unit 2400 Seattle, WA 98101	DATE: ALS JOB#: ALS SAMPLE#:	10/16/2023 EV23100004 EV23100004-17
CLIENT CONTACT:	Michelle Nguyen	DATE RECEIVED:	10/02/2023
CLIENT PROJECT:	BNSF Skykomish PN 30159457.01	COLLECTION DATE:	9/28/2023 10:45:00 AM
CLIENT SAMPLE ID	S3-BU_092823	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U	100	1	UG/L	10/09/2023	DHM
CAS: ARC-DRO							
TPH-Oil Range	NWTPH-DX	U	100	1	UG/L	10/09/2023	DHM
CAS: ARC-TPH-ORO							

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**97.7**	10/09/2023	DHM
CAS: 629-99-2				

U - Analyte analyzed for but not detected at level above reporting limit.

ADDRESS 8620 Holly Drive, Suite 100, Everett, WA 9820 | PHONE 425-356-2600 | FAX 425-356-2626
ALS Group USA, Corp dba ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1420 - 5th Ave , Unit 2400 Seattle, WA 98101	DATE: ALS JOB#: ALS SAMPLE#:	10/16/2023 EV23100004 EV23100004-18
CLIENT CONTACT:	Michelle Nguyen	DATE RECEIVED:	10/02/2023
CLIENT PROJECT:	BNSF Skykomish PN 30159457.01	COLLECTION DATE:	9/27/2023 3:55:00 PM
CLIENT SAMPLE ID	S3-CD_092723	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U	100	1	UG/L	10/09/2023	DHM
CAS: ARC-DRO							
TPH-Oil Range	NWTPH-DX	U	100	1	UG/L	10/09/2023	DHM
CAS: ARC-TPH-ORO							

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**100**	10/09/2023	DHM
CAS: 629-99-2				

U - Analyte analyzed for but not detected at level above reporting limit.

ADDRESS 8620 Holly Drive, Suite 100, Everett, WA 9820 | PHONE 425-356-2600 | FAX 425-356-2626
ALS Group USA, Corp dba ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1420 - 5th Ave , Unit 2400 Seattle, WA 98101	DATE: ALS JOB#: ALS SAMPLE#:	10/16/2023 EV23100004 EV23100004-19
CLIENT CONTACT:	Michelle Nguyen	DATE RECEIVED:	10/02/2023
CLIENT PROJECT:	BNSF Skykomish PN 30159457.01	COLLECTION DATE:	9/27/2023 4:25:00 PM
CLIENT SAMPLE ID	S3-CU_092723 MS/MD	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U	100	1	UG/L	10/09/2023	DHM
CAS: ARC-DRO							
TPH-Oil Range	NWTPH-DX	U	100	1	UG/L	10/09/2023	DHM
CAS: ARC-TPH-ORO							

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**95.1**	10/09/2023	DHM
CAS: 629-99-2				

U - Analyte analyzed for but not detected at level above reporting limit.

ADDRESS 8620 Holly Drive, Suite 100, Everett, WA 9820 | PHONE 425-356-2600 | FAX 425-356-2626
ALS Group USA, Corp dba ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1420 - 5th Ave , Unit 2400 Seattle, WA 98101	DATE: ALS JOB#: ALS SAMPLE#:	10/16/2023 EV23100004 EV23100004-20
CLIENT CONTACT:	Michelle Nguyen	DATE RECEIVED:	10/02/2023
CLIENT PROJECT:	BNSF Skykomish PN 30159457.01	COLLECTION DATE:	9/27/2023 9:28:00 AM
CLIENT SAMPLE ID	S4-AD_092723	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U	100	1	UG/L	10/09/2023	DHM
CAS: ARC-DRO							
TPH-Oil Range	NWTPH-DX	U	100	1	UG/L	10/09/2023	DHM
CAS: ARC-TPH-ORO							

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**100**	10/09/2023	DHM
CAS: 629-99-2				

U - Analyte analyzed for but not detected at level above reporting limit.

ADDRESS 8620 Holly Drive, Suite 100, Everett, WA 9820 | PHONE 425-356-2600 | FAX 425-356-2626
ALS Group USA, Corp dba ALS Environmental

ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1420 - 5th Ave , Unit 2400 Seattle, WA 98101	DATE: ALS JOB#: ALS SAMPLE#:	10/16/2023 EV23100004 EV23100004-21
CLIENT CONTACT:	Michelle Nguyen	DATE RECEIVED:	10/02/2023
CLIENT PROJECT:	BNSF Skykomish PN 30159457.01	COLLECTION DATE:	9/27/2023 10:24:00 AM
CLIENT SAMPLE ID	S4-AU_092723	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U	100	1	UG/L	10/09/2023	DHM
CAS: ARC-DRO							
TPH-Oil Range	NWTPH-DX	U	100	1	UG/L	10/09/2023	DHM
CAS: ARC-TPH-ORO							

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**95.9**	10/09/2023	DHM
CAS: 629-99-2				

U - Analyte analyzed for but not detected at level above reporting limit.

ADDRESS 8620 Holly Drive, Suite 100, Everett, WA 9820 | PHONE 425-356-2600 | FAX 425-356-2626
ALS Group USA, Corp dba ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1420 - 5th Ave , Unit 2400 Seattle, WA 98101	DATE: ALS JOB#: ALS SAMPLE#:	10/16/2023 EV23100004 EV23100004-22
CLIENT CONTACT:	Michelle Nguyen	DATE RECEIVED:	10/02/2023
CLIENT PROJECT:	BNSF Skykomish PN 30159457.01	COLLECTION DATE:	9/27/2023 11:37:00 AM
CLIENT SAMPLE ID	S4-BD_092723	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U	100	1	UG/L	10/09/2023	DHM
CAS: ARC-DRO							
TPH-Oil Range	NWTPH-DX	U	100	1	UG/L	10/09/2023	DHM
CAS: ARC-TPH-ORO							

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**101**	10/09/2023	DHM
CAS: 629-99-2				

U - Analyte analyzed for but not detected at level above reporting limit.

ADDRESS 8620 Holly Drive, Suite 100, Everett, WA 9820 | PHONE 425-356-2600 | FAX 425-356-2626
ALS Group USA, Corp dba ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1420 - 5th Ave , Unit 2400 Seattle, WA 98101	DATE: ALS JOB#: ALS SAMPLE#:	10/16/2023 EV23100004 EV23100004-23
CLIENT CONTACT:	Michelle Nguyen	DATE RECEIVED:	10/02/2023
CLIENT PROJECT:	BNSF Skykomish PN 30159457.01	COLLECTION DATE:	9/27/2023 1:10:00 PM
CLIENT SAMPLE ID	S4-BU_092723	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U	100	1	UG/L	10/09/2023	DHM
CAS: ARC-DRO							
TPH-Oil Range	NWTPH-DX	U	100	1	UG/L	10/09/2023	DHM
CAS: ARC-TPH-ORO							

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**97.2**	10/09/2023	DHM
CAS: 629-99-2				

U - Analyte analyzed for but not detected at level above reporting limit.

ADDRESS 8620 Holly Drive, Suite 100, Everett, WA 9820 | PHONE 425-356-2600 | FAX 425-356-2626
ALS Group USA, Corp dba ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1420 - 5th Ave , Unit 2400 Seattle, WA 98101	DATE: ALS JOB#: ALS SAMPLE#:	10/16/2023 EV23100004 EV23100004-24
CLIENT CONTACT:	Michelle Nguyen	DATE RECEIVED:	10/02/2023
CLIENT PROJECT:	BNSF Skykomish PN 30159457.01	COLLECTION DATE:	9/27/2023 9:35:00 AM
CLIENT SAMPLE ID	S4-CD_092723	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U	100	1	UG/L	10/09/2023	DHM
CAS: ARC-DRO							
TPH-Oil Range	NWTPH-DX	U	100	1	UG/L	10/09/2023	DHM
CAS: ARC-TPH-ORO							

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**105**	10/09/2023	DHM
CAS: 629-99-2				

U - Analyte analyzed for but not detected at level above reporting limit.

ADDRESS 8620 Holly Drive, Suite 100, Everett, WA 9820 | PHONE 425-356-2600 | FAX 425-356-2626
ALS Group USA, Corp dba ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1420 - 5th Ave , Unit 2400 Seattle, WA 98101	DATE: ALS JOB#: ALS SAMPLE#:	10/16/2023 EV23100004 EV23100004-25
CLIENT CONTACT:	Michelle Nguyen	DATE RECEIVED:	10/02/2023
CLIENT PROJECT:	BNSF Skykomish PN 30159457.01	COLLECTION DATE:	9/27/2023 10:30:00 AM
CLIENT SAMPLE ID	S4-CU_092723	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U	100	1	UG/L	10/09/2023	DHM
CAS: ARC-DRO							
TPH-Oil Range	NWTPH-DX	U	100	1	UG/L	10/09/2023	DHM
CAS: ARC-TPH-ORO							

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**95.1**	10/09/2023	DHM
CAS: 629-99-2				

U - Analyte analyzed for but not detected at level above reporting limit.

ADDRESS 8620 Holly Drive, Suite 100, Everett, WA 9820 | PHONE 425-356-2600 | FAX 425-356-2626
ALS Group USA, Corp dba ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1420 - 5th Ave , Unit 2400 Seattle, WA 98101	DATE: ALS JOB#: ALS SAMPLE#:	10/16/2023 EV23100004 EV23100004-26
CLIENT CONTACT:	Michelle Nguyen	DATE RECEIVED:	10/02/2023
CLIENT PROJECT:	BNSF Skykomish PN 30159457.01	COLLECTION DATE:	9/26/2023 3:08:00 PM
CLIENT SAMPLE ID	5-W-14_092623	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U	100	1	UG/L	10/10/2023	DHM
CAS: ARC-DRO							
TPH-Oil Range	NWTPH-DX	U	100	1	UG/L	10/10/2023	DHM
CAS: ARC-TPH-ORO							

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**98.4**	10/10/2023	DHM
CAS: 629-99-2				

U - Analyte analyzed for but not detected at level above reporting limit.

ADDRESS 8620 Holly Drive, Suite 100, Everett, WA 9820 | PHONE 425-356-2600 | FAX 425-356-2626
ALS Group USA, Corp dba ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1420 - 5th Ave , Unit 2400 Seattle, WA 98101	DATE: ALS JOB#: ALS SAMPLE#:	10/16/2023 EV23100004 EV23100004-27
CLIENT CONTACT:	Michelle Nguyen	DATE RECEIVED:	10/02/2023
CLIENT PROJECT:	BNSF Skykomish PN 30159457.01	COLLECTION DATE:	9/26/2023 5:00:00 PM
CLIENT SAMPLE ID	5-W-16_092623	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U	100	1	UG/L	10/10/2023	DHM
CAS: ARC-DRO							
TPH-Oil Range	NWTPH-DX	U	100	1	UG/L	10/10/2023	DHM
CAS: ARC-TPH-ORO							

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**100**	10/10/2023	DHM
CAS: 629-99-2				

U - Analyte analyzed for but not detected at level above reporting limit.

ADDRESS 8620 Holly Drive, Suite 100, Everett, WA 9820 | PHONE 425-356-2600 | FAX 425-356-2626
ALS Group USA, Corp dba ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1420 - 5th Ave , Unit 2400 Seattle, WA 98101	DATE: ALS JOB#: ALS SAMPLE#:	10/16/2023 EV23100004 EV23100004-28
CLIENT CONTACT:	Michelle Nguyen	DATE RECEIVED:	10/02/2023
CLIENT PROJECT:	BNSF Skykomish PN 30159457.01	COLLECTION DATE:	9/29/2023 11:10:00 AM
CLIENT SAMPLE ID	5-W-17_092923	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U	100	1	UG/L	10/10/2023	DHM
CAS: ARC-DRO							
TPH-Oil Range	NWTPH-DX	U	100	1	UG/L	10/10/2023	DHM
CAS: ARC-TPH-ORO							

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**98.0**	10/10/2023	DHM
CAS: 629-99-2				

U - Analyte analyzed for but not detected at level above reporting limit.

ADDRESS 8620 Holly Drive, Suite 100, Everett, WA 9820 | PHONE 425-356-2600 | FAX 425-356-2626
ALS Group USA, Corp dba ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1420 - 5th Ave , Unit 2400 Seattle, WA 98101	DATE: ALS JOB#: ALS SAMPLE#:	10/16/2023 EV23100004 EV23100004-29
CLIENT CONTACT:	Michelle Nguyen	DATE RECEIVED:	10/02/2023
CLIENT PROJECT:	BNSF Skykomish PN 30159457.01	COLLECTION DATE:	9/29/2023 11:55:00 AM
CLIENT SAMPLE ID	5-W-18_092923	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U	100	1	UG/L	10/10/2023	DHM
CAS: ARC-DRO							
TPH-Oil Range	NWTPH-DX	U	100	1	UG/L	10/10/2023	DHM
CAS: ARC-TPH-ORO							

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**103**	10/10/2023	DHM
CAS: 629-99-2				

U - Analyte analyzed for but not detected at level above reporting limit.

ADDRESS 8620 Holly Drive, Suite 100, Everett, WA 9820 | PHONE 425-356-2600 | FAX 425-356-2626
ALS Group USA, Corp dba ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1420 - 5th Ave , Unit 2400 Seattle, WA 98101	DATE: ALS JOB#: ALS SAMPLE#:	10/16/2023 EV23100004 EV23100004-30
CLIENT CONTACT:	Michelle Nguyen	DATE RECEIVED:	10/02/2023
CLIENT PROJECT:	BNSF Skykomish PN 30159457.01	COLLECTION DATE:	9/29/2023 12:40:00 PM
CLIENT SAMPLE ID	5-W-19_092923	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U	100	1	UG/L	10/10/2023	DHM
CAS: ARC-DRO							
TPH-Oil Range	NWTPH-DX	U	100	1	UG/L	10/10/2023	DHM
CAS: ARC-TPH-ORO							

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**97.0**	10/10/2023	DHM
CAS: 629-99-2				

U - Analyte analyzed for but not detected at level above reporting limit.

ADDRESS 8620 Holly Drive, Suite 100, Everett, WA 9820 | PHONE 425-356-2600 | FAX 425-356-2626
ALS Group USA, Corp dba ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1420 - 5th Ave , Unit 2400 Seattle, WA 98101	DATE: ALS JOB#: ALS SAMPLE#:	10/16/2023 EV23100004 EV23100004-31
CLIENT CONTACT:	Michelle Nguyen	DATE RECEIVED:	10/02/2023
CLIENT PROJECT:	BNSF Skykomish PN 30159457.01	COLLECTION DATE:	9/29/2023 10:30:00 AM
CLIENT SAMPLE ID	5-W-51_092923	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	**530**	100	1	UG/L	10/10/2023	DHM
CAS: ARC-DRO							
TPH-Oil Range	NWTPH-DX	**220**	100	1	UG/L	10/10/2023	DHM
CAS: ARC-TPH-ORO							

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**98.6**	10/10/2023	DHM
CAS: 629-99-2				

Chromatogram indicates that it is likely that sample contains highly weathered diesel and an unidentified oil range product.
Oil range product results biased high due to diesel range product overlap.

ADDRESS 8620 Holly Drive, Suite 100, Everett, WA 9820 | PHONE 425-356-2600 | FAX 425-356-2626
ALS Group USA, Corp dba ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1420 - 5th Ave , Unit 2400 Seattle, WA 98101	DATE:	10/16/2023
		ALS JOB#:	EV23100004
		ALS SAMPLE#:	EV23100004-32
CLIENT CONTACT:	Michelle Nguyen	DATE RECEIVED:	10/02/2023
CLIENT PROJECT:	BNSF Skykomish PN 30159457.01	COLLECTION DATE:	9/28/2023 3:50:00 PM
CLIENT SAMPLE ID	5-W-55_092823	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U	100	1	UG/L	10/10/2023	DHM
CAS: ARC-DRO							
TPH-Oil Range	NWTPH-DX	U	100	1	UG/L	10/10/2023	DHM
CAS: ARC-TPH-ORO							

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**97.1**	10/10/2023	DHM
CAS: 629-99-2				

U - Analyte analyzed for but not detected at level above reporting limit.

ADDRESS 8620 Holly Drive, Suite 100, Everett, WA 9820 | PHONE 425-356-2600 | FAX 425-356-2626
ALS Group USA, Corp dba ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1420 - 5th Ave , Unit 2400 Seattle, WA 98101	DATE: ALS JOB#: ALS SAMPLE#:	10/16/2023 EV23100004 EV23100004-33
CLIENT CONTACT:	Michelle Nguyen	DATE RECEIVED:	10/02/2023
CLIENT PROJECT:	BNSF Skykomish PN 30159457.01	COLLECTION DATE:	9/28/2023 3:30:00 PM
CLIENT SAMPLE ID	5-W-56_092823	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	**1400**	100	1	UG/L	10/10/2023	DHM
CAS: ARC-DRO							
TPH-Oil Range	NWTPH-DX	**710**	100	1	UG/L	10/10/2023	DHM
CAS: ARC-TPH-ORO							

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**81.2**	10/10/2023	DHM
CAS: 629-99-2				

Chromatogram indicates that it is likely that sample contains an unidentified diesel range product and an unidentified oil range product.

ADDRESS 8620 Holly Drive, Suite 100, Everett, WA 9820 | PHONE 425-356-2600 | FAX 425-356-2626
ALS Group USA, Corp dba ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1420 - 5th Ave , Unit 2400 Seattle, WA 98101	DATE: ALS JOB#: ALS SAMPLE#:	10/16/2023 EV23100004 EV23100004-34
CLIENT CONTACT:	Michelle Nguyen	DATE RECEIVED:	10/02/2023
CLIENT PROJECT:	BNSF Skykomish PN 30159457.01	COLLECTION DATE:	9/29/2023
CLIENT SAMPLE ID	FD-3_092923	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	**590**	100	1	UG/L	10/10/2023	DHM
CAS: ARC-DRO							
TPH-Oil Range	NWTPH-DX	**290**	100	1	UG/L	10/10/2023	DHM
CAS: ARC-TPH-ORO							

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**100**	10/10/2023	DHM
CAS: 629-99-2				

Chromatogram indicates that it is likely that sample contains highly weathered diesel and an unidentified oil range product.
Oil range product results biased high due to diesel range product overlap.

ADDRESS 8620 Holly Drive, Suite 100, Everett, WA 9820 | PHONE 425-356-2600 | FAX 425-356-2626
ALS Group USA, Corp dba ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1420 - 5th Ave , Unit 2400 Seattle, WA 98101	DATE: ALS JOB#: ALS SAMPLE#:	10/16/2023 EV23100004 EV23100004-35
CLIENT CONTACT:	Michelle Nguyen	DATE RECEIVED:	10/02/2023
CLIENT PROJECT:	BNSF Skykomish PN 30159457.01	COLLECTION DATE:	9/28/2023 1:02:00 PM
CLIENT SAMPLE ID	2A-W-40_092823	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U	100	1	UG/L	10/10/2023	DHM
CAS: ARC-DRO							
TPH-Oil Range	NWTPH-DX	U	100	1	UG/L	10/10/2023	DHM
CAS: ARC-TPH-ORO							

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**106**	10/10/2023	DHM
CAS: 629-99-2				

U - Analyte analyzed for but not detected at level above reporting limit.

ADDRESS 8620 Holly Drive, Suite 100, Everett, WA 9820 | PHONE 425-356-2600 | FAX 425-356-2626
ALS Group USA, Corp dba ALS Environmental

ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1420 - 5th Ave , Unit 2400 Seattle, WA 98101	DATE: ALS JOB#: ALS SAMPLE#:	10/16/2023 EV23100004 EV23100004-36
CLIENT CONTACT:	Michelle Nguyen	DATE RECEIVED:	10/02/2023
CLIENT PROJECT:	BNSF Skykomish PN 30159457.01	COLLECTION DATE:	9/28/2023 11:05:00 AM
CLIENT SAMPLE ID	2A-W-41_092823	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	**400**	100	1	UG/L	10/10/2023	DHM
CAS: ARC-DRO							
TPH-Diesel Range	NWTPH-DX w/ SGA	**240**	50	1	UG/L	10/16/2023	DHM
CAS: ARC-DRO							
TPH-Oil Range	NWTPH-DX	**120**	100	1	UG/L	10/10/2023	DHM
CAS: ARC-TPH-ORO							
TPH-Oil Range	NWTPH-DX w/ SGA	U	100	1	UG/L	10/16/2023	DHM
CAS: ARC-TPH-ORO							

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**104**	10/10/2023	DHM
CAS: 629-99-2				
C25	NWTPH-DX w/ SGA	**132 SUR11**	10/16/2023	DHM
CAS: 629-99-2				

SUR11 - Surrogate outside of control limits due to sporadic marginal failure. No corrective action taken.
U - Analyte analyzed for but not detected at level above reporting limit.
Chromatogram indicates that it is likely that sample contains highly weathered diesel and an unidentified oil range product.
Oil range product results biased high due to diesel range product overlap.

ADDRESS 8620 Holly Drive, Suite 100, Everett, WA 9820 | PHONE 425-356-2600 | FAX 425-356-2626
ALS Group USA, Corp dba ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1420 - 5th Ave , Unit 2400 Seattle, WA 98101	DATE: ALS JOB#: ALS SAMPLE#:	10/16/2023 EV23100004 EV23100004-37
CLIENT CONTACT:	Michelle Nguyen	DATE RECEIVED:	10/02/2023
CLIENT PROJECT:	BNSF Skykomish PN 30159457.01	COLLECTION DATE:	9/28/2023 10:01:00 AM
CLIENT SAMPLE ID	2A-W-42_092823	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	**120**	100	1	UG/L	10/10/2023	DHM
CAS: ARC-DRO							
TPH-Oil Range	NWTPH-DX	U	100	1	UG/L	10/10/2023	DHM
CAS: ARC-TPH-ORO							

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**103**	10/10/2023	DHM
CAS: 629-99-2				

U - Analyte analyzed for but not detected at level above reporting limit.
Chromatogram indicates that it is likely that sample contains an unidentified diesel range product.

ADDRESS 8620 Holly Drive, Suite 100, Everett, WA 9820 | PHONE 425-356-2600 | FAX 425-356-2626
ALS Group USA, Corp dba ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1420 - 5th Ave , Unit 2400 Seattle, WA 98101	DATE: ALS JOB#: ALS SAMPLE#:	10/16/2023 EV23100004 EV23100004-38
CLIENT CONTACT:	Michelle Nguyen	DATE RECEIVED:	10/02/2023
CLIENT PROJECT:	BNSF Skykomish PN 30159457.01	COLLECTION DATE:	9/27/2023 5:30:00 PM
CLIENT SAMPLE ID	1B-W-23_092723	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U	100	1	UG/L	10/10/2023	DHM
CAS: ARC-DRO							
TPH-Oil Range	NWTPH-DX	U	100	1	UG/L	10/10/2023	DHM
CAS: ARC-TPH-ORO							

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**86.5**	10/10/2023	DHM
CAS: 629-99-2				

U - Analyte analyzed for but not detected at level above reporting limit.

ADDRESS 8620 Holly Drive, Suite 100, Everett, WA 9820 | PHONE 425-356-2600 | FAX 425-356-2626
ALS Group USA, Corp dba ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1420 - 5th Ave , Unit 2400 Seattle, WA 98101	DATE: ALS JOB#: ALS SAMPLE#:	10/16/2023 EV23100004 EV23100004-39
CLIENT CONTACT:	Michelle Nguyen	DATE RECEIVED:	10/02/2023
CLIENT PROJECT:	BNSF Skykomish PN 30159457.01	COLLECTION DATE:	9/27/2023 1:00:00 PM
CLIENT SAMPLE ID	1C-W-7_092723	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	**120**	100	1	UG/L	10/10/2023	DHM
CAS: ARC-DRO							
TPH-Oil Range	NWTPH-DX	U	100	1	UG/L	10/10/2023	DHM
CAS: ARC-TPH-ORO							

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**97.0**	10/10/2023	DHM
CAS: 629-99-2				

U - Analyte analyzed for but not detected at level above reporting limit.
Chromatogram indicates that it is likely that sample contains an unidentified diesel range product.

ADDRESS 8620 Holly Drive, Suite 100, Everett, WA 9820 | PHONE 425-356-2600 | FAX 425-356-2626
ALS Group USA, Corp dba ALS Environmental

ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1420 - 5th Ave , Unit 2400 Seattle, WA 98101	DATE: ALS JOB#: ALS SAMPLE#:	10/16/2023 EV23100004 EV23100004-40
CLIENT CONTACT:	Michelle Nguyen	DATE RECEIVED:	10/02/2023
CLIENT PROJECT:	BNSF Skykomish PN 30159457.01	COLLECTION DATE:	9/27/2023 2:45:00 PM
CLIENT SAMPLE ID	1C-W-8_092723	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U	100	1	UG/L	10/10/2023	DHM
CAS: ARC-DRO							
TPH-Oil Range	NWTPH-DX	U	100	1	UG/L	10/10/2023	DHM
CAS: ARC-TPH-ORO							

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**96.7**	10/10/2023	DHM
CAS: 629-99-2				

U - Analyte analyzed for but not detected at level above reporting limit.

ADDRESS 8620 Holly Drive, Suite 100, Everett, WA 9820 | PHONE 425-356-2600 | FAX 425-356-2626
ALS Group USA, Corp dba ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1420 - 5th Ave , Unit 2400 Seattle, WA 98101	DATE: ALS JOB#: ALS SAMPLE#:	10/16/2023 EV23100004 EV23100004-41
CLIENT CONTACT:	Michelle Nguyen	DATE RECEIVED:	10/02/2023
CLIENT PROJECT:	BNSF Skykomish PN 30159457.01	COLLECTION DATE:	9/29/2023 11:30:00 AM
CLIENT SAMPLE ID	5-W-43_092923	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U	100	1	UG/L	10/10/2023	DHM
CAS: ARC-DRO							
TPH-Oil Range	NWTPH-DX	U	100	1	UG/L	10/10/2023	DHM
CAS: ARC-TPH-ORO							

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**93.3**	10/10/2023	DHM
CAS: 629-99-2				

U - Analyte analyzed for but not detected at level above reporting limit.

ADDRESS 8620 Holly Drive, Suite 100, Everett, WA 9820 | PHONE 425-356-2600 | FAX 425-356-2626
ALS Group USA, Corp dba ALS Environmental

ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1420 - 5th Ave , Unit 2400 Seattle, WA 98101	DATE: ALS JOB#: ALS SAMPLE#:	10/16/2023 EV23100004 EV23100004-42
CLIENT CONTACT:	Michelle Nguyen	DATE RECEIVED:	10/02/2023
CLIENT PROJECT:	BNSF Skykomish PN 30159457.01	COLLECTION DATE:	9/29/2023 4:03:00 PM
CLIENT SAMPLE ID	MW-4_092923	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	**290**	100	1	UG/L	10/10/2023	DHM
CAS: ARC-DRO							
TPH-Oil Range	NWTPH-DX	**100**	100	1	UG/L	10/10/2023	DHM
CAS: ARC-TPH-ORO							

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**95.2**	10/10/2023	DHM
CAS: 629-99-2				

Chromatogram indicates that it is likely that sample contains an unidentified diesel range product.

ADDRESS 8620 Holly Drive, Suite 100, Everett, WA 9820 | PHONE 425-356-2600 | FAX 425-356-2626
ALS Group USA, Corp dba ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1420 - 5th Ave , Unit 2400 Seattle, WA 98101	DATE: ALS JOB#: ALS SAMPLE#:	10/16/2023 EV23100004 EV23100004-43
CLIENT CONTACT:	Michelle Nguyen	DATE RECEIVED:	10/02/2023
CLIENT PROJECT:	BNSF Skykomish PN 30159457.01	COLLECTION DATE:	9/27/2023
CLIENT SAMPLE ID	FD-1_092723	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	**100**	100	1	UG/L	10/10/2023	DHM
CAS: ARC-DRO							
TPH-Oil Range	NWTPH-DX	**220**	100	1	UG/L	10/10/2023	DHM
CAS: ARC-TPH-ORO							

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**115**	10/10/2023	DHM
CAS: 629-99-2				

Chromatogram indicates that it is likely that sample contains an unidentified diesel range product and an unidentified oil range product.

ADDRESS 8620 Holly Drive, Suite 100, Everett, WA 9820 | PHONE 425-356-2600 | FAX 425-356-2626
ALS Group USA, Corp dba ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1420 - 5th Ave , Unit 2400 Seattle, WA 98101	DATE: ALS JOB#: ALS SAMPLE#:	10/16/2023 EV23100004 EV23100004-44
CLIENT CONTACT:	Michelle Nguyen	DATE RECEIVED:	10/02/2023
CLIENT PROJECT:	BNSF Skykomish PN 30159457.01	COLLECTION DATE:	9/27/2023 5:10:00 PM
CLIENT SAMPLE ID	EB-1_092723	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U	100	1	UG/L	10/10/2023	DHM
CAS: ARC-DRO							
TPH-Oil Range	NWTPH-DX	U	100	1	UG/L	10/10/2023	DHM
CAS: ARC-TPH-ORO							

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**88.2**	10/10/2023	DHM
CAS: 629-99-2				

U - Analyte analyzed for but not detected at level above reporting limit.

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ALS Group USA, Corp dba ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1420 - 5th Ave , Unit 2400 Seattle, WA 98101	DATE: ALS JOB#: ALS SAMPLE#:	10/16/2023 EV23100004 EV23100004-45
CLIENT CONTACT:	Michelle Nguyen	DATE RECEIVED:	10/02/2023
CLIENT PROJECT:	BNSF Skykomish PN 30159457.01	COLLECTION DATE:	9/27/2023
CLIENT SAMPLE ID	FD-2_092923	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U	100	1	UG/L	10/10/2023	DHM
CAS: ARC-DRO							
TPH-Oil Range	NWTPH-DX	U	100	1	UG/L	10/10/2023	DHM
CAS: ARC-TPH-ORO							

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**89.2**	10/10/2023	DHM
CAS: 629-99-2				

U - Analyte analyzed for but not detected at level above reporting limit.

ADDRESS 8620 Holly Drive, Suite 100, Everett, WA 9820 | PHONE 425-356-2600 | FAX 425-356-2626
ALS Group USA, Corp dba ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1420 - 5th Ave , Unit 2400 Seattle, WA 98101	DATE: ALS JOB#: ALS SAMPLE#:	10/16/2023 EV23100004 EV23100004-46
CLIENT CONTACT:	Michelle Nguyen	DATE RECEIVED:	10/02/2023
CLIENT PROJECT:	BNSF Skykomish PN 30159457.01	COLLECTION DATE:	9/29/2023
CLIENT SAMPLE ID	FD-4_092923	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U	100	1	UG/L	10/10/2023	DHM
CAS: ARC-DRO							
TPH-Oil Range	NWTPH-DX	U	100	1	UG/L	10/10/2023	DHM
CAS: ARC-TPH-ORO							

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**93.2**	10/10/2023	DHM
CAS: 629-99-2				

U - Analyte analyzed for but not detected at level above reporting limit.

ADDRESS 8620 Holly Drive, Suite 100, Everett, WA 9820 | PHONE 425-356-2600 | FAX 425-356-2626
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ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1420 - 5th Ave , Unit 2400 Seattle, WA 98101	DATE:	10/16/2023
		ALS SDG#:	EV23100004
		WDOE ACCREDITATION:	C601
CLIENT CONTACT:	Michelle Nguyen		
CLIENT PROJECT:	BNSF Skykomish PN 30159457.01		

LABORATORY BLANK RESULTS

MB-100623W - Batch 201638 - Water by NWTPH-DX

ANALYTE	METHOD	RESULTS	UNITS	REPORTING LIMITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U	UG/L	100	10/09/2023	DHM
TPH-Oil Range	NWTPH-DX	U	UG/L	100	10/09/2023	DHM

U - Analyte analyzed for but not detected at level above reporting limit.

MB-100823W - Batch 201641 - Water by NWTPH-DX

ANALYTE	METHOD	RESULTS	UNITS	REPORTING LIMITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U	UG/L	100	10/10/2023	DHM
TPH-Oil Range	NWTPH-DX	U	UG/L	100	10/10/2023	DHM

U - Analyte analyzed for but not detected at level above reporting limit.

MB2-100623W - Batch 201639 - Water by NWTPH-DX

ANALYTE	METHOD	RESULTS	UNITS	REPORTING LIMITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U	UG/L	50	10/10/2023	DHM
TPH-Oil Range	NWTPH-DX	U	UG/L	100	10/10/2023	DHM

U - Analyte analyzed for but not detected at level above reporting limit.

ADDRESS 8620 Holly Drive, Suite 100, Everett, WA 9820 | PHONE 425-356-2600 | FAX 425-356-2626
ALS Group USA, Corp dba ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1420 - 5th Ave , Unit 2400 Seattle, WA 98101	DATE:	10/16/2023
		ALS SDG#:	EV23100004
		WDOE ACCREDITATION:	C601
CLIENT CONTACT:	Michelle Nguyen		
CLIENT PROJECT:	BNSF Skykomish PN 30159457.01		

LABORATORY CONTROL SAMPLE RESULTS

ALS Test Batch ID: 201638 - Water by NWTPH-DX

SPIKED COMPOUND	METHOD	%REC	RPD	QUAL	LIMITS MIN	LIMITS MAX	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range - BS	NWTPH-DX	**95.1**			67	125	10/09/2023	DHM
TPH-Diesel Range - BSD	NWTPH-DX	**96.3**	**1**		67	125	10/09/2023	DHM

ALS Test Batch ID: 201639 - Water by NWTPH-DX

SPIKED COMPOUND	METHOD	%REC	RPD	QUAL	LIMITS MIN	LIMITS MAX	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range - BS	NWTPH-DX	**92.2**			67	125	10/10/2023	DHM
TPH-Diesel Range - BSD	NWTPH-DX	**96.0**	**4**		67	125	10/10/2023	DHM

ALS Test Batch ID: 201641 - Water by NWTPH-DX

SPIKED COMPOUND	METHOD	%REC	RPD	QUAL	LIMITS MIN	LIMITS MAX	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range - BS	NWTPH-DX	**99.5**			67	125	10/10/2023	DHM
TPH-Diesel Range - BSD	NWTPH-DX	**97.7**	**2**		67	125	10/10/2023	DHM

ADDRESS 8620 Holly Drive, Suite 100, Everett, WA 9820 | PHONE 425-356-2600 | FAX 425-356-2626
ALS Group USA, Corp dba ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1420 - 5th Ave , Unit 2400 Seattle, WA 98101	DATE: ALS SDG#: WDOE ACCREDITATION:	10/16/2023 EV23100004 C601
CLIENT CONTACT:	Michelle Nguyen		
CLIENT PROJECT:	BNSF Skykomish PN 30159457.01		

MATRIX SPIKE RESULTS

ALS Test Batch ID: 201638 - Water

Parent Sample: S2-BU_092923 MS/MSD

SPIKED COMPOUND	METHOD	%REC	RPD	QUAL	SPIKE ADDED	PARENT SAMPLE RESULT	CALC RESULT*	LIMITS MIN	LIMITS MAX	RPD	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range - MS	NWTPH-DX	**141**		SQ2	493	1000	700 SQ2	67	125		10/09/2023	DHM
TPH-Diesel Range - MSD	NWTPH-DX	**158**	**5**	MS14	500	1000	790 MS14	67	125	15.2	10/09/2023	DHM

Parent Sample: S3-CU_092723 MS/MD

SPIKED COMPOUND	METHOD	%REC	RPD	QUAL	SPIKE ADDED	PARENT SAMPLE RESULT	CALC RESULT*	LIMITS MIN	LIMITS MAX	RPD	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range - MS	NWTPH-DX	**97.0**			493	16.0	480	67	125		10/09/2023	DHM
TPH-Diesel Range - MSD	NWTPH-DX	**98.5**	**1**		493	16.0	480	67	125	15.2	10/09/2023	DHM

MS14 - MS/MSD recoveries were above the control limits, due to matrix interference. The associated LCS recoveries and MS/MSD RPD were within the control limits.

SQ2 - Spike outside of control limits due to matrix effect.

*Calc Result = (Sample Result - Parent Sample Result)

APPROVED BY

Rob Greer
Laboratory Director

ADDRESS 8620 Holly Drive, Suite 100, Everett, WA 9820 | PHONE 425-356-2600 | FAX 425-356-2626
ALS Group USA, Corp dba ALS Environmental

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Chain of Custody Form

Page 1 of 5

COC ID: 289093

EV2310000 4

ALS Project Manager: | ALS Work Order #:

Customer Information		Project Information		Parameter/Method Request for Analysis	
Purchase Order		Project Name	BNSF Skykomish PN 30159457.01	A	210_DX_W
Work Order		Project Number		B	
Company Name	Arcadis U.S., Inc.	Bill To Company	Arcadis U.S., Inc.	C	210_DXSGA_W
Send Report To	Michelle Nguyen	Invoice Attn	Accounts Payable	D	
Address	1420 - 5th Ave Unit 2400	Address	630 Plaza Drive Suite 600	E	
				F	
City/State/Zip	Seattle, WA 98101	City/State/Zip	Highlands Ranch CO 80129	G	
Phone	(206) 325-5254	Phone	(303) 471-3699	H	
Fax	(206) .32-5.82	Fax		I	
e-Mail Address	Michelle.Nguyen@arcadis.com	e-Mail Address	invoices_us@arcadis.com	J	

No.	Sample Description	Date	Time	Matrix	Pres.	# Bottles	A	B	C	D	E	F	G	H	I	J	Hold
1	~~GW-1~~ NOT SAMPLED			Water	1	1	X										
1 2	GW-2_092823	9/28/23	14:05	Water	1	1	X								-	1	
2 3	GW-3_092723	17:55 ↔ 9/27/23		Water	1	2	X		X						-	2	
3 4	GW-4_092723	9/27/23	12:30	Water	1	1	X								-	3	
4 5	EW-1_092823	9/28/23	16:42	Water	1	1	X								-	4	
5 6	EW-2A_092723	9/27/23	13:50	Water	1	1	X								-	5	
6 7	S1-AD_092823	9/28/23	17:25	Water	1	1	X								-	6	
7 8	S1-AU_092823	9/28/23	17:25	Water	1	1	X								-	7	
8 9	S1-BD_092823	9/28/23	17:50	Water	1	1	X								-	8	
9 10	S1-BU_092823	9/28/23	17:55	Water	1	1	X								-	9	

Sampler(s) Please Print & Sign: Kyle Johnson

Shipment Method: Dropped off

Required Turnaround Time: (Check Box) ☐ Other ____ ☒ STD 10 Wk Days ☐ 5 Wk Days ☐ 2 Wk Days ☐ 24 Hour

Results Due Date:

Relinquished by:	Date:	Time:	Received by:
Kyle Johnson	10/2/23	1220	10/2/23 1220
Relinquished by:	Date:	Time:	Received by (Laboratory): ACJ Fraun
Logged by (Laboratory):	Date:	Time:	Checked by (Laboratory):

Notes:

Cooler ID	Cooler Temp.

QC Package: (Check One Box Below)

- ☒ Level II Std QC
- ☐ Level III Std QC/Raw Date
- ☐ Level IV SW846/CLP
- ☐ Other ____
- ☐ TRRP Checklist
- ☐ TRRP Level IV

Preservative Key: 1-HCl 2-HNO_3 3-H_2SO_4 4-NaOH 5-$Na_2S_2O_3$ 6-$NaHSO_4$ 7-Other 8-4°C 9-5035

Note: 1. Any changes must be made in writing once samples and COC Form have been submitted to ALS Environmental.
2. Unless otherwise agreed in a formal contract, services provided by ALS Environmental are expressly limited to the terms and conditions stated on the reverse.
3. The Chain of Custody is a legal document. All information must be completed accurately.

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Chain of Custody Form

COC ID: 289092

EV2310004

ALS Project Manager:

ALS Work Order #:

Customer Information		Project Information		Parameter/Method Request for Analysis	
Purchase Order		Project Name	BNSF Skykomish PN 30159457.01	A	210_DX_W
Work Order		Project Number		B	
Company Name	Arcadis U.S., Inc.	Bill To Company	Arcadis U.S., Inc.	C	210_DXSGA_W
Send Report To	Michelle Nguyen	Invoice Attn	Accounts Payable	D	
Address	1420 - 5th Ave Unit 2400	Address	630 Plaza Drive Suite 600	E	
				F	
City/State/Zip	Seattle, WA 98101	City/State/Zip	Highlands Ranch CO 80129	G	
Phone	(206) 325-5254	Phone	(303) 471-3699	H	
Fax	(206) .32-5.82	Fax		I	
e-Mail Address	Michelle.Nguyen@arcadis.com	e-Mail Address	invoices_us@arcadis.com	J	

No.	Sample Description	Date	Time	Matrix	Pres.	# Bottles	A	B	C	D	E	F	G	H	I	J	Hold
1	S2-AD_092923	9/29/23	1542	Water	1	1	X									10	
2	S2-AU_092923	9/29/23	1518	Water	1	1	X									11	
3	S2-BD_092923	9/29/23	1242	Water	1	1	X									12	
4	~~S2-BU_092823~~ KJ 9/29 _092923 MS/MSD	~~9/28/23~~ 9/29/23	~~10:45~~ 1203	Water	1	1	X									13	
5	S3-AD_092723	9/27/23	16:51	Water	1	1	X									14	
6	S3-AU_092723	9/27/23	16:26	Water	1	1	X									15	
7	S3-BD_092823	9/28/23	09:30	Water	1	1	X									16	
8	S3-BU_092823	9/28/23	1045	Water	1	1	X									17	
9	S3-CD_092723	9/27/23	1555	Water	1	1	X									18	
10	S3-CU_092723 MS/MSD	9/27/23	16:25	Water	1	3	X									19	

Sampler(s) Please Print & Sign: Kyle Johnson

Shipment Method: dropped off

Required Turnaround Time: (Check Box) ☐ Other ____ ☒ STD 10 Wk Days ☐ 5 Wk Days ☐ 2 Wk Days ☐ 24 Hour

Results Due Date:

Relinquished by:	Date:	Time:	Received by:
Kyle Johnson	10/2/23	1220	10/2/23 12:32
Relinquished by:	Date:	Time:	Received by (Laboratory): ALS Everett
Logged by (Laboratory):	Date:	Time:	Checked by (Laboratory):

Notes:

Cooler ID	Cooler Temp.

QC Package: (Check One Box Below)

- ☒ Level II Std QC
- ☐ Level III Std QC/Raw Date
- ☐ Level IV SW846/CLP
- ☐ Other
- ☐ TRRP Checklist
- ☐ TRRP Level IV

Preservative Key: 1-HCl 2-HNO_3 3-H_2SO_4 4-NaOH 5-$Na_2S_2O_3$ 6-$NaHSO_4$ 7-Other 8-4°C 9-5035

Note:
1. Any changes must be made in writing once samples and COC Form have been submitted to ALS Environmental.
2. Unless otherwise agreed in a formal contract, services provided by ALS Environmental are expressly limited to the terms and conditions stated on the reverse.
3. The Chain of Custody is a legal document. All information must be completed accurately.

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Spring City, PA +1 610 948 4903
Salt Lake City, UT +1 801 266 7700
South Charleston, WV +1 304 356 3168
York, PA +1 717 505 5280

Chain of Custody Form

COC ID: 289091

EV2310O004

ALS Project Manager:		ALS Work Order #:	

Customer Information		Project Information		Parameter/Method Request for Analysis	
Purchase Order		Project Name	BNSF Skykomish P'N 30159457.01	A	210_DX_W
Work Order		Project Number		B	
Company Name	Arcadis U.S., Inc.	Bill To Company	Arcadis U.S., Inc.	C	210_DXSGA_W
Send Report To	Michelle Nguyen	Invoice Attn	Accounts Payable	D	
Address	1420 - 5th Ave Unit 2400	Address	630 Plaza Drive Suite 600	E F	
City/State/Zip	Seattle, WA 98101	City/State/Zip	Highlands Ranch CO 80129	G	
Phone	(206) 325-5254	Phone	(303) 471-3699	H	
Fax	(206) .32-5.82	Fax		I	
e-Mail Address	Michelle.Nguyen@arcadis.com	e-Mail Address	invoices_us@arcadis.com	J	

No.	Sample Description	Date	Time	Matrix	Pres.	# Bottles	A	B	C	D	E	F	G	H	I	J	Hold
20 1	S4-AD_092723	9/27/23	09:28	Water	1	1	X									-20	
21 2	S4-AU_092723	9/27/23	10:24	Water	1	1	X									-21	
22 3	S4-BD_092723	9/27/23	11:37	Water	1	1	X									-22	
23 4	S4-BU_092723	9/27/23	13:16	Water	1	1	X									-23	
24 5	S4-CD_092723	9/27/23	9:35	Water	1	1	X									-24	
25 6	S4-CU_092723	9/27/23	10:30	Water	1	1	X									-25	
26 7	5-W-14_092623	9/26/23	15:08	Water	1	1	X									-26	
27 8	5-W-16_092623	9/26/23	17:00	Water	1	1	X									-27	
28 9	5-W-17_092923	9/29/23	1110	Water	1	1	X									-28	
29 10	5-W-18_092923	9/29/23	1155	Water	1	1	X									-29	

Sampler(s) Please Print & Sign: Kyle Johnson

Shipment Method: drop off

Required Turnaround Time: (Check Box) ☐ Other ____ ☒ STD 10 Wk Days ☐ 5 Wk Days ☐ 2 Wk Days ☐ 24 Hour

Results Due Date:

Relinquished by:	Date:	Time:	Received by:
Kyle Johnson	10/2/23	1220	10/2/23 12:30
Relinquished by:	Date:	Time:	Received by (Laboratory): ALS Everett
Logged by (Laboratory):	Date:	Time:	Checked by (Laboratory):

Notes:

Cooler ID	Cooler Temp.

QC Package: (Check One Box Below)

- ☒ Level II Std QC
- ☐ Level III Std QC/Raw Date
- ☐ Level IV SW846/CLP
- ☐ Other ____
- ☐ TRRP Checklist
- ☐ TRRP Level IV

Preservative Key: 1-HCl 2-HNO_3 3-H_2SO_4 4-NaOH 5-$Na_2S_2O_3$ 6-$NaHSO_4$ 7-Other 8-4°C 9-5035

Note: 1. Any changes must be made in writing once samples and COC Form have been submitted to ALS Environmental.
2. Unless otherwise agreed in a formal contract, services provided by ALS Environmental are expressly limited to the terms and conditions stated on the reverse.
3. The Chain of Custody is a legal document. All information must be completed accurately.

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Everett, WA +1 425 356 2600
Fort Collins, CO +1 970 490 1511
Holland, MI +1 616 399 6070
Houston, TX +1 281 530 5656
Middletown, PA +1 717 944 5541
Spring City, PA +1 610 948 4903
Salt Lake City, UT +1 801 266 7700
South Charleston, WV +1 304 356 3168
York, PA +1 717 505 5280

Chain of Custody Form

COC ID: 289090

EV2310004

ALS Project Manager:	ALS Work Order #:

Customer Information		Project Information		Parameter/Method Request for Analysis	
Purchase Order		Project Name	BNSF Skykomish PN 30159457.01	A	210_DX_W
Work Order		Project Number		B	
Company Name	Arcadis U.S., Inc.	Bill To Company	Arcadis U.S., Inc.	C	210_DXSGA_W
Send Report To	Michelle Nguyen	Invoice Attn	Accounts Payable	D	
Address	1420 - 5th Ave Unit 2400	Address	630 Plaza Drive Suite 600	E F	
City/State/Zip	Seattle, WA 98101	City/State/Zip	Highlands Ranch CO 80129	G	
Phone	(206) 325-5254	Phone	(303) 471-3699	H	
Fax	(206) .32-5.82	Fax		I	
e-Mail Address	Michelle.Nguyen@arcadis.com	e-Mail Address	invoices_us@arcadis.com	J	

No.	Sample Description	Date	Time	Matrix	Pres.	# Bottles	A	B	C	D	E	F	G	H	I	J	Hold
30 1	5-W-19_092923	9/29/23	1240	Water	1	1	X									-30	
31 2	5-W-51_092923	9/29/23	10:30	Water	1	1	X									-31	
32 3	5-W-55_092823	9/28/23	15:50	Water	1	1	X									-32	
33 4	5-W-56_092823	9/28/23	15:30	Water	1	1	X									-33	
34 5	~~2A-W-9~~ IKJ 9/29 FD-3_092923	9/29/23		Water	1	1	X									-34	
35 6	2A-W-40_092823	9/28/23	13:02	Water	1	1	X									-35	
36 7	2A-W-41_092823	9/28/23	11:05	Water	1		X		X							-36	
37 8	2A-W-42_092823	9/28/23	10:01	Water	1	1	X									-37	
38 9	1B-W-23_092723	9/27/23	17:30	Water	1	1	X									-38	
~~39~~ 10	~~1C-W-4~~ NOT SAMPLED			Water	1	1	X										

Sampler(s) Please Print & Sign: Kyle Johnson

Shipment Method: drop off

Required Turnaround Time: (Check Box) ☐ Other ____ ☒ STD 10 Wk Days ☐ 5 Wk Days ☐ 2 Wk Days ☐ 24 Hour

Results Due Date:

Relinquished by:	Date:	Time:	Received by:
Kyle Johnson	10/2/23	1220	pkl 10/2/23 12:30
Relinquished by:	Date:	Time:	Received by (Laboratory): ALS Everett
Logged by (Laboratory):	Date:	Time:	Checked by (Laboratory):

Notes:

Cooler ID	Cooler Temp.

QC Package: (Check One Box Below)

- ☒ Level II Std QC
- ☐ Level III Std QC/Raw Date
- ☐ Level IV SW846/CLP
- ☐ Other
- ☐ TRRP Checklist
- ☐ TRRP Level IV

Preservative Key: 1-HCl 2-HNO_3 3-H_2SO_4 4-NaOH 5-$Na_2S_2O_3$ 6-$NaHSO_4$ 7-Other 8-4°C 9-5035

Note:
1. Any changes must be made in writing once samples and COC Form have been submitted to ALS Environmental.
2. Unless otherwise agreed in a formal contract, services provided by ALS Environmental are expressly limited to the terms and conditions stated on the reverse.
3. The Chain of Custody is a legal document. All information must be completed accurately.

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Spring City, PA +1 610 948 4903
Salt Lake City, UT +1 801 266 7700
South Charleston, WV +1 304 356 3168
York, PA +1 717 505 5280

Chain of Custody Form

COC ID: 289089

EV2310004

ALS Project Manager:		ALS Work Order #:	

Customer Information		Project Information		Parameter/Method Request for Analysis	
Purchase Order		Project Name	BNSF Skykomish PN 30159457.01	A	210_DX_W
Work Order		Project Number		B	
Company Name	Arcadis U.S., Inc.	Bill To Company	Arcadis U.S., Inc.	C	210_DXSGA_W
Send Report To	Michelle Nguyen	Invoice Attn	Accounts Payable	D	
Address	1420 - 5th Ave Unit 2400	Address	630 Plaza Drive Suite 600	E	~~Total Metals 200.8~~ KJ 9/29
				F	
City/State/Zip	Seattle, WA 98101	City/State/Zip	Highlands Ranch CO 80129	G	
Phone	(206) 325-5254	Phone	(303) 471-3699	H	
Fax	(206) .32-5.82	Fax		I	
e-Mail Address	Michelle.Nguyen@arcadis.com	e-Mail Address	invoices_us@arcadis.com	J	

No.	Sample Description	Date	Time	Matrix	Pres.	# Bottles	A	B	C	D	E	F	G	H	I	J	Hold
1	1C-W-7_092723	9/27/23	13:00	Water	1	1	X									-39	
2	1C-W-8_092723	9/27/23	14:45	Water	1	1	X									-40	
3	5-W-43_092923	9/29/23	11:30	Water	1	1	X									-41	
4	MW-4_092923	9/29/23	16:03	Water	1	1	X									-42	
5	FD-1_092723	9/27/23	—	Water	1	1	X									-43	
6	EB-1_092723	9/27/23	17:10	Water	1	1	X									-44	
7	~~T-05-092620223~~	~~9/26/23~~	~~15:00~~	~~Water~~	~~1,2~~	~~3~~	~~X~~				~~X~~	KJ 9/29					
8	~~T-05-092620223~~	~~9/26/23~~	~~14:40~~	~~Water~~	~~1,2~~	~~3~~	~~X~~				~~X~~	KJ 9/29					
9	FD-2_092723	9/27/23	—	water	1	1	X									-45	
10	FD-4_092923	9/29/23	—	water	1	1	X									46	

Sampler(s) Please Print & Sign	Shipment Method	Required Turnaround Time: (Check Box)	Results Due Date:
Kyle Johnson	drop off	☒ STD 10 Wk Days ☐ 5 Wk Days ☐ 2 Wk Days ☐ 24 Hour ☐ Other	

Relinquished by:	Date:	Time:	Received by:	Notes:
Kyle Johnson	10/2/23	1220	10/2/23 1220pm	
Relinquished by:	Date:	Time:	Received by (Laboratory): ALS Everett	
Logged by (Laboratory):	Date:	Time:	Checked by (Laboratory):	

Cooler ID	Cooler Temp.

QC Package: (Check One Box Below)
- ☒ Level II Std QC
- ☐ Level III Std QC/Raw Date
- ☐ Level IV SW846/CLP
- ☐ Other
- ☐ TRRP Checklist
- ☐ TRRP Level IV

Preservative Key: 1-HCl 2-HNO_3 3-H_2SO_4 4-NaOH 5-$Na_2S_2O_3$ 6-$NaHSO_4$ 7-Other 8-4°C 9-5035

Note:
1. Any changes must be made in writing once samples and COC Form have been submitted to ALS Environmental.
2. Unless otherwise agreed in a formal contract, services provided by ALS Environmental are expressly limited to the terms and conditions stated on the reverse.
3. The Chain of Custody is a legal document. All information must be completed accurately.

ALS ENVIRONMENTAL

Sample Receiving Checklist

Client: Arcadis ALS Job #: EV2310004

Project: BNSF Skykomish PN 30159457.01

Received Date: 10/2/23 Received Time: 1230 By: CR

Type of shipping container: Cooler X Box ___ Other ___

Shipped via: FedEx Ground ___ UPS ___ Mail ___ Courier ___ Hand Delivered X
FedEx Express ___

	Yes	No	N/A
Were custody seals on outside of shipping container?	___	___	X
If yes, how many? ___ Where? ___			
Custody seal date: ___ Seal name: ___			
Was Chain of Custody properly filled out (ink, signed, dated, etc.)?	X	___	___
Did all bottles have labels?	X	___	___
Did all bottle labels and tags agree with Chain of Custody?	___	X	___
Were samples received within hold time?	X	___	___
Did all bottles arrive in good condition (unbroken, etc.)?	X	___	___
Was sufficient amount of sample sent for the tests indicated?	X	___	___
Was correct preservation added to samples?	X	___	___

If no, Sample Control added preservative to the following:

Sample Number	Reagent	Analyte

Were VOA vials checked for absence of air bubbles?	___	___	X
Bubbles present in sample #: ___			

Temperature of cooler upon receipt: 1.3°C/1.8°C/1.2°C 1.8°C Cold Cool Ambient N/A

Explain any discrepancies: S2-AP wrong time #10; SW-43 # 43 times many times vary. #35 has 2 samples, diff times logged as A & B

Was client contacted? ___ Who was called? ___ By whom? ___ Date: ___

Outcome of call: ___

October 24, 2023

Mr. Kyle Haslam
Arcadis U.S., Inc.
1420 - 5th Ave , Unit 2400
Seattle, WA 98101

Dear Mr. Haslam,

On October 17th, 2 samples were received by our laboratory and assigned our laboratory project number EV23100095. The project was identified as your 30159457. The sample identification and requested analyses are outlined on the attached chain of custody record.

No abnormalities or nonconformances were observed during the analyses of the project samples.

Please do not hesitate to call me if you have any questions or if I can be of further assistance.

Sincerely,

ALS Laboratory Group

Rob Greer
Laboratory Director

ADDRESS 8620 Holly Drive, Suite 100, Everett, WA 98208 | PHONE 425-356-2600 | FAX 425-356-2626
ALS Group USA, Corp dba ALS Environmental

ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1420 - 5th Ave , Unit 2400 Seattle, WA 98101	DATE:	10/24/2023
		ALS JOB#:	EV23100095
		ALS SAMPLE#:	EV23100095-01
CLIENT CONTACT:	Kyle Haslam	DATE RECEIVED:	10/17/2023
CLIENT PROJECT:	30159457	COLLECTION DATE:	10/17/2023 12:40:00 PM
CLIENT SAMPLE ID	GW-1_101723	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	**150**	100	1	UG/L	10/23/2023	DHM
CAS: ARC-DRO							
TPH-Oil Range	NWTPH-DX	**110**	100	1	UG/L	10/23/2023	DHM
CAS: ARC-TPH-ORO							

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**100**	10/23/2023	DHM
CAS: 629-99-2				

Chromatogram indicates that it is likely that sample contains an unidentified diesel range product and an unidentified oil range product.

ADDRESS 8620 Holly Drive, Suite 100, Everett, WA 98208 | PHONE 425-356-2600 | FAX 425-356-2626
ALS Group USA, Corp dba ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1420 - 5th Ave , Unit 2400 Seattle, WA 98101	DATE: ALS JOB#: ALS SAMPLE#:	10/24/2023 EV23100095 EV23100095-02
CLIENT CONTACT:	Kyle Haslam	DATE RECEIVED:	10/17/2023
CLIENT PROJECT:	30159457	COLLECTION DATE:	10/17/2023
CLIENT SAMPLE ID	DUP-1	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	**140**	100	1	UG/L	10/23/2023	DHM
CAS: ARC-DRO							
TPH-Oil Range	NWTPH-DX	**130**	100	1	UG/L	10/23/2023	DHM
CAS: ARC-TPH-ORO							

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**101**	10/23/2023	DHM
CAS: 629-99-2				

Chromatogram indicates that it is likely that sample contains an unidentified diesel range product and an unidentified oil range product.

ADDRESS 8620 Holly Drive, Suite 100, Everett, WA 98208 | PHONE 425-356-2600 | FAX 425-356-2626
ALS Group USA, Corp dba ALS Environmental

ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1420 - 5th Ave , Unit 2400 Seattle, WA 98101	DATE:	10/24/2023
		ALS SDG#:	EV23100095
		WDOE ACCREDITATION:	C601
CLIENT CONTACT:	Kyle Haslam		
CLIENT PROJECT:	30159457		

LABORATORY BLANK RESULTS

MB-102023W - Batch 202366 - Water by NWTPH-DX

ANALYTE	METHOD	RESULTS	UNITS	REPORTING LIMITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U	UG/L	100	10/23/2023	DHM
TPH-Oil Range	NWTPH-DX	U	UG/L	100	10/23/2023	DHM

U - Analyte analyzed for but not detected at level above reporting limit.

ADDRESS 8620 Holly Drive, Suite 100, Everett, WA 98208 | PHONE 425-356-2600 | FAX 425-356-2626
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CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1420 - 5th Ave , Unit 2400 Seattle, WA 98101	DATE:	10/24/2023
		ALS SDG#:	EV23100095
		WDOE ACCREDITATION:	C601
CLIENT CONTACT:	Kyle Haslam		
CLIENT PROJECT:	30159457		

LABORATORY CONTROL SAMPLE RESULTS

ALS Test Batch ID: 202366 - Water by NWTPH-DX

SPIKED COMPOUND	METHOD	%REC	RPD	QUAL	LIMITS MIN	LIMITS MAX	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range - BS	NWTPH-DX	**82.2**			67	125	10/23/2023	DHM
TPH-Diesel Range - BSD	NWTPH-DX	**84.0**	**2**		67	125	10/23/2023	DHM

APPROVED BY

Rob Greer
Laboratory Director

ADDRESS 8620 Holly Drive, Suite 100, Everett, WA 98208 | PHONE 425-356-2600 | FAX 425-356-2626
ALS Group USA, Corp dba ALS Environmental

ALS Environmental
8620 Holly Drive, Suite 100
Everett, WA 98208
Phone (425) 356-2600
Fax (425) 356-2626
http://www.alsglobal.com

Chain Of Custody/ Laboratory Analysis Request

Ext

ALS Job# (Laboratory Use Only)

EV2310095

Date 10-17 Page 1 Of 1

PROJECT ID: 3015945 7.
REPORT TO COMPANY: Arcadis
PROJECT MANAGER: Kyle Johnson
ADDRESS: 1420 5th Ave. 98101 Ste. 2400
PHONE: 206-719-6991 P.O. #:
E-MAIL: Kyle.Johnson@arcadis.com
INVOICE TO COMPANY:
ATTENTION:
ADDRESS:

SAMPLE I.D.	DATE	TIME	TYPE	LAB#	NWTPH-HCID	NWTPH-DX w/o SGC LL	NWTPH-GX	BTEX by EPA 8021 BTEX by EPA 8260	MTBE by EPA 8021 MTBE by EPA 8260	Halogenated Volatiles by EPA 8260	Volatile Organic Compounds by EPA 8260	EDB / EDC by EPA 8260 SIM (water)	EDB / EDC by EPA 8260 (soil)	Semivolatile Organic Compounds by EPA 8270	Polycyclic Aromatic Hydrocarbons (PAH) by EPA 8270 SIM	PCB by EPA 8082 Pesticides by EPA 8081	Metals-MTCA-5 RCRA-8 Pri Pol TAL	Metals Other (Specify)	TCLP-Metals VOA Semi-Vol Pest Herbs	OTHER (Specify)	NUMBER OF CONTAINERS	RECEIVED IN GOOD CONDITION?
1. GW-1_101723	10-17	1240	W	1		X																
2. DUP-1	10-17	/	W	2		X																
3.																						
4.																						
5.																						
6.																						
7.																						
8.																						
9.																						
10.																						

4.8C

SPECIAL INSTRUCTIONS

SIGNATURES (Name, Company, Date, Time):

1. Relinquished By: Kyle Johnson, Arcadis 10-17, 1512
   Received By: Shawn Robinson ALS 10/17/23 1512
2. Relinquished By:
   Received By:

TURNAROUND REQUESTED in Business Days*

Organic, Metals & Inorganic Analysis: ~~10~~ Standard | 5 | 3 | 2 | 1 | SAME DAY

Fuels & Hydrocarbon Analysis: ~~5~~ Standard | 3 | 1 | SAME DAY

OTHER:
Specify: Standard

*Turnaround request less than standard may incur Rush Charges

ALS ENVIRONMENTAL

Sample Receiving Checklist

Client: Arcadis ALS Job #: EV2360095

Project: 30159457

Received Date: 10/17/03 Received Time: 1512 By: Shm

Type of shipping container: Cooler ___ Box ___ Other ___

Shipped via: FedEx Ground ___ UPS ___ Mail ___ Courier ___ Hand Delivered ___
FedEx Express ___

	Yes	No	N/A
Were custody seals on outside of shipping container?			
If yes, how many? ___ Where? ___			
Custody seal date: ___ Seal name: ___			
Was Chain of Custody properly filled out (ink, signed, dated, etc.)?	✓		
Did all bottles have labels?	✓		
Did all bottle labels and tags agree with Chain of Custody?	✓		
Were samples received within hold time?	✓		
Did all bottles arrive in good condition (unbroken, etc.)?	✓		
Was sufficient amount of sample sent for the tests indicated?	✓		
Was correct preservation added to samples?	✓		

If no, Sample Control added preservative to the following:

Sample Number	Reagent	Analyte

Were VOA vials checked for absence of air bubbles? ✓

Bubbles present in sample #: ___

Temperature of cooler upon receipt: 5.8°C in ice Cold Cool Ambient N/A

Explain any discrepancies: ___

Was client contacted? ___ Who was called? ___ By whom? ___ Date: ___

Outcome of call: ___

Appendix B

Data Validation Reports

BNSF Skykomish

DATA REVIEW

Skykomish, Washington

Total Petroleum Hydrocarbon (TPH) Analyses

SDG #: EV23040003

Analyses Performed By:
ALS Environmental
Everett, Washington

Report #: 49616R
Project: 30159458.02

1 Summary

This data quality assessment summarizes the review of Sample Delivery Group (SDG) # EV23040003 for samples collected in association with the BNSF Skykomish, Washington. The review was conducted as a Tier II evaluation and included review of data package completeness. Only analytical data as reported by the laboratory were reviewed for this validation. Field documentation was not included in this review. Included with this assessment are the validation annotated sample result sheets, and chain of custody records. Analyses were performed on the following samples:

Sample ID	Lab ID	Matrix	Sample Collection Date	Parent Sample	Analysis
					TPH
1C-W-8	EV23040003-01	Water	03/28/2023		X
5-W-17	EV23040003-02	Water	03/28/2023		X
5-W-16	EV23040003-03	Water	03/28/2023		X
5-W-55	EV23040003-04	Water	03/28/2023		X
1C-W-4	EV23040003-05	Water	03/28/2023		X
5-W-56	EV23040003-06	Water	03/28/2023		X
5-W-14	EV23040003-07	Water	03/28/2023		X
5-W-19	EV23040003-08	Water	03/28/2023		X
5-W-18	EV23040003-09	Water	03/28/2023		X
DUP-1	EV23040003-10	Water	03/28/2023	5-W-14	X
EW-2A	EV23040003-11	Water	03/29/2023		X
MW-4	EV23040003-12	Water	03/29/2023		X
EW-1	EV23040003-13	Water	03/29/2023		X
5-W-43	EV23040003-14	Water	03/29/2023		X
2-A-W-40	EV23040003-15	Water	03/29/2023		X
GW-1	EV23040003-16	Water	03/29/2023		X
GW-3	EV23040003-17	Water	03/29/2023		X
GW-2	EV23040003-18	Water	03/29/2023		X
5W-51	EV23040003-19	Water	03/29/2023		X
1B-W-23	EV23040003-20	Water	03/29/2023		X
2A-W-9	EV23040003-21	Water	03/29/2023		X
1C-W-7	EV23040003-22	Water	03/29/2023		X
2A-W-41	EV23040003-23	Water	03/29/2023		X
GW-4	EV23040003-24	Water	03/30/2023		X
S3-CD	EV23040003-25	Water	03/30/2023		X
S4-CD	EV23040003-26	Water	03/30/2023		X
S4-AD	EV23040003-27	Water	03/30/2023		X
S4-BD	EV23040003-28	Water	03/30/2023		X

Sample ID	Lab ID	Matrix	Sample Collection Date	Parent Sample	Analysis
					TPH
S3-AD	EV23040003-29	Water	03/30/2023		X
S1-BU	EV23040003-30	Water	03/30/2023		X
S4-AU	EV23040003-31	Water	03/30/2023		X
S1-AU	EV23040003-32	Water	03/30/2023		X
S3-BD	EV23040003-33	Water	03/30/2023		X
S4-CU	EV23040003-34	Water	03/30/2023		X
S3-CU	EV23040003-35	Water	03/30/2023		X
S4-BU	EV23040003-36	Water	03/30/2023		X
DUP-2	EV23040003-37	Water	03/29/2023	2-A-W-40	X
DUP-3	EV23040003-38	Water	03/29/2023	EW-2A	X
S1-BD	EV23040003-39	Water	03/30/2023		X
S2-BU	EV23040003-40	Water	03/30/2023		X
S2-BD	EV23040003-41	Water	03/30/2023		X
S3-AU	EV23040003-42	Water	03/30/2023		X
S1-AD	EV23040003-43	Water	03/30/2023		X
S3-BU	EV23040003-44	Water	03/30/2023		X
S2-AD	EV23040003-45	Water	03/30/2023		X
2A-W-42	EV23040003-46	Water	03/30/2023		X
S2-AU	EV23040003-47	Water	03/30/2023		X
DUP-4	EV23040003-48	Water	03/30/2023	S3 AU	X
EQUIPMENT BLANK	EV23040003-49	Water	03/30/2023		X

2 Analytical Data Package Documentation

The table below is the evaluation of the data package completeness.

Items Reviewed	Reported		Performance Acceptable		Not Required
	No	Yes	No	Yes	
1. Sample receipt condition		X		X	
2. Requested analyses and sample results		X		X	
3. Master tracking list		X		X	
4. Methods of analysis		X		X	
5. Reporting limits		X		X	
6. Sample collection date		X		X	
7. Laboratory sample received date		X		X	
8. Sample preservation verification (as applicable)		X		X	
9. Sample preparation/extraction/analysis dates		X		X	
10. Fully executed Chain-of-Custody (COC) form		X		X	
11. Narrative summary of Quality Assurance (QA) or sample problems provided		X		X	
12. Data Package Completeness and Compliance		X		X	

3 Organic Analysis Introduction

Analyses were performed according to United States Environmental Protection Agency (USEPA) Method NWTPH-DX. Data were reviewed in accordance with USEPA CLP National Functional Guidelines for Organic Superfund Methods Data Review, document number EPA 540-R-20-005, November 2020 (with reference to the historical USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review, OSWER 9240.1-05A-P, October 1999, as appropriate).

The data review process is an evaluation of data on a technical basis rather than a determination of contract compliance. As such, the standards against which the data are being weighed may differ from those specified in the analytical method. It is assumed that the data package represents the best efforts of the laboratory and had already been subjected to sufficient quality review prior to submission.

During the review process, laboratory qualified and unqualified data are verified against the supporting documentation. Based on this evaluation, qualifier codes may be added, deleted, or modified by the data reviewer. Results are qualified with the following codes in accordance with USEPA National Functional Guidelines:

- J The compound was positively identified; however, the associated numerical value is an estimated concentration only.
- J+ The result is an estimated quantity, but the result may be biased high.
- J- The result is an estimated quantity, but the result may be biased low.
- UJ The compound was not detected above the reported sample quantitation limit. However, the reported limit is approximate and may or may not represent the actual limit of quantitation.
- NJ The analysis indicates the presence of a compound for which there is presumptive evidence to make a tentative identification. The associated numerical value is an estimated concentration only.
- U The compound was analyzed for but not detected. The associated value is the compound quantitation limit.
- R The sample results are rejected as unusable. The compound may or may not be present in the sample.

