2023 ANNUAL REPORT

Remedy Implementation
Crownhill Elementary School Site

Prepared for: Bremerton School District

Project No. AS100094-J-012 • March 21, 2024 FINAL

Aspect
A Geosyntec Company

earth + water

2023 ANNUAL REPORT
Remedy Implementation
Crownhill Elementary School Site

Prepared for: Bremerton School District

Project No. AS100094-J-012 • March 21, 2024 FINAL

Aspect Consulting

3/21/2024

MATTHEW M. LEWIS

Matthew M. Lewis, LHG
Project Hydrogeologist
matthew.lewis@aspectconsulting.com

Peter S. Bannister, PE
Principal Engineer
peter.bannister@aspectconsulting.com

V:\100094 BSD Crownhill Elementary RIFS\Deliverables\Remediation Implementation\2023 Annual Report\Final\2023 Annual Report_Final.docx

Contents

List of Tables

List of Figures

List of Appendices

1 Introduction

Historical landfill activities at the Bremerton School District (BSD) Crownhill Elementary School site (Site) have resulted in soil and groundwater contamination, including the presence of light nonaqueous-phase liquid (LNAPL) floating on the water table. The Washington State Department of Ecology (Ecology) and BSD entered into two Agreed Orders (AOs) to provide for remedial action at the Site. The first AO (No. DE7916) required BSD to conduct a Remedial Investigation (RI) and Feasibility Study (FS) in accordance with the Washington State Model Toxics Control Act (MTCA) Cleanup Regulation (Washington Administrative Code [WAC] 173-340). Upon completion of those activities in 2014, Ecology selected a cleanup remedy and prepared a Cleanup Action Plan (CAP) for the Site (Ecology, 2014). As documented in the CAP, requirements of the selected remedy include the following:

- Periodic monitoring of groundwater quality and LNAPL layer thickness.
- Periodic removal and off-Site recycling/disposal of LNAPL from existing wells.
- Periodic inspection and maintenance of the existing cover system to prevent direct contact exposures to landfilled materials and impacted soils.
- Running the HVAC system in the main school building continuously during the school day (to address the soil vapor intrusion pathway).
- Periodic subslab soil vapor and/or indoor air sampling to reconfirm that vapor intrusion is not a concern[1].
- Defining requirements for performing invasive work in soil[2].

The second AO (No. DE11107) required BSD to develop Site-specific work plans addressing the above requirements, and to implement the cleanup remedy in accordance with those work plans. The following remedy implementation work plans were prepared by BSD and approved by Ecology in 2015:

- "Groundwater/LNAPL Monitoring and Contingency Plan" (Plan; Aspect, 2015a)
- "LNAPL Removal Work Plan" (Aspect, 2015b)
- "Cover System Inspection and Maintenance Plan" (Aspect, 2015c)

[1] Requirements for sampling subslab soil vapor are specified in the Cover System Inspection and Maintenance Plan (Aspect, 2015c). Subslab soil vapor sampling was last conducted in November 2020 and is next required in November 2025. If subslab sampling indicates a potential vapor intrusion concern, then follow-up indoor air sampling may be warranted.

[2] Requirements for performing invasive work in soil are specified in Appendix A of the Cover System Inspection and Maintenance Plan (Aspect, 2015c).

In October 2018, Ecology provided a letter to BSD (Ecology, 2018) stating that *no further remedial action is necessary to clean up contamination at the Site, other than further operation and maintenance of the final remedy (including removal of LNAPL, continuous operation of the HVAC system during school hours, and institutional controls and monitoring), and periodically reviewing conditions at the Site*.

Annual reports documenting remedy implementation activities completed by BSD for the calendar year are submitted to Ecology in January of the following year. Annual reports for 2015 through 2021 (Aspect, 2016 through Aspect, 2022b) are referenced in Section 6 of this report. This report documents activities completed in 2023.

1.1 Project Background

Located in Bremerton, Washington, the Site includes both the Crownhill Elementary School (School) property at 1500 Rocky Point Road and the northern portion of the Bremerton United Methodist Church (BUMC) property at 1150 Marine Drive. A Site Plan is provided as Figure 1. The Site was used for sand and gravel mining up to the 1930s, and the mined area was backfilled with municipal and industrial wastes in the 1930s and 1940s. The original school building was constructed in 1956, and partially burned down in 1993. A series of environmental investigations were conducted during the period between that fire and construction of the current school building, which was completed in 1996. Additional investigations were conducted beginning in 2009, culminating in preparation of the "Remedial Investigation Report" (Aspect, 2014a; herein referred to as the RI report).

The purpose of the RI was to collect data necessary to adequately characterize the nature and extent of Site contamination. Using multiple lines of evidence (e.g., historical photographs, Site assessment activity, construction observations), the RI identified two generalized areas of landfill accumulation, designated the 'north' and 'south' landfill areas. Figure 1 shows the interpreted boundaries of these two areas. Landfilled materials were found at up to 40-foot depth in the north landfill area, and at up to 20-foot depth in the south landfill area. Extensive sampling identified the following constituents of potential concern (COPCs) in Site soils:

- Total petroleum hydrocarbon (TPH) in the diesel and motor-oil ranges
- Trichloroethene (TCE)
- Carcinogenic polycyclic aromatic hydrocarbons (cPAHs)
- The metals/metalloids antimony, arsenic, chromium III, copper, lead, and zinc

Three monitoring wells (MW-1 through MW-3) were installed at the Site in December 1994/January 1995, and another 13 wells (MW-4 through MW-16) during the RI (between March 2011 and October 2012; refer to Figure 1 for well locations). This network of 2-inch-diameter wells was used to periodically monitor groundwater, which is encountered beneath the Site at roughly 110-foot depth, for a wide range of contaminants. Monitoring identified TPH in the diesel and motor oil ranges, TCE, arsenic, and lead as COPCs dissolved in groundwater in the northern portion of the Site.

In addition to dissolved contaminants, separate-phase oil was observed floating on the groundwater table (as LNAPL) in well MW-8, which is installed in the north landfill

area. The primary reason for installing the last five RI monitoring wells (MW-12 through MW-16) was to investigate the areal extent and thickness of the LNAPL accumulation. LNAPL was observed in three of these wells (MW-13, MW-14, and MW-16), and periodic removal of LNAPL via bailing began in November 2012. At the recommendation of Ecology, a 4-inch-diameter well designed specifically for LNAPL extraction (EW-17) was installed in October 2015.

Site cleanup alternatives were developed and comparatively evaluated with respect to MTCA-specified criteria in the "Feasibility Study" report (FS; Aspect, 2014b). Based on the information provided in the RI report and on the FS evaluation, the CAP (Ecology, 2014) then established Site-specific cleanup levels (CULs) for constituents of concern (COCs) in Site soil, groundwater, and air, and selected a cleanup remedy for implementation. Figure 1 shows the estimated TPH, TCE, and arsenic plumes[3] (i.e., areas where concentrations in groundwater exceed the respective groundwater cleanup levels) as depicted in the CAP. Refer to the CAP for a full description of the selected cleanup remedy for the Site.

In April 2022, the total arsenic threshold of 40 micrograms per liter (µg/L) was exceeded at MW-6, triggering a response memo (Aspect, 2022c) detailing how BSD would address the arsenic exceedance. As a result of this response, Aspect submitted an addendum to the Groundwater/LNAPL Monitoring and Contingency Plan (Addendum; Aspect, 2022d) adding turbidity to the list of required field parameters to be collected during sampling procedures, additional analytes to the project list of COCs (Table 1), and procedures for conducting a soil-gas survey, if warranted. These additional measures will better support potential arsenic cleanup activities in the future. Although total arsenic concentrations in groundwater have not exceeded the threshold since April 2022, the observed groundwater chemistry and trends in total arsenic concentrations at MW-6 support completing the investigation as described.

2 Routine Activities Completed in 2023

This section documents routine cleanup-related activities completed by BSD during the 2023 calendar year. Periodic monitoring of groundwater and LNAPL thickness is documented in Section 2.1, LNAPL removal in Section 2.2, and Site inspections in Section 2.3.

2.1 Periodic Monitoring Activities

The Plan (Aspect, 2015b) requires periodic monitoring activities during the second and fourth quarters of the year and specifies contingency actions that will be taken if total arsenic is detected above 40 µg/L at MW-6 or above 4.5 µg/L at MW-10. Following exceedance of the threshold at MW-6 in 2021, the Addendum (Aspect, 2022d) was

[3] Lead is also a COC in groundwater. However, as discussed in the "Groundwater/LNAPL Monitoring and Contingency Plan" (Aspect, 2015a), compliance with the groundwater cleanup level for lead has been demonstrated. Therefore, lead is not included in the groundwater monitoring program.

prepared that requires additional groundwater monitoring during the first and third quarters of the year, and sample collection to support a better understanding of groundwater conditions leading to arsenic mobilization. Locations of groundwater monitoring wells and LNAPL monitoring/recovery wells are shown on Figure 1. Table 1 lists which Site wells are included in the monitoring program, which of those wells contain LNAPL, and the updated COCs analyzed in groundwater samples collected from the wells that do not contain LNAPL.

2.1.1 Groundwater Sampling Results and Interpretation

Semiannual groundwater monitoring was conducted by Aspect on April 4, 2023, and October 26, 2023, in accordance with the Plan and Addendum. Additional groundwater monitoring was conducted at MW-6 and MW-10 on January 30, 2023, and July 11, 2023, in accordance with the Addendum. Samples were collected in laboratory-supplied containers and submitted for analysis to analytical laboratory Friedman and Bruya, Inc under chain-of-custody procedures. Results for the 2023 groundwater monitoring are discussed below and historical groundwater sampling results since 2013 are summarized in Table 2. Refer to the RI report for results prior to December 2013 and for information on Site wells not included in the monitoring program. Laboratory reports for groundwater samples submitted for analysis are provided in Appendix C.

Diesel-range TPHs were detected in groundwater at concentrations above the Site CUL of 500 µg/L at monitoring wells MW-5 (3,000 µg/L) and MW-12 (2,100 µg/L). Diesel-range TPHs were detected at concentrations below the Site CUL at MW-10 (58 µg/L in October) and MW-15 (67 µg/L in October). The laboratory qualified all diesel-range TPH detections with "sample chromatographic pattern does not resemble the fuel standard used for quantitation."

MW-15, located immediately downgradient of the LNAPL area, is the conditional point of compliance for LNAPL migration and serves as a sentinel well for TPH plume migration[4]. Diesel-range TPH was not detected at this well in April but was detected in the October monitoring round. However, the concentration detected at MW-15 remains well below the CULs and no indication of LNAPL was observed on the water level indicator. The October 2023 round marks the seventh time diesel-range TPH has been detected at MW-15; see Table 2 for a summary of historical detections.

Motor Oil-range TPHs were detected in groundwater at concentrations above the Site CUL of 500 µg/L at monitoring wells MW-5 (2,100 µg/L) and MW-12 (880 µg/L). The laboratory qualified all diesel-range TPH detections with "sample chromatographic pattern does not resemble the fuel standard used for quantitation." Consistent with previous years, motor oil-range TPHs were not detected at above the reporting limit (250 µg/L) at MW-10 and MW-15.

TCE was detected in groundwater at a concentration above the Site CUL of 5 µg/L at monitoring well MW-9 (8.8 µg/L in April and 9.5 µg/L in October). TCE was not detected at the reporting limit (0.5 µg/L) at MW-10 or the McKinney domestic well.

[4] Well MW-15 is also the conditional point of compliance for LNAPL migration.

MW-9 is the only well with TCE CUL exceedances. TCE concentrations measured at this well decreased marginally from 2022 to 2023 but remained within the range of previous measurements.

Water samples collected from the McKinney domestic well (sampled twice in 2023) are analyzed for TCE only. As shown in Table 2, TCE has never been detected in any of the water samples collected from the McKinney well.

Total Arsenic was detected in groundwater at a concentration above the Site cleanup level of 5 µg/L at monitoring well MW-6 (20.0 µg/L in January, 22.5 µg/L in April, 20.3 µg/L in July, and 25.7 µg/L in October), but did not exceed the 40 µg/L threshold in 2023. Total arsenic was detected in groundwater below the Site CUL at MW-10 (1.8 µg/L in January, 1.6 µg/L in April, 1.6 µg/L in July, and 1.5 in October), MW-12 (1.9 µg/L in October), and MW-15 (1.3 µg/L in October). Total arsenic was not detected at the reporting limit (1.0 µg/L) at MW-5 and MW-9 in 2023.

Figure 2 shows arsenic concentrations measured at MW-6 and MW-10 since those wells were installed. Well MW-6 is located approximately 130 feet upgradient of MW-10 and serves as a sentinel well for dissolved contaminant plume migration. Through 2021, concentrations at MW-6 exhibited a fluctuating and generally increasing trend, thought to be caused by local, complex geochemical mechanisms mobilizing naturally occurring arsenic in aquifer materials. Since 2021, total arsenic concentrations at MW-6 have decreased to less than 30 ug/L and have stabilized.

The total arsenic concentrations at MW-10 have been below the contingency action level of 4.5 µg/L since 2012 and appear to have stabilized around 2 µg/L. Therefore, total arsenic concentrations have met the cleanup level within the Site.

Dissolved Arsenic was detected above cleanup levels in MW-6 (between 19.4 and 23.9 µg/L), below cleanup levels in MW-10 (between 1.5 and 1.7 µg/L), and slightly above the reporting limit in MW-12 (between 1.6 and 2.2 µg/L) and MW-15 (1.2 µg/L in the October round only). Dissolved arsenic concentrations are similar to or below the total arsenic concentrations at each respective well. This indicates that using low-flow sampling protocols has minimized sample turbidity, thereby providing reliable total arsenic results.

Dissolved Iron was detected across a range of concentrations, supporting the conceptual model of local, complex geochemical mechanisms mobilizing metals that occur naturally in the aquifer. Dissolved iron is listed as a secondary contaminant (WAC 173-200), and concentrations were observed above the groundwater standards[5] of 0.30 milligrams per liter (mg/L) (300 µg/L) in both semi-annual sampling events at MW-5, MW-6, MW-10, and MW-12, as indicated by results in Table 2 with bold format. Dissolved iron was detected below secondary groundwater standards in April and October at MW-9 and MW-15.

[5] The criteria for metals as primary and secondary contaminants are defined according in WAC 173-200-040 and are applicable to total metals concentrations only. Based on the use of low-flow sampling protocols at this Site, dissolved metals concentrations are considered approximate proxies for the total metals concentrations.

Dissolved Manganese was also detected across a range of concentrations, again supporting the conceptual model of local, complex geochemical mechanisms mobilizing metals that occur naturally in the aquifer. Dissolved manganese is listed as a secondary contaminant (WAC 173-200), and concentrations were observed above the groundwater standard of 0.05 mg/L (50 µg/L) in MW-5 (April), MW-6 (January, April, July, and October), MW-10 (January, April, July, and October), and MW-12 (October). Dissolved manganese was detected below secondary groundwater standards at MW-9 in October; however, it was not detected above reporting limits (1 µg/L) at MW-9 in April or MW-15 in either sampling events in 2023. See Table 2 for specific concentration values.

Total Alkalinity is a measure of groundwater buffering changes in acidity, one of the geochemical mechanisms. At this Site, groundwater acidity is affected by dissolved carbon dioxide which is generated by waste decomposition. The lowest concentrations of total alkalinity were detected in MW-9 (257 and 273 mg/L as CaCO3 [calcium carbonate]), upgradient of the LNAPL plume and the wells showing exceedances of dissolved metals. Total alkalinity in downgradient wells was detected at higher concentrations in wells within and downgradient of the LNAPL plume, as shown in Table 2.

In the event that additional contingency actions are triggered, these total alkalinity data may be used in conjunction with other groundwater and soil gas monitoring data to design an appropriate remedial response. Aspect recommends continuing to monitor groundwater in accordance with the Plan and Addendum (see Table 1).

2.1.2 NAPL Thickness Monitoring

LNAPL thickness monitoring was conducted on April 4, 2023, and October 26, 2023. Consistent with previous monitoring rounds, LNAPL was detected in five wells (MW-8, MW-13, MW-14, MW-16, and EW-17). Table 3 summarizes LNAPL thicknesses measured in these wells since they were installed. Thicknesses measured in 2023 ranged from 0.4 feet in EW-17 to 0.10 feet in MW-14.

2.2 LNAPL Removal

Bottom-filling bailers are used to periodically remove LNAPL from Site wells. LNAPL removal is attempted whenever an LNAPL layer thickness of at least 0.3 foot is measured in a well (prior to bailing). In 2023, LNAPL removal was conducted concurrent with the two LNAPL thickness/groundwater monitoring rounds discussed above, in general accordance with the requirements of the LNAPL Removal Work Plan (Aspect, 2015b). Bailing was attempted from all five LNAPL-containing wells (MW-8, MW-13, MW-14, MW-16, and EW-17) in both the April and October rounds. Table 3 shows estimated LNAPL volumes bailed from each well during each removal event, and Figure 3 plots cumulative LNAPL removal on an annual basis. An estimated total of 3.3 liters of LNAPL was bailed in 2023. Since bailing began in 2012, an estimated total of about 40 liters of LNAPL have been removed.

2.3 Site Inspections

Semiannual Site inspections were conducted on June 20 and December 21, 2023, in accordance with the requirements of the Cover System Inspection and Maintenance Plan (Aspect, 2015c). The completed inspection records are provided in Appendices A and B,

along with photos taken during the inspections. The photos were taken from four specific vantage points, identified on Figure 1, to provide photo-documentation of the following cover features:

- **Photo Location 1 –** Pavement in the parking area along Bertha Avenue NW, where an RI soil sample collected from beneath the pavement (composite sample to 3-foot depth) contained lead at a concentration exceeding the cleanup level.
- **Photo Locations 2 and 4 –** Soil/sod covers next to the portable classroom building and in the southeast corner of the School property, where lead cleanup level exceedances were identified in soil samples collected from the 1- to 3-foot depth range. In summer 2013, these two areas were covered with a geotextile fabric (placed directly on the undisturbed ground surface) and an additional 1-foot thickness of fill soil was imported and hydroseeded to supplement the pre-existing clean soil cover layer.
- **Photo Location 3 –** A soil/sod cover in the northwest corner of the BUMC property (and extending approximately 10 feet onto the School property), where an interim action was completed in spring 2012 in which contaminated surface soils were removed to a 1-foot depth, a geotextile fabric was placed on remaining contaminated soils, and a 1-foot thickness of fill soil was imported and hydroseeded.

In July 2018, asphalt repairs were completed at three locations in the Bertha Ave NW parking area (Photo Location 1) after potholes were observed (documented in Aspect, 2019). The parking area appeared to be in good condition, except for one observed pothole in December. The soil/sod cover (Photo Locations 2 through 4) appeared to be in excellent condition during both 2023 inspection events. The 2023 inspections did not identify any cover system deficiencies in other areas of the Site or other action items.

3 Nonroutine Activities Completed in 2023

3.1 Soil Gas Survey

In the 2022 Annual Monitoring Report, Aspect recommended conducting a soil gas survey at nine monitoring wells to measure landfill gas concentrations in the deep vadose zone (Aspect, 2023). The survey was performed on April 4 and 5, 2023, in accordance with the Addendum (Aspect, 2022d) during a period of falling barometric pressure to ensure representative results. Results are tabulated in Table 4 and presented on Figure 4.

Survey results showed carbon dioxide between 4.7 and 10.3 percent with trace amounts of methane and hydrogen sulfide. For reference, landfill gas is typically about 40 percent carbon dioxide and 60 percent methane, whereas unimpacted soil gas typically contains about 5 percent carbon dioxide and no methane. The highest carbon dioxide concentrations were clustered near the center of the area of TPH exceedances: MW-8, MW-12, MW-13, and EW-17 (see Figure 4).

These results suggest that while subsurface conditions are not at typical landfill levels, subsurface carbon dioxide levels associated with the TPH exceedances are sufficient to cause reducing conditions and raise acidity, thereby mobilizing certain naturally occurring metals, including iron, manganese, and arsenic. The variability in total arsenic concentrations at MW-6 suggests that subsurface carbon dioxide concentrations may be much higher due to less exchange with atmospheric air.

Aspect recommends that the plastic well caps be removed and retained at most project wells to promote atmospheric air exchange with the subsurface gases. This will allow the excess carbon dioxide to be passively vented. During passive venting, atmospheric air enters the subsurface with rising barometric pressure and subsurface gases are vented during decreasing barometric pressures. The well monument lids will continue to keep the wells secure and well monuments with histories of filling with surface water will not have the caps removed. Air dispersion above the well monuments will mix the venting soil gases to below detectable levels.

3.2 Tree Removal

In March 2023, BSD removed two trees damaging nearby sidewalks at the school (see photographs in Appendix E). Prior to removal, Aspect submitted formal notification to Ecology via email on BSD's behalf notifying them of the planned work in accordance with Agreed Order No. DE11107 (also included in Appendix E). The trees were cut down by a licensed contractor and the stumps ground down to about 8 inches below ground surface. The work was supervised by the BSD facilities director and workers were notified of ground conditions. BSD has since replaced the trees with shrubs that will not impact the sidewalk.

3.3 Ecology 5-year Site Visit

Vance Atkins with Ecology conducted a site visit on November 21, 2023, to support the 5-Year review that had been postponed from 2020. John Fisher (BSD), and Matthew Lewis (Aspect) attended the site visit, inspecting the soil cap areas, well monuments (where accessible), indoor sub-slab vapor monitoring points, and tree removal area. Ecology will use the information gathered in the site visit and annual monitoring reports to write a 5-Year review report, tentatively scheduled for first quarter 2024 after a public review process.

4 Statement of Compliance

On behalf of BSD, Aspect certifies that the remedy implementation activities completed at the Site in 2023 complied with the requirements of the CAP, Agreed Order No. DE11107, and the remedy implementation work plans approved by Ecology.

5 Plans for 2024

The following remedy implementation activities are planned for 2024:

- Conduct semiannual rounds of groundwater/LNAPL monitoring and LNAPL removal (scheduled for April and October 2024)[6]
- Continue sampling MW-6 and MW-10 on a quarterly basis (January and July 2024)
- Conduct semiannual Site inspections (scheduled for June and December 2024)
- Remove the well caps on select project wells and retain in case they need to be replaced.
- Support Ecology as needed with public comments in response to the 5-year review report.

In addition to the above activities, Aspect recommends:

- The pothole in the parking area along Bertha Avenue NW (and any that occur after this writing) be patched up by BSD as soon as practical.

Other activities, as specified in the remedy implementation work plans, may also be required based on monitoring and/or inspection results.

6 References

Aspect Consulting, LLC (Aspect), 2010, Soil Vapor Intrusion Assessment, November 2010 Sub-Slab Sampling, Crownhill Elementary School, prepared for Bremerton School District, dated December 22, 2010.

Aspect Consulting, LLC (Aspect), 2014a, Remedial Investigation, Crownhill Elementary School, prepared for Bremerton School District, November 2014.

Aspect Consulting, LLC (Aspect), 2014b, Feasibility Study, Crownhill Elementary School, prepared for Bremerton School District, October 21, 2014.

Aspect Consulting, LLC (Aspect), 2015a, Groundwater/LNAPL Monitoring and Contingency Plan, Crownhill Elementary School Site, prepared for Bremerton School District, November 19, 2015.

Aspect Consulting, LLC (Aspect), 2015b, LNAPL Removal Work Plan, Crownhill Elementary School Site, prepared for Bremerton School District, November 19, 2015.

[6] If an LNAPL thickness greater than 4 feet is measured in the April monitoring round, an LNAPL removal round will also be required in July 2024.

Aspect Consulting, LLC (Aspect), 2015c, Cover System Inspection and Maintenance Plan, Crownhill Elementary School Site, prepared for Bremerton School District, December 17, 2015.

Aspect Consulting, LLC (Aspect), 2016, 2015 Annual Report, Remedy Implementation, Crownhill Elementary School Site, prepared for Bremerton School District, January 14, 2016.

Aspect Consulting, LLC (Aspect), 2017, 2016 Annual Report, Remedy Implementation, Crownhill Elementary School Site, prepared for Bremerton School District, January 9, 2017.

Aspect Consulting, LLC (Aspect), 2018, 2017 Annual Report, Remedy Implementation, Crownhill Elementary School Site, prepared for Bremerton School District, January 29, 2018.

Aspect Consulting, LLC (Aspect), 2019, 2018 Annual Report, Remedy Implementation, Crownhill Elementary School Site, prepared for Bremerton School District, January 22, 2019.

Aspect Consulting, LLC (Aspect), 2020, 2019 Annual Report, Remedy Implementation, Crownhill Elementary School Site, prepared for Bremerton School District, January 14, 2020.

Aspect Consulting, LLC (Aspect), 2021, 2020 Annual Report, Remedy Implementation, Crownhill Elementary School Site, prepared for Bremerton School District, March 3, 2021.

Aspect Consulting, LLC (Aspect), 2022a, Crownhill Elementary School Site: Garden Inspection, prepared for Bremerton School District, January 24, 2022.

Aspect Consulting, LLC (Aspect), 2022b, 2021 Annual Report, Remedy Implementation, Crownhill Elementary School Site, prepared for Bremerton School District, June 14, 2022.

Aspect Consulting, LLC (Aspect), 2022c, Crownhill Elementary Exceedance Response Memorandum, prepared for Bremerton School District, July 5, 2022.

Aspect Consulting, LLC (Aspect), 2022d, Crownhill Elementary: Addendum to the Groundwater/LNAPL Monitoring and Contingency Plan, prepared for Bremerton School District, November 21, 2022.

Washington State Department of Ecology (Ecology), 2014, Cleanup Action Plan, Bremerton School District, Crownhill Elementary School Site, December 10, 2014.

Washington State Department of Ecology (Ecology), 2018, Letter to D. Herrington, Bremerton School District, regarding Status of Agreed Order No. DE11107 and No Further Action to complete Cleanup of the Crownhill Elementary School Site, October 15, 2018.

7 Limitations

Work for this project was performed for the Bremerton School District (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.

All reports prepared by Aspect Consulting for the Client apply only to the services described in the Agreement(s) with the Client. Any use or reuse by any party other than the Client is at the sole risk of that party, and without liability to Aspect Consulting. Aspect Consulting's original files/reports shall govern in the event of any dispute regarding the content of electronic documents furnished to others.

Please refer to Appendix F titled "Report Limitations and Guidelines for Use" for additional information governing the use of this report.

TABLES

Table 1. 2023 Well Monitoring Program Summary

Project No. AS100094J-12, Crownhill Elementary, Bremerton, Washington

Well Included in Monitoring Program[1]	LNAPL Present in Well[3]	Groundwater Samples Collected for Analysis of COCs[1]			Additional Diagnostic Analytes[2]		Additional Notes
		TPH[4]	Total Arsenic[5]	TCE[6]	Dissolved As, Fe, Mn	Alkalinity	
MW-5		spring	spring		spring	spring	
MW-6			quarterly		quarterly	quarterly	7
MW-8	X						
MW-9			spring/fall	spring/fall	spring/fall	spring/fall	
MW-10		quarterly	quarterly	quarterly	quarterly	quarterly	8
MW-12		fall	fall		fall	fall	
MW-13	X						
MW-14	X						
MW-15		spring/fall	spring/fall		spring/fall	spring/fall	9
MW-16	X						
EW-17	X						
McKinney				spring/fall			10

COC	constituent of concern
LNAPL	light non-aqueous-phase liquid
TCE	trichloroethene
TPH	total petroleum hydrocarbon

Notes:

1) The *Groundwater/LNAPL Monitoring and Contingency Plan* (Aspect, 2015a) provides the rationale for including a well in the monitoring program, and for selecting well-specific COC analytes. Refer to Table 2 for groundwater monitoring results.

2) The *Addendum to the Groundwater/LNAPL Monitoring and Contingency Plan* (Aspect, 2022c) provides the rationale for adding these analytes to the list of project COCs.

3) All wells except McKinney are monitored for LNAPL. If LNAPL is detected, its thickness is measured (refer to Table 3) and groundwater samples are not collected for analysis.

4) TPH is analyzed for using Method NWTPH-Dx. Both diesel-range TPH and motor-oil-range TPH are COCs.

5) Analyzed for using EPA Method 6010.

6) TCE is analyzed for using EPA Method 8260.

7) Well MW-6 provides early warning of potential arsenic migration.

8) Well MW-10 is the conditional point of compliance for achieving groundwater cleanup levels.

9) Well MW-15 is the conditional point of compliance for LNAPL migration.

10) The McKinney domestic well water sample is collected from the outdoor faucet on the north side of the residence at 1724 Dora Ave NW.

