# 2022 ANNUAL REPORT FOR GROUNDWATER MONITORED NATURAL ATTENUATION

## Pulp & Tissue Mill RAU, Georgia-Pacific West Site

Prepared for: Port of Bellingham

Project No. 140298-A-19 • February 14, 2023 • Final

Aspect CONSULTING

earth + water

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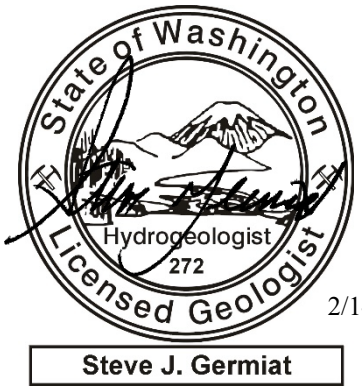


2/14/2023

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# 1 Background for Groundwater Monitoring Program

This report presents results from the 2022 compliance monitoring for the groundwater monitored natural attenuation (MNA) cleanup action selected by the Washington State Department of Ecology (Ecology) for the Pulp and Tissue Mill (PTM) Remedial Action Unit (RAU) at the Georgia-Pacific West Site (Site). The PTM RAU is being cleaned up under the terms of Consent Decree No. 14207008 (Decree) between the Port of Bellingham (Port) and Ecology. Monitoring of the groundwater MNA cleanup action is being conducted by Aspect Consulting, LLC (Aspect) in accordance with the Compliance Monitoring Plan for Groundwater MNA (CMP; Aspect, 2015), which was reviewed and approved by Ecology prior to initiation of the monitoring program.

As described in the Cleanup Action Plan for the PTM RAU (CAP; Ecology, 2014), the highest beneficial use of Site groundwater is discharge to marine water and sediment, not potable use, and groundwater cleanup levels (CULs) for the PTM RAU were established accordingly. Groundwater CULs for individual contaminants are included in the data tables for this report (Tables 1 and 2).

At the time of the CAP preparation in 2014, the contaminants that exceeded CULs in PTM RAU groundwater included:

- Acidic pH and selected metals in the Acid Plant Subarea
- Chlorinated solvent volatile organic compounds (VOCs) tetrachloroethene (PCE) and vinyl chloride (VC) in the LP-MW01 Subarea
- Selected metals in the Miscellaneous Dissolved Metals Exceedances Area (termed here Miscellaneous Metals Area).

Figure 1 depicts the locations of these three areas. Subsequent to the CAP, chlorinated VOC concentrations in the LP-MW01 Subarea were demonstrated to meet groundwater cleanup levels by the end of the 2017 monitoring period; therefore, monitoring for that subarea was terminated, as documented in the 2017 MNA Monitoring Annual Report (Aspect, 2018a). The LP-MW01 Subarea is therefore not discussed further in this report.

As described in the 2017 MNA Monitoring Annual Report (Aspect, 2018a), wells AA-MW01 through AA-MW04, FH-MW01, and GF-MW01 were decommissioned in 2016 prior to construction of the RAU-wide environmental cap and, following cap construction, were replaced with wells that were essentially identical in construction and location. The replacement well names included an ‘R’ suffix (e.g., AA-MW01R). Wells AA-MW01R and FH-MW01R were subsequently decommissioned in early 2021 to accommodate construction of Harcourt Development’s (Harcourt) Granary Avenue Waterfront Residential project, the outline of which is depicted on Figure 1. Those wells will be reestablished for monitoring, in consultation with Ecology, following completion of that redevelopment project. Figure 1 depicts locations of the monitoring wells that have been and are currently being monitored during the MNA program, including wells that were not accessible for monitoring during the 2022 monitoring.

This report documents the groundwater MNA compliance monitoring data collected to date and, in accordance with Section 2.2 of the CMP, presents the plan for the next year of monitoring.

Following this Background section, the structure of the report is as follows:

- Section 2 – Describes the groundwater sampling and analysis completed in 2022.
- Section 3 – Contains an evaluation of the groundwater analytical data with respect to compliance with CULs and long-term trends.
- Section 4 – Presents the plan for monitoring in 2023.

# 2 2022 Groundwater Sampling and Analysis

In accordance with the CMP (Aspect, 2015) and the findings from the 2021 MNA Monitoring Annual Report (Aspect, 2022), semiannual groundwater monitoring was performed in April and October of 2022. The wells sampled are depicted on Figure 1 and their chemical analyses[1] in 2022 were as follows:

**Acid Plant Subarea**

- Within the active construction area for Harcourt's residential redevelopment project, wells FH-MW01R and AA-MW01R were previously decommissioned and, therefore, could not be monitored in 2022. In addition, wells GF-MW01R and BC-MW05 remained inaccessible for monitoring in 2022 because they are located within the active construction active (fenced area).
- The two groundwater samples from well AA-MW04R was analyzed for five dissolved metals: arsenic, cadmium, copper, nickel, and zinc.
- Because wells AA-MW04R and FH-MW01R did not yet meet cleanup levels at the end of 2021, the following wells positioned outside the Acid Plant Subarea were also monitored in accordance with the CMP:
    - Crossgradient from the Acid Plant Subarea, groundwater parameters, including pH, were measured in the field at wells AA-MW02R and AA-MW03R.[2] If the field measurement of groundwater pH was less than pH 6.2 in a well, then that well was sampled for analysis of the same five dissolved metals as were analyzed at AA-MW04R. During 2022:

[1] Groundwater parameters (temperature, pH, electrical conductance, and oxidation reduction potential [ORP]) were also measured in the field for each monitoring location and event. Dissolved oxygen was measured in the October 2022 event, but the dissolved oxygen probe was not functioning during the April event.

[2] Well AA-MW03R had pH exceeding the CUL, but no dissolved metals exceedances during the RI/FS period (2009–2013), so is considered on the edge of the Acid Plant Subarea.

- Well AA-MW03R had a measured pH less than 6.2 during the April and October 2022 monitoring events, so groundwater samples were collected for analysis of the five dissolved metals during both events.
- Well AA-MW02R had a pH of greater than 6.2 during both monitoring events in 2022. Regardless of pH, well AA-MW02R was sampled for dissolved copper during each round to provide monitoring downgradient of the Miscellaneous Metals Area as required by the CMP and as described below.

**Miscellaneous Metals Area**

- Within the Miscellaneous Metals Area, groundwater samples from wells LP-MW01 and SC-MW02R were analyzed for dissolved copper.
- Because wells LP-MW01 and SC-MW02R did not meet CULs at the end of 2021, downgradient wells LB-MW01R and AA-MW02R were sampled for dissolved copper in accordance with the CMP.

# 3 Data Evaluation

The following subsections describe the analytical results from the 2022 groundwater monitoring events for the Acid Plant Subarea and Miscellaneous Metals Area. The 2022 results are compared with CULs and with data from prior monitoring events to assess temporal trends in groundwater pH and metals concentrations. Tables 1 and 2 present the analytical results over the entire period of monitoring for the Acid Plant Subarea and Miscellaneous Metals Area, respectively.

Based on Aspect's independent quality assurance validation of the 2022 analytical data, no data were qualified, and the data are usable for their intended purpose. Appendix A provides Aspect's data validation report and the laboratory reports generated by OnSite Environmental[3] for the two rounds of 2022 analytical data.

## 3.1 Acid Plant Subarea

### *3.1.1 pH*

The groundwater pH exceeded the CUL (pH 6.2)[4] in well AA-MW04R, located within the acidic source area,[5] and at crossgradient well AA-MW03R,[6] during both 2022 monitoring events. The crossgradient shoreline well GF-MW01R, located mill-west of

[3] An analytical laboratory accredited by Ecology and located in Redmond, Washington.

[4] While the term "exceedance" typically refers to a measurement greater than a cleanup level, for acidic pH, it refers to a measurement less than the pH 6.2 CUL.

[5] The 2004 data from the acidic source area are from well GF-MW02, which was located just mill-west of well AA-MW04/04R (Figure 1), but which could not be found at the start of the RI in 2009.

[6] This well has data from 2009 to 2022 only; there was not a monitoring well in the AA-MW03R location in 2004.

the Acid Plant Subarea, could not be monitored in 2022 as described in Section 2. The measured pH met the CUL at the crossgradient inland well AA-MW02R during both 2022 monitoring events.

Within the Acid Plant Subarea as a whole, measured pH levels show a gradual, long-term improvement (increase in pH) relative to the earliest measurements in 2004, but with considerable short-term variation. Figure 2 graphically illustrates the long-term pH trends at three well locations within the Subarea since their monitoring began (2004 for AA-MW04R and FH-MW01R[7]; 2009 for AA-MW03R). On all figures in this report, the groundwater pH vertical axis is plotted in reverse order, so that points higher on the axis are farther from the CUL (pH 6.2), consistent with how metals concentrations are plotted. The average annual groundwater pH in these three pH-impacted wells over the past 5 years (no data from decommissioned well FH-MW01R over past 2 years) are tabulated below.

| Well | Area represented by samples from well | Average Annual Groundwater pH (CUL = 6.2) | | | | |
|---|---|---|---|---|---|---|
| | | 2018 | 2019 | 2020 | 2021 | 2022 |
| AA-MW04R | Acidic metals plume source | 4.8 | 5.5 | 6.3 | 5.8 | 6.4 |
| FH-MW01R | Downgradient from source | 5.5 | 5.7 | 5.0 | NA | NA |
| AA-MW03R | Crossgradient from source | 4.5 | 5.6 | 5.8 | 6.2 | 5.7 |

NA: Not monitored.

Observations regarding groundwater pH for wells AA-MW-04R and AA-MW03R are as follows:

- Within the footprint of the historical Acid Plant where the release(s) of acid occurred ("source area" well AA-MW04R), the pH readings measured during both 2022 monitoring events (6.23 and 6.73) were greater than the CUL for the first time in the entire 18-year monitoring period (Table 1). Despite the anomalously low pH of 5.5 measured in October 2021, the acidic pH within the source area is trending toward near-neutral (Figure 2).
- The 2022 measurements from crossgradient well AA-MW03R reversed the trend of increasing pH observed between 2018 and 2021, with the October 2022 reading (pH 5.55) being the lowest value measured since October 2019 (pH 5.47) (Table 1).

## *3.1.2 Dissolved Metals*

### AA-MW04R

The 2022 dissolved metals concentrations detected at source area well AA-MW04R were lower than measured during October 2021, and the October 2022 sample was the first, over the 18-year period of monitoring, in which the concentration of every metal met its CUL (Table 1).

Plotting the groundwater pH and the summed concentrations of the five dissolved metals monitored (arsenic, cadmium, copper, nickel, zinc) over time illustrates a general

[7] Combining data from original wells and replacement wells in those locations.

improvement in groundwater quality since the October 2016 concentration spike created by formation disturbance during drilling of replacement well AA-MW04R, which was described in the 2018 MNA Monitoring Annual Report (Aspect, 2018b). A general correlation between lower pH and higher metals concentrations is also apparent over the past 5 years of data, although the correlation is not perfect (Figure 3).[8]

### FH-MW01R

Well FH-MW01R was inaccessible and could not be sampled in 2022, as described in Section 2. Accordingly, no analysis of metals trends beyond that presented in the 2020 MNA Monitoring Annual Report (Aspect, 2021) can be conducted.

### AA-MW03R

At well AA-MW03R, located on the mill-east edge of the Acid Plant Subarea (Figure 1), the concentrations of dissolved metals were less than CULs (most were nondetect) despite the pH being less than the pH 6.2 CUL during both events. The data indicate that the elevated dissolved nickel concentrations first observed in April 2018, and resulting from the City of Bellingham's adjacent Granary Avenue-Laurel Street (GALS) construction as first described in Aspect's 2018 Annual Report (2018b), have abated (Table 1).

### AA-MW01R

Shoreline well AA-MW01R could not be sampled in 2022 as described in Section 2. Accordingly, no analysis of metals trends beyond that presented in the 2020 Annual Report (Aspect, 2021) can be conducted. Following a 2018 spike in dissolved nickel attributable to GALS construction, all metals were nondetect at this shoreline well during each of the five monitoring events from January 2019 through April 2020 (Table 1).

### Other Cross-Gradient and Downgradient Wells

During both 2022 monitoring events, dissolved copper remained nondetect at well AA-MW02R located mill-east of the Acid Plant Subarea (Figure 1). Wells GF-MW01R and BC-MW05 were inaccessible and could not be monitored in 2022, as described in Section 2.

## 3.2 Miscellaneous Metals Area

The Miscellaneous Metals Area encompasses two wells, LP-MW01 and SC-MW02R, that had low-level exceedances of selected metals without pH impacts during the Site remedial investigation/feasibility study (RI/FS).

### LP-MW01

Groundwater pH at well LP-MW01 complied with the CUL during both 2022 monitoring events, consistent with prior data. The dissolved copper concentrations detected in the April and October 2022 samples both exceeded the CUL, with the 25 micrograms per

[8] Figure 3 does not extend back to 2004 because adjacent 2004 well GF-MW02 never had elevated metals concentrations in groundwater, despite having highly acidic groundwater, so it is not meaningful to combine those data for analysis of long-term metals trends back to 2004.

liter (µg/L) October result being the highest measured concentration since 2004. The cause of the anomalous dissolved copper result in not known; however, the seasonal pattern of higher concentrations in the dry season versus the wet season continues with the 2022 monitoring data (Table 2). The anomalously high October 2022 result also reverses the general trend of declining average annual copper concentrations that had been observed between 2017 and 2021, as indicated in the tabulation below.

| Year | Average Annual Copper in µg/L |
|---|---|
| 2017* | 7.7 |
| 2018 | 7.5 |
| 2019 | 6.2 |
| 2020 | 6.0 |
| 2021 | 5.8 |
| 2022 | 14.5 |

* 2017 average includes October 2016 data (see Table 2)

## SC-MW02R

At well SC-MW02R, the dissolved copper concentration was slightly below the CUL during the April sampling event, but above it during the October event (2.5 µg/L and 6.6 µg/L, respectively; Table 2). The resulting 2022 average annual copper concentration (4.6 µg/L) is above the CUL and slightly higher than measured in 2020 and 2021, as noted in the tabulation below.

| Year | Average Annual Copper in µg/L |
|---|---|
| 2017* | 3.9 |
| 2018 | 7.8 |
| 2019 | 7.8 |
| 2020 | 3.1 |
| 2021 | 2.6 |
| 2022 | 4.6 |

* 2017 average includes October 2016 data (see Table 2)

## Downgradient Wells AA-MW02R and LB-MW01R

At well AA-MW02R, downgradient of the Miscellaneous Metals Area, dissolved copper remained nondetect, consistent with prior results (Table 2).