Two facts should be noted by all data users. First, the “R” flag means that the associated value is unusable. In other words, due to significant quality control (QC) problems, the analysis is invalid and provides no information as to whether the compound is present or not. “R” values should not appear on data tables because they cannot be relied upon, even as a last resort. The second fact to keep in mind is that no compound concentration, even if it has passed all QC tests, is guaranteed to be accurate. Strict QC serves to increase confidence in data, but any value potentially contains error.

4 Total Petroleum Hydrocarbons (TPH) Analyses

4.1 Holding Times

The specified holding times for the following methods are presented in the following table.

Method	Matrix	Holding Time	Preservation
NWTPH-DX	Water	14 days from collection to extraction and 40 days from extraction to analysis (preserved) 7 days from collection to extraction and 40 days from extraction to analysis (Unpreserved)	Cool to <6 °C

The analyses that exceeded the holding are presented in the following table.

Sample IDs	Holding Time	Criteria
1C-W-8 5-W-17 5-W-16 5-W-55 1C-W-4 5-W-56 5-W-14 5-W-19 5-W-18 DUP-1 EW-2A MW-4 EW-1 5-W-43 2-A-W-40 GW-1 GW-3 GW-2 5W-51 1B-W-23 2A-W-9 1C-W-7 2A-W-41 GW-4 S3-CD S4-CD	6.4°C	Cool to <6 °C

Sample IDs	Holding Time	Criteria
S4-AD		
S4-BD		
S3-AD		
S1-BU		
S4-AU		
S1-AU		
S3-BD		
S4-CU		
S3-CU		
S4-BU		
DUP-2		
DUP-3		
S1-BD		
S2-BU		
S2-BD		
S3-AU		
S1-AD		
S3-BU		
S2-AD		
2A-W-42		
S2-AU		
DUP-4		
EQUIPMENT BLANK		

Sample results associated with sample locations analyzed by analytical method NWTPH-DX were qualified, as specified in the table below. All other holding times were met.

Criteria	Qualification	
	Detected Analytes	Non-detect Analytes
Analysis completed past holding time	J	UJ

4.2 Blank Contamination

Quality assurance (QA) blanks (i.e. laboratory method blanks and equipment rinse blanks) are prepared to identify any contamination which may have been introduced into the samples during sample preparation or field activity. Method blanks measure laboratory contamination. Rinse blanks also measure contamination of samples during field operations.

Target compounds were not detected above the RL in the associated blanks; therefore, detected sample results are not associated with blank contamination.

4.3 Surrogates/System Monitoring Compounds

All samples to be analyzed for organic compounds are spiked with surrogate compounds prior to sample preparation to evaluate overall laboratory performance and efficiency of the analytical technique. The analysis requires surrogate compounds exhibit recoveries within the laboratory-established acceptance limits.

All samples exhibited surrogate recoveries within the control limits with the exceptions noted below.

Sample IDs	Surrogate	Recovery
EW-2A GW-1	C25	> UL

Note:

UL Upper control limit

The criteria used to evaluate the surrogate recoveries are presented in the following table. In the case of a surrogate deviation, the sample results are qualified as documented in the table below.

Control Limit	Sample Result	Qualification
> UL	Non-detect	No Action
	Detect	J
< LL but > 10%	Non-detect	UJ
	Detect	J
< 10%	Non-detect	R
	Detect	J
Surrogates diluted below the calibration curve due to the high concentration of a target compounds	Non-detect	UJ[1]
	Detect	J[1]

Note:

[1] A more concentrated analysis was not performed with surrogate compounds within the calibration range; therefore, no determination of extraction efficiency could be made.

4.4 Matrix Spike/Matrix Spike Duplicate (MS/MSD) Analysis

MS/MSD data are used to assess the precision and accuracy of the analytical method. The compounds used to perform the MS/MSD analysis must exhibit a percent recovery within the laboratory-established acceptance limits. The relative percent difference (RPD) between the MS/MSD recoveries must exhibit an RPD within the laboratory-established acceptance limits.

Note: The MS/MSD recovery control limits do not apply for MS/MSD performed on samples where the compound concentration detected in the parent sample exceeds the MS/MSD concentration by a factor of four or greater.

MS/MSD analysis was performed on a sample S4-AU. MS/MSD analysis exhibited recoveries and RPDs within the control limits.

4.5 Laboratory Control Sample/Laboratory Control Sample Duplicate (LCS/LCSD) Analysis

The LCS/LCSD analysis is used to assess the precision and accuracy of the analytical method independent of matrix interferences. The compounds associated with the LCS/LCSD analysis must exhibit a percent recovery within the laboratory-established acceptance limits. The RPD between the LCS and LCSD results must be within the laboratory-established acceptance limits.

All compounds associated with the LCS/LCSD analyses exhibited recoveries and RPDs within the control limits.

4.6 Field Duplicate Sample Analysis

The field duplicate sample analysis is used to assess the precision of the field sampling procedures and analytical method. The control limit of 30% for water matrices and 50% for soil matrices is applied to the RPD between the parent sample and the field duplicate sample results. In the instance when the parent and/or duplicate sample concentrations are less than or equal to five times the reporting limit (RL), a control limit of two times the RL for water matrices or three times the RL for soil matrices is applied to the difference between the results.

Results for duplicate samples are summarized in the following table.

Sample ID/Duplicate ID	Compound	Sample Result (UG/L)	Duplicate Result (UG/L)	RPD
5-W-14 / DUP-1	All compounds	U	U	AC
2-A-W-40 / DUP-2	TPH-Oil Range	280	330	AC
EW-2A / DUP-3	All compounds	U	U	AC
S3-AU / DUP-4	TPH-Diesel Range	160	170	AC

Note:

AC Acceptable

The calculated RPDs between the parent sample and field duplicate were acceptable.

4.7 Compound Identification

The retention times of all quantitated peaks must fall within the calculated retention time windows.

All identified compounds met the specified criteria.

4.8 System Performance and Overall Assessment

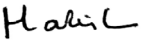
Overall system performance was acceptable. Other than for those deviations specifically mentioned in this review, the overall data quality is within the guidelines specified in the method.

4.9 Data Validation Checklist for Total Petroleum Hydrocarbon (TPH)

TPH: NWTPH-DX	Reported		Performance Acceptable		Not Required
	No	Yes	No	Yes	
Gas Chromatography/Flame- and Photo- Ionization Detectors (GC/FID/PID)					
Tier II Validation					
Holding Times/Preservation		X	X		
Reporting Limits (Units)		X		X	
Blanks					
A. Method Blanks		X		X	
B. Trip Blanks	X				X
C. Equipment Blanks		X		X	
Surrogates Accuracy (%R)		X	X		
Matrix Spike (MS) %R		X		X	
Matrix Spike Duplicate (MSD) %R		X		X	
MS/MSD Precision (RPD)		X		X	
Laboratory Control Sample (LCS) %R		X		X	
Laboratory Control Sample Duplicate (LCSD) %R		X		X	
LCS/LCSD RPD		X		X	
Laboratory Duplicate Sample RPD	X				X
Field Duplicate Sample RPD		X		X	
Dilution Factor		X		X	
Moisture Content	X				X

Notes:

%R - percent recovery
RPD - relative percent difference

Validation Performed By:	Hareesha Naik
Signature:	
Date:	May 09, 2023
Peer Review:	Jennifer Singer
Date:	May 9, 2023

EV2304 0003

Company Name/Addr:
Arcadis - ~~Chevron - WA~~

1100 Olive Way
Suite 800
Seattle. WA 98101

Billing Information:
Attn: Accounts Payable
630 Plaza Dr., Ste. 600
Highlands Ranch, CO 80129

Pres Chk

Report to:
~~James O'Connell/Sydney Clark~~ KYLE HASLAM

Email To: KYLE.HASLAM@ARCADIS.COM
~~Sydney.Clark@arcadis.com;Amanda.Bowring@a~~

Project Description:
~~200410~~ BNSF SKYKOMISH

City/State Collected: SKYKOMISH, WA

Please Circle: PT MT CT ET

Phone: ~~206-325-5254~~ 206 726 4753

Client Project # 30144053
~~30063829.25.21~~ BNSF SKYKOMISH

Lab Project #
~~CHEVARCWA 200410~~

Collected by (print):
~~ELIZABETH~~ SCHELLER

Site/Facility ID #
~~15510 AURORA AVE N~~

P.O. #

Collected by (signature):

Immediately
Packed on Ice N ___ Y X

Rush? (Lab MUST Be Notified)
___ Same Day ___ Five Day
___ Next Day ___ 5 Day (Rad Only)
___ Two Day ___ 10 Day (Rad Only)
___ Three Day

Date Results Needed

Quote #

No. of Cntrs

Analysis / Container / Preservative

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	BTEXM,EDB,EDC 8260D 40mlAmb/MeOH10ml/Syr	NWTPHDX no silica ~~8ozClr-NoPres~~	NWTPHGX 40mlAmb/MeOH10ml/Syr	Total Lead 6010 8ozClr-NoPres						Remarks	Sample # (lab only)
IC-W-8	G	~~GW~~ SS		3-28-23	0945	1		X							1		
S-W-17		GW ~~SS~~			0950	1		X							2		
S-W-16		~~SS~~			1115	1		X							3		
S-W-55		~~SS~~			1610	1		X							4		
IC-W-4		SS			1100	1		X							5		
S-W-56		~~SS~~			1605	1		X							6		
S-W-14		~~SS~~			1240	1		X							7		
S-W-19		~~SS~~			1408	1		X							8		
S-W-18		~~SS~~			~~1510~~	1		X							9		
DUP-1		~~SS~~			—	1		X							10		

Chain of Custody Page 1 of 1

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SDG # EV2304 0003

Table #

Acctnum: ~~CHEVARCWA~~

Template: ~~T220745~~

Prelogin: ~~P967072~~

~~PM: 110 - Brian Ford~~

PB:

Shipped Via:

* Matrix:
SS - Soil **AIR** - Air **F** - Filter
GW - Groundwater **B** - Bioassay
WW - WasteWater
DW - Drinking Water
OT - Other_____

Remarks:
STD TAT

pH _____ Temp _____
Flow _____ Other _____

Samples returned via:
___ UPS ___ FedEx ___ Courier

Tracking #

Sample Receipt Checklist
COC Seal Present/Intact: ___NP ___Y ___N
COC Signed/Accurate: ___Y ___N
Bottles arrive intact: ___Y ___N
Correct bottles used: ___Y ___N
Sufficient volume sent: ___Y ___N
If Applicable
VOA Zero Headspace: ___Y ___N
Preservation Correct/Checked: ___Y ___N
RAD Screen <0.5 mR/hr: ___Y ___N

Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Trip Blank Received: Yes / No HCL / MeoH TBR	If preservation required by Login: Date/Time
	3-31-23	1520	3-31-23 15:20		
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Temp: °C Bottles Received:	
Relinquished by: (Signature)	Date:	Time:	Received for lab by: (Signature)	Date: Time:	Hold: Condition: NCF / OK

EV23040003

Company Name/Address:
Arcadis ~~Chevron - WA~~
1100 Olive Way
Suite 800
Seattle, WA 98101

Billing Information:
Attn: Accounts Payable
630 Plaza Dr., Ste. 600
Highlands Ranch, CO 80129

Pres Chk

Report to: James O'Connell/Sydney Clark

Email To: Sydney.Clark@arcadis.com;Amanda.Bowring@a

Project Description: ~~200410~~

City/State Collected:

Please Circle: PT MT CT ET

Phone: ~~206-325-5254~~

Client Project # ~~30063829.25.21~~ BNSF SKY Kent

Lab Project # ~~CHEVARCWA-200410~~

Collected by (print):

Site/Facility ID # ~~15510 AURORA AVE N~~

P.O. #

Collected by (signature):

Immediately Packed on Ice N____ Y____

Rush? (Lab MUST Be Notified)
____ Same Day ____ Five Day
____ Next Day ____ 5 Day (Rad Only)
____ Two Day ____ 10 Day (Rad Only)
____ Three Day

Quote #

Date Results Needed

Analysis / Container / Preservative

Chain of Custody Page 2 of 6

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SDG # EV23040003

Table #

Acctnum: CHEVARCWA
Template: T220745
Prelogin: P967072
PM: 110 - Brian Ford
PB:

Shipped Via:

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	BTEXM,EDB,EDC 8260D 40mlAmb/MeOH10ml/Syr	NWTPHDX no silica ~~6ozClr-NoPres~~	NWTPHGX 40mlAmb/MeOH10ml/Syr	Total Lead 6010 8ozClr-NoPres	NWTPH-Dx W/SGC					Remarks	Sample # (lab only)
EW-2A	G	~~SS~~ GW		3-29-23	1702	1		X							11		
MW-4		~~SS~~			1015	1		X							12		
EW-1		~~SS~~			1220	1		X							13		
5-W-43		~~SS~~			1250	1		X							14		
2-A-W-40		~~SS~~			1445	1		X							15		
GW-1		~~SS~~			1210	1		X							16		
GW-3		~~SS~~			1700	2		X			X				17		
GW-2		~~SS~~			1345	1		X							18		
SW-51		~~SS~~			1300	1		X							19		
IB-W-23	↓	~~SS~~ ↓		↓	1535	1		X							20		

* Matrix:
SS - Soil **AIR** - Air **F** - Filter
GW - Groundwater **B** - Bioassay
WW - WasteWater
DW - Drinking Water
OT - Other_____

Remarks: STD TAT

pH _____ Temp _____

Flow _____ Other _____

Samples returned via:
__ UPS __ FedEx __ Courier _____

Tracking #

Sample Receipt Checklist
COC Seal Present/Intact: __NP __Y __N
COC Signed/Accurate: __Y __N
Bottles arrive intact: __Y __N
Correct bottles used: __Y __N
Sufficient volume sent: __Y __N
If Applicable
VOA Zero Headspace: __Y __N
Preservation Correct/Checked: __Y __N
RAD Screen <0.5 mR/hr: __Y __N

Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Trip Blank Received: Yes / No HCL / MeoH TBR	If preservation required by Login: Date/Time
	3-31-23	1520	3-31-23 17:20		
Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Temp: °C Bottles Received:	
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature)	Date: Time:	Hold: Condition: NCF / OK

EV2304003

Chain of Custody Page 3 of 6

Company Name/Address:
Arcadis - Chevron - WA

1100 Olive Way
Suite 800
Seattle, WA 98101

Billing Information:
Attn: Accounts Payable
630 Plaza Dr., Ste. 600
Highlands Ranch, CO 80129

Pres Chk

Report to:
~~James O'Connell/Sydney Clark~~

Email To:
~~Sydney.Clark@arcadis.com,Amanda.Bowring@a~~

Project Description:
~~208410~~

City/State Collected:

Please Circle: PT MT CT ET

Phone: ~~206-325-5254~~

Client Project #
~~30063829.25.21~~
BNSF SKYKOMISH

Lab Project #
~~CHEVARCWA-200410~~

Collected by (print):

Site/Facility ID #
~~15510 AURORA AVE N~~

P.O. #

Collected by (signature):

Immediately
Packed on Ice N____ Y____

Rush? (Lab MUST Be Notified)
____ Same Day ____ Five Day
____ Next Day ____ 5 Day (Rad Only)
____ Two Day ____ 10 Day (Rad Only)
____ Three Day

Quote #

Date Results Needed

No. of Cntrs

Analysis / Container / Preservative

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	BTEXM,EDB,EDC 8260D 40mlAmb/MeOH10ml/Syr	NWTPHDX no silica 8ozClr-NoPres	NWTPHGX 40mlAmb/MeOH10ml/Syr	Total Lead 6010 8ozClr-NoPres	NWTPHDX SGC				
2A-W-9	G	~~SS~~ GW		3-29-23	1155	1		X							21
1C-W-7		~~SS~~			1410	1		X							22
2A-W-41		~~SS~~			1600	2		X			X				23
GW-4		~~SS~~		3-30-23	1750	1		X							24
S3-CD		~~SS~~			1449	1		X							25
S4-CD		~~SS~~			1655	1		X							26
S4-AD		~~SS~~			1549	1		X							27
S4-BD		~~SS~~			1624	1		X							28
S3-AD		~~SS~~			1316	1		X							29
S1-BU		~~SS~~			1205	1		X							30

Remarks | Sample # (lab only)

* Matrix:
SS - Soil **AIR** - Air **F** - Filter
GW - Groundwater **B** - Bioassay
WW - WasteWater
DW - Drinking Water
OT - Other_____

Remarks: STD TAT

pH _____ Temp _____
Flow _____ Other _____

Samples returned via:
__ UPS __ FedEx __ Courier _____

Tracking #

Sample Receipt Checklist
COC Seal Present/Intact: __NP __Y __N
COC Signed/Accurate: __Y __N
Bottles arrive intact: __Y __N
Correct bottles used: __Y __N
Sufficient volume sent: __Y __N
If Applicable
VOA Zero Headspace: __Y __N
Preservation Correct/Checked: __Y __N
RAD Screen <0.5 mR/hr: __Y __N

Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Trip Blank Received: Yes / No HCL / MeoH TBR
	3-31-23	1520	3-31-23 15:20	
Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Temp: °C Bottles Received:
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature)	Date: Time:

If preservation required by Login: Date/Time

Hold: Condition: NCF / OK

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SDG #

Table #

Acctnum: CHEVARCWA
Template: T220745
Prelogin: P967072
PM: 110 - Brian Ford
PB:

Shipped Via:

EV2304003

Company Name/Address:
Arcadis - Chevron - WA

1100 Olive Way
Suite 800
Seattle, WA 98101

Billing Information:
Attn: Accounts Payable
630 Plaza Dr., Ste. 600
Highlands Ranch, CO 80129

Pres Chk

Report to:
James O'Connell/Sydney Clark

Email To:
Sydney.Clark@arcadis.com;Amanda.Bowring@a

Project Description:
200410

City/State Collected:

Please Circle: PT MT CT ET

Phone: 206-325-5254

Client Project #
30063829.25.21
BNSF SKYKOMISH

Lab Project #
CHEVARCWA-200410

Collected by (print):

Site/Facility ID #
15510 AURORA AVE N

P.O. #

Collected by (signature):

Immediately
Packed on Ice N____ Y____

Rush? (Lab MUST Be Notified)
____ Same Day ____ Five Day
____ Next Day ____ 5 Day (Rad Only)
____ Two Day ____ 10 Day (Rad Only)
____ Three Day

Quote #

Date Results Needed

Analysis / Container / Preservative

Chain of Custody Page 4 of 6

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SDG #

Table #

Acctnum: CHEVARCWA
Template: T220745
Prelogin: P967072
PM: 110 - Brian Ford
PB:

Shipped Via:

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	BTEXM,EDB,EDC 8260D 40mlAmb/MeOH10ml/Syr	NWTPHDX no silica 8ozClr-NoPres	NWTPHGX 40mlAmb/MeOH10ml/Syr	Total Lead 6010 8ozClr-NoPres						Remarks	Sample # (lab only)
S4-AU	G	GW SS		3-30-23	1550	3		X							31	MS/MSD	
~~MS~~		SS			1550	1		X							32		
~~MSD~~		SS			1550	1		X							33		
S1-AU		SS			1235	1		X							34	32	
S3-BD		SS			1355	1		X							35	33	
S4-CU		SS			1700	1		X							36	34	
S3-CU		SS			1448	1		X							37	35	
S4-BU		SS			1630	1		X							38	36	
DUP-2		SS		3-29-23	—	1		X							39	37	
DUP-3	X	X SS		3-29-23	—	1		X							40	38	

* Matrix:
SS - Soil AIR - Air F - Filter
GW - Groundwater B - Bioassay
WW - WasteWater
DW - Drinking Water
OT - Other_____

Remarks: STD TAT

pH _____ Temp _____
Flow _____ Other _____

Sample Receipt Checklist
COC Seal Present/Intact: __NP __Y __N
COC Signed/Accurate: __Y __N
Bottles arrive intact: __Y __N
Correct bottles used: __Y __N
Sufficient volume sent: __Y __N
If Applicable
VOA Zero Headspace: __Y __N
Preservation Correct/Checked: __Y __N
RAD Screen <0.5 mR/hr: __Y __N

Samples returned via:
__ UPS __ FedEx __ Courier _____

Tracking #

Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Trip Blank Received: Yes / No HCL / MeoH TBR	If preservation required by Login: Date/Time
	3-31-23	1520	3-31-23 15:20		
Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Temp: °C Bottles Received:	
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature)	Date: Time:	Hold: Condition: NCF / OK

EV2304 0003

Company Name/Address:
Arcadis ~~Chevron - WA~~

1100 Olive Way
Suite 800
Seattle. WA 98101

Billing Information:
Attn: Accounts Payable
630 Plaza Dr., Ste. 600
Highlands Ranch, CO 80129

Pres Chk

Report to:
James O'Connell/Sydney Clark

Email To:
Sydney.Clark@arcadis.com;Amanda.Bowring@a

Project Description:
200410

City/State Collected:

Please Circle: PT MT CT ET

Phone: **~~206-325-5254~~**

Client Project #
30063829.25.21
BNSF Skykomish

Lab Project #
~~CHEVARCWA-200410~~

Collected by (print):

Site/Facility ID #
~~15510 AURORA~~ AVE N

P.O. #

Collected by (signature):

Immediately
Packed on Ice N____ Y____

Rush? (Lab MUST Be Notified)
____ Same Day ____ Five Day
____ Next Day ____ 5 Day (Rad Only)
____ Two Day ____ 10 Day (Rad Only)
____ Three Day

Quote #

Date Results Needed

No. of Cntrs

Analysis / Container / Preservative

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	BTEXM,EDB,EDC 8260D 40mlAmb/MeOH10ml/Syr	NWTPHDX no silica ~~8ozCl-NoPres~~	NWTPHGX 40mlAmb/MeOH10ml/Syr	Total Lead 6010 8ozCl-NoPres						Remarks	Sample # (lab only)
~~S1-BU~~	G	~~GW~~ SS		~~3-30-23~~	1205	1		X							~~41~~	NOT RECEIVED	
S1-BD		SS			1120	1		X							~~42~~	39	
S2-BU		~~SS~~			0955	1		X							~~43~~	40	
S2-BD		~~SS~~			0907	1		X							~~44~~	41	
S3-AU		~~SS~~			1356	1		X							~~45~~	42	
S1-AD		~~SS~~			1126	1		X							~~46~~	43	
S3-BU		~~SS~~			1321	1		X							~~47~~	44	
S2-AD		~~SS~~			0905	1		X							~~48~~	45	
2A-W-42		~~SS~~			1818	1		X							~~49~~	46	
S2-AU	↓	~~SS~~		↓	0945	1		X							~~50~~	47	

Chain of Custody Page ~~5~~ 6 of ~~6~~

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12065 Lebanon Rd Mount Juliet, TN 37122
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SDG #

Table #

Acctnum: **CHEVARCWA**
Template: **T220745**
Prelogin: **P967072**
PM: **110 - Brian Ford**
PB:

Shipped Via:

* Matrix:
SS - Soil **AIR** - Air **F** - Filter
GW - Groundwater **B** - Bioassay
WW - WasteWater
DW - Drinking Water
OT - Other_____

Remarks:
STD TAT

pH _____ Temp _____
Flow _____ Other _____

Samples returned via:
__ UPS __ FedEx __ Courier _____

Tracking #

Sample Receipt Checklist
COC Seal Present/Intact: __NP __Y __N
COC Signed/Accurate: __Y __N
Bottles arrive intact: __Y __N
Correct bottles used: __Y __N
Sufficient volume sent: __Y __N
If Applicable
VOA Zero Headspace: __Y __N
Preservation Correct/Checked: __Y __N
RAD Screen <0.5 mR/hr: __Y __N

Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Trip Blank Received: Yes / No HCL / MeoH TBR	If preservation required by Login: Date/Time
	3-31-23	1520	3-31-23 15:20		
Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Temp: °C Bottles Received:	
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature)	Date: Time:	Hold: Condition: NCF / OK

EV23040003

Company Name/Address:
Arcadis - ~~Chevron~~ - WA

1100 Olive Way
Suite 800
Seattle, WA 98101

Billing Information:
Attn: Accounts Payable
630 Plaza Dr., Ste. 600
Highlands Ranch, CO 80129

Pres Chk

Report to:
James O'Connell/Sydney Clark

Email To:
~~Sydney.Clark@arcadis.com~~;Amanda.Bowring@a

Project Description:
~~200410~~

City/State Collected:

Please Circle: PT MT CT ET

Phone: ~~206-325-5254~~

Client Project #
~~30063829.25.21~~
BNSF SKYLONTST

Lab Project #
CHEVARCWA-200410

Collected by (print):

Site/Facility ID #
~~15510 AURORA AVE N~~

P.O. #

Collected by (signature):

Immediately Packed on Ice N____ Y____

Rush? (Lab MUST Be Notified)
____ Same Day ____ Five Day
____ Next Day ____ 5 Day (Rad Only)
____ Two Day ____ 10 Day (Rad Only)
____ Three Day

Quote #

Date Results Needed

No. of Cntrs

Analysis / Container / Preservative

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	BTEXM,EDB,EDC 8260D 40mlAmb/MeOH10ml/Syr	NWTPHDX no silica ~~8ozClr-NoPres~~	NWTPHGX 40mlAmb/MeOH10ml/Syr	Total Lead 6010 ~~8ozClr-NoPres~~						
DUP- 4	G	~~GW~~ SS		3-30-23	—	1		X							~~51~~ 48	
EQUIPMENT BLANK	—	~~GW~~ SS		3-30-23	~~1300~~ 1320	1		X							~~52~~ 49	
		SS														
		SS														
		SS														
		SS														
		SS														
		SS														
		SS														
		SS														

* Matrix:
SS - Soil **AIR** - Air **F** - Filter
GW - Groundwater **B** - Bioassay
WW - WasteWater
DW - Drinking Water
OT - Other_____

Remarks: STD TAT

pH _____ Temp _____
Flow _____ Other _____

Samples returned via:
__UPS __FedEx __Courier

Tracking #

Sample Receipt Checklist
COC Seal Present/Intact: __NP __Y __N
COC Signed/Accurate: __Y __N
Bottles arrive intact: __Y __N
Correct bottles used: __Y __N
Sufficient volume sent: __Y __N
If Applicable
VOA Zero Headspace: __Y __N
Preservation Correct/Checked: __Y __N
RAD Screen <0.5 mR/hr: __Y __N

Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Trip Blank Received: Yes / No HCL / MeoH TBR	If preservation required by Login: Date/Time
	3-31-23	1520	3:31-23 15:20		
Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Temp: °C Bottles Received:	
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature)	Date: Time:	Hold: Condition: NCF / OK

Chain of Custody Page 6 of 6

Pace
PEOPLE ADVANCING SCIENCE

MT JULIET, TN
12065 Lebanon Rd Mount Juliet, TN 37122
Submitting a sample via this chain of custody constitutes acknowledgment and acceptance of the Pace Terms and Conditions found at: https://info.pacelabs.com/hubfs/pas-standard-terms.pdf

SDG #

Table #

Acctnum: **CHEVARCWA**
Template: **T220745**
Prelogin: **P967072**
PM: **110 - Brian Ford**
PB:

Shipped Via:

Remarks | Sample # (lab only)

CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1100 Olive Way, Suite 800 Seattle, WA 98101	DATE:	4/12/2023
		ALS JOB#:	EV23040003
		ALS SAMPLE#:	EV23040003-01
CLIENT CONTACT:	Kyle Haslam	DATE RECEIVED:	03/31/2023
CLIENT PROJECT:	BNSF Skykomish	COLLECTION DATE:	3/28/2023 9:45:00 AM
CLIENT SAMPLE ID	1C-W-8	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U UJ	100	1	UG/L	04/07/2023	DHM
TPH-Oil Range	NWTPH-DX	U	100	1	UG/L	04/07/2023	DHM

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**103**	04/07/2023	DHM

U - Analyte analyzed for but not detected at level above reporting limit.

ADDRESS 8620 Holly Drive, Suite 100, Everett, WA 9820 | PHONE 425-356-2600 | FAX 425-356-2626
ALS Group USA, Corp dba ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1100 Olive Way, Suite 800 Seattle, WA 98101	DATE:	4/12/2023
		ALS JOB#:	EV23040003
		ALS SAMPLE#:	EV23040003-02
CLIENT CONTACT:	Kyle Haslam	DATE RECEIVED:	03/31/2023
CLIENT PROJECT:	BNSF Skykomish	COLLECTION DATE:	3/28/2023 9:50:00 AM
CLIENT SAMPLE ID	5-W-17	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U	100	1	UG/L	04/07/2023	DHM
TPH-Oil Range	NWTPH-DX	U UJ	100	1	UG/L	04/07/2023	DHM

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**116**	04/07/2023	DHM

U - Analyte analyzed for but not detected at level above reporting limit.

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ALS Group USA, Corp dba ALS Environmental

ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1100 Olive Way, Suite 800 Seattle, WA 98101	DATE: ALS JOB#: ALS SAMPLE#:	4/12/2023 EV23040003 EV23040003-03
CLIENT CONTACT:	Kyle Haslam	DATE RECEIVED:	03/31/2023
CLIENT PROJECT:	BNSF Skykomish	COLLECTION DATE:	3/28/2023 11:15:00 AM
CLIENT SAMPLE ID	5-W-16	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U UJ	100	1	UG/L	04/07/2023	DHM
TPH-Oil Range	NWTPH-DX	U	100	1	UG/L	04/07/2023	DHM

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**100**	04/07/2023	DHM

U - Analyte analyzed for but not detected at level above reporting limit.

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ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1100 Olive Way, Suite 800 Seattle, WA 98101	DATE: ALS JOB#: ALS SAMPLE#:	4/12/2023 EV23040003 EV23040003-04
CLIENT CONTACT:	Kyle Haslam	DATE RECEIVED:	03/31/2023
CLIENT PROJECT:	BNSF Skykomish	COLLECTION DATE:	3/28/2023 4:10:00 PM
CLIENT SAMPLE ID	5-W-55	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U UJ	100	1	UG/L	04/07/2023	DHM
TPH-Oil Range	NWTPH-DX	U	100	1	UG/L	04/07/2023	DHM

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**108**	04/07/2023	DHM

U - Analyte analyzed for but not detected at level above reporting limit..

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CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1100 Olive Way, Suite 800 Seattle, WA 98101	DATE:	4/12/2023
		ALS JOB#:	EV23040003
		ALS SAMPLE#:	EV23040003-05
CLIENT CONTACT:	Kyle Haslam	DATE RECEIVED:	03/31/2023
CLIENT PROJECT:	BNSF Skykomish	COLLECTION DATE:	3/28/2023 11:00:00 AM
CLIENT SAMPLE ID	1C-W-4	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	**100** J	100	1	UG/L	04/07/2023	DHM
TPH-Oil Range	NWTPH-DX	~~U~~ UJ	100	1	UG/L	04/07/2023	DHM

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**104**	04/07/2023	DHM

U - Analyte analyzed for but not detected at level above reporting limit.
Chromatogram indicates that it is likely that sample contains an unidentified diesel range product.

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CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1100 Olive Way, Suite 800 Seattle, WA 98101	DATE: ALS JOB#: ALS SAMPLE#:	4/12/2023 EV23040003 EV23040003-06
CLIENT CONTACT:	Kyle Haslam	DATE RECEIVED:	03/31/2023
CLIENT PROJECT:	BNSF Skykomish	COLLECTION DATE:	3/28/2023 4:05:00 PM
CLIENT SAMPLE ID	5-W-56	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS		REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	**2800**	J	500	5	UG/L	04/09/2023	DHM
TPH-Oil Range	NWTPH-DX	**1800**		500	5	UG/L	04/09/2023	DHM

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25 5X Dilution	NWTPH-DX	**87.6**	04/09/2023	DHM

Chromatogram indicates that it is likely that sample contains an unidentified diesel range product and an unidentified oil range product.

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CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1100 Olive Way, Suite 800 Seattle, WA 98101	DATE: ALS JOB#: ALS SAMPLE#:	4/12/2023 EV23040003 EV23040003-07
CLIENT CONTACT:	Kyle Haslam	DATE RECEIVED:	03/31/2023
CLIENT PROJECT:	BNSF Skykomish	COLLECTION DATE:	3/28/2023 12:40:00 PM
CLIENT SAMPLE ID	5-W-14	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U	100	1	UG/L	04/08/2023	DHM
TPH-Oil Range	NWTPH-DX	U UJ	100	1	UG/L	04/08/2023	DHM

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**99.6**	04/08/2023	DHM

U - Analyte analyzed for but not detected at level above reporting limit.

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CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1100 Olive Way, Suite 800 Seattle, WA 98101	DATE: ALS JOB#: ALS SAMPLE#:	4/12/2023 EV23040003 EV23040003-08
CLIENT CONTACT:	Kyle Haslam	DATE RECEIVED:	03/31/2023
CLIENT PROJECT:	BNSF Skykomish	COLLECTION DATE:	3/28/2023 2:08:00 PM
CLIENT SAMPLE ID	5-W-19	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U UJ	100	1	UG/L	04/08/2023	DHM
TPH-Oil Range	NWTPH-DX	U	100	1	UG/L	04/08/2023	DHM

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**109**	04/08/2023	DHM

U - Analyte analyzed for but not detected at level above reporting limit.

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CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1100 Olive Way, Suite 800 Seattle, WA 98101	DATE: ALS JOB#: ALS SAMPLE#:	4/12/2023 EV23040003 EV23040003-09
CLIENT CONTACT:	Kyle Haslam	DATE RECEIVED:	03/31/2023
CLIENT PROJECT:	BNSF Skykomish	COLLECTION DATE:	3/28/2023 3:10:00 PM
CLIENT SAMPLE ID	5-W-18	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U UJ	100	1	UG/L	04/08/2023	DHM
TPH-Oil Range	NWTPH-DX	U	100	1	UG/L	04/08/2023	DHM

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**106**	04/08/2023	DHM

U - Analyte analyzed for but not detected at level above reporting limit

ADDRESS 8620 Holly Drive, Suite 100, Everett, WA 9820 | PHONE 425-356-2600 | FAX 425-356-2626
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CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1100 Olive Way, Suite 800 Seattle, WA 98101	DATE:	4/12/2023
		ALS JOB#:	EV23040003
		ALS SAMPLE#:	EV23040003-10
CLIENT CONTACT:	Kyle Haslam	DATE RECEIVED:	03/31/2023
CLIENT PROJECT:	BNSF Skykomish	COLLECTION DATE:	3/28/2023
CLIENT SAMPLE ID	DUP-1	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U UJ	100	1	UG/L	04/08/2023	DHM
TPH-Oil Range	NWTPH-DX	U	100	1	UG/L	04/08/2023	DHM

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**107**	04/08/2023	DHM

U - Analyte analyzed for but not detected at level above reporting limit.

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CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1100 Olive Way, Suite 800 Seattle, WA 98101	DATE: ALS JOB#: ALS SAMPLE#:	4/12/2023 EV23040003 EV23040003-11
CLIENT CONTACT:	Kyle Haslam	DATE RECEIVED:	03/31/2023
CLIENT PROJECT:	BNSF Skykomish	COLLECTION DATE:	3/29/2023 5:02:00 PM
CLIENT SAMPLE ID	EW-2A	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U UJ	100	1	UG/L	04/08/2023	DHM
TPH-Oil Range	NWTPH-DX	U	100	1	UG/L	04/08/2023	DHM

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**150 SUR01**	04/08/2023	DHM

SUR01 -One or more surrogate recoveries were above the upper control limits. The sample results may be biased high.
U - Analyte analyzed for but not detected at level above reporting limit.

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CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1100 Olive Way, Suite 800 Seattle, WA 98101	DATE:	4/12/2023
		ALS JOB#:	EV23040003
		ALS SAMPLE#:	EV23040003-12
CLIENT CONTACT:	Kyle Haslam	DATE RECEIVED:	03/31/2023
CLIENT PROJECT:	BNSF Skykomish	COLLECTION DATE:	3/29/2023 10:15:00 AM
CLIENT SAMPLE ID	MW-4	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS		REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	**140**	J	100	1	UG/L	04/08/2023	DHM
TPH-Oil Range	NWTPH-DX	**160**		100	1	UG/L	04/08/2023	DHM

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**105**	04/08/2023	DHM

Chromatogram indicates that it is likely that sample contains an unidentified diesel range product and light oil.
Diesel range product results biased high due to oil range product overlap.

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CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1100 Olive Way, Suite 800 Seattle, WA 98101	DATE:	4/12/2023
		ALS JOB#:	EV23040003
		ALS SAMPLE#:	EV23040003-13
CLIENT CONTACT:	Kyle Haslam	DATE RECEIVED:	03/31/2023
CLIENT PROJECT:	BNSF Skykomish	COLLECTION DATE:	3/29/2023 12:20:00 PM
CLIENT SAMPLE ID	EW-1	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U UJ	100	1	UG/L	04/08/2023	DHM
TPH-Oil Range	NWTPH-DX	U	100	1	UG/L	04/08/2023	DHM

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**110**	04/08/2023	DHM

U - Analyte analyzed for but not detected at level above reporting limit..

ADDRESS 8620 Holly Drive, Suite 100, Everett, WA 9820 | PHONE 425-356-2600 | FAX 425-356-2626
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ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1100 Olive Way, Suite 800 Seattle, WA 98101	DATE: ALS JOB#: ALS SAMPLE#:	4/12/2023 EV23040003 EV23040003-14
CLIENT CONTACT:	Kyle Haslam	DATE RECEIVED:	03/31/2023
CLIENT PROJECT:	BNSF Skykomish	COLLECTION DATE:	3/29/2023 12:50:00 PM
CLIENT SAMPLE ID	5-W-43	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U UJ	100	1	UG/L	04/08/2023	DHM
TPH-Oil Range	NWTPH-DX	U	100	1	UG/L	04/08/2023	DHM

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**111**	04/08/2023	DHM

U - Analyte analyzed for but not detected at level above reporting limit.

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CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1100 Olive Way, Suite 800 Seattle, WA 98101	DATE:	4/12/2023
		ALS JOB#:	EV23040003
		ALS SAMPLE#:	EV23040003-15
CLIENT CONTACT:	Kyle Haslam	DATE RECEIVED:	03/31/2023
CLIENT PROJECT:	BNSF Skykomish	COLLECTION DATE:	3/29/2023 2:45:00 PM
CLIENT SAMPLE ID	2-A-W-40	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	~~U~~ UJ	100	1	UG/L	04/08/2023	DHM
TPH-Oil Range	NWTPH-DX	**280** J	100	1	UG/L	04/08/2023	DHM

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**106**	04/08/2023	DHM

U - Analyte analyzed for but not detected at level above reporting limit.
Chromatogram indicates that it is likely that sample contains weathered lube oil.

ADDRESS 8620 Holly Drive, Suite 100, Everett, WA 9820 | PHONE 425-356-2600 | FAX 425-356-2626
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CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1100 Olive Way, Suite 800 Seattle, WA 98101	DATE:	4/12/2023
		ALS JOB#:	EV23040003
		ALS SAMPLE#:	EV23040003-16
CLIENT CONTACT:	Kyle Haslam	DATE RECEIVED:	03/31/2023
CLIENT PROJECT:	BNSF Skykomish	COLLECTION DATE:	3/29/2023 12:10:00 PM
CLIENT SAMPLE ID	GW-1	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U UJ	100	1	UG/L	04/08/2023	DHM
TPH-Oil Range	NWTPH-DX	U	100	1	UG/L	04/08/2023	DHM

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**161 SUR01**	04/08/2023	DHM

U - Analyte analyzed for but not detected at level above reporting limit.
SUR01 -One or more surrogate recoveries were above the upper control limits. The sample results may be biased high.

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ALS Group USA, Corp dba ALS Environmental

ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1100 Olive Way, Suite 800 Seattle, WA 98101	DATE: ALS JOB#: ALS SAMPLE#:	4/12/2023 EV23040003 EV23040003-17
CLIENT CONTACT:	Kyle Haslam	DATE RECEIVED:	03/31/2023
CLIENT PROJECT:	BNSF Skykomish	COLLECTION DATE:	3/29/2023 5:00:00 PM
CLIENT SAMPLE ID	GW-3	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX w/ SGA	**160** J	100	1	UG/L	04/09/2023	DHM
TPH-Oil Range	NWTPH-DX w/ SGA	~~U~~ UJ	100	1	UG/L	04/09/2023	DHM
TPH-Diesel Range	NWTPH-DX	**490** J	100	1	UG/L	04/08/2023	DHM
TPH-Oil Range	NWTPH-DX	**140**	100	1	UG/L	04/08/2023	DHM

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX w/ SGA	**105**	04/09/2023	DHM
C25	NWTPH-DX	**106**	04/08/2023	DHM

U - Analyte analyzed for but not detected at level above reporting limit.
Chromatogram indicates that it is likely that sample contains highly weathered diesel and an unidentified oil range product.
Oil range product results biased high due to diesel range product overlap.

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ALS Group USA, Corp dba ALS Environmental

ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1100 Olive Way, Suite 800 Seattle, WA 98101	DATE:	4/12/2023
		ALS JOB#:	EV23040003
		ALS SAMPLE#:	EV23040003-18
CLIENT CONTACT:	Kyle Haslam	DATE RECEIVED:	03/31/2023
CLIENT PROJECT:	BNSF Skykomish	COLLECTION DATE:	3/29/2023 1:45:00 PM
CLIENT SAMPLE ID	GW-2	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U UJ	100	1	UG/L	04/08/2023	DHM
TPH-Oil Range	NWTPH-DX	U	100	1	UG/L	04/08/2023	DHM

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**106**	04/08/2023	DHM

U - Analyte analyzed for but not detected at level above reporting limit.

ADDRESS 8620 Holly Drive, Suite 100, Everett, WA 9820 | PHONE 425-356-2600 | FAX 425-356-2626
ALS Group USA, Corp dba ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1100 Olive Way, Suite 800 Seattle, WA 98101	DATE: ALS JOB#: ALS SAMPLE#:	4/12/2023 EV23040003 EV23040003-19
CLIENT CONTACT:	Kyle Haslam	DATE RECEIVED:	03/31/2023
CLIENT PROJECT:	BNSF Skykomish	COLLECTION DATE:	3/29/2023 1:00:00 PM
CLIENT SAMPLE ID	5W-51	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	**270** J	100	1	UG/L	04/08/2023	DHM
TPH-Oil Range	NWTPH-DX	**120**	100	1	UG/L	04/08/2023	DHM

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**95.7**	04/08/2023	DHM

Chromatogram indicates that it is likely that sample contains highly weathered an unidentified diesel range product and an unidentified oil range product.
Oil range product results biased high due to diesel range product overlap.

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CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1100 Olive Way, Suite 800 Seattle, WA 98101	DATE:	4/12/2023
		ALS JOB#:	EV23040003
		ALS SAMPLE#:	EV23040003-20
CLIENT CONTACT:	Kyle Haslam	DATE RECEIVED:	03/31/2023
CLIENT PROJECT:	BNSF Skykomish	COLLECTION DATE:	3/29/2023 3:35:00 PM
CLIENT SAMPLE ID	1B-W-23	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U UJ	100	1	UG/L	04/08/2023	DHM
TPH-Oil Range	NWTPH-DX	U	100	1	UG/L	04/08/2023	DHM

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**95.1**	04/08/2023	DHM

U - Analyte analyzed for but not detected at level above reporting limit.

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CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1100 Olive Way, Suite 800 Seattle, WA 98101	DATE: ALS JOB#: ALS SAMPLE#:	4/12/2023 EV23040003 EV23040003-21
CLIENT CONTACT:	Kyle Haslam	DATE RECEIVED:	03/31/2023
CLIENT PROJECT:	BNSF Skykomish	COLLECTION DATE:	3/29/2023 11:55:00 AM
CLIENT SAMPLE ID	2A-W-9	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	**350**	100	1	UG/L	04/08/2023	DHM
TPH-Oil Range	NWTPH-DX	**220** J	100	1	UG/L	04/08/2023	DHM

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**91.9**	04/08/2023	DHM

Chromatogram indicates that it is likely that sample contains highly weathered diesel and lube oil.

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CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1100 Olive Way, Suite 800 Seattle, WA 98101	DATE:	4/12/2023
		ALS JOB#:	EV23040003
		ALS SAMPLE#:	EV23040003-22
CLIENT CONTACT:	Kyle Haslam	DATE RECEIVED:	03/31/2023
CLIENT PROJECT:	BNSF Skykomish	COLLECTION DATE:	3/29/2023 2:10:00 PM
CLIENT SAMPLE ID	1C-W-7	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	**100** J	100	1	UG/L	04/08/2023	DHM
TPH-Oil Range	NWTPH-DX	~~U~~ UJ	100	1	UG/L	04/08/2023	DHM

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**89.9**	04/08/2023	DHM

U - Analyte analyzed for but not detected at level above reporting limit.
Chromatogram indicates that it is likely that sample contains an unidentified diesel range product.

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CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1100 Olive Way, Suite 800 Seattle, WA 98101	DATE: ALS JOB#: ALS SAMPLE#:	4/12/2023 EV23040003 EV23040003-23
CLIENT CONTACT:	Kyle Haslam	DATE RECEIVED:	03/31/2023
CLIENT PROJECT:	BNSF Skykomish	COLLECTION DATE:	3/29/2023 4:00:00 PM
CLIENT SAMPLE ID	2A-W-41	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX w/ SGA	**110** J	100	1	UG/L	04/09/2023	DHM
TPH-Oil Range	NWTPH-DX w/ SGA	~~U~~ UJ	100	1	UG/L	04/09/2023	DHM
TPH-Diesel Range	NWTPH-DX	**310** J	100	1	UG/L	04/08/2023	DHM
TPH-Oil Range	NWTPH-DX	~~U~~ UJ	100	1	UG/L	04/08/2023	DHM

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX w/ SGA	**91.1**	04/09/2023	DHM
C25	NWTPH-DX	**92.9**	04/08/2023	DHM

U - Analyte analyzed for but not detected at level above reporting limit.
Chromatogram indicates that it is likely that sample contains highly weathered diesel.

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CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1100 Olive Way, Suite 800 Seattle, WA 98101	DATE: ALS JOB#: ALS SAMPLE#:	4/12/2023 EV23040003 EV23040003-24
CLIENT CONTACT:	Kyle Haslam	DATE RECEIVED:	03/31/2023
CLIENT PROJECT:	BNSF Skykomish	COLLECTION DATE:	3/30/2023 5:50:00 PM
CLIENT SAMPLE ID	GW-4	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U	100	1	UG/L	04/08/2023	DHM
TPH-Oil Range	NWTPH-DX	U	100	1	UG/L	04/08/2023	DHM

UJ

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**92.1**	04/08/2023	DHM

U - Analyte analyzed for but not detected at level above reporting limit.

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CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1100 Olive Way, Suite 800 Seattle, WA 98101	DATE: ALS JOB#: ALS SAMPLE#:	4/12/2023 EV23040003 EV23040003-25
CLIENT CONTACT:	Kyle Haslam	DATE RECEIVED:	03/31/2023
CLIENT PROJECT:	BNSF Skykomish	COLLECTION DATE:	3/30/2023 2:49:00 PM
CLIENT SAMPLE ID	S3-CD	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U UJ	100	1	UG/L	04/08/2023	DHM
TPH-Oil Range	NWTPH-DX	U	100	1	UG/L	04/08/2023	DHM

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**88.6**	04/08/2023	DHM

U - Analyte analyzed for but not detected at level above reporting limit.

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CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1100 Olive Way, Suite 800 Seattle, WA 98101	DATE: ALS JOB#: ALS SAMPLE#:	4/12/2023 EV23040003 EV23040003-26
CLIENT CONTACT:	Kyle Haslam	DATE RECEIVED:	03/31/2023
CLIENT PROJECT:	BNSF Skykomish	COLLECTION DATE:	3/30/2023 4:55:00 PM
CLIENT SAMPLE ID	S4-CD	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U UJ	100	1	UG/L	04/08/2023	DHM
TPH-Oil Range	NWTPH-DX	U	100	1	UG/L	04/08/2023	DHM

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**90.9**	04/08/2023	DHM

U - Analyte analyzed for but not detected at level above reporting limit.

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CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1100 Olive Way, Suite 800 Seattle, WA 98101	DATE:	4/12/2023
		ALS JOB#:	EV23040003
		ALS SAMPLE#:	EV23040003-27
CLIENT CONTACT:	Kyle Haslam	DATE RECEIVED:	03/31/2023
CLIENT PROJECT:	BNSF Skykomish	COLLECTION DATE:	3/30/2023 3:49:00 PM
CLIENT SAMPLE ID	S4-AD	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U UJ	100	1	UG/L	04/08/2023	DHM
TPH-Oil Range	NWTPH-DX	U	100	1	UG/L	04/08/2023	DHM

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**94.2**	04/08/2023	DHM

U - Analyte analyzed for but not detected at level above reporting limit.

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CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1100 Olive Way, Suite 800 Seattle, WA 98101	DATE: ALS JOB#: ALS SAMPLE#:	4/12/2023 EV23040003 EV23040003-28
CLIENT CONTACT:	Kyle Haslam	DATE RECEIVED:	03/31/2023
CLIENT PROJECT:	BNSF Skykomish	COLLECTION DATE:	3/29/2023 4:24:00 PM
CLIENT SAMPLE ID	S4-BD	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U UJ	100	1	UG/L	04/08/2023	DHM
TPH-Oil Range	NWTPH-DX	U	100	1	UG/L	04/08/2023	DHM

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**95.2**	04/08/2023	DHM

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CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1100 Olive Way, Suite 800 Seattle, WA 98101	DATE: ALS JOB#: ALS SAMPLE#:	4/12/2023 EV23040003 EV23040003-29
CLIENT CONTACT:	Kyle Haslam	DATE RECEIVED:	03/31/2023
CLIENT PROJECT:	BNSF Skykomish	COLLECTION DATE:	3/30/2023 1:16:00 PM
CLIENT SAMPLE ID	S3-AD	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U UJ	100	1	UG/L	04/08/2023	DHM
TPH-Oil Range	NWTPH-DX	U	100	1	UG/L	04/08/2023	DHM

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**91.4**	04/08/2023	DHM

U - Analyte analyzed for but not detected at level above reporting limit.

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CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1100 Olive Way, Suite 800 Seattle, WA 98101	DATE:	4/12/2023
		ALS JOB#:	EV23040003
		ALS SAMPLE#:	EV23040003-30
CLIENT CONTACT:	Kyle Haslam	DATE RECEIVED:	03/31/2023
CLIENT PROJECT:	BNSF Skykomish	COLLECTION DATE:	3/30/2023 12:05:00 PM
CLIENT SAMPLE ID	S1-BU	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U	100	1	UG/L	04/08/2023	DHM
TPH-Oil Range	NWTPH-DX	U UJ	100	1	UG/L	04/08/2023	DHM

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**94.0**	04/08/2023	DHM

U - Analyte analyzed for but not detected at level above reporting limit.

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CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1100 Olive Way, Suite 800 Seattle, WA 98101	DATE: ALS JOB#: ALS SAMPLE#:	4/12/2023 EV23040003 EV23040003-31
CLIENT CONTACT:	Kyle Haslam	DATE RECEIVED:	03/31/2023
CLIENT PROJECT:	BNSF Skykomish	COLLECTION DATE:	3/30/2023 3:50:00 PM
CLIENT SAMPLE ID	S4-AU	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U UJ	100	1	UG/L	04/08/2023	DHM
TPH-Oil Range	NWTPH-DX	U	100	1	UG/L	04/08/2023	DHM

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**80.4**	04/08/2023	DHM

U - Analyte analyzed for but not detected at level above reporting limit.

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CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1100 Olive Way, Suite 800 Seattle, WA 98101	DATE:	4/12/2023
		ALS JOB#:	EV23040003
		ALS SAMPLE#:	EV23040003-32
CLIENT CONTACT:	Kyle Haslam	DATE RECEIVED:	03/31/2023
CLIENT PROJECT:	BNSF Skykomish	COLLECTION DATE:	3/30/2023 12:35:00 PM
CLIENT SAMPLE ID	S1-AU	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U UJ	100	1	UG/L	04/08/2023	DHM
TPH-Oil Range	NWTPH-DX	U	100	1	UG/L	04/08/2023	DHM

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**92.7**	04/08/2023	DHM

U - Analyte analyzed for but not detected at level above reporting limit.

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CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1100 Olive Way, Suite 800 Seattle, WA 98101	DATE:	4/12/2023
		ALS JOB#:	EV23040003
		ALS SAMPLE#:	EV23040003-33
CLIENT CONTACT:	Kyle Haslam	DATE RECEIVED:	03/31/2023
CLIENT PROJECT:	BNSF Skykomish	COLLECTION DATE:	3/30/2023 1:55:00 PM
CLIENT SAMPLE ID	S3-BD	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U	100	1	UG/L	04/08/2023	DHM
TPH-Oil Range	NWTPH-DX	U	100	1	UG/L	04/08/2023	DHM

UJ

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**95.3**	04/08/2023	DHM

U - Analyte analyzed for but not detected at level above reporting limit.

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CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1100 Olive Way, Suite 800 Seattle, WA 98101	DATE:	4/12/2023
		ALS JOB#:	EV23040003
		ALS SAMPLE#:	EV23040003-34
CLIENT CONTACT:	Kyle Haslam	DATE RECEIVED:	03/31/2023
CLIENT PROJECT:	BNSF Skykomish	COLLECTION DATE:	3/30/2023 5:00:00 PM
CLIENT SAMPLE ID	S4-CU	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	**130** J	100	1	UG/L	04/08/2023	DHM
TPH-Oil Range	NWTPH-DX	~~U~~ UJ	100	1	UG/L	04/08/2023	DHM

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**93.0**	04/08/2023	DHM

U - Analyte analyzed for but not detected at level above reporting limit.
Chromatogram indicates that it is likely that sample contains an unidentified diesel range product.

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CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1100 Olive Way, Suite 800 Seattle, WA 98101	DATE: ALS JOB#: ALS SAMPLE#:	4/12/2023 EV23040003 EV23040003-35
CLIENT CONTACT:	Kyle Haslam	DATE RECEIVED:	03/31/2023
CLIENT PROJECT:	BNSF Skykomish	COLLECTION DATE:	3/30/2023 2:48:00 PM
CLIENT SAMPLE ID	S3-CU	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U UJ	100	1	UG/L	04/08/2023	DHM
TPH-Oil Range	NWTPH-DX	U	100	1	UG/L	04/08/2023	DHM

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**90.7**	04/08/2023	DHM

U - Analyte analyzed for but not detected at level above reporting limit.

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CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1100 Olive Way, Suite 800 Seattle, WA 98101	DATE: ALS JOB#: ALS SAMPLE#:	4/12/2023 EV23040003 EV23040003-36
CLIENT CONTACT:	Kyle Haslam	DATE RECEIVED:	03/31/2023
CLIENT PROJECT:	BNSF Skykomish	COLLECTION DATE:	3/30/2023 4:30:00 PM
CLIENT SAMPLE ID	S4-BU	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U UJ	100	1	UG/L	04/08/2023	DHM
TPH-Oil Range	NWTPH-DX	U	100	1	UG/L	04/08/2023	DHM

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**93.1**	04/08/2023	DHM

U - Analyte analyzed for but not detected at level above reporting limit.

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CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1100 Olive Way, Suite 800 Seattle, WA 98101	DATE:	4/12/2023
		ALS JOB#:	EV23040003
		ALS SAMPLE#:	EV23040003-37
CLIENT CONTACT:	Kyle Haslam	DATE RECEIVED:	03/31/2023
CLIENT PROJECT:	BNSF Skykomish	COLLECTION DATE:	3/29/2023
CLIENT SAMPLE ID	DUP-2	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	~~U~~ UJ	100	1	UG/L	04/08/2023	DHM
TPH-Oil Range	NWTPH-DX	**330** J	100	1	UG/L	04/08/2023	DHM

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**101**	04/08/2023	DHM

U - Analyte analyzed for but not detected at level above reporting limit.
Chromatogram indicates that it is likely that sample contains weathered lube oil.

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CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1100 Olive Way, Suite 800 Seattle, WA 98101	DATE: ALS JOB#: ALS SAMPLE#:	4/12/2023 EV23040003 EV23040003-38
CLIENT CONTACT:	Kyle Haslam	DATE RECEIVED:	03/31/2023
CLIENT PROJECT:	BNSF Skykomish	COLLECTION DATE:	3/29/2023
CLIENT SAMPLE ID	DUP-3	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U UJ	100	1	UG/L	04/08/2023	DHM
TPH-Oil Range	NWTPH-DX	U	100	1	UG/L	04/08/2023	DHM

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**96.9**	04/08/2023	DHM

U - Analyte analyzed for but not detected at level above reporting limit.

ADDRESS 8620 Holly Drive, Suite 100, Everett, WA 9820 | PHONE 425-356-2600 | FAX 425-356-2626
ALS Group USA, Corp dba ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1100 Olive Way, Suite 800 Seattle, WA 98101	DATE:	4/12/2023
		ALS JOB#:	EV23040003
		ALS SAMPLE#:	EV23040003-39
CLIENT CONTACT:	Kyle Haslam	DATE RECEIVED:	03/31/2023
CLIENT PROJECT:	BNSF Skykomish	COLLECTION DATE:	3/30/2023 11:20:00 AM
CLIENT SAMPLE ID	S1-BD	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U UJ	100	1	UG/L	04/08/2023	DHM
TPH-Oil Range	NWTPH-DX	U	100	1	UG/L	04/08/2023	DHM

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**101**	04/08/2023	DHM

U - Analyte analyzed for but not detected at level above reporting limit.

ADDRESS 8620 Holly Drive, Suite 100, Everett, WA 9820 | PHONE 425-356-2600 | FAX 425-356-2626
ALS Group USA, Corp dba ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1100 Olive Way, Suite 800 Seattle, WA 98101	DATE:	4/12/2023
		ALS JOB#:	EV23040003
		ALS SAMPLE#:	EV23040003-40
CLIENT CONTACT:	Kyle Haslam	DATE RECEIVED:	03/31/2023
CLIENT PROJECT:	BNSF Skykomish	COLLECTION DATE:	3/30/2023 9:55:00 AM
CLIENT SAMPLE ID	S2-BU	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	**360** J	100	1	UG/L	04/08/2023	DHM
TPH-Oil Range	NWTPH-DX	**110**	100	1	UG/L	04/08/2023	DHM

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**91.4**	04/08/2023	DHM

Chromatogram indicates that it is likely that sample contains highly weathered diesel and an unidentified oil range product.
Oil range product results biased high due to diesel range product overlap.

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ALS Group USA, Corp dba ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1100 Olive Way, Suite 800 Seattle, WA 98101	DATE:	4/12/2023
		ALS JOB#:	EV23040003
		ALS SAMPLE#:	EV23040003-41
CLIENT CONTACT:	Kyle Haslam	DATE RECEIVED:	03/31/2023
CLIENT PROJECT:	BNSF Skykomish	COLLECTION DATE:	3/30/2023 9:07:00 AM
CLIENT SAMPLE ID	S2-BD	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U	100	1	UG/L	04/08/2023	DHM
TPH-Oil Range	NWTPH-DX	U UJ	100	1	UG/L	04/08/2023	DHM

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**94.5**	04/08/2023	DHM

U - Analyte analyzed for but not detected at level above reporting limit.

ADDRESS 8620 Holly Drive, Suite 100, Everett, WA 9820 | PHONE 425-356-2600 | FAX 425-356-2626
ALS Group USA, Corp dba ALS Environmental

ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1100 Olive Way, Suite 800 Seattle, WA 98101	DATE: ALS JOB#: ALS SAMPLE#:	4/12/2023 EV23040003 EV23040003-42
CLIENT CONTACT:	Kyle Haslam	DATE RECEIVED:	03/31/2023
CLIENT PROJECT:	BNSF Skykomish	COLLECTION DATE:	3/30/2023 1:56:00 PM
CLIENT SAMPLE ID	S3-AU	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	**160** J	100	1	UG/L	04/08/2023	DHM
TPH-Oil Range	NWTPH-DX	~~U~~ UJ	100	1	UG/L	04/08/2023	DHM

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**98.7**	04/08/2023	DHM

U - Analyte analyzed for but not detected at level above reporting limit.
Chromatogram indicates that it is likely that sample contains an unidentified diesel range product.

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ALS Group USA, Corp dba ALS Environmental

ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1100 Olive Way, Suite 800 Seattle, WA 98101	DATE: ALS JOB#: ALS SAMPLE#:	4/12/2023 EV23040003 EV23040003-43
CLIENT CONTACT:	Kyle Haslam	DATE RECEIVED:	03/31/2023
CLIENT PROJECT:	BNSF Skykomish	COLLECTION DATE:	3/30/2023 11:26:00 AM
CLIENT SAMPLE ID	S1-AD	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U	100	1	UG/L	04/09/2023	DHM
TPH-Oil Range	NWTPH-DX	U UJ	100	1	UG/L	04/09/2023	DHM

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**100**	04/09/2023	DHM

U - Analyte analyzed for but not detected at level above reporting limit.

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ALS Group USA, Corp dba ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1100 Olive Way, Suite 800 Seattle, WA 98101	DATE:	4/12/2023
		ALS JOB#:	EV23040003
		ALS SAMPLE#:	EV23040003-44
CLIENT CONTACT:	Kyle Haslam	DATE RECEIVED:	03/31/2023
CLIENT PROJECT:	BNSF Skykomish	COLLECTION DATE:	3/30/2023 1:21:00 PM
CLIENT SAMPLE ID	S3-BU	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U UJ	100	1	UG/L	04/09/2023	DHM
TPH-Oil Range	NWTPH-DX	U	100	1	UG/L	04/09/2023	DHM

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**93.0**	04/09/2023	DHM

U - Analyte analyzed for but not detected at level above reporting limit.

ADDRESS 8620 Holly Drive, Suite 100, Everett, WA 9820 | PHONE 425-356-2600 | FAX 425-356-2626
ALS Group USA, Corp dba ALS Environmental

ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1100 Olive Way, Suite 800 Seattle, WA 98101	DATE: ALS JOB#: ALS SAMPLE#:	4/12/2023 EV23040003 EV23040003-45
CLIENT CONTACT:	Kyle Haslam	DATE RECEIVED:	03/31/2023
CLIENT PROJECT:	BNSF Skykomish	COLLECTION DATE:	3/30/2023 9:05:00 AM
CLIENT SAMPLE ID	S2-AD	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U	100	1	UG/L	04/09/2023	DHM
TPH-Oil Range	NWTPH-DX	U UJ	100	1	UG/L	04/09/2023	DHM

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**93.8**	04/09/2023	DHM

U - Analyte analyzed for but not detected at level above reporting limit.

ADDRESS 8620 Holly Drive, Suite 100, Everett, WA 9820 | PHONE 425-356-2600 | FAX 425-356-2626
ALS Group USA, Corp dba ALS Environmental

ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1100 Olive Way, Suite 800 Seattle, WA 98101	DATE: ALS JOB#: ALS SAMPLE#:	4/12/2023 EV23040003 EV23040003-46
CLIENT CONTACT:	Kyle Haslam	DATE RECEIVED:	03/31/2023
CLIENT PROJECT:	BNSF Skykomish	COLLECTION DATE:	3/30/2023 6:18:00 PM
CLIENT SAMPLE ID	2A-W-42	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U	100	1	UG/L	04/09/2023	DHM
TPH-Oil Range	NWTPH-DX	U	100	1	UG/L	04/09/2023	DHM

UJ

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**96.9**	04/09/2023	DHM

U - Analyte analyzed for but not detected at level above reporting limit.

ADDRESS 8620 Holly Drive, Suite 100, Everett, WA 9820 | PHONE 425-356-2600 | FAX 425-356-2626
ALS Group USA, Corp dba ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1100 Olive Way, Suite 800 Seattle, WA 98101	DATE:	4/12/2023
		ALS JOB#:	EV23040003
		ALS SAMPLE#:	EV23040003-47
CLIENT CONTACT:	Kyle Haslam	DATE RECEIVED:	03/31/2023
CLIENT PROJECT:	BNSF Skykomish	COLLECTION DATE:	3/30/2023 9:45:00 AM
CLIENT SAMPLE ID	S2-AU	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U UJ	100	1	UG/L	04/09/2023	DHM
TPH-Oil Range	NWTPH-DX	U	100	1	UG/L	04/09/2023	DHM

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**96.1**	04/09/2023	DHM

U - Analyte analyzed for but not detected at level above reporting limit.

ADDRESS 8620 Holly Drive, Suite 100, Everett, WA 9820 | PHONE 425-356-2600 | FAX 425-356-2626
ALS Group USA, Corp dba ALS Environmental

ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1100 Olive Way, Suite 800 Seattle, WA 98101	DATE: ALS JOB#: ALS SAMPLE#:	4/12/2023 EV23040003 EV23040003-48
CLIENT CONTACT:	Kyle Haslam	DATE RECEIVED:	03/31/2023
CLIENT PROJECT:	BNSF Skykomish	COLLECTION DATE:	3/30/2023
CLIENT SAMPLE ID	DUP-4	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	**170** J	100	1	UG/L	04/09/2023	DHM
TPH-Oil Range	NWTPH-DX	~~U~~ UJ	100	1	UG/L	04/09/2023	DHM

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**96.7**	04/09/2023	DHM

U - Analyte analyzed for but not detected at level above reporting limit.
Chromatogram indicates that it is likely that sample contains an unidentified diesel range product.

ADDRESS 8620 Holly Drive, Suite 100, Everett, WA 9820 | PHONE 425-356-2600 | FAX 425-356-2626
ALS Group USA, Corp dba ALS Environmental

ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1100 Olive Way, Suite 800 Seattle, WA 98101	DATE:	4/12/2023
		ALS JOB#:	EV23040003
		ALS SAMPLE#:	EV23040003-49
CLIENT CONTACT:	Kyle Haslam	DATE RECEIVED:	03/31/2023
CLIENT PROJECT:	BNSF Skykomish	COLLECTION DATE:	3/30/2023 1:00:00 PM
CLIENT SAMPLE ID	EQUIPMENT BLANK	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U UJ	100	1	UG/L	04/09/2023	DHM
TPH-Oil Range	NWTPH-DX	U	100	1	UG/L	04/09/2023	DHM

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**92.9**	04/09/2023	DHM

U - Analyte analyzed for but not detected at level above reporting limit.

ADDRESS 8620 Holly Drive, Suite 100, Everett, WA 9820 | PHONE 425-356-2600 | FAX 425-356-2626
ALS Group USA, Corp dba ALS Environmental

BNSF Skykomish

DATA REVIEW

Skykomish, Washington

Total Petroleum Hydrocarbon (TPH) Analyses

SDG #: EV23100004

Analyses Performed By:
ALS Environmental
Everett, Washington

Report #: 52032R
Project: 30159458.02

1 Summary

This data quality assessment summarizes the review of Sample Delivery Group (SDG) # EV23100004 for samples collected in association with the BNSF Skykomish, Washington. The review was conducted as a Tier II evaluation and included review of data package completeness. Only analytical data as reported by the laboratory were reviewed for this validation. Field documentation was not included in this review. Included with this assessment are the validation annotated sample result sheets, and chain of custody records. Analyses were performed on the following samples:

Sample ID	Lab ID	Matrix	Sample Collection Date	Parent Sample	Analysis
					TPH
GW-2_092823	EV23100004-01	Water	09/28/2023		X
GW-3_092723	EV23100004-02	Water	09/27/2023		X
GW-4_092723	EV23100004-03	Water	09/27/2023		X
EW-1_092823	EV23100004-04	Water	09/28/2023		X
EW-2A_092723	EV23100004-05	Water	09/27/2023		X
S1-AD_092823	EV23100004-06	Water	09/28/2023		X
S1-AU_092823	EV23100004-07	Water	09/28/2023		X
S1-BD_092823	EV23100004-08	Water	09/28/2023		X
S1-BU_092823	EV23100004-09	Water	09/28/2023		X
S2-AD_092923	EV23100004-10	Water	09/29/2023		X
S2-AU_092923	EV23100004-11	Water	09/29/2023		X
S2-BD_092923	EV23100004-12	Water	09/29/2023		X
S2-BU_092923 MS/MSD	EV23100004-13	Water	09/29/2023		X
S3-AD_092723	EV23100004-14	Water	09/27/2023		X
S3-AU_092723	EV23100004-15	Water	09/27/2023		X
S3-BD_092823	EV23100004-16	Water	09/28/2023		X
S3-BU_092823	EV23100004-17	Water	09/28/2023		X
S3-CD_092723	EV23100004-18	Water	09/27/2023		X
S3-CU_092723 MS/MD	EV23100004-19	Water	09/27/2023		X
S4-AD_092723	EV23100004-20	Water	09/27/2023		X
S4-AU_092723	EV23100004-21	Water	09/27/2023		X
S4-BD_092723	EV23100004-22	Water	09/27/2023		X
S4-BU_092723	EV23100004-23	Water	09/27/2023		X
S4-CD_092723	EV23100004-24	Water	09/27/2023		X
S4-CU_092723	EV23100004-25	Water	09/27/2023		X
5-W-14_092623	EV23100004-26	Water	09/26/2023		X
5-W-16_092623	EV23100004-27	Water	09/26/2023		X
5-W-17_092923	EV23100004-28	Water	09/29/2023		X

Sample ID	Lab ID	Matrix	Sample Collection Date	Parent Sample	Analysis
					TPH
5-W-18_092923	EV23100004-29	Water	09/29/2023		X
5-W-19_092923	EV23100004-30	Water	09/29/2023		X
5-W-51_092923	EV23100004-31	Water	09/29/2023		X
5-W-55_092823	EV23100004-32	Water	09/28/2023		X
5-W-56_092823	EV23100004-33	Water	09/28/2023		X
FD-3_092923	EV23100004-34	Water	09/29/2023	5-W-51_092923	X
2A-W-40_092823	EV23100004-35	Water	09/28/2023		X
2A-W-41_092823	EV23100004-36	Water	09/28/2023		X
2A-W-42_092823	EV23100004-37	Water	09/28/2023		X
1B-W-23_092723	EV23100004-38	Water	09/27/2023		X
1C-W-7_092723	EV23100004-39	Water	09/27/2023		X
1C-W-8_092723	EV23100004-40	Water	09/27/2023		X
5-W-43_092923	EV23100004-41	Water	09/29/2023		X
MW-4_092923	EV23100004-42	Water	09/29/2023		X
FD-1_092723	EV23100004-43	Water	09/27/2023	S3-CU_092723 MS/MD	X
EB-1_092723	EV23100004-44	Water	09/27/2023		X
FD-2_092723	EV23100004-45	Water	09/27/2023		X
FD-4_092923	EV23100004-46	Water	09/29/2023	5-W-43_092923	X

Note:
TPH = Total Petroleum Hydrocarbons

Sample FD-2_092723 is a field duplicate sample. The parent sample could not be identified.