Table 2. Groundwater Monitoring Data Summary

Project No. AS100094J-12, Crownhill Elementary, Bremerton, Washington

Well ID and Top-of-Casing Elevation[1,2]	Top-of-Casing Elevation (feet)	Date	Depth to Water (feet below top-of-casing)	Groundwater Elevation (feet)[2]	Constituent of Concern/Concentration[3]				Additional Diagnostic Analytes			
					Diesel-Range TPH	Motor-Oil-Range TPH	TCE	Total Arsenic	Dissolved Arsenic	Dissolved Iron	Dissolved Manganese	Total Alkalinity (as CaCO3) in mg/L
MW-5 136.95 ft	136.95	12/18/13	117.36	19.59	**2,100 x**	**750 x**	1.8	1.0	na	na	na	na
		04/03/14	117.17	19.78	**2,400 x**	**770 x**	na	1.2	na	na	na	na
		07/01/14	116.23	20.72	**2,000 x**	490 x	na	1.0	na	na	na	na
		10/13/14	117.56	19.39	**1,300**	260 x	na	1.0	na	na	na	na
		04/07/15	116.49	20.46	**2,000**	430 x	na	na	na	na	na	na
		04/05/16	113.41	23.54	**1,800**	**600 x**	na	na	na	na	na	na
		04/04/17	112.13	24.82	**2,200 x**	**750 x**	na	na	na	na	na	na
		04/05/18	113.16	23.79	**2,600 x**	**1,100 x**	na	na	na	na	na	na
		04/04/19	116.24	20.71	**1,600 x**	**520 x**	na	na	na	na	na	na
		04/10/20	117.97	18.98	**2,400 x**	**660 x**	na	na	na	na	na	na
		04/14/21	116.92	20.03	**1,300 x**	490 x	na	na	na	na	na	na
		04/27/22	115.35	21.60	**1,000 x**	310 x	na	na	1 U	**487**	**4,090**	794
		04/04/23	116.39	20.56	**3,000 x**	**2,100** x	na	1 U	1 U	**384**	**4,860**	802
MW-6 133.87 ft	133.87	12/18/13	124.36	9.51	50 U	250 U	1 U	**16.6**	na	na	na	na
		04/03/14	124.70	9.17	50 U	250 U	na	**20.5**	na	na	na	na
		07/01/14	124.40	9.47	50 U	250 U	na	**19.9**	na	na	na	na
		10/13/14	124.54	9.33	50 U	250 U	na	**20.4**	na	na	na	na
		04/07/15	124.61	9.26	na	na	na	**26.7**	na	na	na	na
		10/28/15	124.84	9.03	na	na	na	**22.8**	na	na	na	na
		04/05/16	124.54	9.33	na	na	na	**29.1**	na	na	na	na
		10/28/16	123.70	10.17	na	na	na	**23.3**	na	na	na	na
		04/04/17	123.21	10.66	na	na	na	**12.5**	na	na	na	na
		10/27/17	122.79	11.08	na	na	na	**29.3**	na	na	na	na
		04/05/18	123.31	10.56	na	na	na	**29.7**	na	na	na	na
		10/26/18	123.71	10.16	na	na	na	**23.0**	na	na	na	na
		04/04/19	124.14	9.73	na	na	na	**19.4**	na	na	na	na
		10/14/19	124.77	9.10	na	na	na	**21.9**	na	na	na	na
		04/10/20	125.10	8.77	na	na	na	**28.5**	na	na	na	na
		10/15/20	125.45	8.42	na	na	na	**35.3**	na	na	na	na
		04/14/21	125.13	8.74	na	na	na	**28.6**	na	na	na	na
		11/22/21	125.15	8.72	na	na	na	**37.1**	na	na	na	na
		04/27/22	124.70	9.17	na	na	na	**40.6**	**28.0**	**10,400**	**1,760**	342
		07/25/22	124.22	9.65	na	na	na	**24.2**	**23.5**	**9,800**	**1,700**	322
		10/11/22	124.47	9.40	na	na	na	**23.6**	**10.0**	**2,730**	**459**	315
		01/30/23	124.74	9.13	na	na	na	**20.0**	**19.4**	**7,580**	**2,030**	350
		04/04/23	124.67	9.20	na	na	na	**22.5**	**23.5**	**7,440**	**1,980**	357
		07/11/23	124.53	9.34	na	na	na	**20.3**	**21.2**	**6,030**	**1,820**	334
		10/26/23	124.93	8.94	na	na	na	**25.7**	**23.9**	**8,770**	**1,940**	327
MW-9 134.39 ft	134.39	12/17/13	114.49	19.90	110 x	250 U	**11**	1 U	na	na	na	na
		04/03/14	114.35	20.04	210 x	280 x	**11**	1 U	na	na	na	na
		07/01/14	113.44	20.95	180 x	250 U	**12**	1 U	na	na	na	na
		10/13/14	114.71	19.68	180 x	250 U	**10**	1 U	na	na	na	na
		04/07/15	114.50	19.89	na	na	**11**	na	na	na	na	na
		10/28/15	115.30	19.09	na	na	**10**	na	na	na	na	na
		04/05/16	110.60	23.79	na	na	**11**	na	na	na	na	na
		10/28/16	112.35	22.04	na	na	**8.6**	na	na	na	na	na
		04/04/17	109.23	25.16	na	na	**9.5**	na	na	na	na	na
		10/27/17	110.58	23.81	na	na	**6.8**	na	na	na	na	na
		05/02/18	110.35	24.04	na	na	**7.1**	na	na	na	na	na
		10/26/18	112.98	21.41	na	na	**7.9**	na	na	na	na	na
		04/04/19	113.39	21.00	na	na	**9.7**	na	na	na	na	na
		10/14/19	nm[4]	--	na	na	**8.0**	na	na	na	na	na
		04/10/20	nm[4]	--	na	na	**7.1**	na	na	na	na	na
		10/15/20	nm[4]	--	na	na	**5.0**	na	na	na	na	na
		04/21/21	114.00	20.39	na	na	**7.2**	na	na	na	na	na
		11/11/21	nm[4]	--	na	na	**5.4**	na	na	na	na	na
		04/27/22	112.50	21.89	na	na	**11.0**	na	1 U	95	3.1	113
		10/11/22	113.55	20.84	na	na	**8.2**	1 U	1 U	100 U	1.8 U	137
		04/04/23	113.54	20.85	na	na	**8.8**	1 U	1 U	179	1 U	273
		10/26/23	nm[4]	--	na	na	**9.5**	1 U	1 U	177	2.0	257
MW-10 132.33 ft	132.33	12/18/13	120.87	11.46	50 U	250 U	1 U	3.3	na	na	na	na
		04/03/14	121.21	11.12	50 U	250 U	1 U	3.9	na	na	na	na
		07/01/14	120.55	11.78	50 U	250 U	1 U	3.0	na	na	na	na
		10/13/14	121.48	10.85	50 U	250 U	1 U	3.0	na	na	na	na
		04/07/15	120.60	11.73	50 U	250 U	1 U	2.8	na	na	na	na
		10/28/15	121.30	11.03	80 U	400 U	1 U	2.7	na	na	na	na
		04/05/16	119.33	13.00	50 U	250 U	1 U	2.6	na	na	na	na
		10/28/16	120.35	11.98	50 U	250 U	1 U	2.6	na	na	na	na
		04/04/17	118.58	13.75	50 U	250 U	1 U	2.2	na	na	na	na
		10/27/17	119.30	13.03	50 U	250 U	1 U	2.1	na	na	na	na
		04/05/18	122.04	10.29	50 U	250 U	1 U	1.9	na	na	na	na
		10/26/18	120.62	11.71	50 U	250 U	1 U	1.8	na	na	na	na
		04/04/19	120.85	11.48	50 U	250 U	1 U	2.0	na	na	na	na
		10/14/19	121.79	10.54	50 U	250 U	1 U	2.1	na	na	na	na
		04/10/20	121.68	10.65	50 U	250 U	1 U	2.0	na	na	na	na
		10/15/20	121.66	10.67	50 U	250 U	1 U	2.4	na	na	na	na
		04/14/21	120.80	11.53	50 U	250 U	1 U	2.0	na	na	na	na
		11/11/21	121.20	11.13	55 x	250 U	0.5 U	1.9	na	na	na	na
		04/27/22	120.07	12.26	50 U	250 U	0.5 U	1.3	1.7	**1,850**	**1,080**	196
		07/25/22	120.15	12.18	50 U	250 U	0.5 U	1.5	1.4	**2,280**	**1,230**	241
		10/11/22	120.71	11.62	50 U	250 U	0.5 U	2.0	1.7	**1,990**	**1,280**	218
		01/30/23	120.74	11.59	50 U	250 U	0.5 U	1.8	1.7	**2,420**	**1,430**	253
		04/04/23	120.96	11.37	50 U	250 U	0.5 U	1.6	1.6	**2,520**	**1,360**	261
		07/11/23	120.81	11.52	50 U	250 U	0.5 U	1.6	1.6	**2,240**	**1,440**	249
		10/26/23	121.46	10.87	58 x	250 U	0.5 U	1.6	1.5	**2,530**	**1,410**	237

Table 2. Groundwater Monitoring Data Summary

Project No. AS100094J-12, Crownhill Elementary, Bremerton, Washington

Well ID and Top-of-Casing Elevation[1,2]	Top-of-Casing Elevation (feet)	Date	Depth to Water (feet below top-of-casing)	Groundwater Elevation (feet)[2]	Constituent of Concern/Concentration[3]				Additional Diagnostic Analytes			
					Diesel-Range TPH	Motor-Oil-Range TPH	TCE	Total Arsenic	Dissolved Arsenic	Dissolved Iron	Dissolved Manganese	Total Alkalinity (as CaCO3) in mg/L
MW-12 133.87 ft	133.87	12/17/13	114.24	19.63	**2,000 x**	**800 x**	1.0 U	1.5	na	na	na	na
		04/03/14	114.11	19.76	**2,800 x**	**850 x**	na	1.4	na	na	na	na
		07/01/14	113.17	20.70	**1,800 x**	420 x	na	1.7	na	na	na	na
		10/13/14	114.45	19.42	**1,600**	250 U	na	1.7	na	na	na	na
		10/28/15	115.02	18.85	**2,400 x**	**620 x**	na	na	na	na	na	na
		10/28/16	112.19	21.68	**1,500 x**	**680 x**	na	na	na	na	na	na
		10/27/17	110.40	23.47	**1,700 x**	**570 x**	na	na	na	na	na	na
		10/26/18	112.76	21.11	**2,200 x**	**510 x**	na	na	na	na	na	na
		10/14/19	115.37	18.50	**1,900 x**	**1,200 x**	na	na	na	na	na	na
		10/15/20	116.54	17.33	**1,600 x**	**1,400 x**	na	na	na	na	na	na
		11/11/21	115.60	18.27	**1,900 x**	**990 x**	na	na	na	na	na	na
		10/11/22	113.33	20.54	**1,600 x**	430 **x**	na	2.0	2.2	**309**	**5,340**	725
		10/26/23	114.86	19.01	**2,100 x**	**880 x**	na	1.9	1.6	**613**	**5,260**	759
MW-15 133.37 ft	133.37	12/17/13	nm[4]	--	50 U	250 U	1 U	4.6	na	na	na	na
		04/03/14	nm[4]	--	50 U	250 U	na	1.2	na	na	na	na
		07/01/14	nm[4]	--	50 U	250 U	na	1 U	na	na	na	na
		10/13/14	nm[4]	--	50 U	250 U	na	1.1	na	na	na	na
		04/07/15	nm[4]	--	50 U	250 U	na	na	na	na	na	na
		10/28/15	nm[4]	--	50 U	250 U	na	na	na	na	na	na
		04/05/16	109.88	23.49	50 U	250 U	na	na	na	na	na	na
		10/28/16	111.65	21.72	50 U	250 U	na	na	na	na	na	na
		04/04/17	109.61	23.76	50 U	250 U	na	na	na	na	na	na
		10/27/17	109.90	23.47	50 U	250 U	na	na	na	na	na	na
		04/05/18	109.65	23.72	53 x	250 U	na	na	na	na	na	na
		10/26/18	nm[4]	--	60 U	300 U	na	na	na	na	na	na
		04/04/19	nm[4]	--	61 x	250 U	na	na	na	na	na	na
		10/14/19	nm[4]	--	50 U	250 U	na	na	na	na	na	na
		04/10/20	nm[4]	--	64 x	260 U	na	na	na	na	na	na
		10/15/20	nm[4]	--	nm[6]	nm[6]	na	na	na	na	na	na
		04/14/21	nm[4]	--	50 x	250 U	na	na	na	na	na	na
		11/11/21	nm[4]	--	95 U	480 U	na	na	na	na	na	na
		04/27/22	110.70	22.67	53 x	250 U	na	na	1 U	126	1 U	307
		10/11/22	nm[4]	--	87 x	250 U	na	1 U	1.2	100 U	1.8 U	308
		04/04/23	nm[4]	--	50 U	250 U	na	1 U	1 U	142	1 U	351
		10/26/23	nm[4]	--	67 x	250 U	na	1.3	1.2	129	1 U	313
McKinney (domestic well)		10/6/14[5]	nm	--	100 U	200 U	0.2 U	0.4	na	na	na	na
		2/19/15[5]	nm	--	100 U	200 U	0.2 U	0.4	na	na	na	na
		6/1/2015[5]	nm	--	100 U	200 U	0.2 U	0.3	na	na	na	na
		10/28/15	nm	--	na	na	1.0 U	na	na	na	na	na
		04/05/16	nm	--	na	na	1.0 U	na	na	na	na	na
		10/28/16	nm	--	na	na	1.0 U	na	na	na	na	na
		04/04/17	nm	--	na	na	1.0 U	na	na	na	na	na
		10/27/17	nm	--	na	na	1.0 U	na	na	na	na	na
		04/04/18	nm	--	na	na	1.0 U	na	na	na	na	na
		10/26/18	nm	--	na	na	1.0 U	na	na	na	na	na
		04/04/19	nm	--	na	na	1.0 U	na	na	na	na	na
		10/14/19	nm	--	na	na	1.0 U	na	na	na	na	na
		04/10/20	nm	--	na	na	1.0 U	na	na	na	na	na
		10/15/20	nm	--	na	na	1.0 U	na	na	na	na	na
		04/14/21	nm	--	na	na	1.0 U	na	na	na	na	na
		11/11/21	nm	--	na	na	0.5 U	na	na	na	na	na
		04/27/22	nm	--	na	na	0.5 U	na	na	na	na	na
		10/11/22	nm	--	na	na	0.5 U	na	na	na	na	na
		04/04/23	nm	--	na	na	0.5 U	na	na	na	na	na
		10/26/23	nm	--	na	na	0.5 U	na	na	na	na	na

na not analyzed
nm not measured
TCE trichloroethene
TPH total petroleum hydrocarbons
U analyte not detected at or above the reported result
x sample chromatographic pattern does not resemble the fuel standard used for quantitation

Notes:

1) Only wells included in the current monitoring program that do not contain LNAPL are shown in this table. Refer to Table 3 for wells containing LNAPL. Refer to the *Remedial Investigation Report* (Aspect, 2014a) for data prior to December 2013 and for information on other wells.

2) Elevations are based on NAVD88 vertical datum.

3) All concentrations are in micrograms per liter (µg/L) unless otherwise noted. Cleanup levels are 500 µg/L for diesel- and motor-oil-range TPH, and 5 µg/L for TCE and total arsenic. Cleanup level exceedances are bolded.

4) Water level was below top of pump and could not be measured.

5) Samples from McKinney well were initially collected for analysis by the Kitsap Public Health District and analyzed by Analytical Resources, Inc.

6) Water level was below pump intake and sample could not be collected.

Table 3. LNAPL Thickness Measurements and Removal Summary

Project No. AS100094J-12, Crownhill Elementary, Bremerton, Washington

Well ID	Date	Initial Thickness in ft[1]	LNAPL Removal in Liters[2]	Notes
MW-8	10/26/12	0.20		Well installed on 12/20/11.
	11/21/12	#N/A		
	01/31/13	0.10		
	05/03/13	0.03		
	08/07/13	0.23		
	12/17/13	0.86		
	04/02/14	0.39	0.18	(Note 5)
	05/23/14	0.38	0.11	(Note 4)
	07/01/14	0.23		
	10/13/14	0.28		
	04/07/15	0.27		Not bailed because initial thickness was <0.3 feet.
	10/28/15	0.90	0.36	(Note 4)
	01/18/16	0.10		Not bailed because initial thickness was <0.3 feet.
	04/05/16	0.01		Not bailed because initial thickness was <0.3 feet.
	10/28/16	0.40	0.01	(Note 4)
	04/04/17	0.13		Not bailed because initial thickness was <0.3 feet.
	10/27/17	0.15		Not bailed because initial thickness was <0.3 feet.
	04/03/18	#N/A	0.02	(Note 4), (Note 6)
	10/26/18	1.70	0.75	(Note 4)
	04/04/19	0.40	0.23	(Note 4)
	10/14/19	1.15	0.18	(Note 4)
	04/10/20	0.95	0.38	(Note 4)
	10/15/20	1.08	0.16	(Note 4)
	04/15/21	1.20	0.19	(Note 4)
	11/11/21	1.20	0.34	(Note 4)
	04/27/22	1.00	0.57	(Note 4)
	10/11/22	1.70	1.78	(Note 4)
	04/04/23	0.34	0.35	(Note 4)
	10/26/23	0.89	0.25	(Note 4)
Cumulative LNAPL Removal			5.86	
MW-13	11/01/12	1.46		Well installed on 10/25/12.
	11/21/12	0.99	0.90	(Note 4)
	01/31/13	0.10		
	05/03/13	0.31		
	08/07/13	0.49		
	12/17/13	4.90		
	04/02/14	1.35	0.02	Water detected above LNAPL. (Note 4)
	05/23/14	2.08	0.18	Water detected above LNAPL. (Note 4)
	07/01/14	0.84		
	10/13/14	3.39		
	04/07/15	1.00	0.17	(Note 4)
	10/28/15	4.15	0.02	(Note 4)
	01/18/16	1.39	0.52	(Note 4)
	04/05/16	1.31	0.26	(Note 4)
	10/28/16	0.05		Not bailed because initial thickness was <0.3 feet.
	04/04/17	0.20		Not bailed because initial thickness was <0.3 feet.
	10/27/17	0.04		Not bailed because initial thickness was <0.3 feet.
	04/03/18	1.70	0.35	(Note 4)
	10/26/18	2.00	1.05	(Note 4)
	04/04/19	1.70	0.22	(Note 4)
	10/14/19	1.10	0.10	(Note 4)
	04/10/20	2.95	0.13	(Note 4)
	10/15/20	1.22	0.38	(Note 4)
	04/15/21	1.00	0.33	(Note 4)
	11/11/21	1.80	0.37	(Note 4)
	04/27/22	1.76	0.00	Bailing attempt abandoned, obstruction in well.
	10/11/22	0.42	0.40	(Note 4)
	04/04/23	1.20	0.57	(Note 4)
	10/26/23	0.13		Not bailed because initial thickness was <0.3 feet.
Cumulative LNAPL Removal			5.95	
MW-14	11/01/12	nd		Well installed on 10/26/12.
	01/31/13	nd		
	05/03/13	nd		
	08/07/13	0.12		
	12/17/13	0.10		
	04/02/14	0.08		Not bailed because initial thickness was <0.1 feet.
	05/23/14	0.09		Not bailed because initial thickness was <0.1 feet.
	07/01/14	0.46		
	10/13/14	0.71		
	04/07/15	0.23		Not bailed because initial thickness was <0.3 feet.
	10/28/15	1.48	0.35	(Note 4)
	01/18/16	0.32	0.20	(Note 4)
	04/05/16	0.01	0.00	Not bailed because initial thickness was <0.3 feet.
	10/28/16	0.37	0.03	(Note 5)
	04/04/17	0.77	0.32	(Note 4)
	10/27/17	0.60	0.64	(Note 5)
	04/03/18	0.70	0.06	(Note 5)
	10/26/18	2.40	1.65	(Note 5)
	04/04/19	1.20	0.71	(Note 4)
	10/14/19	2.90	0.27	(Note 4)
	04/10/20	0.15	0.00	Not bailed because initial thickness was <0.3 feet.
	10/15/20	0.45	0.24	(Note 4)
	04/15/21	0.90	0.39	(Note 4)
	11/11/21	0.80	0.34	(Note 4)
	04/27/22	1.30	0.70	(Note 4)
	10/11/22	1.78	0.85	(Note 4)
	04/04/23	0.10	0.04	(Note 4)
	10/26/23	1.33	1.10	(Note 4)
Cumulative LNAPL Removal			7.87	

Table 3. LNAPL Thickness Measurements and Removal Summary

Project No. AS100094J-12, Crownhill Elementary, Bremerton, Washington

Well ID	Date	Initial Thickness in ft[1]	LNAPL Removal in Liters[2]	Notes
MW-16	11/01/12	nd		Well installed on 10/26/12.
	01/31/13	0.50		
	05/03/13	0.48		
	08/07/13	2.61		
	12/17/13	2.83		
	04/02/14	3.02	0.85	(Note 5)
	05/23/14	4.25	2.06	(Note 5)
	07/01/14	3.79		
	10/13/14	3.25		
	04/07/15	2.64	1.19	(Note 5)
	10/28/15	2.18	0.35	(Note 4)
	01/18/16	0.45	0.17	Bailing was stopped after measuring <0.01 foot LNAPL thickness.
	04/05/16	0.39	0.00	Four bailing attempts recovered only a trace of LNAPL.
	10/28/16	0.87	0.10	Third bailing attempt recovered only 20 ml of LNAPL.
	04/04/17	0.24		Not bailed because initial thickness was <0.3 feet.
	10/27/17	2.15	1.35	(Note 4)
	04/03/18	#N/A	0.30	(Note 4), (Note 6)
	10/26/18	3.25	1.55	(Note 5)
	04/04/19	2.30	0.27	(Note 4)
	10/14/19	1.10	0.15	(Note 4)
	04/10/20	2.30	0.16	(Note 4)
	10/15/20	2.46	0.40	(Note 4)
	04/15/21	0.80	0.60	(Note 4)
	11/11/21	0.80	0.40	(Note 4)
	04/27/22	0.69	0.85	(Note 4)
	10/11/22	2.92	0.27	(Note 4)
	04/04/23	0.26	0.10	(Note 4)
	10/26/23	0.24	0.33	(Note 4)
Cumulative LNAPL Removal			11.44	
EW-17	10/28/15	0.45	0.03	Well installed on 10/13/15.
	01/18/16	0.40	0.21	LNAPL observed to be much more viscous (sludge-like) than in other wells. (Note 4)
	04/05/16	0.44	1.66	LNAPL appears to be less viscous than in previous rounds. (Note 4)
	10/28/16	0.47	0.11	Fourth bailing attempt recovered only 5 ml of LNAPL.
	04/04/17	1.95	0.52	Initial thickness measurements ranged from 0.23 to 3.45 ft. (Note 4)
	10/27/17	0.85	0.12	(Note 4)
	04/03/18	#N/A	0.60	(Note 4), (Note 6)
	10/26/18	1.90	1.11	(Note 5)
	04/04/19	3.00	0.18	(Note 4)
	10/14/19	1.30	0.14	(Note 4)
	04/10/20	0.40	0.13	(Note 4)
	10/15/20	0.60	0.32	(Note 4)
	04/15/21	0.50	0.25	(Note 4)
	11/11/21	0.60	0.23	(Note 4)
	04/27/22	1.60	0.50	(Note 4)
	10/11/22	4.08	2.45	(Note 4)
	04/04/23	0.67	0.17	(Note 4)
	10/26/23	2.88	0.53	(Note 4)
Cumulative LNAPL Removal			9.25	
TOTAL LNAPL REMOVED			**40.4**	**(ALL WELLS)**

LNAPL = light non-aqueous-phase liquid nd = no detectable LNAPL thickness nm = not measured

Notes:

1) The viscous, sticky nature of the LNAPL results in inconsistent readings of the interface probe (used to measure depth-to-LNAPL and depth-to-water). Therefore, the reported LNAPL thicknesses can only be regarded as estimates.

2) Water has been observed to separate out from LNAPL samples over a period of months. Therefore, actual volumes of non-aqueous-phase liquid removed from the subsurface are likely less than the LNAPL volumes reported in this table.

3) Well EW-17 (4-inch ID) has a unit volume of approximately 2.5 liters per vertical foot of well casing. All other wells are 2-inch ID and have unit volumes of approximately 0.62 liter per vertical foot of well casing.

4) Bailing was stopped after bailer retrieved a relatively large volume of water with little or no LNAPL.

5) Bailing was stopped because bailer would no longer go down well due to LNAPL buildup on inside well casing.

6) Unable to determine initial thickness of LNAPL. Bailing was attempted.

Table 4. Soil Gas Survey Results Summary

Project No. AS100094J-12, Crownhill Elementary, Bremerton, Washington

Well ID	CH_4 (% volume)	CO_2† (% volume)	O_2 (% volume)	Balance (% volume)	CO (ppm)	H_2S (ppm)
MW-5	0.0	8.6	4.5	87.0	0	0
MW-6	0.0	4.7	14.4	80.9	1	0
MW-8	0.1	9.4	0.0	90.5	0	0
MW-9	0.0	6.7	8.4	84.9	0	0
MW-12	0.0	10.0	0.0	90.1	0	0
MW-13	0.4	9.4	0.0	90.2	0	1
MW-15	0.0	6.2	4.9	88.9	0	0
MW-16	0.0	7.8	2.0	90.2	0	0
EW-17	0.5	10.3	0.0	89.3	0	7
Air	0.0	0.1	20.0	79.9	0	0

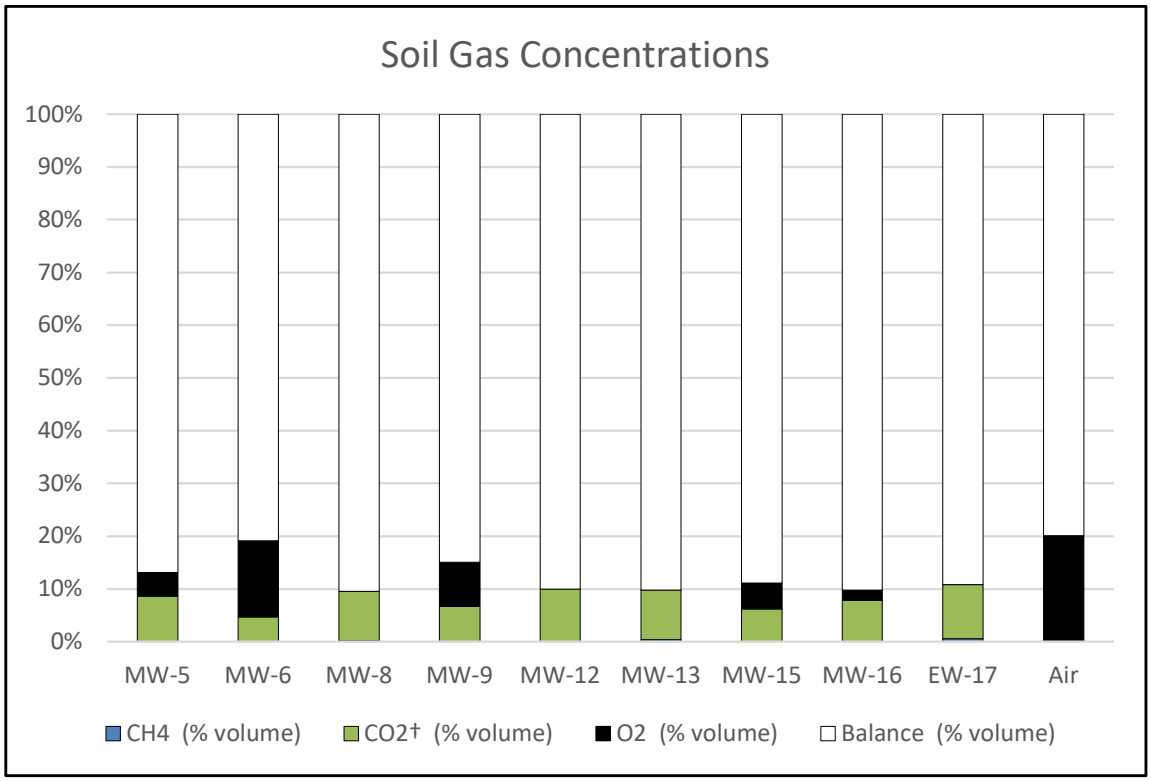
Notes:

† Typical CO2 content in landfill gas is 50-60%.