At the other downgradient well, LB-MW01R, dissolved copper was less than the CUL during the April sampling event (1.9 µg/L), but above it during the October sampling event (5.2 µg/L)—the opposite of the relative change observed between those months in 2021 (Table 2). The 2022 average annual dissolved copper concentration at the well was slightly lower than measured in the past 6 years, as indicated in the tabulation below.

| Year | Average Annual Copper in µg/L |
|---|---|
| 2017* | 5.2 |
| 2018 | 5.6 |
| 2019 | 5.0 |
| 2020 | 5.6 |
| 2021 | 4.6 |
| 2022 | 3.6 |

* 2017 average includes October 2016 data (see Table 2)

# 4 Plan for 2023 MNA Monitoring

Following completion of the 2022 MNA monitoring, no wells or analytes qualify for exclusion from the monitoring program based on the decision framework of the CMP (Aspect, 2015). As described in the 2015 CMP and reiterated above, wells AA-MW02R, AA-MW03R, and LB-MW01 must be monitored until other specified wells reach CULs.

Consequently, the semiannual monitoring program conducted in 2022 will be repeated in 2023—the same analytes will be measured from the same wells in April and October 2023, as indicated in Table 3.

Following receipt of data from the 2023 monitoring events, an annual report will be prepared that analyzes the collective data and re-evaluates the scope of the monitoring program for the subsequent (2024) monitoring, in accordance with the CMP.

# 5 References

Aspect Consulting, LLC (Aspect), 2015, Compliance Monitoring Plan for Groundwater Monitored Natural Attenuation, Pulp & Tissue Mill RAU, Georgia-Pacific West Site, July 7, 2015.

Aspect Consulting, LLC (Aspect), 2018a, 2017 Annual Report for Groundwater Monitored Natural Attenuation, Pulp & Tissue Mill RAU, Georgia-Pacific West Site, January 3, 2018.

Aspect Consulting, LLC (Aspect), 2018b, 2018 Annual Report for Groundwater Monitored Natural Attenuation, Pulp & Tissue Mill RAU, Georgia-Pacific West Site, December 17, 2018.

Aspect Consulting, LLC (Aspect), 2020, 2019 Annual Report for Groundwater Monitored Natural Attenuation, Pulp & Tissue Mill RAU, Georgia-Pacific West Site, January 17, 2020.

Aspect Consulting, LLC (Aspect), 2021, 2020 Annual Report for Groundwater Monitored Natural Attenuation, Pulp & Tissue Mill RAU, Georgia-Pacific West Site, January 19, 2021.

Aspect Consulting, LLC (Aspect), 2022, 2021 Annual Report for Groundwater Monitored Natural Attenuation, Pulp & Tissue Mill RAU, Georgia-Pacific West Site, February 15, 2022.

Washington State Department of Ecology (Ecology), 2014, Cleanup Action Plan, Pulp/Tissue Mill Remedial Action Unit, Georgia-Pacific West Site, Bellingham, Washington, Exhibit B to Consent Decree No. 14207008, October 30, 2014.

# 6 Limitations

Work for this project was performed for the Port of Bellingham (Client), and this report was prepared in accordance with generally accepted professional practices for the nature and conditions of work completed in the same or similar localities, at the time the work was performed. This report does not represent a legal opinion. No other warranty, expressed or implied, is made.

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# TABLES

# Table 1. Groundwater Chemistry Data for Acid Plant Subarea

Project No. 140298-A, Georgia-Pacific West Site, Bellingham, Washington

| Analyte | Units | Groundwater Cleanup Level | Wells Within Acidic Metals Plume | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | GF-MW02 | AA-MW04 | | | AA-MW04R | | | | | | | | |
| | | | 07/25/04 | 09/29/09 | 03/30/10 | 02/25/15 | 10/14/16 | 11/02/16 | 01/11/17 | 04/17/17 | 07/05/17 | 01/24/18 | 04/23/18 | 07/10/18 | 10/02/18 |
| **Field Parameters** | | | | | | | | | | | | | | | |
| pH | pH units | 6.2 | **3.34** | **4.18** | **4.49** | **4.50** | **4.34** | **4.38** | **4.51** | **4.53** | **4.45** | **4.58** | **4.54** | **5.5** | **6.5** |
| Temperature | deg C | | **18.87** | **15.35** | **11.12** | **11.0** | **15.49** | **15.48** | **8.81** | **11.1** | **15.95** | **10.9** | **12.8** | **15.1** | **15.7** |
| Specific Conductance | uS/cm | | **2442** | **2345** | **1716** | **538.7** | **2900.6** | **2123.3** | **1527.3** | **1195** | **1095.6** | **835** | **981** | **1150** | **1088** |
| Dissolved Oxygen | mg/L | | **1.55** | **1.23** | **0.38** | **0.51** | **0.12** | **0.14** | **0.15** | **0.26** | **0.13** | **0.4** | **0.3** | **0.1** | **0.11** |
| ORP | mV | | **393.7** | **-164** | **277.9** | **74.7** | **204.2** | **167.4** | **136.1** | **158.3** | **135.4** | **83** | **62** | **44** | **-177** |
| Turbidity | NTU | | **5** | **10** | **20** | **2** | **22** | **7** | **13** | **--** | **6** | **--** | **20** | **35** | **0.02** |
| **Metals** | | | | | | | | | | | | | | | |
| Arsenic (Dissolved) | ug/L | 5 | **38** | **4.73** | **48** | **5.3** | **83** | **17** | **6.4** | **7.1** | **25** | **14** | 3.0 U | **8.1** | **17** |
| Cadmium (Dissolved) | ug/L | 8.8 | **81.1** | **1650** | **74.3** | **7.8** | **5000** | **920** | **120** | **49** | **20** | **14** | **9.4** | **47** | 4.0 U |
| Copper (Dissolved) | ug/L | 3.1 | **795** | **2.78** | **179** | **1.4** | **15000** | **3900** | **1000** | **420** | **240** | **120** | **170** | **130** | **3.8** |
| Nickel (Dissolved) | ug/L | 8.2 | **626** | **1560** | **108** | **19** | **1400** | **320** | **65** | **39** | **42** | **24** | **13** | **83** | 4.0 U |
| Zinc (Dissolved) | ug/L | 81 | **2440** | **7420** | **836** | **82** | **10000** | **1800** | **440** | **250** | **330** | **150** | **83** | **330** | 25 U |

| Analyte | Units | Groundwater Cleanup Level | Wells Within Acidic Metals Plume | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | AA-MW04R (continued) | | | | | | | | | |
| | | | 01/13/19 | 04/08/19 | 07/24/19 | 10/09/19 | 04/21/20 | 10/07/20 | 04/29/21 | 10/20/21 | 04/27/22 | 10/26/22 |
| **Field Parameters** | | | | | | | | | | | | |
| pH | pH units | 6.2 | **5.93** | **5.08** | **6.28** | **5.68** | **6.13** | **6.43** | **6.30** | **5.53** | **6.23** | **6.73** |
| Temperature | deg C | | **12.66** | **10.6** | **16.8** | **15.9** | **11.4** | **16.3** | **12.1** | **16.1** | **11.1** | **15.3** |
| Specific Conductance | uS/cm | | **1254** | **1478** | **1149** | **1126** | **770** | **838** | **748** | **823** | **1022** | **967** |
| Dissolved Oxygen | mg/L | | **0.14** | **0.22** | **0.61** | **0.19** | **0.93** | **0.28** | **0.23** | **0.11** | -- | **0.27** |
| ORP | mV | | **63** | **145** | **-9** | **68** | **-135** | **-39** | **-202** | **147** | **125** | **-42** |
| Turbidity | NTU | | **29** | **17** | **15** | **46** | **12** | **8** | **3** | **4** | **5** | **11** |
| **Metals** | | | | | | | | | | | | |
| Arsenic (Dissolved) | ug/L | 5 | 3.0 U | 3.0 U | **4.3** | 3.0 U | 3.0 U | 3.0 U | 3.0 U | 3.0 U | **5.0** | **4.4** |
| Cadmium (Dissolved) | ug/L | 8.8 | **81** | **54** | 4.0 U | **120** | 4.0 U | 4.0 U | 4.0 U | **66** | **23** | 4.0 U |
| Copper (Dissolved) | ug/L | 3.1 | **100** | **300** | **18** | **94** | **1.2** | 1.0 U | **1.2** | **190** | **110** | **3.0** |
| Nickel (Dissolved) | ug/L | 8.2 | **93** | **60** | **18** | **130** | **38** | **21** | **24** | **44** | **18** | 4.0 U |
| Zinc (Dissolved) | ug/L | 81 | **480** | **470** | **68** | **530** | **66** | **44** | **63** | **230** | **110** | 25 U |

## Table 1. Groundwater Chemistry Data for Acid Plant Subarea

Project No. 140298-A, Georgia-Pacific West Site, Bellingham, Washington

| Analyte | Units | Groundwater Cleanup Level | Wells Within Acidic Metals Plume | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | FH-MW01 | | | | FH-MW01R | | | | | | | |
| | | | 07/25/04 | 09/29/09 | 03/30/10 | 02/25/15 | 10/15/16 | 01/11/17 | 04/18/17 | 07/05/17 | 01/24/18 | 04/23/18 | 07/10/18 | 10/02/18 |
| **Field Parameters** | | | | | | | | | | | | | | |
| pH | pH units | 6.2 | **4.11** | **4.36** | **4.64** | **5.27** | **4.92** | **5.16** | **5.41** | **5.08** | **5.46** | **5.52** | **5.35** | **5.7** |
| Temperature | deg C | | **20.39** | **16.53** | **11.22** | **11.9** | **16.91** | **9.93** | **12.5** | **19.52** | **11.8** | **12.2** | **16.3** | **17.1** |
| Specific Conductance | uS/cm | | **2305** | **2132** | **1613** | **1877** | **2085.4** | **1527.5** | **1348** | **1458.5** | **1152** | **1563** | **1899** | **2086** |
| Dissolved Oxygen | mg/L | | **0.73** | **0.82** | **0.45** | **0.80** | **0.1** | **0.16** | **0.33** | **0.35** | **1.4** | **0.3** | **0.1** | **0.17** |
| ORP | mV | | **261** | **-159** | **72** | **122** | **-155** | **44** | **83** | **-114** | **-22** | **-7** | **-57** | **-174** |
| Turbidity | NTU | | **3.22** | **10** | **10** | **300** | **36.1** | **19.2** | -- | **21.2** | -- | **39** | **25** | **3.94** |
| **Metals** | | | | | | | | | | | | | | |
| Arsenic (Dissolved) | ug/L | 5 | **2** | **2.72** | 0.5 U | 3 U | 3.0 U | 3.0 U | 3.0 U | 3.0 U | **5.3** | **15** | **88** | **20** |
| Cadmium (Dissolved) | ug/L | 8.8 | 0.2 U | 0.02 U | **0.443** | 4 U | 4.0 U | 4.0 U | 4.0 U | 4.0 U | 4.0 U | **5.9** | 4.0 U | 4.0 U |
| Copper (Dissolved) | ug/L | 3.1 | **0.8** | **1.55** | **1.55** | 1 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U |
| Nickel (Dissolved) | ug/L | 8.2 | **405** | **209** | **459** | **190** | **140** | **69** | **59** | **77** | **54** | **6200** | **2700** | **1100** |
| Zinc (Dissolved) | ug/L | 81 | **760** | **616** | **1130** | **530** | **510** | **250** | **180** | **230** | **150** | **950** | **560** | **180** |

| Analyte | Units | Groundwater Cleanup Level | Wells Within Acidic Metals Plume | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | FH-MW01R (continued) | | | | | |
| | | | 01/14/19 | 04/08/19 | 07/24/19 | 10/09/19 | 04/22/20 | 10/07/20 | 04/29/21 | 10/20/21 | 04/27/22 | 10/26/22 |
| **Field Parameters** | | | | | | | | |
| pH | pH units | 6.2 | **5.96** | **5.71** | **5.69** | **5.62** | **5.00** | **Not Monitored** |
| Temperature | deg C | | **10.82** | **11.9** | **16.8** | **16.7** | **11.7** | |
| Specific Conductance | uS/cm | | **2291** | **2370** | **2110** | **1879** | **1005** | |
| Dissolved Oxygen | mg/L | | **0.34** | **0.38** | **0.29** | **0.17** | **0.80** | |
| ORP | mV | | **32** | **-10** | **-24** | **64** | **32** | |
| Turbidity | NTU | | **37** | **40.5** | **34.1** | **11.8** | **17** | |
| **Metals** | | | | | | | | |
| Arsenic (Dissolved) | ug/L | 5 | **29** | **35** | **25** | **27** | **46** | **Not Monitored** |
| Cadmium (Dissolved) | ug/L | 8.8 | 4.0 U | 4.0 U | 4.0 U | 4.0 U | 4.0 U | |
| Copper (Dissolved) | ug/L | 3.1 | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | |
| Nickel (Dissolved) | ug/L | 8.2 | **2400** | **2500** | **990** | **850** | **590** | |
| Zinc (Dissolved) | ug/L | 81 | **810** | **1300** | **940** | **840** | **750** | |