2 Analytical Data Package Documentation

The table below is the evaluation of the data package completeness.

Items Reviewed	Reported		Performance Acceptable		Not Required
	No	Yes	No	Yes	
1. Sample receipt condition		X		X	
2. Requested analyses and sample results		X		X	
3. Master tracking list		X		X	
4. Methods of analysis		X		X	
5. Reporting limits		X		X	
6. Sample collection date		X	X		
7. Laboratory sample received date		X		X	
8. Sample preservation verification (as applicable)		X		X	
9. Sample preparation/extraction/analysis dates		X		X	
10. Fully executed Chain-of-Custody (COC) form		X		X	
11. Narrative summary of Quality Assurance (QA) or sample problems provided		X		X	
12. Data Package Completeness and Compliance		X		X	

Note:
6. Sample ID mismatch observed between chain of custody and analysis report. Details are presented in the following table. Field sample id was considered as per chain of custody.

Field Sample ID on COC	Field Sample ID on Analysis Report
FD-2_092723	FD-2_092923

10. The Sample Receiving Checklist notes that there was disagreement between the collection times listed on the sample labels and chain of custody. The samples were logged in using the times listed on the chain of custody.

3 Organic Analysis Introduction

Analyses were performed according to United States Environmental Protection Agency (USEPA) Method NWTPH-DX. Data were reviewed in accordance with USEPA CLP National Functional Guidelines for Organic Superfund Methods Data Review, document number EPA 540-R-20-005, November 2020 (with reference to the historical USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review, OSWER 9240.1-05A-P, October 1999, as appropriate).

The data review process is an evaluation of data on a technical basis rather than a determination of contract compliance. As such, the standards against which the data are being weighed may differ from those specified in the analytical method. It is assumed that the data package represents the best efforts of the laboratory and had already been subjected to sufficient quality review prior to submission.

During the review process, laboratory qualified and unqualified data are verified against the supporting documentation. Based on this evaluation, qualifier codes may be added, deleted, or modified by the data reviewer. Results are qualified with the following codes in accordance with USEPA National Functional Guidelines:

- Concentration (C) Qualifiers
  - U The compound was analyzed for but not detected. The associated value is the compound quantitation limit.
  - B The compound has been found in the sample as well as its associated blank, its presence in the sample may be suspect.
- Quantitation (Q) Qualifiers
  - E The compound was quantitated above the calibration range.
  - D Concentration is based on a diluted sample analysis.
- Validation Qualifiers
  - J The compound was positively identified; however, the associated numerical value is an estimated concentration only.
  - UJ The compound was not detected above the reported sample quantitation limit. However, the reported limit is approximate and may or may not represent the actual limit of quantitation.
  - JN The analysis indicates the presence of a compound for which there is presumptive evidence to make a tentative identification. The associated numerical value is an estimated concentration only.
  - UB Compound considered non-detect at the listed value due to associated blank contamination.
  - N The analysis indicates the presence of a compound for which there is presumptive evidence to make a tentative identification.
  - R The sample results are rejected.

Two facts should be noted by all data users. First, the “R” flag means that the associated value is unusable. In other words, due to significant quality control (QC) problems, the analysis is invalid and provides no information as to whether the compound is present or not. “R” values should not appear on data tables because they cannot be relied upon, even as a last resort. The second fact to keep in mind is that no compound concentration, even

if it has passed all QC tests, is guaranteed to be accurate. Strict QC serves to increase confidence in data, but any value potentially contains error.

4 Total Petroleum Hydrocarbons (TPH) Analyses

4.1 Holding Times

The specified holding times for the following methods are presented in the following table.

Method	Matrix	Holding Time	Preservation
NWTPH-DX	Water	14 days from collection to extraction and 40 days from extraction to analysis (preserved) 7 days from collection to extraction and 40 days from extraction to analysis (Unpreserved)	Cool to <6 °C

All samples were analyzed within the specified holding time criteria.

4.2 Blank Contamination

Quality assurance (QA) blanks (i.e. laboratory method blanks and equipment rinse blanks) are prepared to identify any contamination which may have been introduced into the samples during sample preparation or field activity. Method blanks measure laboratory contamination. Rinse blanks also measure contamination of samples during field operations.

A blank action level (BAL) of five times the concentration of a detected compound in an associated blank (common laboratory contaminant compounds are calculated at ten times) is calculated for QA blanks containing concentrations greater than the reporting limit (RL). The BAL is compared to the associated sample results to determine the appropriate qualification of the sample results, if needed.

Compounds were not detected above the RL in the associated blanks; therefore, detected sample results were not associated with blank contamination.

4.3 Surrogates/System Monitoring Compounds

All samples to be analyzed for organic compounds are spiked with surrogate compounds prior to sample preparation to evaluate overall laboratory performance and efficiency of the analytical technique. The analysis requires surrogate compounds exhibit recoveries within the laboratory-established acceptance limits.

All samples exhibited surrogate recoveries within the control limits with the exceptions noted below.

Sample ID	Surrogate	Recovery
2A-W-41_092823	C25 (NWTPH-DX w/ SGA)	> UL

Note:

UL = upper control limit

The criteria used to evaluate the surrogate recoveries are presented in the following table. In the case of a surrogate deviation, the sample results are qualified as documented in the table below.

Control Limit	Sample Result	Qualification
> UL	Non-detect	No Action
	Detect	J
< LL but > 10%	Non-detect	UJ
	Detect	J
< 10%	Non-detect	R
	Detect	J
Surrogates diluted below the calibration curve due to the high concentration of a target compounds	Non-detect	UJ[1]
	Detect	J[1]

Note:

[1] A more concentrated analysis was not performed with surrogate compounds within the calibration range; therefore, no determination of extraction efficiency could be made.

4.4 Matrix Spike/Matrix Spike Duplicate (MS/MSD) Analysis

MS/MSD data are used to assess the precision and accuracy of the analytical method. The compounds used to perform the MS/MSD analysis must exhibit a percent recovery within the laboratory-established acceptance limits. The relative percent difference (RPD) between the MS/MSD recoveries must exhibit an RPD within the laboratory-established acceptance limits.

Note: The MS/MSD recovery control limits do not apply for MS/MSD performed on samples where the compound concentration detected in the parent sample exceeds the MS/MSD concentration by a factor of four or greater.

MS/MSD analysis was performed on samples S2-BU_092923 and S3-CU_092723. MS/MSD analysis exhibited recoveries and RPDs within the control limits with the exceptions noted below.

Sample ID	Compound	MS Recovery	MSD Recovery
S2-BU_092923	TPH-Diesel Range	>UL	>UL

The criteria used to evaluate the MS/MSD recoveries are presented in the following table. In the case of an MS/MSD deviation, the sample results are qualified as documented in the table below.

Control Limit	Sample Result	Qualification
> the upper control limit (UL)	Non-detect	No Action
	Detect	J
< the lower control limit (LL) but > 10%	Non-detect	UJ
	Detect	J
< 10%	Non-detect	R
	Detect	J

Control Limit	Sample Result	Qualification
Parent sample concentration > four times the MS/MSD spiking solution concentration.	Detect	No Action
	Non-detect	

4.5 Laboratory Control Sample/Laboratory Control Sample Duplicate (LCS/LCSD) Analysis

The LCS/LCSD analysis is used to assess the precision and accuracy of the analytical method independent of matrix interferences. The compounds associated with the LCS/LCSD analysis must exhibit a percent recovery within the laboratory-established acceptance limits. The RPD between the LCS and LCSD results must be within the laboratory-established acceptance limits.

All compounds associated with the LCS/LCSD analyses exhibited recoveries and RPDs within the control limits.

4.6 Field Duplicate Sample Analysis

The field duplicate sample analysis is used to assess the precision of the field sampling procedures and analytical method. The control limit of 30% for water matrices and 50% for soil matrices is applied to the RPD between the parent sample and the field duplicate sample results. In the instance when the parent and/or duplicate sample concentrations are less than or equal to five times the reporting limit (RL), a control limit of two times the RL for water matrices or three times the RL for soil matrices is applied to the difference between the results.

Results for duplicate samples are summarized in the following table.

Sample ID/Duplicate ID	Compound	Sample Result (UG/L)	Duplicate Result (UG/L)	RPD
S3-CU_092723 MS/MD / FD-1_092723	TPH-Diesel Range	100 U	100	AC
	TPH-Oil Range	100 U	220	AC
5-W-51_092923 / FD-3_092923	TPH-Diesel Range	530	590	10.7%
	TPH-Oil Range	220	290	AC
5-W-43_092923 / FD-4_092923	All compounds	U	U	AC

Notes:

AC = acceptable

U = non-detect

The calculated RPDs between the parent sample and field duplicate were acceptable.

4.7 Compound Identification

The retention times of all quantitated peaks must fall within the calculated retention time windows.

All identified compounds met the specified criteria.

4.8 System Performance and Overall Assessment

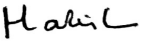
Overall system performance was acceptable. Other than for those deviations specifically mentioned in this review, the overall data quality is within the guidelines specified in the method.

4.9 Data Validation Checklist for Total Petroleum Hydrocarbon (TPH)

TPH: NWTPH-DX	Reported		Performance Acceptable		Not Required
	No	Yes	No	Yes	
Gas Chromatography/Flame- and Photo- Ionization Detectors (GC/FID/PID)					
Tier II Validation					
Holding Times/Preservation		X		X	
Reporting Limits (Units)		X		X	
Blanks					
A. Method Blanks		X		X	
B. Trip Blanks	X				X
C. Equipment Blanks		X		X	
Surrogates Accuracy (%R)		X	X		
Matrix Spike (MS) %R		X	X		
Matrix Spike Duplicate (MSD) %R		X	X		
MS/MSD Precision (RPD)		X		X	
Laboratory Control Sample (LCS) %R		X		X	
Laboratory Control Sample Duplicate (LCSD) %R		X		X	
LCS/LCSD RPD		X		X	
Laboratory Duplicate Sample RPD	X				X
Field Duplicate Sample RPD		X		X	
Dilution Factor		X		X	
Moisture Content	X				X

Notes:

%R - percent recovery
RPD - relative percent difference

Validation Performed By:	Hareesha Naik
Signature:	
Date:	November 28, 2023
Peer Review:	Jennifer Singer
Date:	November 29, 2023

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Chain of Custody Form

Page 1 of 5

COC ID: 289093

EV2310000 4

ALS Project Manager: | ALS Work Order #:

Customer Information		Project Information		Parameter/Method Request for Analysis	
Purchase Order		Project Name	BNSF Skykomish PN 30159457.01	A	210_DX_W
Work Order		Project Number		B	
Company Name	Arcadis U.S., Inc.	Bill To Company	Arcadis U.S., Inc.	C	210_DXSGA_W
Send Report To	Michelle Nguyen	Invoice Attn	Accounts Payable	D	
Address	1420 - 5th Ave Unit 2400	Address	630 Plaza Drive Suite 600	E	
				F	
City/State/Zip	Seattle, WA 98101	City/State/Zip	Highlands Ranch CO 80129	G	
Phone	(206) 325-5254	Phone	(303) 471-3699	H	
Fax	(206) .32-5.82	Fax		I	
e-Mail Address	Michelle.Nguyen@arcadis.com	e-Mail Address	invoices_us@arcadis.com	J	

No.	Sample Description	Date	Time	Matrix	Pres.	# Bottles	A	B	C	D	E	F	G	H	I	J	Hold
1	~~GW-1~~ NOT SAMPLED			Water	1	1	X										
1 2	GW-2_092823	9/28/23	14:05	Water	1	1	X								-	1	
2 3	GW-3_092723	17:55 ↔ 9/27/23		Water	1	2	X		X						-	2	
3 4	GW-4_092723	9/27/23	12:30	Water	1	1	X								-	3	
4 5	EW-1_092823	9/28/23	16:42	Water	1	1	X								-	4	
5 6	EW-2A_092723	9/27/23	13:50	Water	1	1	X								-	5	
6 7	S1-AD_092823	9/28/23	17:25	Water	1	1	X								-	6	
7 8	S1-AU_092823	9/28/23	17:25	Water	1	1	X								-	7	
8 9	S1-BD_092823	9/28/23	17:50	Water	1	1	X								-	8	
9 10	S1-BU_092823	9/28/23	17:55	Water	1	1	X								-	9	

Sampler(s) Please Print & Sign: Kyle Johnson

Shipment Method: Dropped off

Required Turnaround Time: (Check Box) ☐ Other ____ ☒ STD 10 Wk Days ☐ 5 Wk Days ☐ 2 Wk Days ☐ 24 Hour

Results Due Date:

Relinquished by:	Date:	Time:	Received by:
Kyle Johnson	10/2/23	1220	10/2/23 1220
Relinquished by:	Date:	Time:	Received by (Laboratory): ACJ Fraun
Logged by (Laboratory):	Date:	Time:	Checked by (Laboratory):

Notes:

Cooler ID	Cooler Temp.

QC Package: (Check One Box Below)

- ☒ Level II Std QC
- ☐ Level III Std QC/Raw Date
- ☐ Level IV SW846/CLP
- ☐ Other ____
- ☐ TRRP Checklist
- ☐ TRRP Level IV

Preservative Key: 1-HCl 2-HNO_3 3-H_2SO_4 4-NaOH 5-$Na_2S_2O_3$ 6-$NaHSO_4$ 7-Other 8-4°C 9-5035

Note: 1. Any changes must be made in writing once samples and COC Form have been submitted to ALS Environmental.
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Chain of Custody Form

COC ID: 289092

EV2310004

ALS Project Manager:

ALS Work Order #:

Customer Information		Project Information		Parameter/Method Request for Analysis	
Purchase Order		Project Name	BNSF Skykomish PN 30159457.01	A	210_DX_W
Work Order		Project Number		B	
Company Name	Arcadis U.S., Inc.	Bill To Company	Arcadis U.S., Inc.	C	210_DXSGA_W
Send Report To	Michelle Nguyen	Invoice Attn	Accounts Payable	D	
Address	1420 - 5th Ave Unit 2400	Address	630 Plaza Drive Suite 600	E	
				F	
City/State/Zip	Seattle, WA 98101	City/State/Zip	Highlands Ranch CO 80129	G	
Phone	(206) 325-5254	Phone	(303) 471-3699	H	
Fax	(206) .32-5.82	Fax		I	
e-Mail Address	Michelle.Nguyen@arcadis.com	e-Mail Address	invoices_us@arcadis.com	J	

No.	Sample Description	Date	Time	Matrix	Pres.	# Bottles	A	B	C	D	E	F	G	H	I	J	Hold
1	S2-AD_092923	9/29/23	1542	Water	1	1	X									10	
2	S2-AU_092923	9/29/23	1518	Water	1	1	X									11	
3	S2-BD_092923	9/29/23	1242	Water	1	1	X									12	
4	~~S2-BU_092823~~ KJ 9/29 _092923 MS/MSD	~~9/28/23~~ 9/29/23	~~10:45~~ 1203	Water	1	1	X									13	
5	S3-AD_092723	9/27/23	16:51	Water	1	1	X									14	
6	S3-AU_092723	9/27/23	16:26	Water	1	1	X									15	
7	S3-BD_092823	9/28/23	09:30	Water	1	1	X									16	
8	S3-BU_092823	9/28/23	1045	Water	1	1	X									17	
9	S3-CD_092723	9/27/23	1555	Water	1	1	X									18	
10	S3-CU_092723 MS/MSD	9/27/23	16:25	Water	1	3	X									19	

Sampler(s) Please Print & Sign: Kyle Johnson

Shipment Method: dropped off

Required Turnaround Time: (Check Box) ☐ Other ____ ☒ STD 10 Wk Days ☐ 5 Wk Days ☐ 2 Wk Days ☐ 24 Hour

Results Due Date:

Relinquished by:	Date:	Time:	Received by:
Kyle Johnson	10/2/23	1220	10/2/23 12:32
Relinquished by:	Date:	Time:	Received by (Laboratory): ALS Everett
Logged by (Laboratory):	Date:	Time:	Checked by (Laboratory):

Notes:

Cooler ID	Cooler Temp.

QC Package: (Check One Box Below)

- ☒ Level II Std QC
- ☐ Level III Std QC/Raw Date
- ☐ Level IV SW846/CLP
- ☐ Other
- ☐ TRRP Checklist
- ☐ TRRP Level IV

Preservative Key: 1-HCl 2-HNO_3 3-H_2SO_4 4-NaOH 5-$Na_2S_2O_3$ 6-$NaHSO_4$ 7-Other 8-4°C 9-5035

Note:
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Chain of Custody Form

COC ID: 289091

EV2310O004

ALS Project Manager:		ALS Work Order #:	

Customer Information		Project Information		Parameter/Method Request for Analysis	
Purchase Order		Project Name	BNSF Skykomish P'N 30159457.01	A	210_DX_W
Work Order		Project Number		B	
Company Name	Arcadis U.S., Inc.	Bill To Company	Arcadis U.S., Inc.	C	210_DXSGA_W
Send Report To	Michelle Nguyen	Invoice Attn	Accounts Payable	D	
Address	1420 - 5th Ave Unit 2400	Address	630 Plaza Drive Suite 600	E F	
City/State/Zip	Seattle, WA 98101	City/State/Zip	Highlands Ranch CO 80129	G	
Phone	(206) 325-5254	Phone	(303) 471-3699	H	
Fax	(206) .32-5.82	Fax		I	
e-Mail Address	Michelle.Nguyen@arcadis.com	e-Mail Address	invoices_us@arcadis.com	J	

No.	Sample Description	Date	Time	Matrix	Pres.	# Bottles	A	B	C	D	E	F	G	H	I	J	Hold
20 1	S4-AD_092723	9/27/23	09:28	Water	1	1	X									-20	
21 2	S4-AU_092723	9/27/23	10:24	Water	1	1	X									-21	
22 3	S4-BD_092723	9/27/23	11:37	Water	1	1	X									-22	
23 4	S4-BU_092723	9/27/23	13:16	Water	1	1	X									-23	
24 5	S4-CD_092723	9/27/23	9:35	Water	1	1	X									-24	
25 6	S4-CU_092723	9/27/23	10:30	Water	1	1	X									-25	
26 7	5-W-14_092623	9/26/23	15:08	Water	1	1	X									-26	
27 8	5-W-16_092623	9/26/23	17:00	Water	1	1	X									-27	
28 9	5-W-17_092923	9/29/23	1110	Water	1	1	X									-28	
29 10	5-W-18_092923	9/29/23	1155	Water	1	1	X									-29	

Sampler(s) Please Print & Sign: Kyle Johnson

Shipment Method: drop off

Required Turnaround Time: (Check Box) ☐ Other ____ ☒ STD 10 Wk Days ☐ 5 Wk Days ☐ 2 Wk Days ☐ 24 Hour

Results Due Date:

Relinquished by:	Date:	Time:	Received by:
Kyle Johnson	10/2/23	1220	10/2/23 12:30
Relinquished by:	Date:	Time:	Received by (Laboratory): ALS Everett
Logged by (Laboratory):	Date:	Time:	Checked by (Laboratory):

Notes:

Cooler ID	Cooler Temp.

QC Package: (Check One Box Below)

- ☒ Level II Std QC
- ☐ Level III Std QC/Raw Date
- ☐ Level IV SW846/CLP
- ☐ Other ____
- ☐ TRRP Checklist
- ☐ TRRP Level IV

Preservative Key: 1-HCl 2-HNO_3 3-H_2SO_4 4-NaOH 5-$Na_2S_2O_3$ 6-$NaHSO_4$ 7-Other 8-4°C 9-5035

Note: 1. Any changes must be made in writing once samples and COC Form have been submitted to ALS Environmental.
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Chain of Custody Form

COC ID: 289090

EV2310004

ALS Project Manager:	ALS Work Order #:

Customer Information		Project Information		Parameter/Method Request for Analysis	
Purchase Order		Project Name	BNSF Skykomish PN 30159457.01	A	210_DX_W
Work Order		Project Number		B	
Company Name	Arcadis U.S., Inc.	Bill To Company	Arcadis U.S., Inc.	C	210_DXSGA_W
Send Report To	Michelle Nguyen	Invoice Attn	Accounts Payable	D	
Address	1420 - 5th Ave Unit 2400	Address	630 Plaza Drive Suite 600	E F	
City/State/Zip	Seattle, WA 98101	City/State/Zip	Highlands Ranch CO 80129	G	
Phone	(206) 325-5254	Phone	(303) 471-3699	H	
Fax	(206) .32-5.82	Fax		I	
e-Mail Address	Michelle.Nguyen@arcadis.com	e-Mail Address	invoices_us@arcadis.com	J	

No.	Sample Description	Date	Time	Matrix	Pres.	# Bottles	A	B	C	D	E	F	G	H	I	J	Hold
30 1	5-W-19_092923	9/29/23	1240	Water	1	1	X									-30	
31 2	5-W-51_092923	9/29/23	10:30	Water	1	1	X									-31	
32 3	5-W-55_092823	9/28/23	15:50	Water	1	1	X									-32	
33 4	5-W-56_092823	9/28/23	15:30	Water	1	1	X									-33	
34 5	~~2A-W-9~~ IKJ 9/29 FD-3_092923	9/29/23		Water	1	1	X									-34	
35 6	2A-W-40_092823	9/28/23	13:02	Water	1	1	X									-35	
36 7	2A-W-41_092823	9/28/23	11:05	Water	1		X		X							-36	
37 8	2A-W-42_092823	9/28/23	10:01	Water	1	1	X									-37	
38 9	1B-W-23_092723	9/27/23	17:30	Water	1	1	X									-38	
~~39~~ 10	~~1C-W-4~~ NOT SAMPLED			Water	1	1	X										

Sampler(s) Please Print & Sign: Kyle Johnson

Shipment Method: drop off

Required Turnaround Time: (Check Box) ☐ Other ____ ☒ STD 10 Wk Days ☐ 5 Wk Days ☐ 2 Wk Days ☐ 24 Hour

Results Due Date:

Relinquished by:	Date:	Time:	Received by:
Kyle Johnson	10/2/23	1220	pkl 10/2/23 12:30
Relinquished by:	Date:	Time:	Received by (Laboratory): ALS Everett
Logged by (Laboratory):	Date:	Time:	Checked by (Laboratory):

Notes:

Cooler ID	Cooler Temp.

QC Package: (Check One Box Below)

- ☒ Level II Std QC
- ☐ Level III Std QC/Raw Date
- ☐ Level IV SW846/CLP
- ☐ Other
- ☐ TRRP Checklist
- ☐ TRRP Level IV

Preservative Key: 1-HCl 2-HNO_3 3-H_2SO_4 4-NaOH 5-$Na_2S_2O_3$ 6-$NaHSO_4$ 7-Other 8-4°C 9-5035

Note:
1. Any changes must be made in writing once samples and COC Form have been submitted to ALS Environmental.
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South Charleston, WV +1 304 356 3168
York, PA +1 717 505 5280

Chain of Custody Form

COC ID: 289089

EV2310004

ALS Project Manager:		ALS Work Order #:	

Customer Information		Project Information		Parameter/Method Request for Analysis	
Purchase Order		Project Name	BNSF Skykomish PN 30159457.01	A	210_DX_W
Work Order		Project Number		B	
Company Name	Arcadis U.S., Inc.	Bill To Company	Arcadis U.S., Inc.	C	210_DXSGA_W
Send Report To	Michelle Nguyen	Invoice Attn	Accounts Payable	D	
Address	1420 - 5th Ave Unit 2400	Address	630 Plaza Drive Suite 600	E	~~Total Metals 200.8~~ KJ 9/29
				F	
City/State/Zip	Seattle, WA 98101	City/State/Zip	Highlands Ranch CO 80129	G	
Phone	(206) 325-5254	Phone	(303) 471-3699	H	
Fax	(206) .32-5.82	Fax		I	
e-Mail Address	Michelle.Nguyen@arcadis.com	e-Mail Address	invoices_us@arcadis.com	J	

No.	Sample Description	Date	Time	Matrix	Pres.	# Bottles	A	B	C	D	E	F	G	H	I	J	Hold
1	1C-W-7_092723	9/27/23	13:00	Water	1	1	X									-39	
2	1C-W-8_092723	9/27/23	14:45	Water	1	1	X									-40	
3	5-W-43_092923	9/29/23	11:30	Water	1	1	X									-41	
4	MW-4_092923	9/29/23	16:03	Water	1	1	X									-42	
5	FD-1_092723	9/27/23	—	Water	1	1	X									-43	
6	EB-1_092723	9/27/23	17:10	Water	1	1	X									-44	
7	~~T-05-092620223~~	~~9/26/23~~	~~15:00~~	~~Water~~	~~1,2~~	~~3~~	~~X~~				~~X~~	KJ 9/29					
8	~~T-05-092620223~~	~~9/26/23~~	~~14:40~~	~~Water~~	~~1,2~~	~~3~~	~~X~~				~~X~~	KJ 9/29					
9	FD-2_092723	9/27/23	—	water	1	1	X									-45	
10	FD-4_092923	9/29/23	—	water	1	1	X									46	

Sampler(s) Please Print & Sign	Shipment Method	Required Turnaround Time: (Check Box)	Results Due Date:
Kyle Johnson	drop off	☒ STD 10 Wk Days ☐ 5 Wk Days ☐ 2 Wk Days ☐ 24 Hour ☐ Other	

Relinquished by:	Date:	Time:	Received by:	Notes:
Kyle Johnson	10/2/23	1220	10/2/23 1220pm	
Relinquished by:	Date:	Time:	Received by (Laboratory): ALS Everett	
Logged by (Laboratory):	Date:	Time:	Checked by (Laboratory):	

Cooler ID	Cooler Temp.

QC Package: (Check One Box Below)
- ☒ Level II Std QC
- ☐ Level III Std QC/Raw Date
- ☐ Level IV SW846/CLP
- ☐ Other
- ☐ TRRP Checklist
- ☐ TRRP Level IV

Preservative Key: 1-HCl 2-HNO_3 3-H_2SO_4 4-NaOH 5-$Na_2S_2O_3$ 6-$NaHSO_4$ 7-Other 8-4°C 9-5035

Note:
1. Any changes must be made in writing once samples and COC Form have been submitted to ALS Environmental.
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3. The Chain of Custody is a legal document. All information must be completed accurately.

ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1420 - 5th Ave , Unit 2400 Seattle, WA 98101	DATE:	10/16/2023
		ALS JOB#:	EV23100004
		ALS SAMPLE#:	EV23100004-01
CLIENT CONTACT:	Michelle Nguyen	DATE RECEIVED:	10/02/2023
CLIENT PROJECT:	BNSF Skykomish PN 30159457.01	COLLECTION DATE:	9/28/2023 2:05:00 PM
CLIENT SAMPLE ID	GW-2_092823	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U	100	1	UG/L	10/09/2023	DHM
CAS: ARC-DRO							
TPH-Oil Range	NWTPH-DX	U	100	1	UG/L	10/09/2023	DHM
CAS: ARC-TPH-ORO							

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**93.8**	10/09/2023	DHM
CAS: 629-99-2				

U - Analyte analyzed for but not detected at level above reporting limit.

ADDRESS 8620 Holly Drive, Suite 100, Everett, WA 9820 | PHONE 425-356-2600 | FAX 425-356-2626
ALS Group USA, Corp dba ALS Environmental

ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1420 - 5th Ave , Unit 2400 Seattle, WA 98101	DATE: ALS JOB#: ALS SAMPLE#:	10/16/2023 EV23100004 EV23100004-02
CLIENT CONTACT:	Michelle Nguyen	DATE RECEIVED:	10/02/2023
CLIENT PROJECT:	BNSF Skykomish PN 30159457.01	COLLECTION DATE:	9/27/2023 5:55:00 PM
CLIENT SAMPLE ID	GW-3_092723	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	**250**	100	1	UG/L	10/09/2023	DHM
CAS: ARC-DRO							
TPH-Diesel Range	NWTPH-DX w/ SGA	**110**	100	1	UG/L	10/16/2023	DHM
CAS: ARC-DRO							
TPH-Oil Range	NWTPH-DX	U	100	1	UG/L	10/09/2023	DHM
CAS: ARC-TPH-ORO							
TPH-Oil Range	NWTPH-DX w/ SGA	U	100	1	UG/L	10/16/2023	DHM
CAS: ARC-TPH-ORO							

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**90.4**	10/09/2023	DHM
CAS: 629-99-2				
C25	NWTPH-DX w/ SGA	**101**	10/16/2023	DHM
CAS: 629-99-2				

U - Analyte analyzed for but not detected at level above reporting limit.
Chromatogram indicates that it is likely that sample contains highly weathered diesel.

ADDRESS 8620 Holly Drive, Suite 100, Everett, WA 9820 | PHONE 425-356-2600 | FAX 425-356-2626
ALS Group USA, Corp dba ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1420 - 5th Ave , Unit 2400 Seattle, WA 98101	DATE: ALS JOB#: ALS SAMPLE#:	10/16/2023 EV23100004 EV23100004-03
CLIENT CONTACT:	Michelle Nguyen	DATE RECEIVED:	10/02/2023
CLIENT PROJECT:	BNSF Skykomish PN 30159457.01	COLLECTION DATE:	9/27/2023 12:30:00 PM
CLIENT SAMPLE ID	GW-4_092723	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	**130**	100	1	UG/L	10/09/2023	DHM
CAS: ARC-DRO							
TPH-Oil Range	NWTPH-DX	**690**	100	1	UG/L	10/09/2023	DHM
CAS: ARC-TPH-ORO							

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**93.8**	10/09/2023	DHM
CAS: 629-99-2				

Chromatogram indicates that it is likely that sample contains an unidentified diesel range product and an unidentified oil range product.

ADDRESS 8620 Holly Drive, Suite 100, Everett, WA 9820 | PHONE 425-356-2600 | FAX 425-356-2626
ALS Group USA, Corp dba ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1420 - 5th Ave , Unit 2400 Seattle, WA 98101	DATE:	10/16/2023
		ALS JOB#:	EV23100004
		ALS SAMPLE#:	EV23100004-04
CLIENT CONTACT:	Michelle Nguyen	DATE RECEIVED:	10/02/2023
CLIENT PROJECT:	BNSF Skykomish PN 30159457.01	COLLECTION DATE:	9/28/2023 4:42:00 PM
CLIENT SAMPLE ID	EW-1_092823	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U	100	1	UG/L	10/09/2023	DHM
CAS: ARC-DRO							
TPH-Oil Range	NWTPH-DX	U	100	1	UG/L	10/09/2023	DHM
CAS: ARC-TPH-ORO							

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**95.0**	10/09/2023	DHM
CAS: 629-99-2				

U - Analyte analyzed for but not detected at level above reporting limit.

ADDRESS 8620 Holly Drive, Suite 100, Everett, WA 9820 | PHONE 425-356-2600 | FAX 425-356-2626
ALS Group USA, Corp dba ALS Environmental

ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1420 - 5th Ave , Unit 2400 Seattle, WA 98101	DATE: ALS JOB#: ALS SAMPLE#:	10/16/2023 EV23100004 EV23100004-05
CLIENT CONTACT:	Michelle Nguyen	DATE RECEIVED:	10/02/2023
CLIENT PROJECT:	BNSF Skykomish PN 30159457.01	COLLECTION DATE:	9/27/2023 1:50:00 PM
CLIENT SAMPLE ID	EW-2A_092723	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U	100	1	UG/L	10/09/2023	DHM
CAS: ARC-DRO							
TPH-Oil Range	NWTPH-DX	**250**	100	1	UG/L	10/09/2023	DHM
CAS: ARC-TPH-ORO							

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**115**	10/09/2023	DHM
CAS: 629-99-2				

U - Analyte analyzed for but not detected at level above reporting limit.
Chromatogram indicates that it is likely that sample contains an unidentified oil range product.

ADDRESS 8620 Holly Drive, Suite 100, Everett, WA 9820 | PHONE 425-356-2600 | FAX 425-356-2626
ALS Group USA, Corp dba ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1420 - 5th Ave , Unit 2400 Seattle, WA 98101	DATE: ALS JOB#: ALS SAMPLE#:	10/16/2023 EV23100004 EV23100004-06
CLIENT CONTACT:	Michelle Nguyen	DATE RECEIVED:	10/02/2023
CLIENT PROJECT:	BNSF Skykomish PN 30159457.01	COLLECTION DATE:	9/28/2023 5:25:00 PM
CLIENT SAMPLE ID	S1-AD_092823	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U	100	1	UG/L	10/09/2023	DHM
CAS: ARC-DRO							
TPH-Oil Range	NWTPH-DX	U	100	1	UG/L	10/09/2023	DHM
CAS: ARC-TPH-ORO							

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**93.0**	10/09/2023	DHM
CAS: 629-99-2				

U - Analyte analyzed for but not detected at level above reporting limit.

ADDRESS 8620 Holly Drive, Suite 100, Everett, WA 9820 | PHONE 425-356-2600 | FAX 425-356-2626
ALS Group USA, Corp dba ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1420 - 5th Ave , Unit 2400 Seattle, WA 98101	DATE: ALS JOB#: ALS SAMPLE#:	10/16/2023 EV23100004 EV23100004-07
CLIENT CONTACT:	Michelle Nguyen	DATE RECEIVED:	10/02/2023
CLIENT PROJECT:	BNSF Skykomish PN 30159457.01	COLLECTION DATE:	9/28/2023 5:25:00 PM
CLIENT SAMPLE ID	S1-AU_092823	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U	100	1	UG/L	10/09/2023	DHM
CAS: ARC-DRO							
TPH-Oil Range	NWTPH-DX	U	100	1	UG/L	10/09/2023	DHM
CAS: ARC-TPH-ORO							

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**82.6**	10/09/2023	DHM
CAS: 629-99-2				

U - Analyte analyzed for but not detected at level above reporting limit.

ADDRESS 8620 Holly Drive, Suite 100, Everett, WA 9820 | PHONE 425-356-2600 | FAX 425-356-2626
ALS Group USA, Corp dba ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1420 - 5th Ave , Unit 2400 Seattle, WA 98101	DATE:	10/16/2023
		ALS JOB#:	EV23100004
		ALS SAMPLE#:	EV23100004-08
CLIENT CONTACT:	Michelle Nguyen	DATE RECEIVED:	10/02/2023
CLIENT PROJECT:	BNSF Skykomish PN 30159457.01	COLLECTION DATE:	9/28/2023 5:50:00 PM
CLIENT SAMPLE ID	S1-BD_092823	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U	100	1	UG/L	10/09/2023	DHM
CAS: ARC-DRO							
TPH-Oil Range	NWTPH-DX	U	100	1	UG/L	10/09/2023	DHM
CAS: ARC-TPH-ORO							

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**93.3**	10/09/2023	DHM
CAS: 629-99-2				

U - Analyte analyzed for but not detected at level above reporting limit.

ADDRESS 8620 Holly Drive, Suite 100, Everett, WA 9820 | PHONE 425-356-2600 | FAX 425-356-2626
ALS Group USA, Corp dba ALS Environmental

ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1420 - 5th Ave , Unit 2400 Seattle, WA 98101	DATE: ALS JOB#: ALS SAMPLE#:	10/16/2023 EV23100004 EV23100004-09
CLIENT CONTACT:	Michelle Nguyen	DATE RECEIVED:	10/02/2023
CLIENT PROJECT:	BNSF Skykomish PN 30159457.01	COLLECTION DATE:	9/28/2023 5:55:00 PM
CLIENT SAMPLE ID	S1-BU_092823	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U	100	1	UG/L	10/09/2023	DHM
CAS: ARC-DRO							
TPH-Oil Range	NWTPH-DX	U	100	1	UG/L	10/09/2023	DHM
CAS: ARC-TPH-ORO							

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**86.3**	10/09/2023	DHM
CAS: 629-99-2				

U - Analyte analyzed for but not detected at level above reporting limit.

ADDRESS 8620 Holly Drive, Suite 100, Everett, WA 9820 | PHONE 425-356-2600 | FAX 425-356-2626
ALS Group USA, Corp dba ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1420 - 5th Ave , Unit 2400 Seattle, WA 98101	DATE: ALS JOB#: ALS SAMPLE#:	10/16/2023 EV23100004 EV23100004-10
CLIENT CONTACT:	Michelle Nguyen	DATE RECEIVED:	10/02/2023
CLIENT PROJECT:	BNSF Skykomish PN 30159457.01	COLLECTION DATE:	9/29/2023 3:42:00 PM
CLIENT SAMPLE ID	S2-AD_092923	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U	100	1	UG/L	10/09/2023	DHM
CAS: ARC-DRO							
TPH-Oil Range	NWTPH-DX	U	100	1	UG/L	10/09/2023	DHM
CAS: ARC-TPH-ORO							

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**96.9**	10/09/2023	DHM
CAS: 629-99-2				

U - Analyte analyzed for but not detected at level above reporting limit.

ADDRESS 8620 Holly Drive, Suite 100, Everett, WA 9820 | PHONE 425-356-2600 | FAX 425-356-2626
ALS Group USA, Corp dba ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1420 - 5th Ave , Unit 2400 Seattle, WA 98101	DATE: ALS JOB#: ALS SAMPLE#:	10/16/2023 EV23100004 EV23100004-11
CLIENT CONTACT:	Michelle Nguyen	DATE RECEIVED:	10/02/2023
CLIENT PROJECT:	BNSF Skykomish PN 30159457.01	COLLECTION DATE:	9/29/2023 3:18:00 PM
CLIENT SAMPLE ID	S2-AU_092923	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U	100	1	UG/L	10/09/2023	DHM
CAS: ARC-DRO							
TPH-Oil Range	NWTPH-DX	U	100	1	UG/L	10/09/2023	DHM
CAS: ARC-TPH-ORO							

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**94.5**	10/09/2023	DHM
CAS: 629-99-2				

U - Analyte analyzed for but not detected at level above reporting limit.

ADDRESS 8620 Holly Drive, Suite 100, Everett, WA 9820 | PHONE 425-356-2600 | FAX 425-356-2626
ALS Group USA, Corp dba ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1420 - 5th Ave , Unit 2400 Seattle, WA 98101	DATE: ALS JOB#: ALS SAMPLE#:	10/16/2023 EV23100004 EV23100004-12
CLIENT CONTACT:	Michelle Nguyen	DATE RECEIVED:	10/02/2023
CLIENT PROJECT:	BNSF Skykomish PN 30159457.01	COLLECTION DATE:	9/29/2023 12:42:00 PM
CLIENT SAMPLE ID	S2-BD_092923	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U	100	1	UG/L	10/09/2023	DHM
CAS: ARC-DRO							
TPH-Oil Range	NWTPH-DX	**140**	100	1	UG/L	10/09/2023	DHM
CAS: ARC-TPH-ORO							

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**93.7**	10/09/2023	DHM
CAS: 629-99-2				

U - Analyte analyzed for but not detected at level above reporting limit.
Chromatogram indicates that it is likely that sample contains an unidentified oil range product.

ADDRESS 8620 Holly Drive, Suite 100, Everett, WA 9820 | PHONE 425-356-2600 | FAX 425-356-2626
ALS Group USA, Corp dba ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1420 - 5th Ave , Unit 2400 Seattle, WA 98101	DATE: ALS JOB#: ALS SAMPLE#:	10/16/2023 EV23100004 EV23100004-13
CLIENT CONTACT:	Michelle Nguyen	DATE RECEIVED:	10/02/2023
CLIENT PROJECT:	BNSF Skykomish PN 30159457.01	COLLECTION DATE:	9/29/2023 12:03:00 PM
CLIENT SAMPLE ID	S2-BU_092923 MS/MSD	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	**1000** J	100	1	UG/L	10/09/2023	DHM
CAS: ARC-DRO							
TPH-Oil Range	NWTPH-DX	**200**	100	1	UG/L	10/09/2023	DHM
CAS: ARC-TPH-ORO							

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**97.6**	10/09/2023	DHM
CAS: 629-99-2				

Chromatogram indicates that it is likely that sample contains weathered diesel and an unidentified oil range product.
Oil range product results biased high due to diesel range product overlap.

ADDRESS 8620 Holly Drive, Suite 100, Everett, WA 9820 | PHONE 425-356-2600 | FAX 425-356-2626
ALS Group USA, Corp dba ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1420 - 5th Ave , Unit 2400 Seattle, WA 98101	DATE: ALS JOB#: ALS SAMPLE#:	10/16/2023 EV23100004 EV23100004-14
CLIENT CONTACT:	Michelle Nguyen	DATE RECEIVED:	10/02/2023
CLIENT PROJECT:	BNSF Skykomish PN 30159457.01	COLLECTION DATE:	9/27/2023 4:51:00 PM
CLIENT SAMPLE ID	S3-AD_092723	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U	100	1	UG/L	10/09/2023	DHM
CAS: ARC-DRO							
TPH-Oil Range	NWTPH-DX	U	100	1	UG/L	10/09/2023	DHM
CAS: ARC-TPH-ORO							

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**92.8**	10/09/2023	DHM
CAS: 629-99-2				

U - Analyte analyzed for but not detected at level above reporting limit.

ADDRESS 8620 Holly Drive, Suite 100, Everett, WA 9820 | PHONE 425-356-2600 | FAX 425-356-2626
ALS Group USA, Corp dba ALS Environmental

ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1420 - 5th Ave , Unit 2400 Seattle, WA 98101	DATE: ALS JOB#: ALS SAMPLE#:	10/16/2023 EV23100004 EV23100004-15
CLIENT CONTACT:	Michelle Nguyen	DATE RECEIVED:	10/02/2023
CLIENT PROJECT:	BNSF Skykomish PN 30159457.01	COLLECTION DATE:	9/27/2023 4:26:00 PM
CLIENT SAMPLE ID	S3-AU_092723	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U	100	1	UG/L	10/09/2023	DHM
CAS: ARC-DRO							
TPH-Oil Range	NWTPH-DX	U	100	1	UG/L	10/09/2023	DHM
CAS: ARC-TPH-ORO							

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**95.0**	10/09/2023	DHM
CAS: 629-99-2				

U - Analyte analyzed for but not detected at level above reporting limit.

ADDRESS 8620 Holly Drive, Suite 100, Everett, WA 9820 | PHONE 425-356-2600 | FAX 425-356-2626
ALS Group USA, Corp dba ALS Environmental

ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1420 - 5th Ave , Unit 2400 Seattle, WA 98101	DATE:	10/16/2023
		ALS JOB#:	EV23100004
		ALS SAMPLE#:	EV23100004-16
CLIENT CONTACT:	Michelle Nguyen	DATE RECEIVED:	10/02/2023
CLIENT PROJECT:	BNSF Skykomish PN 30159457.01	COLLECTION DATE:	9/28/2023 9:30:00 AM
CLIENT SAMPLE ID	S3-BD_092823	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U	100	1	UG/L	10/09/2023	DHM
CAS: ARC-DRO							
TPH-Oil Range	NWTPH-DX	U	100	1	UG/L	10/09/2023	DHM
CAS: ARC-TPH-ORO							

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**91.7**	10/09/2023	DHM
CAS: 629-99-2				

U - Analyte analyzed for but not detected at level above reporting limit.

ADDRESS 8620 Holly Drive, Suite 100, Everett, WA 9820 | PHONE 425-356-2600 | FAX 425-356-2626
ALS Group USA, Corp dba ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1420 - 5th Ave , Unit 2400 Seattle, WA 98101	DATE: ALS JOB#: ALS SAMPLE#:	10/16/2023 EV23100004 EV23100004-17
CLIENT CONTACT:	Michelle Nguyen	DATE RECEIVED:	10/02/2023
CLIENT PROJECT:	BNSF Skykomish PN 30159457.01	COLLECTION DATE:	9/28/2023 10:45:00 AM
CLIENT SAMPLE ID	S3-BU_092823	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U	100	1	UG/L	10/09/2023	DHM
CAS: ARC-DRO							
TPH-Oil Range	NWTPH-DX	U	100	1	UG/L	10/09/2023	DHM
CAS: ARC-TPH-ORO							

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**97.7**	10/09/2023	DHM
CAS: 629-99-2				

U - Analyte analyzed for but not detected at level above reporting limit.

ADDRESS 8620 Holly Drive, Suite 100, Everett, WA 9820 | PHONE 425-356-2600 | FAX 425-356-2626
ALS Group USA, Corp dba ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1420 - 5th Ave , Unit 2400 Seattle, WA 98101	DATE: ALS JOB#: ALS SAMPLE#:	10/16/2023 EV23100004 EV23100004-18
CLIENT CONTACT:	Michelle Nguyen	DATE RECEIVED:	10/02/2023
CLIENT PROJECT:	BNSF Skykomish PN 30159457.01	COLLECTION DATE:	9/27/2023 3:55:00 PM
CLIENT SAMPLE ID	S3-CD_092723	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U	100	1	UG/L	10/09/2023	DHM
CAS: ARC-DRO							
TPH-Oil Range	NWTPH-DX	U	100	1	UG/L	10/09/2023	DHM
CAS: ARC-TPH-ORO							

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**100**	10/09/2023	DHM
CAS: 629-99-2				

U - Analyte analyzed for but not detected at level above reporting limit.

ADDRESS 8620 Holly Drive, Suite 100, Everett, WA 9820 | PHONE 425-356-2600 | FAX 425-356-2626
ALS Group USA, Corp dba ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1420 - 5th Ave , Unit 2400 Seattle, WA 98101	DATE: ALS JOB#: ALS SAMPLE#:	10/16/2023 EV23100004 EV23100004-19
CLIENT CONTACT:	Michelle Nguyen	DATE RECEIVED:	10/02/2023
CLIENT PROJECT:	BNSF Skykomish PN 30159457.01	COLLECTION DATE:	9/27/2023 4:25:00 PM
CLIENT SAMPLE ID	S3-CU_092723 MS/MD	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U	100	1	UG/L	10/09/2023	DHM
CAS: ARC-DRO							
TPH-Oil Range	NWTPH-DX	U	100	1	UG/L	10/09/2023	DHM
CAS: ARC-TPH-ORO							

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**95.1**	10/09/2023	DHM
CAS: 629-99-2				

U - Analyte analyzed for but not detected at level above reporting limit.

ADDRESS 8620 Holly Drive, Suite 100, Everett, WA 9820 | PHONE 425-356-2600 | FAX 425-356-2626
ALS Group USA, Corp dba ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1420 - 5th Ave , Unit 2400 Seattle, WA 98101	DATE: ALS JOB#: ALS SAMPLE#:	10/16/2023 EV23100004 EV23100004-20
CLIENT CONTACT:	Michelle Nguyen	DATE RECEIVED:	10/02/2023
CLIENT PROJECT:	BNSF Skykomish PN 30159457.01	COLLECTION DATE:	9/27/2023 9:28:00 AM
CLIENT SAMPLE ID	S4-AD_092723	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U	100	1	UG/L	10/09/2023	DHM
CAS: ARC-DRO							
TPH-Oil Range	NWTPH-DX	U	100	1	UG/L	10/09/2023	DHM
CAS: ARC-TPH-ORO							

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**100**	10/09/2023	DHM
CAS: 629-99-2				

U - Analyte analyzed for but not detected at level above reporting limit.

ADDRESS 8620 Holly Drive, Suite 100, Everett, WA 9820 | PHONE 425-356-2600 | FAX 425-356-2626
ALS Group USA, Corp dba ALS Environmental

ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1420 - 5th Ave , Unit 2400 Seattle, WA 98101	DATE: ALS JOB#: ALS SAMPLE#:	10/16/2023 EV23100004 EV23100004-21
CLIENT CONTACT:	Michelle Nguyen	DATE RECEIVED:	10/02/2023
CLIENT PROJECT:	BNSF Skykomish PN 30159457.01	COLLECTION DATE:	9/27/2023 10:24:00 AM
CLIENT SAMPLE ID	S4-AU_092723	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U	100	1	UG/L	10/09/2023	DHM
CAS: ARC-DRO							
TPH-Oil Range	NWTPH-DX	U	100	1	UG/L	10/09/2023	DHM
CAS: ARC-TPH-ORO							

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**95.9**	10/09/2023	DHM
CAS: 629-99-2				

U - Analyte analyzed for but not detected at level above reporting limit.

ADDRESS 8620 Holly Drive, Suite 100, Everett, WA 9820 | PHONE 425-356-2600 | FAX 425-356-2626
ALS Group USA, Corp dba ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1420 - 5th Ave , Unit 2400 Seattle, WA 98101	DATE: ALS JOB#: ALS SAMPLE#:	10/16/2023 EV23100004 EV23100004-22
CLIENT CONTACT:	Michelle Nguyen	DATE RECEIVED:	10/02/2023
CLIENT PROJECT:	BNSF Skykomish PN 30159457.01	COLLECTION DATE:	9/27/2023 11:37:00 AM
CLIENT SAMPLE ID	S4-BD_092723	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U	100	1	UG/L	10/09/2023	DHM
CAS: ARC-DRO							
TPH-Oil Range	NWTPH-DX	U	100	1	UG/L	10/09/2023	DHM
CAS: ARC-TPH-ORO							

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**101**	10/09/2023	DHM
CAS: 629-99-2				

U - Analyte analyzed for but not detected at level above reporting limit.

ADDRESS 8620 Holly Drive, Suite 100, Everett, WA 9820 | PHONE 425-356-2600 | FAX 425-356-2626
ALS Group USA, Corp dba ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1420 - 5th Ave , Unit 2400 Seattle, WA 98101	DATE: ALS JOB#: ALS SAMPLE#:	10/16/2023 EV23100004 EV23100004-23
CLIENT CONTACT:	Michelle Nguyen	DATE RECEIVED:	10/02/2023
CLIENT PROJECT:	BNSF Skykomish PN 30159457.01	COLLECTION DATE:	9/27/2023 1:10:00 PM
CLIENT SAMPLE ID	S4-BU_092723	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U	100	1	UG/L	10/09/2023	DHM
CAS: ARC-DRO							
TPH-Oil Range	NWTPH-DX	U	100	1	UG/L	10/09/2023	DHM
CAS: ARC-TPH-ORO							

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**97.2**	10/09/2023	DHM
CAS: 629-99-2				

U - Analyte analyzed for but not detected at level above reporting limit.

ADDRESS 8620 Holly Drive, Suite 100, Everett, WA 9820 | PHONE 425-356-2600 | FAX 425-356-2626
ALS Group USA, Corp dba ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1420 - 5th Ave , Unit 2400 Seattle, WA 98101	DATE: ALS JOB#: ALS SAMPLE#:	10/16/2023 EV23100004 EV23100004-24
CLIENT CONTACT:	Michelle Nguyen	DATE RECEIVED:	10/02/2023
CLIENT PROJECT:	BNSF Skykomish PN 30159457.01	COLLECTION DATE:	9/27/2023 9:35:00 AM
CLIENT SAMPLE ID	S4-CD_092723	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U	100	1	UG/L	10/09/2023	DHM
CAS: ARC-DRO							
TPH-Oil Range	NWTPH-DX	U	100	1	UG/L	10/09/2023	DHM
CAS: ARC-TPH-ORO							

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**105**	10/09/2023	DHM
CAS: 629-99-2				

U - Analyte analyzed for but not detected at level above reporting limit.

ADDRESS 8620 Holly Drive, Suite 100, Everett, WA 9820 | PHONE 425-356-2600 | FAX 425-356-2626
ALS Group USA, Corp dba ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1420 - 5th Ave , Unit 2400 Seattle, WA 98101	DATE: ALS JOB#: ALS SAMPLE#:	10/16/2023 EV23100004 EV23100004-25
CLIENT CONTACT:	Michelle Nguyen	DATE RECEIVED:	10/02/2023
CLIENT PROJECT:	BNSF Skykomish PN 30159457.01	COLLECTION DATE:	9/27/2023 10:30:00 AM
CLIENT SAMPLE ID	S4-CU_092723	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U	100	1	UG/L	10/09/2023	DHM
CAS: ARC-DRO							
TPH-Oil Range	NWTPH-DX	U	100	1	UG/L	10/09/2023	DHM
CAS: ARC-TPH-ORO							

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**95.1**	10/09/2023	DHM
CAS: 629-99-2				

U - Analyte analyzed for but not detected at level above reporting limit.

ADDRESS 8620 Holly Drive, Suite 100, Everett, WA 9820 | PHONE 425-356-2600 | FAX 425-356-2626
ALS Group USA, Corp dba ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1420 - 5th Ave , Unit 2400 Seattle, WA 98101	DATE: ALS JOB#: ALS SAMPLE#:	10/16/2023 EV23100004 EV23100004-26
CLIENT CONTACT:	Michelle Nguyen	DATE RECEIVED:	10/02/2023
CLIENT PROJECT:	BNSF Skykomish PN 30159457.01	COLLECTION DATE:	9/26/2023 3:08:00 PM
CLIENT SAMPLE ID	5-W-14_092623	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U	100	1	UG/L	10/10/2023	DHM
CAS: ARC-DRO							
TPH-Oil Range	NWTPH-DX	U	100	1	UG/L	10/10/2023	DHM
CAS: ARC-TPH-ORO							

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**98.4**	10/10/2023	DHM
CAS: 629-99-2				

U - Analyte analyzed for but not detected at level above reporting limit.

ADDRESS 8620 Holly Drive, Suite 100, Everett, WA 9820 | PHONE 425-356-2600 | FAX 425-356-2626
ALS Group USA, Corp dba ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1420 - 5th Ave , Unit 2400 Seattle, WA 98101	DATE: ALS JOB#: ALS SAMPLE#:	10/16/2023 EV23100004 EV23100004-27
CLIENT CONTACT:	Michelle Nguyen	DATE RECEIVED:	10/02/2023
CLIENT PROJECT:	BNSF Skykomish PN 30159457.01	COLLECTION DATE:	9/26/2023 5:00:00 PM
CLIENT SAMPLE ID	5-W-16_092623	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U	100	1	UG/L	10/10/2023	DHM
CAS: ARC-DRO							
TPH-Oil Range	NWTPH-DX	U	100	1	UG/L	10/10/2023	DHM
CAS: ARC-TPH-ORO							

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**100**	10/10/2023	DHM
CAS: 629-99-2				

U - Analyte analyzed for but not detected at level above reporting limit.

ADDRESS 8620 Holly Drive, Suite 100, Everett, WA 9820 | PHONE 425-356-2600 | FAX 425-356-2626
ALS Group USA, Corp dba ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1420 - 5th Ave , Unit 2400 Seattle, WA 98101	DATE: ALS JOB#: ALS SAMPLE#:	10/16/2023 EV23100004 EV23100004-28
CLIENT CONTACT:	Michelle Nguyen	DATE RECEIVED:	10/02/2023
CLIENT PROJECT:	BNSF Skykomish PN 30159457.01	COLLECTION DATE:	9/29/2023 11:10:00 AM
CLIENT SAMPLE ID	5-W-17_092923	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U	100	1	UG/L	10/10/2023	DHM
CAS: ARC-DRO							
TPH-Oil Range	NWTPH-DX	U	100	1	UG/L	10/10/2023	DHM
CAS: ARC-TPH-ORO							

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**98.0**	10/10/2023	DHM
CAS: 629-99-2				

U - Analyte analyzed for but not detected at level above reporting limit.

ADDRESS 8620 Holly Drive, Suite 100, Everett, WA 9820 | PHONE 425-356-2600 | FAX 425-356-2626
ALS Group USA, Corp dba ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1420 - 5th Ave , Unit 2400 Seattle, WA 98101	DATE: ALS JOB#: ALS SAMPLE#:	10/16/2023 EV23100004 EV23100004-29
CLIENT CONTACT:	Michelle Nguyen	DATE RECEIVED:	10/02/2023
CLIENT PROJECT:	BNSF Skykomish PN 30159457.01	COLLECTION DATE:	9/29/2023 11:55:00 AM
CLIENT SAMPLE ID	5-W-18_092923	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U	100	1	UG/L	10/10/2023	DHM
CAS: ARC-DRO							
TPH-Oil Range	NWTPH-DX	U	100	1	UG/L	10/10/2023	DHM
CAS: ARC-TPH-ORO							

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**103**	10/10/2023	DHM
CAS: 629-99-2				

U - Analyte analyzed for but not detected at level above reporting limit.

ADDRESS 8620 Holly Drive, Suite 100, Everett, WA 9820 | PHONE 425-356-2600 | FAX 425-356-2626
ALS Group USA, Corp dba ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1420 - 5th Ave , Unit 2400 Seattle, WA 98101	DATE: ALS JOB#: ALS SAMPLE#:	10/16/2023 EV23100004 EV23100004-30
CLIENT CONTACT:	Michelle Nguyen	DATE RECEIVED:	10/02/2023
CLIENT PROJECT:	BNSF Skykomish PN 30159457.01	COLLECTION DATE:	9/29/2023 12:40:00 PM
CLIENT SAMPLE ID	5-W-19_092923	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U	100	1	UG/L	10/10/2023	DHM
CAS: ARC-DRO							
TPH-Oil Range	NWTPH-DX	U	100	1	UG/L	10/10/2023	DHM
CAS: ARC-TPH-ORO							

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**97.0**	10/10/2023	DHM
CAS: 629-99-2				

U - Analyte analyzed for but not detected at level above reporting limit.

ADDRESS 8620 Holly Drive, Suite 100, Everett, WA 9820 | PHONE 425-356-2600 | FAX 425-356-2626
ALS Group USA, Corp dba ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1420 - 5th Ave , Unit 2400 Seattle, WA 98101	DATE: ALS JOB#: ALS SAMPLE#:	10/16/2023 EV23100004 EV23100004-31
CLIENT CONTACT:	Michelle Nguyen	DATE RECEIVED:	10/02/2023
CLIENT PROJECT:	BNSF Skykomish PN 30159457.01	COLLECTION DATE:	9/29/2023 10:30:00 AM
CLIENT SAMPLE ID	5-W-51_092923	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	**530**	100	1	UG/L	10/10/2023	DHM
CAS: ARC-DRO							
TPH-Oil Range	NWTPH-DX	**220**	100	1	UG/L	10/10/2023	DHM
CAS: ARC-TPH-ORO							

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**98.6**	10/10/2023	DHM
CAS: 629-99-2				

Chromatogram indicates that it is likely that sample contains highly weathered diesel and an unidentified oil range product.
Oil range product results biased high due to diesel range product overlap.

ADDRESS 8620 Holly Drive, Suite 100, Everett, WA 9820 | PHONE 425-356-2600 | FAX 425-356-2626
ALS Group USA, Corp dba ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1420 - 5th Ave , Unit 2400 Seattle, WA 98101	DATE:	10/16/2023
		ALS JOB#:	EV23100004
		ALS SAMPLE#:	EV23100004-32
CLIENT CONTACT:	Michelle Nguyen	DATE RECEIVED:	10/02/2023
CLIENT PROJECT:	BNSF Skykomish PN 30159457.01	COLLECTION DATE:	9/28/2023 3:50:00 PM
CLIENT SAMPLE ID	5-W-55_092823	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U	100	1	UG/L	10/10/2023	DHM
CAS: ARC-DRO							
TPH-Oil Range	NWTPH-DX	U	100	1	UG/L	10/10/2023	DHM
CAS: ARC-TPH-ORO							

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**97.1**	10/10/2023	DHM
CAS: 629-99-2				

U - Analyte analyzed for but not detected at level above reporting limit.

ADDRESS 8620 Holly Drive, Suite 100, Everett, WA 9820 | PHONE 425-356-2600 | FAX 425-356-2626
ALS Group USA, Corp dba ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1420 - 5th Ave , Unit 2400 Seattle, WA 98101	DATE: ALS JOB#: ALS SAMPLE#:	10/16/2023 EV23100004 EV23100004-33
CLIENT CONTACT:	Michelle Nguyen	DATE RECEIVED:	10/02/2023
CLIENT PROJECT:	BNSF Skykomish PN 30159457.01	COLLECTION DATE:	9/28/2023 3:30:00 PM
CLIENT SAMPLE ID	5-W-56_092823	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	**1400**	100	1	UG/L	10/10/2023	DHM
CAS: ARC-DRO							
TPH-Oil Range	NWTPH-DX	**710**	100	1	UG/L	10/10/2023	DHM
CAS: ARC-TPH-ORO							

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**81.2**	10/10/2023	DHM
CAS: 629-99-2				

Chromatogram indicates that it is likely that sample contains an unidentified diesel range product and an unidentified oil range product.

ADDRESS 8620 Holly Drive, Suite 100, Everett, WA 9820 | PHONE 425-356-2600 | FAX 425-356-2626
ALS Group USA, Corp dba ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1420 - 5th Ave , Unit 2400 Seattle, WA 98101	DATE: ALS JOB#: ALS SAMPLE#:	10/16/2023 EV23100004 EV23100004-34
CLIENT CONTACT:	Michelle Nguyen	DATE RECEIVED:	10/02/2023
CLIENT PROJECT:	BNSF Skykomish PN 30159457.01	COLLECTION DATE:	9/29/2023
CLIENT SAMPLE ID	FD-3_092923	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	**590**	100	1	UG/L	10/10/2023	DHM
CAS: ARC-DRO							
TPH-Oil Range	NWTPH-DX	**290**	100	1	UG/L	10/10/2023	DHM
CAS: ARC-TPH-ORO							

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**100**	10/10/2023	DHM
CAS: 629-99-2				

Chromatogram indicates that it is likely that sample contains highly weathered diesel and an unidentified oil range product.
Oil range product results biased high due to diesel range product overlap.

ADDRESS 8620 Holly Drive, Suite 100, Everett, WA 9820 | PHONE 425-356-2600 | FAX 425-356-2626
ALS Group USA, Corp dba ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1420 - 5th Ave , Unit 2400 Seattle, WA 98101	DATE: ALS JOB#: ALS SAMPLE#:	10/16/2023 EV23100004 EV23100004-35
CLIENT CONTACT:	Michelle Nguyen	DATE RECEIVED:	10/02/2023
CLIENT PROJECT:	BNSF Skykomish PN 30159457.01	COLLECTION DATE:	9/28/2023 1:02:00 PM
CLIENT SAMPLE ID	2A-W-40_092823	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U	100	1	UG/L	10/10/2023	DHM
CAS: ARC-DRO							
TPH-Oil Range	NWTPH-DX	U	100	1	UG/L	10/10/2023	DHM
CAS: ARC-TPH-ORO							

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**106**	10/10/2023	DHM
CAS: 629-99-2				

U - Analyte analyzed for but not detected at level above reporting limit.

ADDRESS 8620 Holly Drive, Suite 100, Everett, WA 9820 | PHONE 425-356-2600 | FAX 425-356-2626
ALS Group USA, Corp dba ALS Environmental

ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1420 - 5th Ave , Unit 2400 Seattle, WA 98101	DATE: ALS JOB#: ALS SAMPLE#:	10/16/2023 EV23100004 EV23100004-36
CLIENT CONTACT:	Michelle Nguyen	DATE RECEIVED:	10/02/2023
CLIENT PROJECT:	BNSF Skykomish PN 30159457.01	COLLECTION DATE:	9/28/2023 11:05:00 AM
CLIENT SAMPLE ID	2A-W-41_092823	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	**400**	100	1	UG/L	10/10/2023	DHM
CAS: ARC-DRO							
TPH-Diesel Range	NWTPH-DX w/ SGA	**240** J	50	1	UG/L	10/16/2023	DHM
CAS: ARC-DRO							
TPH-Oil Range	NWTPH-DX	**120**	100	1	UG/L	10/10/2023	DHM
CAS: ARC-TPH-ORO							
TPH-Oil Range	NWTPH-DX w/ SGA	U	100	1	UG/L	10/16/2023	DHM
CAS: ARC-TPH-ORO							

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**104**	10/10/2023	DHM
CAS: 629-99-2				
C25	NWTPH-DX w/ SGA	**132 SUR11**	10/16/2023	DHM
CAS: 629-99-2				

SUR11 - Surrogate outside of control limits due to sporadic marginal failure. No corrective action taken.
U - Analyte analyzed for but not detected at level above reporting limit.
Chromatogram indicates that it is likely that sample contains highly weathered diesel and an unidentified oil range product.
Oil range product results biased high due to diesel range product overlap.

ADDRESS 8620 Holly Drive, Suite 100, Everett, WA 9820 | PHONE 425-356-2600 | FAX 425-356-2626
ALS Group USA, Corp dba ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1420 - 5th Ave , Unit 2400 Seattle, WA 98101	DATE: ALS JOB#: ALS SAMPLE#:	10/16/2023 EV23100004 EV23100004-37
CLIENT CONTACT:	Michelle Nguyen	DATE RECEIVED:	10/02/2023
CLIENT PROJECT:	BNSF Skykomish PN 30159457.01	COLLECTION DATE:	9/28/2023 10:01:00 AM
CLIENT SAMPLE ID	2A-W-42_092823	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	**120**	100	1	UG/L	10/10/2023	DHM
CAS: ARC-DRO							
TPH-Oil Range	NWTPH-DX	U	100	1	UG/L	10/10/2023	DHM
CAS: ARC-TPH-ORO							

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**103**	10/10/2023	DHM
CAS: 629-99-2				

U - Analyte analyzed for but not detected at level above reporting limit.
Chromatogram indicates that it is likely that sample contains an unidentified diesel range product.

ADDRESS 8620 Holly Drive, Suite 100, Everett, WA 9820 | PHONE 425-356-2600 | FAX 425-356-2626
ALS Group USA, Corp dba ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1420 - 5th Ave , Unit 2400 Seattle, WA 98101	DATE: ALS JOB#: ALS SAMPLE#:	10/16/2023 EV23100004 EV23100004-38
CLIENT CONTACT:	Michelle Nguyen	DATE RECEIVED:	10/02/2023
CLIENT PROJECT:	BNSF Skykomish PN 30159457.01	COLLECTION DATE:	9/27/2023 5:30:00 PM
CLIENT SAMPLE ID	1B-W-23_092723	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U	100	1	UG/L	10/10/2023	DHM
CAS: ARC-DRO							
TPH-Oil Range	NWTPH-DX	U	100	1	UG/L	10/10/2023	DHM
CAS: ARC-TPH-ORO							

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**86.5**	10/10/2023	DHM
CAS: 629-99-2				

U - Analyte analyzed for but not detected at level above reporting limit.

ADDRESS 8620 Holly Drive, Suite 100, Everett, WA 9820 | PHONE 425-356-2600 | FAX 425-356-2626
ALS Group USA, Corp dba ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1420 - 5th Ave , Unit 2400 Seattle, WA 98101	DATE: ALS JOB#: ALS SAMPLE#:	10/16/2023 EV23100004 EV23100004-39
CLIENT CONTACT:	Michelle Nguyen	DATE RECEIVED:	10/02/2023
CLIENT PROJECT:	BNSF Skykomish PN 30159457.01	COLLECTION DATE:	9/27/2023 1:00:00 PM
CLIENT SAMPLE ID	1C-W-7_092723	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	**120**	100	1	UG/L	10/10/2023	DHM
CAS: ARC-DRO							
TPH-Oil Range	NWTPH-DX	U	100	1	UG/L	10/10/2023	DHM
CAS: ARC-TPH-ORO							

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**97.0**	10/10/2023	DHM
CAS: 629-99-2				

U - Analyte analyzed for but not detected at level above reporting limit.
Chromatogram indicates that it is likely that sample contains an unidentified diesel range product.

ADDRESS 8620 Holly Drive, Suite 100, Everett, WA 9820 | PHONE 425-356-2600 | FAX 425-356-2626
ALS Group USA, Corp dba ALS Environmental

ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1420 - 5th Ave , Unit 2400 Seattle, WA 98101	DATE: ALS JOB#: ALS SAMPLE#:	10/16/2023 EV23100004 EV23100004-40
CLIENT CONTACT:	Michelle Nguyen	DATE RECEIVED:	10/02/2023
CLIENT PROJECT:	BNSF Skykomish PN 30159457.01	COLLECTION DATE:	9/27/2023 2:45:00 PM
CLIENT SAMPLE ID	1C-W-8_092723	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U	100	1	UG/L	10/10/2023	DHM
CAS: ARC-DRO							
TPH-Oil Range	NWTPH-DX	U	100	1	UG/L	10/10/2023	DHM
CAS: ARC-TPH-ORO							

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**96.7**	10/10/2023	DHM
CAS: 629-99-2				

U - Analyte analyzed for but not detected at level above reporting limit.

ADDRESS 8620 Holly Drive, Suite 100, Everett, WA 9820 | PHONE 425-356-2600 | FAX 425-356-2626
ALS Group USA, Corp dba ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1420 - 5th Ave , Unit 2400 Seattle, WA 98101	DATE: ALS JOB#: ALS SAMPLE#:	10/16/2023 EV23100004 EV23100004-41
CLIENT CONTACT:	Michelle Nguyen	DATE RECEIVED:	10/02/2023
CLIENT PROJECT:	BNSF Skykomish PN 30159457.01	COLLECTION DATE:	9/29/2023 11:30:00 AM
CLIENT SAMPLE ID	5-W-43_092923	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U	100	1	UG/L	10/10/2023	DHM
CAS: ARC-DRO							
TPH-Oil Range	NWTPH-DX	U	100	1	UG/L	10/10/2023	DHM
CAS: ARC-TPH-ORO							

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**93.3**	10/10/2023	DHM
CAS: 629-99-2				

U - Analyte analyzed for but not detected at level above reporting limit.

