2018 ANNUAL REPORT

Remedy Implementation
Crownhill Elementary School Site

Prepared for: Bremerton School District

Project No. 100094-006-01 • January 22, 2019 Final

Aspect CONSULTING

earth + water

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1 Introduction

1.1 General

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 non-aqueous-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 (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 offsite 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 sub-slab 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* (Aspect, 2015a)
- *LNAPL Removal Work Plan* (Aspect, 2015b)
- *Cover System Inspection and Maintenance Plan* (Aspect, 2015c)

[1] Requirements for sampling sub-slab soil vapor are specified in the *Cover System Inspection and Maintenance Plan* (Aspect, 2015a). Sub-slab soil vapor sampling was last conducted in November 2015, and is next required in November 2020. If sub-slab 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, 2015a).

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 2017 (Aspect, 2016 through Aspect, 2018) are referenced in Section 7 of this report. This report documents activities completed in 2018.

1.2 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 (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 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.

2 Routine Activities Completed in 2018

This section documents routine cleanup-related activities completed by BSD during the 2018 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

2.1.1 Groundwater Monitoring

Semiannual groundwater monitoring was conducted on April 5 and October 26, 2018, in general accordance with the requirements of the *Groundwater/LNAPL Monitoring and Contingency Plan* (Aspect, 2015a). Well locations are shown on Figure 1. Table 1 identifies which Site wells are included in the monitoring program, which of those wells contain LNAPL, and the specific COCs analyzed in groundwater samples collected from the wells that do not contain LNAPL. Monitoring results for the non-LNAPL wells are summarized in Table 2. Recent results (going back to December 2013) are included in Table 2; refer to the RI report (Aspect, 2014a) 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, dated April 13 and November 5, 2018, are provided in Appendix G.

Groundwater cleanup levels are 500 micrograms per liter (µg/L) for diesel- and motor-oil-range TPH, and 5 µg/L for TCE and total arsenic. Well MW-10 is the conditional point of compliance for achieving these cleanup levels. This well has been sampled on 19 occasions through October 2018, and arsenic is the only COC detected in any of those sampling rounds. Well MW-6, the only well with arsenic cleanup level exceedances since early 2012,[4] is located approximately 130 feet upgradient of MW-10 and serves as a sentinel well for dissolved contaminant plume migration. The *Groundwater/LNAPL Monitoring and Contingency Plan* (Aspect, 2015a) specifies contingency actions that will be taken if arsenic

[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.

[4] As shown on Figure 2, the arsenic cleanup level was also exceeded at MW-10 the first two times it was sampled following its installation in December 2011. Arsenic at MW-10 has been consistently below its cleanup level in the last 15 monitoring rounds.

is detected above 40 µg/L at MW-6 or above 4.5 µg/L at MW-10. Neither of these concentration limits was exceeded in 2018.

Figure 2 shows arsenic concentrations measured at MW-6 and MW-10 since those wells were installed. Concentrations at MW-6 exhibited an increasing trend through the April 2016 monitoring round. More recent results have fluctuated widely, and while the April 2018 result (29.7 µg/L) was the highest concentration measured to date, a significantly lower concentration (23.0 µg/L) was measured in the October 2018 round. The cause(s) of arsenic concentration fluctuation at MW-6 is unknown.

The arsenic concentrations measured at MW-10 in 2018 continue the "slow but steady" decreasing concentration trend observed at that well over the previous 3 years. The concentration of 1.8 µg/L measured in October 2018 is the lowest detection to date at that well.

Well MW-9 is the only well with TCE cleanup level exceedances. While the TCE concentration detected at this well has increased somewhat over the last three monitoring rounds (from 6.8 µg/L in October 2017 to 7.9 µg/L in October 2018), those three results are the lowest TCE detections to date at MW-9, suggesting an overall downward concentration trend over time.

Well MW-15 is located immediately downgradient of the LNAPL area and serves as a sentinel well for TPH plume migration.[5] Diesel-range TPH was detected at this well in the April monitoring round at a concentration of 53 ug/L (just above the 50 ug/L detection limit), but was not detected in the October round. This is just the second time diesel-range TPH has been detected at MW-15; the only previous detection was in November 2012 (an estimated 70 ug/L). Consistent with previous rounds, motor-oil-range TPH was not detected at MW-15 in either 2018 round.