# Table 1. Groundwater Chemistry Data for Acid Plant Subarea

Project No. 140298-A, Georgia-Pacific West Site, Bellingham, Washington

| Analyte | Units | Groundwater Cleanup Level | Wells Outside of Acidic Metals Plume | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | AA-MW01 | | | AA-MW01R | | | | | | | |
| | | | 09/29/09 | 03/30/10 | 02/25/15 | 10/15/16 | 01/11/17 | 04/17/17 | 07/06/17 | 01/24/18 | 04/23/18 | 07/10/18 | 10/02/18 |
| **Field Parameters** | | | | | | | | | | | | | |
| pH | pH units | 6.2 | **7.56** | **6.92** | **6.99** | **6.99** | **6.91** | **6.99** | **6.74** | **6.75** | **6.98** | **6.82** | **6.79** |
| Temperature | deg C | | **18.45** | **12.8** | **11.9** | **16.36** | **11.01** | **12.9** | **17.18** | **12.9** | **13.3** | **16.1** | **17.5** |
| Specific Conductance | uS/cm | | **746** | **848** | **1526** | **1503.7** | **1341.3** | **1333** | **1361.2** | **1586** | **1437** | **2720** | **5075** |
| Dissolved Oxygen | mg/L | | **1.2** | **0.47** | **0.55** | **0.11** | **0.16** | **1** | **0.13** | **0.3** | **0.5** | **0.2** | **0.13** |
| ORP | mV | | **-354** | **-113** | **9** | **-194** | **-33** | **-107** | **-81** | **-85** | **-49** | **-108** | **-210** |
| Turbidity | NTU | | **10** | **10** | **1.39** | **27.3** | **37.3** | -- | **4.54** | -- | **14** | **12** | **16.4** |
| **Metals** | | | | | | | | | | | | | |
| Arsenic (Dissolved) | ug/L | 5 | **0.11 J** | 0.5 U | 3 U | 3.0 U | 3.0 U | 3.0 U | 3.0 U | 3.0 U | **4.5** | **3.8** | 3.0 U |
| Cadmium (Dissolved) | ug/L | 8.8 | 0.02 U | 0.02 U | 4 U | 4.0 U | 4.0 U | 4.0 U | 4.0 U | 4.0 U | 4.0 U | 4.0 U | 4.0 U |
| Copper (Dissolved) | ug/L | 3.1 | **0.3** | **0.58** | 1 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U |
| Nickel (Dissolved) | ug/L | 8.2 | **0.84** | **1.62** | 4 U | 4.0 U | 4.0 U | 4.0 U | 4.0 U | 4.0 U | **130** | **16** | **11** |
| Zinc (Dissolved) | ug/L | 81 | 0.5 U | 0.5 U | 25 U | 25 U | 25 U | 10 U | 25 U | 25 U | 25.0 U | 25 U | 25 U |

| Analyte | Units | Groundwater Cleanup Level | Wells Outside of Acidic Metals Plume | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | AA-MW01R (continued) | | | | | | | | | |
| | | | 01/13/19 | 04/08/19 | 07/24/19 | 10/10/19 | 04/21/20 | 10/07/20 | 04/29/21 | 10/20/21 | 04/27/22 | 10/26/22 |
| **Field Parameters** | | | | | | | | | | | | |
| pH | pH units | 6.2 | **7.38** | **7.03** | **6.88** | **6.88** | **7.05** | **Not Monitored** | | | | |
| Temperature | deg C | | **13.33** | **12.4** | **18.4** | **17.5** | **12.8** | | | | | |
| Specific Conductance | uS/cm | | **2575.2** | **1313** | **5253** | **5139** | **1201** | | | | | |
| Dissolved Oxygen | mg/L | | **0.12** | **0.21** | **0.32** | **4.37** | **0.60** | | | | | |
| ORP | mV | | **-79** | **-105** | **-85** | **41** | **-77** | | | | | |
| Turbidity | NTU | | **28.8** | **18.2** | **9.4** | **0.88** | **1.6** | | | | | |
| **Metals** | | | | | | | | | | | | |
| Arsenic (Dissolved) | ug/L | 5 | 3.0 U | 3.0 U | 3.0 U | 3.0 U | 3.0 U | **Not Monitored** | | | | |
| Cadmium (Dissolved) | ug/L | 8.8 | 4.0 U | 4.0 U | 4.0 U | 4.0 U | 4.0 U | | | | | |
| Copper (Dissolved) | ug/L | 3.1 | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | | | | | |
| Nickel (Dissolved) | ug/L | 8.2 | 4.0 U | 4.0 U | 4.0 U | 4.0 U | 4.0 U | | | | | |
| Zinc (Dissolved) | ug/L | 81 | 25 U | 25 U | 25 U | 25 U | 25 U | | | | | |

## Table 1. Groundwater Chemistry Data for Acid Plant Subarea

Project No. 140298-A, Georgia-Pacific West Site, Bellingham, Washington

| Analyte | Units | Groundwater Cleanup Level | Wells Outside of Acidic Metals Plume | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | AA-MW02 | | | AA-MW02R | | | | | | | | | | | | |
| | | | 10/01/09 | 04/01/10 | 02/25/15 | 10/14/16 | 04/17/17 | 07/05/17 | 01/24/18 | 04/24/18 | 07/10/18 | 10/03/18 | 01/13/19 | 04/08/19 | 07/24/19 | 10/09/19 | 04/22/20 | 10/07/20 |
| **Field Parameters** | | | | | | | | | | | | | | | | | | |
| pH | pH units | 6.2 | **7.23** | **7.24** | **7.32** | **7.35** | **7.41** | **7.19** | **7.18** | **7.33** | **7.1** | **7.2** | **7.56** | **7.24** | **7.21** | **7.25** | **7.25** | **7.27** |
| Temperature | deg C | | **15.13** | **12.39** | **12.4** | **16.46** | **12.4** | **16.16** | **12.3** | **11.4** | **14.9** | **15.1** | **12.85** | **12** | **16.1** | **14.8** | **11.7** | **15.6** |
| Specific Conductance | uS/cm | | **1337** | **984** | **1110** | **1204.2** | **1018** | **883.6** | **957** | **807** | **812** | **753** | **925.5** | **1041** | **1055** | **886** | **806** | **780** |
| Dissolved Oxygen | mg/L | | **0.58** | **0.72** | **0.54** | **0.09** | **0.25** | **0.23** | **0.3** | **0.1** | **0.1** | **0.2** | **0.12** | **0.21** | **0.37** | **0.18** | **0.63** | **0.14** |
| ORP | mV | | **-335.1** | **-239.1** | **0.3** | **-183.2** | **-41.5** | **-27.6** | **59** | **1** | **-11** | **-30.4** | **-133.1** | **-10** | **-42.9** | **26** | **13** | **-228** |
| Turbidity | NTU | | **10** | **10** | **16.3** | **9.01** | -- | **13.2** | -- | **5** | **7** | **0.02** | **7.84** | **0.51** | **8.2** | **1.04** | **1.3** | **0.02** |
| **Metals** | | | | | | | | | | | | | | | | | | |
| Arsenic (Dissolved) | ug/L | 5 | **0.1 J** | 0.5 U | 3 U | -- | 3.0 U | 3.0 U | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Cadmium (Dissolved) | ug/L | 8.8 | 0.02 U | 0.02 U | 4 U | -- | 4.0 U | 4.0 U | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Copper (Dissolved) | ug/L | 3.1 | **0.67** | **0.68** | 1 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U |
| Nickel (Dissolved) | ug/L | 8.2 | **2.18** | **2.3** | 4 U | 4.0 U | 4.0 U | 4.0 U | 4.0 U | 4.0 U | 4.0 U | 4.0 U | 4.0 U | 4.0 U | 4.0 U | 4.0 U | -- | -- |
| Zinc (Dissolved) | ug/L | 81 | **0.4 J** | **0.6 J** | 25 U | -- | 10 U | 25 U | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |

| Analyte | Units | Groundwater Cleanup Level | Wells Outside of Acidic Metals Plume | | | |
|---|---|---|---|---|---|---|
| | | | AA-MW02R (continued) | | | |
| | | | 04/28/21 | 10/20/21 | 04/27/22 | 10/26/22 |
| **Field Parameters** | | | | | | |
| pH | pH units | 6.2 | **7.50** | **7.24** | **7.40** | **7.29** |
| Temperature | deg C | | **12.3** | **15.7** | **11.9** | **15.3** |
| Specific Conductance | uS/cm | | **696** | **591.1** | **661** | **746** |
| Dissolved Oxygen | mg/L | | **0.45** | **0.10** | -- | **0.38** |
| ORP | mV | | **68** | **91** | **-288** | **-191** |
| Turbidity | NTU | | **2.8** | **0.02** | **2** | **6** |
| **Metals** | | | | | | |
| Arsenic (Dissolved) | ug/L | 5 | -- | -- | -- | -- |
| Cadmium (Dissolved) | ug/L | 8.8 | -- | -- | -- | -- |
| Copper (Dissolved) | ug/L | 3.1 | 1.0 U | 1.0 U | 1.0 U | 1.0 U |
| Nickel (Dissolved) | ug/L | 8.2 | **--** | **--** | **--** | **--** |
| Zinc (Dissolved) | ug/L | 81 | **--** | **--** | **--** | **--** |

# Table 1. Groundwater Chemistry Data for Acid Plant Subarea

Project No. 140298-A, Georgia-Pacific West Site, Bellingham, Washington

| Analyte | Units | Groundwater Cleanup Level | Wells Outside of Acidic Metals Plume | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | AA-MW03 | | | AA-MW03R | | | | | | | | | | | | | |
| | | | 09/29/09 | 03/30/10 | 02/25/15 | 10/15/16 | 01/11/17 | 04/17/17 | 07/05/17 | 01/24/18 | 04/24/18 | 07/10/18 | 10/03/18 | 01/13/19 | 04/08/19 | 07/24/19 | 10/10/19 | 04/21/20 | 10/07/20 |
| **Field Parameters** | | | | | | | | | | | | | | | | | | | |
| pH | pH units | 6.2 | **5.06** | **4.87** | **5.52** | **4.42** | **4.61** | **5.27** | **4.23** | **4.84** | **4.4** | **4.63** | **4.43** | **5.67** | **5.72** | **5.64** | **5.47** | **5.80** | **5.76** |
| Temperature | deg C | | **15.94** | **11.26** | **12.2** | **16.55** | **10.54** | **11.9** | **16.95** | **11.2** | **11** | **16** | **16.9** | **12.9** | **11.5** | **17.4** | **17.5** | **12.2** | **18.1** |
| Specific Conductance | uS/cm | | **1581** | **1661** | **1960** | **1820.5** | **1667.8** | **1820** | **1600.8** | **1431** | **1247** | **1288** | **1350** | **1153** | **901** | **976** | **706** | **813** | **805** |
| Dissolved Oxygen | mg/L | | **0.86** | **0.92** | **0.99** | **0.1** | **0.51** | **1.55** | **0.11** | **0.9** | **0.2** | **0.1** | **0.12** | **0.08** | **0.2** | **0.35** | **0.14** | **0.75** | **0.45** |
| ORP | mV | | **-268** | **69.9** | **119.3** | **-141.2** | **-10.5** | **-33.2** | **12** | **-25** | **-21** | **-49** | **39.4** | **-155** | **-77.2** | **-79.5** | **-4.4** | **-137** | **-30** |
| Turbidity | NTU | | **10** | **10** | **2.55** | **7.12** | -- | -- | **9.34** | -- | **4** | **4** | **0.02** | **8.54** | **11.8** | **11.2** | **2.41** | **1.9** | **0.02** |
| **Metals** | | | | | | | | | | | | | | | | | | | |
| Arsenic (Dissolved) | ug/L | 5 | **0.87** | 0.5 U | 3 U | 3.0 U | 3.0 U | 3.0 U | 3.0 U | 3.0 U | 3.0 U | 3.0 U | 3.0 U | 3.0 U | 3.0 U | 3.0 U | 3.0 U | 3.0 U | 3.0 U |
| Cadmium (Dissolved) | ug/L | 8.8 | 0.02 U | **0.09** | 4 U | 4.0 U | 4.0 U | 4.0 U | 4.0 U | 4.0 U | 4 U | 4.0 U | 4.0 U | 4.0 U | 4.0 U | 4.0 U | 4.0 U | 4.0 U | 4.0 U |
| Copper (Dissolved) | ug/L | 3.1 | **0.99** | **1.09** | 1 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U |
| Nickel (Dissolved) | ug/L | 8.2 | **3.01** | **7.37** | **8.0** | **4.3** | 4.0 U | 4.0 U | 4.0 U | 4.0 U | 4.0 U | 4.0 U | 4.0 U | **65** | **33** | **27** | **45** | **12** | **6.4** |
| Zinc (Dissolved) | ug/L | 81 | **32.3** | **23.6** | 25 U | 25 U | 25 U | 10 U | 25 U | 25 U | 25.0 U | 25 U | 25 U | 25 U | 25 U | 25 U | 25 U | 25 U | 25 U |

| Analyte | Units | Groundwater Cleanup Level | Wells Outside of Acidic Metals Plume | | | |
|---|---|---|---|---|---|---|
| | | | AA-MW03R (continued) | | | |
| | | | 04/28/21 | 10/20/21 | 04/27/22 | 10/26/22 |
| **Field Parameters** | | | | | | |
| pH | pH units | 6.2 | **6.06** | **6.35** | **6.10** | **5.55** |
| Temperature | deg C | | **12.6** | **17.7** | **12.2** | **17.6** |
| Specific Conductance | uS/cm | | **1126** | **399.6** | **992** | **523** |
| Dissolved Oxygen | mg/L | | **0.06** | **0.93** | -- | **0.18** |
| ORP | mV | | **-39** | **-149.5** | **-267** | **-168** |
| Turbidity | NTU | | **2.9** | **0.02** | **2** | **8** |
| **Metals** | | | | | | |
| Arsenic (Dissolved) | ug/L | 5 | 3.0 U | -- | 3.0 U | 3.0 U |
| Cadmium (Dissolved) | ug/L | 8.8 | 4.0 U | -- | 4.0 U | 4.0 U |
| Copper (Dissolved) | ug/L | 3.1 | 1.0 U | -- | **2.4** | 1.0 U |
| Nickel (Dissolved) | ug/L | 8.2 | 4.0 U | -- | 4.0 U | 4.0 U |
| Zinc (Dissolved) | ug/L | 81 | 25 U | -- | 25 U | 25 U |