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ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1420 - 5th Ave , Unit 2400 Seattle, WA 98101	DATE: ALS JOB#: ALS SAMPLE#:	10/16/2023 EV23100004 EV23100004-42
CLIENT CONTACT:	Michelle Nguyen	DATE RECEIVED:	10/02/2023
CLIENT PROJECT:	BNSF Skykomish PN 30159457.01	COLLECTION DATE:	9/29/2023 4:03:00 PM
CLIENT SAMPLE ID	MW-4_092923	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	**290**	100	1	UG/L	10/10/2023	DHM
CAS: ARC-DRO							
TPH-Oil Range	NWTPH-DX	**100**	100	1	UG/L	10/10/2023	DHM
CAS: ARC-TPH-ORO							

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**95.2**	10/10/2023	DHM
CAS: 629-99-2				

Chromatogram indicates that it is likely that sample contains an unidentified diesel range product.

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CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1420 - 5th Ave , Unit 2400 Seattle, WA 98101	DATE: ALS JOB#: ALS SAMPLE#:	10/16/2023 EV23100004 EV23100004-43
CLIENT CONTACT:	Michelle Nguyen	DATE RECEIVED:	10/02/2023
CLIENT PROJECT:	BNSF Skykomish PN 30159457.01	COLLECTION DATE:	9/27/2023
CLIENT SAMPLE ID	FD-1_092723	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	**100**	100	1	UG/L	10/10/2023	DHM
CAS: ARC-DRO							
TPH-Oil Range	NWTPH-DX	**220**	100	1	UG/L	10/10/2023	DHM
CAS: ARC-TPH-ORO							

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**115**	10/10/2023	DHM
CAS: 629-99-2				

Chromatogram indicates that it is likely that sample contains an unidentified diesel range product and an unidentified oil range product.

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CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1420 - 5th Ave , Unit 2400 Seattle, WA 98101	DATE: ALS JOB#: ALS SAMPLE#:	10/16/2023 EV23100004 EV23100004-44
CLIENT CONTACT:	Michelle Nguyen	DATE RECEIVED:	10/02/2023
CLIENT PROJECT:	BNSF Skykomish PN 30159457.01	COLLECTION DATE:	9/27/2023 5:10:00 PM
CLIENT SAMPLE ID	EB-1_092723	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U	100	1	UG/L	10/10/2023	DHM
CAS: ARC-DRO							
TPH-Oil Range	NWTPH-DX	U	100	1	UG/L	10/10/2023	DHM
CAS: ARC-TPH-ORO							

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**88.2**	10/10/2023	DHM
CAS: 629-99-2				

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CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1420 - 5th Ave , Unit 2400 Seattle, WA 98101	DATE: ALS JOB#: ALS SAMPLE#:	10/16/2023 EV23100004 EV23100004-45
CLIENT CONTACT:	Michelle Nguyen	DATE RECEIVED:	10/02/2023
CLIENT PROJECT:	BNSF Skykomish PN 30159457.01	COLLECTION DATE:	9/27/2023
CLIENT SAMPLE ID	~~FD-2_092923~~ FD-2_092723	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U	100	1	UG/L	10/10/2023	DHM
CAS: ARC-DRO							
TPH-Oil Range	NWTPH-DX	U	100	1	UG/L	10/10/2023	DHM
CAS: ARC-TPH-ORO							

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**89.2**	10/10/2023	DHM
CAS: 629-99-2				

U - Analyte analyzed for but not detected at level above reporting limit.

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CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1420 - 5th Ave , Unit 2400 Seattle, WA 98101	DATE: ALS JOB#: ALS SAMPLE#:	10/16/2023 EV23100004 EV23100004-46
CLIENT CONTACT:	Michelle Nguyen	DATE RECEIVED:	10/02/2023
CLIENT PROJECT:	BNSF Skykomish PN 30159457.01	COLLECTION DATE:	9/29/2023
CLIENT SAMPLE ID	FD-4_092923	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	U	100	1	UG/L	10/10/2023	DHM
CAS: ARC-DRO							
TPH-Oil Range	NWTPH-DX	U	100	1	UG/L	10/10/2023	DHM
CAS: ARC-TPH-ORO							

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**93.2**	10/10/2023	DHM
CAS: 629-99-2				

U - Analyte analyzed for but not detected at level above reporting limit.

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BNSF Skykomish

DATA REVIEW

Skykomish, Washington

Total Petroleum Hydrocarbon (TPH) Analyses

SDG #: EV23100095

Analyses Performed By:
ALS Environmental
Everett, Washington

Report #: 52033R
Project: 30159458.02

1 Summary

This data quality assessment summarizes the review of Sample Delivery Group (SDG) # EV23100095 for samples collected in association with the BNSF Skykomish, Washington. The review was conducted as a Tier II evaluation and included review of data package completeness. Only analytical data as reported by the laboratory were reviewed for this validation. Field documentation was not included in this review. Included with this assessment are the validation annotated sample result sheets, and chain of custody records. Analyses were performed on the following samples:

Sample ID	Lab ID	Matrix	Sample Collection Date	Parent Sample	Analysis
					TPH
GW-1_101723	EV23100095-01	Water	10/17/2023		X
DUP-1	EV23100095-02	Water	10/17/2023	GW-1_101723	X

Note:
TPH = Total Petroleum Hydrocarbons

2 Analytical Data Package Documentation

The table below is the evaluation of the data package completeness.

Items Reviewed	Reported		Performance Acceptable		Not Required
	No	Yes	No	Yes	
1. Sample receipt condition		X		X	
2. Requested analyses and sample results		X		X	
3. Master tracking list		X		X	
4. Methods of analysis		X		X	
5. Reporting limits		X		X	
6. Sample collection date		X		X	
7. Laboratory sample received date		X		X	
8. Sample preservation verification (as applicable)		X		X	
9. Sample preparation/extraction/analysis dates		X		X	
10. Fully executed Chain-of-Custody (COC) form		X		X	
11. Narrative summary of Quality Assurance (QA) or sample problems provided		X		X	
12. Data Package Completeness and Compliance		X		X	

3 Organic Analysis Introduction

Analyses were performed according to United States Environmental Protection Agency (USEPA) Method NWTPH-DX. Data were reviewed in accordance with USEPA CLP National Functional Guidelines for Organic Superfund Methods Data Review, document number EPA 540-R-20-005, November 2020 (with reference to the historical USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review, OSWER 9240.1-05A-P, October 1999, as appropriate).

The data review process is an evaluation of data on a technical basis rather than a determination of contract compliance. As such, the standards against which the data are being weighed may differ from those specified in the analytical method. It is assumed that the data package represents the best efforts of the laboratory and had already been subjected to sufficient quality review prior to submission.

During the review process, laboratory qualified and unqualified data are verified against the supporting documentation. Based on this evaluation, qualifier codes may be added, deleted, or modified by the data reviewer. Results are qualified with the following codes in accordance with USEPA National Functional Guidelines:

- Concentration (C) Qualifiers
  - U The compound was analyzed for but not detected. The associated value is the compound quantitation limit.
  - B The compound has been found in the sample as well as its associated blank, its presence in the sample may be suspect.
- Quantitation (Q) Qualifiers
  - E The compound was quantitated above the calibration range.
  - D Concentration is based on a diluted sample analysis.
- Validation Qualifiers
  - J The compound was positively identified; however, the associated numerical value is an estimated concentration only.
  - UJ The compound was not detected above the reported sample quantitation limit. However, the reported limit is approximate and may or may not represent the actual limit of quantitation.
  - JN The analysis indicates the presence of a compound for which there is presumptive evidence to make a tentative identification. The associated numerical value is an estimated concentration only.
  - UB Compound considered non-detect at the listed value due to associated blank contamination.
  - N The analysis indicates the presence of a compound for which there is presumptive evidence to make a tentative identification.
  - R The sample results are rejected.

Two facts should be noted by all data users. First, the “R” flag means that the associated value is unusable. In other words, due to significant quality control (QC) problems, the analysis is invalid and provides no information as to whether the compound is present or not. “R” values should not appear on data tables because they cannot be relied upon, even as a last resort. The second fact to keep in mind is that no compound concentration, even if it has passed all QC tests, is guaranteed to be accurate. Strict QC serves to increase confidence in data, but any value potentially contains error.

4 Total Petroleum Hydrocarbons (TPH) Analyses

4.1 Holding Times

The specified holding times for the following methods are presented in the following table.

Method	Matrix	Holding Time	Preservation
NWTPH-DX	Water	14 days from collection to extraction and 40 days from extraction to analysis (preserved) 7 days from collection to extraction and 40 days from extraction to analysis (Unpreserved)	Cool to <6 °C

All samples were analyzed within the specified holding time criteria.

4.2 Blank Contamination

Quality assurance (QA) blanks (i.e. laboratory method blanks and equipment rinse blanks) are prepared to identify any contamination which may have been introduced into the samples during sample preparation or field activity. Method blanks measure laboratory contamination. Rinse blanks also measure contamination of samples during field operations.

A blank action level (BAL) of five times the concentration of a detected compound in an associated blank (common laboratory contaminant compounds are calculated at ten times) is calculated for QA blanks containing concentrations greater than the reporting limit (RL). The BAL is compared to the associated sample results to determine the appropriate qualification of the sample results, if needed.

Compounds were not detected above the RL in the associated blanks; therefore, detected sample results were not associated with blank contamination.

4.3 Surrogates/System Monitoring Compounds

All samples to be analyzed for organic compounds are spiked with surrogate compounds prior to sample preparation to evaluate overall laboratory performance and efficiency of the analytical technique. The analysis requires surrogate compounds exhibit recoveries within the laboratory-established acceptance limits.

All samples exhibited surrogate recoveries within the control limits.

4.4 Matrix Spike/Matrix Spike Duplicate (MS/MSD) Analysis

MS/MSD data are used to assess the precision and accuracy of the analytical method. The compounds used to perform the MS/MSD analysis must exhibit a percent recovery within the laboratory-established acceptance limits. The relative percent difference (RPD) between the MS/MSD recoveries must exhibit an RPD within the laboratory-established acceptance limits.

Note: The MS/MSD recovery control limits do not apply for MS/MSD performed on samples where the compound concentration detected in the parent sample exceeds the MS/MSD concentration by a factor of four or greater.

MS/MSD analysis was not performed on samples from this SDG.

4.5 Laboratory Control Sample (LCS) Analysis

The LCS analysis is used to assess the accuracy of the analytical method independent of matrix interferences. The compounds associated with the LCS analysis must exhibit a percent recovery within the laboratory-established acceptance limits.

All compounds associated with the LCS analyses exhibited recoveries within the control limits.

4.6 Field Duplicate Sample Analysis

The field duplicate sample analysis is used to assess the precision of the field sampling procedures and analytical method. The control limit of 30% for water matrices and 50% for soil matrices is applied to the RPD between the parent sample and the field duplicate sample results. In the instance when the parent and/or duplicate sample concentrations are less than or equal to five times the reporting limit (RL), a control limit of two times the RL for water matrices or three times the RL for soil matrices is applied to the difference between the results.

Results for duplicate samples are summarized in the following table.

Sample ID/Duplicate ID	Compounds	Sample Result (UG/L)	Duplicate Result (UG/L)	RPD
GW-1_101723 / DUP-1	TPH-Diesel Range	150	140	AC
	TPH-Oil Range	110	130	AC

Note:

AC = acceptable

The calculated RPDs between the parent sample and field duplicate were acceptable.

4.7 Compound Identification

The retention times of all quantitated peaks must fall within the calculated retention time windows.

All identified compounds met the specified criteria.

4.8 System Performance and Overall Assessment

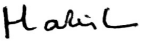
Overall system performance was acceptable. Other than for those deviations specifically mentioned in this review, the overall data quality is within the guidelines specified in the method.

4.9 Data Validation Checklist for Total Petroleum Hydrocarbon (TPH)

TPH: NWTPH-DX	Reported		Performance Acceptable		Not Required
	No	Yes	No	Yes	
Gas Chromatography/Flame- and Photo- Ionization Detectors (GC/FID/PID)					
Tier II Validation					
Holding Times/Preservation		X		X	
Reporting Limits (Units)		X		X	
Blanks					
A. Method Blanks		X		X	
B. Trip Blanks	X				X
C. Equipment Blanks	X				X
Surrogates Accuracy (%R)		X		X	
Matrix Spike (MS) %R	X				X
Matrix Spike Duplicate (MSD) %R	X				X
MS/MSD Precision (RPD)	X				X
Laboratory Control Sample (LCS) %R		X		X	
Laboratory Control Sample Duplicate (LCSD) %R	X				X
LCS/LCSD RPD	X				X
Laboratory Duplicate Sample RPD	X				X
Field Duplicate Sample RPD		X		X	
Dilution Factor		X		X	
Moisture Content	X				X

Notes:

%R = percent recovery
RPD = relative percent difference

Validation Performed By:	Hareesha Naik
Signature:	
Date:	November 28, 2023
Peer Review:	Jennifer Singer
Date:	November 29, 2023

ALS Environmental
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Everett, WA 98208
Phone (425) 356-2600
Fax (425) 356-2626
http://www.alsglobal.com

Chain Of Custody/ Laboratory Analysis Request

Ext

ALS Job# (Laboratory Use Only)

EV2310095

Date 10-17 Page 1 Of 1

PROJECT ID: 3015945 7.
REPORT TO COMPANY: Arcadis
PROJECT MANAGER: Kyle Johnson
ADDRESS: 1420 5th Ave. 98101 Ste. 2400
PHONE: 206-719-6991 P.O. #:
E-MAIL: Kyle.Johnson@arcadis.com
INVOICE TO COMPANY:
ATTENTION:
ADDRESS:

SAMPLE I.D.	DATE	TIME	TYPE	LAB#	NWTPH-HCID	NWTPH-DX w/o SGC LL	NWTPH-GX	BTEX by EPA 8021 BTEX by EPA 8260	MTBE by EPA 8021 MTBE by EPA 8260	Halogenated Volatiles by EPA 8260	Volatile Organic Compounds by EPA 8260	EDB / EDC by EPA 8260 SIM (water)	EDB / EDC by EPA 8260 (soil)	Semivolatile Organic Compounds by EPA 8270	Polycyclic Aromatic Hydrocarbons (PAH) by EPA 8270 SIM	PCB by EPA 8082 Pesticides by EPA 8081	Metals-MTCA-5 RCRA-8 Pri Pol TAL	Metals Other (Specify)	TCLP-Metals VOA Semi-Vol Pest Herbs	OTHER (Specify)	NUMBER OF CONTAINERS	RECEIVED IN GOOD CONDITION?
1. GW-1_101723	10-17	1240	W	1		X																
2. DUP-1	10-17	/	W	2		X																
3.																						
4.																						
5.																						
6.																						
7.																						
8.																						
9.																						
10.																						

4.8C

SPECIAL INSTRUCTIONS

SIGNATURES (Name, Company, Date, Time):

1. Relinquished By: Kyle Johnson, Arcadis 10-17, 1512
   Received By: Shawn Robinson ALS 10/17/23 1512
2. Relinquished By:
   Received By:

TURNAROUND REQUESTED in Business Days*

Organic, Metals & Inorganic Analysis: ~~10~~ Standard | 5 | 3 | 2 | 1 | SAME DAY

Fuels & Hydrocarbon Analysis: ~~5~~ Standard | 3 | 1 | SAME DAY

OTHER:
Specify: Standard

*Turnaround request less than standard may incur Rush Charges

ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1420 - 5th Ave , Unit 2400 Seattle, WA 98101	DATE:	10/24/2023
		ALS JOB#:	EV23100095
		ALS SAMPLE#:	EV23100095-01
CLIENT CONTACT:	Kyle Haslam	DATE RECEIVED:	10/17/2023
CLIENT PROJECT:	30159457	COLLECTION DATE:	10/17/2023 12:40:00 PM
CLIENT SAMPLE ID	GW-1_101723	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	**150**	100	1	UG/L	10/23/2023	DHM
CAS: ARC-DRO							
TPH-Oil Range	NWTPH-DX	**110**	100	1	UG/L	10/23/2023	DHM
CAS: ARC-TPH-ORO							

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**100**	10/23/2023	DHM
CAS: 629-99-2				

Chromatogram indicates that it is likely that sample contains an unidentified diesel range product and an unidentified oil range product.

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ALS Group USA, Corp dba ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT:	Arcadis U.S., Inc. 1420 - 5th Ave , Unit 2400 Seattle, WA 98101	DATE: ALS JOB#: ALS SAMPLE#:	10/24/2023 EV23100095 EV23100095-02
CLIENT CONTACT:	Kyle Haslam	DATE RECEIVED:	10/17/2023
CLIENT PROJECT:	30159457	COLLECTION DATE:	10/17/2023
CLIENT SAMPLE ID	DUP-1	WDOE ACCREDITATION:	C601

SAMPLE DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
TPH-Diesel Range	NWTPH-DX	**140**	100	1	UG/L	10/23/2023	DHM
CAS: ARC-DRO							
TPH-Oil Range	NWTPH-DX	**130**	100	1	UG/L	10/23/2023	DHM
CAS: ARC-TPH-ORO							

SURROGATE	METHOD	%REC	ANALYSIS DATE	ANALYSIS BY
C25	NWTPH-DX	**101**	10/23/2023	DHM
CAS: 629-99-2				

Chromatogram indicates that it is likely that sample contains an unidentified diesel range product and an unidentified oil range product.

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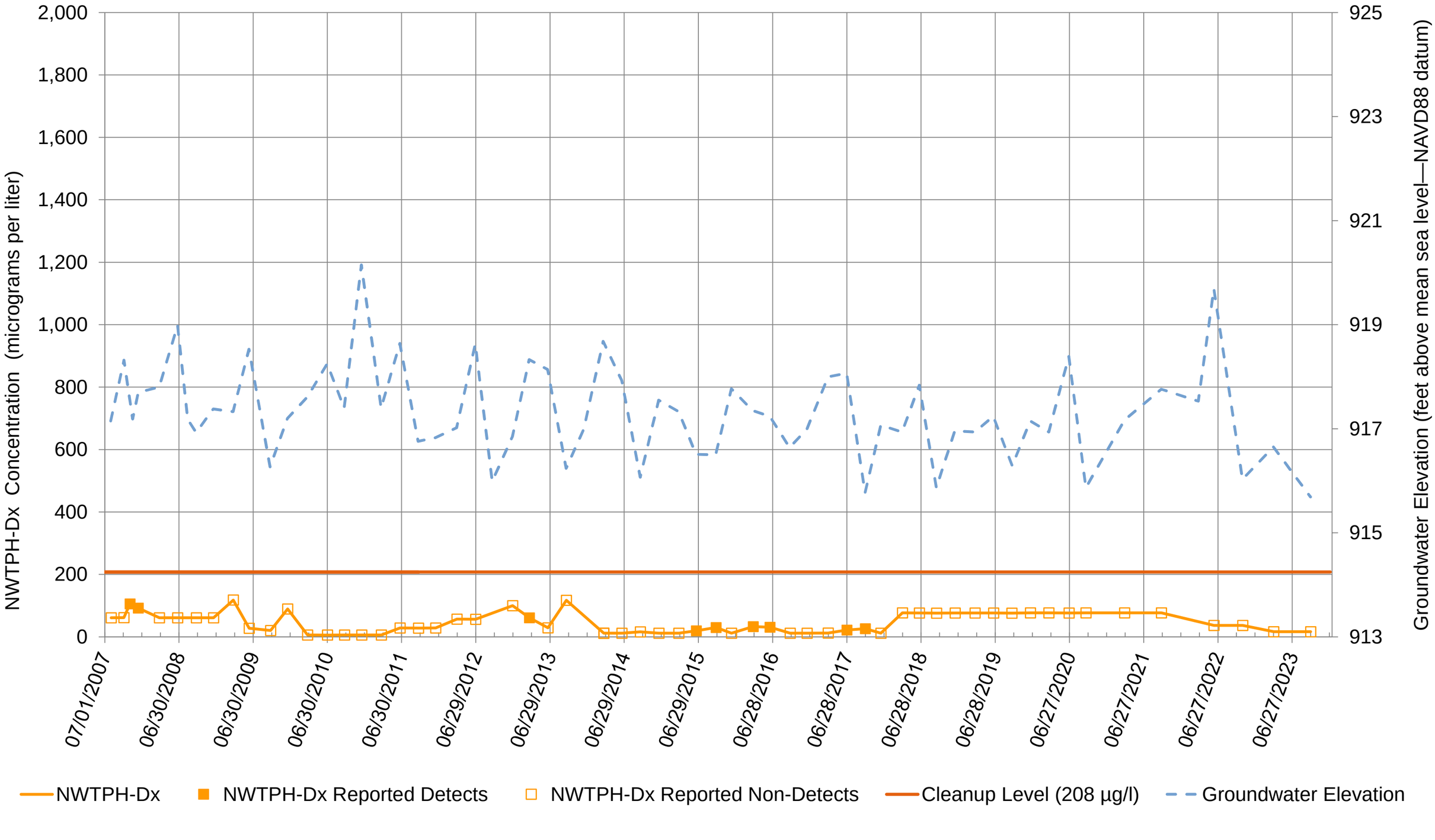
Appendix C

NWTPH-Dx Trend Plots

Compliance Monitoring Levee Zone Monitoring Wells

NWTPH-Dx Cleanup Level of 208 micrograms per liter

NWTPH-Dx Trend Plot
Well 5-W-14



NWTPH-Dx Trend Plot
Well 5-W-16

NWTPH-Dx Concentration (micrograms per liter)

2,000
1,800
1,600
1,400
1,200
1,000
800
600
400
200
0

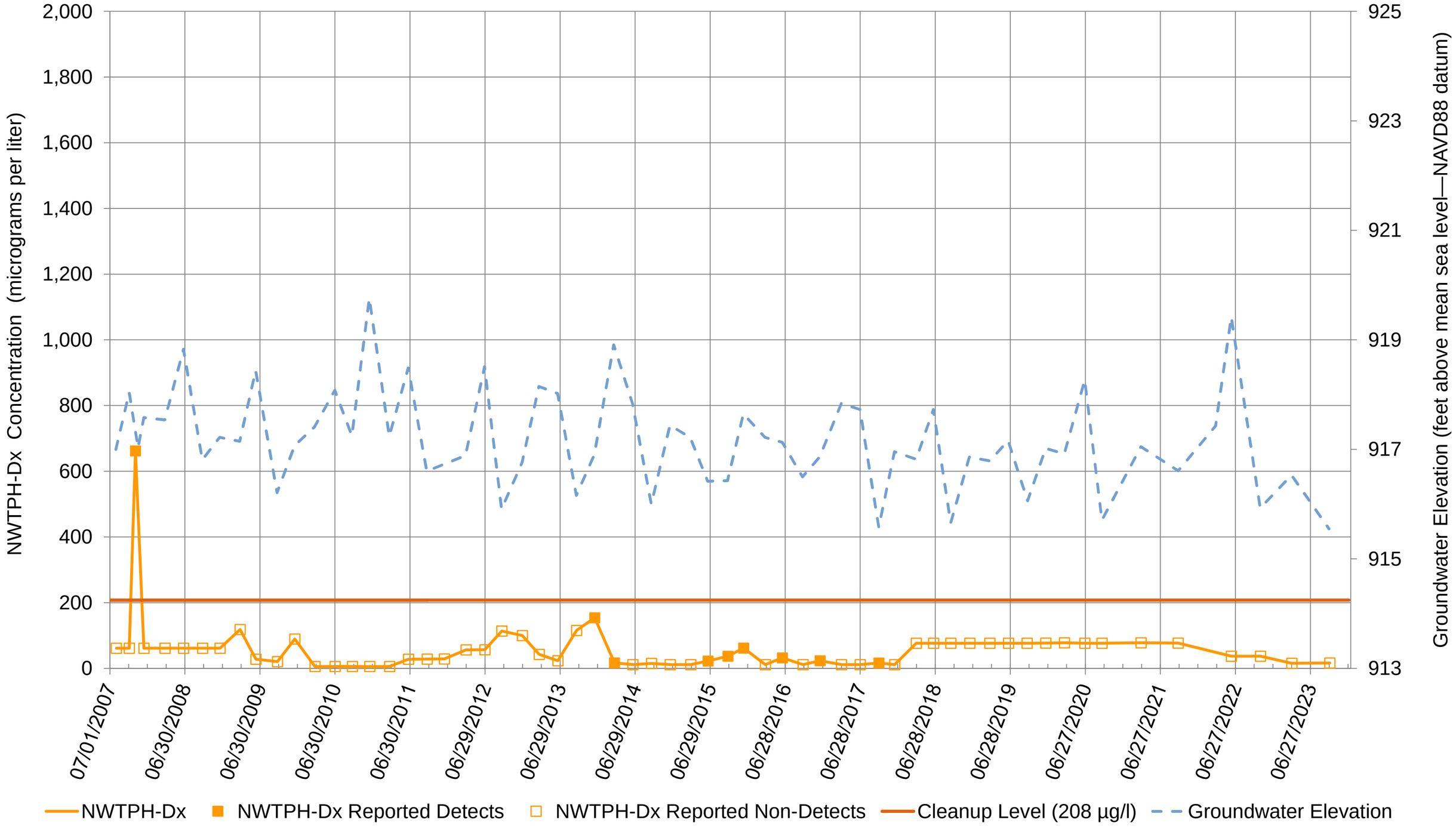
Groundwater Elevation (feet above mean sea level—NAVD88 datum)

925
923
921
919
917
915
913

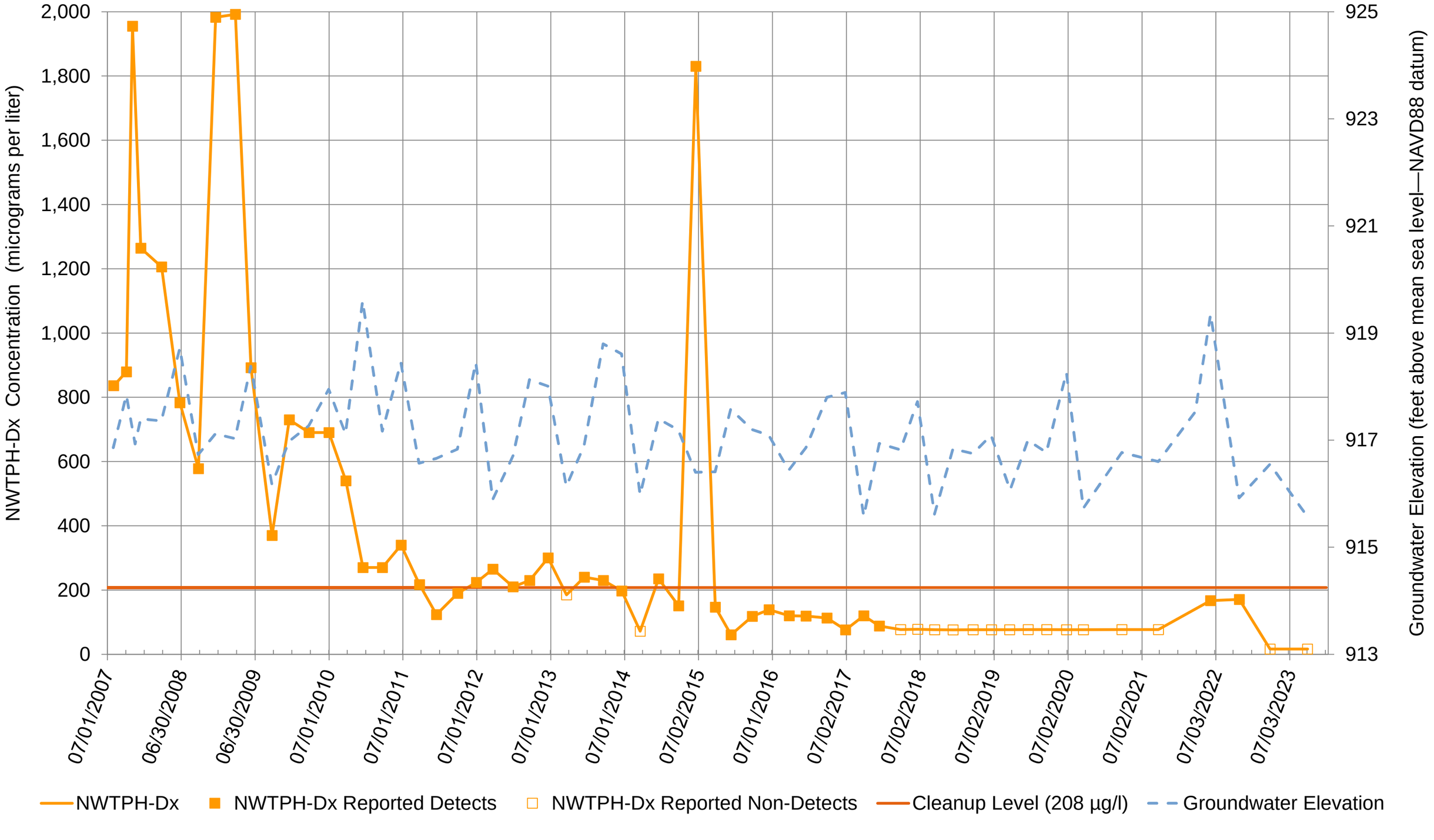
07/01/2007
06/30/2008
06/30/2009
06/30/2010
06/30/2011
06/29/2012
06/29/2013
06/29/2014
06/29/2015
06/28/2016
06/28/2017
06/28/2018
06/28/2019
06/27/2020
06/27/2021
06/27/2022
06/27/2023

NWTPH-Dx
NWTPH-Dx Reported Detects
NWTPH-Dx Reported Non-Detects
Cleanup Level (208 µg/l)
Groundwater Elevation

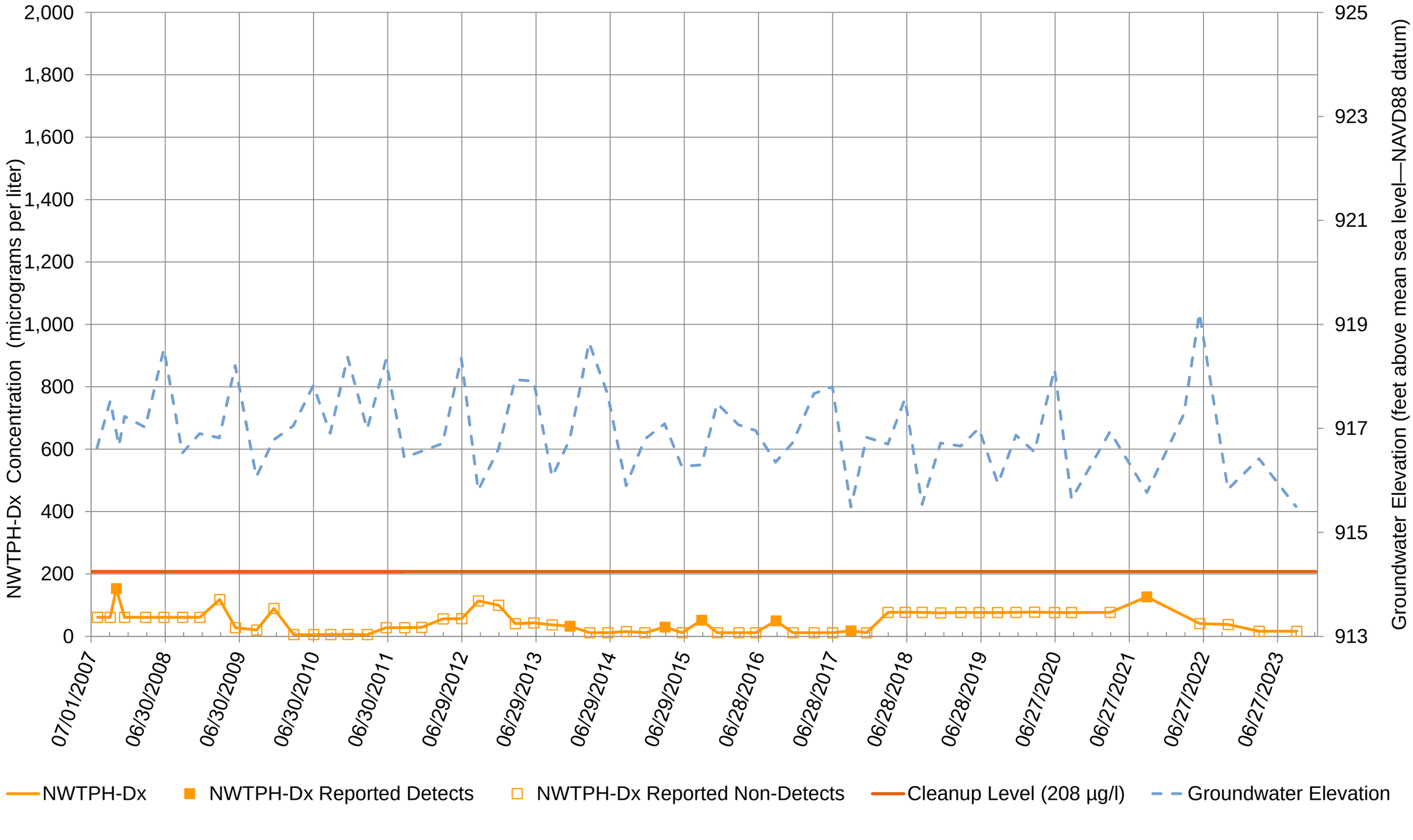
NWTPH-Dx Trend Plot
Well 5-W-17



NWTPH-Dx Trend Plot
Well 5-W-18



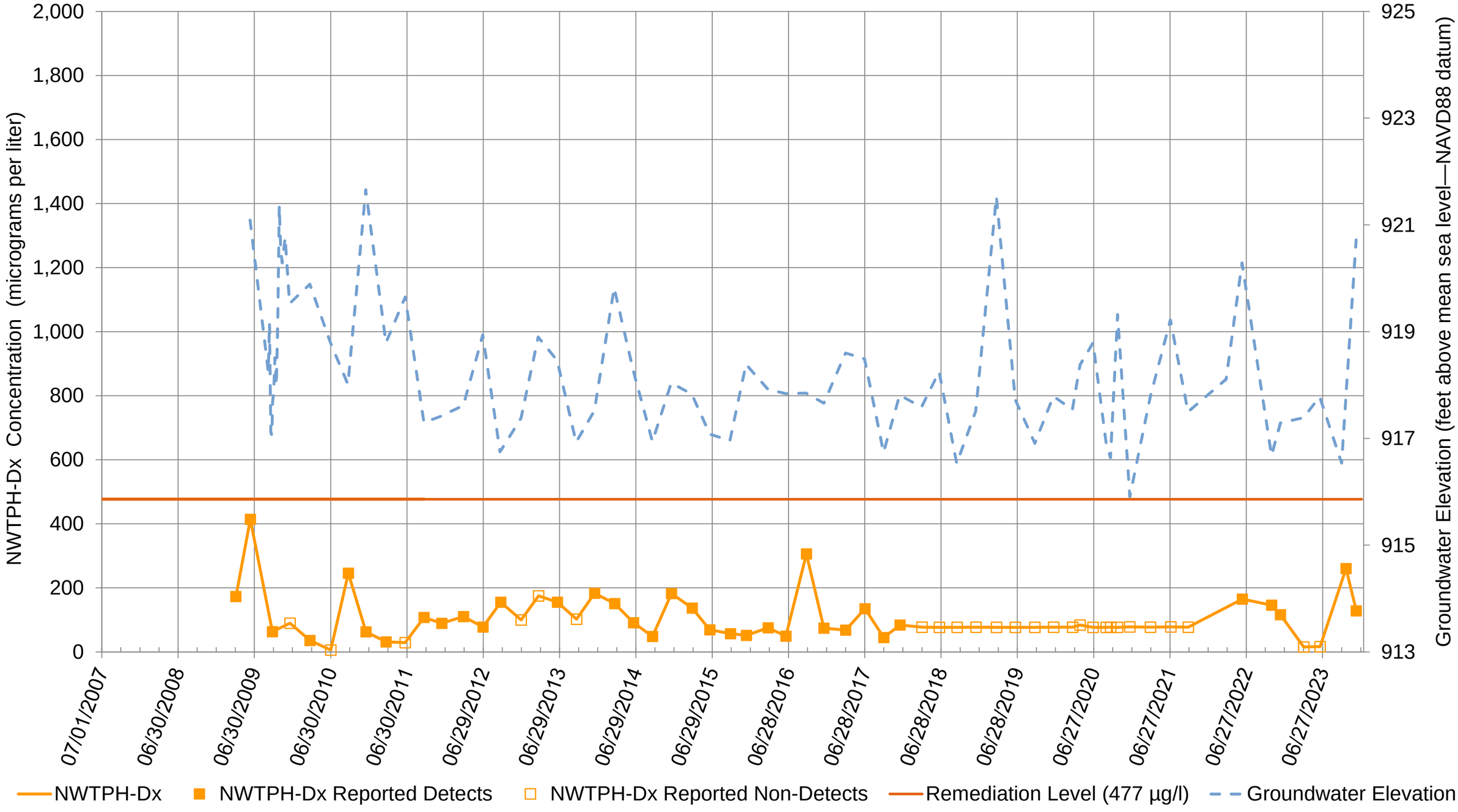
NWTPH-Dx Trend Plot
Well 5-W-19



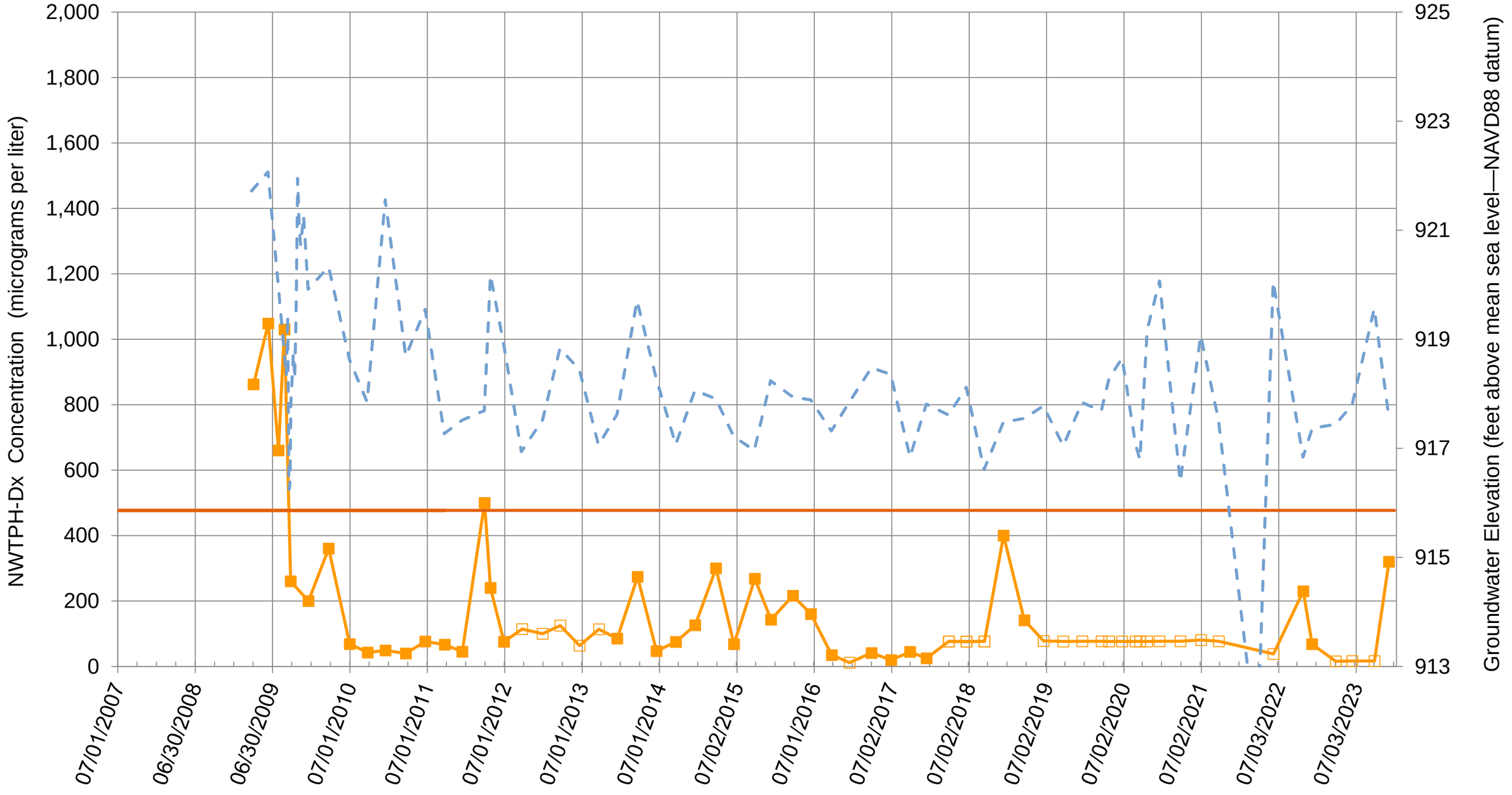
Remediation Performance Monitoring Wells North of Railyard and Outside Levee Zone

NWTPH-Dx Cleanup Level of 477 micrograms per liter

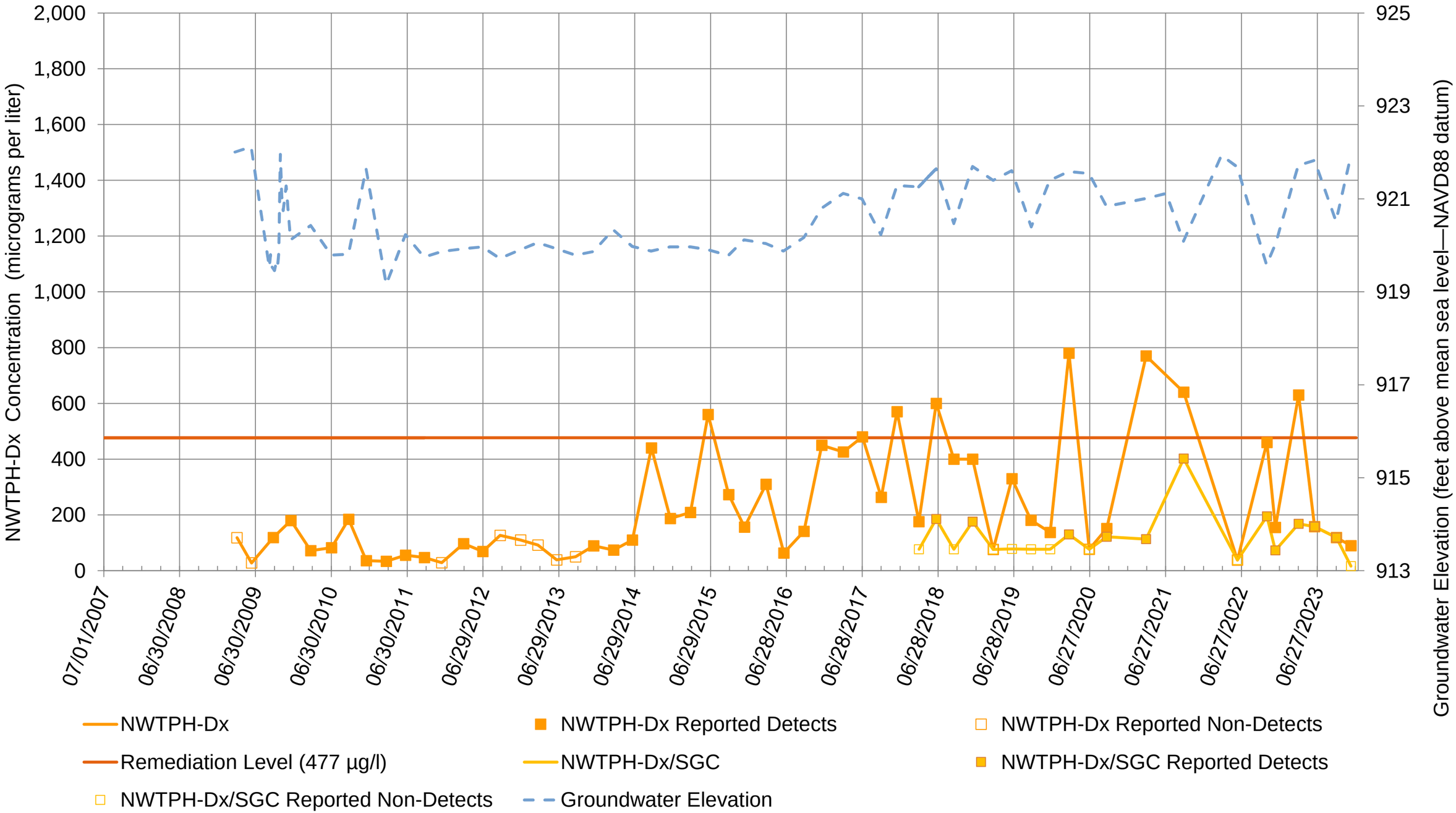
NWTPH-Dx Trend Plot
Well GW-1



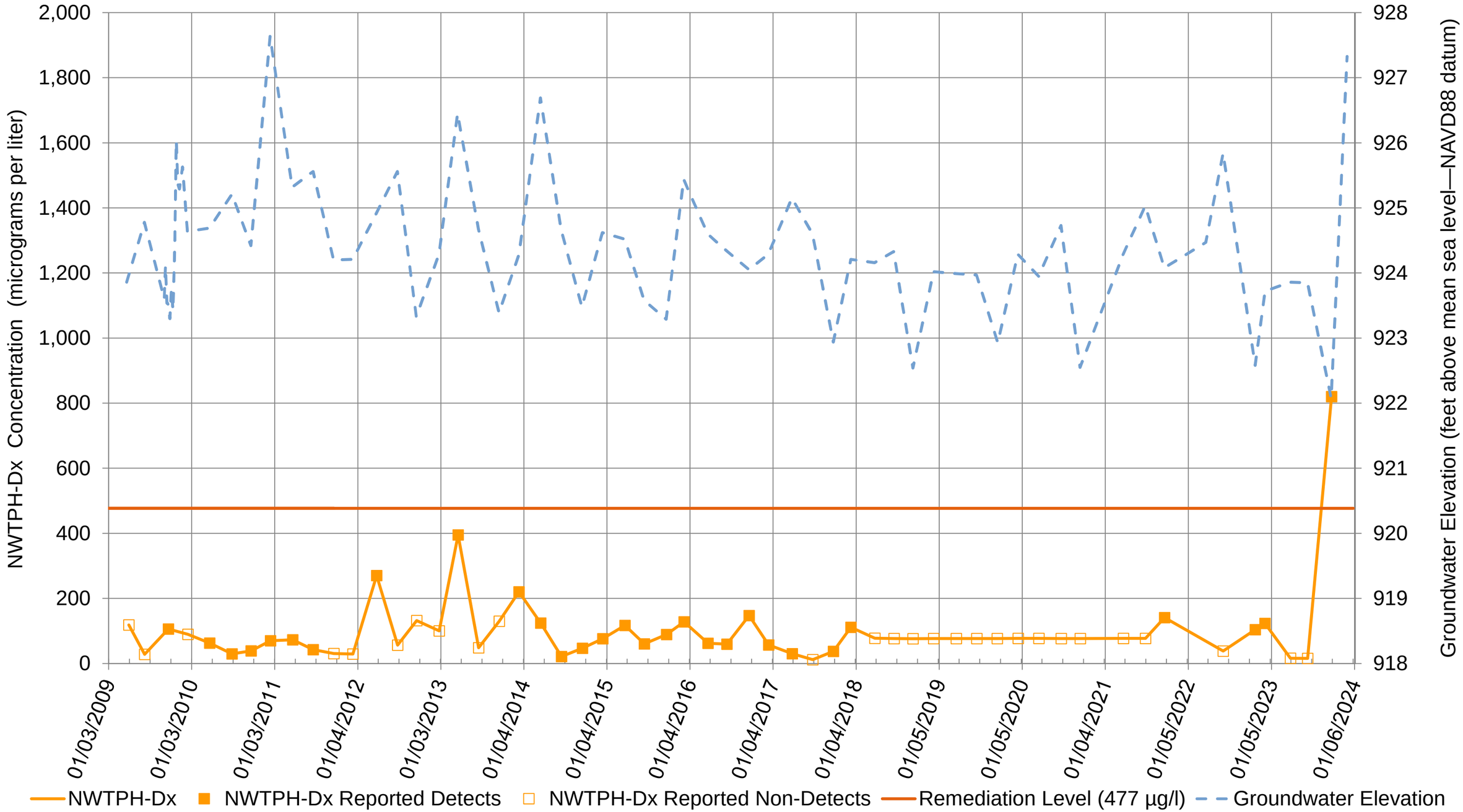
NWTPH-Dx Trend Plot
Well GW-2



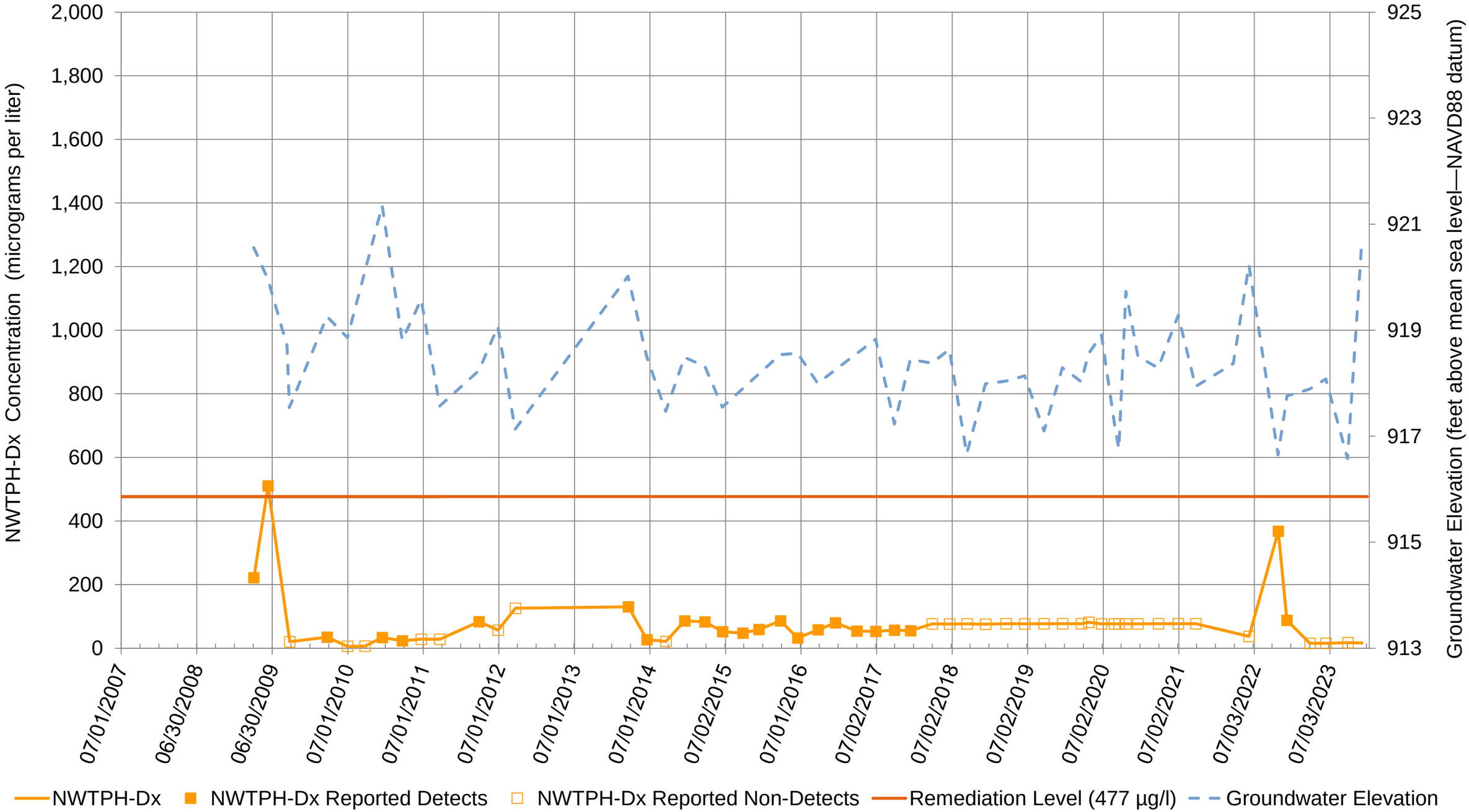
NWTPH-Dx Trend Plot
Well GW-3



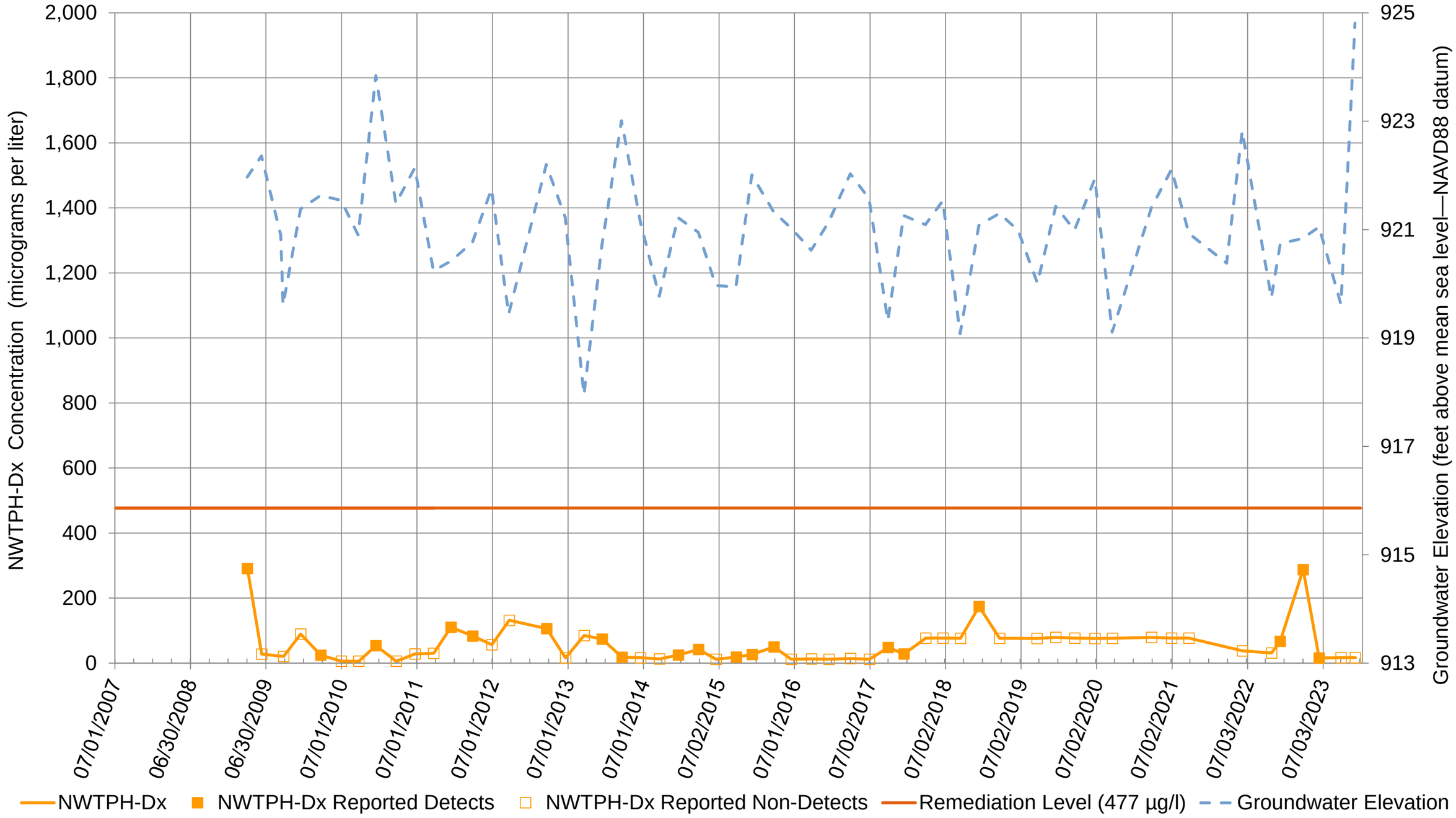
NWTPH-Dx Trend Plot
Well GW-4



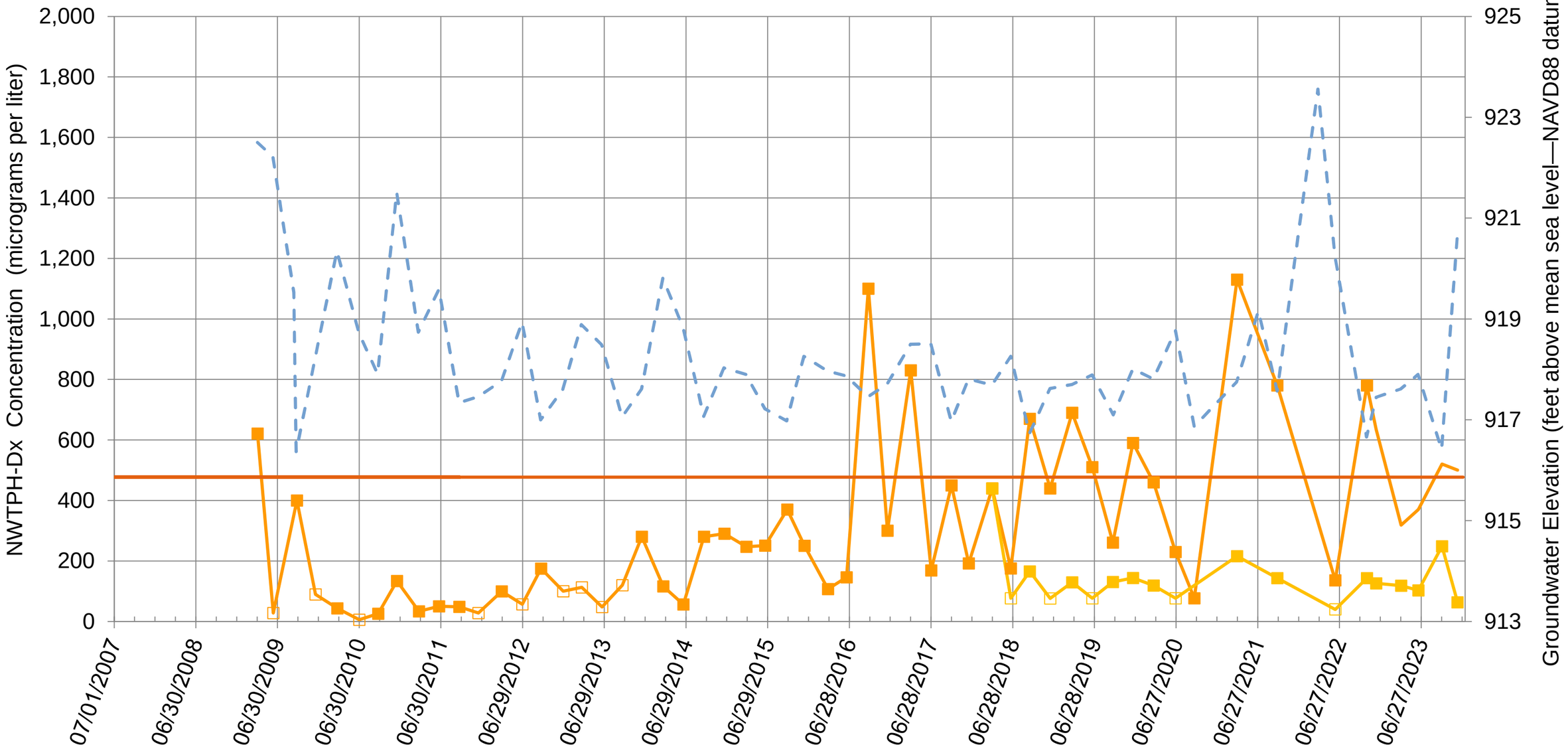
NWTPH-Dx Trend Plot
Well 5-W-43



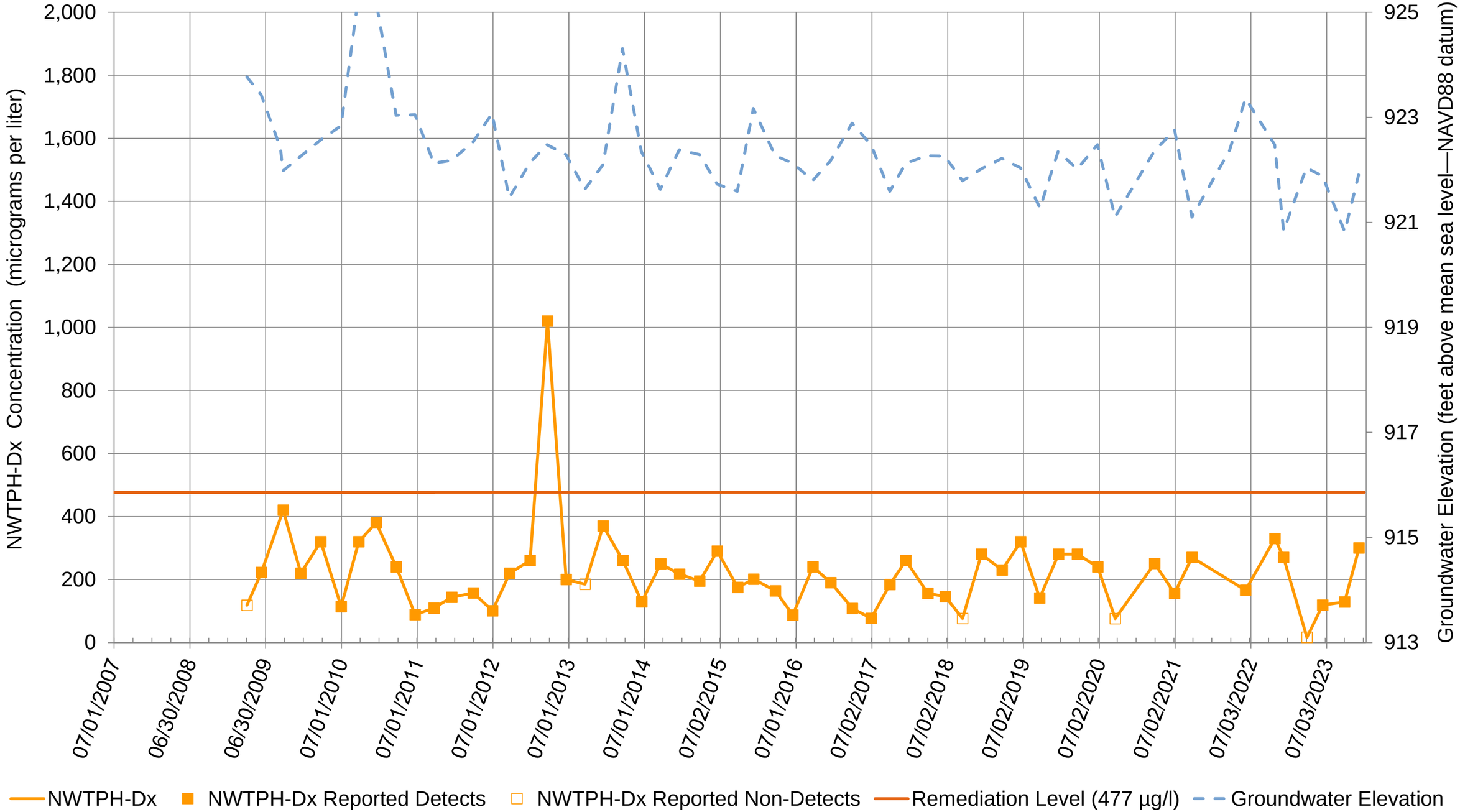
NWTPH-Dx Trend Plot
Well 2A-W-40



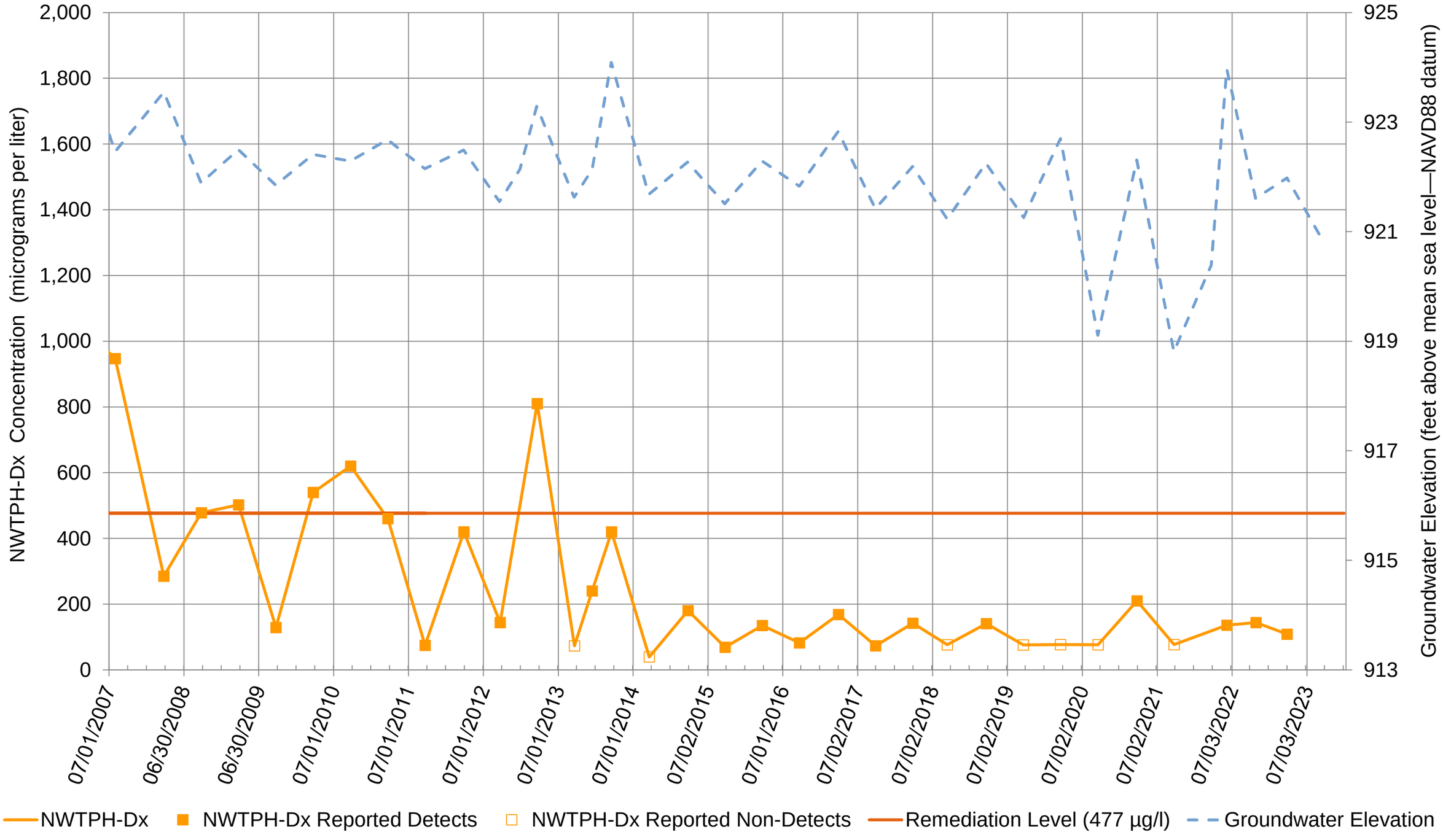
NWTPH-Dx Trend Plot
Well 2A-W-41



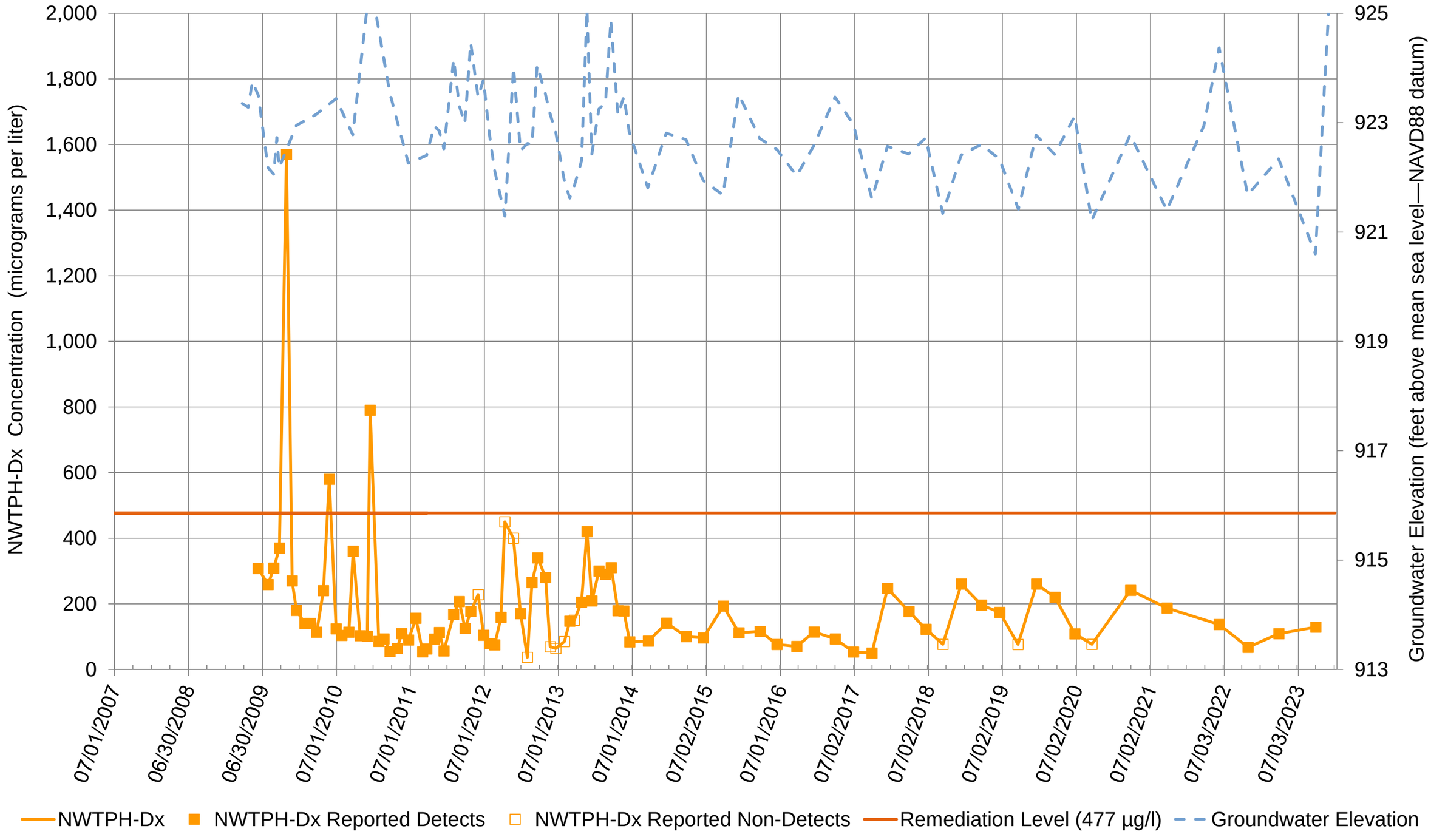
NWTPH-Dx Trend Plot
Well 2A-W-42



NWTPH-Dx Trend Plot
Well 1C-W-4

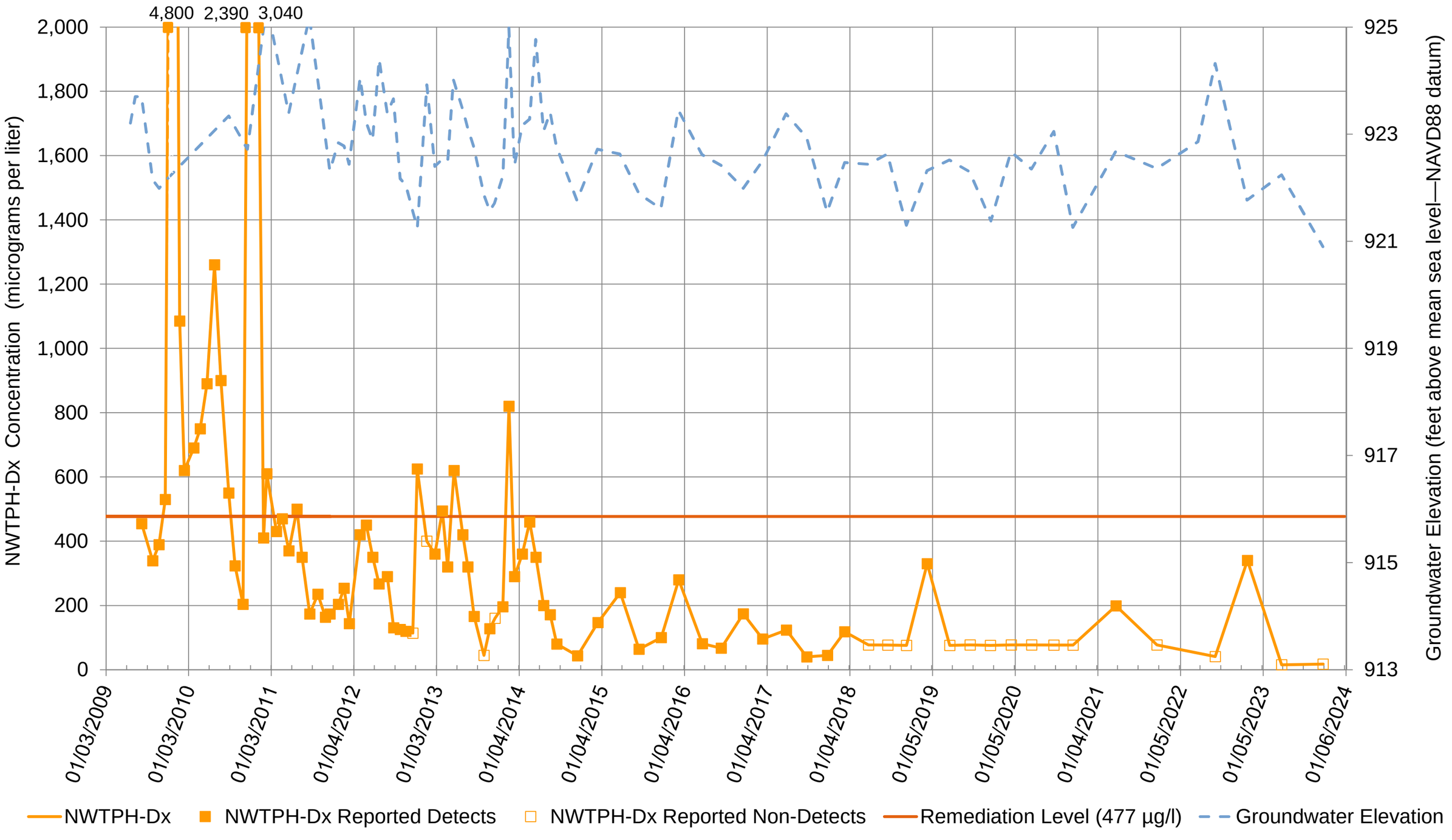


NWTPH-Dx Trend Plot
Well 1C-W-7

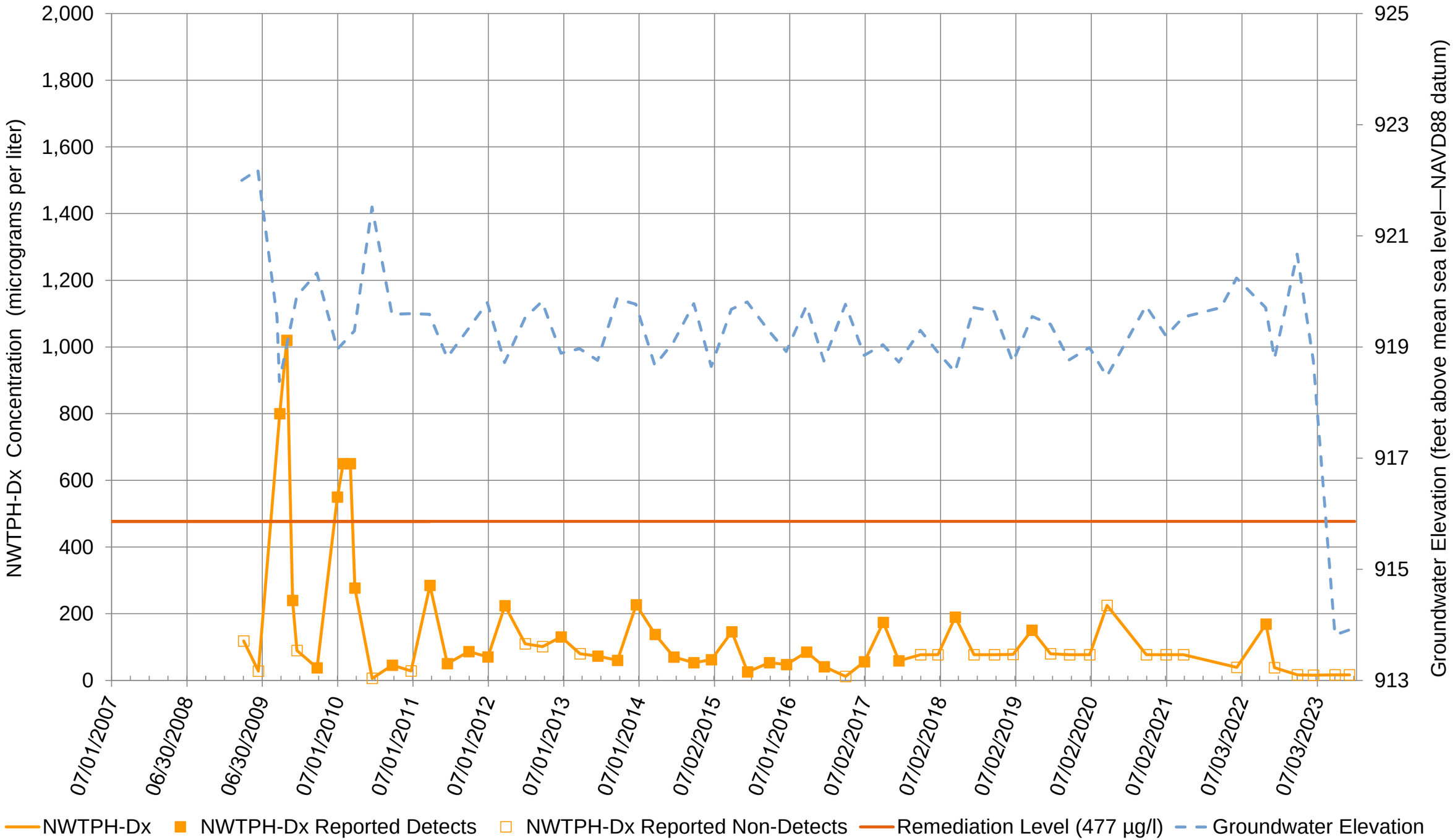


NWTPH-Dx concentrations exceeding the plot scale are shown above the plot area with the associated reported concentration value.