The soil gas survey was conducted on April 4 and 5, 2023 during a period of falling barometric pressure.

All values are reported at the peak recorded CO2 reading during a purge of three casing volumes of air.

Complete soil gas records are in the soil gas survey field forms.



FIGURES

1724 Dora Avenue NW (Note 2)

North Landfill Area

MW-2

Estimated Extent of TPH Cleanup Level Exceedance

MW-9

Estimated Extent of TCE Cleanup Level Exceedance

BERTHA AVE NW

MW-16 (Note 1) MW-14

EW-17 MW-13

MW-12

MW-8

MW-15 MW-5

Geotextile at 1 Foot Below Ground Surface (Summer 2013 Interim Action)

Estimated Extent of Arsenic Cleanup Level Exceedance

ROCKY POINT RD

PORTABLE CLASSROOM BUILDING

Bertha Ave NW Parking Area

MW-4

MW-6

MAIN SCHOOL BUILDING

MW-3

MW-10

South Landfill Area

MW-1

Geotextile at 1 Foot Below Ground Surface (Summer 2013 Interim Action)

MW-7

Geotextile at 1 Foot Below Ground Surface (Spring 2012 Interim Action)

MW-11

MARINE DR

DORA AVE

0 100 200 Feet

Well Locations:

- Extraction Well Included in Monitoring Program
- Monitoring Well Included in Monitoring Program
- Monitoring Well Not Included in Monitoring Program
- McKinney Domestic Well (Note 2)
- Approximate photo location & orientation for semiannual cover system inspections

Other Site Features and Interpretation:

- Interpreted Extent of Landfill Activity
- Estimated Extent of Groundwater Cleanup Level Exceedances in 2014 (Ecology, 2014)
- Bremerton School District Property Boundary
- Bremerton United Methodist Church Property Boundary
- Inferred Direction of Groundwater Flow

Note:

(1) LNAPL has been observed in Wells EW-17, MW-8, MW-13, MW-14, and MW-16.
(2) The McKinney well water sample is collected from the outdoor faucet on the north side of the residence at 1724 Dora Avenue NW.

Site Plan

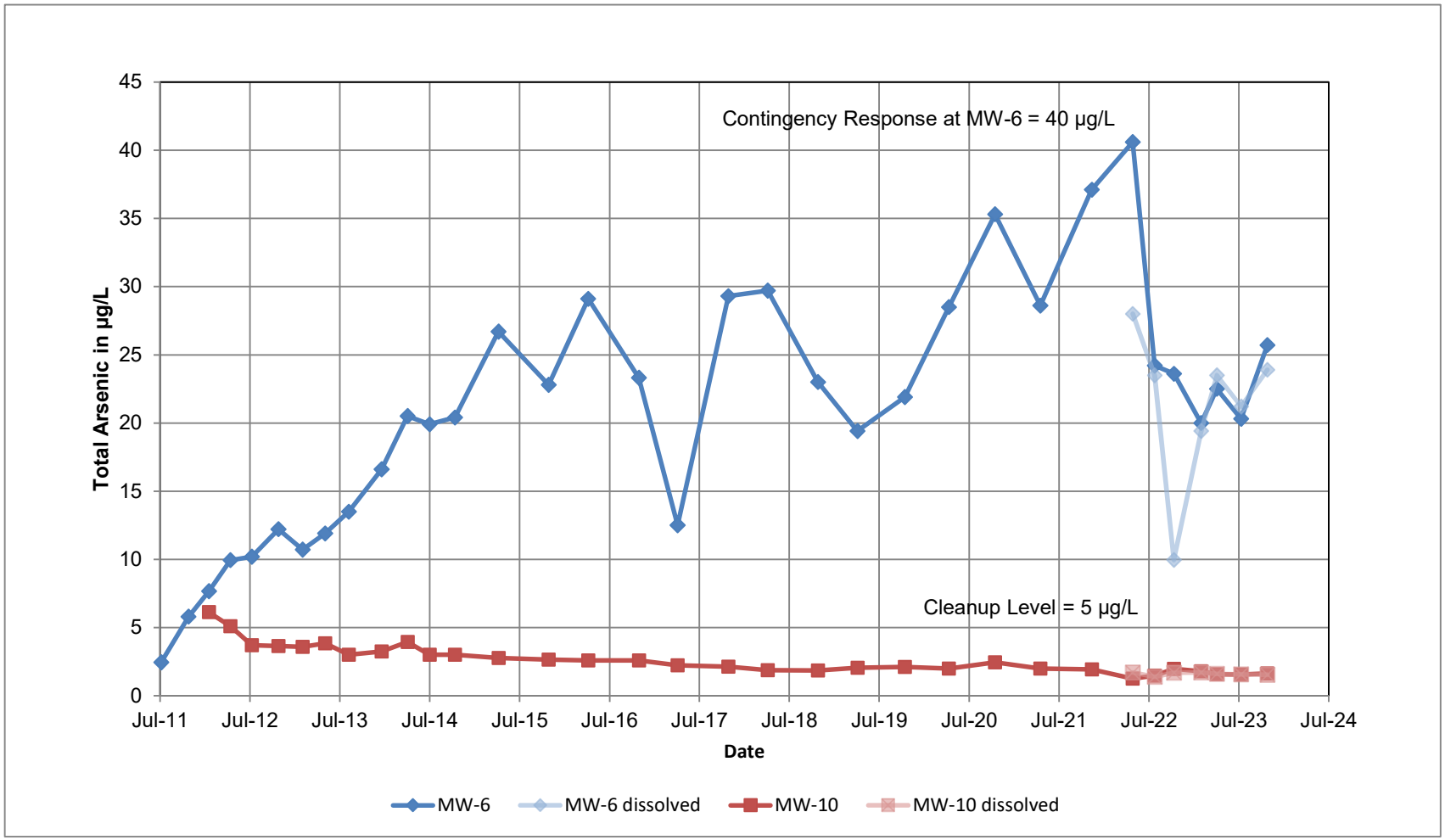
2023 Annual Report
Crownhill Elementary
Bremerton, Washington

Aspect Consulting	JAN-2020	BY: DLH / PPW	FIGURE NO. 1
	PROJECT NO. 100094	REVISED BY: EAC	

GIS Path: T:\projects_8\CrownHillElementary\Delivered\Annual Report 2019\01-Site Plan.mxd || Coordinate System: NAD 1983 StatePlane Washington North FIPS 4601 Feet || Date Saved: 1/10/2020 || User: ecrumbaker || Print Date: 1/10/2020

Figure 2. Arsenic in Wells MW-6 and MW-10

Project No. AS100094J-12, Crownhill Elementary, Bremerton, Washington



Notes:

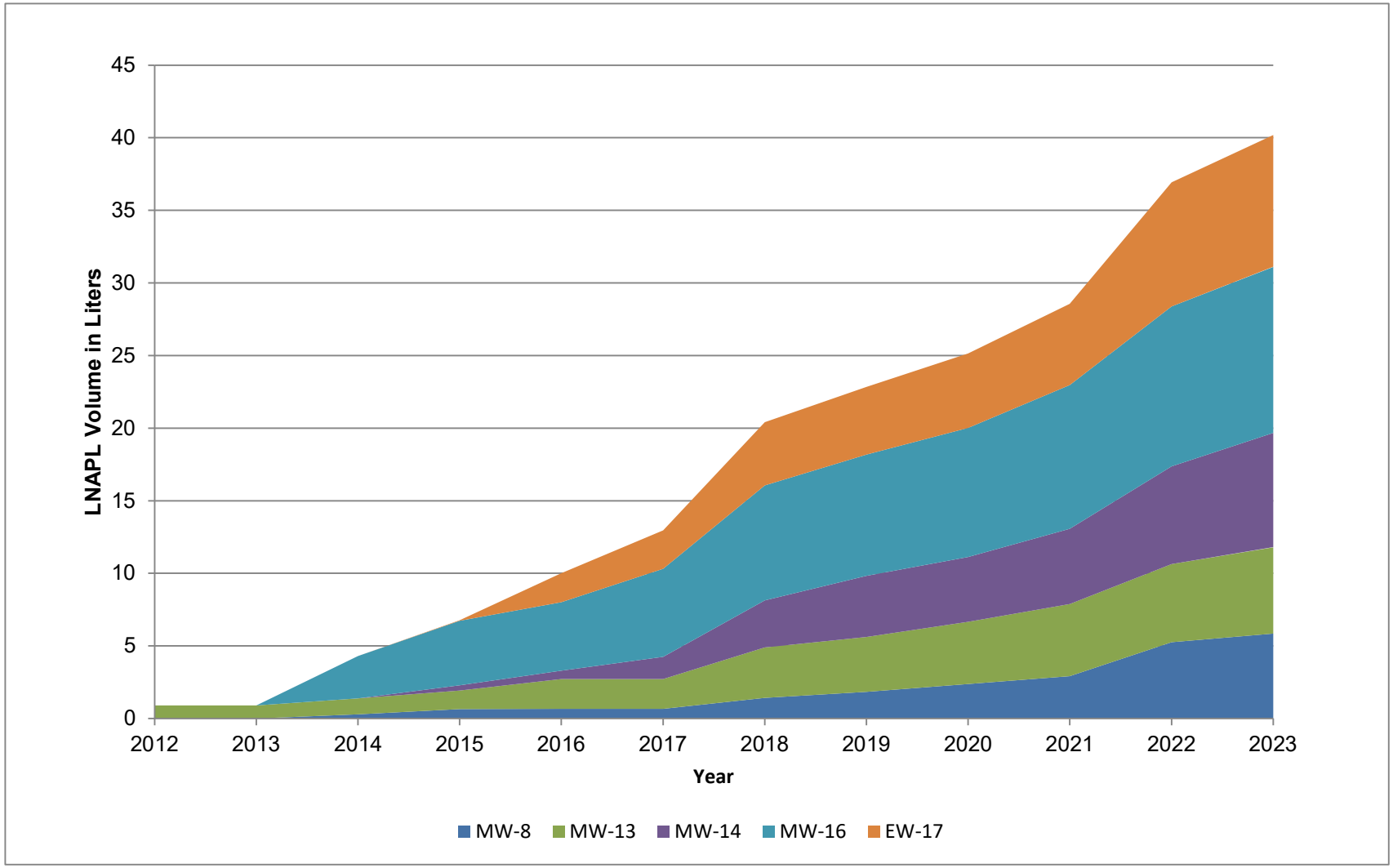
1) Well MW-6, installed in March 2011, provides early warning of potential arsenic migration.

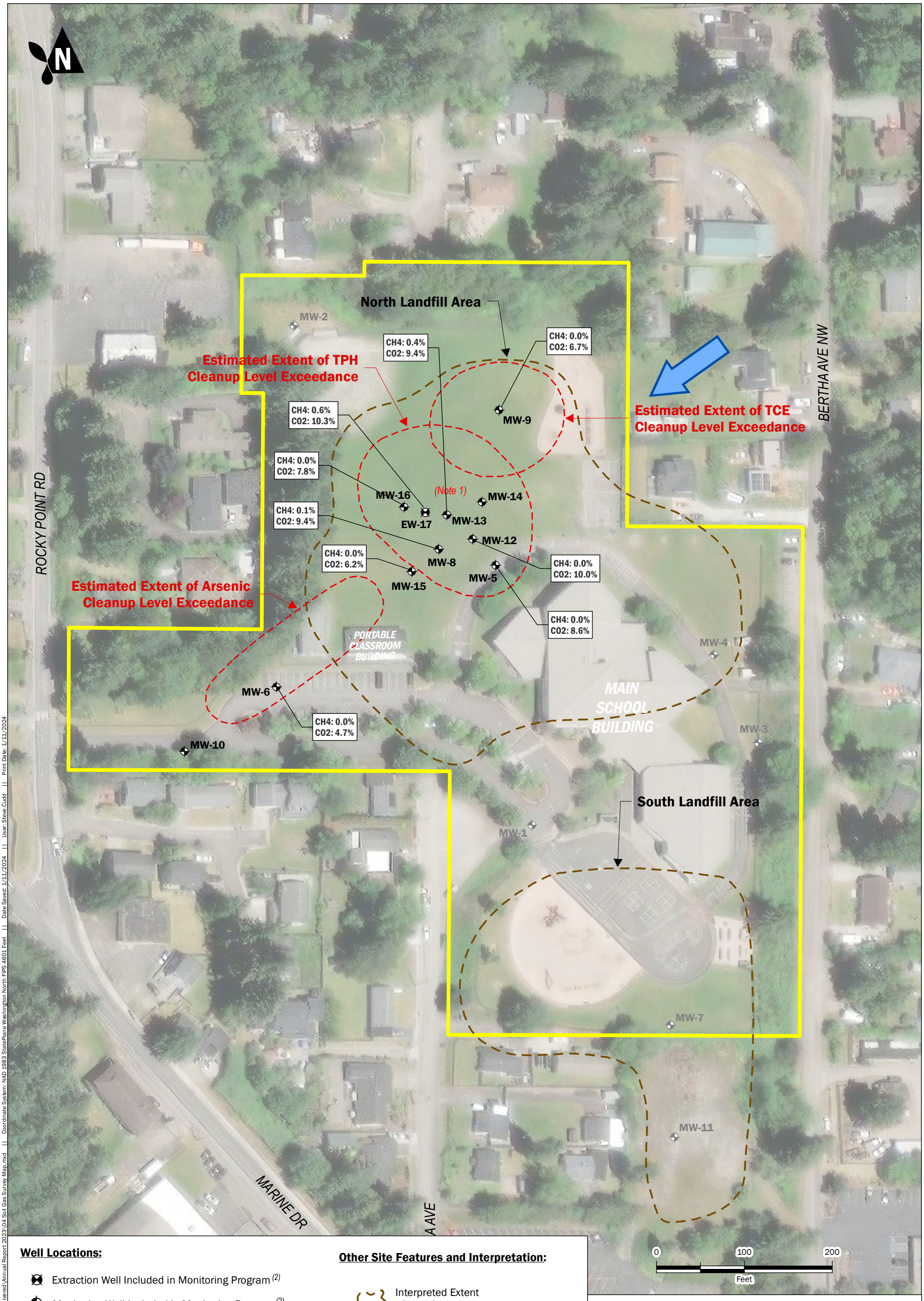
2) Well MW-10, installed in December 2011, is the conditional point of compliance for arsenic in groundwater.

3) Dissolved Arsenic was added to the constituents of concern in 2022 in response to the April 2022 arsenic exceedance in MW-6.

Figure 3. Cumulative LNAPL Removal Over Time

Project No. AS100094J-12, Crownhill Elementary, Bremerton, WA





Well Locations:

- Extraction Well Included in Monitoring Program (2)
- Monitoring Well Included in Monitoring Program (2)
- Monitoring Well Not Included in Monitoring Program (2)

Other Site Features and Interpretation:

- Interpreted Extent of Landfill Activity
- Bremerton School District Property Boundary
- Inferred Direction of Groundwater Flow

Note:

(1) LNAPL has been observed in Wells EW-17, MW-8, MW-13, MW-14, and MW-16.
(2) Refer to the Groundwater/LNAPL Monitoring and Contingency Plan (Aspect, 2015b).

Soil Gas Survey Map

2023 Annual Report
Remedy Implementation
Crownhill Elementary School Site
Bremerton, Washington

Aspect CONSULTING	JAN-2024	BY: DLH / PPW	FIGURE NO. 4
	PROJECT NO. 100094	REV BY: MML / SCC	

GIS Path: T:\projects_8\CrownHillElementary\Delivered\Annual Report 2023\04 Soil Gas Survey Map.mxd || Coordinate System: NAD 1983 StatePlane Washington North FIPS 4601 Feet || Date Saved: 1/11/2024 || User: Steve.Cudd || Print Date: 1/11/2024

APPENDIX A

June 2023 Inspection Record and Photos

Aspect CONSULTING

Project Name: **Crownhill Elementary School**

Project No.: 100094

Date: 6/20/2023

Inspector's Name: Matthew Lewis

Inspector's Signature: Matthew Lewis

Weather Conditions: 50°F's, light rain

Inspector's Title/Affiliation: Project Hydrogeologist

FORM 1 - INSPECTION RECORD

INSPECTION ITEM	YES	NO	COMMENTS/NOTES
1. North Environmental Covenant Area			
a. Building or pavement modifications since last inspection?		X	
b. Pavement deterioration/damage along Bertha Ave NW?[1]		X	
c. Evidence of soil disturbance?		X	
d. Geotextile fabric visible in interim action area?		X	
2. South Environmental Covenant Area			
a. Building or pavement modifications since last inspection?		X	
b. Evidence of soil disturbance?		X	
c. Geotextile fabric visible in interim action areas?		X	
3. Other Inspection Items			
a. Are all wells (MW-1 through EW-17) accessible?	X		
b. Evidence of well monument damage/tampering?		X	
c. HVAC system operates continuously during school day?[2]	X		Heating as necessary

Deficient Action Items & Other Comments:

HVAC operation confirmed w/ maintenance on 6/20/2023

Notes

1. Item 1b refers to the paved parking area described in Section 1.3.
2. The inspector should describe under COMMENTS/NOTES how the determination is made regarding HVAC system operation.

Revision: December 2015

Photo Location 1. 6/20/2023 site inspection

Photo Location 2. 6/20/2023 site inspection

Photo Location 3. 6/20/2023 site inspection

Photo Location 4. 6/20/2023 site inspection

APPENDIX B

December 2023 Inspection Record and Photos

Aspect CONSULTING

Project Name: **Crownhill Elementary School**

Project No.: AS100094

Weather Conditions: Cloudy, 40°F

Date: 12/21/23

Inspector's Name: Matthew M. Lewis

Inspector's Signature: Matthew M Lewis

Inspector's Title/Affiliation: Aspect Project Hydrogeologist

FORM 1 - INSPECTION RECORD

INSPECTION ITEM	YES	NO	COMMENTS/NOTES
1. North Environmental Covenant Area			
a. Building or pavement modifications since last inspection?		X	
b. Pavement deterioration/damage along Bertha Ave NW?[1]	X		There is one new pot hole in parking lot (pic)
c. Evidence of soil disturbance?		X	
d. Geotextile fabric visible in interim action area?		X	
2. South Environmental Covenant Area			
a. Building or pavement modifications since last inspection?		X	
b. Evidence of soil disturbance?		X	
c. Geotextile fabric visible in interim action areas?		X	
3. Other Inspection Items			
a. Are all wells (MW-1 through EW-17) accessible?	X		
b. Evidence of well monument damage/tampering?		X	
c. HVAC system operates continuously during school day?[2]	X		HVAC runs continuously, heating/cooling as necessary

Deficient Action Items & Other Comments:

Notes

1. Item 1b refers to the paved parking area described in Section 1.3.
2. The inspector should describe under COMMENTS/NOTES how the determination is made regarding HVAC system operation.

Revision: December 2015

Photo Location 1. 12/21/2023 site inspection, pothole circled.

Photo Location 1. 12/21/2023 site inspection, pothole in photo above.

•

Photo Location 2. 12/21/2023 site inspection

Photo Location 3. 12/21/2023 site inspection

Photo Location 4. 12/21/2023 site inspection

APPENDIX C

Laboratory Reports,
2023 Groundwater Sampling

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

James E. Bruya, Ph.D.
Yelena Aravkina, M.S.
Michael Erdahl, B.S.
Vineta Mills, M.S.
Eric Young, B.S.

5500 4th Avenue South
Seattle, WA 98108
(206) 285-8282
fbi@isomedia.com
www.friedmanandbruya.com

February 10, 2023

Matthew Lewis, Project Manager
Aspect Consulting, LLC
710 2nd Ave S, Suite 550
Seattle, WA 98104

Dear Mr Lewis:

Included are the results from the testing of material submitted on January 31, 2023 from the Crownhill Elementary 100094, F&BI 301462 project. There are 17 pages included in this report. Any samples that may remain are currently scheduled for disposal in 30 days, or as directed by the Chain of Custody document. If you would like us to return your samples or arrange for long term storage at our offices, please contact us as soon as possible.

We appreciate this opportunity to be of service to you and hope you will call if you have any questions.

Sincerely,

FRIEDMAN & BRUYA, INC.

Michael Erdahl
Project Manager

Enclosures
c: Aspect Data
ASP0210R.DOC

CASE NARRATIVE

This case narrative encompasses samples received on January 31, 2023 by Friedman & Bruya, Inc. from the Aspect Consulting, LLC Crownhill Elementary 100094, F&BI 301462 project. Samples were logged in under the laboratory ID's listed below.

Laboratory ID	Aspect Consulting, LLC
301462 -01	MW-6-230130
301462 -02	MW-10-230130

The samples were sent to Fremont Analytical for alkalinity analysis. The report is enclosed.

All quality control requirements were acceptable.

Date of Report: 02/10/23
Date Received: 01/31/23
Project: Crownhill Elementary 100094, F&BI 301462
Date Extracted: 02/01/23
Date Analyzed: 02/01/23

RESULTS FROM THE ANALYSIS OF WATER SAMPLES FOR TOTAL PETROLEUM HYDROCARBONS AS DIESEL AND MOTOR OIL USING METHOD NWTPH-Dx

Results Reported as ug/L (ppb)

Sample ID Laboratory ID	Diesel Range (C_{10}-C_{25})	Motor Oil Range (C_{25}-C_{36})	Surrogate (% Recovery) (Limit 41-152)
MW-10-230130 301462-02	<50	<250	110
Method Blank 03-295 MB2	<50	<250	126

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	MW-6-230130	Client:	Aspect Consulting, LLC
Date Received:	01/31/23	Project:	Crownhill Elementary 100094
Date Extracted:	02/01/23	Lab ID:	301462-01
Date Analyzed:	02/02/23	Data File:	301462-01.119
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	MG

Analyte:	Concentration ug/L (ppb)
Arsenic	19.4

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	MW-6-230130	Client:	Aspect Consulting, LLC
Date Received:	01/31/23	Project:	Crownhill Elementary 100094
Date Extracted:	02/01/23	Lab ID:	301462-01 x20
Date Analyzed:	02/07/23	Data File:	301462-01 x20.222
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Iron	7,580
Manganese	2,030

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	MW-10-230130	Client:	Aspect Consulting, LLC
Date Received:	01/31/23	Project:	Crownhill Elementary 100094
Date Extracted:	02/01/23	Lab ID:	301462-02
Date Analyzed:	02/02/23	Data File:	301462-02.120
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	MG

Analyte:	Concentration ug/L (ppb)
Arsenic	1.70
Iron	2,420

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	MW-10-230130	Client:	Aspect Consulting, LLC
Date Received:	01/31/23	Project:	Crownhill Elementary 100094
Date Extracted:	02/01/23	Lab ID:	301462-02 x20
Date Analyzed:	02/07/23	Data File:	301462-02 x20.223
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Manganese	1,430

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	Method Blank	Client:	Aspect Consulting, LLC
Date Received:	NA	Project:	Crownhill Elementary 100094
Date Extracted:	02/01/23	Lab ID:	I3-72 mb
Date Analyzed:	02/02/23	Data File:	I3-72 mb.035
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	MG

Analyte:	Concentration ug/L (ppb)
Arsenic	<1
Iron	<50
Manganese	<1

Analysis For Total Metals By EPA Method 6020B

Client ID:	MW-6-230130	Client:	Aspect Consulting, LLC
Date Received:	01/31/23	Project:	Crownhill Elementary 100094
Date Extracted:	02/01/23	Lab ID:	301462-01
Date Analyzed:	02/02/23	Data File:	301462-01.115
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	MG

Analyte:	Concentration ug/L (ppb)
Arsenic	20.0

Analysis For Total Metals By EPA Method 6020B

Client ID:	MW-10-230130	Client:	Aspect Consulting, LLC
Date Received:	01/31/23	Project:	Crownhill Elementary 100094
Date Extracted:	02/01/23	Lab ID:	301462-02
Date Analyzed:	02/02/23	Data File:	301462-02.116
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	MG

Analyte:	Concentration ug/L (ppb)
Arsenic	1.78

Analysis For Total Metals By EPA Method 6020B

Client ID:	Method Blank	Client:	Aspect Consulting, LLC
Date Received:	NA	Project:	Crownhill Elementary 100094
Date Extracted:	02/01/23	Lab ID:	I3-72 mb
Date Analyzed:	02/02/23	Data File:	I3-72 mb.035
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	MG

Analyte:	Concentration ug/L (ppb)
Arsenic	<1

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	MW-10-230130	Client:	Aspect Consulting, LLC
Date Received:	01/31/23	Project:	Crownhill Elementary 100094
Date Extracted:	02/01/23	Lab ID:	301462-02
Date Analyzed:	02/01/23	Data File:	020136.D
Matrix:	Water	Instrument:	GCMS13
Units:	ug/L (ppb)	Operator:	LM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	93	71	132
Toluene-d8	91	68	139
4-Bromofluorobenzene	98	62	136

Compounds:	Concentration ug/L (ppb)
Trichloroethene	<0.5

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	Method Blank	Client:	Aspect Consulting, LLC
Date Received:	Not Applicable	Project:	Crownhill Elementary 100094
Date Extracted:	02/01/23	Lab ID:	03-0257 mb
Date Analyzed:	02/01/23	Data File:	020107.D
Matrix:	Water	Instrument:	GCMS13
Units:	ug/L (ppb)	Operator:	LM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	95	71	132
Toluene-d8	93	68	139
4-Bromofluorobenzene	95	62	136

Compounds:	Concentration ug/L (ppb)
Trichloroethene	<0.5

Date of Report: 02/10/23
Date Received: 01/31/23
Project: Crownhill Elementary 100094, F&BI 301462

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER SAMPLES FOR TOTAL PETROLEUM HYDROCARBONS AS DIESEL EXTENDED USING METHOD NWTPH-Dx

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
Diesel Extended	ug/L (ppb)	2,500	132	120	70-130	10

Date of Report: 02/10/23
Date Received: 01/31/23
Project: Crownhill Elementary 100094, F&BI 301462

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER SAMPLES FOR DISSOLVED METALS USING EPA METHOD 6020B

Laboratory Code: 301238-01 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Arsenic	ug/L (ppb)	10	2.06	83	79	75-125	5
Iron	ug/L (ppb)	100	1,630	74	54 b	75-125	31 b
Manganese	ug/L (ppb)	20	949	59 b	25 b	75-125	81 b

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Arsenic	ug/L (ppb)	10	89	80-120
Iron	ug/L (ppb)	100	99	80-120
Manganese	ug/L (ppb)	20	95	80-120

Date of Report: 02/10/23
Date Received: 01/31/23
Project: Crownhill Elementary 100094, F&BI 301462

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER SAMPLES FOR TOTAL METALS USING EPA METHOD 6020B

Laboratory Code: 301238-01 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Arsenic	ug/L (ppb)	10	2.06	83	79	75-125	5

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Arsenic	ug/L (ppb)	10	89	80-120

Date of Report: 02/10/23
Date Received: 01/31/23
Project: Crownhill Elementary 100094, F&BI 301462

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER SAMPLES FOR VOLATILES BY EPA METHOD 8260D

Laboratory Code: 301465-14 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Acceptance Criteria
Trichloroethene	ug/L (ppb)	10	<0.5	95	43-133

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
Trichloroethene	ug/L (ppb)	10	95	93	70-130	2

Data Qualifiers & Definitions

a - The analyte was detected at a level less than five times the reporting limit. The RPD results may not provide reliable information on the variability of the analysis.

b - The analyte was spiked at a level that was less than five times that present in the sample. Matrix spike recoveries may not be meaningful.

ca - The calibration results for the analyte were outside of acceptance criteria. The value reported is an estimate.

c - The presence of the analyte may be due to carryover from previous sample injections.

cf - The sample was centrifuged prior to analysis.

d - The sample was diluted. Detection limits were raised and surrogate recoveries may not be meaningful.

dv - Insufficient sample volume was available to achieve normal reporting limits.

f - The sample was laboratory filtered prior to analysis.

fb - The analyte was detected in the method blank.

fc - The analyte is a common laboratory and field contaminant.

hr - The sample and duplicate were reextracted and reanalyzed. RPD results were still outside of control limits. Variability is attributed to sample inhomogeneity.

hs - Headspace was present in the container used for analysis.

ht – The analysis was performed outside the method or client-specified holding time requirement.

ip - Recovery fell outside of control limits due to sample matrix effects.

j - The analyte concentration is reported below the lowest calibration standard. The value reported is an estimate.