# Table 1. Groundwater Chemistry Data for Acid Plant Subarea

Project No. 140298-A, Georgia-Pacific West Site, Bellingham, Washington

| Analyte | Units | Groundwater Cleanup Level | Wells Outside of Acidic Metals Plume | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | BC-MW05 | | | | | | | | | | | | | | |
| | | | 12/19/10 | 10/15/16 | 04/17/17 | 07/06/17 | 01/24/18 | 04/25/18 | 07/10/18 | 10/02/18 | 01/13/19 | 04/08/19 | 07/23/19 | 10/09/19 | 04/21/20 | 10/07/20 | 04/28/21 | 10/20/21 |
| **Field Parameters** | | | | | | | | | | | | | | | | | | |
| pH | pH units | 6.2 | **7.64** | **7.25** | **7.4** | **7.2** | **7.2** | **7.42** | **7.21** | **7.26** | **7.54** | **7.25** | **7.17** | **7.12** | **7.22** | **Not Monitored** | | |
| Temperature | deg C | | **10.82** | **15.04** | **12.2** | **16.78** | **11.5** | **12.4** | **15** | **16** | **11.37** | **11.2** | **17.2** | **14.9** | **11.4** | | | |
| Specific Conductance | uS/cm | | **25250** | **9868.8** | **4674** | **11489.4** | **5766** | **10857** | **13952** | **31689** | **15228** | **10350** | **11949** | **13024** | **13070** | | | |
| Dissolved Oxygen | mg/L | | **0.22** | **0.12** | **0.2** | **0.16** | **0.3** | **0.1** | **1.9** | **0.53** | **0.18** | **0.23** | **0.33** | **0.27** | **6.77** | | | |
| ORP | mV | | **-313.1** | **-326.5** | **-297.7** | **-327.8** | **-325** | **-207** | **-161** | **-294** | **-305.09** | **-290** | **-266.9** | **-187.4** | **-309** | | | |
| Turbidity | NTU | | **2.75** | **13.7** | -- | **7.72** | -- | -- | -- | **0.02** | **80** | **8.19** | **7.8** | **0.87** | **0.4** | | | |
| **Metals** | | | | | | | | | | | | | | | | | | |
| Arsenic (Dissolved) | ug/L | 5 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | **Not Monitored** | | |
| Cadmium (Dissolved) | ug/L | 8.8 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | | | |
| Copper (Dissolved) | ug/L | 3.1 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | | | |
| Nickel (Dissolved) | ug/L | 8.2 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | | | |
| Zinc (Dissolved) | ug/L | 81 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | | | |

| Analyte | Units | Groundwater Cleanup Level | Wells Outside of Acidic Metals Plume | |
|---|---|---|---|---|
| | | | BC-MW05 (cont'd) | |
| | | | 04/27/22 | 10/26/22 |
| **Field Parameters** | | | | |
| pH | pH units | 6.2 | **Not Monitored** | |
| Temperature | deg C | | | |
| Specific Conductance | uS/cm | | | |
| Dissolved Oxygen | mg/L | | | |
| ORP | mV | | | |
| Turbidity | NTU | | | |
| **Metals** | | | | |
| Arsenic (Dissolved) | ug/L | 5 | **Not Monitored** | |
| Cadmium (Dissolved) | ug/L | 8.8 | | |
| Copper (Dissolved) | ug/L | 3.1 | | |
| Nickel (Dissolved) | ug/L | 8.2 | | |
| Zinc (Dissolved) | ug/L | 81 | | |

# Table 1. Groundwater Chemistry Data for Acid Plant Subarea

Project No. 140298-A, Georgia-Pacific West Site, Bellingham, Washington

| Analyte | Units | Groundwater Cleanup Level | Wells Outside of Acidic Metals Plume | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | GF-MW01R | | | | | | | | | | | | | | |
| | | | 10/15/16 | 01/11/17 | 04/19/17 | 07/06/17 | 01/24/18 | 04/25/18 | 07/10/18 | 10/02/18 | 01/13/19 | 04/08/19 | 07/23/19 | 10/09/19 | 04/22/20 | 10/07/20 | 04/28/21 | 10/20/21 |
| **Field Parameters** | | | | | | | | | | | | | | | | | | |
| pH | pH units | 6.2 | **6.13** | **6.44** | **6.4** | **6.23** | **6.26** | **6.25** | **6.23** | **6.52** | **6.91** | **6.34** | **6.24** | **6.5** | **6.13** | **Not Monitored** | | |
| Temperature | deg C | | **16.95** | **10.73** | **12** | **16.42** | **12** | **13.4** | **15.8** | **17.6** | **12.99** | **11.3** | **17.2** | **17.1** | **11.9** | | | |
| Specific Conductance | uS/cm | | **7059.1** | **7950.7** | **3687** | **1125.2** | **8380** | **1231** | **1764** | **19073** | **3445.7** | **4901** | **3204** | **2012** | **1464** | | | |
| Dissolved Oxygen | mg/L | | **0.1** | **0.15** | **0.19** | **0.17** | **0.5** | **0.2** | **0.1** | **0.08** | **0.09** | **0.21** | **0.19** | **0.17** | **1.18** | | | |
| ORP | mV | | **-219.6** | **-168.4** | **-127.7** | **-14.9** | **-90** | **-61** | **-95** | **-277.6** | **-254.3** | **-127** | **-61.3** | **-67.7** | **8.5** | | | |
| Turbidity | NTU | | **6.47** | **9.7** | -- | **7.72** | -- | -- | **5** | **0.02** | **3.17** | -- | **8.1** | **3.99** | **1.9** | | | |
| **Metals** | | | | | | | | | | | | | | | | | | |
| Arsenic (Dissolved) | ug/L | 5 | 3.0 U | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 3.0 U | Not Monitored | | |
| Cadmium (Dissolved) | ug/L | 8.8 | 4.0 U | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 4.0 U | | | |
| Copper (Dissolved) | ug/L | 3.1 | 1.0 U | -- | 1.0 U | -- | -- | -- | -- | -- | -- | -- | -- | -- | 1.0 U | | | |
| Nickel (Dissolved) | ug/L | 8.2 | 4.0 U | -- | 4.0 U | -- | -- | -- | -- | -- | -- | -- | -- | -- | 4.0 U | | | |
| Zinc (Dissolved) | ug/L | 81 | 25 U | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 25 U | | | |

| Analyte | Units | Groundwater Cleanup Level | Wells Outside of Acidic Metals Plume | |
|---|---|---|---|---|
| | | | GF-MW01R (cont'd) | |
| | | | 04/27/22 | 10/26/22 |
| **Field Parameters** | | | | |
| pH | pH units | 6.2 | **Not Monitored** | |
| Temperature | deg C | | | |
| Specific Conductance | uS/cm | | | |
| Dissolved Oxygen | mg/L | | | |
| ORP | mV | | | |
| Turbidity | NTU | | | |
| **Metals** | | | | |
| Arsenic (Dissolved) | ug/L | 5 | **Not Monitored** | |
| Cadmium (Dissolved) | ug/L | 8.8 | | |
| Copper (Dissolved) | ug/L | 3.1 | | |
| Nickel (Dissolved) | ug/L | 8.2 | | |
| Zinc (Dissolved) | ug/L | 81 | | |

**Notes**

Wells AA-MW01R, BC-MW05, FH-MW01R, and GF-MW01R not monitored because they were within the Harcourt construction zone.

U - Not detected at PQL. Yellow - exceeded cleanup level. "--" indicates analysis not conducted.

deg C - degrees Celsius, ug/L - micrograms per liter, uS/cm -microsiemens per centimeter, mg/L - miligrams per liter, mV - millivolts, NTU - Nephelometric Turbidity Unit

# Table 2. Groundwater Chemistry Data for Miscellaneous Metals Area

Project No. 140298-A, Georgia-Pacific West Site, Bellingham, Washington

| Analyte | Units | Groundwater Cleanup Level | Wells Within Miscellaneous Metals Area | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | LP-MW01 | | | | | | | | | | | |
| | | | 07/27/04 | 09/30/09 | 03/29/10 | 02/26/15 | 10/14/16 | 01/11/17 | 04/17/17 | 07/06/17 | 01/23/18 | 04/23/18 | 07/10/18 | 10/03/18 |
| **Field Parameters** | | | | | | | | | | | | | | |
| pH | pH units | 6.2 | **7.20** | **7.09** | **7.79** | **6.94** | **6.71** | **7.04** | **7.23** | **6.88** | **6.85** | **6.56** | **6.50** | **6.59** |
| Temperature | deg C | | **19.14** | **19.1** | **11.39** | **10.8** | **16.11** | **7.6** | **11.2** | **18.79** | **9.1** | **11.7** | **18** | **16.9** |
| Specific Conductance | uS/cm | | **863** | **712** | **222** | **193.3** | **277.5** | **237.2** | **509.8** | **430.2** | **317** | **164** | **590** | **670** |
| Dissolved Oxygen | mg/L | | **0.73** | **0.99** | **3.14** | **0.60** | **7.46** | **1.79** | **0.21** | **0.16** | **0.4** | **1.2** | **0.1** | **3.21** |
| ORP | mV | | **-27** | **-289** | **98** | **-179** | **77** | **30** | **-96** | **-193** | **121** | **-50** | **-111** | **77** |
| Turbidity | NTU | | **17** | **10** | **10** | **4** | **3** | **1** | -- | **5** | **10** | **9** | **7** | **0.02** |
| **Metals** | | | | | | | | | | | | | | |
| Arsenic (Dissolved) | ug/L | 5 | **14.1** | **3.18** | **1.1 J** | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Cadmium (Dissolved) | ug/L | 8.8 | **1.5** | **0.097** | **0.061** | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Copper (Dissolved) | ug/L | 3.1 | **45** | **3.10** | **4.41** | **3.5** | **4.1** | **4.5** | **11** | **11** | **6.5** | **4.4** | **10** | **9.1** |
| Nickel (Dissolved) | ug/L | 8.2 | **7** | **1.61** | **1.2** | 4 U | 4.0 U | 4.0 U | 4.0 U | 4.0 U | 4.0 U | -- | **4.1** | -- |
| Zinc (Dissolved) | ug/L | 81 | **10** | **0.56** | 0.5 U | -- | -- | -- | -- | -- | -- | -- | -- | -- |

| Analyte | Units | Groundwater Cleanup Level | Wells Within Miscellaneous Metals Area | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | LP-MW01 (continued) | | | | | | | | | |
| | | | 01/14/19 | 04/09/19 | 07/24/19 | 10/08/19 | 04/20/20 | 10/07/20 | 04/29/21 | 10/21/21 | 04/28/22 | 10/26/22 |
| **Field Parameters** | | | | | | | | | | | | |
| pH | pH units | 6.2 | **7.13** | **6.26** | **6.47** | **6.40** | **6.09** | **6.59** | **6.57** | **6.35** | **6.63** | **6.56** |
| Temperature | deg C | | **10.39** | **11.1** | **17.6** | **14.9** | **12.3** | **16.7** | **12.8** | **14.9** | **11.2** | **16.2** |
| Specific Conductance | uS/cm | | **166** | **265** | **563.6** | **273.4** | **190** | **385** | **243** | **284.5** | **239.8** | **1618** |
| Dissolved Oxygen | mg/L | | **2.5** | **0.92** | **0.22** | **0.23** | **0.64** | **0.38** | **0.13** | **1.01** | -- | **2.25** |
| ORP | mV | | **-3** | **84** | **86** | **15** | **-121** | **140** | **60** | **-48** | **-241** | **-18** |
| Turbidity | NTU | | **5** | **0.1** | **7** | **2** | **1** | **1** | **6** | **0.02** | **1** | **12** |
| **Metals** | | | | | | | | | | | | |
| Arsenic (Dissolved) | ug/L | 5 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Cadmium (Dissolved) | ug/L | 8.8 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Copper (Dissolved) | ug/L | 3.1 | **3.9** | **4.2** | **7.4** | **9.1** | **3.1** | **8.8** | **2.1** | **9.4** | **4.0** | **25** |
| Nickel (Dissolved) | ug/L | 8.2 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Zinc (Dissolved) | ug/L | 81 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |

## Table 2. Groundwater Chemistry Data for Miscellaneous Metals Area

Project No. 140298-A, Georgia-Pacific West Site, Bellingham, Washington

| Analyte | Units | Groundwater Cleanup Level | Wells Within Miscellaneous Metals Area | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | SC-MW02 | | | | SC-MW02R | | | | | | |
| | | | 07/27/04 | 09/30/09 | 04/01/10 | 02/26/15 | 10/14/16 | 04/17/17 | 07/05/17 | 01/23/18 | 04/23/18 | 07/10/18 | 10/02/18 |
| **Field Parameters** | | | | | | | | | | | | | |
| pH | pH units | 6.2 | **6.05** | **6.41** | **6.56** | **6.78** | **6.89** | **6.94** | **6.34** | **6.7** | **6.69** | **6.51** | **6.71** |
| Temperature | deg C | | **15.28** | **16.58** | **10.89** | **11.3** | **16.51** | **11.6** | **17.38** | **11.1** | **11.1** | **16.1** | **15.3** |
| Specific Conductance | uS/cm | | **6685** | **4137** | **2920** | **3325** | **1765.5** | **1726** | **1855.5** | **1389** | **1024** | **2557** | **4233** |
| Dissolved Oxygen | mg/L | | **0.68** | **0.65** | **4.58** | **0.58** | **0.12** | **0.1** | **0.1** | **0.6** | -- | **0.1** | **0.06** |
| ORP | mV | | **-385** | **-497** | **-272** | **-194** | **-303** | **-178** | **-269** | **-62** | **-92** | **-215** | **230** |
| Turbidity | NTU | | **56** | **10** | **15** | **9** | **28** | -- | -- | -- | **12** | **38** | **0** |
| **Metals** | | | | | | | | | | | | | |
| Arsenic (Dissolved) | ug/L | 5 | **12.2** | **2.94** | 1.67 U | -- | -- | -- | -- | -- | -- | -- | -- |
| Cadmium (Dissolved) | ug/L | 8.8 | 0.5 U | **0.043** | 0.067 U | -- | -- | -- | -- | -- | -- | -- | -- |
| Copper (Dissolved) | ug/L | 3.1 | **17** | **4.78** | **0.412** | 2 U | **4.4** | **3.1** | **4.1** | **3.7** | **4.1** | **16** | **7.3** |
| Nickel (Dissolved) | ug/L | 8.2 | **29** | **8.42** | 1.67 U | **13** | 4.0 U | 4.0 U | 4.0 U | 4.0 U | 4.0 U | **17** | **28** |
| Zinc (Dissolved) | ug/L | 81 | **20** | **4.13** | 1.67 U | -- | -- | -- | -- | -- | -- | -- | -- |

| Analyte | Units | Groundwater Cleanup Level | Wells Within Miscellaneous Metals Area | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | SC-MW02R (continued) | | | | | | | | | |
| | | | 01/14/19 | 04/09/19 | 07/24/19 | 10/08/19 | 04/20/20 | 10/07/20 | 04/29/21 | 10/21/21 | 04/28/22 | 10/26/22 |
| **Field Parameters** | | | | | | | | | | | | |
| pH | pH units | 6.2 | **7.12** | **6.37** | **6.55** | **6.56** | **6.33** | **6.73** | **6.87** | **6.55** | **7.03** | **6.92** |
| Temperature | deg C | | **9.53** | **10.3** | **15.7** | **14.6** | **12.1** | **16.0** | **12.2** | **15.9** | **11.4** | **15.2** |
| Specific Conductance | uS/cm | | **1187** | **1587** | **2267** | **1053** | **1577** | **2799** | **2083** | **1067** | **1564** | **3771** |
| Dissolved Oxygen | mg/L | | **0.15** | **0.79** | **0.11** | **0.47** | **0.47** | **0.16** | **0.16** | **0.11** | **0.17** | **-324** |
| ORP | mV | | **-216** | **-116** | **-341** | **-44** | **-154** | **-300** | **-286** | **-209** | | **-353** |
| Turbidity | NTU | | **18** | **42** | **38** | **8** | **70** | **9** | **17** | **6** | **11** | **13** |
| **Metals** | | | | | | | | | | | | |
| Arsenic (Dissolved) | ug/L | 5 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Cadmium (Dissolved) | ug/L | 8.8 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Copper (Dissolved) | ug/L | 3.1 | **14** | **4.8** | **7.4** | **5.1** | **2.9** | **3.3** | **2.8** | **2.4** | **2.5** | **6.6** |
| Nickel (Dissolved) | ug/L | 8.2 | 4.0 U | 4.0 U | **6.2** | 4.0 U | -- | -- | -- | -- | -- | -- |
| Zinc (Dissolved) | ug/L | 81 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |

## Table 2. Groundwater Chemistry Data for Miscellaneous Metals Area

Project No. 140298-A, Georgia-Pacific West Site, Bellingham, Washington

| Analyte | Units | Groundwater Cleanup Level | Wells Downgradient of Miscellaneous Metals Area | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | AA-MW02 | | | AA-MW02R | | | | | | |
| | | | 10/01/09 | 04/01/10 | 02/25/15 | 10/14/16 | 04/17/17 | 07/05/17 | 01/24/18 | 04/24/18 | 07/10/18 | 10/03/18 |
| **Field Parameters** | | | | | | | | | | | | |
| pH | pH units | 6.2 | **7.23** | **7.24** | **7.32** | **7.35** | **7.41** | **7.19** | **7.18** | **7.33** | **7.1** | **7.2** |
| Temperature | deg C | | **15.13** | **12.39** | **12.4** | **16.46** | **12.4** | **16.16** | **12.3** | **11.4** | **14.9** | **15.1** |
| Specific Conductance | uS/cm | | **1337** | **984** | **1110** | **1204.2** | **1018** | **883.6** | **957** | **807** | **812** | **753** |
| Dissolved Oxygen | mg/L | | **0.58** | **0.72** | **0.54** | **0.09** | **0.25** | **0.23** | **0.3** | **0.1** | **0.1** | **0.2** |
| ORP | mV | | **-335** | **-239** | **0** | **-183** | **-42** | **-28** | **59** | **1** | **-11** | **-30** |
| Turbidity | NTU | | **10** | **10** | **16** | **9** | -- | **13** | -- | **5** | **7** | **0.02** |
| **Metals** | | | | | | | | | | | | |
| Arsenic (Dissolved) | ug/L | 5 | **0.1 J** | 0.5 U | 3 U | -- | 3.0 U | 3.0 U | -- | -- | -- | -- |
| Cadmium (Dissolved) | ug/L | 8.8 | 0.02 U | 0.02 U | 4 U | -- | 4.0 U | 4.0 U | -- | -- | -- | -- |
| Copper (Dissolved) | ug/L | 3.1 | **0.67** | **0.68** | 1 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U |
| Nickel (Dissolved) | ug/L | 8.2 | **2.18** | **2.3** | 4 U | 4.0 U | 4.0 U | 4.0 U | 4.0 U | 4.0 U | 4.0 U | 4.0 U |
| Zinc (Dissolved) | ug/L | 81 | **0.4 J** | **0.6 J** | 25 U | -- | 10 U | 25 U | -- | -- | -- | -- |

| Analyte | Units | Groundwater Cleanup Level | Wells Downgradient of Miscellaneous Metals Area | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | AA-MW02R (continued) | | | | | | | | | |
| | | | 01/13/19 | 04/08/19 | 07/24/19 | 10/09/19 | 04/22/20 | 10/07/20 | 04/28/21 | 10/20/21 | 04/28/22 | 10/26/22 |
| **Field Parameters** | | | | | | | | | | | | |
| pH | pH units | 6.2 | **7.56** | **7.24** | **7.21** | **7.25** | **7.25** | **7.27** | **7.50** | **7.24** | **7.40** | **7.29** |
| Temperature | deg C | | **12.85** | **12** | **16.1** | **14.8** | **11.7** | **15.6** | **12.3** | **15.7** | **11.9** | **15.3** |
| Specific Conductance | uS/cm | | **925.5** | **1041** | **1055** | **886** | **806** | **780** | **696** | **591.1** | **661** | **746** |
| Dissolved Oxygen | mg/L | | **0.12** | **0.21** | **0.37** | **0.18** | **0.63** | **0.14** | **0.45** | **0.10** | -- | **0.38** |
| ORP | mV | | **-133** | **-10** | **-43** | **26** | **13** | **-228** | **68** | **91** | **-288** | **-191** |
| Turbidity | NTU | | **8** | **1** | **8** | **1** | **1** | **0.02** | **3** | **0.02** | **2** | **6** |
| **Metals** | | | | | | | | | | | | |
| Arsenic (Dissolved) | ug/L | 5 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Cadmium (Dissolved) | ug/L | 8.8 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Copper (Dissolved) | ug/L | 3.1 | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U | 1.0 U |
| Nickel (Dissolved) | ug/L | 8.2 | 4.0 U | 4.0 U | 4.0 U | 4.0 U | -- | -- | -- | -- | -- | -- |
| Zinc (Dissolved) | ug/L | 81 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |

## Table 2. Groundwater Chemistry Data for Miscellaneous Metals Area

Project No. 140298-A, Georgia-Pacific West Site, Bellingham, Washington

| Analyte | Units | Groundwater Cleanup Level | Wells Downgradient of Miscellaneous Metals Area | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | LB-MW01 | | | | LB-MW01R | | | | | | | |
| | | | 07/27/04 | 10/01/09 | 04/01/10 | 02/26/15 | 10/14/16 | 01/11/17 | 04/19/17 | 07/05/17 | 01/24/18 | 04/23/18 | 07/10/18 | 10/02/18 |
| **Field Parameters** | | | | | | | | | | | | | | |
| pH | pH units | 6.2 | **6.60** | **6.79** | **6.84** | **6.70** | **6.93** | **7** | **7.23** | **7.04** | **6.95** | **7.19** | **7.39** | **7.74** |
| Temperature | deg C | | **20.00** | **18.3** | **11.38** | **11.3** | **16.09** | **10.93** | **11** | **16.33** | **10.7** | **12.3** | **15.1** | **15.3** |
| Specific Conductance | uS/cm | | **858** | **1001** | **702** | **607** | **1008** | **723.3** | **540.1** | **478.9** | **589** | **376** | **1001** | **1489** |
| Dissolved Oxygen | mg/L | | **0.86** | **0.61** | **0.95** | **0.53** | **0.15** | **0.22** | **0.15** | **0.06** | **0.3** | **0.1** | **0.1** | **0.01** |
| ORP | mV | | **-295** | **-379** | **-251** | **57** | **-207** | **-44** | **-18** | **-51** | **47** | **-43** | **-33** | **-299** |
| Turbidity | NTU | | **6** | **10** | **10** | **4** | **19** | **11** | -- | **2** | -- | **5** | **8** | -- |
| **Metals** | | | | | | | | | | | | | | |
| Arsenic (Dissolved) | ug/L | 5 | 0.5 U | 0.5 U | 0.5 U | 3 U | -- | -- | -- | -- | -- | -- | -- | -- |
| Cadmium (Dissolved) | ug/L | 8.8 | 0.5 U | 0.02 U | 0.02 U | 4 U | -- | -- | -- | -- | -- | -- | -- | -- |
| Copper (Dissolved) | ug/L | 3.1 | 1 U | **1.4** | **0.79** | **8.7** | **5.9** | **2.0** | **2.0** | **11.0** | **6.7** | **6.0** | **5.4** | **4.1** |
| Nickel (Dissolved) | ug/L | 8.2 | 1 U | **0.86** | **2** | 4 U | 4.0 U | 4.0 U | 4.0 U | 4.0 U | 4.0 U | 4 U | 4.0 U | 4.0 U |
| Zinc (Dissolved) | ug/L | 81 | 10 U | **0.72** | **0.6 J** | 25 U | -- | -- | -- | -- | -- | -- | -- | -- |

| Analyte | Units | Groundwater Cleanup Level | Wells Downgradient of Miscellaneous Metals Area | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | LB-MW01R (continued) | | | | | | | | | |
| | | | 01/13/19 | 04/09/19 | 07/24/19 | 10/09/19 | 04/21/20 | 10/07/20 | 04/28/21 | 10/20/21 | 04/28/22 | 10/26/22 |
| **Field Parameters** | | | | | | | | | | | | |
| pH | pH units | 6.2 | **7.45** | **7.64** | **7.62** | **7.45** | **7.44** | **7.66** | **8.24** | **7.10** | **7.75** | **8.39** |
| Temperature | deg C | | **11.1** | **10.8** | **15** | **14.7** | **11.4** | **15.5** | **12.3** | **15.4** | **11.3** | **14.8** |
| Specific Conductance | uS/cm | | **634.9** | **1364** | **1361** | **1197** | **626** | **1122** | **995** | **760** | **471.5** | **905** |
| Dissolved Oxygen | mg/L | | **0.13** | **0.22** | **0.08** | **0.12** | **1.17** | **0.18** | **0.11** | **1.96** | | **0.11** |
| ORP | mV | | **-170** | **-146** | **-66** | **-18** | **-188** | **-95** | **-273** | **-146** | **-147** | **-250** |
| Turbidity | NTU | | **2** | **0.1** | **9** | **2** | **3** | **2** | **3** | **0.02** | **2** | **7** |
| **Metals** | | | | | | | | | | | | |
| Arsenic (Dissolved) | ug/L | 5 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Cadmium (Dissolved) | ug/L | 8.8 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Copper (Dissolved) | ug/L | 3.1 | **3.4** | **5.7** | **7.1** | **3.7** | **5.5** | **5.6** | **7.4** | **1.7** | **1.9** | **5.2** |
| Nickel (Dissolved) | ug/L | 8.2 | 4.0 U | 4.0 U | 4.0 U | 4.0 U | -- | -- | -- | -- | -- | -- |
| Zinc (Dissolved) | ug/L | 81 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |

**Notes**

Wells AA-MW02R and SC-MW02R not monitored 1/11/17 due to iced-in monuments.

U - Not detected at PQL. Yellow - exceeded cleanup level. "--" indicates analysis not conducted.

deg C - degrees Celsius, ug/L - micrograms per liter, uS/cm -microsiemens per centimeter, mg/L - miligrams per liter, mV - millivolts, NTU - Nephelometric Turbidity Unit

# Table 3. Wells and Analytes for 2023 Groundwater Monitoring

Project No. 140298-A, Georgia-Pacific West Site, Bellingham, Washington

| Well ID | Field Parameters | Dissolved Metals | | | | |
|---|---|---|---|---|---|---|
| | | Arsenic | Cadmium | Copper | Nickel | Zinc |
| AA-MW01R | X | X | X | X | X | X |
| AA-MW04R | X | X | X | X | X | X |
| FH-MW01R | X | X | X | X | X | X |
| LB-MW01R | X | | | X | | |
| LP-MW01 | X | | | X | | |
| SC-MW02R | X | | | X | | |
| AA-MW02R | X | X if pH <6.2 | X if pH <6.2 | X | X if pH <6.2 | X if pH<6.2 |
| AA-MW03R | X | X for As, Cd, Cu, Ni, Zn if pH <6.2 | | | | |
| BC-MW05 | X | | | | | |
| GF-MW01R | X | | | | | |

**Notes**

If pH < 6.2 in AA-MW02R, AA-MW03R, BC-MW05R, or GF-MW01R, analyze that well for full suite of dissolved metals (As, Cd, Cu, Ni, Zn). However, AA-MW02R is analyzed for Cu and Ni each event regardless of pH (refer to text).