NWTPH-Dx Trend Plot
Well 1C-W-8



NWTPH-Dx Trend Plot
Well 1B-W-23

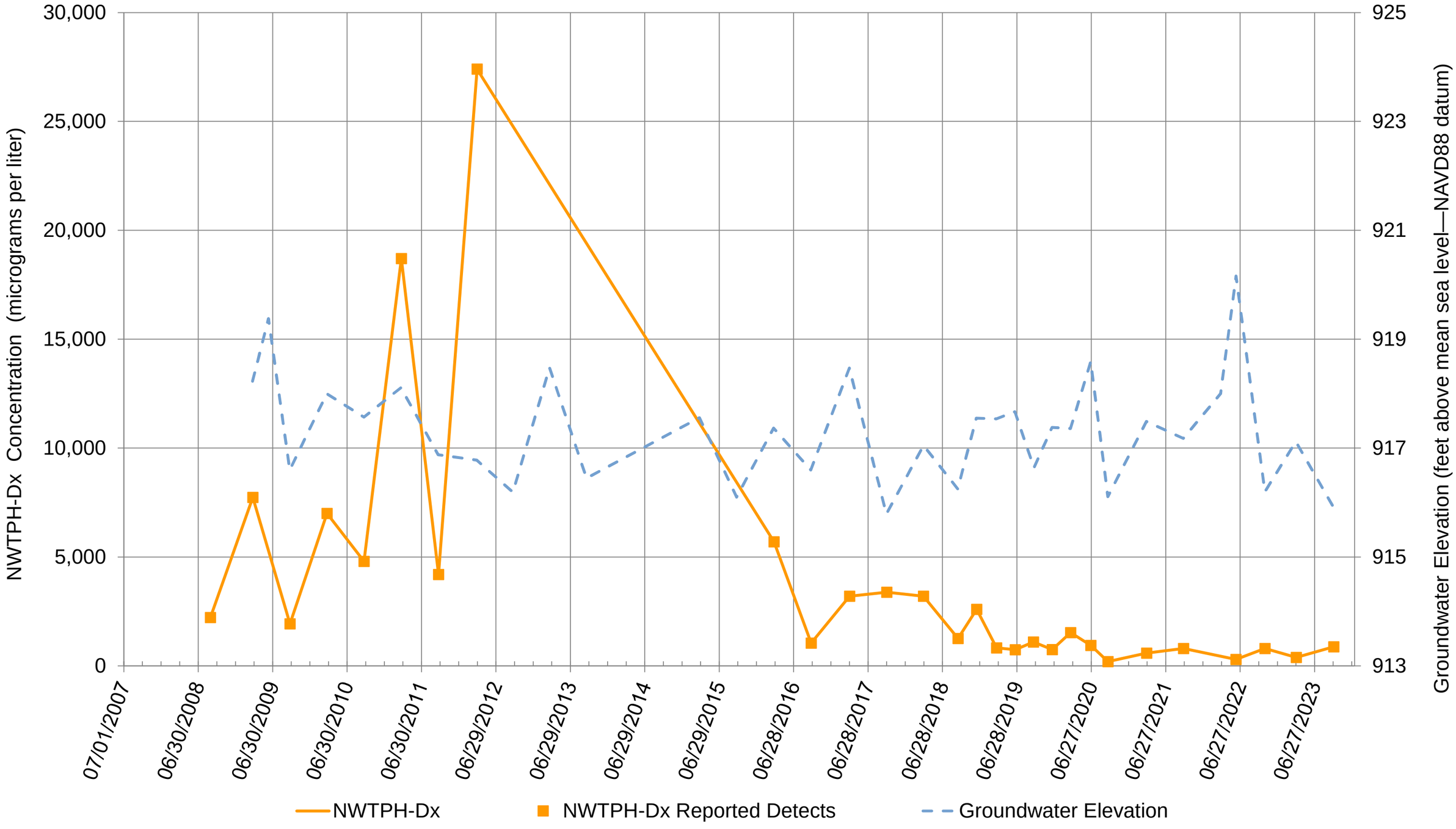


Schoolyard Remediation Monitoring Wells

No NWTPH-Dx Cleanup Level

Note: Vertical scale is different from other plots; scale increased from 2,000 micrograms per liter

NWTPH-Dx Trend Plot
Well 5-W-51



NWTPH-Dx Trend Plot
Well 5-W-55

NWTPH-Dx Concentration (micrograms per liter)

2,000
1,800
1,600
1,400
1,200
1,000
800
600
400
200
0

Groundwater Elevation (feet above mean sea level—NAVD88 datum)

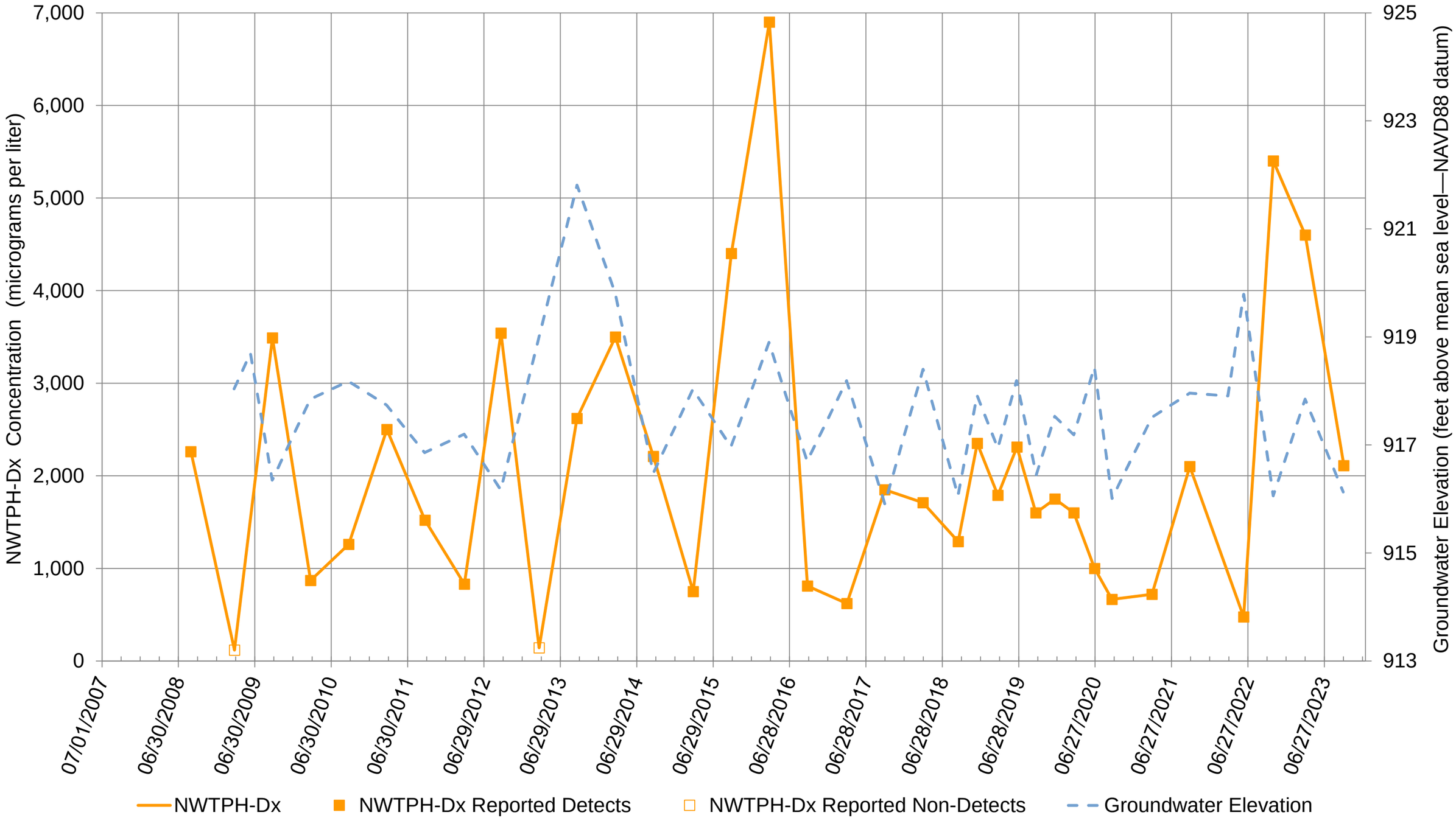
925
923
921
919
917
915
913

07/01/2007
06/30/2008
06/30/2009
07/01/2010
07/01/2011
07/01/2012
07/01/2013
07/01/2014
07/02/2015
07/01/2016
07/02/2017
07/02/2018
07/02/2019
07/02/2020
07/02/2021
07/03/2022
07/03/2023

NWTPH-Dx
NWTPH-Dx Reported Detects
NWTPH-Dx Reported Non-Detects
Groundwater Elevation

Note: Vertical scale is different from other plots; scale increased from 2,000 µg/l to 7,000 µg/l to show all data points.

NWTPH-Dx Trend Plot
Well 5-W-56



Remediation Performance Monitoring Wells Within Railyard

No NWTPH-Dx Cleanup Level

NWTPH-Dx Trend Plot
Well MW-4

NWTPH-Dx Concentration (micrograms per liter)

2,000
1,800
1,600
1,400
1,200
1,000
800
600
400
200
0

Groundwater Elevation (feet above mean sea level—NAVD88 datum)

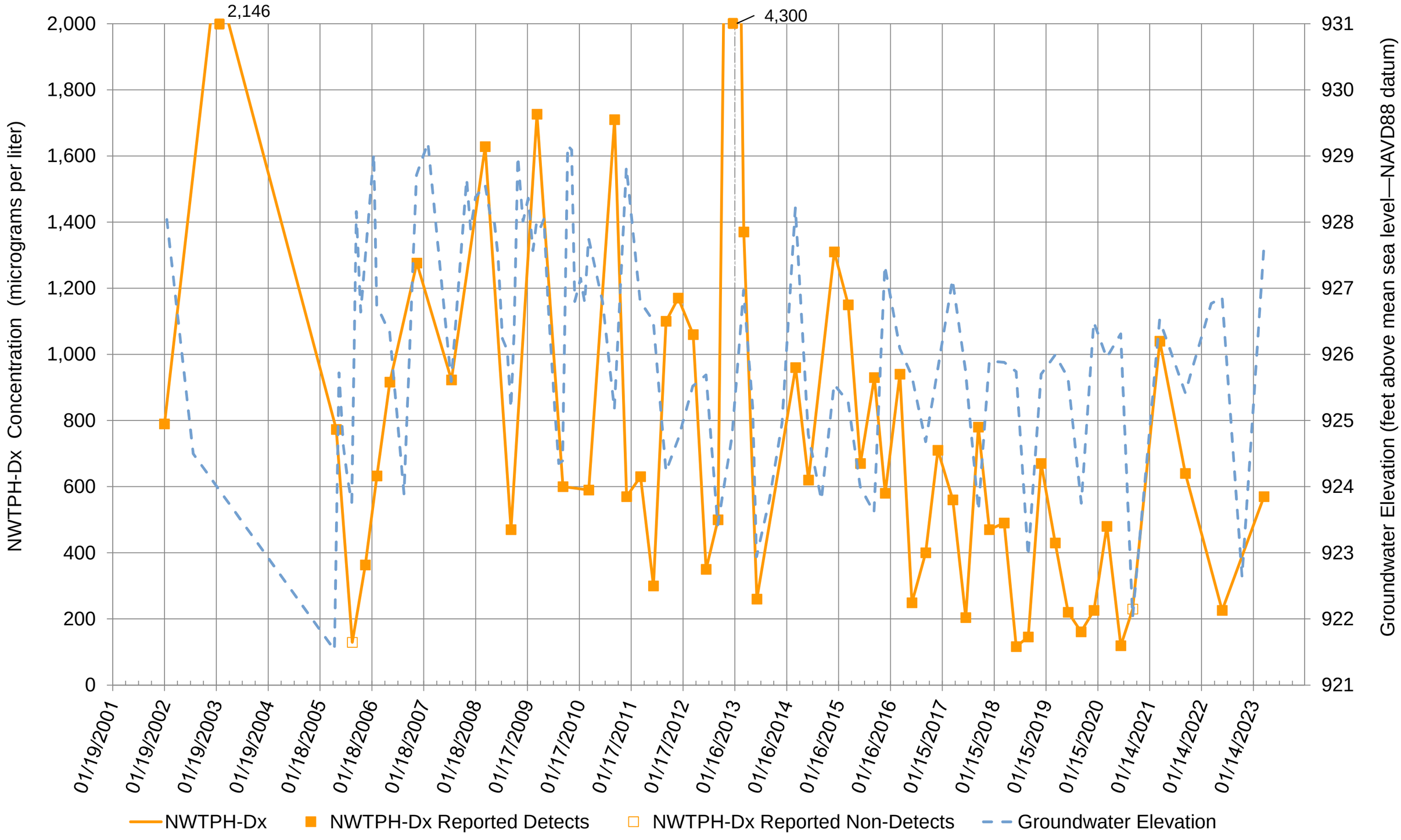
931
930
929
928
927
926
925
924
923
922
921

01/05/2000
01/05/2001
01/06/2002
01/07/2003
01/08/2004
01/08/2005
01/09/2006
01/10/2007
01/11/2008
01/11/2009
01/12/2010
01/13/2011
01/14/2012
01/14/2013
01/15/2014
01/16/2015
01/17/2016
01/17/2017
01/18/2018
01/19/2019
01/20/2020
01/20/2021
01/21/2022
01/22/2023

NWTPH-Dx
NWTPH-Dx Reported Detects
NWTPH-Dx Reported Non-Detects
Groundwater Elevation

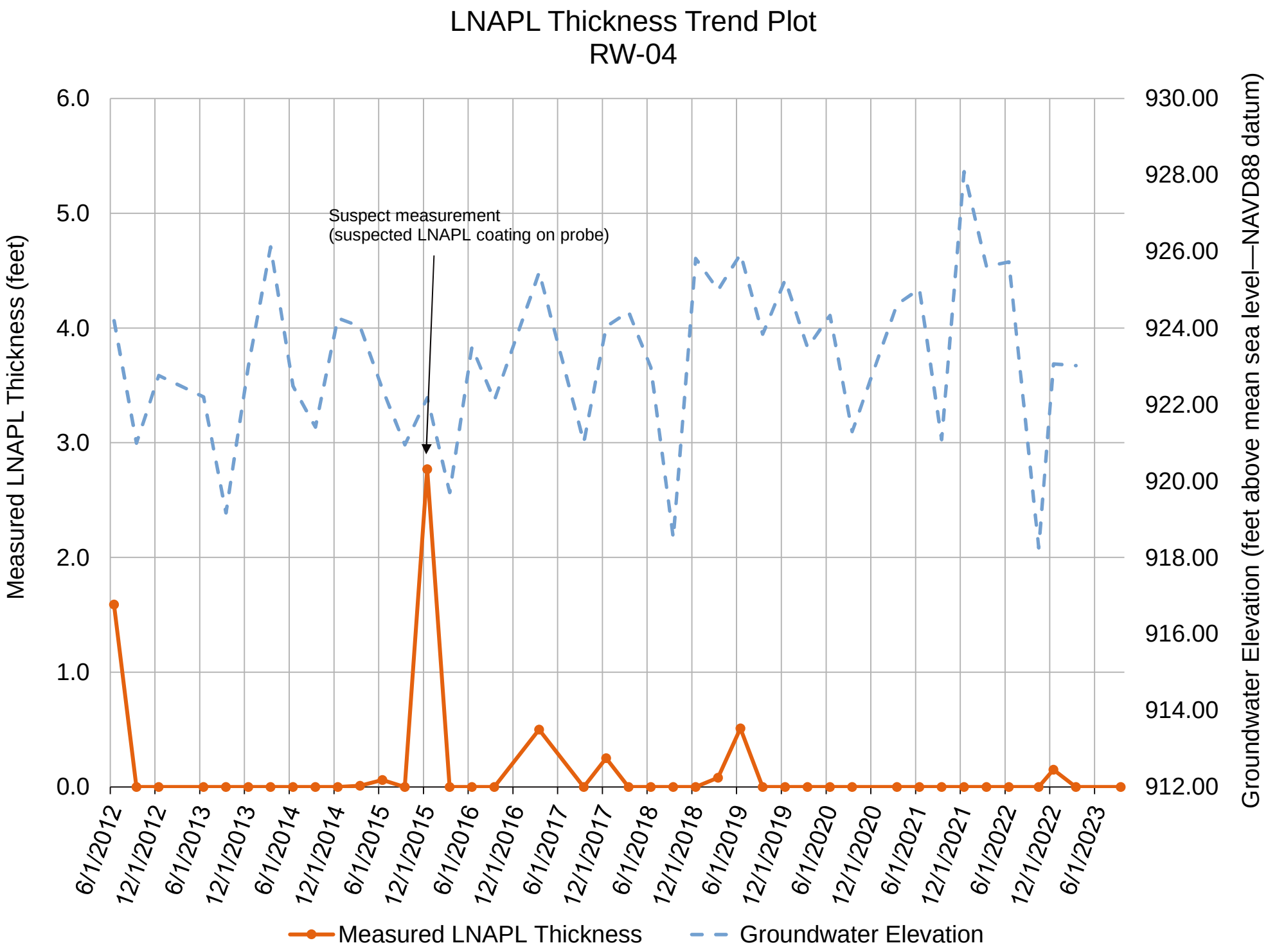
NWTPH-Dx concentrations exceeding the plot scale are shown above the plot area with the associated reported concentration value.

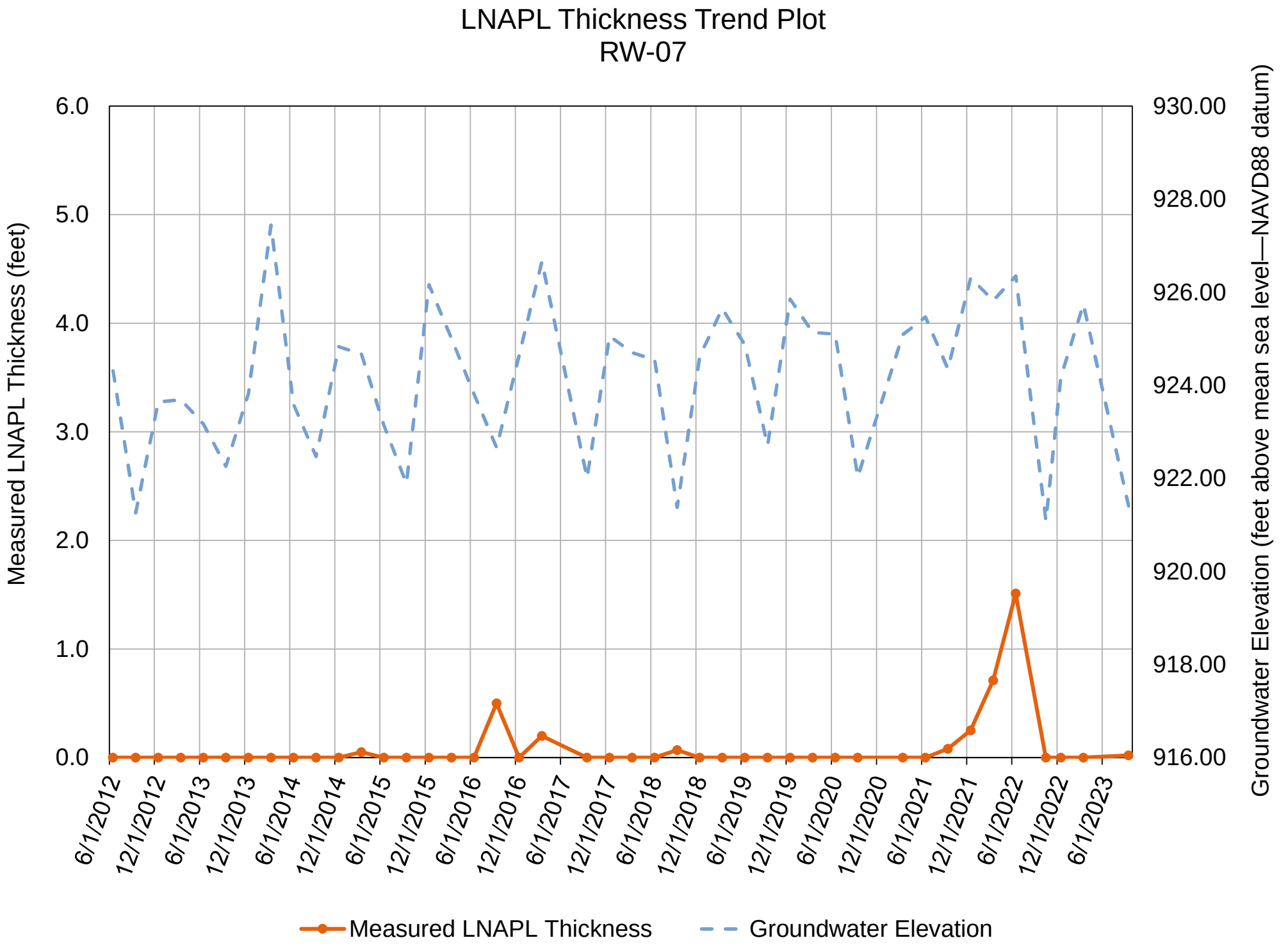
NWTPH-Dx Trend Plot
Well 2A-W-9

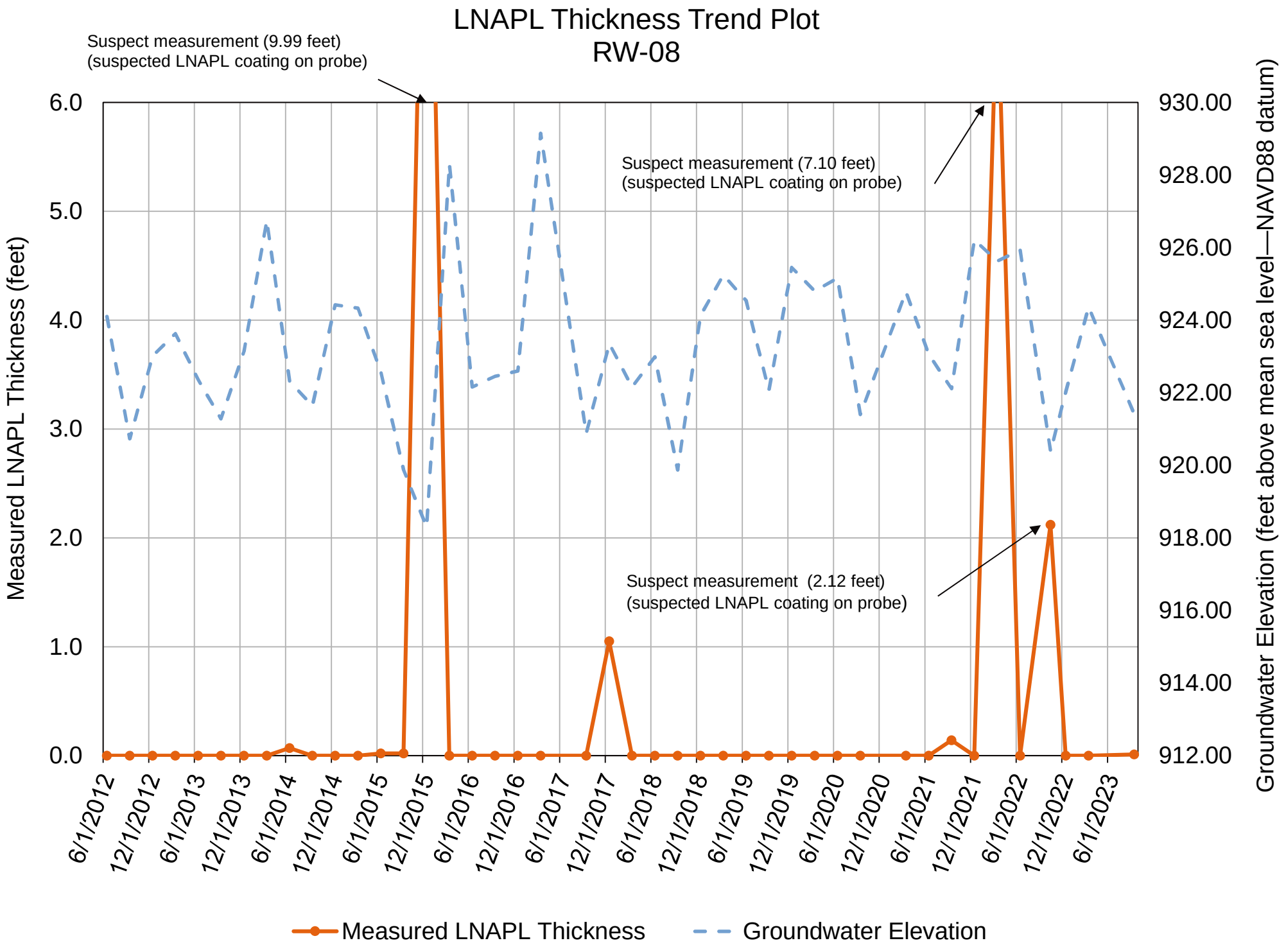


Appendix D

LNAPL Trend Plots


LNAPL Thickness Trend Plot
RW-04
Suspect measurement
(suspected LNAPL coating on probe)
Measured LNAPL Thickness (feet)
Groundwater Elevation (feet above mean sea level—NAVD88 datum)
6.0
5.0
4.0
3.0
2.0
1.0
0.0
930.00
928.00
926.00
924.00
922.00
920.00
918.00
916.00
914.00
912.00
6/1/2012
12/1/2012
6/1/2013
12/1/2013
6/1/2014
12/1/2014
6/1/2015
12/1/2015
6/1/2016
12/1/2016
6/1/2017
12/1/2017
6/1/2018
12/1/2018
6/1/2019
12/1/2019
6/1/2020
12/1/2020
6/1/2021
12/1/2021
6/1/2022
12/1/2022
6/1/2023
Measured LNAPL Thickness
Groundwater Elevation


LNAPL Thickness Trend Plot
RW-07
Measured LNAPL Thickness (feet)
Groundwater Elevation (feet above mean sea level—NAVD88 datum)
6.0
5.0
4.0
3.0
2.0
1.0
0.0
930.00
928.00
926.00
924.00
922.00
920.00
918.00
916.00
6/1/2012
12/1/2012
6/1/2013
12/1/2013
6/1/2014
12/1/2014
6/1/2015
12/1/2015
6/1/2016
12/1/2016
6/1/2017
12/1/2017
6/1/2018
12/1/2018
6/1/2019
12/1/2019
6/1/2020
12/1/2020
6/1/2021
12/1/2021
6/1/2022
12/1/2022
6/1/2023
Measured LNAPL Thickness
Groundwater Elevation


LNAPL Thickness Trend Plot
RW-08
Suspect measurement (9.99 feet)
(suspected LNAPL coating on probe)
Suspect measurement (7.10 feet)
(suspected LNAPL coating on probe)
Suspect measurement (2.12 feet)
(suspected LNAPL coating on probe)
Measured LNAPL Thickness (feet)
Groundwater Elevation (feet above mean sea level—NAVD88 datum)
6.0
5.0
4.0
3.0
2.0
1.0
0.0
930.00
928.00
926.00
924.00
922.00
920.00
918.00
916.00
914.00
912.00
6/1/2012
12/1/2012
6/1/2013
12/1/2013
6/1/2014
12/1/2014
6/1/2015
12/1/2015
6/1/2016
12/1/2016
6/1/2017
12/1/2017
6/1/2018
12/1/2018
6/1/2019
12/1/2019
6/1/2020
12/1/2020
6/1/2021
12/1/2021
6/1/2022
12/1/2022
6/1/2023
Measured LNAPL Thickness
Groundwater Elevation

Appendix E

Statistical Analysis

Mann-Kendall Trend Results

Table E-1
Mann-Kendall Trend Results
2023 Annual Long-Term Monitoring Report
BNSF Railway Company
Former Maintenance and Fueling Facility, Skykomish, WA

Well ID	Analyte	Date Range	Figure	FOD	Detected Results Summary [1]				Mann-Kendall Test [2]			
					Range	Mean	Median	SD	Result[4]	MK Result Note	P-Value	S Value
1C-W-4	NWTPH-Dx	03/18 - 03/23	E-1	6 / 11	136 - 210	154	143	28	NST	--	0.162	13
1C-W-7	NWTPH-Dx	03/18 - 09/23	E-2	14 / 17	109 - 260	188	181.5	49.3	NST	--	0.484	2
2A-W-10	NWTPH-Dx	03/18 - 06/20	E-3	10 / 10	151 - 550	303	278.5	129	NST	--	0.500	1
2A-W-41	NWTPH-Dx	03/18 - 12/23	E-4	21 / 21	145 - 1130	536	500	290	NST	--	0.325	-16
2A-W-42	NWTPH-Dx	03/18 - 12/23	E-5	20 / 22	100 - 330	217	222.5	66.9	NST	--	0.500	-1
2A-W-9	NWTPH-Dx	03/18 - 03/23	E-6	14 / 15	117 - 1040	395	327.75	272	NST	--	0.260	14
5-W-51	NWTPH-Dx	03/18 - 09/23	E-7	16 / 16	201 - 3200	1060	815	802	DWN	--	0.012	-51
5-W-56	NWTPH-Dx	03/18 - 09/23	E-8	16 / 16	477 - 5400	1970	1730	1320	NST	--	0.500	-1
GW-3	NWTPH-Dx	03/18 - 12/23	E-9	18 / 22	131 - 1020	417	365	270	NST	--	0.325	-17
MW-3	NWTPH-Dx	03/18 - 12/19	E-10	9 / 10	109 - 3170	1700	1860	1090	NST	--	0.190	11
MW-38R	NWTPH-Dx	03/18 - 03/20	E-11	3 / 5	131 - 158	147	151	14	NST	5a	0.180	5
MW-4	NWTPH-Dx	03/18 - 09/23	E-12	15 / 17	109 - 600	319	320	134	NST	--	0.063	38
PZ-7S	NWTPH-Dx	12/18 - 12/20	E-13	10 / 18	123 - 320	198	151	74.5	NST	--	0.088	35
S2-BU	NWTPH-Dx	03/18 - 12/23	E-14	25 / 29	78.5 - 1640	429	370	312	NST	--	0.455	7
S4-CU	NWTPH-Dx	03/18 - 12/23	E-15	8 / 14	100 - 510	215	159.25	140	NST	--	0.061	28
WG-EV	NWTPH-Dx	12/18 - 12/20	E-16	17 / 18	390 - 1010	768	780	168	NST	--	0.144	-29
WG-WV	NWTPH-Dx	12/18 - 12/20	E-17	18 / 18	129 - 1040	378	330	235	NST	--	0.099	-35

Abbreviations:

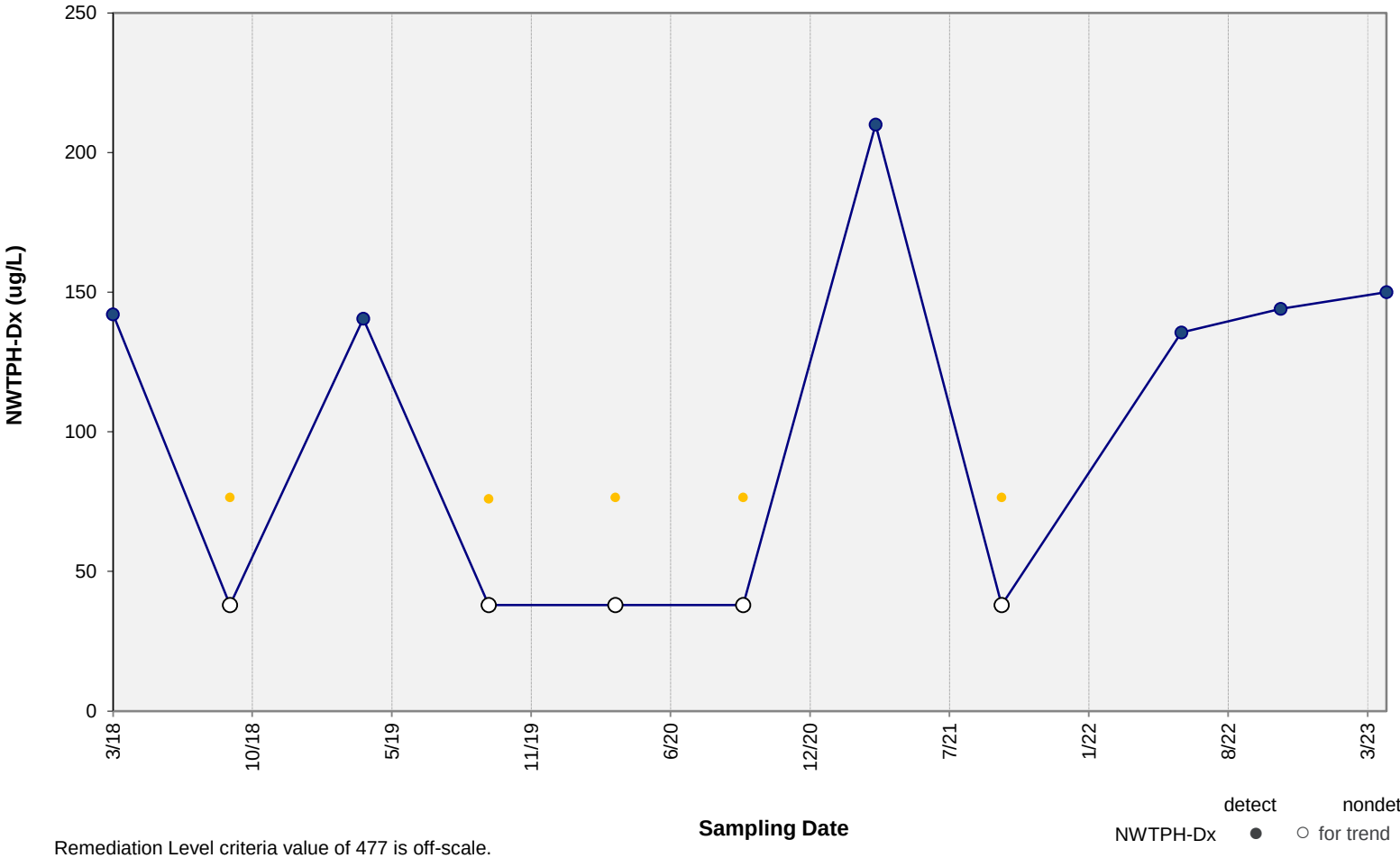
-- = insufficient data for calculating statistics (n < 4) or not available
FOD = frequency of detection (# detects / # samples)
mean = arithmetic mean
SD = standard deviation
S = summary statistic
NWTPH-Dx = sum of total petroleum hydrocarbons as diesel-range organics and oil-range organics analyzed using Washington State Department of Ecology Method
NST = no significant trend
NT = no trend
DWN = downward trend
UP = upward trend
µg/L = microgram per liter

Notes:

1. All analytical results are in µg/L. Result values less than 10 are reported to 2 significant figures; values greater than 10 are reported to 3 significant figures. P-values are reported to 3 decimal places.
2. Trend results are presented when at least four samples and one detected value are available. Significance of trends evaluated at 95% confidence (alpha = 0.05).
3. Non-detects were assigned a common value less than the minimum detected value, equal to half the minimum reporting limit (RL) in the dataset (USEPA, 2009). If half the minimum RL was greater than the minimum detected value, then half the minimum detect was assigned.
4. Statistically significant trend defined as having p-value ≤ 0.05, or 95% confidence.
5a. MK Trend results for datasets with fewer than 8 samples may not be reliable and should be treated with caution.

Reference:

USEPA. 2009. Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities. Unified Guidance. EPA/530/R-09/007, 2009.



Remediation Level criteria value of 477 is off-scale.

Results of Mann-Kendall Test for Trend: **No Significant Trend**

p value = 0.162 Note: p value < 0.05 indicates a statistically significant trend (95% confidence level).

Results of Sen's Estimator of Slope: **No Significant Trend**

Median Slope Estimate = 2.7E-03 ug/L Per Day

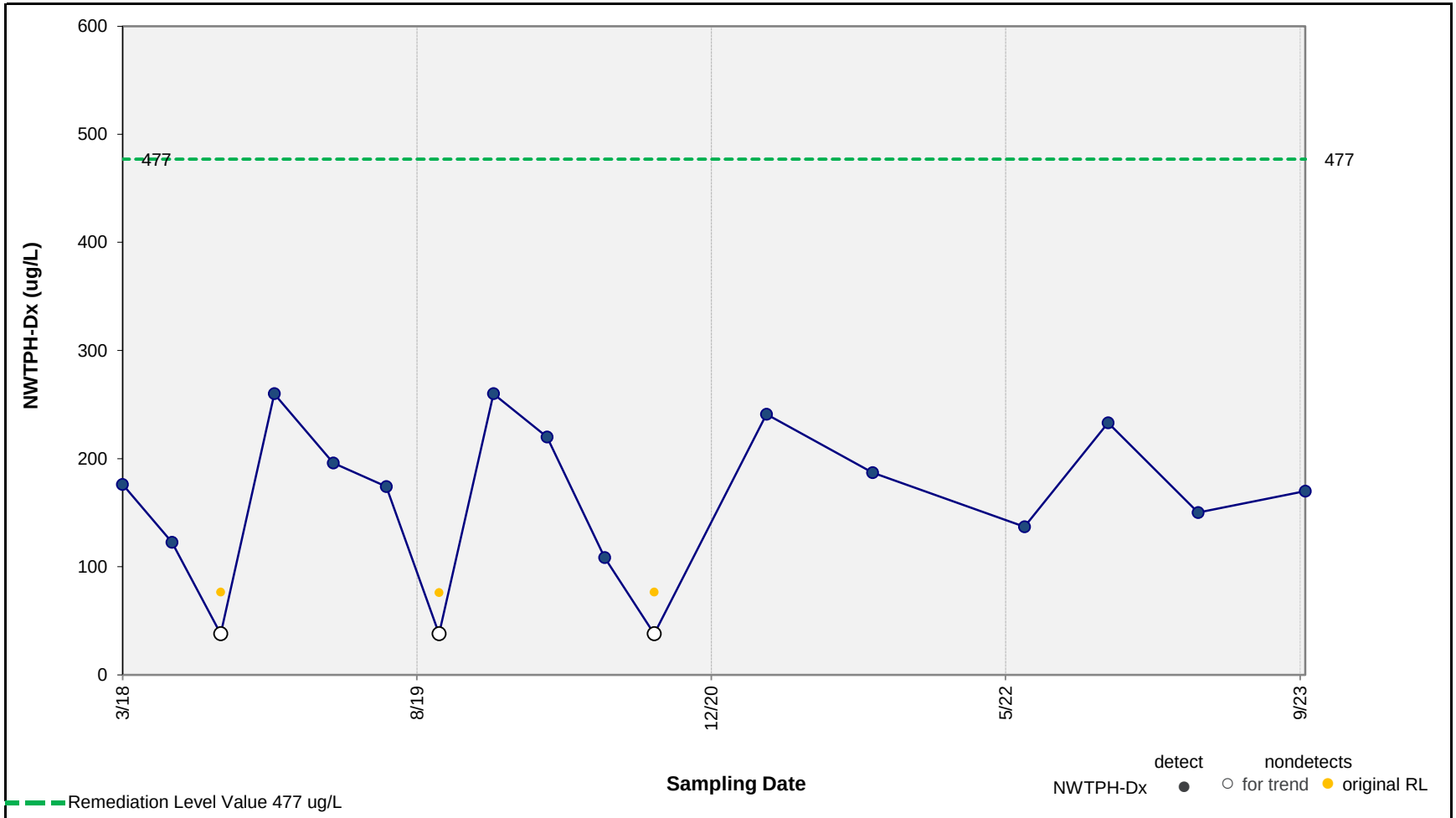
95% Confidence Interval = -4.2E-03 to 9.4E-02 ug/L Per Day

ARCADIS

Concentration vs. Time Plot – NWTPH-Dx in Well 1C-W-4

BNSF Former Maintenance and Fueling Facility, Skykomish, Washington

Figure E-1



Results of Mann-Kendall Test for Trend: **No Significant Trend**

p value = 0.484 Note: p value < 0.05 indicates a statistically significant trend (95% confidence level).

Results of Sen's Estimator of Slope: **No Significant Trend**

Median Slope Estimate = 0.0E+00 ug/L Per Day

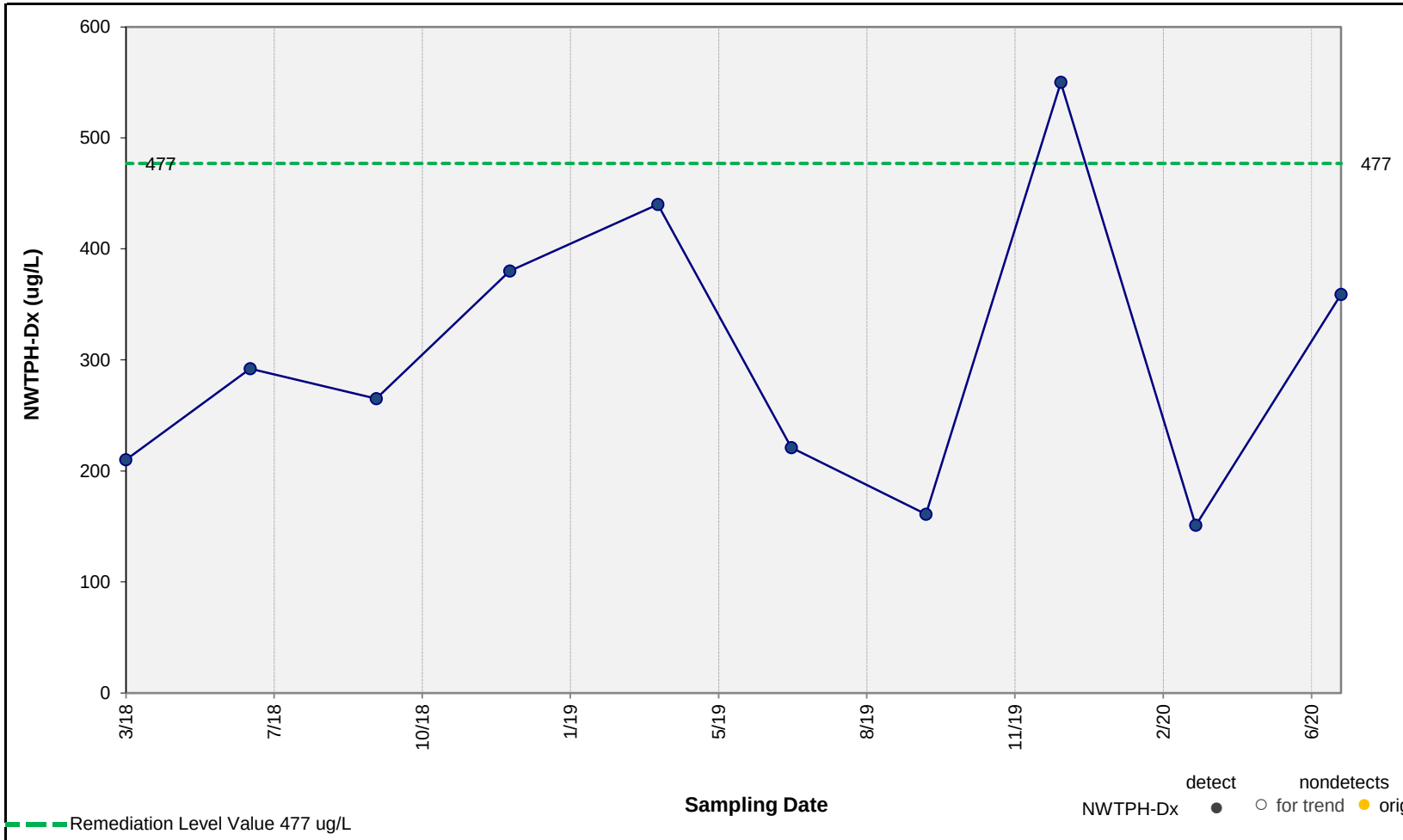
95% Confidence Interval = -6.2E-02 to 6.9E-02 ug/L Per Day

ARCADIS

Concentration vs. Time Plot – NWTPH-Dx in Well 1C-W-7

BNSF Former Maintenance and Fueling Facility, Skykomish, Washington

Figure E-2



Results of Mann-Kendall Test for Trend: **No Significant Trend**

p value = 0.500 Note: p value < 0.05 indicates a statistically significant trend (95% confidence level).

Results of Sen's Estimator of Slope: **No Significant Trend**

Median Slope Estimate = 2.4E-02 ug/L Per Day

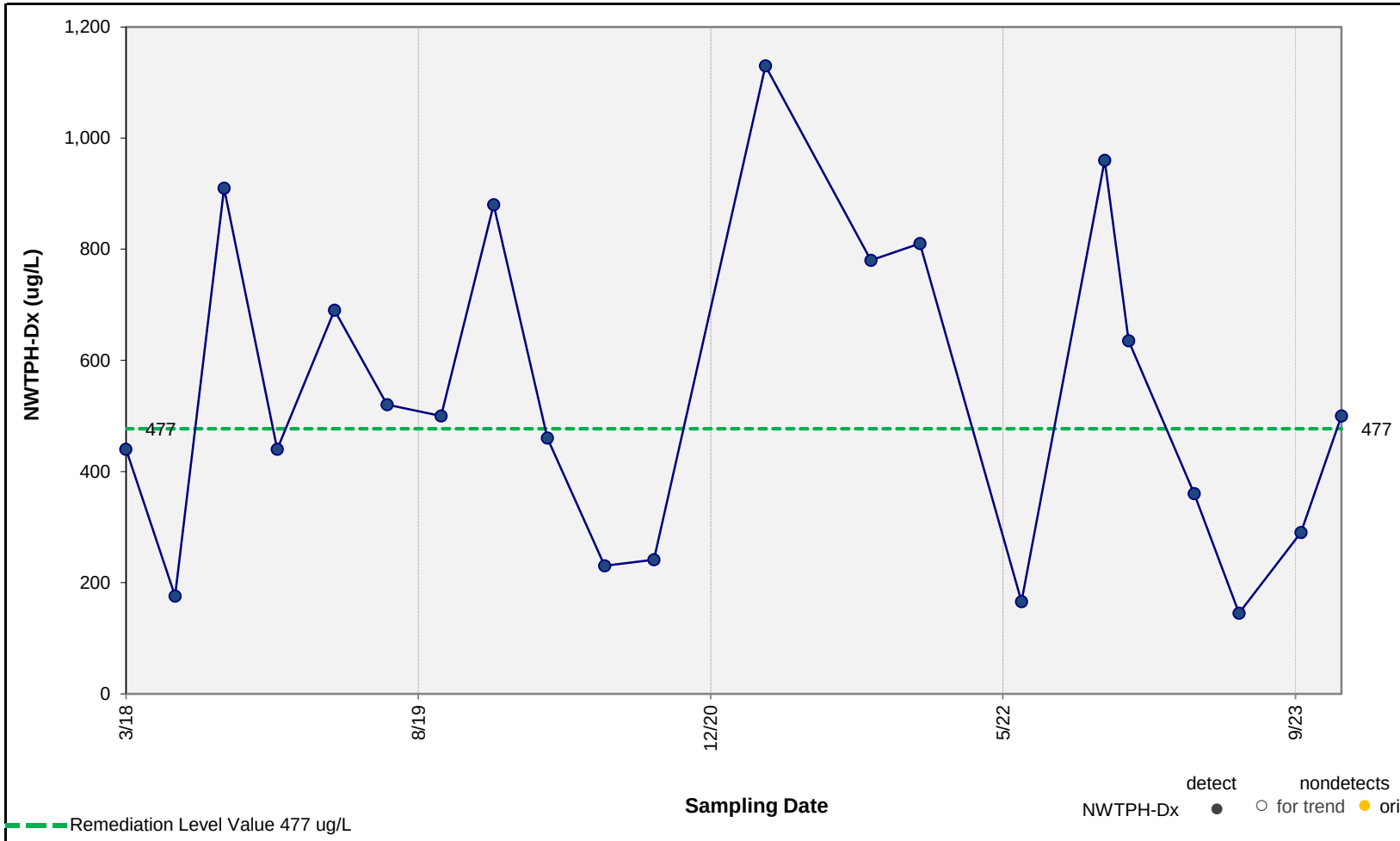
95% Confidence Interval = -2.8E-01 to 5.4E-01 ug/L Per Day

ARCADIS

Concentration vs. Time Plot – NWTPH-Dx in Well 2A-W-10

BNSF Former Maintenance and Fueling Facility, Skykomish, Washington

Figure E-3



Results of Mann-Kendall Test for Trend: **No Significant Trend**

p value = 0.325 Note: p value < 0.05 indicates a statistically significant trend (95% confidence level).

Results of Sen's Estimator of Slope: **No Significant Trend**

Median Slope Estimate = -6.1E-02 ug/L Per Day

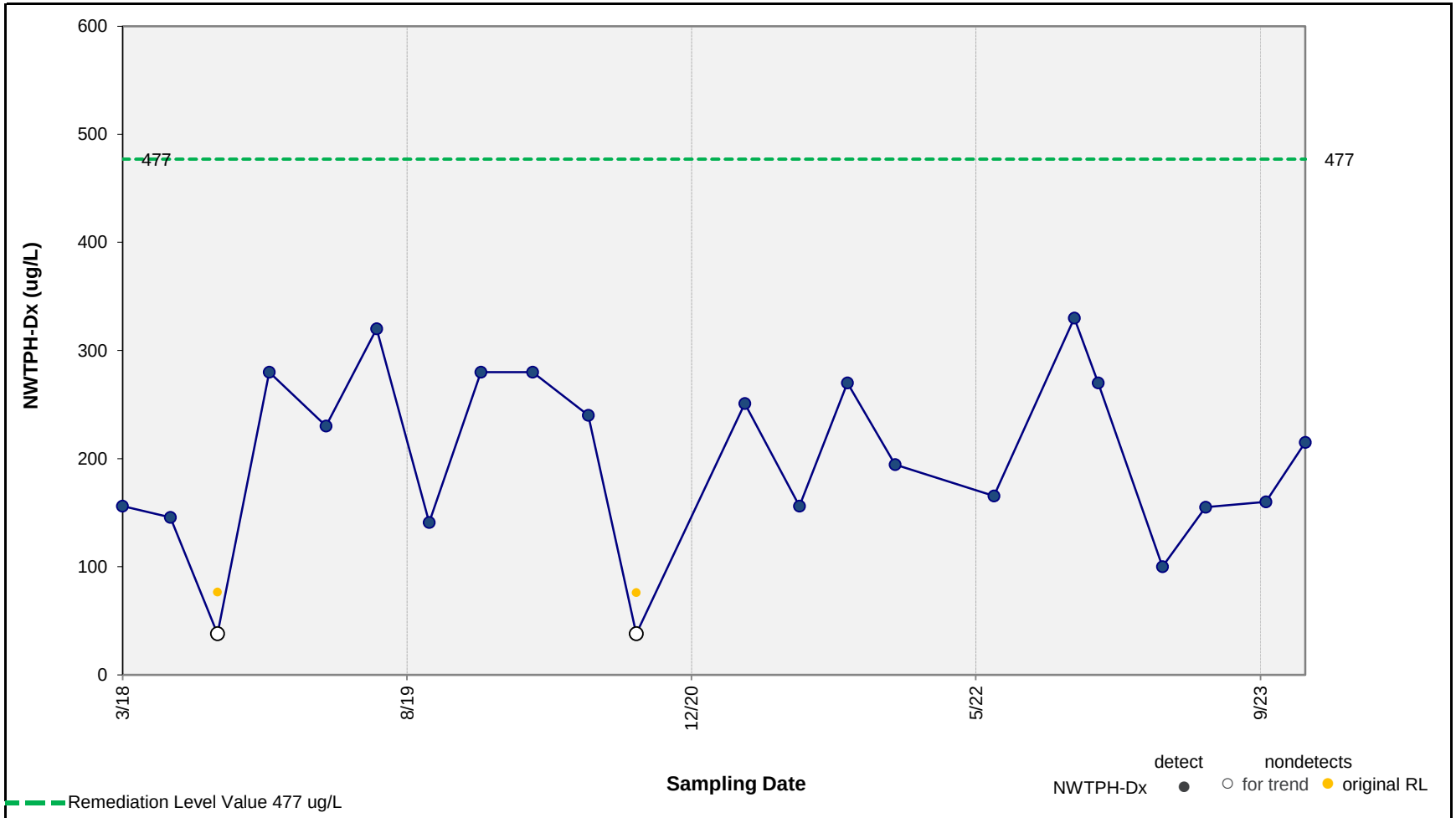
95% Confidence Interval = -2.6E-01 to 1.5E-01 ug/L Per Day

ARCADIS

Concentration vs. Time Plot – NWTPH-Dx in Well 2A-W-41

BNSF Former Maintenance and Fueling Facility, Skykomish, Washington

Figure E-4



Results of Mann-Kendall Test for Trend: **No Significant Trend**

p value = 0.500 Note: p value < 0.05 indicates a statistically significant trend (95% confidence level).

Results of Sen's Estimator of Slope: **No Significant Trend**

Median Slope Estimate = 0.0E+00 ug/L Per Day

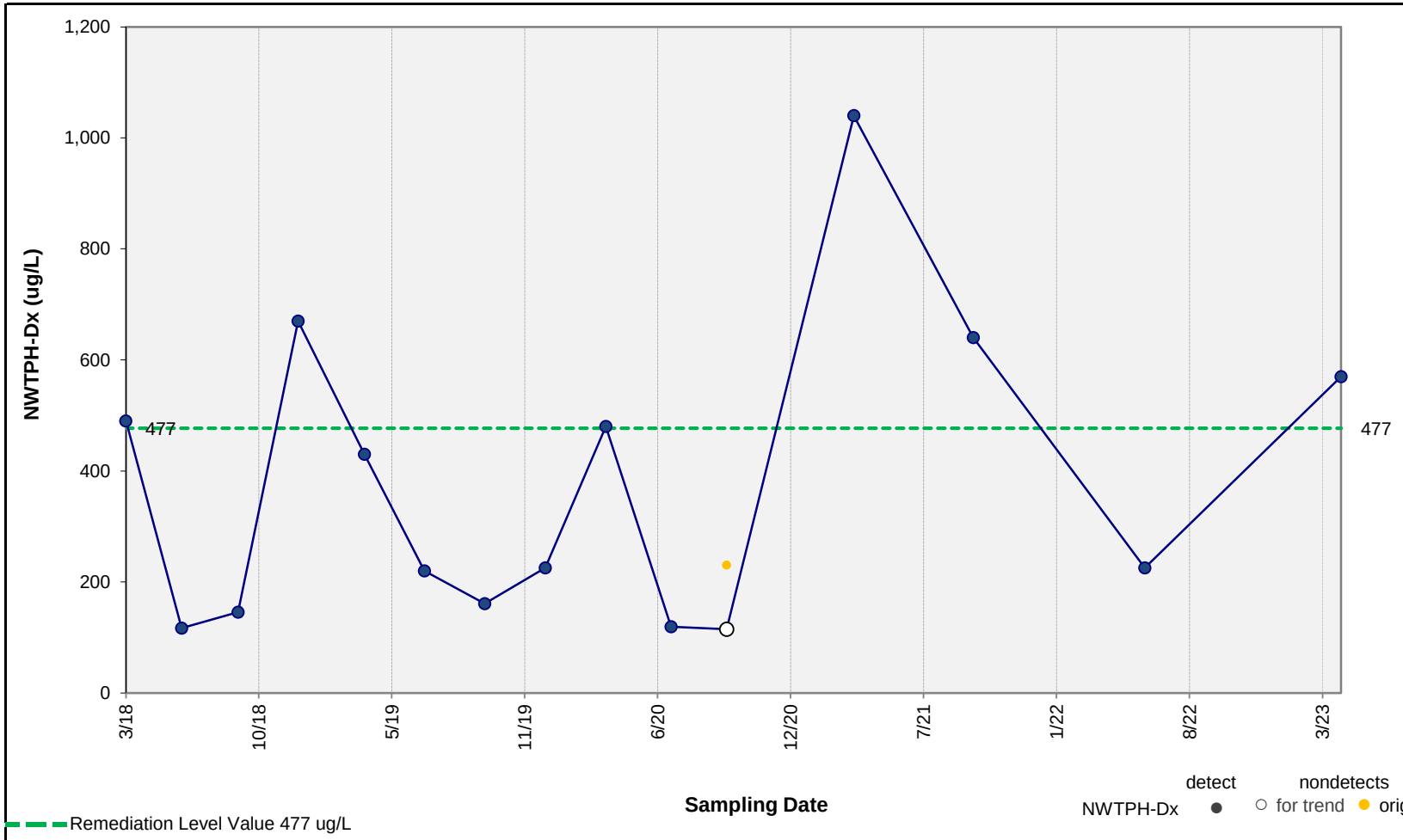
95% Confidence Interval = -6.8E-02 to 5.5E-02 ug/L Per Day

ARCADIS

Concentration vs. Time Plot – NWTPH-Dx in Well 2A-W-42

BNSF Former Maintenance and Fueling Facility, Skykomish, Washington

Figure E-5



Results of Mann-Kendall Test for Trend: **No Significant Trend**

p value = 0.260 Note: p value < 0.05 indicates a statistically significant trend (95% confidence level).

Results of Sen's Estimator of Slope: **No Significant Trend**

Median Slope Estimate = 6.5E-02 ug/L Per Day

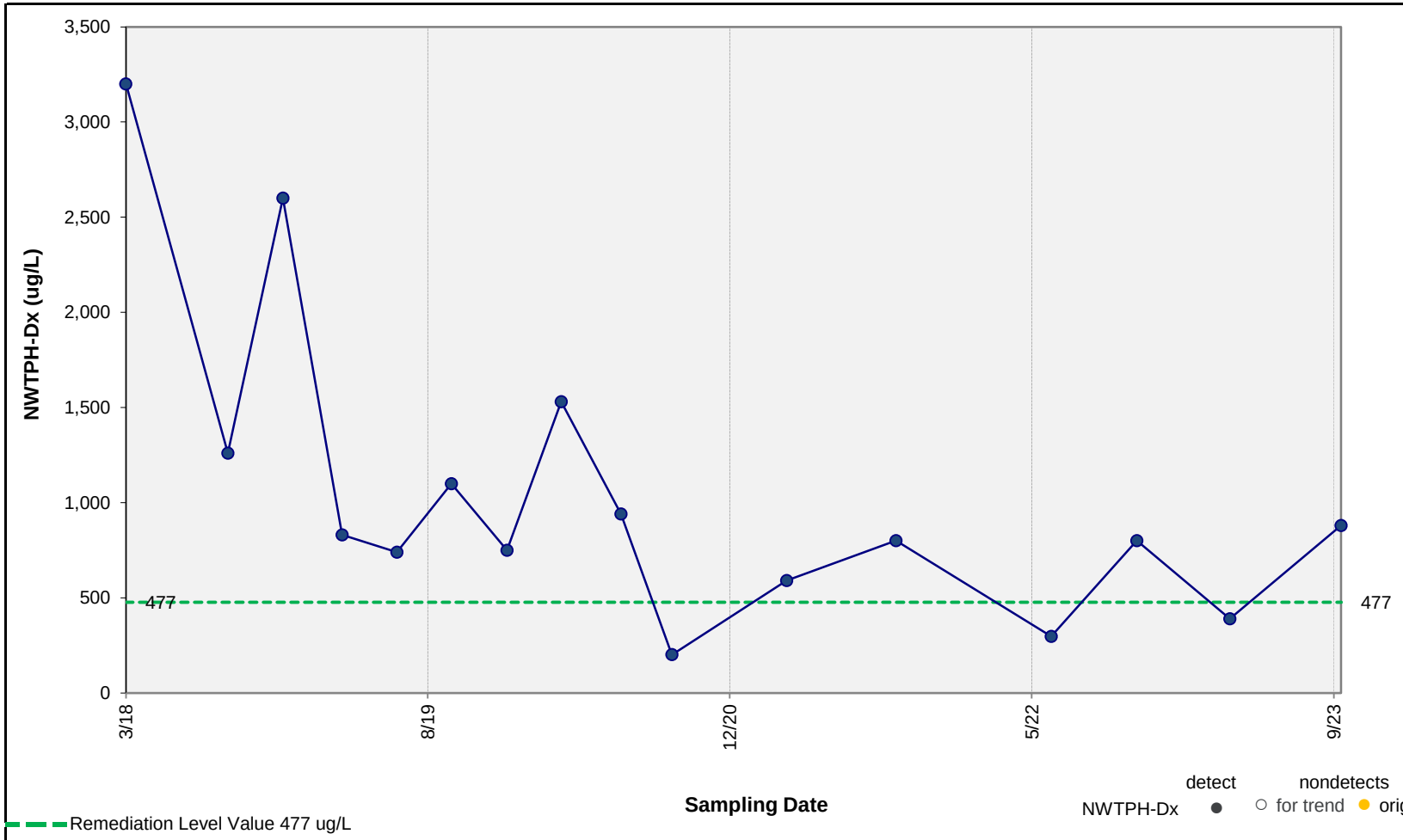
95% Confidence Interval = -1.9E-01 to 3.2E-01 ug/L Per Day

ARCADIS

Concentration vs. Time Plot – NWTPH-Dx in Well 2A-W-9

BNSF Former Maintenance and Fueling Facility, Skykomish, Washington

Figure E-6



Results of Mann-Kendall Test for Trend: **DECREASING TREND**

p value = 0.012 Note: p value < 0.05 indicates a statistically significant trend (95% confidence level).