J - The internal standard associated with the analyte is out of control limits. The reported concentration is an estimate.

jl - The laboratory control sample(s) percent recovery and/or RPD were out of control limits. The reported concentration should be considered an estimate.

js - The surrogate associated with the analyte is out of control limits. The reported concentration should be considered an estimate.

lc - The presence of the analyte is likely due to laboratory contamination.

L - The reported concentration was generated from a library search.

nm - The analyte was not detected in one or more of the duplicate analyses. Therefore, calculation of the RPD is not applicable.

pc - The sample was received with incorrect preservation or in a container not approved by the method. The value reported should be considered an estimate.

ve - The analyte response exceeded the valid instrument calibration range. The value reported is an estimate.

vo - The value reported fell outside the control limits established for this analyte.

x - The sample chromatographic pattern does not resemble the fuel standard used for quantitation.

SAMPLE CHAIN OF CUSTODY

01/31/23 C2/J3/VW1

Page # 1 of 1

301462

Report To Matthew Lewis

Company Aspect Consulting

Address 710 2nd Ave #550

City, State, ZIP Seattle, WA, 98104

Phone 404-210-6437 Email mlewis@aspectconsulting.com

SAMPLERS (signature) Carmen Tappero

PROJECT NAME Crownhill Elementary

PO # 100094

REMARKS

Project specific RLs? - Yes / No

INVOICE TO

TURNAROUND TIME
- ☑ Standard turnaround
- ☐ RUSH
- Rush charges authorized by:

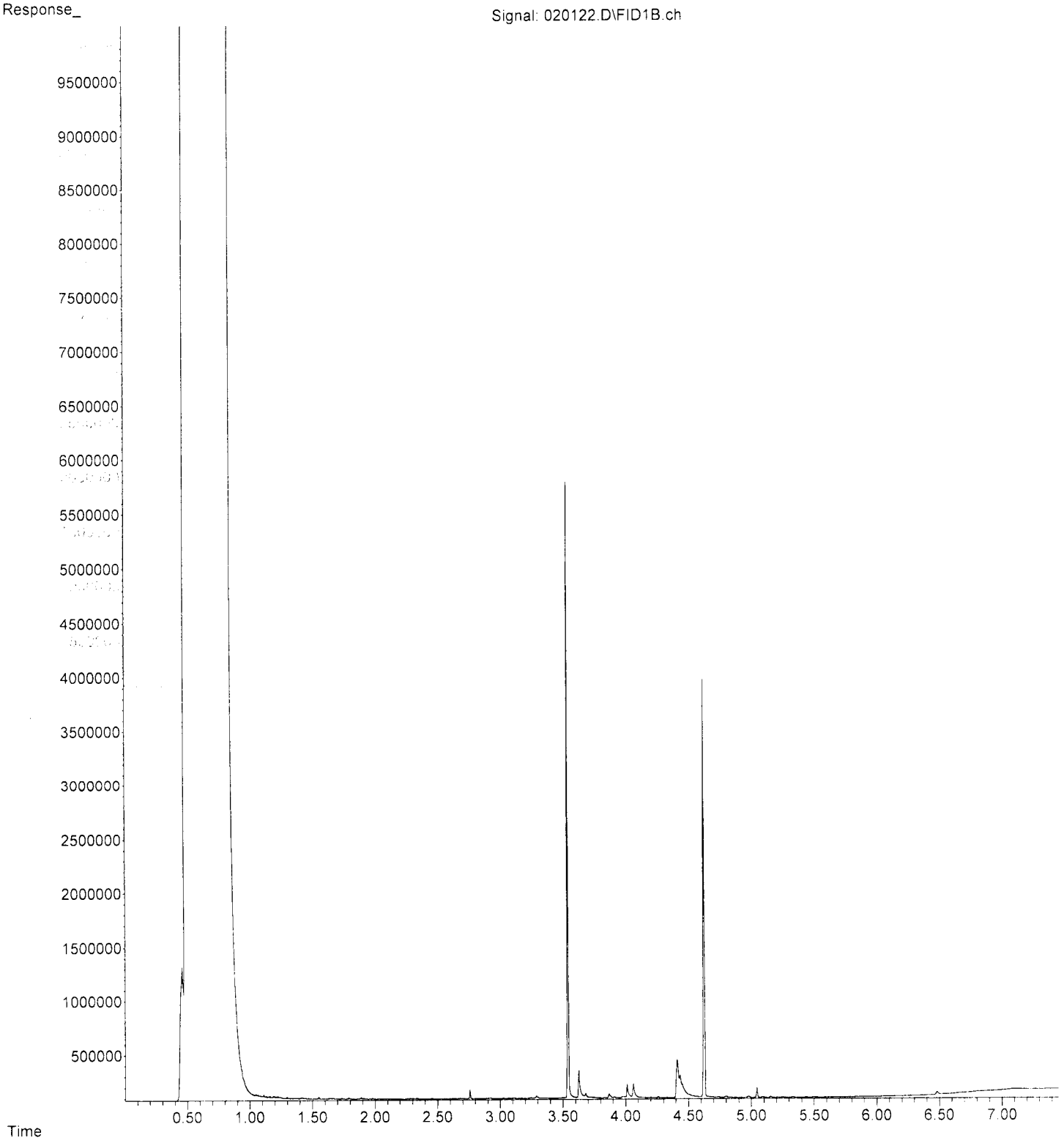
SAMPLE DISPOSAL
- ☐ Archive samples
- ☐ Other
- Default: Dispose after 30 days

Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	NWTPH-Dx	NWTPH-Gx	BTEX EPA 8021	NWTPH-HCID	VOCs EPA 8260	PAHs EPA 8270	PCBs EPA 8082	TCE	Total Arsenic	Dissolved As, Fe, Mn	Alkalinity	Notes
MW-6-230130	01 A-F	1/30/23	1220	W	~~7~~ 6									X	X	X	
MW-10-230130	02 A-G	↓	1315	↓	7	X							X	X	X	X	
													Samples received at 0 °C				

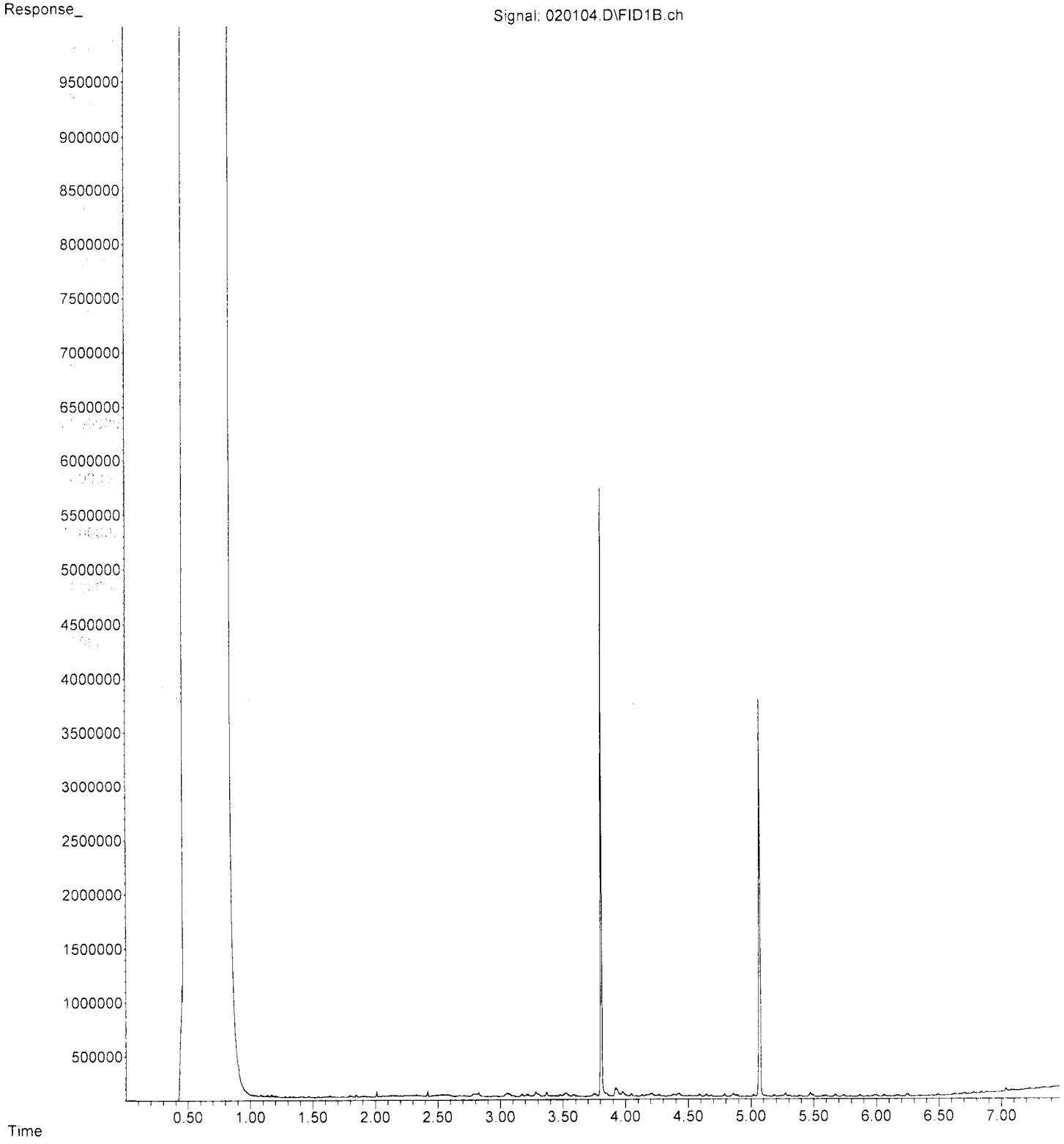
SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by: Carmen Tappero	Carmen Tappero	Aspect Consulting	1/31/23	15:30
Received by:	ARNHPHAN	F&B	01/31/23	15:30
Relinquished by:			AP	
Received by:		Samples received at 20 °C		

Friedman & Bruya, Inc.
Ph. (206) 285-8282

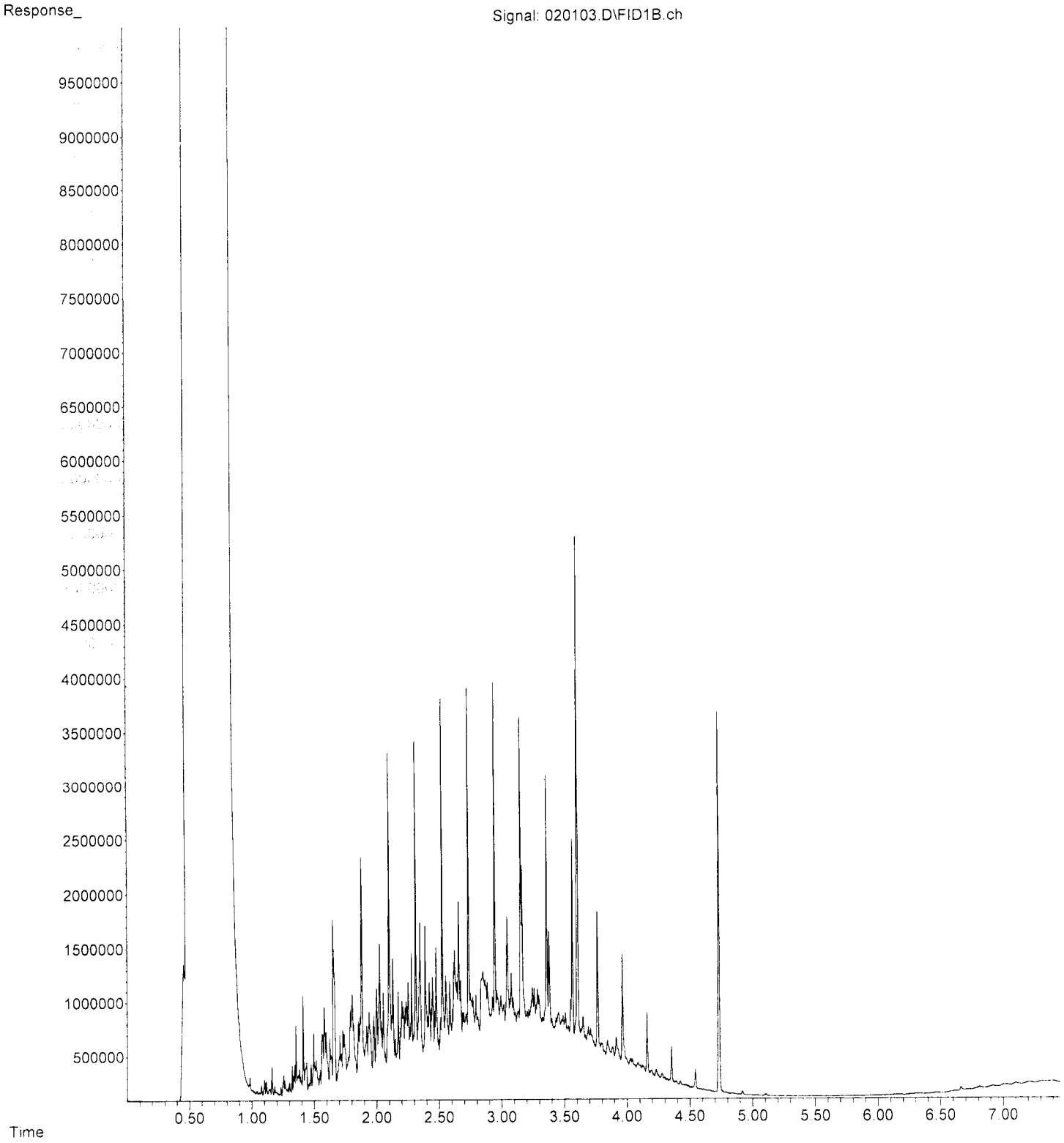
File : P:\Proc_GC10\02-01-23\020122.D
Operator : TL
Acquired : 01 Feb 2023 02:43 pm using AcqMethod DX.M
Instrument : GC10
Sample Name: 301462-02
Misc Info :
Vial Number: 45



File :P:\Proc_GC10\02-01-23\020104.D
Operator : TL
Acquired : 01 Feb 2023 09:52 am using AcqMethod DX.M
Instrument : GC10
Sample Name: 03-295 mb2
Misc Info :
Vial Number: 6



File : P:\Proc_GC10\02-01-23\020103.D
Operator : TL
Acquired : 01 Feb 2023 08:08 am using AcqMethod DX.M
Instrument : GC10
Sample Name: 500 DX 67-143B
Misc Info :
Vial Number: 3



3600 Fremont Ave. N.
Seattle, WA 98103
T: (206) 352-3790
F: (206) 352-7178
info@fremontanalytical.com

Friedman & Bruya
Michael Erdahl
5500 4th Ave S
Seattle, WA 98108

RE: 301462
Work Order Number: 2302019

February 09, 2023

Attention Michael Erdahl:

Fremont Analytical, Inc. received 2 sample(s) on 2/1/2023 for the analyses presented in the following report.

Total Alkalinity by SM 2320B

This report consists of the following:

- Case Narrative
- Analytical Results
- Applicable Quality Control Summary Reports
- Chain of Custody

All analyses were performed consistent with the Quality Assurance program of Fremont Analytical, Inc. Please contact the laboratory if you should have any questions about the results.

Thank you for using Fremont Analytical.

Sincerely,

Brianna Barnes
Project Manager

Date: *02/09/2023*

CLIENT: Friedman & Bruya
Project: 301462
Work Order: 2302019

Work Order Sample Summary

Lab Sample ID	Client Sample ID	Date/Time Collected	Date/Time Received
2302019-001	MW-6-230130	01/30/2023 12:20 PM	02/01/2023 2:30 PM
2302019-002	MW-10-230130	01/30/2023 1:15 PM	02/01/2023 2:30 PM

Note: If no "Time Collected" is supplied, a default of 12:00AM is assigned

Case Narrative

WO#: **2302019**
Date: **2/9/2023**

CLIENT: Friedman & Bruya
Project: 301462

I. SAMPLE RECEIPT:
Samples receipt information is recorded on the attached Sample Receipt Checklist.

II. GENERAL REPORTING COMMENTS:
Results are reported on a wet weight basis unless dry-weight correction is denoted in the units field on the analytical report ("mg/kg-dry" or "ug/kg-dry").

The validity of the analytical procedures for which data is reported in this analytical report is determined by the Laboratory Control Sample (LCS) and the Method Blank (MB). The LCS and the MB are processed with the samples to ensure method criteria are achieved throughout the entire analytical process.

III. ANALYSES AND EXCEPTIONS:
Exceptions associated with this report will be footnoted in the analytical results page(s) or the quality control summary page(s) and/or noted below.

Qualifiers:

* - Flagged value is not within established control limits
B - Analyte detected in the associated Method Blank
D - Dilution was required
E - Value above quantitation range
H - Holding times for preparation or analysis exceeded
I - Analyte with an internal standard that does not meet established acceptance criteria
J - Analyte detected below Reporting Limit
N - Tentatively Identified Compound (TIC)
Q - Analyte with an initial or continuing calibration that does not meet established acceptance criteria
S - Spike recovery outside accepted recovery limits
ND - Not detected at the Reporting Limit
R - High relative percent difference observed

Acronyms:

%Rec - Percent Recovery
CCB - Continued Calibration Blank
CCV - Continued Calibration Verification
DF - Dilution Factor
DUP - Sample Duplicate
HEM - Hexane Extractable Material
ICV - Initial Calibration Verification
LCS/LCSD - Laboratory Control Sample / Laboratory Control Sample Duplicate
MCL - Maximum Contaminant Level
MB or MBLANK - Method Blank
MDL - Method Detection Limit
MS/MSD - Matrix Spike / Matrix Spike Duplicate
PDS - Post Digestion Spike
Ref Val - Reference Value
REP - Sample Replicate
RL - Reporting Limit
RPD - Relative Percent Difference
SD - Serial Dilution
SGT - Silica Gel Treatment
SPK - Spike
Surr - Surrogate

Analytical Report

Work Order: **2302019**
Date Reported: **2/9/2023**

CLIENT: Friedman & Bruya
Project: 301462

Lab ID: 2302019-001 **Collection Date:** 1/30/2023 12:20:00 PM
Client Sample ID: **MW-6-230130** **Matrix:** Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Total Alkalinity by SM 2320B				Batch ID: R81713		Analyst: SS
Alkalinity, Total (As CaCO3)	350	2.50		mg/L	1	2/8/2023 10:48:59 AM

Lab ID: 2302019-002 **Collection Date:** 1/30/2023 1:15:00 PM
Client Sample ID: **MW-10-230130** **Matrix:** Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Total Alkalinity by SM 2320B				Batch ID: R81713		Analyst: SS
Alkalinity, Total (As CaCO3)	253	2.50		mg/L	1	2/8/2023 10:48:59 AM

Work Order: 2302019
CLIENT: Friedman & Bruya
Project: 301462

QC SUMMARY REPORT

Total Alkalinity by SM 2320B

Sample ID: MB-R81713	SampType: MBLK			Units: mg/L		Prep Date: 2/8/2023			RunNo: 81713		
Client ID: MBLKW	Batch ID: R81713					Analysis Date: 2/8/2023			SeqNo: 1693671		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Alkalinity, Total (As CaCO3)	ND	2.50									

Sample ID: LCS-R81713	SampType: LCS			Units: mg/L		Prep Date: 2/8/2023			RunNo: 81713		
Client ID: LCSW	Batch ID: R81713					Analysis Date: 2/8/2023			SeqNo: 1693672		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Alkalinity, Total (As CaCO3)	105	2.50	100.0	0	105	81.3	118				

Sample ID: 2302019-001ADUP	SampType: DUP			Units: mg/L		Prep Date: 2/8/2023			RunNo: 81713		
Client ID: MW-6-230130	Batch ID: R81713					Analysis Date: 2/8/2023			SeqNo: 1693674		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Alkalinity, Total (As CaCO3)	350	2.50						350.5	0.195	20	

Fremont Analytical

Sample Log-In Check List

Client Name:	FB	Work Order Number:	2302019
Logged by:	Kate Porter	Date Received:	2/1/2023 2:30:00 PM

Chain of Custody

1.	Is Chain of Custody complete?	Yes	☑	No	☐	Not Present ☐
2.	How was the sample delivered?	Client				

Log In

3.	Coolers are present?	Yes	☑	No	☐	NA ☐
4.	Shipping container/cooler in good condition?	Yes	☑	No	☐	
5.	Custody Seals present on shipping container/cooler? (Refer to comments for Custody Seals not intact)	Yes	☐	No	☐	Not Present ☑
6.	Was an attempt made to cool the samples?	Yes	☑	No	☐	NA ☐
7.	Were all items received at a temperature of >2°C to 6°C *	Yes	☑	No	☐	NA ☐
8.	Sample(s) in proper container(s)?	Yes	☑	No	☐	
9.	Sufficient sample volume for indicated test(s)?	Yes	☑	No	☐	
10.	Are samples properly preserved?	Yes	☑	No	☐	
11.	Was preservative added to bottles?	Yes	☐	No	☑	NA ☐
12.	Is there headspace in the VOA vials?	Yes	☐	No	☐	NA ☑
13.	Did all samples containers arrive in good condition(unbroken)?	Yes	☑	No	☐	
14.	Does paperwork match bottle labels?	Yes	☑	No	☐	
15.	Are matrices correctly identified on Chain of Custody?	Yes	☑	No	☐	
16.	Is it clear what analyses were requested?	Yes	☑	No	☐	
17.	Were all holding times able to be met?	Yes	☑	No	☐	

Special Handling (if applicable)

18.	Was client notified of all discrepancies with this order?	Yes	☐	No	☐	NA ☑

Person Notified: _____ Date: _____

By Whom: _____ Via: ☐ eMail ☐ Phone ☐ Fax ☐ In Person

Regarding: _____

Client Instructions: _____

19. Additional remarks:

Item Information

Item #	Temp ºC
Sample	1.5

* Note: DoD/ELAP and TNI require items to be received at 4°C +/- 2°C

SUBCONTRACT SAMPLE CHAIN OF CUSTODY

2302019

Page # 1 of 1

Send Report To Michael Erdahl

Company Friedman and Bruya, Inc.

Address 3012 16th Ave W

City, State, ZIP Seattle, WA 98119

Phone # (206) 285-8282 merdahl@friedmanandbruya.com

SUBCONTRACTER Fremont

PROJECT NAME/NO. 301462

PO # 135 D-~~B5~~

REMARKS

Please Email Results Aspect EDD

TURNAROUND TIME

✓ Standard TAT

RUSH

Rush charges authorized by:

SAMPLE DISPOSAL

Dispose after 30 days

Return samples

Will call with instructions

Sample ID	Lab ID	Date Sampled	Time Sampled	Matrix	# of jars	Dioxins/Furans	EPH	VPH	Alkalinity							Notes
MW-6-230130		1/30/23	1220	Water	1				X							
MW-10-230130		1/30/23	1315	Water	1				X							

ANALYSES REQUESTED

Friedman & Bruya, Inc.
3012 16th Avenue West
Seattle, WA 98119-2029
Ph. (206) 285-8282
Fax (206) 283-5044

	SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by:		Michael Erdahl	Friedman & Bruya	2/1/23	0940
Received by:		Emma Tuck	Fremont Analytical	2/1/23	1433
Relinquished by:					
Received by:					

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

James E. Bruya, Ph.D.
Yelena Aravkina, M.S.
Michael Erdahl, B.S.
Vineta Mills, M.S.
Eric Young, B.S.

5500 4th Avenue South
Seattle, WA 98108
(206) 285-8282
fbi@isomedia.com
www.friedmanandbruya.com

April 17, 2023

Daniel Babcock, Project Manager
Aspect Consulting, LLC
710 2nd Ave S, Suite 550
Seattle, WA 98104

Dear Mr Babcock:

Included are the results from the testing of material submitted on April 5, 2023 from the Crownhill Elementary 100094, F&BI 304052 project. There are 25 pages included in this report. Any samples that may remain are currently scheduled for disposal in 30 days, or as directed by the Chain of Custody document. If you would like us to return your samples or arrange for long term storage at our offices, please contact us as soon as possible.

We appreciate this opportunity to be of service to you and hope you will call if you have any questions.

Sincerely,

FRIEDMAN & BRUYA, INC.

Michael Erdahl
Project Manager

Enclosures
c: Aspect Data
ASP0417R.DOC

CASE NARRATIVE

This case narrative encompasses samples received on April 5, 2023 by Friedman & Bruya, Inc. from the Aspect Consulting, LLC Crownhill Elementary 100094, F&BI 304052 project. Samples were logged in under the laboratory ID's listed below.

Laboratory ID	Aspect Consulting, LLC
304052 -01	MW-5-230404
304052 -02	MW-6-230404
304052 -03	MW-9-230404
304052 -04	MW-10-230404
304052 -05	MW-15-230404
304052 -06	McKinney-230404

Samples MW-5-230404, MW-6-230404, MW-9-230404, MW-10-230404, and MW-15-230404 were sent to Fremont Analytical for alkalinity analysis. The report is enclosed.

All quality control requirements were acceptable.