For the past several years, TPH in the diesel and motor oil ranges has been measured on just an annual basis at wells MW-5 and MW-12. The diesel-range TPH concentration of 2,600 ug/L measured at MW-5 in 2018 is the second-highest detection to date at that well (2,900 ug/L was measured in 2012), and the motor-oil-range TPH concentration (1,100 ug/L) is the highest. TPH concentrations measured at MW-12 in 2018 were within the range of previous detections. TPH concentrations at both wells remain above the corresponding groundwater cleanup levels.

Water samples collected from the McKinney domestic well (sampled in both 2018 monitoring rounds) 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.

2.1.2 LNAPL Thickness Monitoring

LNAPL thickness monitoring was conducted concurrent with groundwater monitoring in April and October 2018. 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 2018

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

ranged from 0.70 feet in MW-14 (April measurement) to 3.25 feet in MW-16 (October measurement).

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 2018, 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 4 plots cumulative LNAPL removal on an annual basis. With an estimated total of 8.83 liters of LNAPL bailed, 2018 is the most productive year to date for LNAPL removal. Since bailing began in 2012, an estimated total of nearly 22 liters of LNAPL have been removed.

2.3 Site Inspections

Semiannual Site inspections were conducted on June 22 and December 4, 2018, 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.

Asphalt repairs were recommended after potholes were observed during the June inspection at three locations in the Bertha Ave NW parking area. Asphalt repairs were completed in July 2018, as documented in Section 3.1. The parking area appeared to be in excellent condition during the December inspection.

The soil/sod cover at Photo Locations 2 through 4 appeared to be in good condition during both inspection events. The 2018 inspections did not identify any cover system deficiencies in other areas of the Site or other action items.

3 Non-Routine Activities Completed in 2018

3.1 Asphalt Repairs in Bertha Avenue NW Parking Area

As noted in Section 2.3, asphalt repairs were recommended after potholes were observed at three locations in the Bertha Ave NW parking area during the June 2018 semiannual Site inspection. BSD coordinated the asphalt repair work, which was completed on July 3, 2018. A maintenance record (Form 2 from the *Cover System Inspection and Maintenance Plan*) is provided in Appendix C along with "before" and "after" photos. Note that, in addition to the three specific pothole locations that were recommended for repair, BSD directed their contractor to make asphalt repairs in other areas of the parking lot as well.

3.2 Installation of New Playground Equipment

In September 2018, BSD installed new play equipment in the Environmental Covenant Areas at the School. The four new pieces of play equipment required that concrete footings be installed at nine locations, to depths ranging from 2.5 to 4.75 feet below ground surface (bgs). The Environmental Covenant for the School property specifies the following when excavating soil from depths greater than one foot bgs within the Environmental Covenant Areas:

- Provide notice to and receive approval from Ecology's project manager prior to performing the work.
- Use only personnel with hazardous waste health and safety training, and notify such personnel of subsurface conditions.

This section describes how soil removal for footing installation was managed to comply with the requirements of the Environmental Covenant.

3.2.1 Pre-Construction Soil Sampling

Aspect prepared a Soil Sampling and Management Plan for Play Equipment Installation (SSMP), which was reviewed and approved by Ecology. The SSMP is provided as Appendix D-1, and Ecology's approval letter as Appendix D-2. As specified in the SSMP, soil samples were collected at all footing locations[6] prior to excavation, to confirm in advance that the soil to be removed did not contain contaminants at concentrations in excess of the soil cleanup levels established in the CAP (Ecology, 2014). This allowed the footing locations to be excavated by the vendor's equipment installer, who was not 40-hour-trained

[6] Bottom-of-footing samples were collected at all locations, and a mid-depth sample was collected at the deepest footing location.

for hazardous waste activities.[7] Soil samples were analyzed for the six metal COCs by EPA Method 6010 and, if there was field evidence of petroleum hydrocarbon contamination at a specific location, for TPH in the diesel and motor oil ranges by Method NWTPH-Dx.