Results of Sen's Estimator of Slope: **DECREASING TREND**

Median Slope Estimate = -5.1E-01 ug/L Per Day

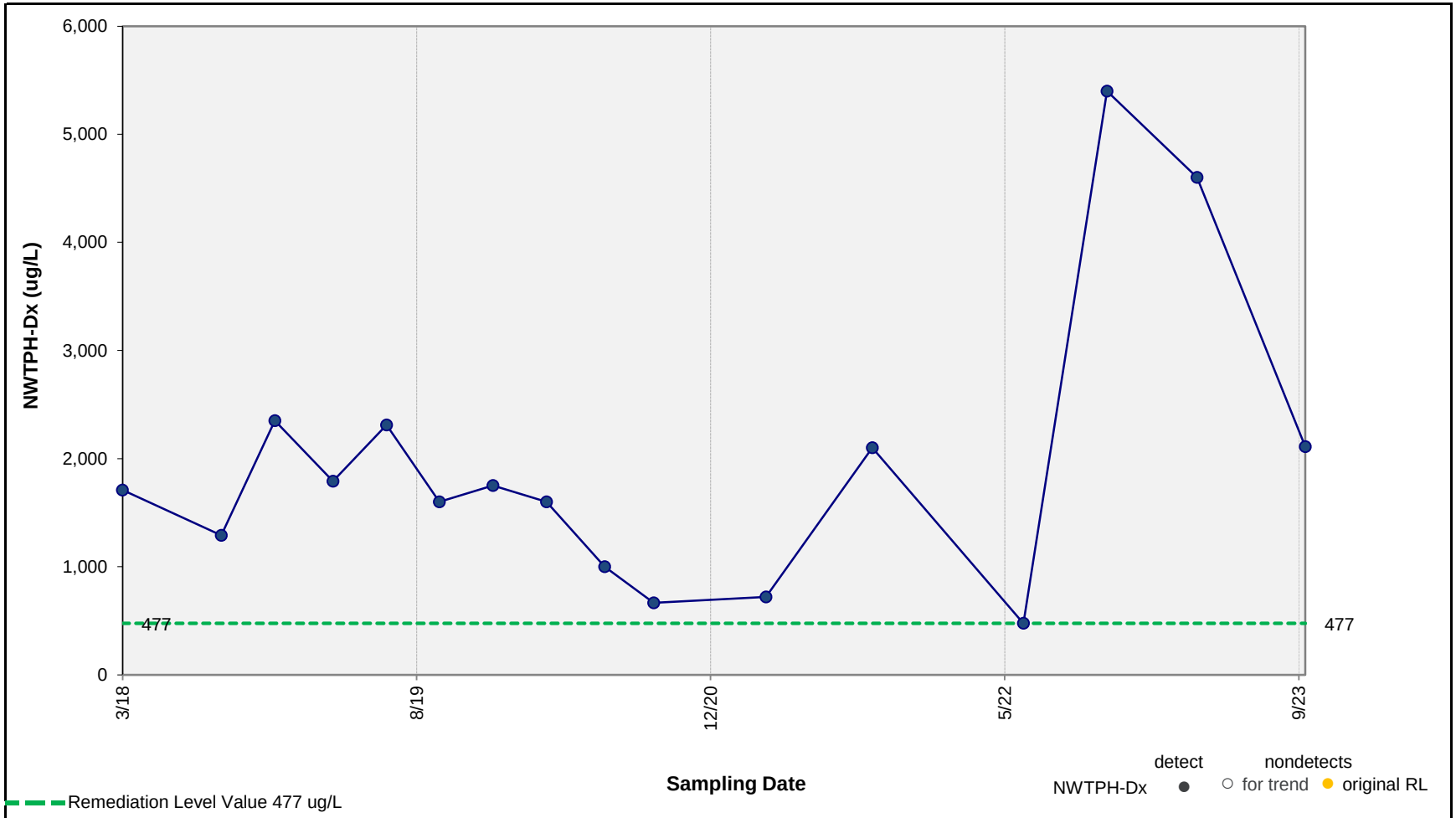
95% Confidence Interval = -1.4E+00 to -1.5E-01 ug/L Per Day

ARCADIS

Concentration vs. Time Plot – NWTPH-Dx in Well 5-W-51

BNSF Former Maintenance and Fueling Facility, Skykomish, Washington

Figure E-7



Results of Mann-Kendall Test for Trend: **No Significant Trend**

p value = 0.500 Note: p value < 0.05 indicates a statistically significant trend (95% confidence level).

Results of Sen's Estimator of Slope: **No Significant Trend**

Median Slope Estimate = -6.4E-02 ug/L Per Day

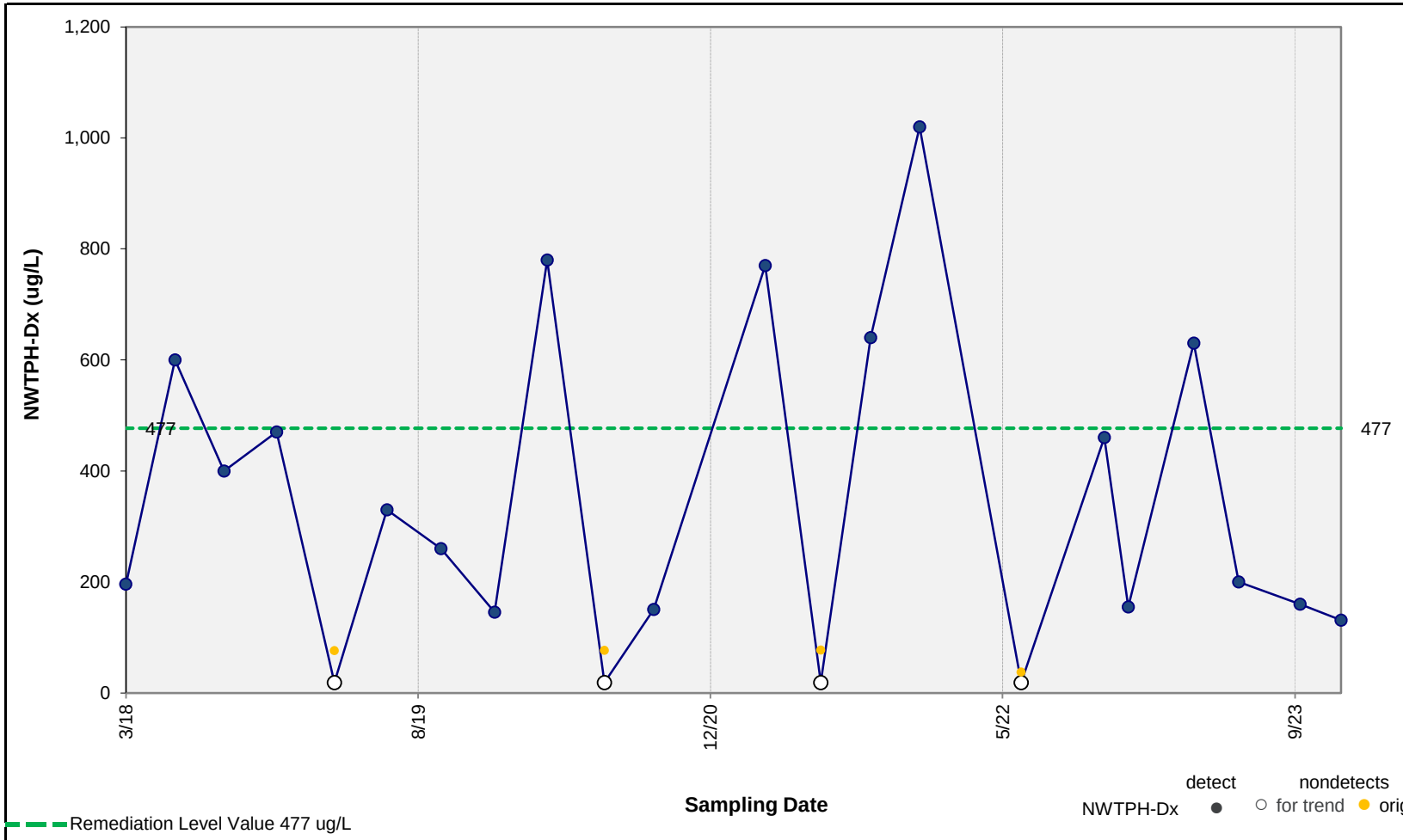
95% Confidence Interval = -1.1E+00 to 1.2E+00 ug/L Per Day

ARCADIS

Concentration vs. Time Plot – NWTPH-Dx in Well 5-W-56

BNSF Former Maintenance and Fueling Facility, Skykomish, Washington

Figure E-8



Results of Mann-Kendall Test for Trend: **No Significant Trend**

p value = 0.325 Note: p value < 0.05 indicates a statistically significant trend (95% confidence level).

Results of Sen's Estimator of Slope: **No Significant Trend**

Median Slope Estimate = -2.4E-02 ug/L Per Day

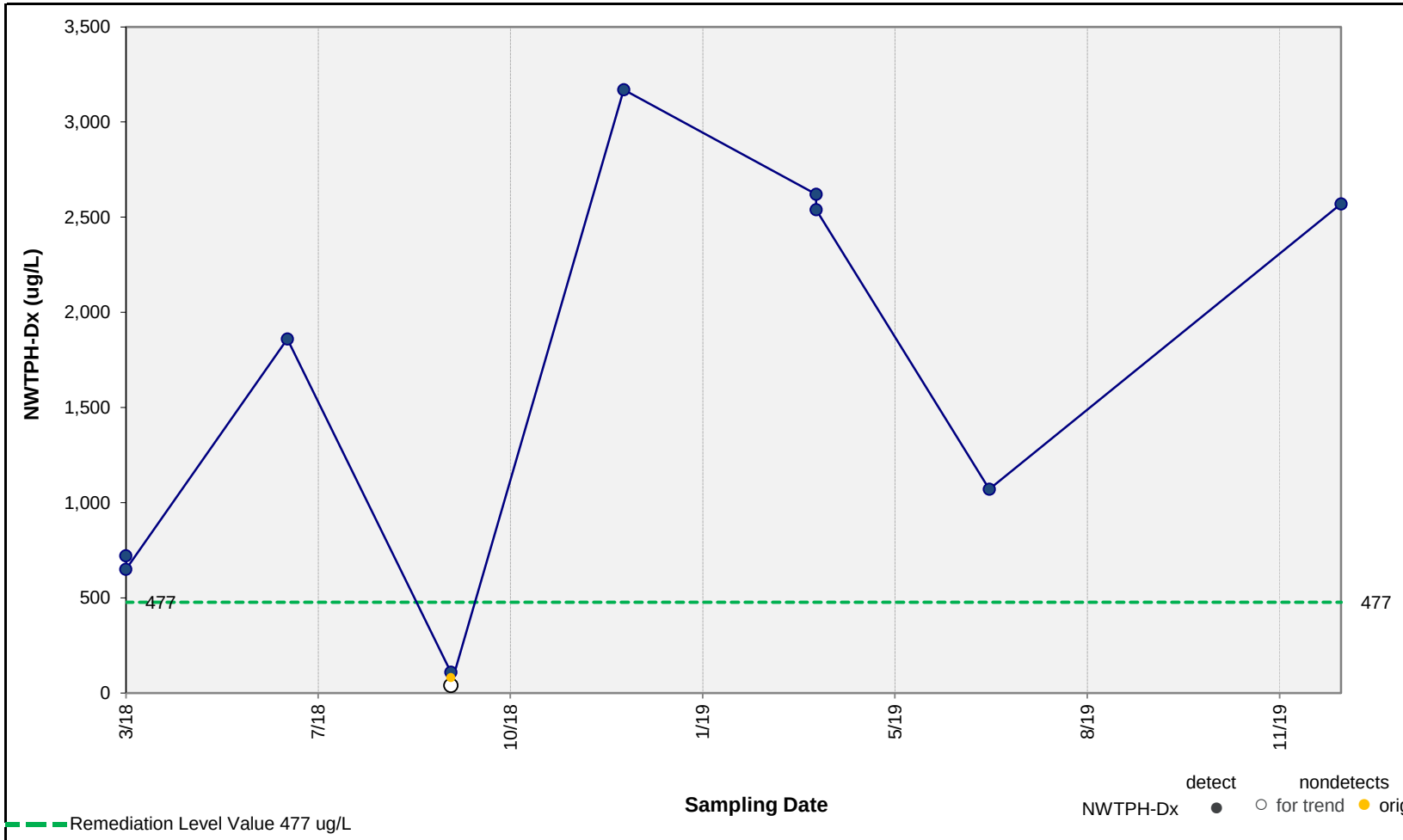
95% Confidence Interval = -2.5E-01 to 1.4E-01 ug/L Per Day

ARCADIS

Concentration vs. Time Plot – NWTPH-Dx in Well GW-3

BNSF Former Maintenance and Fueling Facility, Skykomish, Washington

Figure E-9



Results of Mann-Kendall Test for Trend: **No Significant Trend**

p value = 0.190 Note: p value < 0.05 indicates a statistically significant trend (95% confidence level).

Results of Sen's Estimator of Slope: **NA**

Median Slope Estimate = NA ug/L Per Day

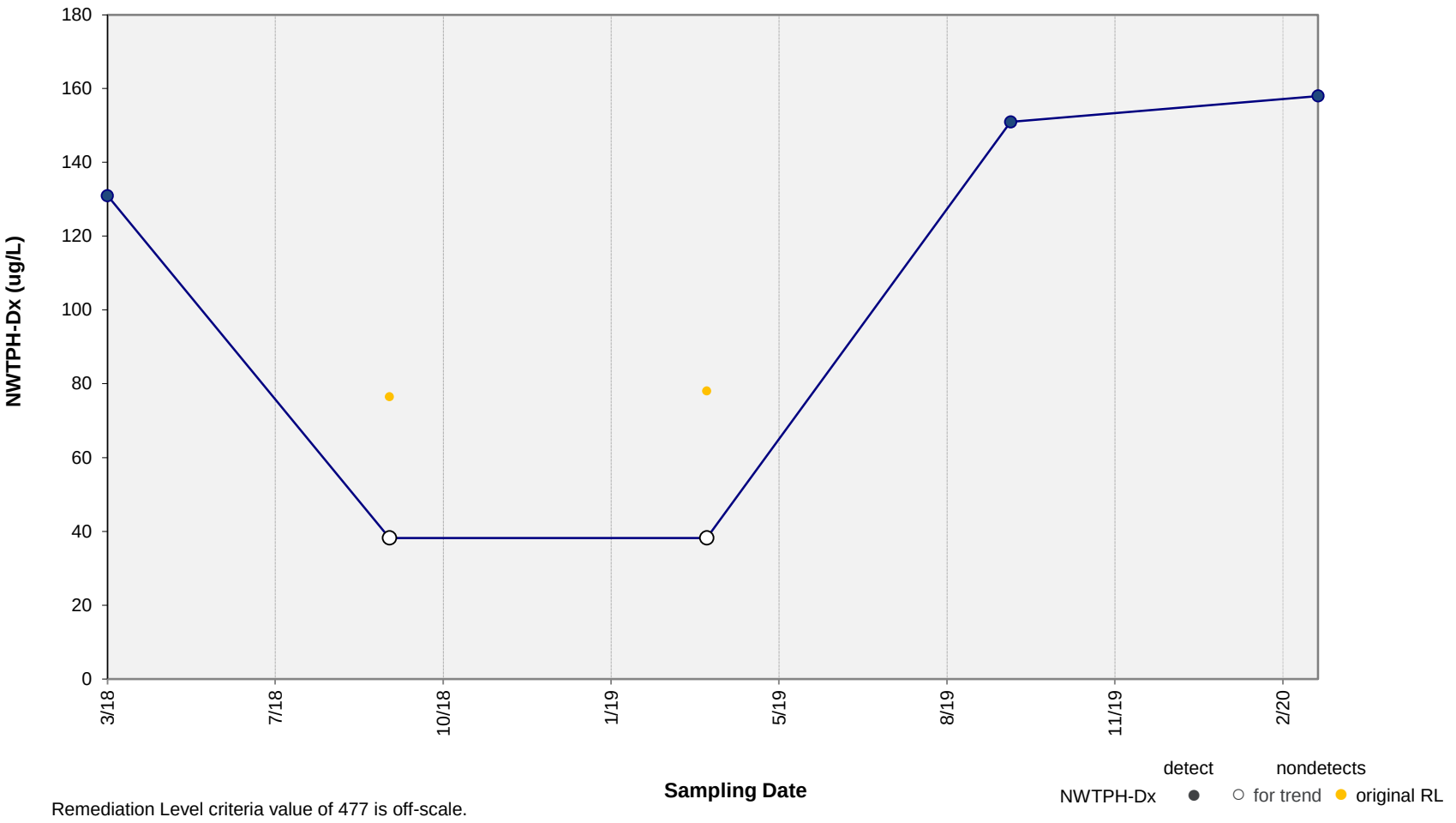
95% Confidence Interval = NA to NA ug/L Per Day

ARCADIS

Concentration vs. Time Plot – NWTPH-Dx in Well MW-3

BNSF Former Maintenance and Fueling Facility, Skykomish, Washington

Figure E-10



Remediation Level criteria value of 477 is off-scale.

Results of Mann-Kendall Test for Trend: **No Significant Trend**

p value = 0.180 Note: p value < 0.05 indicates a statistically significant trend (95% confidence level).

Results of Sen's Estimator of Slope: **No Significant Trend**

Median Slope Estimate = 3.8E-02 ug/L Per Day

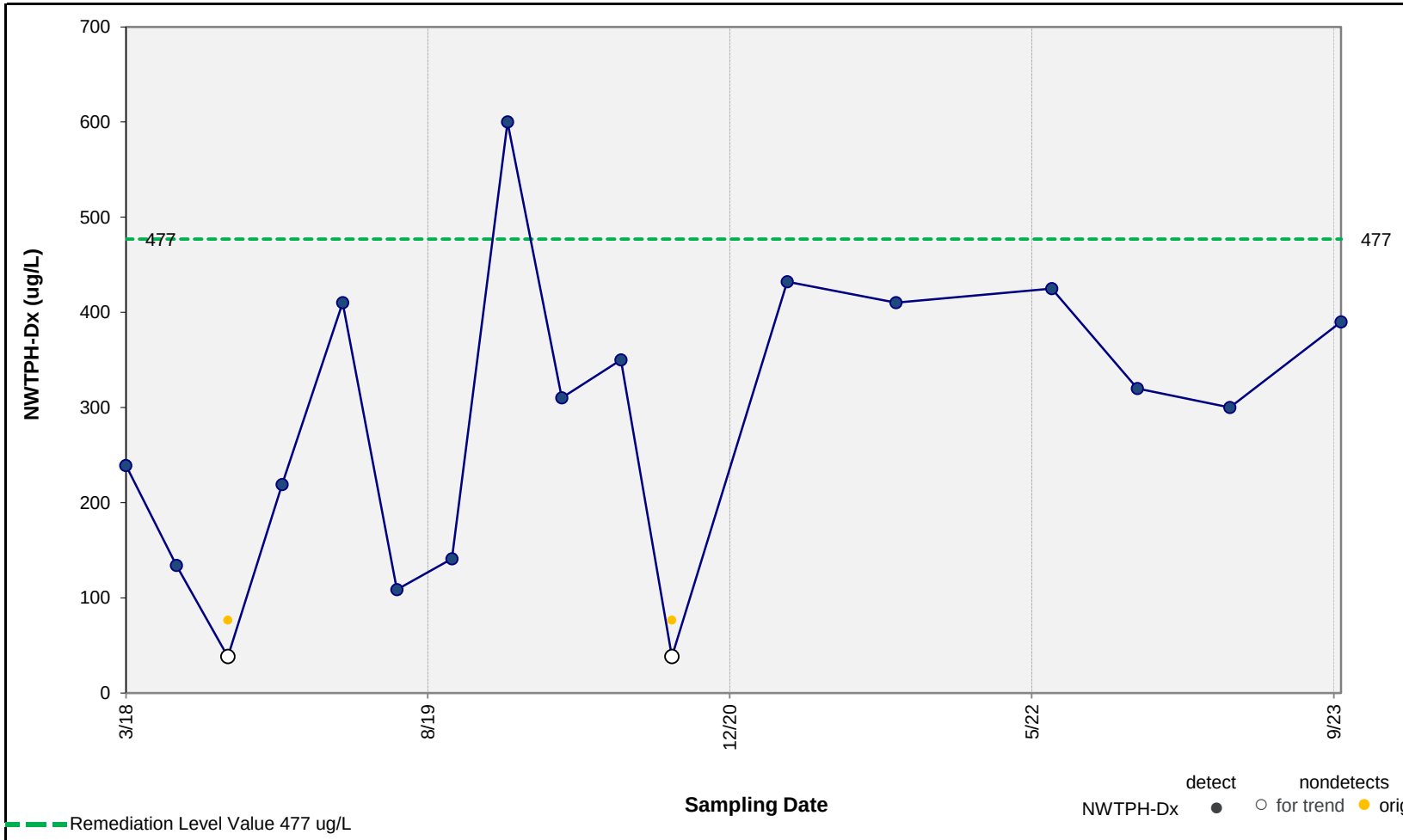
95% Confidence Interval = -5.2E-01 to 3.3E-01 ug/L Per Day

ARCADIS

Concentration vs. Time Plot – NWTPH-Dx in Well MW-38R

BNSF Former Maintenance and Fueling Facility, Skykomish, Washington

Figure E-11



Results of Mann-Kendall Test for Trend: **No Significant Trend**

p value = 0.063 Note: p value < 0.05 indicates a statistically significant trend (95% confidence level).

Results of Sen's Estimator of Slope: **No Significant Trend**

Median Slope Estimate = 1.2E-01 ug/L Per Day

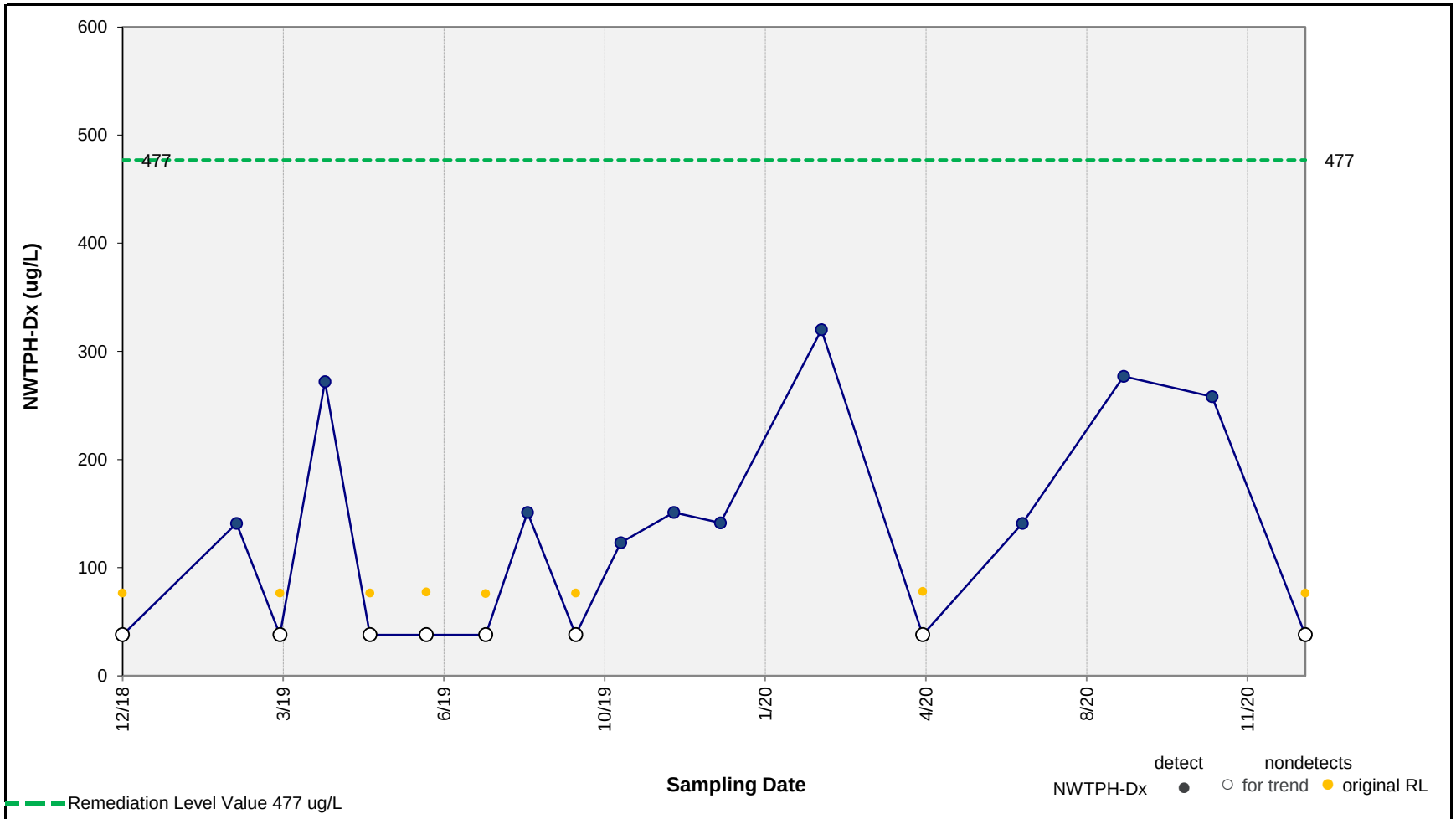
95% Confidence Interval = -3.3E-02 to 2.5E-01 ug/L Per Day

ARCADIS

Concentration vs. Time Plot – NWTPH-Dx in Well MW-4

BNSF Former Maintenance and Fueling Facility, Skykomish, Washington

Figure E-12



Results of Mann-Kendall Test for Trend: **No Significant Trend**

p value = 0.088 Note: p value < 0.05 indicates a statistically significant trend (95% confidence level).

Results of Sen's Estimator of Slope: **No trend**

Median Slope Estimate = 3.7E-02 ug/L Per Day

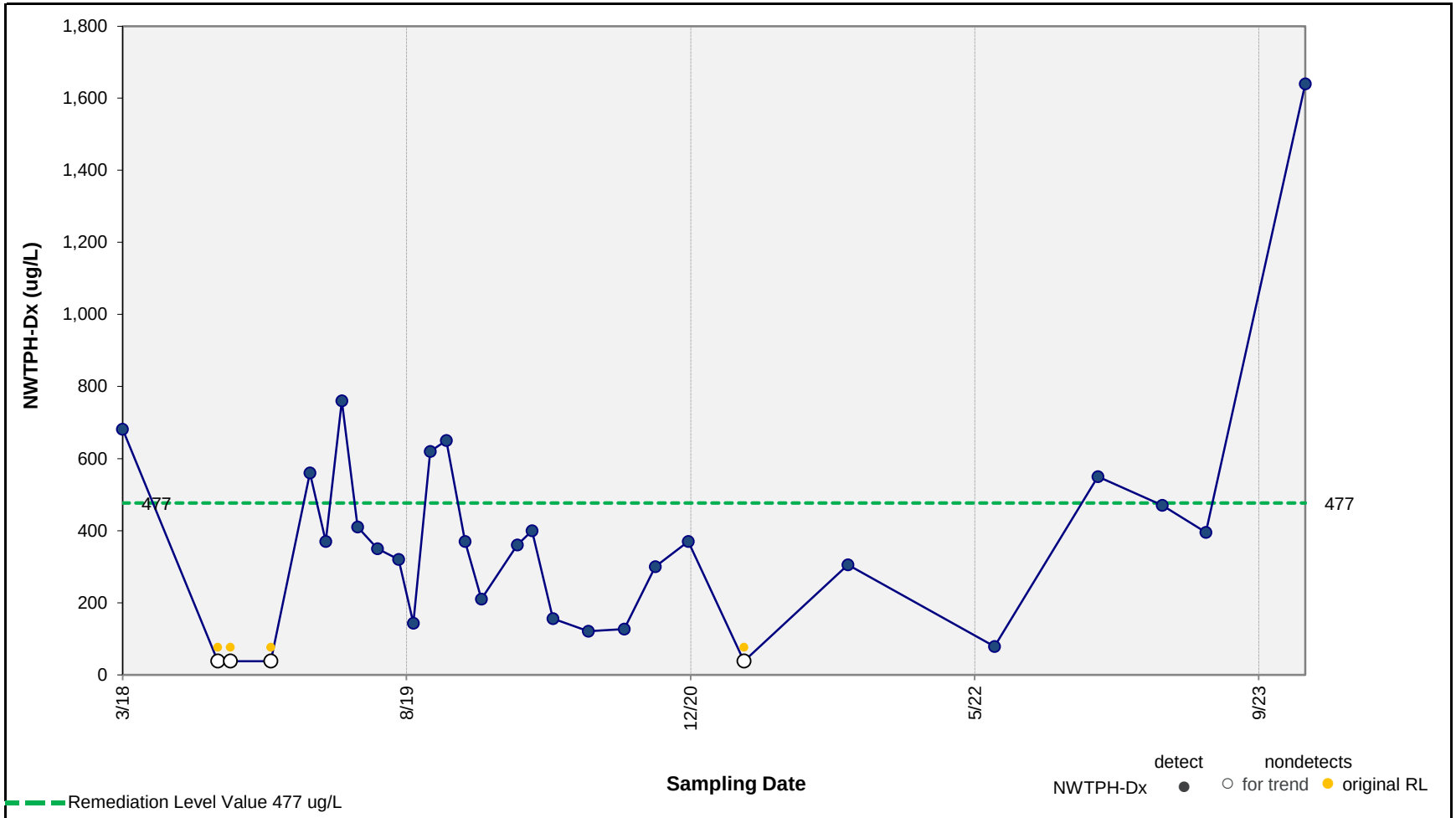
95% Confidence Interval = 0.0E+00 to 3.9E-01 ug/L Per Day

ARCADIS

Concentration vs. Time Plot – NWTPH-Dx in Well PZ-7S

BNSF Former Maintenance and Fueling Facility, Skykomish, Washington

Figure E-13



Results of Mann-Kendall Test for Trend: **No Significant Trend**

p value = 0.455 Note: p value < 0.05 indicates a statistically significant trend (95% confidence level).

Results of Sen's Estimator of Slope: **No Significant Trend**

Median Slope Estimate = 0.0E+00 ug/L Per Day

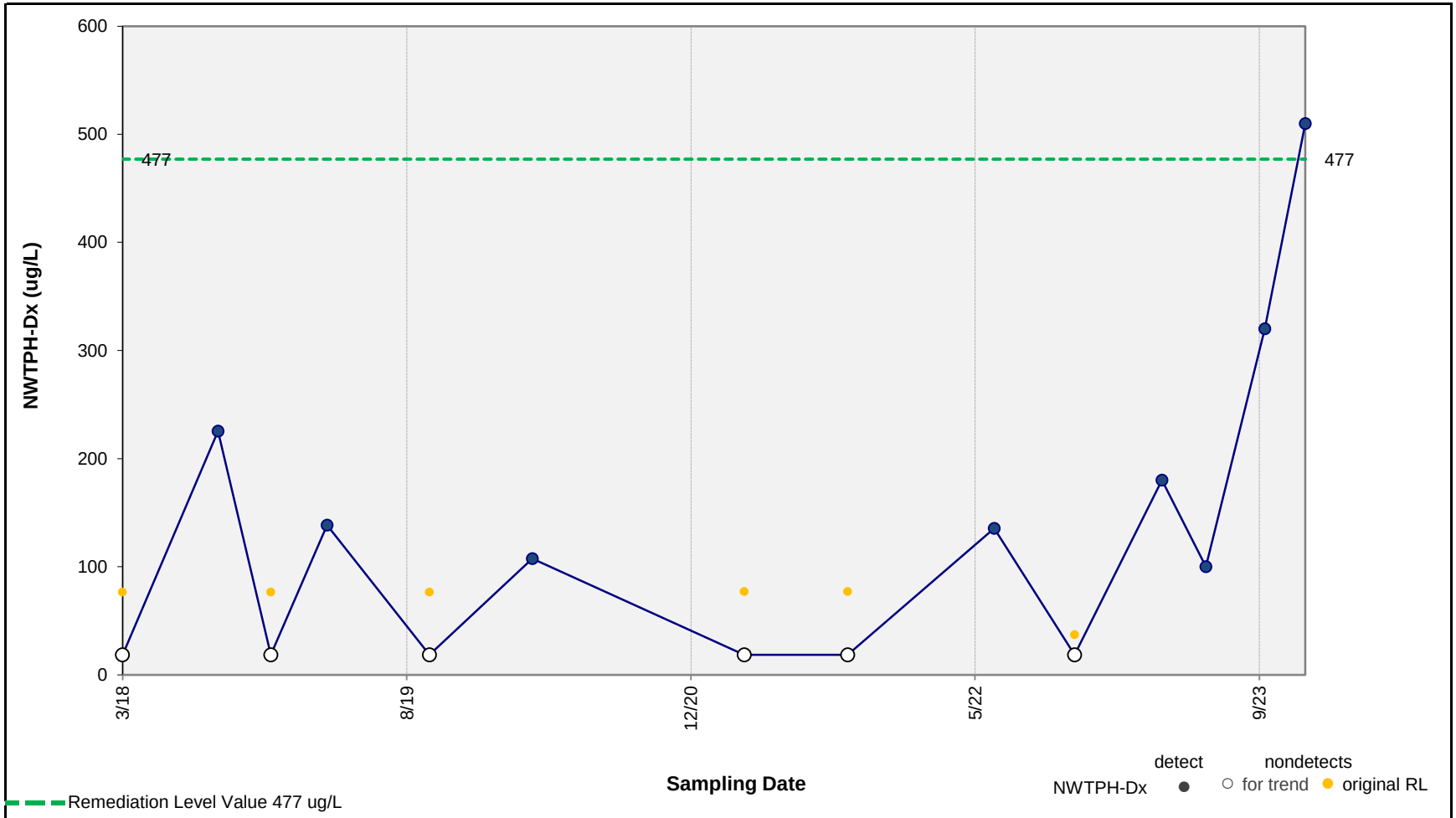
95% Confidence Interval = -2.1E-01 to 2.1E-01 ug/L Per Day

ARCADIS

Concentration vs. Time Plot – NWTPH-Dx in Well S2-BU

BNSF Former Maintenance and Fueling Facility, Skykomish, Washington

Figure E-14



Results of Mann-Kendall Test for Trend: **No Significant Trend**

p value = 0.061 Note: p value < 0.05 indicates a statistically significant trend (95% confidence level).

Results of Sen's Estimator of Slope: **No trend**

Median Slope Estimate = 6.5E-02 ug/L Per Day

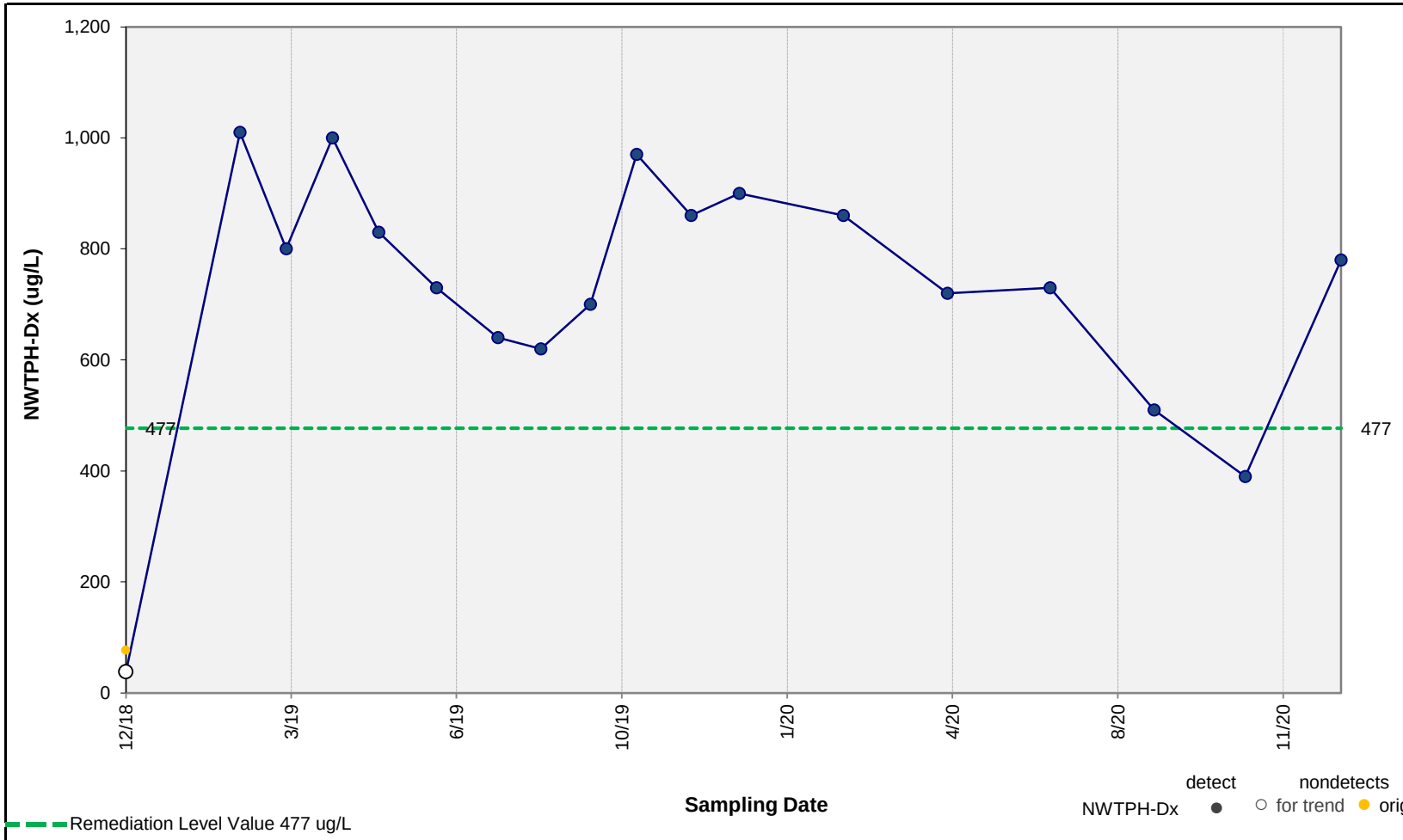
95% Confidence Interval = 0.0E+00 to 2.0E-01 ug/L Per Day

ARCADIS

Concentration vs. Time Plot – NWTPH-Dx in Well S4-CU

BNSF Former Maintenance and Fueling Facility, Skykomish, Washington

Figure E-15



Results of Mann-Kendall Test for Trend: **No Significant Trend**

p value = 0.144 Note: p value < 0.05 indicates a statistically significant trend (95% confidence level).

Results of Sen's Estimator of Slope: **No Significant Trend**

Median Slope Estimate = -3.2E-01 ug/L Per Day

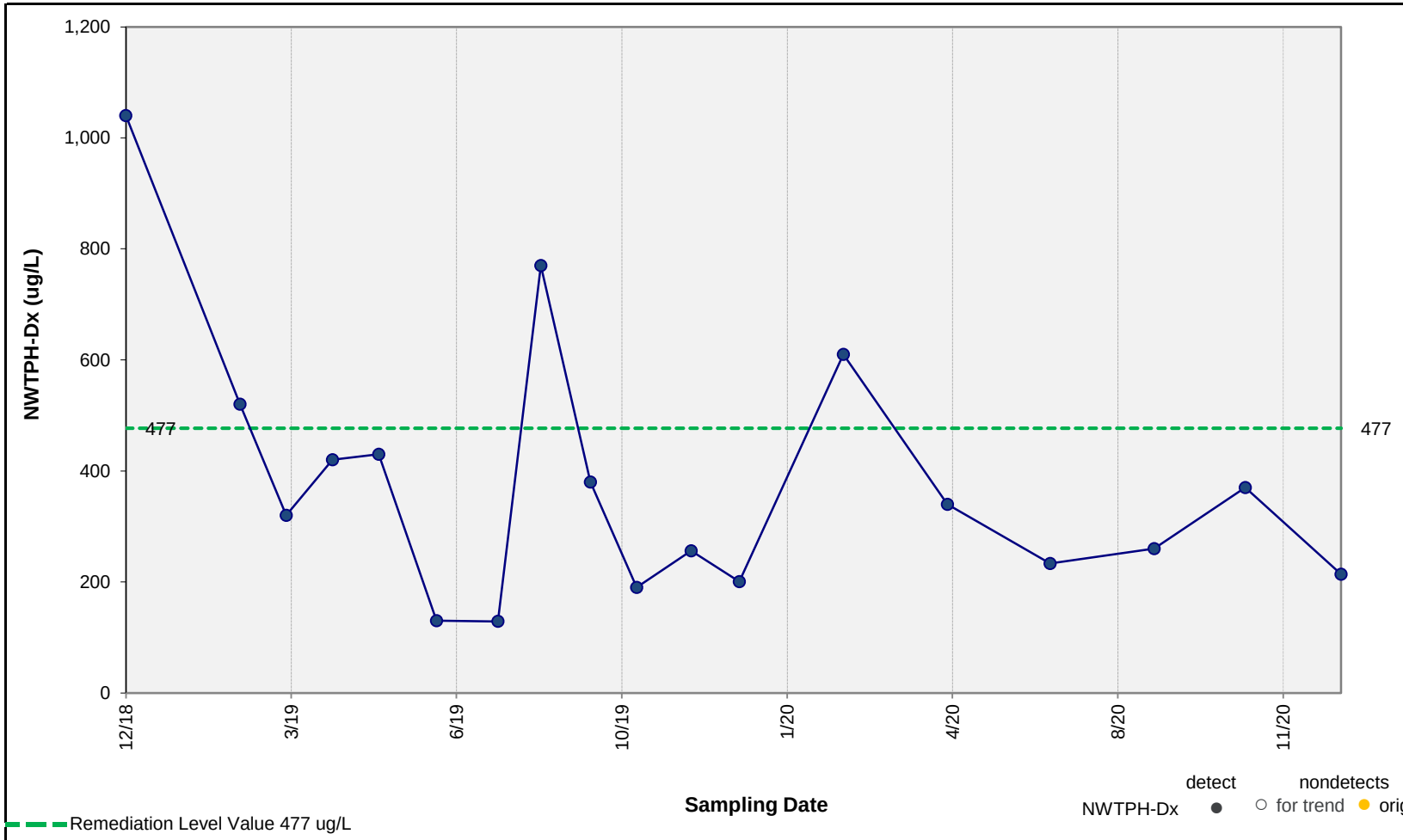
95% Confidence Interval = -7.6E-01 to 2.6E-01 ug/L Per Day

ARCADIS

Concentration vs. Time Plot – NWTPH-Dx in Well WG-EV

BNSF Former Maintenance and Fueling Facility, Skykomish, Washington

Figure E-16



Results of Mann-Kendall Test for Trend: **No Significant Trend**

p value = 0.099 Note: p value < 0.05 indicates a statistically significant trend (95% confidence level).

Results of Sen's Estimator of Slope: **No Significant Trend**

Median Slope Estimate = -3.4E-01 ug/L Per Day

95% Confidence Interval = -9.9E-01 to 1.7E-01 ug/L Per Day

ARCADIS

Concentration vs. Time Plot – NWTPH-Dx in Well WG-WV

BNSF Former Maintenance and Fueling Facility, Skykomish, Washington

Figure E-17

UCL Summary Statistics

Table E-2
UCL Summary Statisitics
2023 Annual Long-Term Monitoring Report
BNSF Railway Company
Former Maintenance and Fueling Facility, Skykomish, WA

ARCADIS

Well ID	NWTPH-Dx Groundwater Cleanup Target (µg/l)		Date Range	FOD	Percent of Dectects	NWTPH-Dx 95% UCL[1] (µg/l)	Percent of Sample Results that Exceed the Target (<10% to Pass)	Are any Sample Results Greater than Two Times the Target Concentration?	Does the Well Meet the 3-Part Statistical Test for Compliance?	Is Well under the Influence of an Engineering Control?	Trend Analysis at Wells Exceeding Cleanup Target
Conditional Point of Compliance Wells (Levee Zone)											
5-W-14	CUL	208	12/19 - 09/23	0 / 10	0%	77	0%	No	Yes	Yes	NA
5-W-16	CUL	208	12/19 - 09/23	0 / 10	0%	77	0%	No	Yes	Yes	NA
5-W-17	CUL	208	12/19 - 09/23	0 / 10	0%	77	0%	No	Yes	Yes	NA
5-W-18	CUL	208	12/19 - 09/23	2 / 10	20%	198	0%	No	Yes	Yes	NA
5-W-19	CUL	208	12/19 - 09/23	1 / 10	10%	127	0%	No	Yes	Yes	NA
Monitoring Wells North of Railyard and Outside the Levee Zone											
5-W-51	RL	477	09/19 - 09/23	10 / 10	100.0%	1,010	20%	Yes	No	Yes	Decreasing
5-W-55	RL	477	12/19 - 09/23	3 / 10	30%	120.8	0%	No	Yes	Yes	NA
5-W-56	RL	477	12/19 - 09/23	10 / 10	100.0%	3,716	100%	Yes	No	Yes	Stable
1B-W-23	RL	477	06/21 - 09/23	1 / 10	10%	169.0	0%	No	Yes	Yes	NA
2A-W-40	RL	477	06/21 - 09/23	10 / 10	100.0%	67	0%	No	Yes	Yes	NA
2A-W-41	RL	477	09/21 - 09/23	21 / 21	100.0%	775	60%	Yes	No	Yes	Stable
2A-W-42	RL	477	09/21 - 09/23	10 / 10	100.0%	242	0%	No	Yes	Yes	NA
1C-W-4	RL	477	09/18 - 03/23	5 / 10	50.0%	144.8	0%	No	Yes	Yes	NA
1C-W-7	RL	477	12/19 - 09/23	9 / 10	90.0%	213.7	100%	No	Yes	Yes	NA
1C-W-8	RL	477	12/19 - 09/23	2 / 10	20.0%	340.0	100%	No	Yes	Yes	NA
5-W-43	RL	477	06/21 - 12/23	3 / 10	30%	368.0	0%	No	Yes	Yes	NA
GW-1	RL	477	06/21 - 12/23	6 / 10	60.0%	118.0	0%	No	Yes	Yes	NA
GW-2	RL	477	06/21 - 12/23	4 / 10	40.0%	211.1	0%	No	Yes	Yes	NA
GW-3	RL	477	06/21 - 12/23	2 / 10	20.0%	539.4	30%	No	No	Yes	Stable
GW-4	RL	477	03/21 - 09/23	5 / 10	50.0%	93.7	0%	No	Yes	Yes	NA
Monitoring Wells within the Railyard											
2A-W-9	RL	None[2]	03/18 - 03/23	9 / 10	90.0%	558.7	30.0%	Yes	No	No	Stable
MW-4	RL	None[2]	12/19 - 09/23	9 / 10	90.0%	438.8	10.0%	No	No	No	Stable

Abbreviations:

-- insufficient data for calculating statistics (n < 4) or not available
CUL = cleanup level
FOD = frequency of detection (# detects / # samples)
NA = not applicable
RL = remediation level
µg/l = microgram per liter
UCL = upper confidence limit
NWTPH-Dx = sum of total petroleum hydrocarbons as diesel-range organics and oil-range organics analyzed using Washington State Department of Ecology Method NWTPH-Dx

Notes:

[1] Where the number of reported non-detects is greater than 50%, the largest value in the the data set is used in place of the 95% UCL.

[2] Location is within the BNSF railyard and does not have a groundwater cleanup target; however, for statistical evaluation purposes, a cleanup target of 477 µg/l was used.

Reference:

USEPA. 2009. Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities. Unified Guidance. EPA/530/R-09/007, 2009.

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.12/13/2024 8:21:39 AM
From File	Pro UCL Data.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Result (1b-w-23)

General Statistics

Total Number of Observations	10	Number of Distinct Observations	7
Number of Detects	1	Number of Non-Detects	9
Number of Distinct Detects	1	Number of Distinct Non-Detects	6

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!

It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Result (1b-w-23) was not processed!

Result (1c-w-4)

General Statistics

Total Number of Observations	10	Number of Distinct Observations	7
Number of Detects	5	Number of Non-Detects	5
Number of Distinct Detects	5	Number of Distinct Non-Detects	2
Minimum Detect	135.5	Minimum Non-Detect	76
Maximum Detect	210	Maximum Non-Detect	76.5
Variance Detects	939.1	Percent Non-Detects	50%
Mean Detects	156	SD Detects	30.65
Median Detects	144	CV Detects	0.196
Skewness Detects	2.073	Kurtosis Detects	4.415
Mean of Logged Detects	5.036	SD of Logged Detects	0.178

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.714	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.762	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.378	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.343	Detected Data Not Normal at 5% Significance Level

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	116	KM Standard Error of Mean	15.71
KM SD	44.45	95% KM (BCA) UCL	142.1
95% KM (t) UCL	144.8	95% KM (Percentile Bootstrap) UCL	138.8
95% KM (z) UCL	141.8	95% KM Bootstrap t UCL	133.6
90% KM Chebyshev UCL	163.1	95% KM Chebyshev UCL	184.5
97.5% KM Chebyshev UCL	214.1	99% KM Chebyshev UCL	272.4

52	**Gamma GOF Tests on Detected Observations Only**											
53					A-D Test Statistic	0.778	**Anderson-Darling GOF Test**					
54					5% A-D Critical Value	0.678	Detected Data Not Gamma Distributed at 5% Significance Level					
55					K-S Test Statistic	0.372	**Kolmogorov-Smirnov GOF**					
56					5% K-S Critical Value	0.357	Detected Data Not Gamma Distributed at 5% Significance Level					
57	**Detected Data Not Gamma Distributed at 5% Significance Level**											
58												
59	**Gamma Statistics on Detected Data Only**											
60					k hat (MLE)	37.18	k star (bias corrected MLE)	15				
61					Theta hat (MLE)	4.196	Theta star (bias corrected MLE)	10.4				
62					nu hat (MLE)	371.8	nu star (bias corrected)	150				
63					Mean (detects)	156						
64												
65	**Gamma ROS Statistics using Imputed Non-Detects**											
66	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
67	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
68	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
69	This is especially true when the sample size is small.											
70	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
71					Minimum	48.84	Mean	116.4				
72					Maximum	210	Median	117.9				
73					SD	48.22	CV	0.414				
74					k hat (MLE)	6.243	k star (bias corrected MLE)	4.436				
75					Theta hat (MLE)	18.64	Theta star (bias corrected MLE)	26.23				
76					nu hat (MLE)	124.9	nu star (bias corrected)	88.73				
77					Adjusted Level of Significance (β)	0.0267						
78					Approximate Chi Square Value (88.73, α)	68.01	Adjusted Chi Square Value (88.73, β)	64.87				
79					95% Gamma Approximate UCL (use when n>=50)	151.8	95% Gamma Adjusted UCL (use when n<50)	159.2				
80												
81	**Estimates of Gamma Parameters using KM Estimates**											
82					Mean (KM)	116	SD (KM)	44.45				
83					Variance (KM)	1976	SE of Mean (KM)	15.71				
84					k hat (KM)	6.811	k star (KM)	4.834				
85					nu hat (KM)	136.2	nu star (KM)	96.69				
86					theta hat (KM)	17.03	theta star (KM)	24				
87					80% gamma percentile (KM)	156.5	90% gamma percentile (KM)	186.6				
88					95% gamma percentile (KM)	214.1	99% gamma percentile (KM)	272.4				
89												
90	**Gamma Kaplan-Meier (KM) Statistics**											
91					Approximate Chi Square Value (96.69, α)	75.01	Adjusted Chi Square Value (96.69, β)	71.69				
92					95% Gamma Approximate KM-UCL (use when n>=50)	149.5	95% Gamma Adjusted KM-UCL (use when n<50)	156.4				
93												
94	**Lognormal GOF Test on Detected Observations Only**											
95					Shapiro Wilk Test Statistic	0.747	**Shapiro Wilk GOF Test**					
96					5% Shapiro Wilk Critical Value	0.762	Detected Data Not Lognormal at 5% Significance Level					
97					Lilliefors Test Statistic	0.358	**Lilliefors GOF Test**					
98					5% Lilliefors Critical Value	0.343	Detected Data Not Lognormal at 5% Significance Level					
99	**Detected Data Not Lognormal at 5% Significance Level**											
100												

101	**Lognormal ROS Statistics Using Imputed Non-Detects**											
102					Mean in Original Scale	124.8			Mean in Log Scale	4.785		
103					SD in Original Scale	39.54			SD in Log Scale	0.304		
104					95% t UCL (assumes normality of ROS data)	147.7			95% Percentile Bootstrap UCL	146.4		
105					95% BCA Bootstrap UCL	149.8			95% Bootstrap t UCL	153.1		
106					95% H-UCL (Log ROS)	153.2						
107												
108	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**											
109					KM Mean (logged)	4.684			KM Geo Mean	108.2		
110					KM SD (logged)	0.37			95% Critical H Value (KM-Log)	2.054		
111					KM Standard Error of Mean (logged)	0.131			95% H-UCL (KM -Log)	149.2		
112					KM SD (logged)	0.37			95% Critical H Value (KM-Log)	2.054		
113					KM Standard Error of Mean (logged)	0.131						
114												
115	**DL/2 Statistics**											
116					**DL/2 Normal**				**DL/2 Log-Transformed**			
117					Mean in Original Scale	97.1			Mean in Log Scale	4.34		
118					SD in Original Scale	65.36			SD in Log Scale	0.744		
119					95% t UCL (Assumes normality)	135			95% H-Stat UCL	193.1		
120	**DL/2 is not a recommended method, provided for comparisons and historical reasons**											
121												
122	**Nonparametric Distribution Free UCL Statistics**											
123	**Data do not follow a Discernible Distribution at 5% Significance Level**											
124												
125	**Suggested UCL to Use**											
126					95% KM (t) UCL	144.8			KM H-UCL	149.2		
127					95% KM (BCA) UCL	142.1						
128												
129	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
130	Recommendations are based upon data size, data distribution, and skewness.											
131	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
132	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
133												
134	**Result (1c-w-7)**											
135												
136	**General Statistics**											
137					Total Number of Observations	10			Number of Distinct Observations	10		
138					Number of Detects	9			Number of Non-Detects	1		
139					Number of Distinct Detects	9			Number of Distinct Non-Detects	1		
140					Minimum Detect	108.5			Minimum Non-Detect	76.5		
141					Maximum Detect	260			Maximum Non-Detect	76.5		
142					Variance Detects	2714			Percent Non-Detects	10%		
143					Mean Detects	189.6			SD Detects	52.09		
144					Median Detects	187			CV Detects	0.275		
145					Skewness Detects	-0.176			Kurtosis Detects	-1.317		
146					Mean of Logged Detects	5.208			SD of Logged Detects	0.295		
147												
148	**Normal GOF Test on Detects Only**											
149					Shapiro Wilk Test Statistic	0.956			**Shapiro Wilk GOF Test**			
150					5% Shapiro Wilk Critical Value	0.829			Detected Data appear Normal at 5% Significance Level			
151					Lilliefors Test Statistic	0.165			**Lilliefors GOF Test**			
152					5% Lilliefors Critical Value	0.274			Detected Data appear Normal at 5% Significance Level			
153	**Detected Data appear Normal at 5% Significance Level**											
154												
155	**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**											
156					KM Mean	178.3			KM Standard Error of Mean	19.33		
157					KM SD	57.64			95% KM (BCA) UCL	207.9		
158					95% KM (t) UCL	213.7			95% KM (Percentile Bootstrap) UCL	209.2		
159					95% KM (z) UCL	210.1			95% KM Bootstrap t UCL	211.1		
160					90% KM Chebyshev UCL	236.3			95% KM Chebyshev UCL	262.6		
161					97.5% KM Chebyshev UCL	299			99% KM Chebyshev UCL	370.7		
162												

	A	B	C	D	E	F	G	H	I	J	K	L
163	**Gamma GOF Tests on Detected Observations Only**											
164					A-D Test Statistic	0.261	**Anderson-Darling GOF Test**					
165					5% A-D Critical Value	0.721	Detected data appear Gamma Distributed at 5% Significance Level					
166					K-S Test Statistic	0.188	**Kolmogorov-Smirnov GOF**					
167					5% K-S Critical Value	0.279	Detected data appear Gamma Distributed at 5% Significance Level					
168	**Detected data appear Gamma Distributed at 5% Significance Level**											
169												
170	**Gamma Statistics on Detected Data Only**											
171					k hat (MLE)	13.79	k star (bias corrected MLE)					9.265
172					Theta hat (MLE)	13.75	Theta star (bias corrected MLE)					20.47
173					nu hat (MLE)	248.2	nu star (bias corrected)					166.8
174					Mean (detects)	189.6						
175												
176	**Gamma ROS Statistics using Imputed Non-Detects**											
177	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
178	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
179	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
180	This is especially true when the sample size is small.											
181	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
182					Minimum	80.42	Mean					178.7
183					Maximum	260	Median					178.5
184					SD	60.04	CV					0.336
185					k hat (MLE)	8.567	k star (bias corrected MLE)					6.064
186					Theta hat (MLE)	20.86	Theta star (bias corrected MLE)					29.47
187					nu hat (MLE)	171.3	nu star (bias corrected)					121.3
188					Adjusted Level of Significance (β)	0.0267						
189					Approximate Chi Square Value (121.27, α)	96.84	Adjusted Chi Square Value (121.27, β)					93.05
190					95% Gamma Approximate UCL (use when n>=50)	223.8	95% Gamma Adjusted UCL (use when n<50)					232.9
191												
192	**Estimates of Gamma Parameters using KM Estimates**											
193					Mean (KM)	178.3	SD (KM)					57.64
194					Variance (KM)	3322	SE of Mean (KM)					19.33
195					k hat (KM)	9.569	k star (KM)					6.765
196					nu hat (KM)	191.4	nu star (KM)					135.3
197					theta hat (KM)	18.63	theta star (KM)					26.36
198					80% gamma percentile (KM)	232	90% gamma percentile (KM)					269.8
199					95% gamma percentile (KM)	304	99% gamma percentile (KM)					375.1
200												
201	**Gamma Kaplan-Meier (KM) Statistics**											
202					Approximate Chi Square Value (135.30, α)	109.4	Adjusted Chi Square Value (135.30, β)					105.4
203					95% Gamma Approximate KM-UCL (use when n>=50)	220.5	95% Gamma Adjusted KM-UCL (use when n<50)					228.9
204												

	A	B	C	D	E	F	G	H	I	J	K	L
205	**Lognormal GOF Test on Detected Observations Only**											
206					Shapiro Wilk Test Statistic	0.944	**Shapiro Wilk GOF Test**					
207					5% Shapiro Wilk Critical Value	0.829	Detected Data appear Lognormal at 5% Significance Level					
208					Lilliefors Test Statistic	0.18	**Lilliefors GOF Test**					
209					5% Lilliefors Critical Value	0.274	Detected Data appear Lognormal at 5% Significance Level					
210	**Detected Data appear Lognormal at 5% Significance Level**											
211												
212	**Lognormal ROS Statistics Using Imputed Non-Detects**											
213					Mean in Original Scale	179.6			Mean in Log Scale	5.137		
214					SD in Original Scale	58.45			SD in Log Scale	0.358		
215					95% t UCL (assumes normality of ROS data)	213.5			95% Percentile Bootstrap UCL	207.1		
216					95% BCA Bootstrap UCL	206.7			95% Bootstrap t UCL	211.9		
217					95% H-UCL (Log ROS)	231.5						
218												
219	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**											
220					KM Mean (logged)	5.121			KM Geo Mean	167.5		
221					KM SD (logged)	0.371			95% Critical H Value (KM-Log)	2.055		
222					KM Standard Error of Mean (logged)	0.124			95% H-UCL (KM -Log)	231.4		
223					KM SD (logged)	0.371			95% Critical H Value (KM-Log)	2.055		
224					KM Standard Error of Mean (logged)	0.124						
225												
226	**DL/2 Statistics**											
227					**DL/2 Normal**				**DL/2 Log-Transformed**			
228					Mean in Original Scale	174.5			Mean in Log Scale	5.052		
229					SD in Original Scale	68.58			SD in Log Scale	0.567		
230					95% t UCL (Assumes normality)	214.2			95% H-Stat UCL	284.6		
231	**DL/2 is not a recommended method, provided for comparisons and historical reasons**											
232												
233	**Nonparametric Distribution Free UCL Statistics**											
234	**Detected Data appear Normal Distributed at 5% Significance Level**											
235												
236	**Suggested UCL to Use**											
237					95% KM (t) UCL	213.7						
238												
239	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
240	Recommendations are based upon data size, data distribution, and skewness.											
241	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
242	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
243												
244	**Result (1c-w-8)**											
245												
246	**General Statistics**											
247					Total Number of Observations	10			Number of Distinct Observations	6		
248					Number of Detects	2			Number of Non-Detects	8		
249					Number of Distinct Detects	2			Number of Distinct Non-Detects	4		
250					Minimum Detect	199			Minimum Non-Detect	40.5		
251					Maximum Detect	340			Maximum Non-Detect	77		
252					Variance Detects	9941			Percent Non-Detects	80%		
253					Mean Detects	269.5			SD Detects	99.7		
254					Median Detects	269.5			CV Detects	0.37		
255					Skewness Detects	N/A			Kurtosis Detects	N/A		
256					Mean of Logged Detects	5.561			SD of Logged Detects	0.379		
257												
258	**Warning: Data set has only 2 Detected Values.**											
259	**This is not enough to compute meaningful or reliable statistics and estimates.**											

260											
261											
262	**Normal GOF Test on Detects Only**										
263	**Not Enough Data to Perform GOF Test**										
264											
265	**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**										
266	KM Mean				86.3	KM Standard Error of Mean					43.32
267	KM SD				96.87	95% KM (BCA) UCL					N/A
268	95% KM (t) UCL				165.7	95% KM (Percentile Bootstrap) UCL					N/A
269	95% KM (z) UCL				157.6	95% KM Bootstrap t UCL					N/A
270	90% KM Chebyshev UCL				216.3	95% KM Chebyshev UCL					275.1
271	97.5% KM Chebyshev UCL				356.9	99% KM Chebyshev UCL					517.4
272											
273	**Gamma GOF Tests on Detected Observations Only**										
274	**Not Enough Data to Perform GOF Test**										
275											
276	**Gamma Statistics on Detected Data Only**										
277	k hat (MLE)				14.27	k star (bias corrected MLE)					N/A
278	Theta hat (MLE)				18.88	Theta star (bias corrected MLE)					N/A
279	nu hat (MLE)				57.09	nu star (bias corrected)					N/A
280	Mean (detects)				269.5						
281											
282	**Estimates of Gamma Parameters using KM Estimates**										
283	Mean (KM)				86.3	SD (KM)					96.87
284	Variance (KM)				9385	SE of Mean (KM)					43.32
285	k hat (KM)				0.794	k star (KM)					0.622
286	nu hat (KM)				15.87	nu star (KM)					12.44
287	theta hat (KM)				108.7	theta star (KM)					138.7
288	80% gamma percentile (KM)				142.2	90% gamma percentile (KM)					222.6
289	95% gamma percentile (KM)				306.5	99% gamma percentile (KM)					508.7
290											
291	**Gamma Kaplan-Meier (KM) Statistics**										
292						Adjusted Level of Significance (β)					0.0267
293	Approximate Chi Square Value (12.44, α)				5.521	Adjusted Chi Square Value (12.44, β)					4.744
294	95% Gamma Approximate KM-UCL (use when n>=50)				194.5	95% Gamma Adjusted KM-UCL (use when n<50)					226.4
295											
296	**Lognormal GOF Test on Detected Observations Only**										
297	**Not Enough Data to Perform GOF Test**										
298											
299	**Lognormal ROS Statistics Using Imputed Non-Detects**										
300	Mean in Original Scale				81.25	Mean in Log Scale					3.826
301	SD in Original Scale				106	SD in Log Scale					1.056
302	95% t UCL (assumes normality of ROS data)				142.7	95% Percentile Bootstrap UCL					140.6
303	95% BCA Bootstrap UCL				160	95% Bootstrap t UCL					370.8
304	95% H-UCL (Log ROS)				248.9						
305											
306	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**										
307	KM Mean (logged)				4.073	KM Geo Mean					58.75
308	KM SD (logged)				0.754	95% Critical H Value (KM-Log)					2.626
309	KM Standard Error of Mean (logged)				0.337	95% H-UCL (KM -Log)					150.9
310	KM SD (logged)				0.754	95% Critical H Value (KM-Log)					2.626
311	KM Standard Error of Mean (logged)				0.337						
312											

313	**DL/2 Statistics**											
314	**DL/2 Normal**						**DL/2 Log-Transformed**					
315				Mean in Original Scale		82.73				Mean in Log Scale		3.965
316				SD in Original Scale		104				SD in Log Scale		0.874
317				95% t UCL (Assumes normality)		143				95% H-Stat UCL		177
318	**DL/2 is not a recommended method, provided for comparisons and historical reasons**											
319												
320	**Nonparametric Distribution Free UCL Statistics**											
321	**Data do not follow a Discernible Distribution at 5% Significance Level**											
322												
323	**Suggested UCL to Use**											
324				95% KM (t) UCL		165.7				KM H-UCL		150.9
325				95% KM (BCA) UCL		N/A						
326	**Warning: One or more Recommended UCL(s) not available!**											
327												
328	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
329	Recommendations are based upon data size, data distribution, and skewness.											
330	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
331	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
332												
333												
334	**Result (2a-w-10)**											
335												
336	**General Statistics**											
337				Total Number of Observations		10				Number of Distinct Observations		10
338										Number of Missing Observations		0
339				Minimum		151				Mean		302.9
340				Maximum		550				Median		278.5
341				SD		128.7				Std. Error of Mean		40.7
342				Coefficient of Variation		0.425				Skewness		0.686
343												
344	**Normal GOF Test**											
345				Shapiro Wilk Test Statistic		0.944	**Shapiro Wilk GOF Test**					
346				5% Shapiro Wilk Critical Value		0.842	Data appear Normal at 5% Significance Level					
347				Lilliefors Test Statistic		0.138	**Lilliefors GOF Test**					
348				5% Lilliefors Critical Value		0.262	Data appear Normal at 5% Significance Level					
349	**Data appear Normal at 5% Significance Level**											
350												
351	**Assuming Normal Distribution**											
352	**95% Normal UCL**						**95% UCLs (Adjusted for Skewness)**					
353				95% Student's-t UCL		377.5				95% Adjusted-CLT UCL (Chen-1995)		379.3
354										95% Modified-t UCL (Johnson-1978)		379
355												
356	**Gamma GOF Test**											
357				A-D Test Statistic		0.186	**Anderson-Darling Gamma GOF Test**					
358				5% A-D Critical Value		0.728	Detected data appear Gamma Distributed at 5% Significance Level					
359				K-S Test Statistic		0.131	**Kolmogorov-Smirnov Gamma GOF Test**					
360				5% K-S Critical Value		0.267	Detected data appear Gamma Distributed at 5% Significance Level					
361	**Detected data appear Gamma Distributed at 5% Significance Level**											
362												

	A	B	C	D	E	F	G	H	I	J	K	L
363	**Gamma Statistics**											
364					k hat (MLE)	6.309			k star (bias corrected MLE)			4.483
365					Theta hat (MLE)	48.01			Theta star (bias corrected MLE)			67.57
366					nu hat (MLE)	126.2			nu star (bias corrected)			89.66
367					MLE Mean (bias corrected)	302.9			MLE Sd (bias corrected)			143.1
368									Approximate Chi Square Value (0.05)			68.83
369					Adjusted Level of Significance	0.0267			Adjusted Chi Square Value			65.66
370												
371	**Assuming Gamma Distribution**											
372			95% Approximate Gamma UCL (use when n>=50))			394.6			95% Adjusted Gamma UCL (use when n<50)			413.6
373												
374	**Lognormal GOF Test**											
375					Shapiro Wilk Test Statistic	0.969			**Shapiro Wilk Lognormal GOF Test**			
376					5% Shapiro Wilk Critical Value	0.842			Data appear Lognormal at 5% Significance Level			
377					Lilliefors Test Statistic	0.122			**Lilliefors Lognormal GOF Test**			
378					5% Lilliefors Critical Value	0.262			Data appear Lognormal at 5% Significance Level			
379	**Data appear Lognormal at 5% Significance Level**											
380												
381	**Lognormal Statistics**											
382					Minimum of Logged Data	5.017			Mean of logged Data			5.632
383					Maximum of Logged Data	6.31			SD of logged Data			0.428
384												
385	**Assuming Lognormal Distribution**											
386					95% H-UCL	414.1			90% Chebyshev (MVUE) UCL			427.6
387					95% Chebyshev (MVUE) UCL	484.1			97.5% Chebyshev (MVUE) UCL			562.4
388					99% Chebyshev (MVUE) UCL	716.3						
389												
390	**Nonparametric Distribution Free UCL Statistics**											
391	**Data appear to follow a Discernible Distribution at 5% Significance Level**											
392												
393	**Nonparametric Distribution Free UCLs**											
394					95% CLT UCL	369.8			95% Jackknife UCL			377.5
395					95% Standard Bootstrap UCL	366.6			95% Bootstrap-t UCL			392.8
396					95% Hall's Bootstrap UCL	390.7			95% Percentile Bootstrap UCL			369.2
397					95% BCA Bootstrap UCL	373.5						
398					90% Chebyshev(Mean, Sd) UCL	425			95% Chebyshev(Mean, Sd) UCL			480.3
399					97.5% Chebyshev(Mean, Sd) UCL	557			99% Chebyshev(Mean, Sd) UCL			707.8
400												
401	**Suggested UCL to Use**											
402					95% Student's-t UCL	377.5						
403												
404	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
405	Recommendations are based upon data size, data distribution, and skewness.											
406	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
407	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
408												
409	**Result (2a-w-40)**											
410												
411	**General Statistics**											
412					Total Number of Observations	10			Number of Distinct Observations			8
413					Number of Detects	1			Number of Non-Detects			9
414					Number of Distinct Detects	1			Number of Distinct Non-Detects			7
415												
416	**Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!**											
417	**It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).**											
418												
419	**The data set for variable Result (2a-w-40) was not processed!**											