Date of Report: 04/17/23
Date Received: 04/05/23
Project: Crownhill Elementary 100094, F&BI 304052
Date Extracted: 04/06/23
Date Analyzed: 04/06/23

RESULTS FROM THE ANALYSIS OF WATER SAMPLES FOR TOTAL PETROLEUM HYDROCARBONS AS DIESEL AND MOTOR OIL USING METHOD NWTPH-Dx

Results Reported as ug/L (ppb)

Sample ID Laboratory ID	Diesel Range (C_{10}-C_{25})	Motor Oil Range (C_{25}-C_{36})	Surrogate (% Recovery) (Limit 41-152)
MW-5-230404 304052-01	3,000 x	2,100 x	145
MW-10-230404 304052-04	<50	<250	132
MW-15-230404 304052-05	<50	<250	113
Method Blank 03-876 MB	<50	<250	117

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	MW-5-230404	Client:	Aspect Consulting, LLC
Date Received:	04/05/23	Project:	Crownhill Elementary 100094
Date Extracted:	04/06/23	Lab ID:	304052-01
Date Analyzed:	04/06/23	Data File:	304052-01 B.123
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	<1
Iron	384

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	MW-5-230404	Client:	Aspect Consulting, LLC
Date Received:	04/05/23	Project:	Crownhill Elementary 100094
Date Extracted:	04/06/23	Lab ID:	304052-01 x20
Date Analyzed:	04/07/23	Data File:	304052-01 x20.065
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Manganese	4,860

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	MW-6-230404	Client:	Aspect Consulting, LLC
Date Received:	04/05/23	Project:	Crownhill Elementary 100094
Date Extracted:	04/06/23	Lab ID:	304052-02 x20
Date Analyzed:	04/07/23	Data File:	304052-02 x20.118
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	23.5
Iron	7,440
Manganese	1,980

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	MW-9-230404	Client:	Aspect Consulting, LLC
Date Received:	04/05/23	Project:	Crownhill Elementary 100094
Date Extracted:	04/06/23	Lab ID:	304052-03
Date Analyzed:	04/06/23	Data File:	304052-03.127
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	<1
Iron	179
Manganese	<1

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	MW-10-230404	Client:	Aspect Consulting, LLC
Date Received:	04/05/23	Project:	Crownhill Elementary 100094
Date Extracted:	04/06/23	Lab ID:	304052-04
Date Analyzed:	04/06/23	Data File:	304052-04.128
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	1.61
Iron	2,520

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	MW-10-230404	Client:	Aspect Consulting, LLC
Date Received:	04/05/23	Project:	Crownhill Elementary 100094
Date Extracted:	04/06/23	Lab ID:	304052-04 x20
Date Analyzed:	04/07/23	Data File:	304052-04 x20.120
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Manganese	1,360

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	MW-15-230404	Client:	Aspect Consulting, LLC
Date Received:	04/05/23	Project:	Crownhill Elementary 100094
Date Extracted:	04/06/23	Lab ID:	304052-05
Date Analyzed:	04/06/23	Data File:	304052-05.130
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	<1
Iron	142
Manganese	<1

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	Method Blank	Client:	Aspect Consulting, LLC
Date Received:	NA	Project:	Crownhill Elementary 100094
Date Extracted:	04/06/23	Lab ID:	I3-266 mb
Date Analyzed:	04/06/23	Data File:	I3-266 mb.112
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	<1
Iron	<50
Manganese	<1

Analysis For Total Metals By EPA Method 6020B

Client ID:	MW-5-230404	Client:	Aspect Consulting, LLC
Date Received:	04/05/23	Project:	Crownhill Elementary 100094
Date Extracted:	04/06/23	Lab ID:	304052-01
Date Analyzed:	04/06/23	Data File:	304052-01 A.122
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	<1

Analysis For Total Metals By EPA Method 6020B

Client ID:	MW-6-230404	Client:	Aspect Consulting, LLC
Date Received:	04/05/23	Project:	Crownhill Elementary 100094
Date Extracted:	04/06/23	Lab ID:	304052-02 x20
Date Analyzed:	04/07/23	Data File:	304052-02 x20.128
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	22.5

Analysis For Total Metals By EPA Method 6020B

Client ID:	MW-9-230404	Client:	Aspect Consulting, LLC
Date Received:	04/05/23	Project:	Crownhill Elementary 100094
Date Extracted:	04/06/23	Lab ID:	304052-03
Date Analyzed:	04/06/23	Data File:	304052-03.135
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	<1

Analysis For Total Metals By EPA Method 6020B

Client ID:	MW-10-230404	Client:	Aspect Consulting, LLC
Date Received:	04/05/23	Project:	Crownhill Elementary 100094
Date Extracted:	04/06/23	Lab ID:	304052-04
Date Analyzed:	04/06/23	Data File:	304052-04.136
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	1.57

Analysis For Total Metals By EPA Method 6020B

Client ID:	MW-15-230404	Client:	Aspect Consulting, LLC
Date Received:	04/05/23	Project:	Crownhill Elementary 100094
Date Extracted:	04/06/23	Lab ID:	304052-05
Date Analyzed:	04/06/23	Data File:	304052-05.137
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	<1

Analysis For Total Metals By EPA Method 6020B

Client ID:	Method Blank	Client:	Aspect Consulting, LLC
Date Received:	NA	Project:	Crownhill Elementary 100094
Date Extracted:	04/06/23	Lab ID:	I3-266 mb
Date Analyzed:	04/06/23	Data File:	I3-266 mb.112
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	<1

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	MW-9-230404	Client:	Aspect Consulting, LLC
Date Received:	04/05/23	Project:	Crownhill Elementary 100094
Date Extracted:	04/07/23	Lab ID:	304052-03
Date Analyzed:	04/07/23	Data File:	040713.D
Matrix:	Water	Instrument:	GCMS13
Units:	ug/L (ppb)	Operator:	MD

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	91	71	132
Toluene-d8	92	68	139
4-Bromofluorobenzene	110	62	136

Compounds:	Concentration ug/L (ppb)
Trichloroethene	8.8

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	MW-10-230404	Client:	Aspect Consulting, LLC
Date Received:	04/05/23	Project:	Crownhill Elementary 100094
Date Extracted:	04/07/23	Lab ID:	304052-04
Date Analyzed:	04/07/23	Data File:	040711.D
Matrix:	Water	Instrument:	GCMS13
Units:	ug/L (ppb)	Operator:	MD

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	87	71	132
Toluene-d8	90	68	139
4-Bromofluorobenzene	108	62	136

Compounds:	Concentration ug/L (ppb)
Trichloroethene	<0.5

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	McKinney-230404	Client:	Aspect Consulting, LLC
Date Received:	04/05/23	Project:	Crownhill Elementary 100094
Date Extracted:	04/07/23	Lab ID:	304052-06
Date Analyzed:	04/07/23	Data File:	040712.D
Matrix:	Water	Instrument:	GCMS13
Units:	ug/L (ppb)	Operator:	MD

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	102	71	132
Toluene-d8	100	68	139
4-Bromofluorobenzene	107	62	136

Compounds:	Concentration ug/L (ppb)
Trichloroethene	<0.5

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	Method Blank	Client:	Aspect Consulting, LLC
Date Received:	Not Applicable	Project:	Crownhill Elementary 100094
Date Extracted:	04/07/23	Lab ID:	03-0717 mb
Date Analyzed:	04/07/23	Data File:	040707.D
Matrix:	Water	Instrument:	GCMS11
Units:	ug/L (ppb)	Operator:	MD

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	93	78	126
Toluene-d8	102	84	115
4-Bromofluorobenzene	89	72	130

Compounds:	Concentration ug/L (ppb)
Trichloroethene	<0.5

Date of Report: 04/17/23
Date Received: 04/05/23
Project: Crownhill Elementary 100094, F&BI 304052

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER SAMPLES FOR TOTAL PETROLEUM HYDROCARBONS AS DIESEL EXTENDED USING METHOD NWTPH-Dx

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
Diesel Extended	ug/L (ppb)	2,500	116	128	70-130	10

Date of Report: 04/17/23
Date Received: 04/05/23
Project: Crownhill Elementary 100094, F&BI 304052

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER SAMPLES FOR DISSOLVED METALS USING EPA METHOD 6020B

Laboratory Code: 304052-02 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Arsenic	ug/L (ppb)	10	23.1	91 b	93 b	75-125	2 b
Iron	ug/L (ppb)	100	6,890	0 b	0 b	75-125	nm
Manganese	ug/L (ppb)	20	1,780	0 b	0 b	75-125	nm

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Arsenic	ug/L (ppb)	10	103	80-120
Iron	ug/L (ppb)	100	94	80-120
Manganese	ug/L (ppb)	20	96	80-120

Date of Report: 04/17/23
Date Received: 04/05/23
Project: Crownhill Elementary 100094, F&BI 304052

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER SAMPLES FOR TOTAL METALS USING EPA METHOD 6020B

Laboratory Code: 304052-02 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Arsenic	ug/L (ppb)	10	23.1	91 b	93 b	75-125	2 b

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Arsenic	ug/L (ppb)	10	103	80-120

Date of Report: 04/17/23
Date Received: 04/05/23
Project: Crownhill Elementary 100094, F&BI 304052

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER SAMPLES FOR VOLATILES BY EPA METHOD 8260D

Laboratory Code: 304063-01 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Acceptance Criteria
Trichloroethene	ug/L (ppb)	10	<0.5	89	50-150

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
Trichloroethene	ug/L (ppb)	10	99	101	70-130	2

Data Qualifiers & Definitions

a - The analyte was detected at a level less than five times the reporting limit. The RPD results may not provide reliable information on the variability of the analysis.

b - The analyte was spiked at a level that was less than five times that present in the sample. Matrix spike recoveries may not be meaningful.

ca - The calibration results for the analyte were outside of acceptance criteria, biased high; or, the calibration results for the analyte were outside of acceptance criteria, biased high, with a detection for the analyte in the sample. The value reported is an estimate.

c - The presence of the analyte may be due to carryover from previous sample injections.

cf - The sample was centrifuged prior to analysis.

d - The sample was diluted. Detection limits were raised and surrogate recoveries may not be meaningful.

dv - Insufficient sample volume was available to achieve normal reporting limits.

f - The sample was laboratory filtered prior to analysis.

fb - The analyte was detected in the method blank.

fc - The analyte is a common laboratory and field contaminant.

hr - The sample and duplicate were reextracted and reanalyzed. RPD results were still outside of control limits. Variability is attributed to sample inhomogeneity.

hs - Headspace was present in the container used for analysis.

ht – The analysis was performed outside the method or client-specified holding time requirement.

ip - Recovery fell outside of control limits due to sample matrix effects.

j - The analyte concentration is reported below the standard reporting limit. The value reported is an estimate.

J - The internal standard associated with the analyte is out of control limits. The reported concentration is an estimate.

jl - The laboratory control sample(s) percent recovery and/or RPD were out of control limits. The reported concentration should be considered an estimate.

js - The surrogate associated with the analyte is out of control limits. The reported concentration should be considered an estimate.

k – The calibration results for the analyte were outside of acceptance criteria, biased high, and the analyte was not detected in the sample.

lc - The presence of the analyte is likely due to laboratory contamination.

L - The reported concentration was generated from a library search.

nm - The analyte was not detected in one or more of the duplicate analyses. Therefore, calculation of the RPD is not applicable.

pc - The sample was received with incorrect preservation or in a container not approved by the method. The value reported should be considered an estimate.

ve - The analyte response exceeded the valid instrument calibration range. The value reported is an estimate.

vo - The value reported fell outside the control limits established for this analyte.

x - The sample chromatographic pattern does not resemble the fuel standard used for quantitation.

SAMPLE CHAIN OF CUSTODY

04/05/23 C2/J54/VW1

Page # 1 of 1

304052

Report To Daniel Babcock

Company Aspect Consulting

Address 710 2nd Ave #550

City, State, ZIP Seattle, WA, 98104

Phone 316.617.0499 Email dbabcock@aspectconsulting.com

SAMPLERS (signature)

PROJECT NAME: Crownhill elementary

PO #: 100094

REMARKS

Project specific RLs? - Yes / No

INVOICE TO

TURNAROUND TIME
- ☑ Standard turnaround
- ☐ RUSH
- Rush charges authorized by:

SAMPLE DISPOSAL
- ☐ Archive samples
- ☐ Other
- Default: Dispose after 30 days

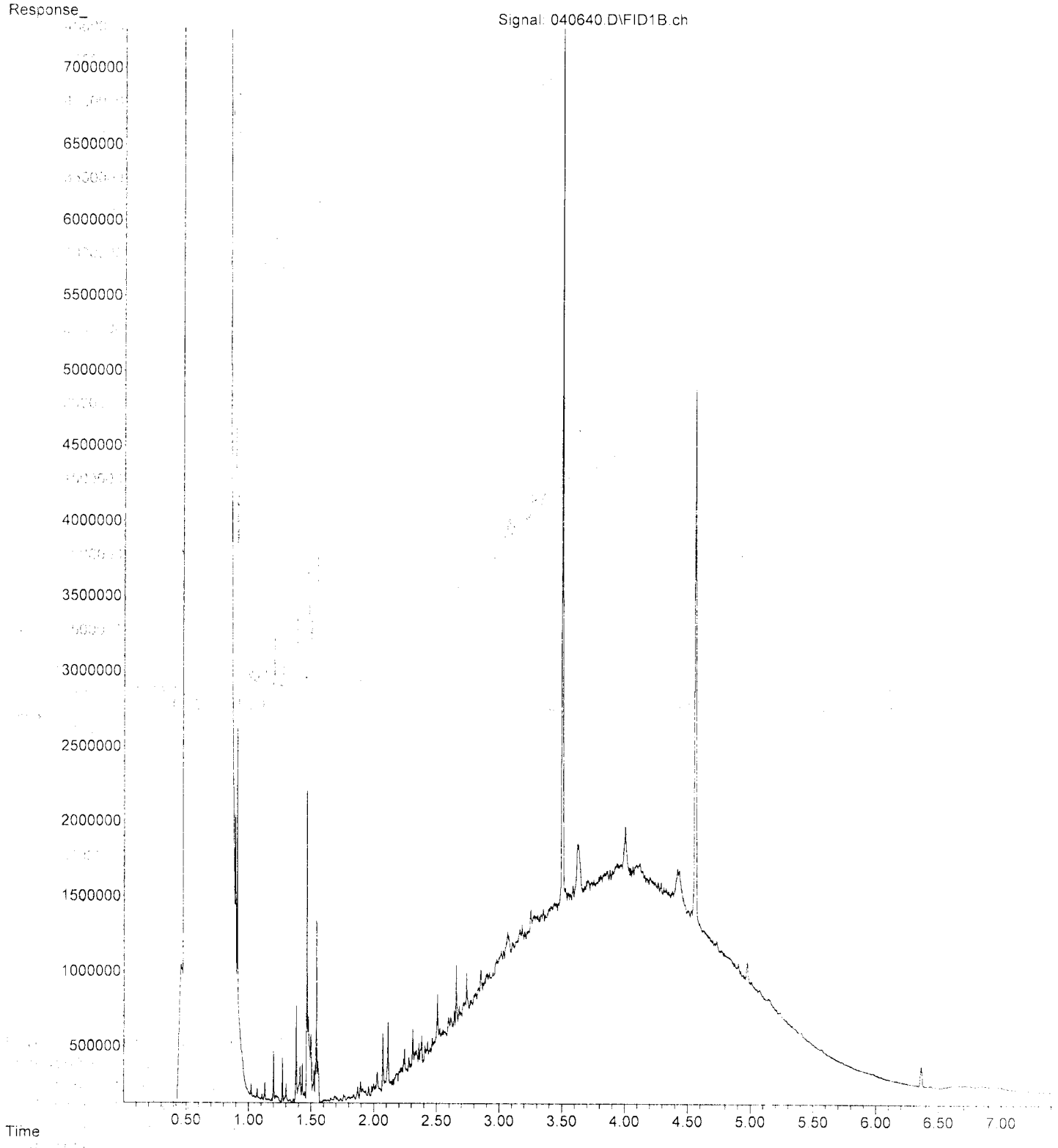
Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	NWTPH-Dx	NWTPH-Gx	BTEX EPA 8021	NWTPH-HCID	VOCs EPA 8260	PAHs EPA 8270	PCBs EPA 8082	Total Arsenic	Dissolved As, Fe, Mn	Alkalinity	TCE	Notes
MW-5-230404	01 A-D	4/4/23	1135	W	4	X							X	X	X		
MW-6-230404	02 A-C		1400		3								X	X	X		
MW-9-230404	03 A-F		1020		6								X	X	X	X	
MW-10-230404	04 A-G		1515		7	X							X	X	X	X	
MW-15-230404	05 A-D		1235		4	X							X	X	X		
McKinney-230404	06 A-C	↓		↓												X	

Sufficient received at 0°C

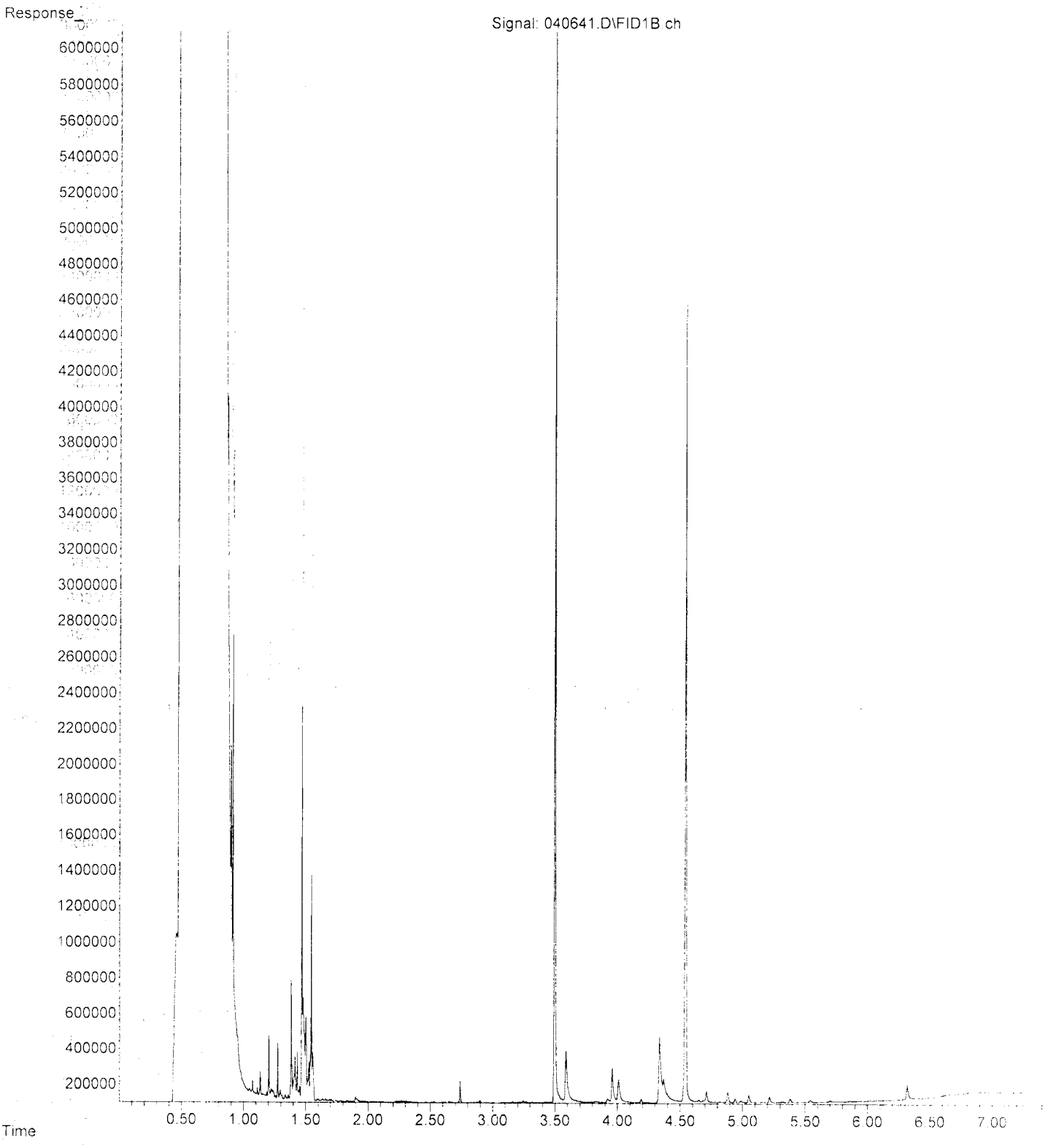
SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by:	Dan Babcock	Aspect	4/5/22	12 10
Received by:	MIN H	FBI	4-5-23	1210
Relinquished by:				
Received by:				

Friedman & Bruya, Inc.
Ph. (206) 285-8282

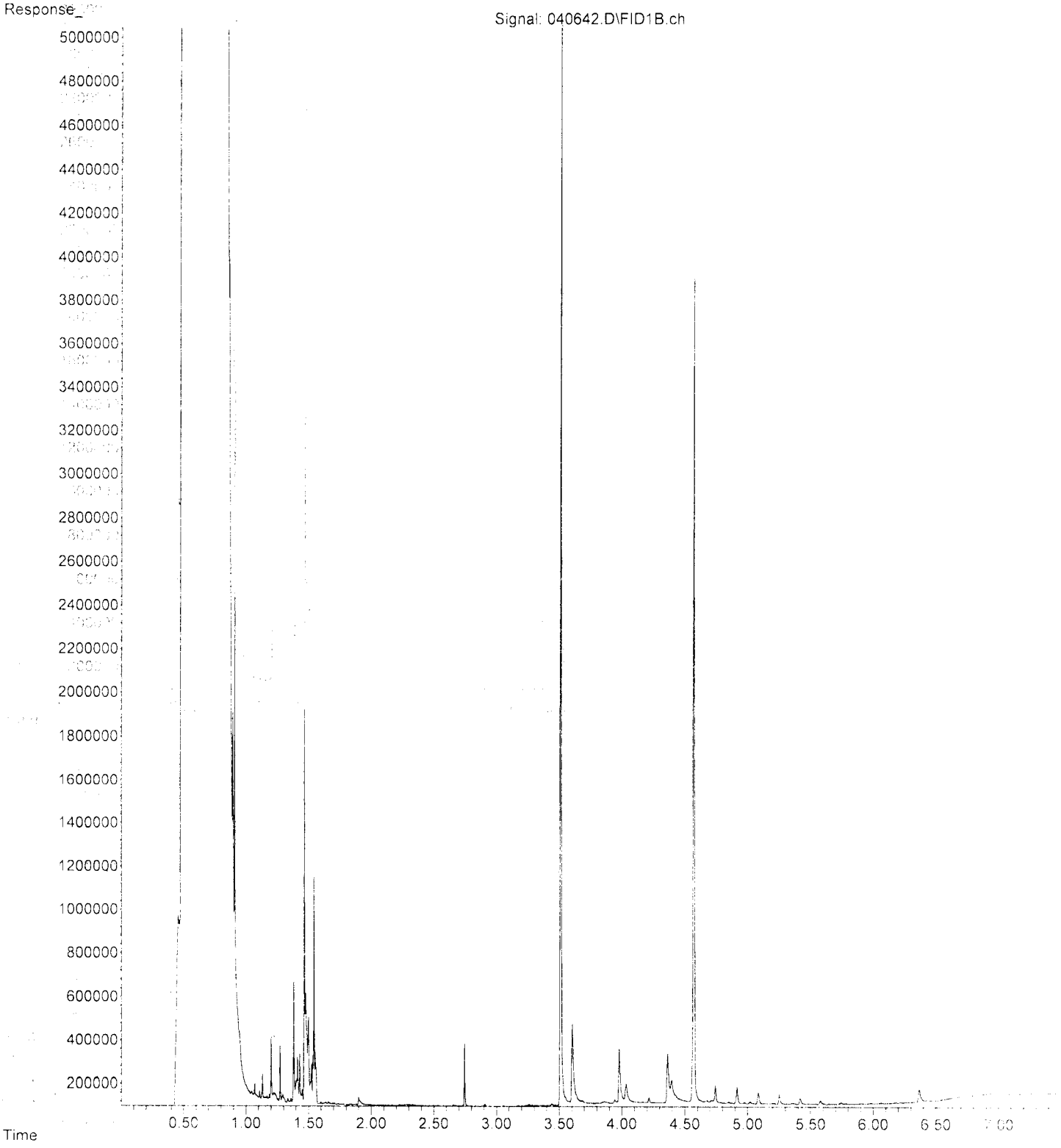
File : P:\Proc_GC10\04-06-23\040640.D
Operator : TL
Acquired : 06 Apr 2023 04:53 pm using AcqMethod DX.M
Instrument : GC10
Sample Name: 304052-01
Misc Info :
Vial Number: 29



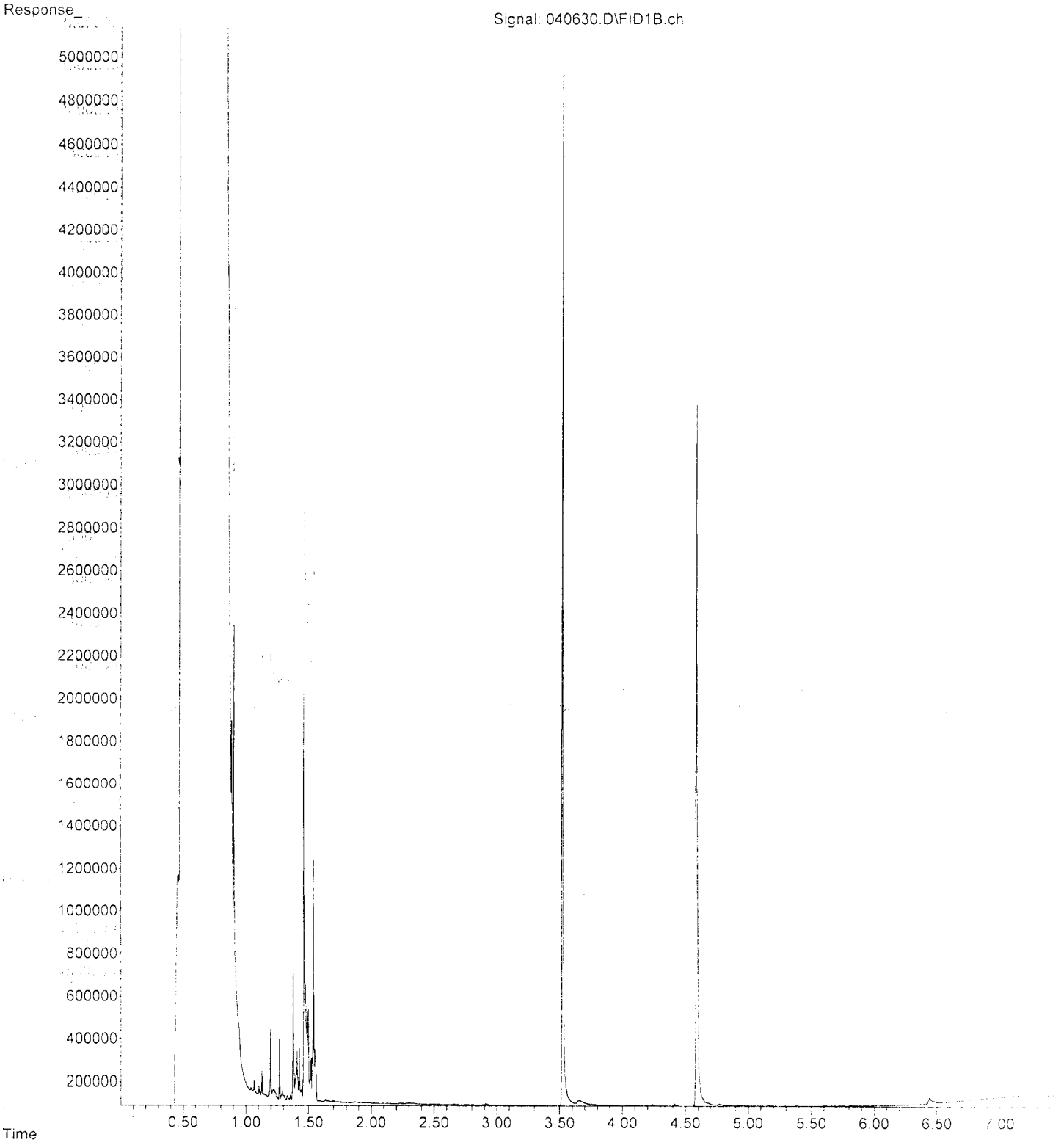
File : P:\Proc_GC10\04-06-23\040641.D
Operator : TL
Acquired : 06 Apr 2023 05:05 pm using AcqMethod DX.M
Instrument : GC10
Sample Name: 304052-04
Misc Info :
Vial Number: 30



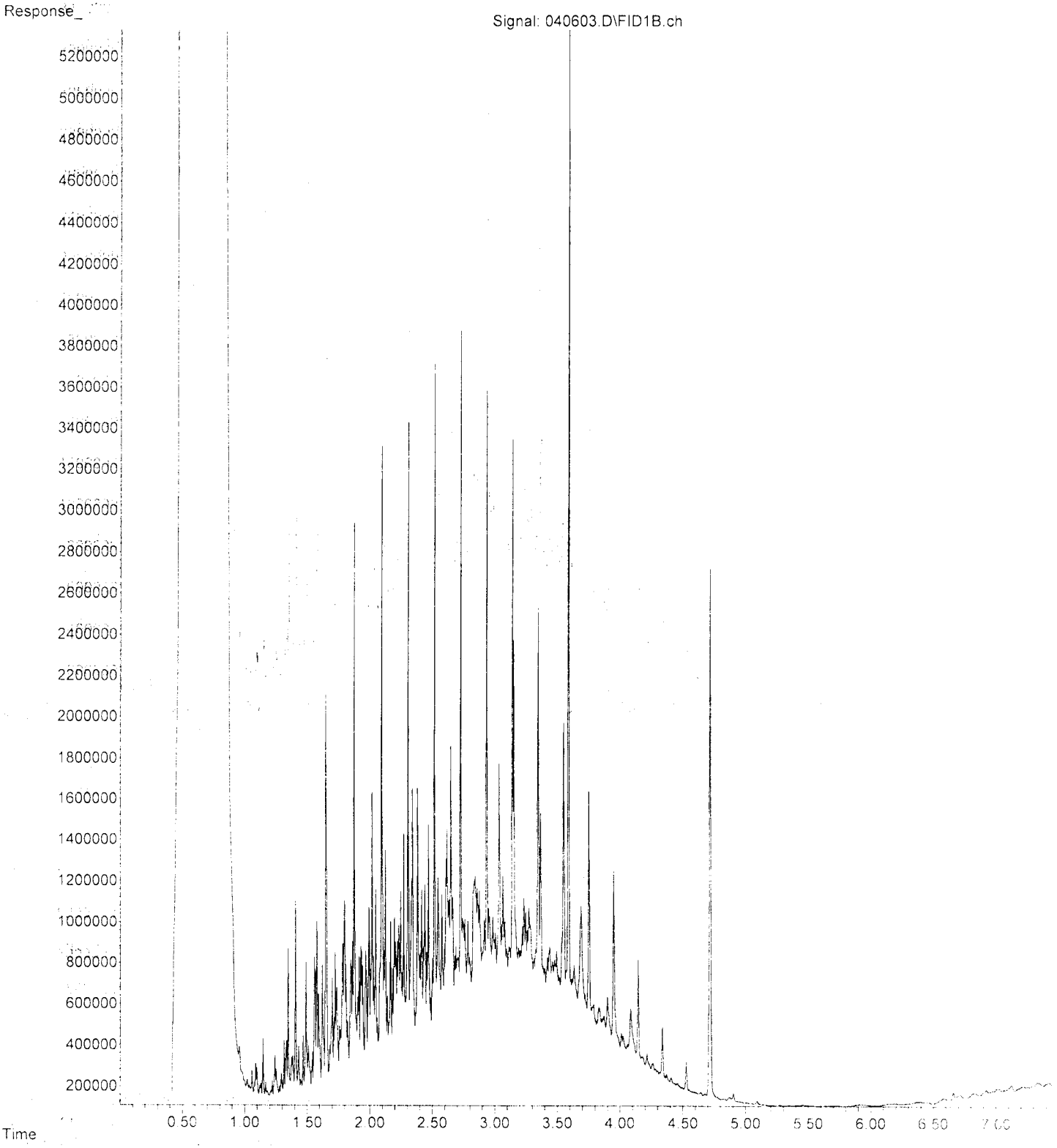
File : P:\Proc_GC10\04-06-23\040642.D
Operator : TL
Acquired : 06 Apr 2023 05:16 pm using AcqMethod DX.M
Instrument : GC10
Sample Name: 304052-05
Misc Info :
Vial Number: 31



File :P:\Proc_GC10\04-06-23\040630.D
Operator : TL
Acquired : 06 Apr 2023 02:58 pm using AcqMethod DX.M
Instrument : GC10
Sample Name: 03-876 mb
Misc Info :
Vial Number: 21



File : P:\Proc_GC10\04-06-23\040603.D
Operator : TL
Acquired : 06 Apr 2023 09:21 am using AcqMethod DX.M
Instrument : GC10
Sample Name: 500 DX 67-143B
Misc Info :
Vial Number: 3



3600 Fremont Ave. N.
Seattle, WA 98103
T: (206) 352-3790
F: (206) 352-7178
info@fremontanalytical.com

Friedman & Bruya
Michael Erdahl
5500 4th Ave S
Seattle, WA 98108

RE: 304052
Work Order Number: 2304099

April 13, 2023

Attention Michael Erdahl:

Fremont Analytical, Inc. received 5 sample(s) on 4/6/2023 for the analyses presented in the following report.