Soil sampling was conducted in two rounds, on April 4 and May 2, 2018.[8] The three figures in Appendix D-3 show soil sampling locations and provide a summary of sampling results. Laboratory reports, dated April 13 and May 14, 2018, are provided in Appendix G.

An old play structure supported by six posts (see Figure D-3.2 in Appendix D-3) was removed from the south playground to make room for the new play equipment. Removal was accomplished by digging around each post to a depth of approximately 6 inches and then cutting the post below grade. The bottom portion of each post was left in place, and soil below 1-foot depth was not disturbed.

3.2.2 Soil Excavation, Profiling, and Disposal

Approximately 11.1 tons of soil were excavated on September 10, 2018, and placed in a roll-off container. Grab samples collected from the bottom of each excavation were composited and the composite sample was submitted for the following analyses, which were required by the disposal facility for waste profiling[9]:

- Volatile compounds by EPA Method 8260
- Semi-volatile compounds by EPA Method 8270
- TCLP metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver) by EPA Method 6020 and 1311
- Polychlorinated biphenyls (PCBs) by EPA Method 8082
- Sulfide by Method SM4500-S2-F

The laboratory report, dated October 23, 2018, is provided in Appendix G. Based on analytical results, the soil was disposed of as non-hazardous waste at the Roosevelt Regional Landfill.

[7] All soil excavation was conducted under the direct supervision of a 40-hour-trained Aspect field technician, in accordance with the SSMP.

[8] The lead concentration at one proposed footing location in the south playground area exceeded the corresponding soil cleanup level. As a result, alternate footing locations were proposed and a second round of soil sampling was conducted.

[9] On two previous occasions when soil excavated from the Site was profiled for landfill disposal (the 2012/2013 soil removal interim action and the 2015 utility line excavation), the disposal facility only required that the soil be analyzed for petroleum hydrocarbons and TCLP lead. When the disposal facility required additional analyses on this occasion, Aspect requested that Ecology provide a letter stating that the Site had been thoroughly investigated and, based on investigation results, COCs in Site soil were limited to those listed in the CAP (Ecology, 2014). Ecology complied with this request; the letter is provided as Appendix E. However, the disposal facility did not reduce their analytical requirements for waste profiling.

4 Completion of Cleanup under Agreed Order

Agreed Order No. DE11107 between Ecology and BSD, which became effective on April 9, 2015, specified actions BSD was required to take to clean up Site contamination. Ecology provided a letter to BSD dated October 15, 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*. A copy of Ecology's letter is included as Appendix F.

5 Statement of Compliance

On behalf of BSD, Aspect certifies that the remedy implementation activities completed at the Site in 2018 complied with the requirements of the CAP, Agreed Order No. DE11107, and the remedy implementation work plans approved by Ecology.

6 Plans for 2019

The following remedy implementation activities are planned for 2019:

- Conduct semiannual rounds of groundwater/LNAPL monitoring and LNAPL removal (scheduled for April and October 2019)[10]
- Conduct semiannual Site inspections (scheduled for June and December 2019)

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

7 References

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.

[10] 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 2018.

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.

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.

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

8 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.

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TABLES

Table 1. 2018 Well Monitoring Program Summary

Project No. 100094-006-01, Crownhill Elementary, Bremerton, Washington

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

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) 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.

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

4) Total arsenic is analyzed for using EPA Method 6010.

5) TCE is analyzed for using EPA Method 8260.

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

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

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

9) 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. 100094-006-01, Crownhill Elementary, Bremerton, Washington