	A	B	C	D	E	F	G	H	I	J	K	L
420												
421												
422												
423	**Result (2a-w-41)**											
424												
425	**General Statistics**											
426	Total Number of Observations					10	Number of Distinct Observations					10
427							Number of Missing Observations					0
428	Minimum					145	Mean					577.6
429	Maximum					1130	Median					567.5
430	SD					340.3	Std. Error of Mean					107.6
431	Coefficient of Variation					0.589	Skewness					0.212
432												
433	**Normal GOF Test**											
434	Shapiro Wilk Test Statistic					0.949	**Shapiro Wilk GOF Test**					
435	5% Shapiro Wilk Critical Value					0.842	Data appear Normal at 5% Significance Level					
436	Lilliefors Test Statistic					0.139	**Lilliefors GOF Test**					
437	5% Lilliefors Critical Value					0.262	Data appear Normal at 5% Significance Level					
438	**Data appear Normal at 5% Significance Level**											
439												
440	**Assuming Normal Distribution**											
441	**95% Normal UCL**						**95% UCLs (Adjusted for Skewness)**					
442	95% Student's-t UCL					774.9	95% Adjusted-CLT UCL (Chen-1995)					762.3
443							95% Modified-t UCL (Johnson-1978)					776.1
444												
445	**Gamma GOF Test**											
446	A-D Test Statistic					0.286	**Anderson-Darling Gamma GOF Test**					
447	5% A-D Critical Value					0.733	Detected data appear Gamma Distributed at 5% Significance Level					
448	K-S Test Statistic					0.163	**Kolmogorov-Smirnov Gamma GOF Test**					
449	5% K-S Critical Value					0.269	Detected data appear Gamma Distributed at 5% Significance Level					
450	**Detected data appear Gamma Distributed at 5% Significance Level**											
451												
452	**Gamma Statistics**											
453	k hat (MLE)					2.627	k star (bias corrected MLE)					1.905
454	Theta hat (MLE)					219.9	Theta star (bias corrected MLE)					303.1
455	nu hat (MLE)					52.53	nu star (bias corrected)					38.11
456	MLE Mean (bias corrected)					577.6	MLE Sd (bias corrected)					418.4
457							Approximate Chi Square Value (0.05)					24.97
458	Adjusted Level of Significance					0.0267	Adjusted Chi Square Value					23.14
459												
460	**Assuming Gamma Distribution**											
461	95% Approximate Gamma UCL (use when n>=50))					881.5	95% Adjusted Gamma UCL (use when n<50)					951.3
462												
463	**Lognormal GOF Test**											
464	Shapiro Wilk Test Statistic					0.921	**Shapiro Wilk Lognormal GOF Test**					
465	5% Shapiro Wilk Critical Value					0.842	Data appear Lognormal at 5% Significance Level					
466	Lilliefors Test Statistic					0.16	**Lilliefors Lognormal GOF Test**					
467	5% Lilliefors Critical Value					0.262	Data appear Lognormal at 5% Significance Level					
468	**Data appear Lognormal at 5% Significance Level**											
469												
470	**Lognormal Statistics**											
471	Minimum of Logged Data					4.977	Mean of logged Data					6.157
472	Maximum of Logged Data					7.03	SD of logged Data					0.722
473												

474	**Assuming Lognormal Distribution**											
475					95% H-UCL	1138			90% Chebyshev (MVUE) UCL	1014		
476					95% Chebyshev (MVUE) UCL	1204			97.5% Chebyshev (MVUE) UCL	1469		
477					99% Chebyshev (MVUE) UCL	1988						
478												
479	**Nonparametric Distribution Free UCL Statistics**											
480	**Data appear to follow a Discernible Distribution at 5% Significance Level**											
481												
482	**Nonparametric Distribution Free UCLs**											
483					95% CLT UCL	754.6			95% Jackknife UCL	774.9		
484					95% Standard Bootstrap UCL	744.2			95% Bootstrap-t UCL	791.3		
485					95% Hall's Bootstrap UCL	756.9			95% Percentile Bootstrap UCL	738.6		
486					95% BCA Bootstrap UCL	751.1						
487					90% Chebyshev(Mean, Sd) UCL	900.4			95% Chebyshev(Mean, Sd) UCL	1047		
488					97.5% Chebyshev(Mean, Sd) UCL	1250			99% Chebyshev(Mean, Sd) UCL	1648		
489												
490	**Suggested UCL to Use**											
491					95% Student's-t UCL	774.9						
492												
493	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
494	Recommendations are based upon data size, data distribution, and skewness.											
495	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
496	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
497												
498												
499	**Result (2a-w-42)**											
500												
501	**General Statistics**											
502					Total Number of Observations	10			Number of Distinct Observations	9		
503									Number of Missing Observations	0		
504					Minimum	100			Mean	201.6		
505					Maximum	330			Median	180		
506					SD	69.67			Std. Error of Mean	22.03		
507					Coefficient of Variation	0.346			Skewness	0.573		
508												
509	**Normal GOF Test**											
510					Shapiro Wilk Test Statistic	0.935			**Shapiro Wilk GOF Test**			
511					5% Shapiro Wilk Critical Value	0.842			Data appear Normal at 5% Significance Level			
512					Lilliefors Test Statistic	0.198			**Lilliefors GOF Test**			
513					5% Lilliefors Critical Value	0.262			Data appear Normal at 5% Significance Level			
514	**Data appear Normal at 5% Significance Level**											
515												
516	**Assuming Normal Distribution**											
517	**95% Normal UCL**								**95% UCLs (Adjusted for Skewness)**			
518					95% Student's-t UCL	242			95% Adjusted-CLT UCL (Chen-1995)	242.1		
519									95% Modified-t UCL (Johnson-1978)	242.6		
520												
521	**Gamma GOF Test**											
522					A-D Test Statistic	0.331			**Anderson-Darling Gamma GOF Test**			
523					5% A-D Critical Value	0.726			Detected data appear Gamma Distributed at 5% Significance Level			
524					K-S Test Statistic	0.182			**Kolmogorov-Smirnov Gamma GOF Test**			
525					5% K-S Critical Value	0.267			Detected data appear Gamma Distributed at 5% Significance Level			
526	**Detected data appear Gamma Distributed at 5% Significance Level**											
527												

	A	B	C	D	E	F	G	H	I	J	K	L
528	**Gamma Statistics**											
529					k hat (MLE)	9.367			k star (bias corrected MLE)			6.624
530					Theta hat (MLE)	21.52			Theta star (bias corrected MLE)			30.44
531					nu hat (MLE)	187.3			nu star (bias corrected)			132.5
532					MLE Mean (bias corrected)	201.6			MLE Sd (bias corrected)			78.33
533									Approximate Chi Square Value (0.05)			106.9
534					Adjusted Level of Significance	0.0267			Adjusted Chi Square Value			102.9
535												
536	**Assuming Gamma Distribution**											
537			95% Approximate Gamma UCL (use when n>=50))			249.9			95% Adjusted Gamma UCL (use when n<50)			259.6
538												
539	**Lognormal GOF Test**											
540					Shapiro Wilk Test Statistic	0.953			**Shapiro Wilk Lognormal GOF Test**			
541					5% Shapiro Wilk Critical Value	0.842			Data appear Lognormal at 5% Significance Level			
542					Lilliefors Test Statistic	0.176			**Lilliefors Lognormal GOF Test**			
543					5% Lilliefors Critical Value	0.262			Data appear Lognormal at 5% Significance Level			
544	**Data appear Lognormal at 5% Significance Level**											
545												
546	**Lognormal Statistics**											
547					Minimum of Logged Data	4.605			Mean of logged Data			5.252
548					Maximum of Logged Data	5.799			SD of logged Data			0.351
549												
550	**Assuming Lognormal Distribution**											
551					95% H-UCL	257.5			90% Chebyshev (MVUE) UCL			269.6
552					95% Chebyshev (MVUE) UCL	300.3			97.5% Chebyshev (MVUE) UCL			342.9
553					99% Chebyshev (MVUE) UCL	426.6						
554												
555	**Nonparametric Distribution Free UCL Statistics**											
556	**Data appear to follow a Discernible Distribution at 5% Significance Level**											
557												
558	**Nonparametric Distribution Free UCLs**											
559					95% CLT UCL	237.8			95% Jackknife UCL			242
560					95% Standard Bootstrap UCL	236.1			95% Bootstrap-t UCL			250
561					95% Hall's Bootstrap UCL	243.5			95% Percentile Bootstrap UCL			238.7
562					95% BCA Bootstrap UCL	240.6						
563					90% Chebyshev(Mean, Sd) UCL	267.7			95% Chebyshev(Mean, Sd) UCL			297.6
564					97.5% Chebyshev(Mean, Sd) UCL	339.2			99% Chebyshev(Mean, Sd) UCL			420.8
565												
566	**Suggested UCL to Use**											
567					95% Student's-t UCL	242						
568												
569	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
570	Recommendations are based upon data size, data distribution, and skewness.											
571	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
572	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
573												

	A	B	C	D	E	F	G	H	I	J	K	L
574	**Result (2a-w-9)**											
575												
576	**General Statistics**											
577	Total Number of Observations					10	Number of Distinct Observations					9
578	Number of Detects					9	Number of Non-Detects					1
579	Number of Distinct Detects					8	Number of Distinct Non-Detects					1
580	Minimum Detect					119	Minimum Non-Detect					230
581	Maximum Detect					1040	Maximum Non-Detect					230
582	Variance Detects					91394	Percent Non-Detects					10%
583	Mean Detects					409	SD Detects					302.3
584	Median Detects					225.5	CV Detects					0.739
585	Skewness Detects					1.218	Kurtosis Detects					1.088
586	Mean of Logged Detects					5.78	SD of Logged Detects					0.725
587												
588	**Normal GOF Test on Detects Only**											
589	Shapiro Wilk Test Statistic					0.856	**Shapiro Wilk GOF Test**					
590	5% Shapiro Wilk Critical Value					0.829	Detected Data appear Normal at 5% Significance Level					
591	Lilliefors Test Statistic					0.284	**Lilliefors GOF Test**					
592	5% Lilliefors Critical Value					0.274	Detected Data Not Normal at 5% Significance Level					
593	**Detected Data appear Approximate Normal at 5% Significance Level**											
594												
595	**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**											
596	KM Mean					387.1	KM Standard Error of Mean					93.57
597	KM SD					278.6	95% KM (BCA) UCL					541.6
598	95% KM (t) UCL					558.7	95% KM (Percentile Bootstrap) UCL					536.8
599	95% KM (z) UCL					541	95% KM Bootstrap t UCL					672.9
600	90% KM Chebyshev UCL					667.8	95% KM Chebyshev UCL					795
601	97.5% KM Chebyshev UCL					971.5	99% KM Chebyshev UCL					1318
602												
603	**Gamma GOF Tests on Detected Observations Only**											
604	A-D Test Statistic					0.434	**Anderson-Darling GOF Test**					
605	5% A-D Critical Value					0.729	Detected data appear Gamma Distributed at 5% Significance Level					
606	K-S Test Statistic					0.278	**Kolmogorov-Smirnov GOF**					
607	5% K-S Critical Value					0.282	Detected data appear Gamma Distributed at 5% Significance Level					
608	**Detected data appear Gamma Distributed at 5% Significance Level**											
609												
610	**Gamma Statistics on Detected Data Only**											
611	k hat (MLE)					2.291	k star (bias corrected MLE)					1.601
612	Theta hat (MLE)					178.5	Theta star (bias corrected MLE)					255.4
613	nu hat (MLE)					41.23	nu star (bias corrected)					28.82
614	Mean (detects)					409						
615												
616	**Gamma ROS Statistics using Imputed Non-Detects**											
617	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
618	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
619	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
620	This is especially true when the sample size is small.											
621	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
622	Minimum					119	Mean					387.2
623	Maximum					1040	Median					225.5
624	SD					293.3	CV					0.757
625	k hat (MLE)					2.309	k star (bias corrected MLE)					1.683
626	Theta hat (MLE)					167.7	Theta star (bias corrected MLE)					230.1
627	nu hat (MLE)					46.18	nu star (bias corrected)					33.66
628	Adjusted Level of Significance (β)					0.0267						
629	Approximate Chi Square Value (33.66, α)					21.39	Adjusted Chi Square Value (33.66, β)					19.71
630	95% Gamma Approximate UCL (use when n>=50)					609.2	95% Gamma Adjusted UCL (use when n<50)					661.3
631												
632	**Estimates of Gamma Parameters using KM Estimates**											
633	Mean (KM)					387.1	SD (KM)					278.6
634	Variance (KM)					77610	SE of Mean (KM)					93.57
635	k hat (KM)					1.931	k star (KM)					1.418

	A	B	C	D	E	F	G	H	I	J	K	L
636					nu hat (KM)	38.62				nu star (KM)		28.37
637					theta hat (KM)	200.5				theta star (KM)		272.9
638				80% gamma percentile (KM)		602.6				90% gamma percentile (KM)		817.8
639				95% gamma percentile (KM)		1028				99% gamma percentile (KM)		1503
640												
641					**Gamma Kaplan-Meier (KM) Statistics**							
642					Approximate Chi Square Value (28.37, α)	17.21				Adjusted Chi Square Value (28.37, β)		15.72
643				95% Gamma Approximate KM-UCL (use when n>=50)		637.9				95% Gamma Adjusted KM-UCL (use when n<50)		698.5
644												
645					**Lognormal GOF Test on Detected Observations Only**							
646					Shapiro Wilk Test Statistic	0.937			**Shapiro Wilk GOF Test**			
647					5% Shapiro Wilk Critical Value	0.829			Detected Data appear Lognormal at 5% Significance Level			
648					Lilliefors Test Statistic	0.247			**Lilliefors GOF Test**			
649					5% Lilliefors Critical Value	0.274			Detected Data appear Lognormal at 5% Significance Level			
650					**Detected Data appear Lognormal at 5% Significance Level**							
651												
652					**Lognormal ROS Statistics Using Imputed Non-Detects**							
653					Mean in Original Scale	388.1				Mean in Log Scale		5.732
654					SD in Original Scale	292.6				SD in Log Scale		0.7
655				95% t UCL (assumes normality of ROS data)		557.7				95% Percentile Bootstrap UCL		540.2
656					95% BCA Bootstrap UCL	578.5				95% Bootstrap t UCL		641.3
657					95% H-UCL (Log ROS)	711.6						
658												
659					**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**							
660					KM Mean (logged)	5.724				KM Geo Mean		306
661					KM SD (logged)	0.675				95% Critical H Value (KM-Log)		2.489
662					KM Standard Error of Mean (logged)	0.228				95% H-UCL (KM -Log)		672.4
663					KM SD (logged)	0.675				95% Critical H Value (KM-Log)		2.489
664					KM Standard Error of Mean (logged)	0.228						
665												
666					**DL/2 Statistics**							
667					**DL/2 Normal**					**DL/2 Log-Transformed**		
668					Mean in Original Scale	379.6				Mean in Log Scale		5.676
669					SD in Original Scale	299.8				SD in Log Scale		0.758
670					95% t UCL (Assumes normality)	553.4				95% H-Stat UCL		756.2
671					**DL/2 is not a recommended method, provided for comparisons and historical reasons**							
672												
673					**Nonparametric Distribution Free UCL Statistics**							
674					**Detected Data appear Approximate Normal Distributed at 5% Significance Level**							
675												
676					**Suggested UCL to Use**							
677					95% KM (t) UCL	558.7						
678												
679					When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test							
680					When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL							
681												
682					Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.							
683					Recommendations are based upon data size, data distribution, and skewness.							
684					These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).							
685					However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.							
686												

	A	B	C	D	E	F	G	H	I	J	K	L
687	**Result (2b-w-4)**											
688												
689	**General Statistics**											
690					Total Number of Observations	10			Number of Distinct Observations			4
691					Number of Detects	0			Number of Non-Detects			10
692					Number of Distinct Detects	0			Number of Distinct Non-Detects			4
693												
694	**Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!**											
695	**Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!**											
696	**The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).**											
697												
698	**The data set for variable Result (2b-w-4) was not processed!**											
699												
700												
701	**Result (5-w-14)**											
702												
703	**General Statistics**											
704					Total Number of Observations	10			Number of Distinct Observations			4
705					Number of Detects	0			Number of Non-Detects			10
706					Number of Distinct Detects	0			Number of Distinct Non-Detects			4
707												
708	**Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!**											
709	**Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!**											
710	**The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).**											
711												
712	**The data set for variable Result (5-w-14) was not processed!**											
713												
714												
715	**Result (5-w-16)**											
716												
717	**General Statistics**											
718					Total Number of Observations	11			Number of Distinct Observations			5
719					Number of Detects	0			Number of Non-Detects			11
720					Number of Distinct Detects	0			Number of Distinct Non-Detects			5
721												
722	**Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!**											
723	**Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!**											
724	**The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).**											
725												
726	**The data set for variable Result (5-w-16) was not processed!**											
727												
728												
729	**Result (5-w-17)**											
730												
731	**General Statistics**											
732					Total Number of Observations	10			Number of Distinct Observations			4
733					Number of Detects	0			Number of Non-Detects			10
734					Number of Distinct Detects	0			Number of Distinct Non-Detects			4
735												
736	**Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!**											
737	**Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!**											
738	**The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).**											
739												
740	**The data set for variable Result (5-w-17) was not processed!**											
741												
742												

	A	B	C	D	E	F	G	H	I	J	K	L
743	**Result (5-w-18)**											
744												
745	**General Statistics**											
746	Total Number of Observations					11	Number of Distinct Observations					5
747	Number of Detects					2	Number of Non-Detects					9
748	Number of Distinct Detects					2	Number of Distinct Non-Detects					3
749	Minimum Detect					166.5	Minimum Non-Detect					76.5
750	Maximum Detect					198	Maximum Non-Detect					78
751	Variance Detects					496.1	Percent Non-Detects					81.82%
752	Mean Detects					182.3	SD Detects					22.27
753	Median Detects					182.3	CV Detects					0.122
754	Skewness Detects					N/A	Kurtosis Detects					N/A
755	Mean of Logged Detects					5.202	SD of Logged Detects					0.123
756												
757	**Warning: Data set has only 2 Detected Values.**											
758	**This is not enough to compute meaningful or reliable statistics and estimates.**											
759												
760												
761	**Normal GOF Test on Detects Only**											
762	**Not Enough Data to Perform GOF Test**											
763												
764	**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**											
765	KM Mean					95.73	KM Standard Error of Mean					17.63
766	KM SD					41.34	95% KM (BCA) UCL					N/A
767	95% KM (t) UCL					127.7	95% KM (Percentile Bootstrap) UCL					N/A
768	95% KM (z) UCL					124.7	95% KM Bootstrap t UCL					N/A
769	90% KM Chebyshev UCL					148.6	95% KM Chebyshev UCL					172.6
770	97.5% KM Chebyshev UCL					205.8	99% KM Chebyshev UCL					271.1
771												
772	**Gamma GOF Tests on Detected Observations Only**											
773	**Not Enough Data to Perform GOF Test**											
774												
775	**Gamma Statistics on Detected Data Only**											
776	k hat (MLE)					133.6	k star (bias corrected MLE)					N/A
777	Theta hat (MLE)					1.365	Theta star (bias corrected MLE)					N/A
778	nu hat (MLE)					534.3	nu star (bias corrected)					N/A
779	Mean (detects)					182.3						
780												
781	**Estimates of Gamma Parameters using KM Estimates**											
782	Mean (KM)					95.73	SD (KM)					41.34
783	Variance (KM)					1709	SE of Mean (KM)					17.63
784	k hat (KM)					5.363	k star (KM)					3.961
785	nu hat (KM)					118	nu star (KM)					87.14
786	theta hat (KM)					17.85	theta star (KM)					24.17
787	80% gamma percentile (KM)					132.1	90% gamma percentile (KM)					160.2
788	95% gamma percentile (KM)					186	99% gamma percentile (KM)					241.3
789												
790	**Gamma Kaplan-Meier (KM) Statistics**											
791							Adjusted Level of Significance (β)					0.0278
792	Approximate Chi Square Value (87.14, α)					66.62	Adjusted Chi Square Value (87.14, β)					63.7
793	95% Gamma Approximate KM-UCL (use when n>=50)					125.2	95% Gamma Adjusted KM-UCL (use when n<50)					130.9
794												
795	**Lognormal GOF Test on Detected Observations Only**											
796	**Not Enough Data to Perform GOF Test**											
797												

798	**Lognormal ROS Statistics Using Imputed Non-Detects**											
799					Mean in Original Scale	106				Mean in Log Scale		4.598
800					SD in Original Scale	42.66				SD in Log Scale		0.37
801				95% t UCL (assumes normality of ROS data)		129.3				95% Percentile Bootstrap UCL		127.5
802					95% BCA Bootstrap UCL	132.1				95% Bootstrap t UCL		144.5
803					95% H-UCL (Log ROS)	134.7						
804												
805	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**											
806					KM Mean (logged)	4.494				KM Geo Mean		89.52
807					KM SD (logged)	0.335				95% Critical H Value (KM-Log)		1.984
808					KM Standard Error of Mean (logged)	0.143				95% H-UCL (KM -Log)		116.9
809					KM SD (logged)	0.335				95% Critical H Value (KM-Log)		1.984
810					KM Standard Error of Mean (logged)	0.143						
811												
812	**DL/2 Statistics**											
813	**DL/2 Normal**						**DL/2 Log-Transformed**					
814					Mean in Original Scale	64.55				Mean in Log Scale		3.93
815					SD in Original Scale	58.62				SD in Log Scale		0.63
816					95% t UCL (Assumes normality)	96.58				95% H-Stat UCL		99.3
817	**DL/2 is not a recommended method, provided for comparisons and historical reasons**											
818												
819	**Nonparametric Distribution Free UCL Statistics**											
820	**Data do not follow a Discernible Distribution at 5% Significance Level**											
821												
822	**Suggested UCL to Use**											
823					95% KM (t) UCL	127.7				KM H-UCL		116.9
824					95% KM (BCA) UCL	N/A						
825	**Warning: One or more Recommended UCL(s) not available!**											
826												
827	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
828	Recommendations are based upon data size, data distribution, and skewness.											
829	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
830	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
831												
832	**Result (5-w-19)**											
833												
834	**General Statistics**											
835					Total Number of Observations	10				Number of Distinct Observations		6
836					Number of Detects	1				Number of Non-Detects		9
837					Number of Distinct Detects	1				Number of Distinct Non-Detects		5
838												
839	**Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!**											
840	**It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).**											
841												
842	**The data set for variable Result (5-w-19) was not processed!**											
843												
844												

	A	B	C	D	E	F	G	H	I	J	K	L
845	**Result (5-w-43)**											
846												
847	**General Statistics**											
848	Total Number of Observations					10	Number of Distinct Observations					6
849	Number of Detects					3	Number of Non-Detects					7
850	Number of Distinct Detects					3	Number of Distinct Non-Detects					3
851	Minimum Detect					88	Minimum Non-Detect					37
852	Maximum Detect					368	Maximum Non-Detect					77
853	Variance Detects					24850	Percent Non-Detects					70%
854	Mean Detects					186.2	SD Detects					157.6
855	Median Detects					102.5	CV Detects					0.847
856	Skewness Detects					1.716	Kurtosis Detects					N/A
857	Mean of Logged Detects					5.005	SD of Logged Detects					0.786
858												
859	**Warning: Data set has only 3 Detected Values.**											
860	**This is not enough to compute meaningful or reliable statistics and estimates.**											
861												
862												
863	**Normal GOF Test on Detects Only**											
864	Shapiro Wilk Test Statistic					0.789	**Shapiro Wilk GOF Test**					
865	5% Shapiro Wilk Critical Value					0.767	Detected Data appear Normal at 5% Significance Level					
866	Lilliefors Test Statistic					0.369	**Lilliefors GOF Test**					
867	5% Lilliefors Critical Value					0.425	Detected Data appear Normal at 5% Significance Level					
868	**Detected Data appear Normal at 5% Significance Level**											
869												
870	**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**											
871	KM Mean					81.75	KM Standard Error of Mean					38.03
872	KM SD					98.2	95% KM (BCA) UCL					N/A
873	95% KM (t) UCL					151.5	95% KM (Percentile Bootstrap) UCL					N/A
874	95% KM (z) UCL					144.3	95% KM Bootstrap t UCL					N/A
875	90% KM Chebyshev UCL					195.8	95% KM Chebyshev UCL					247.5
876	97.5% KM Chebyshev UCL					319.3	99% KM Chebyshev UCL					460.2
877												
878	**Gamma GOF Tests on Detected Observations Only**											
879	**Not Enough Data to Perform GOF Test**											
880												
881	**Gamma Statistics on Detected Data Only**											
882	k hat (MLE)					2.41	k star (bias corrected MLE)					N/A
883	Theta hat (MLE)					77.23	Theta star (bias corrected MLE)					N/A
884	nu hat (MLE)					14.46	nu star (bias corrected)					N/A
885	Mean (detects)					186.2						
886												
887	**Gamma ROS Statistics using Imputed Non-Detects**											
888	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
889	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
890	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
891	This is especially true when the sample size is small.											
892	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
893	Minimum					0.01	Mean					55.86
894	Maximum					368	Median					0.01
895	SD					116.7	CV					2.088
896	k hat (MLE)					0.136	k star (bias corrected MLE)					0.162
897	Theta hat (MLE)					411.6	Theta star (bias corrected MLE)					345.5
898	nu hat (MLE)					2.714	nu star (bias corrected)					3.233
899	Adjusted Level of Significance (β)					0.0267						
900	Approximate Chi Square Value (3.23, α)					0.445	Adjusted Chi Square Value (3.23, β)					0.307
901	95% Gamma Approximate UCL (use when n>=50)					406.1	95% Gamma Adjusted UCL (use when n<50)					N/A
902												
903	**Estimates of Gamma Parameters using KM Estimates**											
904	Mean (KM)					81.75	SD (KM)					98.2
905	Variance (KM)					9643	SE of Mean (KM)					38.03
906	k hat (KM)					0.693	k star (KM)					0.552

907					nu hat (KM)	13.86					nu star (KM)	11.04
908					theta hat (KM)	118					theta star (KM)	148.1
909					80% gamma percentile (KM)	134.7					90% gamma percentile (KM)	216.6
910					95% gamma percentile (KM)	303.2					99% gamma percentile (KM)	514.1
911												
912	**Gamma Kaplan-Meier (KM) Statistics**											
913					Approximate Chi Square Value (11.04, α)	4.599					Adjusted Chi Square Value (11.04, β)	3.903
914					95% Gamma Approximate KM-UCL (use when n>=50)	196.2					95% Gamma Adjusted KM-UCL (use when n<50)	231.2
915												
916	**Lognormal GOF Test on Detected Observations Only**											
917					Shapiro Wilk Test Statistic	0.829	**Shapiro Wilk GOF Test**					
918					5% Shapiro Wilk Critical Value	0.767	Detected Data appear Lognormal at 5% Significance Level					
919					Lilliefors Test Statistic	0.35	**Lilliefors GOF Test**					
920					5% Lilliefors Critical Value	0.425	Detected Data appear Lognormal at 5% Significance Level					
921	**Detected Data appear Lognormal at 5% Significance Level**											
922												
923	**Lognormal ROS Statistics Using Imputed Non-Detects**											
924					Mean in Original Scale	61.63					Mean in Log Scale	2.733
925					SD in Original Scale	113.8					SD in Log Scale	1.795
926					95% t UCL (assumes normality of ROS data)	127.6					95% Percentile Bootstrap UCL	125.8
927					95% BCA Bootstrap UCL	152.4					95% Bootstrap t UCL	261.6
928					95% H-UCL (Log ROS)	1450						
929												
930	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**											
931					KM Mean (logged)	4.029					KM Geo Mean	56.21
932					KM SD (logged)	0.729					95% Critical H Value (KM-Log)	2.582
933					KM Standard Error of Mean (logged)	0.282					95% H-UCL (KM -Log)	137.4
934					KM SD (logged)	0.729					95% Critical H Value (KM-Log)	2.582
935					KM Standard Error of Mean (logged)	0.282						
936												
937	**DL/2 Statistics**											
938					**DL/2 Normal**						**DL/2 Log-Transformed**	
939					Mean in Original Scale	80.68					Mean in Log Scale	3.98
940					SD in Original Scale	104.2					SD in Log Scale	0.829
941					95% t UCL (Assumes normality)	141.1					95% H-Stat UCL	162.1
942	**DL/2 is not a recommended method, provided for comparisons and historical reasons**											
943												
944	**Nonparametric Distribution Free UCL Statistics**											
945	**Detected Data appear Normal Distributed at 5% Significance Level**											
946												
947	**Suggested UCL to Use**											
948					95% KM (t) UCL	151.5						
949												
950	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
951	Recommendations are based upon data size, data distribution, and skewness.											
952	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
953	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
954												
955												

	A	B	C	D	E	F	G	H	I	J	K	L
956	**Result (5-w-51)**											
957												
958	**General Statistics**											
959	Total Number of Observations					10	Number of Distinct Observations					9
960							Number of Missing Observations					0
961	Minimum					201	Mean					788.8
962	Maximum					1530	Median					800
963	SD					381	Std. Error of Mean					120.5
964	Coefficient of Variation					0.483	Skewness					0.28
965												
966	**Normal GOF Test**											
967	Shapiro Wilk Test Statistic					0.957	**Shapiro Wilk GOF Test**					
968	5% Shapiro Wilk Critical Value					0.842	Data appear Normal at 5% Significance Level					
969	Lilliefors Test Statistic					0.159	**Lilliefors GOF Test**					
970	5% Lilliefors Critical Value					0.262	Data appear Normal at 5% Significance Level					
971	**Data appear Normal at 5% Significance Level**											
972												
973	**Assuming Normal Distribution**											
974	**95% Normal UCL**						**95% UCLs (Adjusted for Skewness)**					
975	95% Student's-t UCL					1010	95% Adjusted-CLT UCL (Chen-1995)					998.3
976							95% Modified-t UCL (Johnson-1978)					1011
977												
978	**Gamma GOF Test**											
979	A-D Test Statistic					0.453	**Anderson-Darling Gamma GOF Test**					
980	5% A-D Critical Value					0.73	Detected data appear Gamma Distributed at 5% Significance Level					
981	K-S Test Statistic					0.23	**Kolmogorov-Smirnov Gamma GOF Test**					
982	5% K-S Critical Value					0.268	Detected data appear Gamma Distributed at 5% Significance Level					
983	**Detected data appear Gamma Distributed at 5% Significance Level**											
984												
985	**Gamma Statistics**											
986	k hat (MLE)					3.787	k star (bias corrected MLE)					2.718
987	Theta hat (MLE)					208.3	Theta star (bias corrected MLE)					290.2
988	nu hat (MLE)					75.75	nu star (bias corrected)					54.36
989	MLE Mean (bias corrected)					788.8	MLE Sd (bias corrected)					478.4
990							Approximate Chi Square Value (0.05)					38.42
991	Adjusted Level of Significance					0.0267	Adjusted Chi Square Value					36.1
992												
993	**Assuming Gamma Distribution**											
994	95% Approximate Gamma UCL (use when n>=50))					1116	95% Adjusted Gamma UCL (use when n<50)					1188
995												
996	**Lognormal GOF Test**											
997	Shapiro Wilk Test Statistic					0.888	**Shapiro Wilk Lognormal GOF Test**					
998	5% Shapiro Wilk Critical Value					0.842	Data appear Lognormal at 5% Significance Level					
999	Lilliefors Test Statistic					0.257	**Lilliefors Lognormal GOF Test**					
1000	5% Lilliefors Critical Value					0.262	Data appear Lognormal at 5% Significance Level					
1001	**Data appear Lognormal at 5% Significance Level**											
1002												
1003	**Lognormal Statistics**											
1004	Minimum of Logged Data					5.303	Mean of logged Data					6.533
1005	Maximum of Logged Data					7.333	SD of logged Data					0.607
1006												
1007	**Assuming Lognormal Distribution**											
1008	95% H-UCL					1337	90% Chebyshev (MVUE) UCL					1287
1009	95% Chebyshev (MVUE) UCL					1503	97.5% Chebyshev (MVUE) UCL					1803
1010	99% Chebyshev (MVUE) UCL					2393						
1011												

	A	B	C	D	E	F	G	H	I	J	K	L
1012	**Nonparametric Distribution Free UCL Statistics**											
1013	**Data appear to follow a Discernible Distribution at 5% Significance Level**											
1014												
1015	**Nonparametric Distribution Free UCLs**											
1016					95% CLT UCL	986.9			95% Jackknife UCL	1010		
1017					95% Standard Bootstrap UCL	970.7			95% Bootstrap-t UCL	1009		
1018					95% Hall's Bootstrap UCL	1048			95% Percentile Bootstrap UCL	975		
1019					95% BCA Bootstrap UCL	955.8						
1020					90% Chebyshev(Mean, Sd) UCL	1150			95% Chebyshev(Mean, Sd) UCL	1314		
1021					97.5% Chebyshev(Mean, Sd) UCL	1541			99% Chebyshev(Mean, Sd) UCL	1988		
1022												
1023	**Suggested UCL to Use**											
1024					95% Student's-t UCL	1010						
1025												
1026	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
1027	Recommendations are based upon data size, data distribution, and skewness.											
1028	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
1029	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
1030												
1031	**Result (5-w-55)**											
1032												
1033	**General Statistics**											
1034					Total Number of Observations	10			Number of Distinct Observations	7		
1035					Number of Detects	3			Number of Non-Detects	7		
1036					Number of Distinct Detects	3			Number of Distinct Non-Detects	4		
1037					Minimum Detect	68			Minimum Non-Detect	76		
1038					Maximum Detect	230			Maximum Non-Detect	77.5		
1039					Variance Detects	7682			Percent Non-Detects	70%		
1040					Mean Detects	129.7			SD Detects	87.65		
1041					Median Detects	91			CV Detects	0.676		
1042					Skewness Detects	1.599			Kurtosis Detects	N/A		
1043					Mean of Logged Detects	4.723			SD of Logged Detects	0.636		
1044												
1045	**Warning: Data set has only 3 Detected Values.**											
1046	**This is not enough to compute meaningful or reliable statistics and estimates.**											
1047												
1048												
1049	**Normal GOF Test on Detects Only**											
1050					Shapiro Wilk Test Statistic	0.854			**Shapiro Wilk GOF Test**			
1051					5% Shapiro Wilk Critical Value	0.767			Detected Data appear Normal at 5% Significance Level			
1052					Lilliefors Test Statistic	0.337			**Lilliefors GOF Test**			
1053					5% Lilliefors Critical Value	0.425			Detected Data appear Normal at 5% Significance Level			
1054	**Detected Data appear Normal at 5% Significance Level**											
1055												
1056	**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**											
1057					KM Mean	86.5			KM Standard Error of Mean	18.72		
1058					KM SD	48.32			95% KM (BCA) UCL	N/A		
1059					95% KM (t) UCL	120.8			95% KM (Percentile Bootstrap) UCL	N/A		
1060					95% KM (z) UCL	117.3			95% KM Bootstrap t UCL	N/A		
1061					90% KM Chebyshev UCL	142.6			95% KM Chebyshev UCL	168.1		
1062					97.5% KM Chebyshev UCL	203.4			99% KM Chebyshev UCL	272.7		
1063												
1064	**Gamma GOF Tests on Detected Observations Only**											
1065	**Not Enough Data to Perform GOF Test**											
1066												

	A	B	C	D	E	F	G	H	I	J	K	L
1067	**Gamma Statistics on Detected Data Only**											
1068					k hat (MLE)	3.676			k star (bias corrected MLE)			N/A
1069					Theta hat (MLE)	35.28			Theta star (bias corrected MLE)			N/A
1070					nu hat (MLE)	22.05			nu star (bias corrected)			N/A
1071					Mean (detects)	129.7						
1072												
1073	**Gamma ROS Statistics using Imputed Non-Detects**											
1074	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
1075	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
1076	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
1077	This is especially true when the sample size is small.											
1078	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
1079					Minimum	15.94			Mean			75.55
1080					Maximum	230			Median			57.88
1081					SD	58.67			CV			0.777
1082					k hat (MLE)	2.534			k star (bias corrected MLE)			1.841
1083					Theta hat (MLE)	29.81			Theta star (bias corrected MLE)			41.04
1084					nu hat (MLE)	50.69			nu star (bias corrected)			36.81
1085					Adjusted Level of Significance (β)	0.0267						
1086					Approximate Chi Square Value (36.81, α)	23.93			Adjusted Chi Square Value (36.81, β)			22.13
1087					95% Gamma Approximate UCL (use when n>=50)	116.2			95% Gamma Adjusted UCL (use when n<50)			N/A
1088												
1089	**Estimates of Gamma Parameters using KM Estimates**											
1090					Mean (KM)	86.5			SD (KM)			48.32
1091					Variance (KM)	2335			SE of Mean (KM)			18.72
1092					k hat (KM)	3.204			k star (KM)			2.31
1093					nu hat (KM)	64.09			nu star (KM)			46.19
1094					theta hat (KM)	26.99			theta star (KM)			37.45
1095					80% gamma percentile (KM)	127.3			90% gamma percentile (KM)			162.7
1096					95% gamma percentile (KM)	196.2			99% gamma percentile (KM)			269.8
1097												
1098	**Gamma Kaplan-Meier (KM) Statistics**											
1099					Approximate Chi Square Value (46.19, α)	31.6			Adjusted Chi Square Value (46.19, β)			29.51
1100					95% Gamma Approximate KM-UCL (use when n>=50)	126.5			95% Gamma Adjusted KM-UCL (use when n<50)			135.4
1101												
1102	**Lognormal GOF Test on Detected Observations Only**											
1103					Shapiro Wilk Test Statistic	0.917			**Shapiro Wilk GOF Test**			
1104					5% Shapiro Wilk Critical Value	0.767			Detected Data appear Lognormal at 5% Significance Level			
1105					Lilliefors Test Statistic	0.297			**Lilliefors GOF Test**			
1106					5% Lilliefors Critical Value	0.425			Detected Data appear Lognormal at 5% Significance Level			
1107	**Detected Data appear Lognormal at 5% Significance Level**											
1108												
1109	**Lognormal ROS Statistics Using Imputed Non-Detects**											
1110					Mean in Original Scale	82.98			Mean in Log Scale			4.301
1111					SD in Original Scale	53.69			SD in Log Scale			0.459
1112					95% t UCL (assumes normality of ROS data)	114.1			95% Percentile Bootstrap UCL			114.9
1113					95% BCA Bootstrap UCL	126.5			95% Bootstrap t UCL			173.1
1114					95% H-UCL (Log ROS)	114.2						
1115												
1116	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**											
1117					KM Mean (logged)	4.371			KM Geo Mean			79.08
1118					KM SD (logged)	0.366			95% Critical H Value (KM-Log)			2.049
1119					KM Standard Error of Mean (logged)	0.142			95% H-UCL (KM -Log)			108.6
1120					KM SD (logged)	0.366			95% Critical H Value (KM-Log)			2.049
1121					KM Standard Error of Mean (logged)	0.142						
1122												

1123	**DL/2 Statistics**											
1124	**DL/2 Normal**						**DL/2 Log-Transformed**					
1125					Mean in Original Scale	65.73				Mean in Log Scale		3.969
1126					SD in Original Scale	60.45				SD in Log Scale		0.6
1127					95% t UCL (Assumes normality)	100.8				95% H-Stat UCL		101.8
1128	**DL/2 is not a recommended method, provided for comparisons and historical reasons**											
1129												
1130	**Nonparametric Distribution Free UCL Statistics**											
1131	**Detected Data appear Normal Distributed at 5% Significance Level**											
1132												
1133	**Suggested UCL to Use**											
1134					95% KM (t) UCL	120.8						
1135												
1136	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
1137	Recommendations are based upon data size, data distribution, and skewness.											
1138	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
1139	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
1140												
1141												
1142	**Result (5-w-56)**											
1143												
1144	**General Statistics**											
1145					Total Number of Observations	10				Number of Distinct Observations		10
1146										Number of Missing Observations		0
1147					Minimum	476.5				Mean		2042
1148					Maximum	5400				Median		1675
1149					SD	1676				Std. Error of Mean		530.1
1150					Coefficient of Variation	0.821				Skewness		1.315
1151												
1152	**Normal GOF Test**											
1153					Shapiro Wilk Test Statistic	0.822	**Shapiro Wilk GOF Test**					
1154					5% Shapiro Wilk Critical Value	0.842	Data Not Normal at 5% Significance Level					
1155					Lilliefors Test Statistic	0.284	**Lilliefors GOF Test**					
1156					5% Lilliefors Critical Value	0.262	Data Not Normal at 5% Significance Level					
1157	**Data Not Normal at 5% Significance Level**											
1158												
1159	**Assuming Normal Distribution**											
1160	**95% Normal UCL**						**95% UCLs (Adjusted for Skewness)**					
1161					95% Student's-t UCL	3014				95% Adjusted-CLT UCL (Chen-1995)		3150
1162										95% Modified-t UCL (Johnson-1978)		3051
1163												
1164	**Gamma GOF Test**											
1165					A-D Test Statistic	0.364	**Anderson-Darling Gamma GOF Test**					
1166					5% A-D Critical Value	0.736	Detected data appear Gamma Distributed at 5% Significance Level					
1167					K-S Test Statistic	0.186	**Kolmogorov-Smirnov Gamma GOF Test**					
1168					5% K-S Critical Value	0.27	Detected data appear Gamma Distributed at 5% Significance Level					
1169	**Detected data appear Gamma Distributed at 5% Significance Level**											
1170												
1171	**Gamma Statistics**											
1172					k hat (MLE)	1.881				k star (bias corrected MLE)		1.384
1173					Theta hat (MLE)	1085				Theta star (bias corrected MLE)		1476
1174					nu hat (MLE)	37.63				nu star (bias corrected)		27.67
1175					MLE Mean (bias corrected)	2042				MLE Sd (bias corrected)		1736
1176										Approximate Chi Square Value (0.05)		16.67
1177					Adjusted Level of Significance	0.0267				Adjusted Chi Square Value		15.21
1178												

1179	**Assuming Gamma Distribution**											
1180	95% Approximate Gamma UCL (use when n>=50)				3389	95% Adjusted Gamma UCL (use when n<50)						3716
1181												
1182	**Lognormal GOF Test**											
1183	Shapiro Wilk Test Statistic				0.951	**Shapiro Wilk Lognormal GOF Test**						
1184	5% Shapiro Wilk Critical Value				0.842	Data appear Lognormal at 5% Significance Level						
1185	Lilliefors Test Statistic				0.145	**Lilliefors Lognormal GOF Test**						
1186	5% Lilliefors Critical Value				0.262	Data appear Lognormal at 5% Significance Level						
1187	**Data appear Lognormal at 5% Significance Level**											
1188												
1189	**Lognormal Statistics**											
1190	Minimum of Logged Data				6.166	Mean of logged Data						7.333
1191	Maximum of Logged Data				8.594	SD of logged Data						0.805
1192												
1193	**Assuming Lognormal Distribution**											
1194	95% H-UCL				4387	90% Chebyshev (MVUE) UCL						3644
1195	95% Chebyshev (MVUE) UCL				4373	97.5% Chebyshev (MVUE) UCL						5386
1196	99% Chebyshev (MVUE) UCL				7375							
1197												
1198	**Nonparametric Distribution Free UCL Statistics**											
1199	**Data appear to follow a Discernible Distribution at 5% Significance Level**											
1200												
1201	**Nonparametric Distribution Free UCLs**											
1202	95% CLT UCL				2914	95% Jackknife UCL						3014
1203	95% Standard Bootstrap UCL				2869	95% Bootstrap-t UCL						4001
1204	95% Hall's Bootstrap UCL				8728	95% Percentile Bootstrap UCL						2919
1205	95% BCA Bootstrap UCL				3076							
1206	90% Chebyshev(Mean, Sd) UCL				3632	95% Chebyshev(Mean, Sd) UCL						4353
1207	97.5% Chebyshev(Mean, Sd) UCL				5352	99% Chebyshev(Mean, Sd) UCL						7316
1208												
1209	**Suggested UCL to Use**											
1210	95% Adjusted Gamma UCL				3716							
1211												
1212	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
1213	Recommendations are based upon data size, data distribution, and skewness.											
1214	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
1215	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
1216												
1217	**Result (ew-1)**											
1218												
1219	**General Statistics**											
1220	Total Number of Observations				10	Number of Distinct Observations						6
1221	Number of Detects				3	Number of Non-Detects						7
1222	Number of Distinct Detects				3	Number of Distinct Non-Detects						3
1223	Minimum Detect				68.5	Minimum Non-Detect						37.5
1224	Maximum Detect				103.5	Maximum Non-Detect						77
1225	Variance Detects				325	Percent Non-Detects						70%
1226	Mean Detects				88.5	SD Detects						18.03
1227	Median Detects				93.5	CV Detects						0.204
1228	Skewness Detects				-1.152	Kurtosis Detects						N/A
1229	Mean of Logged Detects				4.468	SD of Logged Detects						0.215
1230												
1231	**Warning: Data set has only 3 Detected Values.**											
1232	**This is not enough to compute meaningful or reliable statistics and estimates.**											
1233												
1234												

1235	**Normal GOF Test on Detects Only**											
1236					Shapiro Wilk Test Statistic	0.942	**Shapiro Wilk GOF Test**					
1237					5% Shapiro Wilk Critical Value	0.767	Detected Data appear Normal at 5% Significance Level					
1238					Lilliefors Test Statistic	0.276	**Lilliefors GOF Test**					
1239					5% Lilliefors Critical Value	0.425	Detected Data appear Normal at 5% Significance Level					
1240	**Detected Data appear Normal at 5% Significance Level**											
1241												
1242	**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**											
1243					KM Mean	62.1	KM Standard Error of Mean	12.87				
1244					KM SD	22.99	95% KM (BCA) UCL	N/A				
1245					95% KM (t) UCL	85.7	95% KM (Percentile Bootstrap) UCL	N/A				
1246					95% KM (z) UCL	83.28	95% KM Bootstrap t UCL	N/A				
1247					90% KM Chebyshev UCL	100.7	95% KM Chebyshev UCL	118.2				
1248					97.5% KM Chebyshev UCL	142.5	99% KM Chebyshev UCL	190.2				
1249												
1250	**Gamma GOF Tests on Detected Observations Only**											
1251	**Not Enough Data to Perform GOF Test**											
1252												
1253	**Gamma Statistics on Detected Data Only**											
1254					k hat (MLE)	33.77	k star (bias corrected MLE)	N/A				
1255					Theta hat (MLE)	2.621	Theta star (bias corrected MLE)	N/A				
1256					nu hat (MLE)	202.6	nu star (bias corrected)	N/A				
1257					Mean (detects)	88.5						
1258												
1259	**Gamma ROS Statistics using Imputed Non-Detects**											
1260	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
1261	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
1262	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
1263	This is especially true when the sample size is small.											
1264	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
1265					Minimum	38.14	Mean	63.95				
1266					Maximum	103.5	Median	62.65				
1267					SD	21.51	CV	0.336				
1268					k hat (MLE)	10.32	k star (bias corrected MLE)	7.287				
1269					Theta hat (MLE)	6.2	Theta star (bias corrected MLE)	8.776				
1270					nu hat (MLE)	206.3	nu star (bias corrected)	145.7				
1271					Adjusted Level of Significance (β)	0.0267						
1272					Approximate Chi Square Value (145.75, α)	118.8	Adjusted Chi Square Value (145.75, β)	114.6				
1273					95% Gamma Approximate UCL (use when n>=50)	78.43	95% Gamma Adjusted UCL (use when n<50)	N/A				
1274												
1275	**Estimates of Gamma Parameters using KM Estimates**											
1276					Mean (KM)	62.1	SD (KM)	22.99				
1277					Variance (KM)	528.4	SE of Mean (KM)	12.87				
1278					k hat (KM)	7.298	k star (KM)	5.175				
1279					nu hat (KM)	146	nu star (KM)	103.5				
1280					theta hat (KM)	8.51	theta star (KM)	12				
1281					80% gamma percentile (KM)	83.16	90% gamma percentile (KM)	98.64				
1282					95% gamma percentile (KM)	112.7	99% gamma percentile (KM)	142.5				
1283												
1284	**Gamma Kaplan-Meier (KM) Statistics**											
1285					Approximate Chi Square Value (103.50, α)	81.03	Adjusted Chi Square Value (103.50, β)	77.58				
1286					95% Gamma Approximate KM-UCL (use when n>=50)	79.33	95% Gamma Adjusted KM-UCL (use when n<50)	82.85				
1287												

1288	**Lognormal GOF Test on Detected Observations Only**											
1289					Shapiro Wilk Test Statistic	0.921	**Shapiro Wilk GOF Test**					
1290					5% Shapiro Wilk Critical Value	0.767	Detected Data appear Lognormal at 5% Significance Level					
1291					Lilliefors Test Statistic	0.294	**Lilliefors GOF Test**					
1292					5% Lilliefors Critical Value	0.425	Detected Data appear Lognormal at 5% Significance Level					
1293	**Detected Data appear Lognormal at 5% Significance Level**											
1294												
1295	**Lognormal ROS Statistics Using Imputed Non-Detects**											
1296					Mean in Original Scale	66.24	Mean in Log Scale	4.158				
1297					SD in Original Scale	19.25	SD in Log Scale	0.274				
1298					95% t UCL (assumes normality of ROS data)	77.4	95% Percentile Bootstrap UCL	76.06				
1299					95% BCA Bootstrap UCL	76.96	95% Bootstrap t UCL	83.8				
1300					95% H-UCL (Log ROS)	79.36						
1301												
1302	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**											
1303					KM Mean (logged)	4.058	KM Geo Mean	57.87				
1304					KM SD (logged)	0.379	95% Critical H Value (KM-Log)	2.064				
1305					KM Standard Error of Mean (logged)	0.233	95% H-UCL (KM -Log)	80.69				
1306					KM SD (logged)	0.379	95% Critical H Value (KM-Log)	2.064				
1307					KM Standard Error of Mean (logged)	0.233						
1308												
1309	**DL/2 Statistics**											
1310					**DL/2 Normal**		**DL/2 Log-Transformed**					
1311					Mean in Original Scale	51.43	Mean in Log Scale	3.821				
1312					SD in Original Scale	27.63	SD in Log Scale	0.508				
1313					95% t UCL (Assumes normality)	67.44	95% H-Stat UCL	75.82				
1314	**DL/2 is not a recommended method, provided for comparisons and historical reasons**											
1315												
1316	**Nonparametric Distribution Free UCL Statistics**											
1317	**Detected Data appear Normal Distributed at 5% Significance Level**											
1318												
1319	**Suggested UCL to Use**											
1320					95% KM (t) UCL	85.7						
1321												
1322	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
1323	Recommendations are based upon data size, data distribution, and skewness.											
1324	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
1325	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
1326												
1327	**Result (ew-2a)**											
1328												
1329	**General Statistics**											
1330					Total Number of Observations	10	Number of Distinct Observations	7				
1331					Number of Detects	2	Number of Non-Detects	8				
1332					Number of Distinct Detects	2	Number of Distinct Non-Detects	5				
1333					Minimum Detect	114	Minimum Non-Detect	38				
1334					Maximum Detect	237	Maximum Non-Detect	78.5				
1335					Variance Detects	7565	Percent Non-Detects	80%				
1336					Mean Detects	175.5	SD Detects	86.97				
1337					Median Detects	175.5	CV Detects	0.496				
1338					Skewness Detects	N/A	Kurtosis Detects	N/A				
1339					Mean of Logged Detects	5.102	SD of Logged Detects	0.518				
1340												
1341	**Warning: Data set has only 2 Detected Values.**											
1342	**This is not enough to compute meaningful or reliable statistics and estimates.**											

1343											
1344											
1345	**Normal GOF Test on Detects Only**										
1346	**Not Enough Data to Perform GOF Test**										
1347											
1348	**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**										
1349	KM Mean				65.5		KM Standard Error of Mean				27.5
1350	KM SD				61.49		95% KM (BCA) UCL				N/A
1351	95% KM (t) UCL				115.9		95% KM (Percentile Bootstrap) UCL				N/A
1352	95% KM (z) UCL				110.7		95% KM Bootstrap t UCL				N/A
1353	90% KM Chebyshev UCL				148		95% KM Chebyshev UCL				185.4
1354	97.5% KM Chebyshev UCL				237.2		99% KM Chebyshev UCL				339.1
1355											
1356	**Gamma GOF Tests on Detected Observations Only**										
1357	**Not Enough Data to Perform GOF Test**										
1358											
1359	**Gamma Statistics on Detected Data Only**										
1360	k hat (MLE)				7.795		k star (bias corrected MLE)				N/A
1361	Theta hat (MLE)				22.51		Theta star (bias corrected MLE)				N/A
1362	nu hat (MLE)				31.18		nu star (bias corrected)				N/A
1363	Mean (detects)				175.5						
1364											
1365	**Estimates of Gamma Parameters using KM Estimates**										
1366	Mean (KM)				65.5		SD (KM)				61.49
1367	Variance (KM)				3781		SE of Mean (KM)				27.5
1368	k hat (KM)				1.135		k star (KM)				0.861
1369	nu hat (KM)				22.69		nu star (KM)				17.22
1370	theta hat (KM)				57.73		theta star (KM)				76.09
1371	80% gamma percentile (KM)				106.6		90% gamma percentile (KM)				156.5
1372	95% gamma percentile (KM)				207		99% gamma percentile (KM)				325.5
1373											
1374	**Gamma Kaplan-Meier (KM) Statistics**										
1375							Adjusted Level of Significance (β)				0.0267
1376	Approximate Chi Square Value (17.22, α)				8.828		Adjusted Chi Square Value (17.22, β)				7.805
1377	95% Gamma Approximate KM-UCL (use when n>=50)				127.8		95% Gamma Adjusted KM-UCL (use when n<50)				144.5
1378											
1379	**Lognormal GOF Test on Detected Observations Only**										
1380	**Not Enough Data to Perform GOF Test**										
1381											
1382	**Lognormal ROS Statistics Using Imputed Non-Detects**										
1383	Mean in Original Scale				43.31		Mean in Log Scale				2.742
1384	SD in Original Scale				75.68		SD in Log Scale				1.382
1385	95% t UCL (assumes normality of ROS data)				87.18		95% Percentile Bootstrap UCL				86.62
1386	95% BCA Bootstrap UCL				108.1		95% Bootstrap t UCL				458.9
1387	95% H-UCL (Log ROS)				247						
1388											
1389	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**										
1390	KM Mean (logged)				3.93		KM Geo Mean				50.93
1391	KM SD (logged)				0.608		95% Critical H Value (KM-Log)				2.381
1392	KM Standard Error of Mean (logged)				0.272		95% H-UCL (KM -Log)				99.31
1393	KM SD (logged)				0.608		95% Critical H Value (KM-Log)				2.381
1394	KM Standard Error of Mean (logged)				0.272						
1395											

	A	B	C	D	E	F	G	H	I	J	K	L
1396	**DL/2 Statistics**											
1397	**DL/2 Normal**						**DL/2 Log-Transformed**					
1398	Mean in Original Scale					62.18	Mean in Log Scale					3.808
1399	SD in Original Scale					66.84	SD in Log Scale					0.755
1400	95% t UCL (Assumes normality)					100.9	95% H-Stat UCL					116.1
1401	**DL/2 is not a recommended method, provided for comparisons and historical reasons**											
1402												
1403	**Nonparametric Distribution Free UCL Statistics**											
1404	**Data do not follow a Discernible Distribution at 5% Significance Level**											
1405												
1406	**Suggested UCL to Use**											
1407	95% KM (Chebyshev) UCL					185.4						
1408												
1409	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
1410	Recommendations are based upon data size, data distribution, and skewness.											
1411	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
1412	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
1413												
1414	**Result (gw-1)**											
1415												
1416	**General Statistics**											
1417	Total Number of Observations					10	Number of Distinct Observations					7
1418	Number of Detects					4	Number of Non-Detects					6
1419	Number of Distinct Detects					4	Number of Distinct Non-Detects					3
1420	Minimum Detect					80.5	Minimum Non-Detect					76.5
1421	Maximum Detect					165	Maximum Non-Detect					78
1422	Variance Detects					1363	Percent Non-Detects					60%
1423	Mean Detects					126.9	SD Detects					36.92
1424	Median Detects					131	CV Detects					0.291
1425	Skewness Detects					-0.512	Kurtosis Detects					-1.14
1426	Mean of Logged Detects					4.808	SD of Logged Detects					0.316
1427												
1428	**Normal GOF Test on Detects Only**											
1429	Shapiro Wilk Test Statistic					0.974	**Shapiro Wilk GOF Test**					
1430	5% Shapiro Wilk Critical Value					0.748	Detected Data appear Normal at 5% Significance Level					
1431	Lilliefors Test Statistic					0.198	**Lilliefors GOF Test**					
1432	5% Lilliefors Critical Value					0.375	Detected Data appear Normal at 5% Significance Level					
1433	**Detected Data appear Normal at 5% Significance Level**											
1434												
1435	**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**											
1436	KM Mean					96.65	KM Standard Error of Mean					11.65
1437	KM SD					31.9	95% KM (BCA) UCL					N/A
1438	95% KM (t) UCL					118	95% KM (Percentile Bootstrap) UCL					N/A
1439	95% KM (z) UCL					115.8	95% KM Bootstrap t UCL					N/A
1440	90% KM Chebyshev UCL					131.6	95% KM Chebyshev UCL					147.4
1441	97.5% KM Chebyshev UCL					169.4	99% KM Chebyshev UCL					212.6
1442												
1443	**Gamma GOF Tests on Detected Observations Only**											
1444	A-D Test Statistic					0.262	**Anderson-Darling GOF Test**					
1445	5% A-D Critical Value					0.657	Detected data appear Gamma Distributed at 5% Significance Level					
1446	K-S Test Statistic					0.236	**Kolmogorov-Smirnov GOF**					
1447	5% K-S Critical Value					0.395	Detected data appear Gamma Distributed at 5% Significance Level					
1448	**Detected data appear Gamma Distributed at 5% Significance Level**											
1449												

1450	**Gamma Statistics on Detected Data Only**											
1451					k hat (MLE)	14.31			k star (bias corrected MLE)			3.744
1452					Theta hat (MLE)	8.867			Theta star (bias corrected MLE)			33.89
1453					nu hat (MLE)	114.5			nu star (bias corrected)			29.95
1454					Mean (detects)	126.9						
1455												
1456	**Gamma ROS Statistics using Imputed Non-Detects**											
1457	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
1458	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
1459	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
1460	This is especially true when the sample size is small.											
1461	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
1462					Minimum	0.01			Mean			61.94
1463					Maximum	165			Median			39.73
1464					SD	61.32			CV			0.99
1465					k hat (MLE)	0.365			k star (bias corrected MLE)			0.322
1466					Theta hat (MLE)	169.9			Theta star (bias corrected MLE)			192.4
1467					nu hat (MLE)	7.292			nu star (bias corrected)			6.438
1468					Adjusted Level of Significance (β)	0.0267						
1469					Approximate Chi Square Value (6.44, α)	1.868			Adjusted Chi Square Value (6.44, β)			1.472
1470				95% Gamma Approximate UCL (use when n>=50)		213.5			95% Gamma Adjusted UCL (use when n<50)			N/A
1471												
1472	**Estimates of Gamma Parameters using KM Estimates**											
1473					Mean (KM)	96.65			SD (KM)			31.9
1474					Variance (KM)	1018			SE of Mean (KM)			11.65
1475					k hat (KM)	9.177			k star (KM)			6.491
1476					nu hat (KM)	183.5			nu star (KM)			129.8
1477					theta hat (KM)	10.53			theta star (KM)			14.89
1478					80% gamma percentile (KM)	126.3			90% gamma percentile (KM)			147.3
1479					95% gamma percentile (KM)	166.3			99% gamma percentile (KM)			205.9
1480												
1481	**Gamma Kaplan-Meier (KM) Statistics**											
1482					Approximate Chi Square Value (129.82, α)	104.5			Adjusted Chi Square Value (129.82, β)			100.6
1483				95% Gamma Approximate KM-UCL (use when n>=50)		120.1			95% Gamma Adjusted KM-UCL (use when n<50)			124.8
1484												
1485	**Lognormal GOF Test on Detected Observations Only**											
1486					Shapiro Wilk Test Statistic	0.947			**Shapiro Wilk GOF Test**			
1487					5% Shapiro Wilk Critical Value	0.748			Detected Data appear Lognormal at 5% Significance Level			
1488					Lilliefors Test Statistic	0.211			**Lilliefors GOF Test**			
1489					5% Lilliefors Critical Value	0.375			Detected Data appear Lognormal at 5% Significance Level			
1490	**Detected Data appear Lognormal at 5% Significance Level**											
1491												
1492	**Lognormal ROS Statistics Using Imputed Non-Detects**											
1493					Mean in Original Scale	76.82			Mean in Log Scale			4.171
1494					SD in Original Scale	48.72			SD in Log Scale			0.608
1495					95% t UCL (assumes normality of ROS data)	105.1			95% Percentile Bootstrap UCL			101.9
1496					95% BCA Bootstrap UCL	104.6			95% Bootstrap t UCL			119.2
1497					95% H-UCL (Log ROS)	126.2						
1498												
1499	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**											
1500					KM Mean (logged)	4.526			KM Geo Mean			92.34
1501					KM SD (logged)	0.288			95% Critical H Value (KM-Log)			1.965
1502					KM Standard Error of Mean (logged)	0.105			95% H-UCL (KM -Log)			116.2
1503					KM SD (logged)	0.288			95% Critical H Value (KM-Log)			1.965
1504					KM Standard Error of Mean (logged)	0.105						
1505												

1506	**DL/2 Statistics**											
1507	**DL/2 Normal**						**DL/2 Log-Transformed**					
1508					Mean in Original Scale	73.93				Mean in Log Scale	4.115	
1509					SD in Original Scale	50.31				SD in Log Scale	0.623	
1510					95% t UCL (Assumes normality)	103.1				95% H-Stat UCL	122.6	
1511	**DL/2 is not a recommended method, provided for comparisons and historical reasons**											
1512												
1513	**Nonparametric Distribution Free UCL Statistics**											
1514	**Detected Data appear Normal Distributed at 5% Significance Level**											
1515												
1516	**Suggested UCL to Use**											
1517					95% KM (t) UCL	118						
1518												
1519	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
1520	Recommendations are based upon data size, data distribution, and skewness.											
1521	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
1522	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
1523												
1524	**Result (gw-2)**											
1525												
1526	**General Statistics**											
1527					Total Number of Observations	10				Number of Distinct Observations	7	
1528					Number of Detects	3				Number of Non-Detects	7	
1529					Number of Distinct Detects	3				Number of Distinct Non-Detects	4	
1530					Minimum Detect	67.5				Minimum Non-Detect	38	
1531					Maximum Detect	485				Maximum Non-Detect	80.5	
1532					Variance Detects	44290				Percent Non-Detects	70%	
1533					Mean Detects	260.8				SD Detects	210.5	
1534					Median Detects	230				CV Detects	0.807	
1535					Skewness Detects	0.645				Kurtosis Detects	N/A	
1536					Mean of Logged Detects	5.278				SD of Logged Detects	0.996	
1537												
1538	**Warning: Data set has only 3 Detected Values.**											
1539	**This is not enough to compute meaningful or reliable statistics and estimates.**											
1540												
1541												
1542	**Normal GOF Test on Detects Only**											
1543					Shapiro Wilk Test Statistic	0.984	**Shapiro Wilk GOF Test**					
1544					5% Shapiro Wilk Critical Value	0.767	Detected Data appear Normal at 5% Significance Level					
1545					Lilliefors Test Statistic	0.225	**Lilliefors GOF Test**					
1546					5% Lilliefors Critical Value	0.425	Detected Data appear Normal at 5% Significance Level					
1547	**Detected Data appear Normal at 5% Significance Level**											
1548												
1549	**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**											
1550					KM Mean	113.7				KM Standard Error of Mean	53.11	
1551					KM SD	135.2				95% KM (BCA) UCL	N/A	
1552					95% KM (t) UCL	211.1				95% KM (Percentile Bootstrap) UCL	N/A	
1553					95% KM (z) UCL	201.1				95% KM Bootstrap t UCL	N/A	
1554					90% KM Chebyshev UCL	273				95% KM Chebyshev UCL	345.2	
1555					97.5% KM Chebyshev UCL	445.4				99% KM Chebyshev UCL	642.2	
1556												
1557	**Gamma GOF Tests on Detected Observations Only**											
1558	**Not Enough Data to Perform GOF Test**											
1559												

	A	B	C	D	E	F	G	H	I	J	K	L
1560	**Gamma Statistics on Detected Data Only**											
1561					k hat (MLE)	1.899			k star (bias corrected MLE)			N/A
1562					Theta hat (MLE)	137.3			Theta star (bias corrected MLE)			N/A
1563					nu hat (MLE)	11.4			nu star (bias corrected)			N/A
1564					Mean (detects)	260.8						
1565												
1566	**Gamma ROS Statistics using Imputed Non-Detects**											
1567	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
1568	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
1569	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
1570	This is especially true when the sample size is small.											
1571	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
1572					Minimum	0.01			Mean			82.96
1573					Maximum	485			Median			1.931
1574					SD	158.4			CV			1.909
1575					k hat (MLE)	0.164			k star (bias corrected MLE)			0.181
1576					Theta hat (MLE)	505.9			Theta star (bias corrected MLE)			457.2
1577					nu hat (MLE)	3.28			nu star (bias corrected)			3.629
1578					Adjusted Level of Significance (β)	0.0267						
1579					Approximate Chi Square Value (3.63, α)	0.581			Adjusted Chi Square Value (3.63, β)			0.409
1580					95% Gamma Approximate UCL (use when n>=50)	518.3			95% Gamma Adjusted UCL (use when n<50)			N/A
1581												
1582	**Estimates of Gamma Parameters using KM Estimates**											
1583					Mean (KM)	113.7			SD (KM)			135.2
1584					Variance (KM)	18285			SE of Mean (KM)			53.11
1585					k hat (KM)	0.707			k star (KM)			0.562
1586					nu hat (KM)	14.14			nu star (KM)			11.23
1587					theta hat (KM)	160.8			theta star (KM)			202.5
1588					80% gamma percentile (KM)	187.3			90% gamma percentile (KM)			300.1
1589					95% gamma percentile (KM)	419			99% gamma percentile (KM)			708.3
1590												
1591	**Gamma Kaplan-Meier (KM) Statistics**											
1592					Approximate Chi Square Value (11.23, α)	4.725			Adjusted Chi Square Value (11.23, β)			4.018
1593					95% Gamma Approximate KM-UCL (use when n>=50)	270.3			95% Gamma Adjusted KM-UCL (use when n<50)			317.9
1594												
1595	**Lognormal GOF Test on Detected Observations Only**											
1596					Shapiro Wilk Test Statistic	0.981			**Shapiro Wilk GOF Test**			
1597					5% Shapiro Wilk Critical Value	0.767			Detected Data appear Lognormal at 5% Significance Level			
1598					Lilliefors Test Statistic	0.23			**Lilliefors GOF Test**			
1599					5% Lilliefors Critical Value	0.425			Detected Data appear Lognormal at 5% Significance Level			
1600	**Detected Data appear Lognormal at 5% Significance Level**											
1601												
1602	**Lognormal ROS Statistics Using Imputed Non-Detects**											
1603					Mean in Original Scale	99.94			Mean in Log Scale			3.853
1604					SD in Original Scale	149.8			SD in Log Scale			1.221
1605					95% t UCL (assumes normality of ROS data)	186.8			95% Percentile Bootstrap UCL			181.6
1606					95% BCA Bootstrap UCL	222.1			95% Bootstrap t UCL			561.4
1607					95% H-UCL (Log ROS)	425.6						
1608												
1609	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**											
1610					KM Mean (logged)	4.302			KM Geo Mean			73.86
1611					KM SD (logged)	0.814			95% Critical H Value (KM-Log)			2.737
1612					KM Standard Error of Mean (logged)	0.359			95% H-UCL (KM -Log)			216.3
1613					KM SD (logged)	0.814			95% Critical H Value (KM-Log)			2.737
1614					KM Standard Error of Mean (logged)	0.359						
1615												