Total Alkalinity by SM 2320B

This report consists of the following:

- Case Narrative
- Analytical Results
- Applicable Quality Control Summary Reports
- Chain of Custody

All analyses were performed consistent with the Quality Assurance program of Fremont Analytical, Inc. Please contact the laboratory if you should have any questions about the results.

Thank you for using Fremont Analytical.

Sincerely,

Brianna Barnes
Project Manager

Date: *04/13/2023*

CLIENT: Friedman & Bruya
Project: 304052
Work Order: 2304099

Work Order Sample Summary

Lab Sample ID	Client Sample ID	Date/Time Collected	Date/Time Received
2304099-001	MW-5-230404	04/04/2023 11:35 AM	04/06/2023 2:24 PM
2304099-002	MW-6-230404	04/04/2023 2:00 PM	04/06/2023 2:24 PM
2304099-003	MW-9-230404	04/04/2023 10:20 AM	04/06/2023 2:24 PM
2304099-004	MW-10-230404	04/04/2023 3:15 PM	04/06/2023 2:24 PM
2304099-005	MW-15-230404	04/04/2023 12:35 PM	04/06/2023 2:24 PM

Note: If no "Time Collected" is supplied, a default of 12:00AM is assigned

Case Narrative

WO#: **2304099**
Date: **4/13/2023**

CLIENT: Friedman & Bruya
Project: 304052

I. SAMPLE RECEIPT:
Samples receipt information is recorded on the attached Sample Receipt Checklist.

II. GENERAL REPORTING COMMENTS:
Results are reported on a wet weight basis unless dry-weight correction is denoted in the units field on the analytical report ("mg/kg-dry" or "ug/kg-dry").

Matrix Spike (MS) and MS Duplicate (MSD) samples are tested from an analytical batch of "like" matrix to check for possible matrix effect. The MS and MSD will provide site specific matrix data only for those samples which are spiked by the laboratory. The sample chosen for spike purposes may or may not have been a sample submitted in this sample delivery group. The validity of the analytical procedures for which data is reported in this analytical report is determined by the Laboratory Control Sample (LCS) and the Method Blank (MB). The LCS and the MB are processed with the samples and the MS/MSD to ensure method criteria are achieved throughout the entire analytical process.

III. ANALYSES AND EXCEPTIONS:
Exceptions associated with this report will be footnoted in the analytical results page(s) or the quality control summary page(s) and/or noted below.

Qualifiers:

* - Flagged value is not within established control limits
B - Analyte detected in the associated Method Blank
D - Dilution was required
E - Value above quantitation range
H - Holding times for preparation or analysis exceeded
I - Analyte with an internal standard that does not meet established acceptance criteria
J - Analyte detected below Reporting Limit
N - Tentatively Identified Compound (TIC)
Q - Analyte with an initial or continuing calibration that does not meet established acceptance criteria
S - Spike recovery outside accepted recovery limits
ND - Not detected at the Reporting Limit
R - High relative percent difference observed

Acronyms:

%Rec - Percent Recovery
CCB - Continued Calibration Blank
CCV - Continued Calibration Verification
DF - Dilution Factor
DUP - Sample Duplicate
HEM - Hexane Extractable Material
ICV - Initial Calibration Verification
LCS/LCSD - Laboratory Control Sample / Laboratory Control Sample Duplicate
MCL - Maximum Contaminant Level
MB or MBLANK - Method Blank
MDL - Method Detection Limit
MS/MSD - Matrix Spike / Matrix Spike Duplicate
PDS - Post Digestion Spike
Ref Val - Reference Value
REP - Sample Replicate
RL - Reporting Limit
RPD - Relative Percent Difference
SD - Serial Dilution
SGT - Silica Gel Treatment
SPK - Spike
Surr - Surrogate

CLIENT: Friedman & Bruya
Project: 304052

Lab ID: 2304099-001 **Collection Date:** 4/4/2023 11:35:00 AM
Client Sample ID: **MW-5-230404** **Matrix:** Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Total Alkalinity by SM 2320B				Batch ID: R83167		Analyst: ME
Alkalinity, Total (As CaCO3)	802	2.50		mg/L	1	4/13/2023 12:35:06 PM

Lab ID: 2304099-002 **Collection Date:** 4/4/2023 2:00:00 PM
Client Sample ID: **MW-6-230404** **Matrix:** Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Total Alkalinity by SM 2320B				Batch ID: R83167		Analyst: ME
Alkalinity, Total (As CaCO3)	357	2.50		mg/L	1	4/13/2023 12:35:06 PM

Lab ID: 2304099-003 **Collection Date:** 4/4/2023 10:20:00 AM
Client Sample ID: **MW-9-230404** **Matrix:** Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Total Alkalinity by SM 2320B				Batch ID: R83167		Analyst: ME
Alkalinity, Total (As CaCO3)	273	2.50		mg/L	1	4/13/2023 12:35:06 PM

Lab ID: 2304099-004 **Collection Date:** 4/4/2023 3:15:00 PM
Client Sample ID: **MW-10-230404** **Matrix:** Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Total Alkalinity by SM 2320B				Batch ID: R83167		Analyst: ME
Alkalinity, Total (As CaCO3)	261	2.50		mg/L	1	4/13/2023 12:35:06 PM

Analytical Report

Work Order: **2304099**
Date Reported: **4/13/2023**

CLIENT: Friedman & Bruya
Project: 304052

Lab ID: 2304099-005
Client Sample ID: **MW-15-230404**
Collection Date: 4/4/2023 12:35:00 PM
Matrix: Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Total Alkalinity by SM 2320B				Batch ID: R83167		Analyst: ME
Alkalinity, Total (As CaCO3)	351	2.50		mg/L	1	4/13/2023 12:35:06 PM

Work Order: 2304099
CLIENT: Friedman & Bruya
Project: 304052

QC SUMMARY REPORT

Total Alkalinity by SM 2320B

Sample ID: **MB-R83167**	SampType: **MBLK**	Units: **mg/L**	Prep Date: **4/13/2023**	RunNo: **83167**
Client ID: **MBLKW**	Batch ID: **R83167**		Analysis Date: **4/13/2023**	SeqNo: **1731583**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Alkalinity, Total (As CaCO3)	ND	2.50									

Sample ID: **LCS-R83167**	SampType: **LCS**	Units: **mg/L**	Prep Date: **4/13/2023**	RunNo: **83167**
Client ID: **LCSW**	Batch ID: **R83167**		Analysis Date: **4/13/2023**	SeqNo: **1731584**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Alkalinity, Total (As CaCO3)	114	2.50	100.0	0	114	83.8	121				

Sample ID: **2304099-001ADUP**	SampType: **DUP**	Units: **mg/L**	Prep Date: **4/13/2023**	RunNo: **83167**
Client ID: **MW-5-230404**	Batch ID: **R83167**		Analysis Date: **4/13/2023**	SeqNo: **1731586**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Alkalinity, Total (As CaCO3)	816	2.50						802.4	1.71	20	

Fremont Analytical

Sample Log-In Check List

Client Name:	FB	Work Order Number:	2304099
Logged by:	Morgan Wilson	Date Received:	4/6/2023 2:24:00 PM

Chain of Custody

1.	Is Chain of Custody complete?	Yes ☑	No ☐	Not Present ☐
2.	How was the sample delivered?	Client		

Log In

3.	Coolers are present?	Yes ☑	No ☐	NA ☐
4.	Shipping container/cooler in good condition?	Yes ☑	No ☐	
5.	Custody Seals present on shipping container/cooler? (Refer to comments for Custody Seals not intact)	Yes ☐	No ☐	Not Present ☑
6.	Was an attempt made to cool the samples?	Yes ☑	No ☐	NA ☐
7.	Were all items received at a temperature of >2°C to 6°C *	Yes ☑	No ☐	NA ☐
8.	Sample(s) in proper container(s)?	Yes ☑	No ☐	
9.	Sufficient sample volume for indicated test(s)?	Yes ☑	No ☐	
10.	Are samples properly preserved?	Yes ☑	No ☐	
11.	Was preservative added to bottles?	Yes ☐	No ☑	NA ☐
12.	Is there headspace in the VOA vials?	Yes ☐	No ☐	NA ☑
13.	Did all samples containers arrive in good condition(unbroken)?	Yes ☑	No ☐	
14.	Does paperwork match bottle labels?	Yes ☑	No ☐	
15.	Are matrices correctly identified on Chain of Custody?	Yes ☑	No ☐	
16.	Is it clear what analyses were requested?	Yes ☑	No ☐	
17.	Were all holding times able to be met?	Yes ☑	No ☐	

Special Handling (if applicable)

18.	Was client notified of all discrepancies with this order?	Yes ☐	No ☐	NA ☑

Person Notified: _____ Date: _____

By Whom: _____ Via: ☐ eMail ☐ Phone ☐ Fax ☐ In Person

Regarding: _____

Client Instructions: _____

19. Additional remarks:

Item Information

Item #	Temp ºC
Sample	0.6

* Note: DoD/ELAP and TNI require items to be received at 4°C +/- 2°C

SUBCONTRACT SAMPLE CHAIN OF CUSTODY

2304044

Send Report To Michael Erdahl

Company Friedman and Bruya, Inc.

Address 3012 16th Ave W

City, State, ZIP Seattle, WA 98119

Phone # (206) 285-8282 merdahl@friedmanandbruya.com

SUBCONTRACTER Fremont

PROJECT NAME/NO. 304052

PO # D-220

REMARKS Aspect EDD

TURNAROUND TIME

☒ Standard TAT

RUSH

Rush charges authorized by:

SAMPLE DISPOSAL

Dispose after 30 days

Return samples

Will call with instructions

Sample ID	Lab ID	Date Sampled	Time Sampled	Matrix	# of jars	ANALYSES REQUESTED: Alkalinity										Notes
MW-5-230404		4/4/2023	1135	water	1	x										
MW-6-230404		4/4/2023	1400	water	1	x										
MW-9-230404		4/4/2023	1020	water	1	x										
MW-10-230404		4/4/2023	1515	water	1	x										
MW-15-230404		4/4/2023	1235	water	1	x										

Friedman & Bruya, Inc.
3012 16th Avenue West
Seattle, WA 98119-2029
Ph. (206) 285-8282
Fax (206) 283-5044

	SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by:		Michael Erdahl	Friedman & Bruya	4/6/23	0830
Received by:		Alaina	FAI	4/6/23	1424
Relinquished by:					
Received by:					

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

James E. Bruya, Ph.D.
Yelena Aravkina, M.S.
Michael Erdahl, B.S.
Vineta Mills, M.S.
Eric Young, B.S.

5500 4th Avenue South
Seattle, WA 98108
(206) 285-8282
fbi@isomedia.com
www.friedmanandbruya.com

July 19, 2023

Matthew Lewis, Project Manager
Aspect Consulting, LLC
710 2nd Ave S, Suite 550
Seattle, WA 98104

Dear Mr Lewis:

Included are the results from the testing of material submitted on July 12, 2023 from the Crownhill Elementary 100094, F&BI 307093 project. There are 17 pages included in this report. Any samples that may remain are currently scheduled for disposal in 30 days, or as directed by the Chain of Custody document. If you would like us to return your samples or arrange for long term storage at our offices, please contact us as soon as possible.

We appreciate this opportunity to be of service to you and hope you will call if you have any questions.

Sincerely,

FRIEDMAN & BRUYA, INC.

Michael Erdahl
Project Manager

Enclosures
c: Aspect Data
ASP0719R.DOC

CASE NARRATIVE

This case narrative encompasses samples received on July 12, 2023 by Friedman & Bruya, Inc. from the Aspect Consulting, LLC Crownhill Elementary 100094, F&BI 307093 project. Samples were logged in under the laboratory ID's listed below.

Laboratory ID	Aspect Consulting, LLC
307093 -01	MW-6-230711
307093 -02	MW-10-230711

The samples were sent to Fremont Analytical for alkalinity analysis. The report is enclosed.

All quality control requirements were acceptable.

Date of Report: 07/19/23
Date Received: 07/12/23
Project: Crownhill Elementary 100094, F&BI 307093
Date Extracted: 07/12/23
Date Analyzed: 07/12/23

RESULTS FROM THE ANALYSIS OF WATER SAMPLES FOR TOTAL PETROLEUM HYDROCARBONS AS DIESEL AND MOTOR OIL USING METHOD NWTPH-Dx

Results Reported as ug/L (ppb)

Sample ID Laboratory ID	Diesel Range (C_{10}-C_{25})	Motor Oil Range (C_{25}-C_{36})	Surrogate (% Recovery) (Limit 50-150)
MW-10-230711 307093-02	<50	<250	120
Method Blank 03-1690 MB	<50	<250	123

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	MW-6-230711	Client:	Aspect Consulting, LLC
Date Received:	07/12/23	Project:	Crownhill Elementary 100094
Date Extracted:	07/13/23	Lab ID:	307093-01
Date Analyzed:	07/13/23	Data File:	307093-01.110
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	21.2

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	MW-6-230711	Client:	Aspect Consulting, LLC
Date Received:	07/12/23	Project:	Crownhill Elementary 100094
Date Extracted:	07/13/23	Lab ID:	307093-01 x10
Date Analyzed:	07/14/23	Data File:	307093-01 x10.067
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Iron	6,030
Manganese	1,820

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	MW-10-230711	Client:	Aspect Consulting, LLC
Date Received:	07/12/23	Project:	Crownhill Elementary 100094
Date Extracted:	07/13/23	Lab ID:	307093-02
Date Analyzed:	07/13/23	Data File:	307093-02.113
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	1.57
Iron	2,240

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	MW-10-230711	Client:	Aspect Consulting, LLC
Date Received:	07/12/23	Project:	Crownhill Elementary 100094
Date Extracted:	07/13/23	Lab ID:	307093-02 x10
Date Analyzed:	07/14/23	Data File:	307093-02 x10.068
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Manganese	1,440

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	Method Blank	Client:	Aspect Consulting, LLC
Date Received:	NA	Project:	Crownhill Elementary 100094
Date Extracted:	07/13/23	Lab ID:	I3-546 mb
Date Analyzed:	07/13/23	Data File:	I3-546 mb.086
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	<1
Iron	<50
Manganese	<1

Analysis For Total Metals By EPA Method 6020B

Client ID:	MW-6-230711	Client:	Aspect Consulting, LLC
Date Received:	07/12/23	Project:	Crownhill Elementary 100094
Date Extracted:	07/13/23	Lab ID:	307093-01
Date Analyzed:	07/13/23	Data File:	307093-01.114
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	20.3

Analysis For Total Metals By EPA Method 6020B

Client ID:	MW-10-230711	Client:	Aspect Consulting, LLC
Date Received:	07/12/23	Project:	Crownhill Elementary 100094
Date Extracted:	07/13/23	Lab ID:	307093-02
Date Analyzed:	07/13/23	Data File:	307093-02.115
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	1.55

Analysis For Total Metals By EPA Method 6020B

Client ID:	Method Blank	Client:	Aspect Consulting, LLC
Date Received:	NA	Project:	Crownhill Elementary 100094
Date Extracted:	07/13/23	Lab ID:	I3-546 mb
Date Analyzed:	07/13/23	Data File:	I3-546 mb.086
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	<1

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	MW-10-230711	Client:	Aspect Consulting, LLC
Date Received:	07/12/23	Project:	Crownhill Elementary 100094
Date Extracted:	07/13/23	Lab ID:	307093-02
Date Analyzed:	07/13/23	Data File:	071324.D
Matrix:	Water	Instrument:	GCMS13
Units:	ug/L (ppb)	Operator:	MD

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	95	71	132
Toluene-d8	100	68	139
4-Bromofluorobenzene	100	62	136

Compounds:	Concentration ug/L (ppb)
Trichloroethene	<0.5

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	Method Blank	Client:	Aspect Consulting, LLC
Date Received:	Not Applicable	Project:	Crownhill Elementary 100094
Date Extracted:	07/13/23	Lab ID:	03-1554 mb
Date Analyzed:	07/13/23	Data File:	071307.D
Matrix:	Water	Instrument:	GCMS13
Units:	ug/L (ppb)	Operator:	MD

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	93	71	132
Toluene-d8	102	68	139
4-Bromofluorobenzene	102	62	136

Compounds:	Concentration ug/L (ppb)
Trichloroethene	<0.5

Date of Report: 07/19/23
Date Received: 07/12/23
Project: Crownhill Elementary 100094, F&BI 307093

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER SAMPLES FOR TOTAL PETROLEUM HYDROCARBONS AS DIESEL EXTENDED USING METHOD NWTPH-Dx

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
Diesel Extended	ug/L (ppb)	2,500	116	116	65-151	0

Date of Report: 07/19/23
Date Received: 07/12/23
Project: Crownhill Elementary 100094, F&BI 307093

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER SAMPLES FOR TOTAL METALS USING EPA METHOD 6020B

Laboratory Code: 307093-01 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Arsenic	ug/L (ppb)	10	21.2	91 b	100 b	75-125	9 b
Iron	ug/L (ppb)	100	5,940	0 b	330 b	75-125	200 b
Manganese	ug/L (ppb)	20	1,660	158 b	410 b	75-125	89 b

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Arsenic	ug/L (ppb)	10	95	80-120
Iron	ug/L (ppb)	100	94	80-120
Manganese	ug/L (ppb)	20	92	80-120

Date of Report: 07/19/23
Date Received: 07/12/23
Project: Crownhill Elementary 100094, F&BI 307093

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER SAMPLES FOR TOTAL METALS USING EPA METHOD 6020B

Laboratory Code: 307093-01 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Arsenic	ug/L (ppb)	10	21.2	91 b	100 b	75-125	9 b

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Arsenic	ug/L (ppb)	10	95	80-120

Date of Report: 07/19/23
Date Received: 07/12/23
Project: Crownhill Elementary 100094, F&BI 307093

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER SAMPLES FOR VOLATILES BY EPA METHOD 8260D

Laboratory Code: 307115-01 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Acceptance Criteria
Trichloroethene	ug/L (ppb)	10	<0.5	111	43-133

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
Trichloroethene	ug/L (ppb)	10	115	119	70-130	3

Data Qualifiers & Definitions

a - The analyte was detected at a level less than five times the reporting limit. The RPD results may not provide reliable information on the variability of the analysis.

b - The analyte was spiked at a level that was less than five times that present in the sample. Matrix spike recoveries may not be meaningful.

ca - The calibration results for the analyte were outside of acceptance criteria, biased low; or, the calibration results for the analyte were outside of acceptance criteria, biased high, with a detection for the analyte in the sample. The value reported is an estimate.

c - The presence of the analyte may be due to carryover from previous sample injections.

cf - The sample was centrifuged prior to analysis.

d - The sample was diluted. Detection limits were raised and surrogate recoveries may not be meaningful.

dv - Insufficient sample volume was available to achieve normal reporting limits.

f - The sample was laboratory filtered prior to analysis.

fb - The analyte was detected in the method blank.

fc - The analyte is a common laboratory and field contaminant.

hr - The sample and duplicate were reextracted and reanalyzed. RPD results were still outside of control limits. Variability is attributed to sample inhomogeneity.

hs - Headspace was present in the container used for analysis.

ht – The analysis was performed outside the method or client-specified holding time requirement.

ip - Recovery fell outside of control limits due to sample matrix effects.

j - The analyte concentration is reported below the standard reporting limit. The value reported is an estimate.

J - The internal standard associated with the analyte is out of control limits. The reported concentration is an estimate.

jl - The laboratory control sample(s) percent recovery and/or RPD were out of control limits. The reported concentration should be considered an estimate.

js - The surrogate associated with the analyte is out of control limits. The reported concentration should be considered an estimate.

k – The calibration results for the analyte were outside of acceptance criteria, biased high, and the analyte was not detected in the sample.

lc - The presence of the analyte is likely due to laboratory contamination.

L - The reported concentration was generated from a library search.

nm - The analyte was not detected in one or more of the duplicate analyses. Therefore, calculation of the RPD is not applicable.

pc - The sample was received with incorrect preservation or in a container not approved by the method. The value reported should be considered an estimate.

ve - The analyte response exceeded the valid instrument calibration range. The value reported is an estimate.

vo - The value reported fell outside the control limits established for this analyte.

x - The sample chromatographic pattern does not resemble the fuel standard used for quantitation.

SAMPLE CHAIN OF CUSTODY 07/12/23 J3/C2/VW1

307093

Report To Mathew Lewis

Company Aspect Consulting

Address 710 2nd Ave #550

City, State, ZIP Seattle, WA, 98104

Phone 404-210-6437 Email mlewis@aspectconsulting.com

SAMPLERS (*signature*) Carmen Tapp

PROJECT NAME: Crownhill Elementary

PO #: 100094

REMARKS

Project specific RLs? - Yes / No

INVOICE TO

Page # _____ of _____

TURNAROUND TIME
- ☑ Standard turnaround
- ☐ RUSH _____
- Rush charges authorized by: _____

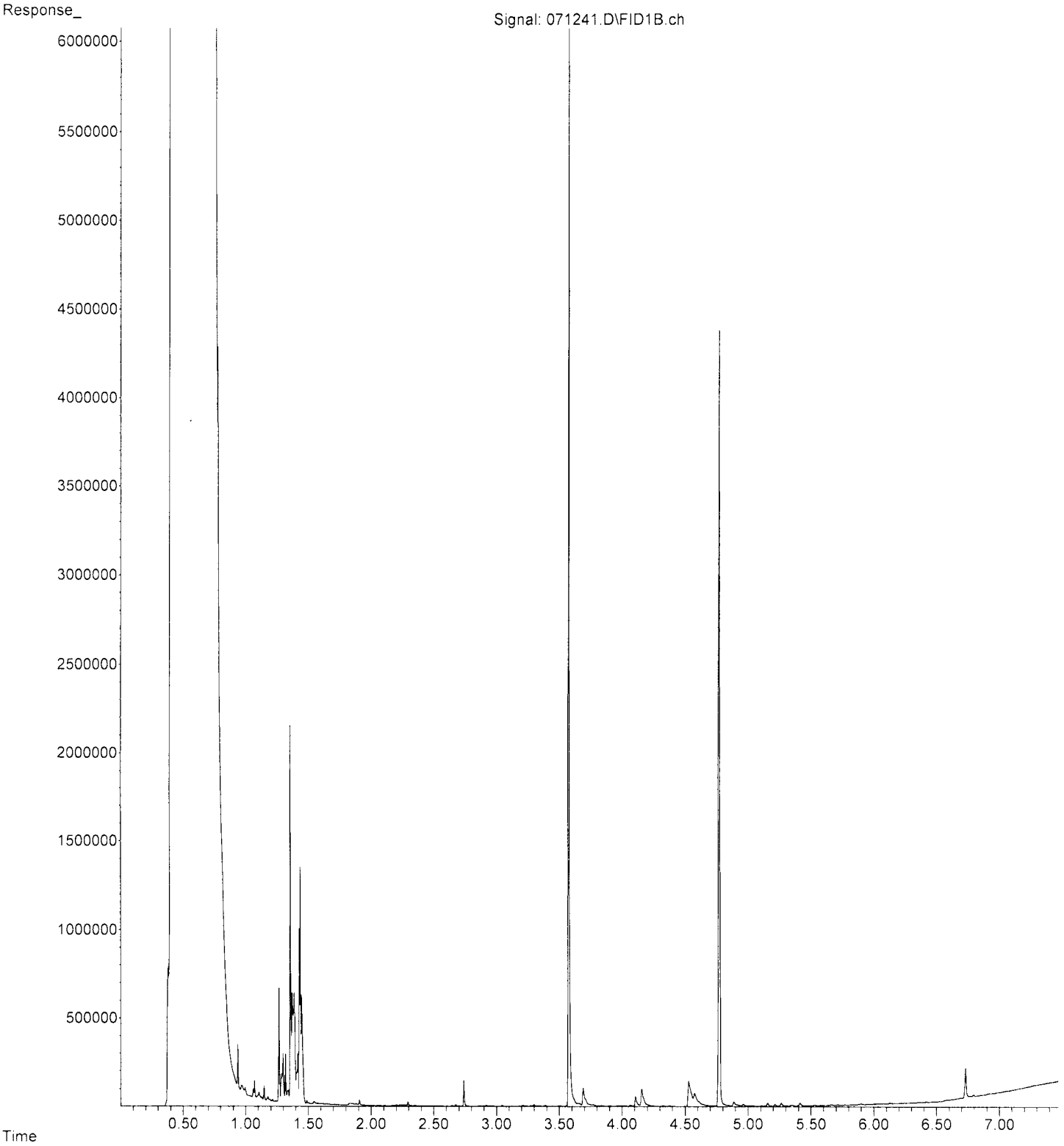
SAMPLE DISPOSAL
- ☐ Archive samples
- ☐ Other _____
- Default: Dispose after 30 days

						ANALYSES REQUESTED											
Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	NWTPH-Dx	NWTPH-Gx	BTEX EPA 8021	NWTPH-HCID	VOCs EPA 8260	PAHs EPA 8270	PCBs EPA 8082	TCE	Total arsenic	Dissolved As, Fe, Mn	Alkalinity	Notes
MW-6-230711	01A-C	7/11/23	1030	W	3									X	X	X	
MW-10-230711	02A-G	7/11/23	1140	W	7	X							X	X	X	X	
							Samples received at Ø °C										

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by: Carmen Tapp	Carmen Tapperio	Aspect Consulting	7/11/23	1330
Received by:	ANHPHAN	FSB	07/12/23	10:08
Relinquished by:				
Received by:				