Well ID and Top-of-Casing Elevation[1,2]	Date	Depth to Water (feet below top-of-casing)	Groundwater Elevation (feet)[2]	Constituent of Concern/Concentration[3]			
				Diesel-Range TPH	Motor-Oil-Range TPH	TCE	Total Arsenic
MW-5 136.95 ft	12/18/13	117.36	19.59	**2,100 x**	**750 x**	1.8	1.0
	04/03/14	117.17	19.78	**2,400 x**	**770 x**	na	1.2
	07/01/14	116.23	20.72	**2,000 x**	490 x	na	1.0
	10/13/14	117.56	19.39	**1,300**	260 x	na	1.0
	04/07/15	116.49	20.46	**2,000**	430 x	na	na
	04/05/16	113.41	23.54	**1,800**	**600 x**	na	na
	04/04/17	112.13	24.82	**2,200 x**	**750 x**	na	na
	04/05/18	113.16	23.79	**2,600 x**	**1,100 x**	na	na
MW-6 133.87 ft	12/18/13	124.36	9.51	50 U	250 U	1.0 U	**16.6**
	04/03/14	124.70	9.17	50 U	250 U	na	**20.5**
	07/01/14	124.40	9.47	50 U	250 U	na	**19.9**
	10/13/14	124.54	9.33	50 U	250 U	na	**20.4**
	04/07/15	124.61	9.26	na	na	na	**26.7**
	10/28/15	124.84	9.03	na	na	na	**22.8**
	04/05/16	124.54	9.33	na	na	na	**29.1**
	10/28/16	123.70	10.17	na	na	na	**23.3**
	04/04/17	123.21	10.66	na	na	na	**12.5**
	10/27/17	122.79	11.08	na	na	na	**29.3**
	04/05/18	123.31	10.56	na	na	na	**29.7**
	10/26/18	123.71	10.16	na	na	na	**23.0**
MW-9 134.39 ft	12/17/13	114.49	19.90	110 x	250 U	**11**	1.0 U
	04/03/14	114.35	20.04	210 x	280 x	**11**	1.0 U
	07/01/14	113.44	20.95	180 x	250 U	**12**	1.0 U
	10/13/14	114.71	19.68	180 x	250 U	**10**	1.0 U
	04/07/15	114.50	19.89	na	na	**11**	na
	10/28/15	115.30	19.09	na	na	**10**	na
	04/05/16	110.60	23.79	na	na	**11**	na
	10/28/16	112.35	22.04	na	na	**8.6**	na
	04/04/17	109.23	25.16	na	na	**9.5**	na
	10/27/17	110.58	23.81	na	na	**6.8**	na
	05/02/18	110.35	24.04	na	na	**7.1**	na
	10/26/18	112.98	21.41	na	na	**7.9**	na
MW-10 132.33 ft	12/18/13	120.87	11.46	50 U	250 U	1.0 U	3.3
	04/03/14	121.21	11.12	50 U	250 U	1.0 U	3.9
	07/01/14	120.55	11.78	50 U	250 U	1.0 U	3.0
	10/13/14	121.48	10.85	50 U	250 U	1.0 U	3.0
	04/07/15	120.60	11.73	50 U	250 U	1.0 U	2.8
	10/28/15	121.30	11.03	80 U	400 U	1.0 U	2.7
	04/05/16	119.33	13.00	50 U	250 U	1.0 U	2.6
	10/28/16	120.35	11.98	50 U	250 U	1.0 U	2.6
	04/04/17	118.58	13.75	50 U	250 U	1.0 U	2.2
	10/27/17	119.30	13.03	50 U	250 U	1.0 U	2.1
	04/05/18	122.04	10.29	50 U	250 U	1.0 U	1.9
	10/26/18	120.62	11.71	50 U	250 U	1.0 U	1.8
MW-12 133.87 ft	12/17/13	114.24	19.63	**2,000 x**	**800 x**	1.0 U	1.5
	04/03/14	114.11	19.76	**2,800 x**	**850 x**	na	1.4
	07/01/14	113.17	20.70	**1,800 x**	420 x	na	1.7
	10/13/14	114.45	19.42	**1,600**	250 U	na	1.7
	10/28/15	115.02	18.85	**2,400 x**	**620 x**	na	na
	10/28/16	112.19	21.68	**1,500 x**	**680 x**	na	na
	10/27/17	110.40	23.47	**1,700 x**	**570 x**	na	na
	10/26/18	112.76	21.11	**2,200 x**	**510 x**	na	na
MW-15 133.37 ft	12/17/13	nm[4]	--	50 U	250 U	1.0 U	4.6
	04/03/14	nm[4]	--	50 U	250 U	na	1.2
	07/01/14	nm[4]	--	50 U	250 U	na	1.0 U
	10/13/14	nm[4]	--	50 U	250 U	na	1.1
	04/07/15	nm[4]	--	50 U	250 U	na	na
	10/28/15	nm[4]	--	50 U	250 U	na	na
	04/05/16	109.88	23.49	50 U	250 U	na	na
	10/28/16	111.65	21.72	50 U	250 U	na	na
	04/04/17	109.61	23.76	50 U	250 U	na	na
	10/27/17	109.90	23.47	50 U	250 U	na	na
	04/05/18	109.65	23.72	53 x	250 U	na	na
	10/26/18	nm[4]	--	60 U	300 U	na	na
McKinney (domestic well)	10/6/2014[5]	nm	--	100 U	200 U	0.2 U	0.4
	2/19/2015[5]	nm	--	100 U	200 U	0.2 U	0.4
	6/1/2015[5]	nm	--	100 U	200 U	0.2 U	0.3
	10/28/15	nm	--	na	na	1.0 U	na
	04/05/16	nm	--	na	na	1.0 U	na
	10/28/16	nm	--	na	na	1.0 U	na
	04/04/17	nm	--	na	na	1.0 U	na
	10/27/17	nm	--	na	na	1.0 U	na
	04/04/18	nm	--	na	na	1.0 U	na
	10/26/18	nm	--	na	na	1.0 U	na