1616	**DL/2 Statistics**											
1617	**DL/2 Normal**						**DL/2 Log-Transformed**					
1618					Mean in Original Scale	103.4				Mean in Log Scale	4.071	
1619					SD in Original Scale	147.3				SD in Log Scale	0.981	
1620					95% t UCL (Assumes normality)	188.7				95% H-Stat UCL	258.3	
1621	**DL/2 is not a recommended method, provided for comparisons and historical reasons**											
1622												
1623	**Nonparametric Distribution Free UCL Statistics**											
1624	**Detected Data appear Normal Distributed at 5% Significance Level**											
1625												
1626	**Suggested UCL to Use**											
1627					95% KM (t) UCL	211.1						
1628												
1629	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
1630	Recommendations are based upon data size, data distribution, and skewness.											
1631	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
1632	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
1633												
1634	**Result (gw-3)**											
1635												
1636	**General Statistics**											
1637					Total Number of Observations	10				Number of Distinct Observations	10	
1638					Number of Detects	8				Number of Non-Detects	2	
1639					Number of Distinct Detects	8				Number of Distinct Non-Detects	2	
1640					Minimum Detect	131				Minimum Non-Detect	37.5	
1641					Maximum Detect	1020				Maximum Non-Detect	77	
1642					Variance Detects	103383				Percent Non-Detects	20%	
1643					Mean Detects	424.5				SD Detects	321.5	
1644					Median Detects	330				CV Detects	0.757	
1645					Skewness Detects	0.889				Kurtosis Detects	-0.0938	
1646					Mean of Logged Detects	5.782				SD of Logged Detects	0.796	
1647												
1648	**Normal GOF Test on Detects Only**											
1649					Shapiro Wilk Test Statistic	0.858	**Shapiro Wilk GOF Test**					
1650					5% Shapiro Wilk Critical Value	0.818	Detected Data appear Normal at 5% Significance Level					
1651					Lilliefors Test Statistic	0.257	**Lilliefors GOF Test**					
1652					5% Lilliefors Critical Value	0.283	Detected Data appear Normal at 5% Significance Level					
1653	**Detected Data appear Normal at 5% Significance Level**											
1654												
1655	**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**											
1656					KM Mean	347.1				KM Standard Error of Mean	104.9	
1657					KM SD	310.4				95% KM (BCA) UCL	527.6	
1658					95% KM (t) UCL	539.4				95% KM (Percentile Bootstrap) UCL	510.3	
1659					95% KM (z) UCL	519.7				95% KM Bootstrap t UCL	596.6	
1660					90% KM Chebyshev UCL	661.9				95% KM Chebyshev UCL	804.5	
1661					97.5% KM Chebyshev UCL	1002				99% KM Chebyshev UCL	1391	
1662												
1663	**Gamma GOF Tests on Detected Observations Only**											
1664					A-D Test Statistic	0.531	**Anderson-Darling GOF Test**					
1665					5% A-D Critical Value	0.724	Detected data appear Gamma Distributed at 5% Significance Level					
1666					K-S Test Statistic	0.258	**Kolmogorov-Smirnov GOF**					
1667					5% K-S Critical Value	0.297	Detected data appear Gamma Distributed at 5% Significance Level					
1668	**Detected data appear Gamma Distributed at 5% Significance Level**											
1669												

1670	**Gamma Statistics on Detected Data Only**											
1671					k hat (MLE)	2.012			k star (bias corrected MLE)			1.341
1672					Theta hat (MLE)	211			Theta star (bias corrected MLE)			316.6
1673					nu hat (MLE)	32.19			nu star (bias corrected)			21.45
1674					Mean (detects)	424.5						
1675												
1676	**Gamma ROS Statistics using Imputed Non-Detects**											
1677	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
1678	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
1679	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
1680	This is especially true when the sample size is small.											
1681	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
1682					Minimum	0.01			Mean			339.6
1683					Maximum	1020			Median			180
1684					SD	335.3			CV			0.987
1685					k hat (MLE)	0.321			k star (bias corrected MLE)			0.292
1686					Theta hat (MLE)	1057			Theta star (bias corrected MLE)			1165
1687					nu hat (MLE)	6.424			nu star (bias corrected)			5.83
1688					Adjusted Level of Significance (β)	0.0267						
1689					Approximate Chi Square Value (5.83, α)	1.554			Adjusted Chi Square Value (5.83, β)			1.204
1690					95% Gamma Approximate UCL (use when n>=50)	1274			95% Gamma Adjusted UCL (use when n<50)			1645
1691												
1692	**Estimates of Gamma Parameters using KM Estimates**											
1693					Mean (KM)	347.1			SD (KM)			310.4
1694					Variance (KM)	96331			SE of Mean (KM)			104.9
1695					k hat (KM)	1.251			k star (KM)			0.942
1696					nu hat (KM)	25.01			nu star (KM)			18.84
1697					theta hat (KM)	277.5			theta star (KM)			368.4
1698					80% gamma percentile (KM)	561.2			90% gamma percentile (KM)			811
1699					95% gamma percentile (KM)	1062			99% gamma percentile (KM)			1647
1700												
1701	**Gamma Kaplan-Meier (KM) Statistics**											
1702					Approximate Chi Square Value (18.84, α)	10			Adjusted Chi Square Value (18.84, β)			8.904
1703					95% Gamma Approximate KM-UCL (use when n>=50)	653.9			95% Gamma Adjusted KM-UCL (use when n<50)			734.6
1704												
1705	**Lognormal GOF Test on Detected Observations Only**											
1706					Shapiro Wilk Test Statistic	0.88			**Shapiro Wilk GOF Test**			
1707					5% Shapiro Wilk Critical Value	0.818			Detected Data appear Lognormal at 5% Significance Level			
1708					Lilliefors Test Statistic	0.228			**Lilliefors GOF Test**			
1709					5% Lilliefors Critical Value	0.283			Detected Data appear Lognormal at 5% Significance Level			
1710	**Detected Data appear Lognormal at 5% Significance Level**											
1711												
1712	**Lognormal ROS Statistics Using Imputed Non-Detects**											
1713					Mean in Original Scale	349.3			Mean in Log Scale			5.402
1714					SD in Original Scale	324.9			SD in Log Scale			1.065
1715					95% t UCL (assumes normality of ROS data)	537.6			95% Percentile Bootstrap UCL			509.4
1716					95% BCA Bootstrap UCL	552.9			95% Bootstrap t UCL			598.8
1717					95% H-UCL (Log ROS)	1236						
1718												
1719	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**											
1720					KM Mean (logged)	5.351			KM Geo Mean			210.8
1721					KM SD (logged)	1.09			95% Critical H Value (KM-Log)			3.291
1722					KM Standard Error of Mean (logged)	0.369			95% H-UCL (KM -Log)			1263
1723					KM SD (logged)	1.09			95% Critical H Value (KM-Log)			3.291
1724					KM Standard Error of Mean (logged)	0.369						
1725												

	A	B	C	D	E	F	G	H	I	J	K	L
1726	**DL/2 Statistics**											
1727	**DL/2 Normal**						**DL/2 Log-Transformed**					
1728	Mean in Original Scale					345.3	Mean in Log Scale					5.284
1729	SD in Original Scale					329.1	SD in Log Scale					1.275
1730	95% t UCL (Assumes normality)					536.1	95% H-Stat UCL					2135
1731	**DL/2 is not a recommended method, provided for comparisons and historical reasons**											
1732												
1733	**Nonparametric Distribution Free UCL Statistics**											
1734	**Detected Data appear Normal Distributed at 5% Significance Level**											
1735												
1736	**Suggested UCL to Use**											
1737	95% KM (t) UCL					539.4						
1738												
1739	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
1740	Recommendations are based upon data size, data distribution, and skewness.											
1741	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
1742	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
1743												
1744	**Result (gw-4)**											
1745												
1746	**General Statistics**											
1747	Total Number of Observations					10	Number of Distinct Observations					7
1748	Number of Detects					4	Number of Non-Detects					6
1749	Number of Distinct Detects					4	Number of Distinct Non-Detects					3
1750	Minimum Detect					80	Minimum Non-Detect					38
1751	Maximum Detect					141	Maximum Non-Detect					77
1752	Variance Detects					683.3	Percent Non-Detects					60%
1753	Mean Detects					112	SD Detects					26.14
1754	Median Detects					113.5	CV Detects					0.233
1755	Skewness Detects					-0.282	Kurtosis Detects					-0.832
1756	Mean of Logged Detects					4.697	SD of Logged Detects					0.244
1757												
1758	**Normal GOF Test on Detects Only**											
1759	Shapiro Wilk Test Statistic					0.992	**Shapiro Wilk GOF Test**					
1760	5% Shapiro Wilk Critical Value					0.748	Detected Data appear Normal at 5% Significance Level					
1761	Lilliefors Test Statistic					0.163	**Lilliefors GOF Test**					
1762	5% Lilliefors Critical Value					0.375	Detected Data appear Normal at 5% Significance Level					
1763	**Detected Data appear Normal at 5% Significance Level**											
1764												
1765	**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**											
1766	KM Mean					67.6	KM Standard Error of Mean					14.23
1767	KM SD					38.98	95% KM (BCA) UCL					N/A
1768	95% KM (t) UCL					93.69	95% KM (Percentile Bootstrap) UCL					N/A
1769	95% KM (z) UCL					91.01	95% KM Bootstrap t UCL					N/A
1770	90% KM Chebyshev UCL					110.3	95% KM Chebyshev UCL					129.6
1771	97.5% KM Chebyshev UCL					156.5	99% KM Chebyshev UCL					209.2
1772												
1773	**Gamma GOF Tests on Detected Observations Only**											
1774	A-D Test Statistic					0.219	**Anderson-Darling GOF Test**					
1775	5% A-D Critical Value					0.657	Detected data appear Gamma Distributed at 5% Significance Level					
1776	K-S Test Statistic					0.201	**Kolmogorov-Smirnov GOF**					
1777	5% K-S Critical Value					0.394	Detected data appear Gamma Distributed at 5% Significance Level					
1778	**Detected data appear Gamma Distributed at 5% Significance Level**											
1779												

	A	B	C	D	E	F	G	H	I	J	K	L
1780	**Gamma Statistics on Detected Data Only**											
1781					k hat (MLE)	23.25			k star (bias corrected MLE)			5.979
1782					Theta hat (MLE)	4.817			Theta star (bias corrected MLE)			18.73
1783					nu hat (MLE)	186			nu star (bias corrected)			47.84
1784					Mean (detects)	112						
1785												
1786	**Gamma ROS Statistics using Imputed Non-Detects**											
1787	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
1788	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
1789	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
1790	This is especially true when the sample size is small.											
1791	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
1792					Minimum	4.667			Mean			62.33
1793					Maximum	141			Median			48.03
1794					SD	47.21			CV			0.757
1795					k hat (MLE)	1.463			k star (bias corrected MLE)			1.091
1796					Theta hat (MLE)	42.6			Theta star (bias corrected MLE)			57.14
1797					nu hat (MLE)	29.26			nu star (bias corrected)			21.82
1798					Adjusted Level of Significance (β)	0.0267						
1799					Approximate Chi Square Value (21.82, α)	12.2			Adjusted Chi Square Value (21.82, β)			10.97
1800					95% Gamma Approximate UCL (use when n>=50)	111.5			95% Gamma Adjusted UCL (use when n<50)			N/A
1801												
1802	**Estimates of Gamma Parameters using KM Estimates**											
1803					Mean (KM)	67.6			SD (KM)			38.98
1804					Variance (KM)	1519			SE of Mean (KM)			14.23
1805					k hat (KM)	3.008			k star (KM)			2.172
1806					nu hat (KM)	60.16			nu star (KM)			43.44
1807					theta hat (KM)	22.47			theta star (KM)			31.12
1808					80% gamma percentile (KM)	100.2			90% gamma percentile (KM)			129
1809					95% gamma percentile (KM)	156.2			99% gamma percentile (KM)			216.5
1810												
1811	**Gamma Kaplan-Meier (KM) Statistics**											
1812					Approximate Chi Square Value (43.44, α)	29.33			Adjusted Chi Square Value (43.44, β)			27.33
1813					95% Gamma Approximate KM-UCL (use when n>=50)	100.1			95% Gamma Adjusted KM-UCL (use when n<50)			107.5
1814												
1815	**Lognormal GOF Test on Detected Observations Only**											
1816					Shapiro Wilk Test Statistic	0.976			**Shapiro Wilk GOF Test**			
1817					5% Shapiro Wilk Critical Value	0.748			Detected Data appear Lognormal at 5% Significance Level			
1818					Lilliefors Test Statistic	0.182			**Lilliefors GOF Test**			
1819					5% Lilliefors Critical Value	0.375			Detected Data appear Lognormal at 5% Significance Level			
1820	**Detected Data appear Lognormal at 5% Significance Level**											
1821												
1822	**Lognormal ROS Statistics Using Imputed Non-Detects**											
1823					Mean in Original Scale	73.62			Mean in Log Scale			4.192
1824					SD in Original Scale	36.99			SD in Log Scale			0.48
1825					95% t UCL (assumes normality of ROS data)	95.06			95% Percentile Bootstrap UCL			93.03
1826					95% BCA Bootstrap UCL	94.69			95% Bootstrap t UCL			102.6
1827					95% H-UCL (Log ROS)	105.5						
1828												
1829	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**											
1830					KM Mean (logged)	4.061			KM Geo Mean			58.05
1831					KM SD (logged)	0.536			95% Critical H Value (KM-Log)			2.271
1832					KM Standard Error of Mean (logged)	0.196			95% H-UCL (KM -Log)			100.5
1833					KM SD (logged)	0.536			95% Critical H Value (KM-Log)			2.271
1834					KM Standard Error of Mean (logged)	0.196						
1835												

1836	**DL/2 Statistics**											
1837	**DL/2 Normal**					**DL/2 Log-Transformed**						
1838				Mean in Original Scale	65.88				Mean in Log Scale	3.997		
1839				SD in Original Scale	42.88				SD in Log Scale	0.655		
1840				95% t UCL (Assumes normality)	90.73				95% H-Stat UCL	115.2		
1841	**DL/2 is not a recommended method, provided for comparisons and historical reasons**											
1842												
1843	**Nonparametric Distribution Free UCL Statistics**											
1844	**Detected Data appear Normal Distributed at 5% Significance Level**											
1845												
1846	**Suggested UCL to Use**											
1847				95% KM (t) UCL	93.69							
1848												
1849	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
1850	Recommendations are based upon data size, data distribution, and skewness.											
1851	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
1852	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
1853												
1854	**Result (mw-4)**											
1855												
1856	**General Statistics**											
1857				Total Number of Observations	10				Number of Distinct Observations	10		
1858				Number of Detects	9				Number of Non-Detects	1		
1859				Number of Distinct Detects	9				Number of Distinct Non-Detects	1		
1860				Minimum Detect	300				Minimum Non-Detect	76.5		
1861				Maximum Detect	600				Maximum Non-Detect	76.5		
1862				Variance Detects	8551				Percent Non-Detects	10%		
1863				Mean Detects	393				SD Detects	92.47		
1864				Median Detects	390				CV Detects	0.235		
1865				Skewness Detects	1.448				Kurtosis Detects	2.732		
1866				Mean of Logged Detects	5.952				SD of Logged Detects	0.217		
1867												
1868	**Normal GOF Test on Detects Only**											
1869				Shapiro Wilk Test Statistic	0.861	**Shapiro Wilk GOF Test**						
1870				5% Shapiro Wilk Critical Value	0.829	Detected Data appear Normal at 5% Significance Level						
1871				Lilliefors Test Statistic	0.225	**Lilliefors GOF Test**						
1872				5% Lilliefors Critical Value	0.274	Detected Data appear Normal at 5% Significance Level						
1873	**Detected Data appear Normal at 5% Significance Level**											
1874												
1875	**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**											
1876				KM Mean	361.4				KM Standard Error of Mean	42.24		
1877				KM SD	125.9				95% KM (BCA) UCL	424.6		
1878				95% KM (t) UCL	438.8				95% KM (Percentile Bootstrap) UCL	423.4		
1879				95% KM (z) UCL	430.8				95% KM Bootstrap t UCL	429.6		
1880				90% KM Chebyshev UCL	488.1				95% KM Chebyshev UCL	545.5		
1881				97.5% KM Chebyshev UCL	625.1				99% KM Chebyshev UCL	781.6		
1882												
1883	**Gamma GOF Tests on Detected Observations Only**											
1884				A-D Test Statistic	0.39	**Anderson-Darling GOF Test**						
1885				5% A-D Critical Value	0.721	Detected data appear Gamma Distributed at 5% Significance Level						
1886				K-S Test Statistic	0.187	**Kolmogorov-Smirnov GOF**						
1887				5% K-S Critical Value	0.279	Detected data appear Gamma Distributed at 5% Significance Level						
1888	**Detected data appear Gamma Distributed at 5% Significance Level**											
1889												

	A	B	C	D	E	F	G	H	I	J	K	L
1890	**Gamma Statistics on Detected Data Only**											
1891					k hat (MLE)	22.9			k star (bias corrected MLE)			15.34
1892					Theta hat (MLE)	17.16			Theta star (bias corrected MLE)			25.62
1893					nu hat (MLE)	412.2			nu star (bias corrected)			276.1
1894					Mean (detects)	393						
1895												
1896	**Gamma ROS Statistics using Imputed Non-Detects**											
1897	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
1898	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
1899	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
1900	This is especially true when the sample size is small.											
1901	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
1902					Minimum	198.6			Mean			373.6
1903					Maximum	600			Median			370
1904					SD	106.7			CV			0.286
1905					k hat (MLE)	13.56			k star (bias corrected MLE)			9.561
1906					Theta hat (MLE)	27.54			Theta star (bias corrected MLE)			39.07
1907					nu hat (MLE)	271.3			nu star (bias corrected)			191.2
1908					Adjusted Level of Significance (β)	0.0267						
1909					Approximate Chi Square Value (191.22, α)	160.2			Adjusted Chi Square Value (191.22, β)			155.3
1910					95% Gamma Approximate UCL (use when n>=50)	445.8			95% Gamma Adjusted UCL (use when n<50)			460
1911												
1912	**Estimates of Gamma Parameters using KM Estimates**											
1913					Mean (KM)	361.4			SD (KM)			125.9
1914					Variance (KM)	15856			SE of Mean (KM)			42.24
1915					k hat (KM)	8.235			k star (KM)			5.831
1916					nu hat (KM)	164.7			nu star (KM)			116.6
1917					theta hat (KM)	43.88			theta star (KM)			61.97
1918					80% gamma percentile (KM)	477.6			90% gamma percentile (KM)			561.5
1919					95% gamma percentile (KM)	637.4			99% gamma percentile (KM)			796.8
1920												
1921	**Gamma Kaplan-Meier (KM) Statistics**											
1922					Approximate Chi Square Value (116.62, α)	92.69			Adjusted Chi Square Value (116.62, β)			88.98
1923					95% Gamma Approximate KM-UCL (use when n>=50)	454.7			95% Gamma Adjusted KM-UCL (use when n<50)			473.6
1924												
1925	**Lognormal GOF Test on Detected Observations Only**											
1926					Shapiro Wilk Test Statistic	0.915			**Shapiro Wilk GOF Test**			
1927					5% Shapiro Wilk Critical Value	0.829			Detected Data appear Lognormal at 5% Significance Level			
1928					Lilliefors Test Statistic	0.184			**Lilliefors GOF Test**			
1929					5% Lilliefors Critical Value	0.274			Detected Data appear Lognormal at 5% Significance Level			
1930	**Detected Data appear Lognormal at 5% Significance Level**											
1931												
1932	**Lognormal ROS Statistics Using Imputed Non-Detects**											
1933					Mean in Original Scale	376.5			Mean in Log Scale			5.899
1934					SD in Original Scale	101.7			SD in Log Scale			0.263
1935					95% t UCL (assumes normality of ROS data)	435.4			95% Percentile Bootstrap UCL			428.2
1936					95% BCA Bootstrap UCL	436.2			95% Bootstrap t UCL			452.6
1937					95% H-UCL (Log ROS)	447.8						
1938												
1939	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**											
1940					KM Mean (logged)	5.79			KM Geo Mean			327.1
1941					KM SD (logged)	0.522			95% Critical H Value (KM-Log)			2.251
1942					KM Standard Error of Mean (logged)	0.175			95% H-UCL (KM -Log)			554.4
1943					KM SD (logged)	0.522			95% Critical H Value (KM-Log)			2.251
1944					KM Standard Error of Mean (logged)	0.175						
1945												

1946	**DL/2 Statistics**											
1947	**DL/2 Normal**						**DL/2 Log-Transformed**					
1948					Mean in Original Scale	357.5				Mean in Log Scale	5.721	
1949					SD in Original Scale	142.1				SD in Log Scale	0.758	
1950					95% t UCL (Assumes normality)	439.9				95% H-Stat UCL	791.1	
1951	**DL/2 is not a recommended method, provided for comparisons and historical reasons**											
1952												
1953	**Nonparametric Distribution Free UCL Statistics**											
1954	**Detected Data appear Normal Distributed at 5% Significance Level**											
1955												
1956	**Suggested UCL to Use**											
1957					95% KM (t) UCL	438.8						
1958												
1959	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
1960	Recommendations are based upon data size, data distribution, and skewness.											
1961	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
1962	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
1963												
1964	**Result (pz-7s)**											
1965												
1966	**General Statistics**											
1967					Total Number of Observations	10				Number of Distinct Observations	9	
1968					Number of Detects	7				Number of Non-Detects	3	
1969					Number of Distinct Detects	7				Number of Distinct Non-Detects	2	
1970					Minimum Detect	123				Minimum Non-Detect	76.5	
1971					Maximum Detect	320				Maximum Non-Detect	78	
1972					Variance Detects	6485				Percent Non-Detects	30%	
1973					Mean Detects	201.6				SD Detects	80.53	
1974					Median Detects	151				CV Detects	0.399	
1975					Skewness Detects	0.54				Kurtosis Detects	-1.96	
1976					Mean of Logged Detects	5.239				SD of Logged Detects	0.393	
1977												
1978	**Normal GOF Test on Detects Only**											
1979					Shapiro Wilk Test Statistic	0.836	**Shapiro Wilk GOF Test**					
1980					5% Shapiro Wilk Critical Value	0.803	Detected Data appear Normal at 5% Significance Level					
1981					Lilliefors Test Statistic	0.307	**Lilliefors GOF Test**					
1982					5% Lilliefors Critical Value	0.304	Detected Data Not Normal at 5% Significance Level					
1983	**Detected Data appear Approximate Normal at 5% Significance Level**											
1984												
1985	**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**											
1986					KM Mean	164.1				KM Standard Error of Mean	28.94	
1987					KM SD	84.73				95% KM (BCA) UCL	211.4	
1988					95% KM (t) UCL	217.2				95% KM (Percentile Bootstrap) UCL	209.2	
1989					95% KM (z) UCL	211.7				95% KM Bootstrap t UCL	223.4	
1990					90% KM Chebyshev UCL	250.9				95% KM Chebyshev UCL	290.3	
1991					97.5% KM Chebyshev UCL	344.8				99% KM Chebyshev UCL	452.1	
1992												
1993	**Gamma GOF Tests on Detected Observations Only**											
1994					A-D Test Statistic	0.659	**Anderson-Darling GOF Test**					
1995					5% A-D Critical Value	0.709	Detected data appear Gamma Distributed at 5% Significance Level					
1996					K-S Test Statistic	0.31	**Kolmogorov-Smirnov GOF**					
1997					5% K-S Critical Value	0.312	Detected data appear Gamma Distributed at 5% Significance Level					
1998	**Detected data appear Gamma Distributed at 5% Significance Level**											
1999												

	A	B	C	D	E	F	G	H	I	J	K	L
2000	**Gamma Statistics on Detected Data Only**											
2001					k hat (MLE)	7.615			k star (bias corrected MLE)			4.447
2002					Theta hat (MLE)	26.48			Theta star (bias corrected MLE)			45.35
2003					nu hat (MLE)	106.6			nu star (bias corrected)			62.25
2004					Mean (detects)	201.6						
2005												
2006	**Gamma ROS Statistics using Imputed Non-Detects**											
2007	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
2008	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
2009	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
2010	This is especially true when the sample size is small.											
2011	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
2012					Minimum	14.55			Mean			151.5
2013					Maximum	320			Median			141.3
2014					SD	104.5			CV			0.69
2015					k hat (MLE)	1.661			k star (bias corrected MLE)			1.229
2016					Theta hat (MLE)	91.23			Theta star (bias corrected MLE)			123.3
2017					nu hat (MLE)	33.21			nu star (bias corrected)			24.58
2018					Adjusted Level of Significance (β)	0.0267						
2019					Approximate Chi Square Value (24.58, α)	14.29			Adjusted Chi Square Value (24.58, β)			12.95
2020					95% Gamma Approximate UCL (use when n>=50)	260.6			95% Gamma Adjusted UCL (use when n<50)			287.7
2021												
2022	**Estimates of Gamma Parameters using KM Estimates**											
2023					Mean (KM)	164.1			SD (KM)			84.73
2024					Variance (KM)	7179			SE of Mean (KM)			28.94
2025					k hat (KM)	3.751			k star (KM)			2.692
2026					nu hat (KM)	75.02			nu star (KM)			53.84
2027					theta hat (KM)	43.75			theta star (KM)			60.95
2028					80% gamma percentile (KM)	237.1			90% gamma percentile (KM)			298.1
2029					95% gamma percentile (KM)	355.4			99% gamma percentile (KM)			480.3
2030												
2031	**Gamma Kaplan-Meier (KM) Statistics**											
2032					Approximate Chi Square Value (53.84, α)	37.99			Adjusted Chi Square Value (53.84, β)			35.68
2033					95% Gamma Approximate KM-UCL (use when n>=50)	232.6			95% Gamma Adjusted KM-UCL (use when n<50)			247.6
2034												
2035	**Lognormal GOF Test on Detected Observations Only**											
2036					Shapiro Wilk Test Statistic	0.847			**Shapiro Wilk GOF Test**			
2037					5% Shapiro Wilk Critical Value	0.803			Detected Data appear Lognormal at 5% Significance Level			
2038					Lilliefors Test Statistic	0.286			**Lilliefors GOF Test**			
2039					5% Lilliefors Critical Value	0.304			Detected Data appear Lognormal at 5% Significance Level			
2040	**Detected Data appear Lognormal at 5% Significance Level**											
2041												
2042	**Lognormal ROS Statistics Using Imputed Non-Detects**											
2043					Mean in Original Scale	162.7			Mean in Log Scale			4.948
2044					SD in Original Scale	90.96			SD in Log Scale			0.572
2045					95% t UCL (assumes normality of ROS data)	215.4			95% Percentile Bootstrap UCL			208.1
2046					95% BCA Bootstrap UCL	212.7			95% Bootstrap t UCL			226.8
2047					95% H-UCL (Log ROS)	258.6						
2048												
2049	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**											
2050					KM Mean (logged)	4.969			KM Geo Mean			143.8
2051					KM SD (logged)	0.513			95% Critical H Value (KM-Log)			2.239
2052					KM Standard Error of Mean (logged)	0.175			95% H-UCL (KM -Log)			240.7
2053					KM SD (logged)	0.513			95% Critical H Value (KM-Log)			2.239
2054					KM Standard Error of Mean (logged)	0.175						
2055												

2056	**DL/2 Statistics**											
2057	**DL/2 Normal**						**DL/2 Log-Transformed**					
2058					Mean in Original Scale	152.7				Mean in Log Scale	4.763	
2059					SD in Original Scale	102.6				SD in Log Scale	0.832	
2060					95% t UCL (Assumes normality)	212.2				95% H-Stat UCL	356.5	
2061	**DL/2 is not a recommended method, provided for comparisons and historical reasons**											
2062												
2063	**Nonparametric Distribution Free UCL Statistics**											
2064	**Detected Data appear Approximate Normal Distributed at 5% Significance Level**											
2065												
2066	**Suggested UCL to Use**											
2067					95% KM (t) UCL	217.2						
2068												
2069	When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test											
2070	When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL											
2071												
2072	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
2073	Recommendations are based upon data size, data distribution, and skewness.											
2074	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
2075	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
2076												
2077	**Result (pz-8)**											
2078												
2079	**General Statistics**											
2080					Total Number of Observations	10				Number of Distinct Observations	5	
2081					Number of Detects	0				Number of Non-Detects	10	
2082					Number of Distinct Detects	0				Number of Distinct Non-Detects	5	
2083												
2084	**Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!**											
2085	**Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!**											
2086	**The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).**											
2087												
2088	**The data set for variable Result (pz-8) was not processed!**											
2089												
2090												
2091	**Result (s1-ad)**											
2092												
2093	**General Statistics**											
2094					Total Number of Observations	10				Number of Distinct Observations	4	
2095					Number of Detects	1				Number of Non-Detects	9	
2096					Number of Distinct Detects	1				Number of Distinct Non-Detects	4	
2097												
2098	**Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!**											
2099	**It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).**											
2100												
2101	**The data set for variable Result (s1-ad) was not processed!**											
2102												
2103												

	A	B	C	D	E	F	G	H	I	J	K	L
2104	**Result (s1-au)**											
2105												
2106						**General Statistics**						
2107					Total Number of Observations	10			Number of Distinct Observations			4
2108					Number of Detects	0			Number of Non-Detects			10
2109					Number of Distinct Detects	0			Number of Distinct Non-Detects			4
2110												
2111					**Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!**							
2112					**Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!**							
2113					**The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).**							
2114												
2115					**The data set for variable Result (s1-au) was not processed!**							
2116												
2117												
2118	**Result (s1-bd)**											
2119												
2120						**General Statistics**						
2121					Total Number of Observations	10			Number of Distinct Observations			6
2122					Number of Detects	1			Number of Non-Detects			9
2123					Number of Distinct Detects	1			Number of Distinct Non-Detects			5
2124												
2125					**Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!**							
2126					**It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).**							
2127												
2128					**The data set for variable Result (s1-bd) was not processed!**							
2129												
2130												
2131	**Result (s1-bu)**											
2132												
2133						**General Statistics**						
2134					Total Number of Observations	10			Number of Distinct Observations			5
2135					Number of Detects	0			Number of Non-Detects			10
2136					Number of Distinct Detects	0			Number of Distinct Non-Detects			5
2137												
2138					**Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!**							
2139					**Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!**							
2140					**The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).**							
2141												
2142					**The data set for variable Result (s1-bu) was not processed!**							
2143												
2144												
2145	**Result (s2-ad)**											
2146												
2147						**General Statistics**						
2148					Total Number of Observations	10			Number of Distinct Observations			6
2149					Number of Detects	0			Number of Non-Detects			10
2150					Number of Distinct Detects	0			Number of Distinct Non-Detects			6
2151												
2152					**Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!**							
2153					**Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!**							
2154					**The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).**							
2155												
2156					**The data set for variable Result (s2-ad) was not processed!**							
2157												
2158												

	A	B	C	D	E	F	G	H	I	J	K	L
2159	**Result (s2-au)**											
2160												
2161	**General Statistics**											
2162					Total Number of Observations	10			Number of Distinct Observations			6
2163					Number of Detects	0			Number of Non-Detects			10
2164					Number of Distinct Detects	0			Number of Distinct Non-Detects			6
2165												
2166	**Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!**											
2167	**Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!**											
2168	**The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).**											
2169												
2170	**The data set for variable Result (s2-au) was not processed!**											
2171												
2172												
2173	**Result (s2-bd)**											
2174												
2175	**General Statistics**											
2176					Total Number of Observations	10			Number of Distinct Observations			4
2177					Number of Detects	0			Number of Non-Detects			10
2178					Number of Distinct Detects	0			Number of Distinct Non-Detects			4
2179												
2180	**Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!**											
2181	**Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!**											
2182	**The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).**											
2183												
2184	**The data set for variable Result (s2-bd) was not processed!**											
2185												
2186												
2187	**Result (s2-bu)**											
2188												
2189	**General Statistics**											
2190					Total Number of Observations	10			Number of Distinct Observations			10
2191					Number of Detects	9			Number of Non-Detects			1
2192					Number of Distinct Detects	9			Number of Distinct Non-Detects			1
2193					Minimum Detect	78.5			Minimum Non-Detect			76.5
2194					Maximum Detect	1640			Maximum Non-Detect			76.5
2195					Variance Detects	214768			Percent Non-Detects			10%
2196					Mean Detects	470.6			SD Detects			463.4
2197					Median Detects	370			CV Detects			0.985
2198					Skewness Detects	2.402			Kurtosis Detects			6.517
2199					Mean of Logged Detects	5.821			SD of Logged Detects			0.866
2200												
2201	**Normal GOF Test on Detects Only**											
2202					Shapiro Wilk Test Statistic	0.703			**Shapiro Wilk GOF Test**			
2203					5% Shapiro Wilk Critical Value	0.829			Detected Data Not Normal at 5% Significance Level			
2204					Lilliefors Test Statistic	0.321			**Lilliefors GOF Test**			
2205					5% Lilliefors Critical Value	0.274			Detected Data Not Normal at 5% Significance Level			
2206	**Detected Data Not Normal at 5% Significance Level**											
2207												
2208	**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**											
2209					KM Mean	431.2			KM Standard Error of Mean			144.6
2210					KM SD	431			95% KM (BCA) UCL			705.2
2211					95% KM (t) UCL	696.2			95% KM (Percentile Bootstrap) UCL			684.4
2212					95% KM (z) UCL	669			95% KM Bootstrap t UCL			984.4
2213					90% KM Chebyshev UCL	864.9			95% KM Chebyshev UCL			1061
2214					97.5% KM Chebyshev UCL	1334			99% KM Chebyshev UCL			1870
2215												
2216	**Gamma GOF Tests on Detected Observations Only**											
2217					A-D Test Statistic	0.458			**Anderson-Darling GOF Test**			
2218					5% A-D Critical Value	0.733			Detected data appear Gamma Distributed at 5% Significance Level			
2219					K-S Test Statistic	0.21			**Kolmogorov-Smirnov GOF**			
2220					5% K-S Critical Value	0.284			Detected data appear Gamma Distributed at 5% Significance Level			

	A	B	C	D	E	F	G	H	I	J	K	L
2221	**Detected data appear Gamma Distributed at 5% Significance Level**											
2222												
2223	**Gamma Statistics on Detected Data Only**											
2224					k hat (MLE)	1.647			k star (bias corrected MLE)			1.172
2225					Theta hat (MLE)	285.7			Theta star (bias corrected MLE)			401.5
2226					nu hat (MLE)	29.65			nu star (bias corrected)			21.1
2227					Mean (detects)	470.6						
2228												
2229	**Gamma ROS Statistics using Imputed Non-Detects**											
2230	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
2231	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
2232	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
2233	This is especially true when the sample size is small.											
2234	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
2235					Minimum	0.01			Mean			423.6
2236					Maximum	1640			Median			337.8
2237					SD	461.6			CV			1.09
2238					k hat (MLE)	0.5			k star (bias corrected MLE)			0.417
2239					Theta hat (MLE)	847.2			Theta star (bias corrected MLE)			1017
2240					nu hat (MLE)	9.999			nu star (bias corrected)			8.333
2241					Adjusted Level of Significance (β)	0.0267						
2242					Approximate Chi Square Value (8.33, α)	2.929			Adjusted Chi Square Value (8.33, β)			2.401
2243					95% Gamma Approximate UCL (use when n>=50)	1205			95% Gamma Adjusted UCL (use when n<50)			1470
2244												
2245	**Estimates of Gamma Parameters using KM Estimates**											
2246					Mean (KM)	431.2			SD (KM)			431
2247					Variance (KM)	185794			SE of Mean (KM)			144.6
2248					k hat (KM)	1.001			k star (KM)			0.767
2249					nu hat (KM)	20.02			nu star (KM)			15.34
2250					theta hat (KM)	430.9			theta star (KM)			562
2251					80% gamma percentile (KM)	706.2			90% gamma percentile (KM)			1059
2252					95% gamma percentile (KM)	1420			99% gamma percentile (KM)			2275
2253												
2254	**Gamma Kaplan-Meier (KM) Statistics**											
2255					Approximate Chi Square Value (15.34, α)	7.501			Adjusted Chi Square Value (15.34, β)			6.571
2256					95% Gamma Approximate KM-UCL (use when n>=50)	882			95% Gamma Adjusted KM-UCL (use when n<50)			1007
2257												
2258	**Lognormal GOF Test on Detected Observations Only**											
2259					Shapiro Wilk Test Statistic	0.944			**Shapiro Wilk GOF Test**			
2260					5% Shapiro Wilk Critical Value	0.829			Detected Data appear Lognormal at 5% Significance Level			
2261					Lilliefors Test Statistic	0.224			**Lilliefors GOF Test**			
2262					5% Lilliefors Critical Value	0.274			Detected Data appear Lognormal at 5% Significance Level			
2263	**Detected Data appear Lognormal at 5% Significance Level**											
2264												
2265	**Lognormal ROS Statistics Using Imputed Non-Detects**											
2266					Mean in Original Scale	427.8			Mean in Log Scale			5.614
2267					SD in Original Scale	457.4			SD in Log Scale			1.045
2268					95% t UCL (assumes normality of ROS data)	693			95% Percentile Bootstrap UCL			676.8
2269					95% BCA Bootstrap UCL	771.5			95% Bootstrap t UCL			971.2
2270					95% H-UCL (Log ROS)	1442						
2271												

2272	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**											
2273					KM Mean (logged)	5.672			KM Geo Mean	290.7		
2274					KM SD (logged)	0.893			95% Critical H Value (KM-Log)	2.888		
2275					KM Standard Error of Mean (logged)	0.3			95% H-UCL (KM -Log)	1023		
2276					KM SD (logged)	0.893			95% Critical H Value (KM-Log)	2.888		
2277					KM Standard Error of Mean (logged)	0.3						
2278												
2279	**DL/2 Statistics**											
2280	**DL/2 Normal**						**DL/2 Log-Transformed**					
2281					Mean in Original Scale	427.4			Mean in Log Scale	5.603		
2282					SD in Original Scale	457.8			SD in Log Scale	1.068		
2283					95% t UCL (Assumes normality)	692.8			95% H-Stat UCL	1521		
2284	**DL/2 is not a recommended method, provided for comparisons and historical reasons**											
2285												
2286	**Nonparametric Distribution Free UCL Statistics**											
2287	**Detected Data appear Gamma Distributed at 5% Significance Level**											
2288												
2289	**Suggested UCL to Use**											
2290					95% KM Adjusted Gamma UCL	1007			95% GROS Adjusted Gamma UCL	1470		
2291												
2292	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
2293	Recommendations are based upon data size, data distribution, and skewness.											
2294	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
2295	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
2296												
2297	**Result (s3-ad)**											
2298												
2299	**General Statistics**											
2300					Total Number of Observations	10			Number of Distinct Observations	6		
2301					Number of Detects	0			Number of Non-Detects	10		
2302					Number of Distinct Detects	0			Number of Distinct Non-Detects	6		
2303												
2304	**Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!**											
2305	**Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!**											
2306	**The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).**											
2307												
2308	**The data set for variable Result (s3-ad) was not processed!**											
2309												
2310												
2311	**Result (s3-au)**											
2312												
2313	**General Statistics**											
2314					Total Number of Observations	10			Number of Distinct Observations	5		
2315					Number of Detects	1			Number of Non-Detects	9		
2316					Number of Distinct Detects	1			Number of Distinct Non-Detects	4		
2317												
2318	**Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!**											
2319	**It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).**											
2320												
2321	**The data set for variable Result (s3-au) was not processed!**											
2322												

Result (s3-bd)

General Statistics

Total Number of Observations	10	Number of Distinct Observations	6
Number of Detects	1	Number of Non-Detects	9
Number of Distinct Detects	1	Number of Distinct Non-Detects	5

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!

It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Result (s3-bd) was not processed!

Result (s3-bu)

General Statistics

Total Number of Observations	10	Number of Distinct Observations	4
Number of Detects	0	Number of Non-Detects	10
Number of Distinct Detects	0	Number of Distinct Non-Detects	4

Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!

Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!

The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Result (s3-bu) was not processed!

Result (s3-cd)

General Statistics

Total Number of Observations	10	Number of Distinct Observations	5
Number of Detects	1	Number of Non-Detects	9
Number of Distinct Detects	1	Number of Distinct Non-Detects	4

Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!

It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).

The data set for variable Result (s3-cd) was not processed!

Result (s3-cu)

General Statistics

Total Number of Observations	10	Number of Distinct Observations	6
Number of Detects	2	Number of Non-Detects	8
Number of Distinct Detects	2	Number of Distinct Non-Detects	4
Minimum Detect	107.5	Minimum Non-Detect	31
Maximum Detect	195.5	Maximum Non-Detect	78
Variance Detects	3872	Percent Non-Detects	80%
Mean Detects	151.5	SD Detects	62.23
Median Detects	151.5	CV Detects	0.411
Skewness Detects	N/A	Kurtosis Detects	N/A
Mean of Logged Detects	4.977	SD of Logged Detects	0.423

Warning: Data set has only 2 Detected Values.

This is not enough to compute meaningful or reliable statistics and estimates.

Normal GOF Test on Detects Only

Not Enough Data to Perform GOF Test

	A	B	C	D	E	F	G	H	I	J	K	L
2385	**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**											
2386					KM Mean	55.1			KM Standard Error of Mean			23.28
2387					KM SD	52.06			95% KM (BCA) UCL			N/A
2388					95% KM (t) UCL	97.78			95% KM (Percentile Bootstrap) UCL			N/A
2389					95% KM (z) UCL	93.4			95% KM Bootstrap t UCL			N/A
2390					90% KM Chebyshev UCL	124.9			95% KM Chebyshev UCL			156.6
2391					97.5% KM Chebyshev UCL	200.5			99% KM Chebyshev UCL			286.8
2392												
2393	**Gamma GOF Tests on Detected Observations Only**											
2394	**Not Enough Data to Perform GOF Test**											
2395												
2396	**Gamma Statistics on Detected Data Only**											
2397					k hat (MLE)	11.51			k star (bias corrected MLE)			N/A
2398					Theta hat (MLE)	13.16			Theta star (bias corrected MLE)			N/A
2399					nu hat (MLE)	46.05			nu star (bias corrected)			N/A
2400					Mean (detects)	151.5						
2401												
2402	**Estimates of Gamma Parameters using KM Estimates**											
2403					Mean (KM)	55.1			SD (KM)			52.06
2404					Variance (KM)	2710			SE of Mean (KM)			23.28
2405					k hat (KM)	1.12			k star (KM)			0.851
2406					nu hat (KM)	22.4			nu star (KM)			17.01
2407					theta hat (KM)	49.19			theta star (KM)			64.77
2408					80% gamma percentile (KM)	89.72			90% gamma percentile (KM)			132
2409					95% gamma percentile (KM)	174.8			99% gamma percentile (KM)			275.5
2410												
2411	**Gamma Kaplan-Meier (KM) Statistics**											
2412									Adjusted Level of Significance (β)			0.0267
2413					Approximate Chi Square Value (17.01, α)	8.683			Adjusted Chi Square Value (17.01, β)			7.67
2414					95% Gamma Approximate KM-UCL (use when n>=50)	108			95% Gamma Adjusted KM-UCL (use when n<50)			122.2
2415												
2416	**Lognormal GOF Test on Detected Observations Only**											
2417	**Not Enough Data to Perform GOF Test**											
2418												
2419	**Lognormal ROS Statistics Using Imputed Non-Detects**											
2420					Mean in Original Scale	42.53			Mean in Log Scale			3.039
2421					SD in Original Scale	61.63			SD in Log Scale			1.179
2422					95% t UCL (assumes normality of ROS data)	78.26			95% Percentile Bootstrap UCL			76.96
2423					95% BCA Bootstrap UCL	86.95			95% Bootstrap t UCL			246.8
2424					95% H-UCL (Log ROS)	164.6						
2425												
2426	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**											
2427					KM Mean (logged)	3.742			KM Geo Mean			42.2
2428					KM SD (logged)	0.631			95% Critical H Value (KM-Log)			2.418
2429					KM Standard Error of Mean (logged)	0.282			95% H-UCL (KM -Log)			85.68
2430					KM SD (logged)	0.631			95% Critical H Value (KM-Log)			2.418
2431					KM Standard Error of Mean (logged)	0.282						
2432												

2433	**DL/2 Statistics**										
2434	**DL/2 Normal**					**DL/2 Log-Transformed**					
2435				Mean in Original Scale	58.75				Mean in Log Scale	3.824	
2436				SD in Original Scale	53.58				SD in Log Scale	0.685	
2437				95% t UCL (Assumes normality)	89.81				95% H-Stat UCL	102.6	
2438	**DL/2 is not a recommended method, provided for comparisons and historical reasons**										
2439											
2440	**Nonparametric Distribution Free UCL Statistics**										
2441	**Data do not follow a Discernible Distribution at 5% Significance Level**										
2442											
2443	**Suggested UCL to Use**										
2444				95% KM (t) UCL	97.78				KM H-UCL	85.68	
2445				95% KM (BCA) UCL	N/A						
2446	**Warning: One or more Recommended UCL(s) not available!**										
2447											
2448	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.										
2449	Recommendations are based upon data size, data distribution, and skewness.										
2450	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).										
2451	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.										
2452											
2453	**Result (s4-ad)**										
2454											
2455	**General Statistics**										
2456				Total Number of Observations	10				Number of Distinct Observations	4	
2457				Number of Detects	0				Number of Non-Detects	10	
2458				Number of Distinct Detects	0				Number of Distinct Non-Detects	4	
2459											
2460	**Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!**										
2461	**Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!**										
2462	**The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).**										
2463											
2464	**The data set for variable Result (s4-ad) was not processed!**										
2465											
2466											
2467	**Result (s4-au)**										
2468											
2469	**General Statistics**										
2470				Total Number of Observations	10				Number of Distinct Observations	4	
2471				Number of Detects	1				Number of Non-Detects	9	
2472				Number of Distinct Detects	1				Number of Distinct Non-Detects	3	
2473											
2474	**Warning: Only one distinct data value was detected! ProUCL (or any other software) should not be used on such a data set!**										
2475	**It is suggested to use alternative site specific values determined by the Project Team to estimate environmental parameters (e.g., EPC, BTV).**										
2476											
2477	**The data set for variable Result (s4-au) was not processed!**										
2478											
2479											
2480	**Result (s4-bd)**										
2481											
2482	**General Statistics**										
2483				Total Number of Observations	10				Number of Distinct Observations	5	
2484				Number of Detects	0				Number of Non-Detects	10	
2485				Number of Distinct Detects	0				Number of Distinct Non-Detects	5	
2486											
2487	**Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!**										
2488	**Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!**										
2489	**The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).**										
2490											
2491	**The data set for variable Result (s4-bd) was not processed!**										

	A	B	C	D	E	F	G	H	I	J	K	L
2492												
2493												
2494	**Result (s4-bu)**											
2495												
2496	**General Statistics**											
2497					Total Number of Observations	10			Number of Distinct Observations	7		
2498					Number of Detects	3			Number of Non-Detects	7		
2499					Number of Distinct Detects	3			Number of Distinct Non-Detects	4		
2500					Minimum Detect	75.5			Minimum Non-Detect	41		
2501					Maximum Detect	701			Maximum Non-Detect	77		
2502					Variance Detects	116575			Percent Non-Detects	70%		
2503					Mean Detects	309.2			SD Detects	341.4		
2504					Median Detects	151			CV Detects	1.104		
2505					Skewness Detects	1.637			Kurtosis Detects	N/A		
2506					Mean of Logged Detects	5.298			SD of Logged Detects	1.14		
2507												
2508	**Warning: Data set has only 3 Detected Values.**											
2509	**This is not enough to compute meaningful or reliable statistics and estimates.**											
2510												
2511												
2512	**Normal GOF Test on Detects Only**											
2513					Shapiro Wilk Test Statistic	0.839			**Shapiro Wilk GOF Test**			
2514					5% Shapiro Wilk Critical Value	0.767			Detected Data appear Normal at 5% Significance Level			
2515					Lilliefors Test Statistic	0.345			**Lilliefors GOF Test**			
2516					5% Lilliefors Critical Value	0.425			Detected Data appear Normal at 5% Significance Level			
2517	**Detected Data appear Normal at 5% Significance Level**											
2518												
2519	**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**											
2520					KM Mean	131.8			KM Standard Error of Mean	75.22		
2521					KM SD	192.4			95% KM (BCA) UCL	N/A		
2522					95% KM (t) UCL	269.7			95% KM (Percentile Bootstrap) UCL	N/A		
2523					95% KM (z) UCL	255.5			95% KM Bootstrap t UCL	N/A		
2524					90% KM Chebyshev UCL	357.4			95% KM Chebyshev UCL	459.7		
2525					97.5% KM Chebyshev UCL	601.5			99% KM Chebyshev UCL	880.2		
2526												
2527	**Gamma GOF Tests on Detected Observations Only**											
2528	**Not Enough Data to Perform GOF Test**											
2529												
2530	**Gamma Statistics on Detected Data Only**											
2531					k hat (MLE)	1.288			k star (bias corrected MLE)	N/A		
2532					Theta hat (MLE)	240			Theta star (bias corrected MLE)	N/A		
2533					nu hat (MLE)	7.729			nu star (bias corrected)	N/A		
2534					Mean (detects)	309.2						
2535												
2536	**Gamma ROS Statistics using Imputed Non-Detects**											
2537	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
2538	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
2539	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
2540	This is especially true when the sample size is small.											
2541	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
2542					Minimum	0.01			Mean	92.76		
2543					Maximum	701			Median	0.01		
2544					SD	219.6			CV	2.367		
2545					k hat (MLE)	0.128			k star (bias corrected MLE)	0.156		
2546					Theta hat (MLE)	727.1			Theta star (bias corrected MLE)	594.7		
2547					nu hat (MLE)	2.552			nu star (bias corrected)	3.119		
2548					Adjusted Level of Significance (β)	0.0267						
2549					Approximate Chi Square Value (3.12, α)	0.409			Adjusted Chi Square Value (3.12, β)	0.281		
2550					95% Gamma Approximate UCL (use when n>=50)	708			95% Gamma Adjusted UCL (use when n<50)	N/A		
2551												
2552	**Estimates of Gamma Parameters using KM Estimates**											
2553					Mean (KM)	131.8			SD (KM)	192.4		

2554					Variance (KM)	37001					SE of Mean (KM)	75.22
2555					k hat (KM)	0.469					k star (KM)	0.395
2556					nu hat (KM)	9.389					nu star (KM)	7.906
2557					theta hat (KM)	280.7					theta star (KM)	333.4
2558					80% gamma percentile (KM)	212.4					90% gamma percentile (KM)	373.1
2559					95% gamma percentile (KM)	549.9					99% gamma percentile (KM)	995
2560												
2561					**Gamma Kaplan-Meier (KM) Statistics**							
2562					Approximate Chi Square Value (7.91, α)	2.681					Adjusted Chi Square Value (7.91, β)	2.182
2563					95% Gamma Approximate KM-UCL (use when n>=50)	388.7					95% Gamma Adjusted KM-UCL (use when n<50)	477.6
2564												
2565					**Lognormal GOF Test on Detected Observations Only**							
2566					Shapiro Wilk Test Statistic	0.955					**Shapiro Wilk GOF Test**	
2567					5% Shapiro Wilk Critical Value	0.767					Detected Data appear Lognormal at 5% Significance Level	
2568					Lilliefors Test Statistic	0.264					**Lilliefors GOF Test**	
2569					5% Lilliefors Critical Value	0.425					Detected Data appear Lognormal at 5% Significance Level	
2570					**Detected Data appear Lognormal at 5% Significance Level**							
2571												
2572					**Lognormal ROS Statistics Using Imputed Non-Detects**							
2573					Mean in Original Scale	113.3					Mean in Log Scale	3.809
2574					SD in Original Scale	210.8					SD in Log Scale	1.295
2575					95% t UCL (assumes normality of ROS data)	235.5					95% Percentile Bootstrap UCL	236.8
2576					95% BCA Bootstrap UCL	295.6					95% Bootstrap t UCL	820.4
2577					95% H-UCL (Log ROS)	523.6						
2578												
2579					**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**							
2580					KM Mean (logged)	4.372					KM Geo Mean	79.21
2581					KM SD (logged)	0.832					95% Critical H Value (KM-Log)	2.769
2582					KM Standard Error of Mean (logged)	0.37					95% H-UCL (KM -Log)	241.1
2583					KM SD (logged)	0.832					95% Critical H Value (KM-Log)	2.769
2584					KM Standard Error of Mean (logged)	0.37						
2585												
2586					**DL/2 Statistics**							
2587					**DL/2 Normal**						**DL/2 Log-Transformed**	
2588					Mean in Original Scale	117.8					Mean in Log Scale	4.079
2589					SD in Original Scale	208.3					SD in Log Scale	1.017
2590					95% t UCL (Assumes normality)	238.5					95% H-Stat UCL	287
2591					**DL/2 is not a recommended method, provided for comparisons and historical reasons**							
2592												
2593					**Nonparametric Distribution Free UCL Statistics**							
2594					**Detected Data appear Normal Distributed at 5% Significance Level**							
2595												
2596					**Suggested UCL to Use**							
2597					95% KM (t) UCL	269.7						
2598												
2599					Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.							
2600					Recommendations are based upon data size, data distribution, and skewness.							
2601					These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).							
2602					However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.							
2603												
2604	**Result (s4-cd)**											
2605												
2606					**General Statistics**							
2607					Total Number of Observations	10					Number of Distinct Observations	5
2608					Number of Detects	0					Number of Non-Detects	10
2609					Number of Distinct Detects	0					Number of Distinct Non-Detects	5
2610												
2611					**Warning: All observations are Non-Detects (NDs), therefore all statistics and estimates should also be NDs!**							
2612					**Specifically, sample mean, UCLs, UPLs, and other statistics are also NDs lying below the largest detection limit!**							
2613					**The Project Team may decide to use alternative site specific values to estimate environmental parameters (e.g., EPC, BTV).**							
2614												
2615					**The data set for variable Result (s4-cd) was not processed!**							

	A	B	C	D	E	F	G	H	I	J	K	L
2616												
2617												
2618	**Result (s4-cu)**											
2619												
2620	**General Statistics**											
2621					Total Number of Observations	10			Number of Distinct Observations	9		
2622					Number of Detects	6			Number of Non-Detects	4		
2623					Number of Distinct Detects	6			Number of Distinct Non-Detects	3		
2624					Minimum Detect	100			Minimum Non-Detect	37		
2625					Maximum Detect	510			Maximum Non-Detect	77		
2626					Variance Detects	25943			Percent Non-Detects	40%		
2627					Mean Detects	225.5			SD Detects	161.1		
2628					Median Detects	157.8			CV Detects	0.714		
2629					Skewness Detects	1.395			Kurtosis Detects	1.179		
2630					Mean of Logged Detects	5.231			SD of Logged Detects	0.648		
2631												
2632	**Normal GOF Test on Detects Only**											
2633					Shapiro Wilk Test Statistic	0.825			**Shapiro Wilk GOF Test**			
2634					5% Shapiro Wilk Critical Value	0.788			Detected Data appear Normal at 5% Significance Level			
2635					Lilliefors Test Statistic	0.278			**Lilliefors GOF Test**			
2636					5% Lilliefors Critical Value	0.325			Detected Data appear Normal at 5% Significance Level			
2637	**Detected Data appear Normal at 5% Significance Level**											
2638												
2639	**Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs**											
2640					KM Mean	150.1			KM Standard Error of Mean	50.79		
2641					KM SD	146.6			95% KM (BCA) UCL	254.3		
2642					95% KM (t) UCL	243.2			95% KM (Percentile Bootstrap) UCL	236.8		
2643					95% KM (z) UCL	233.6			95% KM Bootstrap t UCL	324		
2644					90% KM Chebyshev UCL	302.5			95% KM Chebyshev UCL	371.5		
2645					97.5% KM Chebyshev UCL	467.3			99% KM Chebyshev UCL	655.5		
2646												
2647	**Gamma GOF Tests on Detected Observations Only**											
2648					A-D Test Statistic	0.418			**Anderson-Darling GOF Test**			
2649					5% A-D Critical Value	0.702			Detected data appear Gamma Distributed at 5% Significance Level			
2650					K-S Test Statistic	0.231			**Kolmogorov-Smirnov GOF**			
2651					5% K-S Critical Value	0.335			Detected data appear Gamma Distributed at 5% Significance Level			
2652	**Detected data appear Gamma Distributed at 5% Significance Level**											
2653												
2654	**Gamma Statistics on Detected Data Only**											
2655					k hat (MLE)	2.828			k star (bias corrected MLE)	1.525		
2656					Theta hat (MLE)	79.74			Theta star (bias corrected MLE)	147.9		
2657					nu hat (MLE)	33.94			nu star (bias corrected)	18.3		
2658					Mean (detects)	225.5						
2659												

	A	B	C	D	E	F	G	H	I	J	K	L
2660	**Gamma ROS Statistics using Imputed Non-Detects**											
2661	GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs											
2662	GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)											
2663	For such situations, GROS method may yield incorrect values of UCLs and BTVs											
2664	This is especially true when the sample size is small.											
2665	For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates											
2666					Minimum	0.01			Mean			135.3
2667					Maximum	510			Median			103.8
2668					SD	167.2			CV			1.236
2669					k hat (MLE)	0.203			k star (bias corrected MLE)			0.209
2670					Theta hat (MLE)	665.6			Theta star (bias corrected MLE)			647.5
2671					nu hat (MLE)	4.066			nu star (bias corrected)			4.179
2672					Adjusted Level of Significance (β)	0.0267						
2673					Approximate Chi Square Value (4.18, α)	0.794			Adjusted Chi Square Value (4.18, β)			0.576
2674					95% Gamma Approximate UCL (use when n>=50)	712.4			95% Gamma Adjusted UCL (use when n<50)			982.5
2675												
2676	**Estimates of Gamma Parameters using KM Estimates**											
2677					Mean (KM)	150.1			SD (KM)			146.6
2678					Variance (KM)	21499			SE of Mean (KM)			50.79
2679					k hat (KM)	1.048			k star (KM)			0.8
2680					nu hat (KM)	20.96			nu star (KM)			16
2681					theta hat (KM)	143.2			theta star (KM)			187.6
2682					80% gamma percentile (KM)	245.3			90% gamma percentile (KM)			365
2683					95% gamma percentile (KM)	486.9			99% gamma percentile (KM)			774.8
2684												
2685	**Gamma Kaplan-Meier (KM) Statistics**											
2686					Approximate Chi Square Value (16.00, α)	7.965			Adjusted Chi Square Value (16.00, β)			7.002
2687					95% Gamma Approximate KM-UCL (use when n>=50)	301.6			95% Gamma Adjusted KM-UCL (use when n<50)			343.1
2688												
2689	**Lognormal GOF Test on Detected Observations Only**											
2690					Shapiro Wilk Test Statistic	0.906			**Shapiro Wilk GOF Test**			
2691					5% Shapiro Wilk Critical Value	0.788			Detected Data appear Lognormal at 5% Significance Level			
2692					Lilliefors Test Statistic	0.191			**Lilliefors GOF Test**			
2693					5% Lilliefors Critical Value	0.325			Detected Data appear Lognormal at 5% Significance Level			
2694	**Detected Data appear Lognormal at 5% Significance Level**											
2695												
2696	**Lognormal ROS Statistics Using Imputed Non-Detects**											
2697					Mean in Original Scale	148.1			Mean in Log Scale			4.518
2698					SD in Original Scale	156.2			SD in Log Scale			1.05
2699					95% t UCL (assumes normality of ROS data)	238.7			95% Percentile Bootstrap UCL			232
2700					95% BCA Bootstrap UCL	251.9			95% Bootstrap t UCL			342.3
2701					95% H-UCL (Log ROS)	488.4						
2702												
2703	**Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution**											
2704					KM Mean (logged)	4.583			KM Geo Mean			97.82
2705					KM SD (logged)	0.916			95% Critical H Value (KM-Log)			2.935
2706					KM Standard Error of Mean (logged)	0.317			95% H-UCL (KM -Log)			364.9
2707					KM SD (logged)	0.916			95% Critical H Value (KM-Log)			2.935
2708					KM Standard Error of Mean (logged)	0.317						
2709												
2710	**DL/2 Statistics**											
2711	**DL/2 Normal**								**DL/2 Log-Transformed**			
2712					Mean in Original Scale	148.7			Mean in Log Scale			4.525
2713					SD in Original Scale	155.8			SD in Log Scale			1.053
2714					95% t UCL (Assumes normality)	239			95% H-Stat UCL			496.3
2715	**DL/2 is not a recommended method, provided for comparisons and historical reasons**											
2716												

2717	**Nonparametric Distribution Free UCL Statistics**											
2718	**Detected Data appear Normal Distributed at 5% Significance Level**											
2719												
2720	**Suggested UCL to Use**											
2721					95% KM (t) UCL	243.2						
2722												
2723	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
2724	Recommendations are based upon data size, data distribution, and skewness.											
2725	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
2726	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
2727												
2728												
2729	**Result (wg-ev)**											
2730												
2731	**General Statistics**											
2732					Total Number of Observations	10			Number of Distinct Observations	9		
2733									Number of Missing Observations	0		
2734					Minimum	390			Mean	742		
2735					Maximum	970			Median	755		
2736					SD	178.4			Std. Error of Mean	56.41		
2737					Coefficient of Variation	0.24			Skewness	-0.907		
2738												
2739	**Normal GOF Test**											
2740					Shapiro Wilk Test Statistic	0.925			**Shapiro Wilk GOF Test**			
2741					5% Shapiro Wilk Critical Value	0.842			Data appear Normal at 5% Significance Level			
2742					Lilliefors Test Statistic	0.207			**Lilliefors GOF Test**			
2743					5% Lilliefors Critical Value	0.262			Data appear Normal at 5% Significance Level			
2744	**Data appear Normal at 5% Significance Level**											
2745												
2746	**Assuming Normal Distribution**											
2747					**95% Normal UCL**				**95% UCLs (Adjusted for Skewness)**			
2748					95% Student's-t UCL	845.4			95% Adjusted-CLT UCL (Chen-1995)	817.5		
2749									95% Modified-t UCL (Johnson-1978)	842.7		
2750												
2751	**Gamma GOF Test**											
2752					A-D Test Statistic	0.552			**Anderson-Darling Gamma GOF Test**			
2753					5% A-D Critical Value	0.725			Detected data appear Gamma Distributed at 5% Significance Level			
2754					K-S Test Statistic	0.242			**Kolmogorov-Smirnov Gamma GOF Test**			
2755					5% K-S Critical Value	0.266			Detected data appear Gamma Distributed at 5% Significance Level			
2756	**Detected data appear Gamma Distributed at 5% Significance Level**											
2757												
2758	**Gamma Statistics**											
2759					k hat (MLE)	15.95			k star (bias corrected MLE)	11.23		
2760					Theta hat (MLE)	46.51			Theta star (bias corrected MLE)	66.05		
2761					nu hat (MLE)	319			nu star (bias corrected)	224.7		
2762					MLE Mean (bias corrected)	742			MLE Sd (bias corrected)	221.4		
2763									Approximate Chi Square Value (0.05)	191		
2764					Adjusted Level of Significance	0.0267			Adjusted Chi Square Value	185.6		
2765												
2766	**Assuming Gamma Distribution**											
2767					95% Approximate Gamma UCL (use when n>=50))	872.9			95% Adjusted Gamma UCL (use when n<50)	898.3		
2768												
2769	**Lognormal GOF Test**											
2770					Shapiro Wilk Test Statistic	0.861			**Shapiro Wilk Lognormal GOF Test**			
2771					5% Shapiro Wilk Critical Value	0.842			Data appear Lognormal at 5% Significance Level			
2772					Lilliefors Test Statistic	0.262			**Lilliefors Lognormal GOF Test**			
2773					5% Lilliefors Critical Value	0.262			Data Not Lognormal at 5% Significance Level			
2774	**Data appear Approximate Lognormal at 5% Significance Level**											
2775												

	A	B	C	D	E	F	G	H	I	J	K	L
2776	**Lognormal Statistics**											
2777					Minimum of Logged Data	5.966			Mean of logged Data			6.578
2778					Maximum of Logged Data	6.877			SD of logged Data			0.28
2779												
2780	**Assuming Lognormal Distribution**											
2781					95% H-UCL	897.1			90% Chebyshev (MVUE) UCL			943.3
2782					95% Chebyshev (MVUE) UCL	1033			97.5% Chebyshev (MVUE) UCL			1158
2783					99% Chebyshev (MVUE) UCL	1404						
2784												
2785	**Nonparametric Distribution Free UCL Statistics**											
2786	**Data appear to follow a Discernible Distribution at 5% Significance Level**											
2787												
2788	**Nonparametric Distribution Free UCLs**											
2789					95% CLT UCL	834.8			95% Jackknife UCL			845.4
2790					95% Standard Bootstrap UCL	832.3			95% Bootstrap-t UCL			829.1
2791					95% Hall's Bootstrap UCL	819.4			95% Percentile Bootstrap UCL			824
2792					95% BCA Bootstrap UCL	818						
2793					90% Chebyshev(Mean, Sd) UCL	911.2			95% Chebyshev(Mean, Sd) UCL			987.9
2794					97.5% Chebyshev(Mean, Sd) UCL	1094			99% Chebyshev(Mean, Sd) UCL			1303
2795												
2796	**Suggested UCL to Use**											
2797					95% Student's-t UCL	845.4						
2798												
2799	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
2800	Recommendations are based upon data size, data distribution, and skewness.											
2801	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
2802	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
2803												
2804	**Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be**											
2805	**reliable. Chen's and Johnson's methods provide adjustments for positvely skewed data sets.**											
2806												
2807												
2808	**Result (wg-wv)**											
2809												
2810	**General Statistics**											
2811					Total Number of Observations	10			Number of Distinct Observations			10
2812									Number of Missing Observations			0
2813					Minimum	190			Mean			305.4
2814					Maximum	610			Median			258
2815					SD	127.4			Std. Error of Mean			40.3
2816					Coefficient of Variation	0.417			Skewness			1.676
2817												
2818	**Normal GOF Test**											
2819					Shapiro Wilk Test Statistic	0.823			**Shapiro Wilk GOF Test**			
2820					5% Shapiro Wilk Critical Value	0.842			Data Not Normal at 5% Significance Level			
2821					Lilliefors Test Statistic	0.239			**Lilliefors GOF Test**			
2822					5% Lilliefors Critical Value	0.262			Data appear Normal at 5% Significance Level			
2823	**Data appear Approximate Normal at 5% Significance Level**											
2824												
2825	**Assuming Normal Distribution**											
2826	**95% Normal UCL**								**95% UCLs (Adjusted for Skewness)**			
2827					95% Student's-t UCL	379.2			95% Adjusted-CLT UCL (Chen-1995)			394.4
2828									95% Modified-t UCL (Johnson-1978)			382.8
2829												
2830	**Gamma GOF Test**											
2831					A-D Test Statistic	0.47			**Anderson-Darling Gamma GOF Test**			
2832					5% A-D Critical Value	0.727			Detected data appear Gamma Distributed at 5% Significance Level			
2833					K-S Test Statistic	0.225			**Kolmogorov-Smirnov Gamma GOF Test**			
2834					5% K-S Critical Value	0.267			Detected data appear Gamma Distributed at 5% Significance Level			
2835	**Detected data appear Gamma Distributed at 5% Significance Level**											

2836												
2837	**Gamma Statistics**											
2838					k hat (MLE)	7.881	k star (bias corrected MLE)					5.584
2839					Theta hat (MLE)	38.74	Theta star (bias corrected MLE)					54.69
2840					nu hat (MLE)	157.6	nu star (bias corrected)					111.7
2841					MLE Mean (bias corrected)	305.4	MLE Sd (bias corrected)					129.2
2842							Approximate Chi Square Value (0.05)					88.28
2843					Adjusted Level of Significance	0.0267	Adjusted Chi Square Value					84.67
2844												
2845	**Assuming Gamma Distribution**											
2846				95% Approximate Gamma UCL (use when n>=50))		386.3	95% Adjusted Gamma UCL (use when n<50)					402.7
2847												
2848	**Lognormal GOF Test**											
2849					Shapiro Wilk Test Statistic	0.915	**Shapiro Wilk Lognormal GOF Test**					
2850					5% Shapiro Wilk Critical Value	0.842	Data appear Lognormal at 5% Significance Level					
2851					Lilliefors Test Statistic	0.204	**Lilliefors Lognormal GOF Test**					
2852					5% Lilliefors Critical Value	0.262	Data appear Lognormal at 5% Significance Level					
2853	**Data appear Lognormal at 5% Significance Level**											
2854												
2855	**Lognormal Statistics**											
2856					Minimum of Logged Data	5.247	Mean of logged Data					5.657
2857					Maximum of Logged Data	6.413	SD of logged Data					0.364
2858												
2859	**Assuming Lognormal Distribution**											
2860					95% H-UCL	391.9	90% Chebyshev (MVUE) UCL					409.6
2861					95% Chebyshev (MVUE) UCL	457.5	97.5% Chebyshev (MVUE) UCL					524.1
2862					99% Chebyshev (MVUE) UCL	654.8						
2863												
2864	**Nonparametric Distribution Free UCL Statistics**											
2865	**Data appear to follow a Discernible Distribution at 5% Significance Level**											
2866												
2867	**Nonparametric Distribution Free UCLs**											
2868					95% CLT UCL	371.6	95% Jackknife UCL					379.2
2869					95% Standard Bootstrap UCL	368.6	95% Bootstrap-t UCL					441.5
2870					95% Hall's Bootstrap UCL	477.7	95% Percentile Bootstrap UCL					371.1
2871					95% BCA Bootstrap UCL	388						
2872					90% Chebyshev(Mean, Sd) UCL	426.2	95% Chebyshev(Mean, Sd) UCL					481
2873					97.5% Chebyshev(Mean, Sd) UCL	557	99% Chebyshev(Mean, Sd) UCL					706.3
2874												
2875	**Suggested UCL to Use**											
2876					95% Student's-t UCL	379.2						
2877												
2878	When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test											
2879	When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL											
2880												
2881	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
2882	Recommendations are based upon data size, data distribution, and skewness.											
2883	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
2884	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
2885												

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