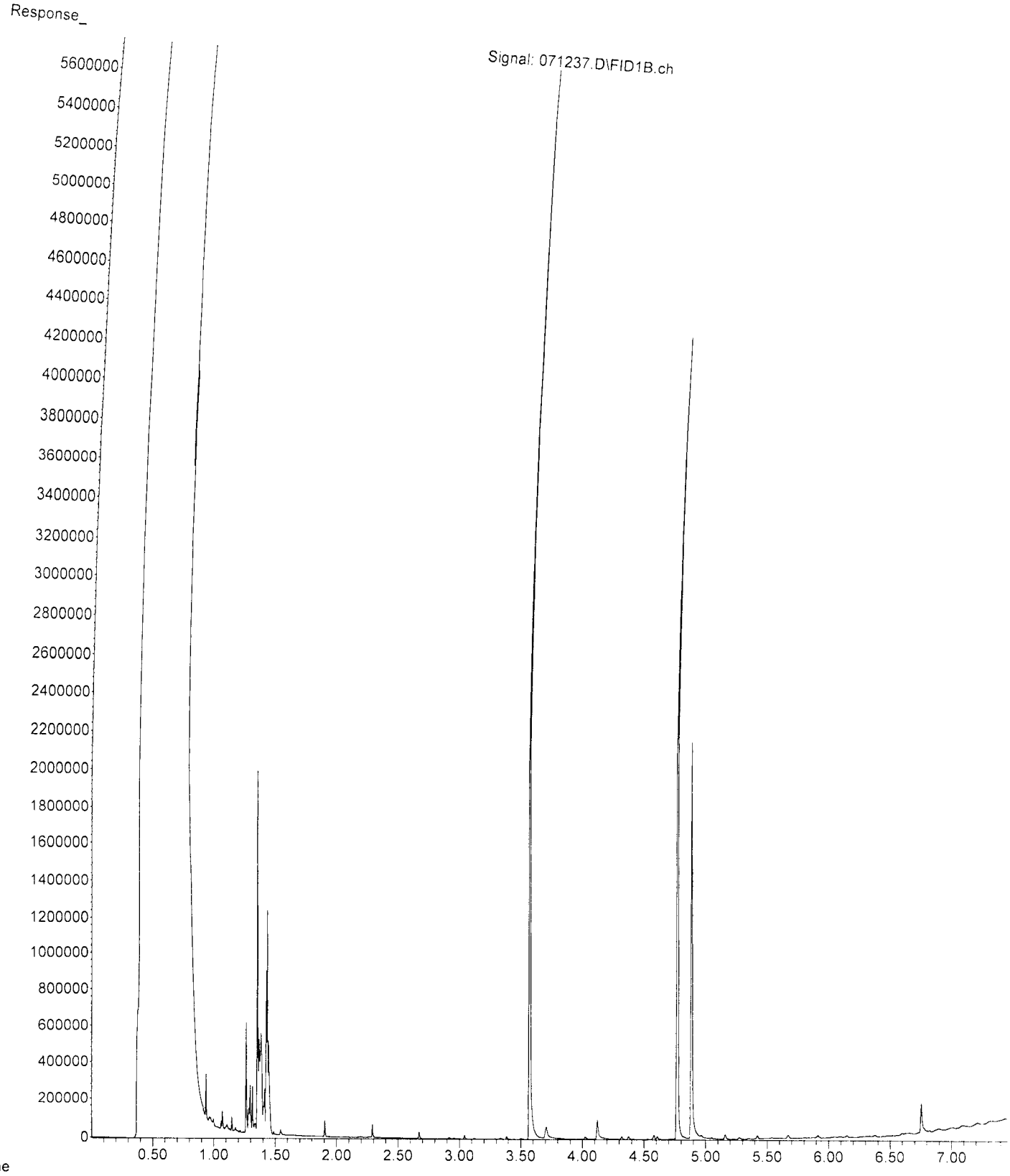
Friedman & Bruya, Inc.
Ph. (206) 285-8282

File :P:\Proc_GC14\07-12-23\071241.D
Operator : TL
Acquired : 12 Jul 2023 04:46 pm using AcqMethod DX.M
Instrument : GC14
Sample Name: 307093-02
Misc Info : ERR
Vial Number: 38

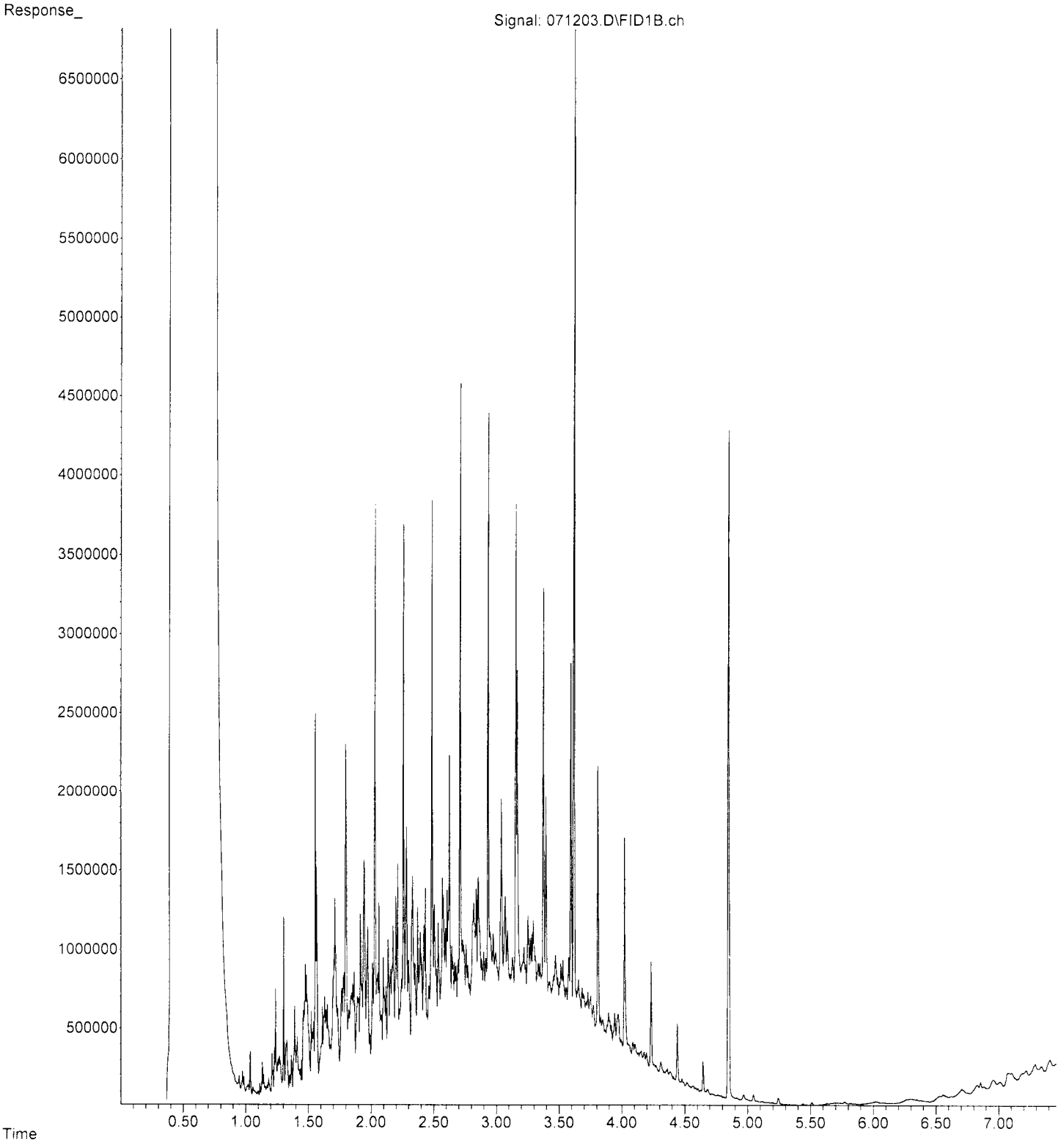


File :P:\Proc_GC14\07-12-23\071237.D
Operator : TL
Acquired : 12 Jul 2023 03:59 pm using AcqMethod DX.M
Instrument : GC14
Sample Name: 03-1690 mb
Misc Info :
Vial Number: 34

ERR



File :P:\Proc_GC14\07-12-23\071203.D
Operator : TL
Acquired : 12 Jul 2023 07:58 am using AcqMethod DX.M
Instrument : GC14
Sample Name: 500 Dx 68-66J
Misc Info : ERR
Vial Number: 3



3600 Fremont Ave. N.
Seattle, WA 98103
T: (206) 352-3790
F: (206) 352-7178
info@fremontanalytical.com

Friedman & Bruya
Michael Erdahl
5500 4th Ave S
Seattle, WA 98108

RE: 307093
Work Order Number: 2307131

July 19, 2023

Attention Michael Erdahl:

Fremont Analytical, Inc. received 2 sample(s) on 7/12/2023 for the analyses presented in the following report.

Total Alkalinity by SM 2320B

This report consists of the following:

- Case Narrative
- Analytical Results
- Applicable Quality Control Summary Reports
- Chain of Custody

All analyses were performed consistent with the Quality Assurance program of Fremont Analytical, Inc. Please contact the laboratory if you should have any questions about the results.

Thank you for using Fremont Analytical.

Sincerely,

Brianna Barnes
Project Manager

Date: *07/19/2023*

CLIENT: Friedman & Bruya
Project: 307093
Work Order: 2307131

Work Order Sample Summary

Lab Sample ID	Client Sample ID	Date/Time Collected	Date/Time Received
2307131-001	MW-6-230711	07/11/2023 10:30 AM	07/12/2023 3:25 PM
2307131-002	MW-10-230711	07/11/2023 11:40 AM	07/12/2023 3:25 PM

Note: If no "Time Collected" is supplied, a default of 12:00AM is assigned

Original

Case Narrative

WO#: **2307131**
Date: **7/19/2023**

CLIENT: Friedman & Bruya
Project: 307093

I. SAMPLE RECEIPT:
Samples receipt information is recorded on the attached Sample Receipt Checklist.

II. GENERAL REPORTING COMMENTS:
Results are reported on a wet weight basis unless dry-weight correction is denoted in the units field on the analytical report ("mg/kg-dry" or "ug/kg-dry").

Matrix Spike (MS) and MS Duplicate (MSD) samples are tested from an analytical batch of "like" matrix to check for possible matrix effect. The MS and MSD will provide site specific matrix data only for those samples which are spiked by the laboratory. The sample chosen for spike purposes may or may not have been a sample submitted in this sample delivery group. The validity of the analytical procedures for which data is reported in this analytical report is determined by the Laboratory Control Sample (LCS) and the Method Blank (MB). The LCS and the MB are processed with the samples and the MS/MSD to ensure method criteria are achieved throughout the entire analytical process.

III. ANALYSES AND EXCEPTIONS:
Exceptions associated with this report will be footnoted in the analytical results page(s) or the quality control summary page(s) and/or noted below.

Qualifiers:

* - Flagged value is not within established control limits
B - Analyte detected in the associated Method Blank
D - Dilution was required
E - Value above quantitation range
H - Holding times for preparation or analysis exceeded
I - Analyte with an internal standard that does not meet established acceptance criteria
J - Analyte detected below Reporting Limit
N - Tentatively Identified Compound (TIC)
Q - Analyte with an initial or continuing calibration that does not meet established acceptance criteria
S - Spike recovery outside accepted recovery limits
ND - Not detected at the Reporting Limit
R - High relative percent difference observed

Acronyms:

%Rec - Percent Recovery
CCB - Continued Calibration Blank
CCV - Continued Calibration Verification
DF - Dilution Factor
DUP - Sample Duplicate
HEM - Hexane Extractable Material
ICV - Initial Calibration Verification
LCS/LCSD - Laboratory Control Sample / Laboratory Control Sample Duplicate
MCL - Maximum Contaminant Level
MB or MBLANK - Method Blank
MDL - Method Detection Limit
MS/MSD - Matrix Spike / Matrix Spike Duplicate
PDS - Post Digestion Spike
Ref Val - Reference Value
REP - Sample Replicate
RL - Reporting Limit
RPD - Relative Percent Difference
SD - Serial Dilution
SGT - Silica Gel Treatment
SPK - Spike
Surr - Surrogate

Analytical Report

Work Order: **2307131**
Date Reported: **7/19/2023**

CLIENT: Friedman & Bruya
Project: 307093

Lab ID: 2307131-001 **Collection Date:** 7/11/2023 10:30:00 AM
Client Sample ID: **MW-6-230711** **Matrix:** Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Total Alkalinity by SM 2320B				Batch ID: R85364		Analyst: ME
Alkalinity, Total (As CaCO3)	334	2.50		mg/L	1	7/18/2023 2:08:42 PM

Lab ID: 2307131-002 **Collection Date:** 7/11/2023 11:40:00 AM
Client Sample ID: **MW-10-230711** **Matrix:** Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Total Alkalinity by SM 2320B				Batch ID: R85364		Analyst: ME
Alkalinity, Total (As CaCO3)	249	2.50		mg/L	1	7/18/2023 2:08:42 PM

Work Order: 2307131
CLIENT: Friedman & Bruya
Project: 307093

QC SUMMARY REPORT

Total Alkalinity by SM 2320B

Sample ID: **MB-R85364** SampType: **MBLK** Units: **mg/L** Prep Date: **7/18/2023** RunNo: **85364**
Client ID: **MBLKW** Batch ID: **R85364** Analysis Date: **7/18/2023** SeqNo: **1781185**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Alkalinity, Total (As CaCO3)	ND	2.50									

Sample ID: **LCS-R85364** SampType: **LCS** Units: **mg/L** Prep Date: **7/18/2023** RunNo: **85364**
Client ID: **LCSW** Batch ID: **R85364** Analysis Date: **7/18/2023** SeqNo: **1781186**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Alkalinity, Total (As CaCO3)	114	2.50	100.0	0	114	83.8	121				

Sample ID: **2307131-001ADUP** SampType: **DUP** Units: **mg/L** Prep Date: **7/18/2023** RunNo: **85364**
Client ID: **MW-6-230711** Batch ID: **R85364** Analysis Date: **7/18/2023** SeqNo: **1781188**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Alkalinity, Total (As CaCO3)	341	2.50						334.0	2.02	20	

Fremont Analytical
An Alliance Technical Group Company

Sample Log-In Check List

Client Name:	FB	Work Order Number:	2307131
Logged by:	Morgan Wilson	Date Received:	7/12/2023 3:25:00 PM

Chain of Custody

1.	Is Chain of Custody complete?	Yes ☑	No ☐	Not Present ☐
2.	How was the sample delivered?	Client		

Log In

3.	Custody Seals present on shipping container/cooler? (Refer to comments for Custody Seals not intact)	Yes ☐	No ☐	Not Present ☑
4.	Was an attempt made to cool the samples?	Yes ☑	No ☐	NA ☐
5.	Were all items received at a temperature of >2°C to 6°C *	Yes ☑	No ☐	NA ☐
6.	Sample(s) in proper container(s)?	Yes ☑	No ☐	
7.	Sufficient sample volume for indicated test(s)?	Yes ☑	No ☐	
8.	Are samples properly preserved?	Yes ☑	No ☐	
9.	Was preservative added to bottles?	Yes ☐	No ☑	NA ☐
10.	Is there headspace in the VOA vials?	Yes ☐	No ☐	NA ☑
11.	Did all samples containers arrive in good condition(unbroken)?	Yes ☑	No ☐	
12.	Does paperwork match bottle labels?	Yes ☑	No ☐	
13.	Are matrices correctly identified on Chain of Custody?	Yes ☑	No ☐	
14.	Is it clear what analyses were requested?	Yes ☑	No ☐	
15.	Were all holding times able to be met?	Yes ☑	No ☐	

Special Handling (if applicable)

16. Was client notified of all discrepancies with this order? Yes ☐ No ☐ NA ☑

Person Notified:		Date:	
By Whom:		Via:	☐ eMail ☐ Phone ☐ Fax ☐ In Person
Regarding:			
Client Instructions:			

17. Additional remarks:

Item Information

Item #	Temp ºC
Sample	5.8

* Note: DoD/ELAP and TNI require items to be received at 4°C +/- 2°C

SUBCONTRACT SAMPLE CHAIN OF CUSTODY

2307131

Send Report To Michael Erdahl

Company Friedman and Bruya, Inc.

Address 3012 16th Ave W

City, State, ZIP Seattle, WA 98119

Phone # (206) 285-8282 merdahl@friedmanandbruya.com

SUBCONTRACTER

PROJECT NAME/NO.	PO #
307093	D-363

REMARKS

Please Email Results

TURNAROUND TIME

X Standard TAT

RUSH

Rush charges authorized by:

SAMPLE DISPOSAL

Dispose after 30 days

Return samples

Will call with instructions

Sample ID	Lab ID	Date Sampled	Time Sampled	Matrix	# of jars	ANALYSES REQUESTED: Dioxins/Furans	EPH	VPH	Alkalinity						Notes
MW-6-230711		7/11/23	1030	W	1				X						
MW-10-230711		7/11/23	1140	W	1				X						

Friedman & Bruya, Inc.
3012 16th Avenue West
Seattle, WA 98119-2029
Ph. (206) 285-8282
Fax (206) 283-5044

	SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by:		Michael Erdahl	Friedman & Bruya	7/12/23	
Received by:		Alaina Bash	FAI	7/12	1525
Relinquished by:					
Received by:					

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

James E. Bruya, Ph.D.
Yelena Aravkina, M.S.
Michael Erdahl, B.S.
Vineta Mills, M.S.
Eric Young, B.S.

5500 4th Avenue South
Seattle, WA 98108
(206) 285-8282
fbi@isomedia.com
www.friedmanandbruya.com

January 16, 2024

Matthew Lewis, Project Manager
Aspect Consulting, LLC
710 2nd Ave S, Suite 550
Seattle, WA 98104

Dear Mr Lewis:

Included is the amended report from the testing of material submitted on October 27, 2023 from the Crownhill Elementary 100094, F&BI 310523 project. The total arsenic reporting limit has been lowered to 1 ug/L to be consistent with the site's historic reporting limit.

We appreciate this opportunity to be of service to you and hope you will call if you have any questions.

Sincerely,

FRIEDMAN & BRUYA, INC.

Michael Erdahl
Project Manager

Enclosures
c: Aspect Data
ASP1107R.DOC

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

James E. Bruya, Ph.D.
Yelena Aravkina, M.S.
Michael Erdahl, B.S.
Vineta Mills, M.S.
Eric Young, B.S.

5500 4th Avenue South
Seattle, WA 98108
(206) 285-8282
fbi@isomedia.com
www.friedmanandbruya.com

November 7, 2023

Matthew Lewis, Project Manager
Aspect Consulting, LLC
710 2nd Ave S, Suite 550
Seattle, WA 98104

Dear Mr Lewis:

Included are the results from the testing of material submitted on October 27, 2023 from the Crownhill Elementary 100094, F&BI 310523 project. There are 26 pages included in this report. Any samples that may remain are currently scheduled for disposal in 30 days, or as directed by the Chain of Custody document. If you would like us to return your samples or arrange for long term storage at our offices, please contact us as soon as possible.

We appreciate this opportunity to be of service to you and hope you will call if you have any questions.

Sincerely,

FRIEDMAN & BRUYA, INC.

Michael Erdahl
Project Manager

Enclosures
c: Aspect Data
ASP1107R.DOC

CASE NARRATIVE

This case narrative encompasses samples received on October 27, 2023 by Friedman & Bruya, Inc. from the Aspect Consulting, LLC Crownhill Elementary 100094, F&BI 310523 project. Samples were logged in under the laboratory ID's listed below.

Laboratory ID	Aspect Consulting, LLC
310523 -01	Mckinney-102623
310523 -02	MW-12-102623
310523 -03	MW-10-102623
310523 -04	MW-6-102623
310523 -05	MW-9-102623
310523 -06	MW-15-102623
310523 -07	Trip Blank

Samples MW-12-102623, MW-10-102623, MW-6-102623, MW-9-102623, and MW-15-102623 were sent to Fremont Analytical for alkalinity analyses. The report is enclosed.

All quality control requirements were acceptable.

Date of Report: 11/07/23
Date Received: 10/27/23
Project: Crownhill Elementary 100094, F&BI 310523
Date Extracted: 10/30/23
Date Analyzed: 10/30/23

RESULTS FROM THE ANALYSIS OF WATER SAMPLES FOR TOTAL PETROLEUM HYDROCARBONS AS DIESEL AND MOTOR OIL USING METHOD NWTPH-Dx

Results Reported as ug/L (ppb)

Sample ID Laboratory ID	Diesel Range (C_{10}-C_{25})	Motor Oil Range (C_{25}-C_{36})	Surrogate (% Recovery) (Limit 50-150)
MW-12-102623 310523-02	2,100 x	880 x	125
MW-10-102623 310523-03	58 x	<250	137
MW-15-102623 310523-06	67 x	<250	134
Method Blank 03-2590 MB	<50	<250	103

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	MW-12-102623	Client:	Aspect Consulting, LLC
Date Received:	10/27/23	Project:	Crownhill Elementary 100094, F&BI 310523
Date Extracted:	11/01/23	Lab ID:	310523-02
Date Analyzed:	11/01/23	Data File:	310523-02.129
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	1.61
Iron	613

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	MW-12-102623	Client:	Aspect Consulting, LLC
Date Received:	10/27/23	Project:	Crownhill Elementary 100094, F&BI 310523
Date Extracted:	11/01/23	Lab ID:	310523-02 x100
Date Analyzed:	11/02/23	Data File:	310523-02 x100.044
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Manganese	5,260

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	MW-10-102623	Client:	Aspect Consulting, LLC
Date Received:	10/27/23	Project:	Crownhill Elementary 100094, F&BI 310523
Date Extracted:	11/01/23	Lab ID:	310523-03
Date Analyzed:	11/01/23	Data File:	310523-03.135
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	1.53
Iron	2,530

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	MW-10-102623	Client:	Aspect Consulting, LLC
Date Received:	10/27/23	Project:	Crownhill Elementary 100094, F&BI 310523
Date Extracted:	11/01/23	Lab ID:	310523-03 x100
Date Analyzed:	11/02/23	Data File:	310523-03 x100.058
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Manganese	1,410

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	MW-6-102623	Client:	Aspect Consulting, LLC
Date Received:	10/27/23	Project:	Crownhill Elementary 100094, F&BI 310523
Date Extracted:	11/01/23	Lab ID:	310523-04
Date Analyzed:	11/01/23	Data File:	310523-04.136
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	23.9

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	MW-6-102623	Client:	Aspect Consulting, LLC
Date Received:	10/27/23	Project:	Crownhill Elementary 100094, F&BI 310523
Date Extracted:	11/01/23	Lab ID:	310523-04 x100
Date Analyzed:	11/02/23	Data File:	310523-04 x100.059
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Iron	8,770
Manganese	1,940

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	MW-9-102623	Client:	Aspect Consulting, LLC
Date Received:	10/27/23	Project:	Crownhill Elementary 100094, F&BI 310523
Date Extracted:	11/01/23	Lab ID:	310523-05
Date Analyzed:	11/01/23	Data File:	310523-05.137
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	<1
Iron	177
Manganese	1.97

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	MW-15-102623	Client:	Aspect Consulting, LLC
Date Received:	10/27/23	Project:	Crownhill Elementary 100094, F&BI 310523
Date Extracted:	11/01/23	Lab ID:	310523-06
Date Analyzed:	11/01/23	Data File:	310523-06.138
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	1.19
Iron	129
Manganese	<1

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	Method Blank	Client:	Aspect Consulting, LLC
Date Received:	NA	Project:	Crownhill Elementary 100094, F&BI 310523
Date Extracted:	11/01/23	Lab ID:	I3-869 mb
Date Analyzed:	11/01/23	Data File:	I3-869 mb.110
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	<1
Iron	<50
Manganese	<1

Analysis For Total Metals By EPA Method 6020B

Client ID:	MW-12-102623	Client:	Aspect Consulting, LLC
Date Received:	10/27/23	Project:	Crownhill Elementary 100094, F&BI 310523
Date Extracted:	10/30/23	Lab ID:	310523-02 x2
Date Analyzed:	10/30/23	Data File:	310523-02 x2.161
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	1.89

Analysis For Total Metals By EPA Method 6020B

Client ID:	MW-10-102623	Client:	Aspect Consulting, LLC
Date Received:	10/27/23	Project:	Crownhill Elementary 100094, F&BI 310523
Date Extracted:	10/30/23	Lab ID:	310523-03 x2
Date Analyzed:	10/30/23	Data File:	310523-03 x2.167
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	1.62

Analysis For Total Metals By EPA Method 6020B

Client ID:	MW-6-102623	Client:	Aspect Consulting, LLC
Date Received:	10/27/23	Project:	Crownhill Elementary 100094, F&BI 310523
Date Extracted:	10/30/23	Lab ID:	310523-04 x2
Date Analyzed:	10/30/23	Data File:	310523-04 x2.168
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	25.7

Analysis For Total Metals By EPA Method 6020B

Client ID:	MW-9-102623	Client:	Aspect Consulting, LLC
Date Received:	10/27/23	Project:	Crownhill Elementary 100094, F&BI 310523
Date Extracted:	10/30/23	Lab ID:	310523-05 x2
Date Analyzed:	10/30/23	Data File:	310523-05 x2.169
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	<1

Analysis For Total Metals By EPA Method 6020B

Client ID:	MW-15-102623	Client:	Aspect Consulting, LLC
Date Received:	10/27/23	Project:	Crownhill Elementary 100094, F&BI 310523
Date Extracted:	10/30/23	Lab ID:	310523-06 x2
Date Analyzed:	10/30/23	Data File:	310523-06 x2.170
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	1.28

Analysis For Total Metals By EPA Method 6020B

Client ID:	Method Blank	Client:	Aspect Consulting, LLC
Date Received:	NA	Project:	Crownhill Elementary 100094, F&BI 310523
Date Extracted:	10/30/23	Lab ID:	I3-863 mb
Date Analyzed:	10/30/23	Data File:	I3-863 mb.114
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	<1

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	Mckinney-102623	Client:	Aspect Consulting, LLC
Date Received:	10/27/23	Project:	Crownhill Elementary 100094, F&BI 310523
Date Extracted:	11/02/23	Lab ID:	310523-01
Date Analyzed:	11/02/23	Data File:	110225.D
Matrix:	Water	Instrument:	GCMS11
Units:	ug/L (ppb)	Operator:	LM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	110	78	126
Toluene-d8	96	84	115
4-Bromofluorobenzene	101	72	130

Compounds:	Concentration ug/L (ppb)
Trichloroethene	<0.5

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	MW-10-102623	Client:	Aspect Consulting, LLC
Date Received:	10/27/23	Project:	Crownhill Elementary 100094, F&BI 310523
Date Extracted:	11/02/23	Lab ID:	310523-03
Date Analyzed:	11/02/23	Data File:	110226.D
Matrix:	Water	Instrument:	GCMS11
Units:	ug/L (ppb)	Operator:	LM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	110	78	126
Toluene-d8	93	84	115
4-Bromofluorobenzene	94	72	130

Compounds:	Concentration ug/L (ppb)
Trichloroethene	<0.5

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	MW-9-102623	Client:	Aspect Consulting, LLC
Date Received:	10/27/23	Project:	Crownhill Elementary 100094, F&BI 310523
Date Extracted:	11/02/23	Lab ID:	310523-05
Date Analyzed:	11/02/23	Data File:	110227.D
Matrix:	Water	Instrument:	GCMS11
Units:	ug/L (ppb)	Operator:	LM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	105	78	126
Toluene-d8	97	84	115
4-Bromofluorobenzene	99	72	130

Compounds:	Concentration ug/L (ppb)
Trichloroethene	9.5

Analysis For Volatile Compounds By EPA Method 8260D Dual Acquisition

Client Sample ID:	Method Blank	Client:	Aspect Consulting, LLC
Date Received:	Not Applicable	Project:	Crownhill Elementary 100094, F&BI 310523
Date Extracted:	11/02/23	Lab ID:	03-2573 mb
Date Analyzed:	11/02/23	Data File:	110208.D
Matrix:	Water	Instrument:	GCMS11
Units:	ug/L (ppb)	Operator:	LM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	107	78	126
Toluene-d8	92	84	115
4-Bromofluorobenzene	97	72	130

Compounds:	Concentration ug/L (ppb)
Trichloroethene	<0.5

Date of Report: 11/07/23
Date Received: 10/27/23
Project: Crownhill Elementary 100094, F&BI 310523

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER SAMPLES FOR TOTAL PETROLEUM HYDROCARBONS AS DIESEL EXTENDED USING METHOD NWTPH-Dx

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
Diesel Extended	ug/L (ppb)	2,500	100	100	65-151	0

Date of Report: 11/07/23
Date Received: 10/27/23
Project: Crownhill Elementary 100094, F&BI 310523

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER SAMPLES FOR DISSOLVED METALS USING EPA METHOD 6020B

Laboratory Code: 310523-02 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Arsenic	ug/L (ppb)	10	1.61	94	92	75-125	2
Iron	ug/L (ppb)	100	613	158 b	143 b	75-125	10 b
Manganese	ug/L (ppb)	20	5,360	2510 b	1490 b	75-125	51 b

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Arsenic	ug/L (ppb)	10	92	80-120
Iron	ug/L (ppb)	100	89	80-120
Manganese	ug/L (ppb)	20	92	80-120

Date of Report: 11/07/23
Date Received: 10/27/23
Project: Crownhill Elementary 100094, F&BI 310523

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER SAMPLES FOR TOTAL METALS USING EPA METHOD 6020B

Laboratory Code: 310516-04 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Arsenic	ug/L (ppb)	10	1.48	99	101	75-125	2

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Arsenic	ug/L (ppb)	10	92	80-120

Date of Report: 11/07/23
Date Received: 10/27/23
Project: Crownhill Elementary 100094, F&BI 310523

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER SAMPLES FOR VOLATILES BY EPA METHOD 8260D

Laboratory Code: 310563-02 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Acceptance Criteria
Trichloroethene	ug/L (ppb)	10	<0.5	102	35-149

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
Trichloroethene	ug/L (ppb)	10	104	102	70-130	2

Data Qualifiers & Definitions

a - The analyte was detected at a level less than five times the reporting limit. The RPD results may not provide reliable information on the variability of the analysis.

b - The analyte was spiked at a level that was less than five times that present in the sample. Matrix spike recoveries may not be meaningful.

ca - The calibration results for the analyte were outside of acceptance criteria, biased low; or, the calibration results for the analyte were outside of acceptance criteria, biased high, with a detection for the analyte in the sample. The value reported is an estimate.

c - The presence of the analyte may be due to carryover from previous sample injections.

cf - The sample was centrifuged prior to analysis.

d - The sample was diluted. Detection limits were raised and surrogate recoveries may not be meaningful.

dv - Insufficient sample volume was available to achieve normal reporting limits.

f - The sample was laboratory filtered prior to analysis.

fb - The analyte was detected in the method blank.

fc - The analyte is a common laboratory and field contaminant.

hr - The sample and duplicate were reextracted and reanalyzed. RPD results were still outside of control limits. Variability is attributed to sample inhomogeneity.

hs - Headspace was present in the container used for analysis.

ht – The analysis was performed outside the method or client-specified holding time requirement.

ip - Recovery fell outside of control limits due to sample matrix effects.

j - The analyte concentration is reported below the standard reporting limit. The value reported is an estimate.