# FIGURES

Whatcom Waterway

BC-MW05

GF-MW01R

AA-MW01R

FH-MW01R

Granary Ave Waterfront Residential Project

GRANARY AVE

AA-MW03R

AA-MW02R

GF-MW02

AA-MW04R

Acid Plant Subarea

LAUREL ST

LB-MW01R

Miscellaneous Dissolved Metals Exceedances

LP-MW01

SC-MW02R

LP-MW01 Subarea

BNSF

MILL NORTH

TRUE NORTH

45°

0 62.5 125 250 375 500 Feet

- Monitoring Wells being Monitored
- Older Monitoring Well Used in Data Analysis
- Decommissioned Well Within Granary Avenue Residential Project Construction Footprint, not Monitored in 2022. Will Be Replaced following Construction Project.
- Inaccessible Well Within Granary Avenue Residential Project Construction Footprint, not Monitored in 2022.
- Pulp & Tissue Mill RAU

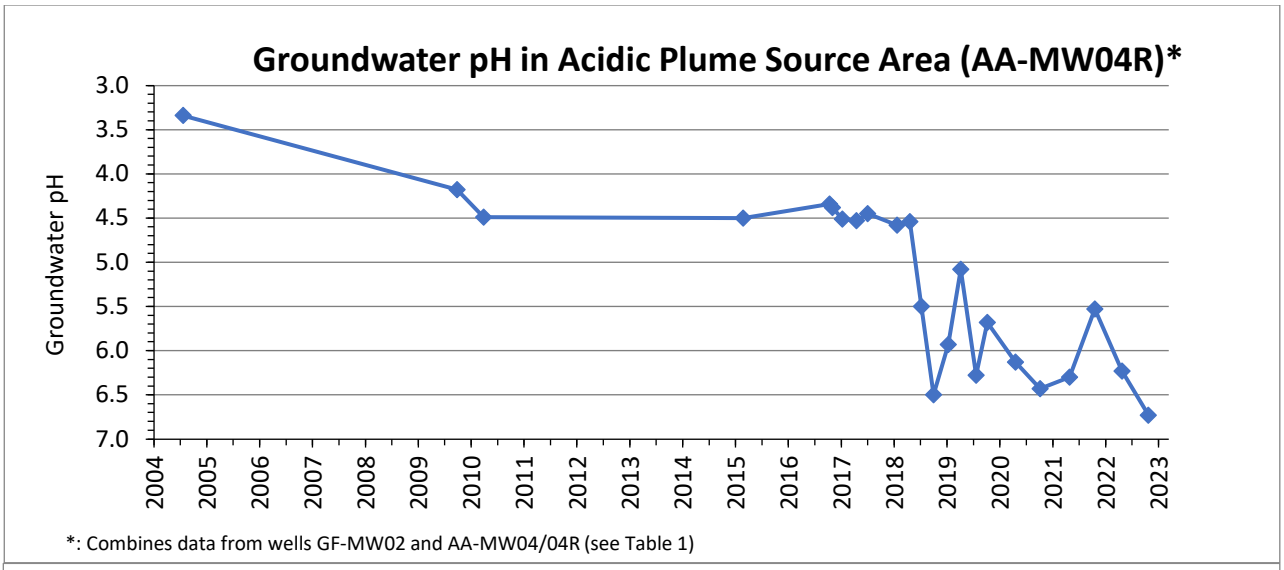
*Aerial Imagery: Esri, 2021*

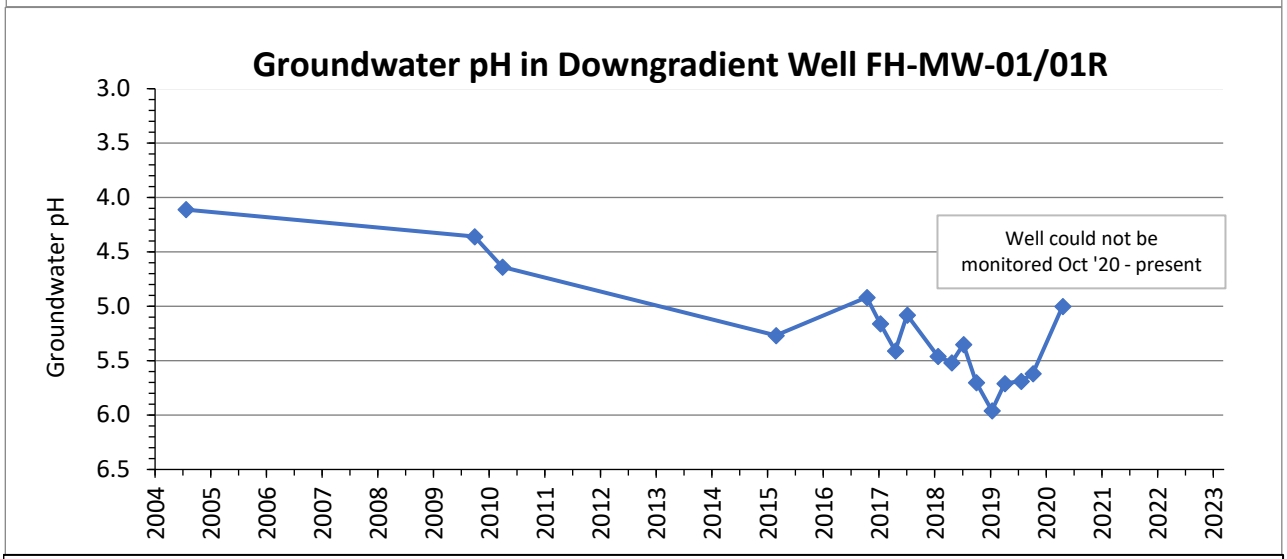
# Monitoring Well Locations

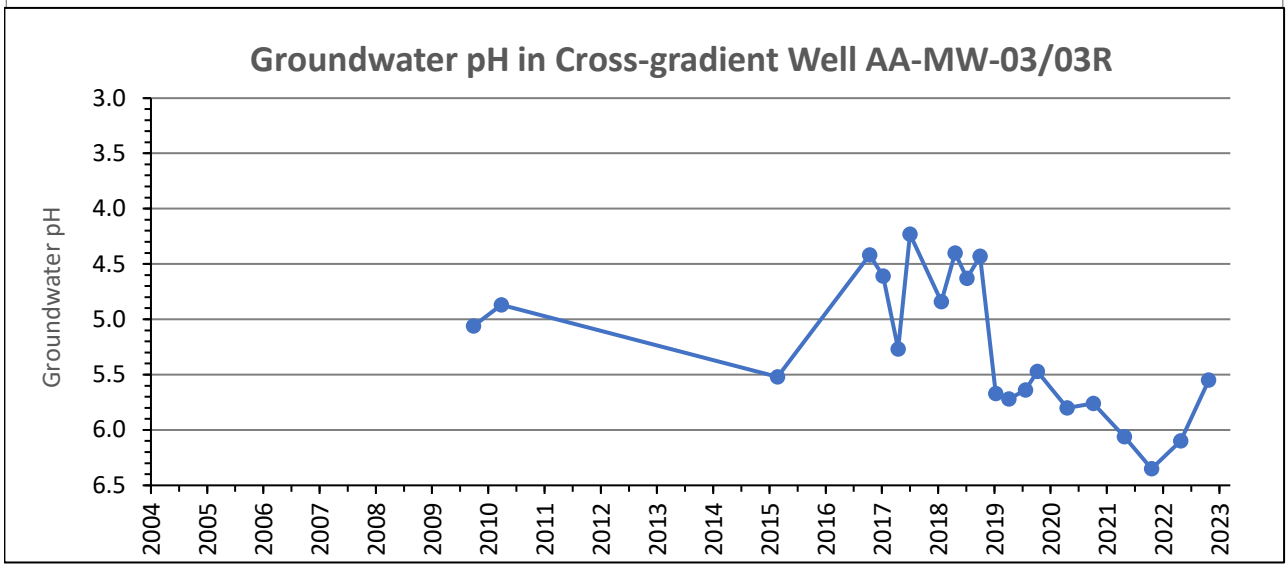
Annual Report for Groundwater MNA Program
Pulp/Tissue Mill RAU
GP West Site, Bellingham, WA

| Aspect Consulting | JAN-2022 | BY: MAV / RAP | FIGURE NO. 1 |
|---|---|---|---|
| | PROJECT NO. 140298 | REVISED BY: NLK | |

Path: G:\projects\Port_of_Bellingham\Delivered\MonitoringPlanGWNaturalAttenuation\Annual Report for GWMNA Program\01 MW Locations.mxd




Note: Groundwater pH axis is plotted in reverse order so higher on axis is farther from pH 6.2 CUL.

**Figure 2**

**Acidic Plume Groundwater pH Trends Over Time, 2004-2022**

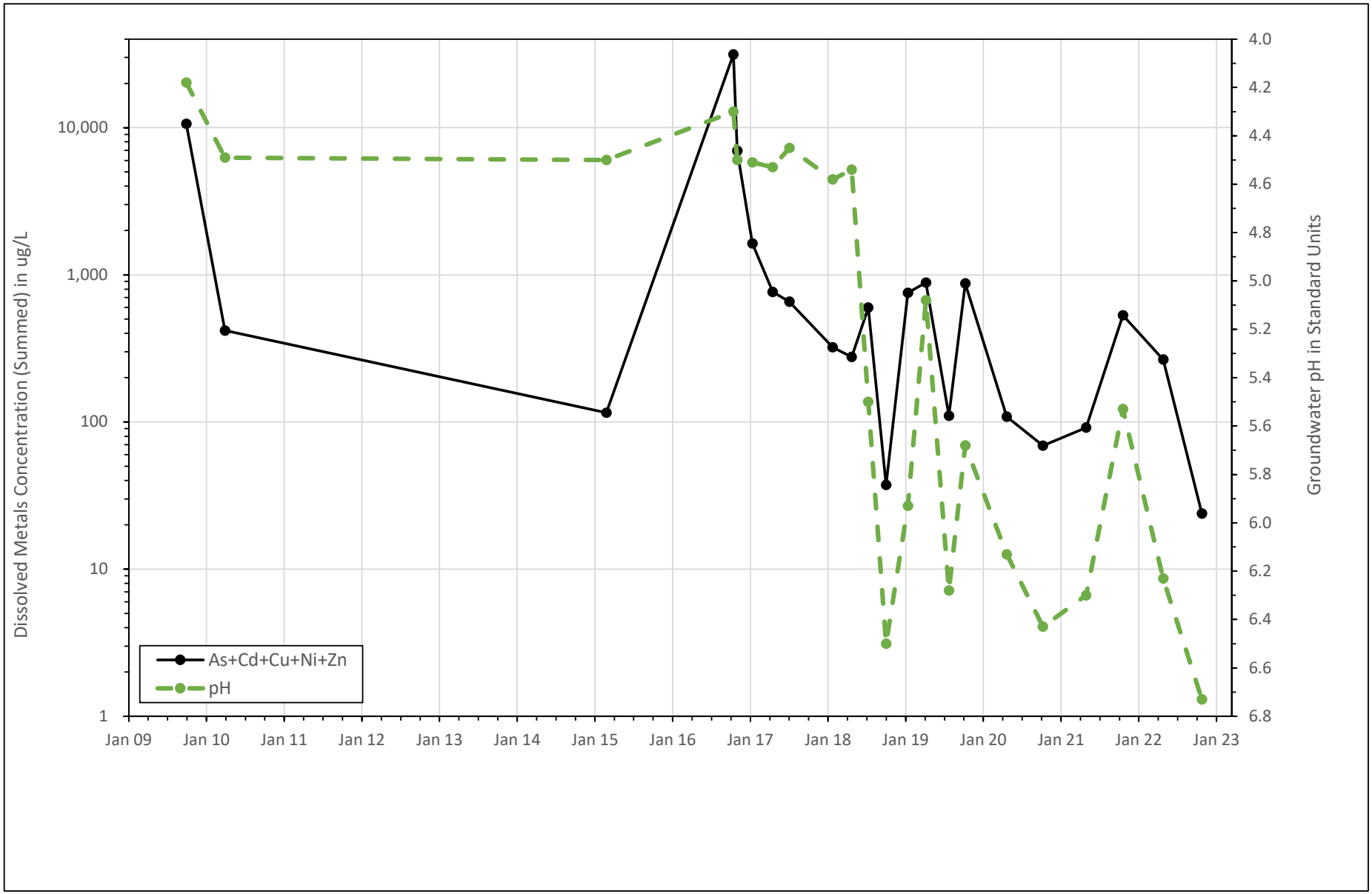



**Figure 3**

**Concentration Trends Over Time for Wells AA-MW04/04R**

2019 Groundwater MNA Annual Report

Project No. 140298

**Aspect Consulting**

12/17/2019

*V:\140298 POB GP West Pulp & Tissue RAU Cleanup\Deliverables\2022 GW MNA Report\Port Review Draft\Tables and Figures\Figure 3- AAMW04 Concentration Trends vs Time.xlsx*

# APPENDIX A

# Data Validation Report and Laboratory Reports from OnSite Environmental

# DATA VALIDATION REPORT

## Pulp/Tissue Mill RAU of GP West Site
## 2022 Groundwater Sampling
## November 2022
## Sample Delivery Groups 2204-340, 2210-322

*Prepared by:*
Aspect Consulting, LLC
710 2nd Ave, Suite 550
Seattle, WA 98104

Project No. 140298-A-19 • November 20, 2022

# 1 Introduction

This report summarizes the findings of a U.S. Environmental Protection Agency (USEPA) Stage 2A data validation performed on analytical data groundwater samples collected in November 2022 for the GP West Pulp and Tissue Mill Remedial Action Unit groundwater monitoring program.

Samples were analyzed for select metals by EPA method 200.8 by Onsite Environmental, Inc. in Redmond, Washington (Onsite). Refer to the table below for further information.

**Table 1. Analytical Methods**

| Analysis | Method | Laboratory |
|---|---|---|
| Metals (arsenic [As], copper [Cu], Cadmium [Cd], nickel [Ni], zinc [Zn]) | EPA 200.8 | OnSite |

The validation followed the procedures documented in the analytical methods, and the *National Functional Guidelines for Organic Data Review* (USEPA, 2017), and *Contract Laboratory Program SOW* (USEPA, 2016).

Data assigned a J qualifier (estimated) may be used for site evaluation purposes but the reasons for qualification should be considered when interpreting sample concentrations. Data marked as rejected (R) should not be used under any circumstances. Values without qualification meet all data measurement quality objectives and are suitable for use.

No data were qualified in the course of this review; all quality control (QC) requirements were met.

# 2 Data Validation Findings for Sample Delivery Group 2204-340

Water samples in this sample delivery group (SDG), and the chemical analyses performed on them, are tabulated below. The sections below describe the results of the data quality review.

**Table 2. Sample Index**

| Sample Name | Sample Date | Sample Matrix | Metals (As, Cu, Cd, Ni, Zn) |
|---|---|---|---|
| LPMW01-20220428 | 2022-04-28 15:30:00 | Water | x |
| AAMW04R-20220427 | 2022-04-27 13:40:00 | Water | x |
| AAMW02R-20220427 | 2022-04-27 16:25:00 | Water | x |
| SCMW02R-20220428 | 2022-04-28 14:23:00 | Water | x |
| AAMW03R-20220428 | 2022-04-28 12:27:00 | Water | x |
| LBMW01R-20220428 | 2022-04-28 11:29:00 | Water | x |

## 2.1 Metals (EPA 200.8)

### *2.1.1 Sample Receipt, Preservation, and Holding Times*

Sample receipt and preservation (2-6 degrees C) were acceptable. Samples were analyzed within the requisite holding time limit.

### *2.1.2 Method Blanks / Detection Levels*

Target analytes were not detected at or above the reporting levels in the method blank. No qualification or action was needed.

### *2.1.3 Laboratory Control Samples*

All laboratory control sample (LCS) percent recoveries (%R) were within the laboratory specified control limits for requested analytes. No qualification or action was needed.

### *2.1.4 Laboratory Duplicate Sample*

All laboratory duplicate sample relative percent differences (RPDs) were within the laboratory specified control limits for all target analytes. No qualification or action was needed.

### *2.1.5 Matrix Spike / Matrix Spike Duplicates*

All matrix spike (MS) and MS duplicate sample %Rs and RPDs were within the laboratory specified control limits for all target analytes. No qualification or actions were needed.

### *2.1.6 Overall Assessment*

Accuracy was acceptable based on the LCS and MS/MSD %Rs and precision was acceptable based on the laboratory duplicate and MS/MSD RPD values. The data are of known quality and are acceptable for use.

# 3 Data Validation Findings for Sample Delivery Group 2210-322

Water samples in this sample delivery group (SDG), and the chemical analyses performed on them, are tabulated below. The sections below describe the results of the data quality review.

**Table 3. Sample Index**

| Sample Name | Sample Date | Sample Matrix | Metals (As, Cu, Cd, Ni, Zn) |
|---|---|---|---|
| AA-MW03R-2022-10-26 | 2022-10-26 11:04:00 | Water | x |
| AA-MW02R-2022-10-26 | 2022-10-26 12:17:00 | Water | x |
| AA-MW04R-2022-10-26 | 2022-10-26 09:15:00 | Water | x |
| SC-MW02R-2022-10-25 | 2022-10-26 10:15:00 | Water | x |
| LP-MW01-2022-10-25 | 2022-10-26 11:45:00 | Water | x |
| LB-MW01R-2022-10-25 | 2022-10-26 14:51:00 | Water | x |

## 3.1 Metals (EPA 200.8)

### *3.1.1 Sample Receipt, Preservation, and Holding Times*

Sample receipt and preservation (2-6 degrees C) were acceptable. Samples were analyzed within the requisite holding time limit.

### *3.1.2 Method Blanks / Detection Levels*

Target analytes were not detected at or above the reporting levels in the method blank. No qualification or action was needed.

### *3.1.3 Laboratory Control Samples*

All laboratory control sample (LCS) percent recoveries (%R) were within the laboratory specified control limits for requested analytes. No qualification or action was needed.

### *3.1.4 Laboratory Duplicate Sample*

All laboratory duplicate sample relative percent differences (RPDs) were within the laboratory specified control limits for all target analytes. No qualification or action was needed.

### *3.1.5 Matrix Spike / Matrix Spike Duplicates*

All matrix spike (MS) and MS duplicate sample %Rs and RPDs were within the laboratory specified control limits for all target analytes. No qualification or actions were needed.

### *3.1.6 Overall Assessment*

Accuracy was acceptable based on the LCS and MS/MSD %Rs and precision was acceptable based on the laboratory duplicate and MS/MSD RPD values. The data are of known quality and are acceptable for use.

# 4 Qualified Data Summary

No sample results were qualified in the course of the Stage 2A validation performed.

# 5 Data Qualifier Definitions

| Data Qualifier | Definition |
|---|---|
| J | The analyte was detected above the reported quantitation limit, and the reported concentration was an estimated value. |
| R | The sample results are unusable due to the quality of the data generated because certain criteria were not met. The analyte may or may not be present in the sample. |
| U | The analyte was analyzed for but was considered not detected at the reporting limit or reported value. |
| UJ | The analyte was analyzed for, and the associated quantitation limit was an estimated value. |

# 6 References

U.S. Environmental Protection Agency (USEPA), 2017 National Functional Guidelines for Organic Methods Data Review, Office of Superfund Remediation and Technology Innovation (OSRTI), USEPA Publication No. 540-R-2017-002, January.

U.S. Environmental Protection Agency (USEPA), 2016, Contract Laboratory Program (CLP) Statement of Work (SOW) for Organic Superfund Methods, Multi-Media, Multi-Concentration, SOM02.4, October.

OnSite Environmental Inc.
14648 NE 95th Street, Redmond, WA 98052 • (425) 883-3881

May 9, 2022

Steve Germiat
Aspect Consulting
Dexter Horton Building
710 2nd Avenue, Suite 550
Seattle, WA 98104

Re: Analytical Data for Project 140298
Laboratory Reference No. 2204-340

Dear Steve:

Enclosed are the analytical results and associated quality control data for samples submitted on April 29, 2022.

The standard policy of OnSite Environmental, Inc. is to store your samples for 30 days from the date of receipt. If you require longer storage, please contact the laboratory.

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning the data, or need additional information, please feel free to call me.

Sincerely,

David Baumeister
Project Manager

Enclosures

Date of Report: May 9, 2022
Samples Submitted: April 29, 2022
Laboratory Reference: 2204-340
Project: 140298

**Case Narrative**

Samples were collected on April 27 and 28, 2022 and received by the laboratory on April 29, 2022. They were maintained at the laboratory at a temperature of 2°C to 6°C.

Please note that any and all soil sample results are reported on a dry-weight basis, unless otherwise noted below.

General QA/QC issues associated with the analytical data enclosed in this laboratory report will be indicated with a reference to a comment or explanation on the Data Qualifier page. More complex and involved QA/QC issues will be discussed in detail below.

Date of Report: May 9, 2022
Samples Submitted: April 29, 2022
Laboratory Reference: 2204-340
Project: 140298

**DISSOLVED METALS**
**EPA 200.8**

Matrix: Water
Units: ug/L (ppb)

| Analyte | Result | PQL | Method | Date Prepared | Date Analyzed | Flags |
|---|---|---|---|---|---|---|
| **Client ID:** | **LPMW01-20220428** | | | | | |
| Laboratory ID: | 04-340-01 | | | | | |
| Copper | **4.0** | 1.0 | EPA 200.8 | | 5-6-22 | |
| **Client ID:** | **AAMW04R-20220427** | | | | | |
| Laboratory ID: | 04-340-02 | | | | | |
| Arsenic | **5.0** | 3.0 | EPA 200.8 | | 5-6-22 | |
| Cadmium | **23** | 4.0 | EPA 200.8 | | 5-6-22 | |
| Copper | **110** | 1.0 | EPA 200.8 | | 5-6-22 | |
| Nickel | **18** | 4.0 | EPA 200.8 | | 5-6-22 | |
| Zinc | **110** | 25 | EPA 200.8 | | 5-6-22 | |
| **Client ID:** | **AAMW02R-20220427** | | | | | |
| Laboratory ID: | 04-340-03 | | | | | |
| Copper | **ND** | 1.0 | EPA 200.8 | | 5-6-22 | |
| **Client ID:** | **SCMW02R-20220428** | | | | | |
| Laboratory ID: | 04-340-04 | | | | | |
| Copper | **2.5** | 1.0 | EPA 200.8 | | 5-6-22 | |
| **Client ID:** | **AAMW03R-20220428** | | | | | |
| Laboratory ID: | 04-340-05 | | | | | |
| Arsenic | **ND** | 3.0 | EPA 200.8 | | 5-6-22 | |
| Cadmium | **ND** | 4.0 | EPA 200.8 | | 5-6-22 | |
| Copper | **2.4** | 1.0 | EPA 200.8 | | 5-6-22 | |
| Nickel | **ND** | 4.0 | EPA 200.8 | | 5-6-22 | |
| Zinc | **ND** | 25 | EPA 200.8 | | 5-6-22 | |
| **Client ID:** | **LBMW01R-20220428** | | | | | |
| Laboratory ID: | 04-340-06 | | | | | |
| Copper | **1.9** | 1.0 | EPA 200.8 | | 5-6-22 | |

Date of Report: May 9, 2022
Samples Submitted: April 29, 2022
Laboratory Reference: 2204-340
Project: 140298

**DISSOLVED METALS**
**EPA 200.8**
**QUALITY CONTROL**

Matrix: Water
Units: ug/L (ppb)

| Analyte | Result | PQL | Method | Date Prepared | Date Analyzed | Flags |
|---|---|---|---|---|---|---|
| **METHOD BLANK** | | | | | | |
| Laboratory ID: | MB0506D1 | | | | | |
| Arsenic | **ND** | 3.0 | EPA 200.8 | | 5-6-22 | |
| Cadmium | **ND** | 4.0 | EPA 200.8 | | 5-6-22 | |
| Copper | **ND** | 1.0 | EPA 200.8 | | 5-6-22 | |
| Nickel | **ND** | 4.0 | EPA 200.8 | | 5-6-22 | |
| Zinc | **ND** | 25 | EPA 200.8 | | 5-6-22 | |

| Analyte | Result | | Spike Level | | Source Result | Percent Recovery | Recovery Limits | RPD | RPD Limit | Flags |
|---|---|---|---|---|---|---|---|---|---|---|
| **DUPLICATE** | | | | | | | | | | |
| Laboratory ID: | 04-340-05 | | | | | | | | | |
| | ORIG | DUP | | | | | | | | |
| Arsenic | **ND** | **ND** | NA | NA | | NA | NA | NA | 20 | |
| Cadmium | **ND** | **ND** | NA | NA | | NA | NA | NA | 20 | |
| Copper | **2.36** | **2.38** | NA | NA | | NA | NA | 1 | 20 | |
| Nickel | **ND** | **ND** | NA | NA | | NA | NA | NA | 20 | |
| Zinc | **ND** | **ND** | NA | NA | | NA | NA | NA | 20 | |
| **MATRIX SPIKES** | | | | | | | | | | |
| Laboratory ID: | 04-340-05 | | | | | | | | | |
| | MS | MSD | MS | MSD | | MS | MSD | | | |
| Arsenic | **88.4** | **88.6** | 80.0 | 80.0 | ND | **111** | **111** | 75-125 | 0 | 20 |
| Cadmium | **80.0** | **81.2** | 80.0 | 80.0 | ND | **100** | **102** | 75-125 | 1 | 20 |
| Copper | **69.2** | **69.0** | 80.0 | 80.0 | 2.36 | **84** | **83** | 75-125 | 0 | 20 |
| Nickel | **76.0** | **76.0** | 80.0 | 80.0 | ND | **95** | **95** | 75-125 | 0 | 20 |
| Zinc | **80.6** | **80.0** | 80.0 | 80.0 | ND | **101** | **100** | 75-125 | 1 | 20 |
| **SPIKE BLANK** | | | | | | | | | | |
| Laboratory ID: | SB0506D1 | | | | | | | | | |
| Arsenic | **77.4** | | 80.0 | | N/A | **97** | 85-115 | | | |
| Cadmium | **80.4** | | 80.0 | | N/A | **101** | 85-115 | | | |
| Copper | **75.2** | | 80.0 | | N/A | **94** | 85-115 | | | |
| Nickel | **75.4** | | 80.0 | | N/A | **94** | 85-115 | | | |
| Zinc | **77.2** | | 80.0 | | N/A | **97** | 85-115 | | | |

OnSite Environmental Inc.

**Data Qualifiers and Abbreviations**

A - Due to a high sample concentration, the amount spiked is insufficient for meaningful MS/MSD recovery data.

B - The analyte indicated was also found in the blank sample.

C - The duplicate RPD is outside control limits due to high result variability when analyte concentrations are within five times the quantitation limit.

E - The value reported exceeds the quantitation range and is an estimate.

F - Surrogate recovery data is not available due to the high concentration of coeluting target compounds.

H - The analyte indicated is a common laboratory solvent and may have been introduced during sample preparation, and be impacting the sample result.

I - Compound recovery is outside of the control limits.

J - The value reported was below the practical quantitation limit. The value is an estimate.

K - Sample duplicate RPD is outside control limits due to sample inhomogeneity. The sample was re-extracted and re-analyzed with similar results.

L - The RPD is outside of the control limits.

M - Hydrocarbons in the gasoline range are impacting the diesel range result.

M1 - Hydrocarbons in the gasoline range (toluene-naphthalene) are present in the sample.

N - Hydrocarbons in the lube oil range are impacting the diesel range result.

N1 - Hydrocarbons in diesel range are impacting lube oil range results.

O - Hydrocarbons indicative of heavier fuels are present in the sample and are impacting the gasoline result.

P - The RPD of the detected concentrations between the two columns is greater than 40.

Q - Surrogate recovery is outside of the control limits.

S - Surrogate recovery data is not available due to the necessary dilution of the sample.

T - The sample chromatogram is not similar to a typical _____.

U - The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

U1 - The practical quantitation limit is elevated due to interferences present in the sample.

V - Matrix Spike/Matrix Spike Duplicate recoveries are outside control limits due to matrix effects.

W - Matrix Spike/Matrix Spike Duplicate RPD are outside control limits due to matrix effects.

X - Sample extract treated with a mercury cleanup procedure.

X1 - Sample extract treated with a sulfuric acid/silica gel cleanup procedure.

X2 - Sample extract treated with a silica gel cleanup procedure.

Y - The calibration verification for this analyte exceeded the 20% drift specified in methods 8260 & 8270, and therefore the reported result should be considered an estimate. The overall performance of the calibration verification standard met the acceptance criteria of the method.

Y1 - Negative effects of the matrix from this sample on the instrument caused values for this analyte in the bracketing continuing calibration verification standard (CCVs) to be outside of 20% acceptance criteria. Because of this, quantitation limits and sample concentrations should be considered estimates.