J - The internal standard associated with the analyte is out of control limits. The reported concentration is an estimate.

jl - The laboratory control sample(s) percent recovery and/or RPD were out of control limits. The reported concentration should be considered an estimate.

js - The surrogate associated with the analyte is out of control limits. The reported concentration should be considered an estimate.

k – The calibration results for the analyte were outside of acceptance criteria, biased high, and the analyte was not detected in the sample.

lc - The presence of the analyte is likely due to laboratory contamination.

L - The reported concentration was generated from a library search.

nm - The analyte was not detected in one or more of the duplicate analyses. Therefore, calculation of the RPD is not applicable.

pc - The sample was received with incorrect preservation or in a container not approved by the method. The value reported should be considered an estimate.

ve - The analyte response exceeded the valid instrument calibration range. The value reported is an estimate.

vo - The value reported fell outside the control limits established for this analyte.

x - The sample chromatographic pattern does not resemble the fuel standard used for quantitation.

310523

SAMPLE CHAIN OF CUSTODY

10/27/23 VW2/C2/J3

Page # 1 of 1

Report To Matthew Lewis

Company Aspect Consulting

Address

City, State, ZIP Seattle

Phone 404-210-6437 Email Matthew.Lewis@aspectconsulting.com

SAMPLERS (*signature*) Carmen Tappen

PROJECT NAME Crownhill Elementary

PO # 100094

REMARKS

Project specific RLs? - Yes / No

INVOICE TO

TURNAROUND TIME
☒ Standard turnaround
☐ RUSH
Rush charges authorized by:

SAMPLE DISPOSAL
☐ Archive samples
☐ Other
Default: Dispose after 30 days

Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	NWTPH-Dx	NWTPH-Gx	BTEX EPA 8021	NWTPH-HCID	VOCs EPA 8260	PAHs EPA 8270	PCBs EPA 8082	Total Arsenic	Dissolved As, Fe, Mn	Alkalinity	TCE EDA Prod	Notes
						ANALYSES REQUESTED											
Mckinney - 102623	01 A-C	10/26/23	1405	W	3											X	
MW-12-102623	02 A-D		1340		4	X							X	X	X		
MW-10-102623	03 A-G		1235		7	X							X	X	X	X	
MW-6-102623	04 A-C		1110		3								X	X	X		
MW-9-102623	05 A-F		0950		6								X	X	X	X	
MW-15-102623	06 A-D	↓	1440	↓	4	X							X	X	X		
Trip Blank	07 A-B	-	-	water	2												Added at lab (AP) 10/27
							Samples received at 4 °C										

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by: Carmen Tappen	Carmen Tappen	Aspect Consulting	10/26/23	1230
Received by:	VINH	FBI	10-27-23	1230
Relinquished by:				
Received by:				

Friedman & Bruya, Inc.
Ph. (206) 285-8282

APPENDIX D

Soil Gas Survey Field Forms

Crownhill Elementary Cleanup
Soil Gas Data Sheet

Aspect CONSULTING

Well ID: MW-5
Date & Time: 4/5/23 0812

Field Personnel: CMT

Baro. Pressure (in Hg): 29.93
Probe Pressure (" wc): -0.00
Total Casing Volume (L): 67
Probe Diameter (in): 2
Top of Screen (ft TOC): 108
Depth to Water (ft TOC): 116.37
Total Depth (ft TOC): 133

Rising or falling? Steady at 29.99 "H_2O, Falling later today.

Screen submerged? No

Casing Volume Purged	Volume Purged (L)	Purge Rate (L/min)	Purge Time (s)	CH_4 (%volume)	CO_2 (%volume)	O_2 (%volume)	CO (ppm)	H_2S (ppm)	Bal (%volume)
0	0	0	0	0.0	0.2	21.3	0	0	78.5
0.25	16.7	5	3.33 200	0.0	0.2	21.3	0	0	78.5
0.50	33.4	5	6.66 400	0.0	0.3	21.3	0	0	78.4
0.75	50.0	5	10 600	0.0	0.7	20.4	0	0	79.0
1.00	66.7	5	11.25 801	0.0	7.4	6.2	0	0	86.4
1.25	83.4	5	16.66 1001	0.0	7.9	5.4	0	0	86.6
1.50	100.1	5	20 1201	0.0	8.1	5.2	0	0	86.7
1.75	116.8	5	23.35 1401	0.0	8.3	4.9	0	0	86.8
2.00	133.4	5	26.66 1601	0.0	8.4	4.8	0	0	86.9
2.25	150.1	5	30 1801	0.0	8.5	4.6	0	0	86.9
2.50	166.8	5	33.3 2002	0.0	8.5	4.6	0	0	86.9
2.75	183.5	5	36.7 2202	0.0	8.6	4.5	0	0	87.0
3.00	200.2	5	40.0 2402	0.0	8.6	4.4	0	0	87.0

Comments: No water in monument. No LNAPL

Crownhill Elementary Cleanup
Soil Gas Data Sheet

Aspect CONSULTING

Well ID: MW-6
Date & Time: 4/5/23 1050

Field Personnel: CMT

Baro. Pressure (in Hg): 29.97
Probe Pressure (" wc): -0.01
Total Casing Volume (L): 72
Probe Diameter (in): 2
Top of Screen (ft TOC): 116
Depth to Water (ft TOC): 124.65
Total Depth (ft TOC): 136.17

Rising or falling? Should be falling over course of the day.

Screen submerged? No

Casing Volume Purged	Volume Purged (L)	Purge Rate (L/min)	Purge Time (s)	CH_4 (%volume)	CO_2 (%volume)	O_2 (%volume)	CO (ppm)	H_2S (ppm)	Bal (%volume)
0	0	0	0	0.0	0.2	20.7	0	0	79.2
0.25	17.9	5	3.58 215	0.0	0.1	20.8	0	0	79.1
0.50	35.9	5	7.18 431	0.0	0.1	20.8	0	0	79.1
0.75	53.8	5	10.7 646	0.0	0.1	20.8	0	0	79.1
1.00	71.8	5	14.35 861	0.0	0.1	20.8	0	0	79.0
1.25	89.7	5	17.951077	0.0	0.1	20.9	0	0	79.0
1.50	107.7	5	21.5 1292	0.0	0.1	20.9	0	1	79.0
1.75	125.6	5	25.121507	0.0	0.2	20.9	0	1	78.9
2.00	143.5	5	28.7 1722	0.0	1.8	19.2	0	1	79.0
2.25	161.5	5	32.31938	0.0	3.2	16.9	0	1	79.9
2.50	179.4	5	35.82153	0.0	3.8	15.8	1	1	80.3
2.75	197.4	5	39.402368	0.0	4.3	15.0	1	0	80.7
3.00	215.3	5	43.02584	0.0	4.7	14.4	1	0	80.9

Comments: no water in monument. No LNAPL

Crownhill Elementary Cleanup
Soil Gas Data Sheet

Aspect CONSULTING

Well ID: MW-8
Date & Time: 4/6/23 0826

Field Personnel: CMT

Baro. Pressure (in Hg): 29.66
Probe Pressure (" wc): 0.13
Total Casing Volume (L): 62
Probe Diameter (in): 2
Top of Screen (ft TOC): 100
Depth to Water (ft TOC): ~106-107
Total Depth (ft TOC): 120

Rising or falling? Falling throughout the day.

Screen submerged? No

*LNAPL ~105

Casing Volume Purged	Volume Purged (L)	Purge Rate (L/min)	Purge Time (s)	CH_4 (%volume)	CO_2 (%volume)	O_2 (%volume)	CO (ppm)	H_2S (ppm)	Bal (%volume)
0	0	0	0	0.0	0.1	20.6	0	0	79.2
0.25	15.4	5	3.08 185	0.1	9.0	6.4	0	0	90.5
0.50	30.9	5	6.18 371	0.1	9.4	0.0	0	0	90.5
0.75	46.3	5	9.26 556	0.1	9.4	0.0	0	0	90.5
1.00	61.8	5	12.35 741	0.1	9.4	0.0	0	0	90.5
1.25	77.2	5	15.45 927	0.1	9.4	0.0	0	0	90.5
1.50	92.7	5	18.51 1112	0.1	9.4	0.0	0	0	90.5
1.75	108.1	5	21.60 1297	0.1	9.4	0.0	0	0	90.5
2.00	123.6	5	24.74 1483	0.1	9.4	0.0	0	0	90.5
2.25	139.0	5	27.81 1668	0.1	9.4	0.0	0	0	90.5
2.50	154.4	5	30.91 1853	0.1	9.4	0.0	0	0	90.5
2.75	169.9	5	33.98 2039	0.1	9.4	0.0	0	0	90.5
3.00	185.3	5	37.08 2224	0.1	9.4	0.0	0	0	90.5

Comments: No water in monument. LNAPL present.

Crownhill Elementary Cleanup
Soil Gas Data Sheet

Aspect CONSULTING

Well ID: MW-9
Date & Time: 4/5/23 0909

Field Personnel: CMT

Baro. Pressure (in Hg):	29.94
Probe Pressure (" wc):	-0.00
Total Casing Volume (L):	66
Probe Diameter (in):	2
Top of Screen (ft TOC):	107
Depth to Water (ft TOC):	113.52
Total Depth (ft TOC):	126.6

Rising or falling? Falling over the course of today

Screen submerged? NO

Casing Volume Purged	Volume Purged (L)	Purge Rate (L/min)	Purge Time (s)	CH_4 (%volume)	CO_2 (%volume)	O_2 (%volume)	CO (ppm)	H_2S (ppm)	Bal (%volume)
0	0	0	0	0.0	0.3	18.0	0.3	0	79.0
0.25	16.5	5	3.3 198	0.0	0.3	21.1	0	0	78.7
0.50	32.9	5	6.58 395	0.0	0.3	21.0	0	0	78.7
0.75	49.4	5	9.8 593	0.0	1.3	18.7	0	0	80.1
1.00	65.9	5	13.1 790	0.0	6.2	9.0	0	0	84.7
1.25	82.3	5	16.4 988	0.0	6.3	8.9	0	0	84.7
1.50	98.8	5	19.75 1185	0.0	6.4	8.8	0	0	84.8
1.75	115.2	5	23.05 1383	0.0	6.5	8.7	0	0	84.8
2.00	131.7	5	26.35 1581	0.0	6.6	8.6	0	0	84.8
2.25	148.2	5	29.60 1778	0.0	6.6	8.5	0	0	84.9
2.50	164.6	5	32.9 1976	0.0	6.7	8.4	0	0	84.9
2.75	181.1	5	36.2 2173	0.0	6.7	8.4	0	0	84.9
3.00	197.6	5	39.5 2371	0.0	6.7	8.3	0	0	85.0

Comments: no water in monument. NO LNAPL.

Crownhill Elementary Cleanup
Soil Gas Data Sheet

Aspect CONSULTING

Well ID: MW-12
Date & Time: 4/5/23 1157

Field Personnel: CMT

Baro. Pressure (in Hg): 29.97
Probe Pressure (" wc): 0.02
Total Casing Volume (L): 58
Probe Diameter (in): 2
Top of Screen (ft TOC): 94
Depth to Water (ft TOC): 113.25
Total Depth (ft TOC): 124

Rising or falling? Should be falling throughout the day.

Screen submerged? No

Casing Volume Purged	Volume Purged (L)	Purge Rate (L/min)	Purge Time (s)	CH_4 (%volume)	CO_2 (%volume)	O_2 (%volume)	CO (ppm)	H_2S (ppm)	Bal (%volume)
0	0	0	0	0.0	0.2	20.7	0	0	79.3
0.25	14.5	5	2.9 174	0.0	10.0	0.0	0	0	90.0
0.50	29.0	5	5.8 348	0.0	10.0	0.0	0	0	90.0
0.75	43.6	5	8.71 523	0.0	10.0	0.0	0	0	90.0
1.00	58.1	5	11.62 697	0.0	10.0	0.0	0	0	90.0
1.25	72.6	5	14.57 871	0.0	10.0	0.0	0	0	90.0
1.50	87.1	5	17.42 1045	0.0	10.0	0.0	0	0	90.0
1.75	101.6	5	20.34 1219	0.0	10.0	0.0	0	0	90.0
2.00	116.1	5	23.23 1394	0.0	9.9	0.0	0	0	90.1
2.25	130.7	5	26.13 1568	0.0	10.0	0.0	0	0	90.1
2.50	145.2	5	29.03 1742	0.0	9.9	0.0	0	0	90.1
2.75	159.7	5	31.93 1916	0.0	9.9	0.0	0	0	90.1
3.00	174.2	5	34.85 2091	0.0	9.9	0.0	0	0	90.1

Comments: Water in monument. Pumped out. NO LNAPL.

Crownhill Elementary Cleanup
Soil Gas Data Sheet

Aspect CONSULTING

Well ID: MW-13
Date & Time: 4/5/23 1325

Field Personnel: CMT

Baro. Pressure (in Hg): 29.94
Probe Pressure (" wc): ~~0~~ 0.10
Total Casing Volume (L): 58
Probe Diameter (in): 2
Top of Screen (ft TOC): 94
Depth to Water (ft TOC): ~112
Total Depth (ft TOC): 124

Rising or falling? ~~Steady~~ Steady, should be falling throughout the day.

Screen submerged? NO

Maybe 3-4' of LNAPL? Hard to tell.

Casing Volume Purged	Volume Purged (L)	Purge Rate (L/min)	Purge Time (s)	CH_4 (%volume)	CO_2 (%volume)	O_2 (%volume)	CO (ppm)	H_2S (ppm)	Bal (%volume)
0	0	0	0	0.0	0.3	18.4	0	0	88.1
0.25	14.5	5	2.9 174	0.4	9.4	0.0	0	1	90.2
0.50	29.0	5	5.8 348	0.4	9.2	0.2	0	0	90.2
0.75	43.6	5	8.72 523	0.4	8.8	1.1	0	0	89.7
1.00	58.1	5	11.61 697	0.4	8.5	1.9	0	0	89.3
1.25	72.6	5	14.5 871	0.3	8.3	2.5	0	0	89.0
1.50	87.1	5	17.4 1045	0.3	8.0	3.0	0	0	88.7
1.75	101.6	5	20.3 1219	0.3	7.9	3.3	0	0	88.5
2.00	116.1	5	23.23 1394	0.3	7.6	3.8	0	0	88.3
2.25	130.7	5	26.13 1568	0.2	7.5	3.9	0	0	88.3
2.50	145.2	5	29.0 1742	0.2	7.4	4.1	0	0	88.2
2.75	159.7	5	31.93 1916	0.2	7.3	4.4	0	0	88.1
3.00	174.2	5	34.83 2091	0.2	7.1	4.7	0	0	88.0

Comments: LNAPL present in well.

Crownhill Elementary Cleanup
Soil Gas Data Sheet

Aspect CONSULTING

Well ID: MW-15
Date & Time: 4/5/23 1000

Field Personnel: CMT

Baro. Pressure (in Hg): 29.96
Probe Pressure (" wc): 0.02
Total Casing Volume (L): 58
Probe Diameter (in): 2
Top of Screen (ft TOC): 93
Depth to Water (ft TOC): *
Total Depth (ft TOC): 123.19

Rising or falling? Should be falling during course of the day.

Screen submerged? NO

* water table below top of dedicated pump. Top of pump at 115.73' bgs.

Casing Volume Purged	Volume Purged (L)	Purge Rate (L/min)	Purge Time (s)	CH_4 (%volume)	CO_2 (%volume)	O_2 (%volume)	CO (ppm)	H_2S (ppm)	Bal (%volume)
0	0	0	0	0.0	0.2	20.1	0	0	79.4
0.25	14.4	5	2.88 173	0.0	0.2	20.6	0	0	79.2
0.50	28.8	5	5.4 345	0.0	0.2	20.7	0	0	79.1
0.75	43.2	5	8.0 518	0.0	1.8	15.7	0	0	81.9
1.00	57.6	5	11.5 691	0.0	6.1	4.8	0	0	81.9
1.25	72.0	5	14.4 864	0.0	6.2	4.9	0	0	88.9
1.50	86.4	5	17.2 1036	0.0	6.1	4.9	0	0	88.9
1.75	100.7	5	20.1 1209	0.0	6.1	5.0	0	0	88.9
2.00	115.1	5	23.0 1382	0.0	6.1	5.0	0	0	88.9
2.25	129.5	5	25.9 1554	0.0	6.1	5.0	0	0	88.9
2.50	143.9	5	28.7 1727	0.0	6.1	5.0	0	0	88.9
2.75	158.3	5	31.6 1900	0.0	6.1	5.0	0	0	88.9
3.00	172.7	5	34.5 2073	0.0	6.1	5.1	0	0	88.9

Comments: no water in monument. No LNAPL.

Crownhill Elementary Cleanup
Soil Gas Data Sheet

Aspect CONSULTING

Well ID: MW-16
Date & Time: 4/5/23 1421

Field Personnel: CMT

Baro. Pressure (in Hg): 29.96
Probe Pressure (" wc): 0.07
Total Casing Volume (L): 58
Probe Diameter (in): 2
Top of Screen (ft TOC): 94
Depth to Water (ft TOC): ~103
Total Depth (ft TOC): 124

Rising or falling? Steady

Screen submerged? No

2-3 ft of LNAPL? Hard to tell.

Casing Volume Purged	Volume Purged (L)	Purge Rate (L/min)	Purge Time (s)	CH_4 (%volume)	CO_2 (%volume)	O_2 (%volume)	CO (ppm)	H_2S (ppm)	Bal (%volume)
0	0	0	0	0.0	0.1	20.4	0	0	79.5
0.25	14.5	5	2.9 174	0.0	7.8	2.1	0	0	90.1
0.50	29.0	5	5.8 348	0.0	7.8	2.0	0	0	90.2
0.75	43.6	5	8.72 523	0.0	7.8	2.0	0	0	90.2
1.00	58.1	5	11.61 697	0.0	7.8	2.0	0	0	90.2
1.25	72.6	5	14.5 871	0.0	7.8	2.0	0	0	90.2
1.50	87.1	5	17.4 1045	0.0	7.8	2.0	0	0	90.2
1.75	101.6	5	20.3 1219	0.0	7.8	2.0	0	0	90.2
2.00	116.1	5	23.23 1394	0.0	7.8	1.9	0	0	90.2
2.25	130.7	5	26.13 1568	0.0	7.8	1.9	0	0	90.2
2.50	145.2	5	29.0 1742	0.0	7.8	1.9	0	0	90.2
2.75	159.7	5	31.93 1916	0.0	7.8	1.9	0	0	90.2
3.00	174.2	5	34.85 2091	0.0	7.8	1.9	0	0	90.2

Comments: no water in monument. LNAPL present.

Crownhill Elementary Cleanup
Soil Gas Data Sheet

Aspect CONSULTING

Well ID: EW-17
Date & Time: 4/6/23 0940

Field Personnel: CMT

Baro. Pressure (in Hg): 29.64
Probe Pressure (" wc): 0.09
Total Casing Volume (L): 248
Probe Diameter (in): 4
Top of Screen (ft TOC): 101
Depth to Water (ft TOC): ~114-113
Total Depth (ft TOC): 120.5

Rising or falling? Falling throughout the day

Screen submerged? No

*LNAPL @ ~111.5 ft dgs.

Casing Volume Purged	Volume Purged (L)	Purge Rate (L/min)	Purge Time (s)	CH_4 (%volume)	CO_2 (%volume)	O_2 (%volume)	CO (ppm)	H_2S (ppm)	Bal (%volume)
0	0	0	0	0.0	0.1	20.6	0	0	79.2
0.25	62.1	5	12.42745	~~0.5~~ 0.5	~~9.9~~ 9.7	~~1.4~~ 1.3	0	0	88.2
0.50	124.2	5	24.81490	0.5	9.7	1.3	0	10	88.5
0.75	186.3	5	37.52235	0.6	9.7	1.2	0	11	88.5
1.00	248.3	5	49.62980	0.5	9.7	1.2	0	10	88.6
1.25	310.4	5 1'42	62.03725	0.5	10.0	0.5	0	8	89.1
1.50	372.5	5 1'14:45	74.5 4470	0.5	10.2	0.0	0	7	89.3
1.75	434.6	5 1'26:55	86.95215	0.5	10.3	0.0	0	7	89.3
2.00	496.7	5 1'39:20	99.3 5960	0.5	10.2	0.0	0	6	89.3
2.25	558.8	5 1'51:45	111.75 6705	0.5	10.2	0.0	0	6	89.3
2.50	620.9	5 2'4:10	124.167450	0.5	10.2	0.0	0	6	89.3
2.75	683.0	5 2'16:35	136.588195	0.5	10.2	0.0	1	6	89.3
3.00	745.0	5 2'29:0	149 8940	0.5	10.2	0.0	0	6	89.3

Comments: No water above NTOC. LNAPL Present

APPENDIX E

Tree Removal Efforts

Photo 1. Trees prior to removal.

Photo 2. Close up of the roots.

Photo 3. Close up of the trunk.

Photo 4. Damage to the sidewalk.

Photo 5. Contractor grinding the stumps.

Photo 6. Close up of stump grinding.

Photo 7. Ground conditions after tree removal.

From: Atkins, Vance (ECY)
To: Matthew Lewis (Aspect)
Cc: John Fisher; Shivjiani, Dhroov (ECY)
Subject: RE: Notice of Planned Tree Removal
Date: Friday, March 10, 2023 9:28:07 AM

Good morning,
Thank you for providing notification in accordance with the covenant. Please let us know if there are any significant observations or deviations from the described work.
Thanks,

Vance Atkins, LG, LHG
Hydrogeologist 4
Toxics Cleanup Program, NWRO
WA State Department of Ecology
425-324-1438 Mobile
206-594-0000 Main

From: Matthew Lewis <mlewis@aspectconsulting.com>
Sent: Thursday, March 9, 2023 2:06 PM
To: Atkins, Vance (ECY) <VATK461@ECY.WA.GOV>
Cc: John Fisher <john.fisher@bremertonschools.org>
Subject: Notice of Planned Tree Removal

Hi Vance,

I hope you're doing well.

John Fisher, the BSD Facility Administrator, is looking to remove a couple decorative trees at Crownhill Elementary to prevent them from damaging the sidewalks in front of the school. This area is within the Environmental Covenant Soil and Structure Prohibitions, see attached map and photos. BSD plans to hire a contractor who will cut them down, grind the stumps down to no more than 8 inches below ground surface and replace them with shrubs. Any removed soil will be replaced with clean, appropriate soil. This will ensure that the soil is not disturbed below 12 inches. BSD will comply with the stipulations in the Agreed Order. They are hoping to complete the work next week (March 13-17th).

In conformance with Section 2.a. of the Environmental Covenant (also attached for your reference), this email is intended to serve as notification of invasive work limited to the top 1-foot depth in the Covenant Area. Aspect has also advised the BSD of the requirements that the work be supervised by the Facilities Supervisor and workers be notified of subsurface conditions. We anticipate that little soil will be generated with the work.

Please let us know if you have any questions or want to discuss further. We welcome your feedback on this.

Thanks,

Matthew M. Lewis, LHG (he/him) | Project Hydrogeologist | Direct: 206.812.4745 | Cell: 206.353.6617
Aspect Consulting LLC | 710 2nd Ave, Suite 550, Seattle 98104 | www.aspectconsulting.com

Due to COVID and my remote work situation, I may be responding to emails at hours outside of a typical work day. Please feel free to respond during your workday.

APPENDIX F

Report Limitations and Guidelines for Use

REPORT LIMITATIONS AND USE GUIDELINES

Reliance Conditions for Third Parties

This report was prepared for the exclusive use of the Client. No other party may rely on this report or the product of our services without the express written consent of Aspect Consulting, LLC (Aspect). This limitation is to provide our firm with reasonable protection against liability claims by third parties with whom there would otherwise be no contractual conditions or limitations and guidelines governing their use of the report. Within the limitations of scope, schedule and budget, our services have been executed in accordance with our Agreement with the Client and recognized standards of professionals in the same locality and involving similar conditions.

Services for Specific Purposes, Persons and Projects

Aspect has performed the services in general accordance with the scope and limitations of our Agreement. This report has been prepared for the exclusive use of the Client and their authorized third parties, approved in writing by Aspect. This report is not intended for use by others, and the information contained herein is not applicable to other properties.

This report is not, and should not, be construed as a warranty or guarantee regarding the presence or absence of hazardous substances or petroleum products that may affect the subject property. The report is not intended to make any representation concerning title or ownership to the subject property. If real property records were reviewed, they were reviewed for the sole purpose of determining the subject property's historical uses. All findings, conclusions, and recommendations stated in this report are based on the data and information provided to Aspect, current use of the subject property, and observations and conditions that existed on the date and time of the report.

Aspect structures its services to meet the specific needs of our clients. Because each environmental study is unique, each environmental report is unique, prepared solely for the specific client and subject property. This report should not be applied for any purpose or project except the purpose described in the Agreement.

This Report Is Project-Specific

Aspect considered a number of unique, project-specific factors when establishing the Scope of Work for this project and report. You should not rely on this report if it was:

- Not prepared for you
- Not prepared for the specific purpose identified in the Agreement
- Not prepared for the specific real property assessed
- Completed before important changes occurred concerning the subject property, project or governmental regulatory actions

If changes are made to the project or subject property after the date of this report, Aspect should be retained to assess the impact of the changes with respect to the conclusions contained in the report.

Geoscience Interpretations

The geoscience practices (geotechnical engineering, geology, and environmental science) require interpretation of spatial information that can make them less exact than other engineering and natural science disciplines. It is important to recognize this limitation in evaluating the content of the report. If you are unclear how these "Report Limitations and Use Guidelines" apply to your project or site, you should contact Aspect.

Discipline-Specific Reports Are Not Interchangeable

The equipment, techniques and personnel used to perform an environmental study differ significantly from those used to perform a geotechnical or geologic study and vice versa. For that reason, a geotechnical engineering or geologic report does not usually address any environmental findings, conclusions or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. Similarly, environmental reports are not used to address geotechnical or geologic concerns regarding the subject property.

Environmental Regulations Are Not Static

Some hazardous substances or petroleum products may be present near the subject property in quantities or under conditions that may have led, or may lead, to contamination of the subject property, but are not included in current local, state or federal regulatory definitions of hazardous substances or petroleum products or do not otherwise present potential liability. Changes may occur in the standards for appropriate inquiry or regulatory definitions of hazardous substance and petroleum products; therefore, this report has a limited useful life.

Property Conditions Change Over Time

This report is based on conditions that existed at the time the study was performed. The findings and conclusions of this report may be affected by the passage of time (for example, Phase I ESA reports are applicable for 180 days), by events such as a change in property use or occupancy, or by natural events, such as floods, earthquakes, slope failure or groundwater fluctuations. If more than six months have passed since issuance of our report, or if any of the described events may have occurred following the issuance of the report, you should contact Aspect so that we may evaluate whether changed conditions affect the continued reliability or applicability of our conclusions and recommendations.

Historical Information Provided by Others

Aspect has relied upon information provided by others in our description of historical conditions and in our review of regulatory databases and files. The available data does not provide definitive information with regard to all past uses, operations or incidents affecting the subject property or adjacent properties. Aspect makes no warranties or guarantees regarding the accuracy or completeness of information provided or compiled by others.