Z -

ND - Not Detected at PQL
PQL - Practical Quantitation Limit
RPD - Relative Percent Difference

# Chain of Custody

Page 1 of 1

**OnSite Environmental Inc.**
Analytical Laboratory Testing Services
14648 NE 95th Street • Redmond, WA 98052
Phone: (425) 883-3881 • www.onsite-env.com

Company: Aspect
Project Number: 140298
Project Name: GP PTM RAU MNA
Project Manager: Steve Germiat
Sampled by: Aaron Fitts

**Turnaround Request (in working days)**
(Check One)
☐ Same Day ☐ 1 Day
☐ 2 Days ☐ 3 Days
☑ Standard (7 Days)
☐ _____ (other)

**Laboratory Number:** 04-340

| Lab ID | Sample Identification | Date Sampled | Time Sampled | Matrix | Number of Containers | NWTPH-HCID | NWTPH-Gx/BTEX (8021☐ 8260☐) | NWTPH-Gx | NWTPH-Dx (Acid / SG Clean-up☐) | Volatiles 8260 | Halogenated Volatiles 8260 | EDB EPA 8011 (Waters Only) | Semivolatiles 8270/SIM (with low-level PAHs) | PAHs 8270/SIM (low-level) | PCBs 8082 | Organochlorine Pesticides 8081 | Organophosphorus Pesticides 8270/SIM | Chlorinated Acid Herbicides 8151 | Total RCRA Metals | Total MTCA Metals | TCLP Metals | HEM (oil and grease) 1664 | Cu Dis | As, Cd, Ni, Zn Dis. | | | % Moisture |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | LPMW01-20220426 | 4/28/22 | 15:30 | GW | 1 | | | | | | | | | | | | | | | | | | X | | | | |
| 2 | AAMW04R-20220427 | 4/27/22 | 13:40 | GW | | | | | | | | | | | | | | | | | | | X | X | | | |
| 3 | AAMW02R-20220427 | 4/27/22 | 16:25 | GW | | | | | | | | | | | | | | | | | | | X | | | | |
| 4 | SCMW02R-20220428 | 4/28/22 | 14:23 | GW | | | | | | | | | | | | | | | | | | | X | | | | |
| 5 | AAMW03R-20220428 | 4/28/22 | 12:27 | GW | | | | | | | | | | | | | | | | | | | X | X | | | |
| 6 | LBMW01R-20220426 | 4/28/22 | 11:29 | GW | | | | | | | | | | | | | | | | | | | X | | | | |

| | Signature | Company | Date | Time |
|---|---|---|---|---|
| Relinquished | | Aspect | 4/28/22 | 4:40 PM |
| Received | | OSE | 4/29/22 | 1200 |
| Relinquished | | | | |
| Received | | | | |
| Relinquished | | | | |
| Received | | | | |
| Reviewed/Date | | Reviewed/Date | | |

**Comments/Special Instructions**

- All samples field filtered 0.45 µ
- E.C. > 1,000 for samples AAMW04R + SCMW02R

Data Package: Standard ☐ Level III ☐ Level IV ☐

Chromatograms with final report ☐ Electronic Data Deliverables (EDDs) ☐

OnSite Environmental Inc.
14648 NE 95th Street, Redmond, WA 98052 • (425) 883-3881

November 7, 2022

Steve Germiat
Aspect Consulting
Dexter Horton Building
710 2nd Avenue, Suite 550
Seattle, WA 98104

Re: Analytical Data for Project 140298
Laboratory Reference No. 2210-322

Dear Steve:

Enclosed are the analytical results and associated quality control data for samples submitted on October 27, 2022.

The standard policy of OnSite Environmental, Inc. is to store your samples for 30 days from the date of receipt. If you require longer storage, please contact the laboratory.

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning the data, or need additional information, please feel free to call me.

Sincerely,

David Baumeister
Project Manager

Enclosures

Date of Report: November 7, 2022
Samples Submitted: October 27, 2022
Laboratory Reference: 2210-322
Project: 140298

**Case Narrative**

Samples were collected on October 25, 26, 2022 and received by the laboratory on October 27, 2022. They were maintained at the laboratory at a temperature of 2°C to 6°C.

Please note that any and all soil sample results are reported on a dry-weight basis, unless otherwise noted below.

General QA/QC issues associated with the analytical data enclosed in this laboratory report will be indicated with a reference to a comment or explanation on the Data Qualifier page. More complex and involved QA/QC issues will be discussed in detail below.

Date of Report: November 7, 2022
Samples Submitted: October 27, 2022
Laboratory Reference: 2210-322
Project: 140298

**DISSOLVED METALS**
**EPA 200.8**

Matrix: Water
Units: ug/L (ppb)

| Analyte | Result | PQL | Method | Date Prepared | Date Analyzed | Flags |
|---|---|---|---|---|---|---|
| **Client ID:** | **AA-MW03R-2022-10-26** | | | | | |
| Laboratory ID: | 10-322-01 | | | | | |
| Arsenic | **ND** | 3.0 | EPA 200.8 | | 11-2-22 | |
| Cadmium | **ND** | 4.0 | EPA 200.8 | | 11-2-22 | |
| Copper | **ND** | 1.0 | EPA 200.8 | | 11-2-22 | |
| Nickel | **ND** | 4.0 | EPA 200.8 | | 11-2-22 | |
| Zinc | **ND** | 25 | EPA 200.8 | | 11-2-22 | |
| **Client ID:** | **AA-MW02R-2022-10-26** | | | | | |
| Laboratory ID: | 10-322-02 | | | | | |
| Copper | **ND** | 1.0 | EPA 200.8 | | 11-2-22 | |
| **Client ID:** | **AA-MW04R-2022-10-26** | | | | | |
| Laboratory ID: | 10-322-03 | | | | | |
| Arsenic | **4.4** | 3.0 | EPA 200.8 | | 11-2-22 | |
| Cadmium | **ND** | 4.0 | EPA 200.8 | | 11-2-22 | |
| Copper | **3.0** | 1.0 | EPA 200.8 | | 11-2-22 | |
| Nickel | **ND** | 4.0 | EPA 200.8 | | 11-2-22 | |
| Zinc | **ND** | 25 | EPA 200.8 | | 11-2-22 | |
| **Client ID:** | **SC-MW02R-2022-10-25** | | | | | |
| Laboratory ID: | 10-322-04 | | | | | |
| Copper | **6.6** | 1.0 | EPA 200.8 | | 11-2-22 | |
| **Client ID:** | **LP-MW01-2022-10-25** | | | | | |
| Laboratory ID: | 10-322-05 | | | | | |
| Copper | **25** | 1.0 | EPA 200.8 | | 11-2-22 | |
| **Client ID:** | **LB-MW01R-2022-10-25** | | | | | |
| Laboratory ID: | 10-322-06 | | | | | |
| Copper | **5.2** | 1.0 | EPA 200.8 | | 11-2-22 | |

Date of Report: November 7, 2022
Samples Submitted: October 27, 2022
Laboratory Reference: 2210-322
Project: 140298

**DISSOLVED METALS**
**EPA 200.8**
**QUALITY CONTROL**

Matrix: Water
Units: ug/L (ppb)

| Analyte | Result | PQL | Method | Date Prepared | Date Analyzed | Flags |
|---|---|---|---|---|---|---|
| **METHOD BLANK** | | | | | | |
| Laboratory ID: | MB1031F1 | | | | | |
| Arsenic | **ND** | 3.0 | EPA 200.8 | 10-31-22 | 11-2-22 | |
| Cadmium | **ND** | 4.0 | EPA 200.8 | 10-31-22 | 11-2-22 | |
| Copper | **ND** | 1.0 | EPA 200.8 | 10-31-22 | 11-2-22 | |
| Nickel | **ND** | 4.0 | EPA 200.8 | 10-31-22 | 11-2-22 | |
| Zinc | **ND** | 25 | EPA 200.8 | 10-31-22 | 11-2-22 | |

| Analyte | Result | | Spike Level | | Source Result | Percent Recovery | Recovery Limits | RPD | RPD Limit | Flags |
|---|---|---|---|---|---|---|---|---|---|---|
| **DUPLICATE** | | | | | | | | | | |
| Laboratory ID: | 10-354-01 | | | | | | | | | |
| | ORIG | DUP | | | | | | | | |
| Arsenic | **ND** | **ND** | NA | NA | | NA | NA | NA | 20 | |
| Cadmium | **ND** | **ND** | NA | NA | | NA | NA | NA | 20 | |
| Copper | **7.60** | **7.42** | NA | NA | | NA | NA | 2 | 20 | |
| Nickel | **ND** | **ND** | NA | NA | | NA | NA | NA | 20 | |
| Zinc | **28.2** | **27.8** | NA | NA | | NA | NA | 1 | 20 | |
| **MATRIX SPIKES** | | | | | | | | | | |
| Laboratory ID: | 10-354-01 | | | | | | | | | |
| | MS | MSD | MS | MSD | | MS | MSD | | | |
| Arsenic | **83.6** | **82.2** | 80.0 | 80.0 | ND | **105** | **103** | 75-125 | 2 | 20 |
| Cadmium | **80.6** | **80.8** | 80.0 | 80.0 | ND | **101** | **101** | 75-125 | 0 | 20 |
| Copper | **83.8** | **82.2** | 80.0 | 80.0 | 7.60 | **95** | **93** | 75-125 | 2 | 20 |
| Nickel | **77.6** | **76.2** | 80.0 | 80.0 | ND | **97** | **95** | 75-125 | 2 | 20 |
| Zinc | **108** | **107** | 80.0 | 80.0 | 28.2 | **100** | **99** | 75-125 | 1 | 20 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **SPIKE BLANK** | | | | | | |
| Laboratory ID: | SB1031F1 | | | | | |
| Arsenic | **81.0** | 80.0 | N/A | **101** | 85-115 | |
| Cadmium | **80.2** | 80.0 | N/A | **100** | 85-115 | |
| Copper | **78.4** | 80.0 | N/A | **98** | 85-115 | |
| Nickel | **78.2** | 80.0 | N/A | **98** | 85-115 | |
| Zinc | **81.8** | 80.0 | N/A | **102** | 85-115 | |

OnSite Environmental Inc.

**Data Qualifiers and Abbreviations**

A - Due to a high sample concentration, the amount spiked is insufficient for meaningful MS/MSD recovery data.

B - The analyte indicated was also found in the blank sample.

C - The duplicate RPD is outside control limits due to high result variability when analyte concentrations are within five times the quantitation limit.

E - The value reported exceeds the quantitation range and is an estimate.

F - Surrogate recovery data is not available due to the high concentration of coeluting target compounds.

H - The analyte indicated is a common laboratory solvent and may have been introduced during sample preparation, and be impacting the sample result.

I - Compound recovery is outside of the control limits.

J - The value reported was below the practical quantitation limit. The value is an estimate.

K - Sample duplicate RPD is outside control limits due to sample inhomogeneity. The sample was re-extracted and re-analyzed with similar results.

L - The RPD is outside of the control limits.

M - Hydrocarbons in the gasoline range are impacting the diesel range result.

M1 - Hydrocarbons in the gasoline range (toluene-naphthalene) are present in the sample.

N - Hydrocarbons in the lube oil range are impacting the diesel range result.

N1 - Hydrocarbons in diesel range are impacting lube oil range results.

O - Hydrocarbons indicative of heavier fuels are present in the sample and are impacting the gasoline result.

P - The RPD of the detected concentrations between the two columns is greater than 40.

Q - Surrogate recovery is outside of the control limits.

S - Surrogate recovery data is not available due to the necessary dilution of the sample.

T - The sample chromatogram is not similar to a typical _____.

U - The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

U1 - The practical quantitation limit is elevated due to interferences present in the sample.

V - Matrix Spike/Matrix Spike Duplicate recoveries are outside control limits due to matrix effects.

W - Matrix Spike/Matrix Spike Duplicate RPD are outside control limits due to matrix effects.

X - Sample extract treated with a mercury cleanup procedure.

X1 - Sample extract treated with a sulfuric acid/silica gel cleanup procedure.

X2 - Sample extract treated with a silica gel cleanup procedure.

Y - The calibration verification for this analyte exceeded the 20% drift specified in methods 8260 & 8270, and therefore the reported result should be considered an estimate. The overall performance of the calibration verification standard met the acceptance criteria of the method.

Y1 - Negative effects of the matrix from this sample on the instrument caused values for this analyte in the bracketing continuing calibration verification standard (CCVs) to be outside of 20% acceptance criteria. Because of this, quantitation limits and sample concentrations should be considered estimates.

Z -

ND - Not Detected at PQL
PQL - Practical Quantitation Limit
RPD - Relative Percent Difference

# Chain of Custody

Page 1 of 1

**OnSite Environmental Inc.**
Analytical Laboratory Testing Services
14648 NE 95th Street • Redmond, WA 98052
Phone: (425) 883-3881 • www.onsite-env.com

Company: Aspect
Project Number: 140298
Project Name: GP PTM RAV MNA
Project Manager: Steve Germiat
Sampled by: B. Ward

**Turnaround Request (in working days)**
(Check One)
☐ Same Day ☐ 1 Day
☐ 2 Days ☐ 3 Days
☒ Standard (7 Days)
☐ _____ (other)

**Laboratory Number:** 10-322

| Lab ID | Sample Identification | Date Sampled | Time Sampled | Matrix | Number of Containers | NWTPH-HCID | NWTPH-Gx/BTEX (8021☐ 8260☐) | NWTPH-Gx | NWTPH-Dx (Acid / SG Clean-up☐) | Volatiles 8260 | Halogenated Volatiles 8260 | EDB EPA 8011 (Waters Only) | Semivolatiles 8270/SIM (with low-level PAHs) | PAHs 8270/SIM (low-level) | PCBs 8082 | Organochlorine Pesticides 8081 | Organophosphorus Pesticides 8270/SIM | Chlorinated Acid Herbicides 8151 | Total RCRA Metals | Total MTCA Metals | TCLP Metals | HEM (oil and grease) 1664 | Cu | As, Cd, Ni, Zn | | | % Moisture |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | AA-MW03R-2022-10-26 | 10/26/22 | 11:04 | GW | 1 | | | | | | | | | | | | | | | | | | X | X | | | |
| 2 | AA-MW02R-2022-10-26 | 10/26/22 | 12:17 | GW | | | | | | | | | | | | | | | | | | | X | | | | |
| 3 | AA-MW04R-2022-10-26 | 10/26/22 | 9:15 | GW | | | | | | | | | | | | | | | | | | | X | X | | | |
| 4 | SC-MW02R-2022-10-25 | 10/25/22 | 10:15 | GW | | | | | | | | | | | | | | | | | | | X | | | | |
| 5 | LP-MW01-2022-10-25 | 10/25/22 | 11:45 | GW | | | | | | | | | | | | | | | | | | | X | | | | |
| 6 | LB-MW01R-2022-10-25 | 10/25/22 | 14:51 | GW | | | | | | | | | | | | | | | | | | | X | | | | |

| | Signature | Company | Date | Time |
|---|---|---|---|---|
| Relinquished | | Aspect | 10/26/22 | 13:33 |
| Received | | ORE | 10/26/22 | 1515 |
| Relinquished | | | | |
| Received | | | | |
| Relinquished | | | | |
| Received | | | | |
| Reviewed/Date | | Reviewed/Date | | |

**Comments/Special Instructions**
- All samples field filtered 0.45µ
- E.C. >1,000 for samples SC-MW02R & LP-MW01

Data Package: Standard ☐ Level III ☐ Level IV ☐

Chromatograms with final report ☐ Electronic Data Deliverables (EDDs) ☐