na not analyzed
nm not measured
TCE trichloroethene
TPH total petroleum hydrocarbon
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). 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) Sample was collected for analysis by the Kitsap Public Health District and analyzed by Analytical Resources, Inc.

Table 3. LNAPL Thickness Measurements and Removal Summary

Project No. 100094-006-01, 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	nm		
	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	(Note 6)	0.02	(Note 4)
	10/26/18	1.70	0.75	(Note 4)
Cumulative LNAPL Removal			1.43	
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	1.0	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	1.7	0.35	(Note 4)
	10/26/18	2.0	1.05	(Note 4)
Cumulative LNAPL Removal			3.46	
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		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	2.4	1.65	(Note 5)
Cumulative LNAPL Removal			3.24	
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	(Note 6)	0.30	(Note 4)
	10/26/18	3.25	1.55	(Note 5)
Cumulative LNAPL Removal			7.92	

Table 3. LNAPL Thickness Measurements and Removal Summary

Project No. 100094-006-01, Crownhill Elementary, Bremerton, Washington

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	(Note 6)	0.60	(Note 4)
	10/26/18	1.90	1.11	(Note 5)
	Cumulative LNAPL Removal		4.35	
	TOTAL LNAPL REMOVED		**20.4**	**(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.

FIGURES

1724 Dora Avenue NW (Note 2)

North Landfill Area

North Playground

MW-2

Estimated Extent of TPH Cleanup Level Exceedance

Estimated Extent of TCE Cleanup Level Exceedance

BERTHA AVE NW

MW-9

MW-16 (Note 1) MW-14

EW-17 MW-13

MW-12

MW-8

MW-5

MW-15

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

Estimated Extent of Arsenic Cleanup Level Exceedance

ROCKY POINT RD

Bertha Ave NW Parking Area

PORTABLE CLASSROOM BUILDING

MW-4

MW-6

MAIN SCHOOL BUILDING

MW-3

MW-10

South Landfill Area

MW-1

South Playground

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

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.

Other Site Features and Interpretation:

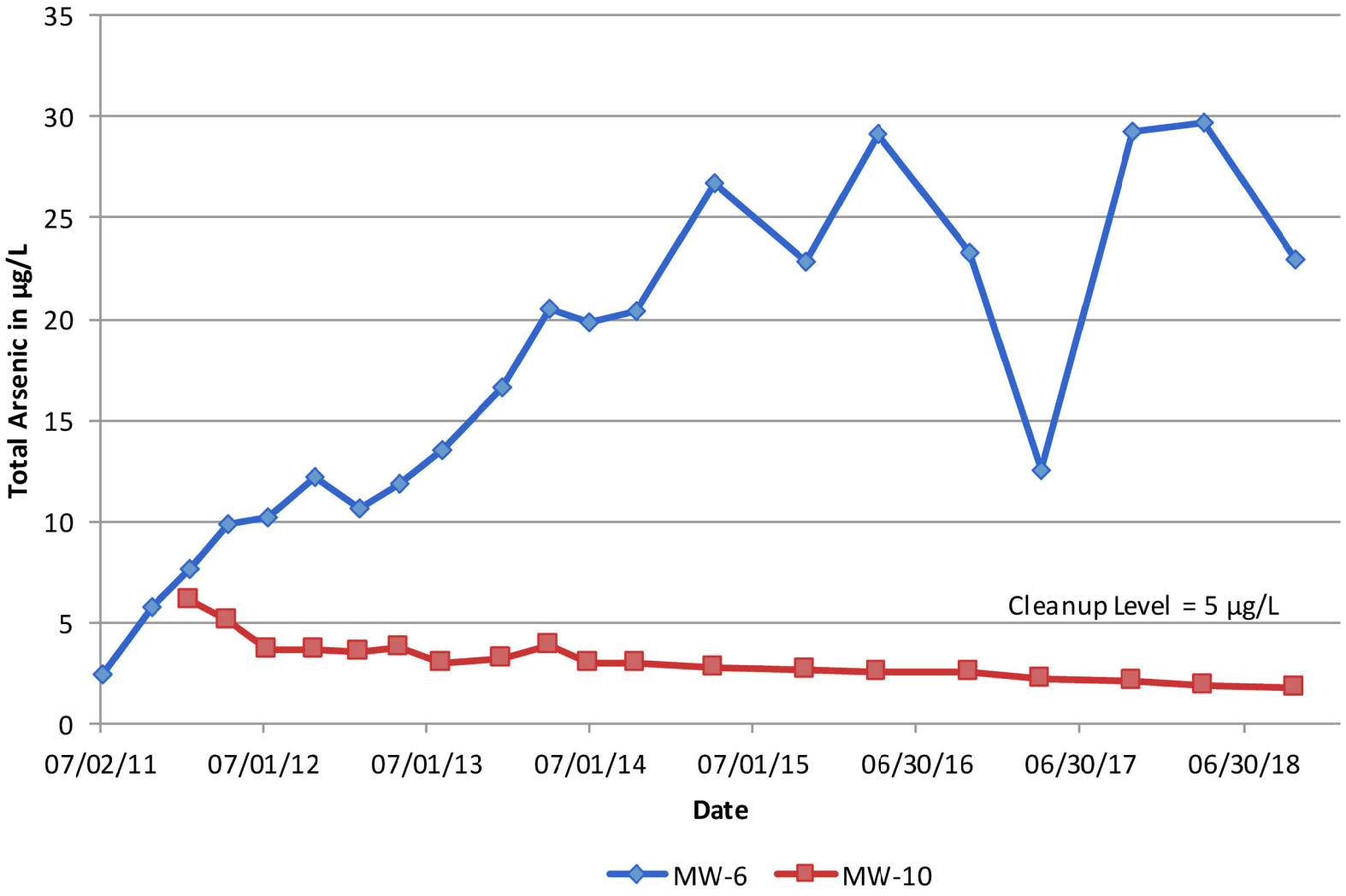
- Interpreted Extent of Landfill Activity
- Estimated Extent of Groundwater Cleanup Level Exceedances in 2014 (Ecology, 2014)
- Bremerton School District Property Boundary
- Bremerton United Methodist Church Property Boundary
- Inferred Direction of Groundwater Flow

Site Plan

2018 Annual Report
Crownhill Elementary
Bremerton, Washington

Aspect Consulting	DEC-2018	BY: DLH / PPW/SCC	FIGURE NO. 1
	PROJECT NO. 100094	REVISED BY: SCC	

GIS Path: T:\projects_8\CrownHillElementary\Delivered\Annual Report 2018\December Update\01 Site Plan.mxd || Coordinate System: NAD 1983 StatePlane Washington North FIPS 4601 Feet || Date Saved: 12/17/2018 || User: scudd || Print Date: 12/17/2018



Notes:

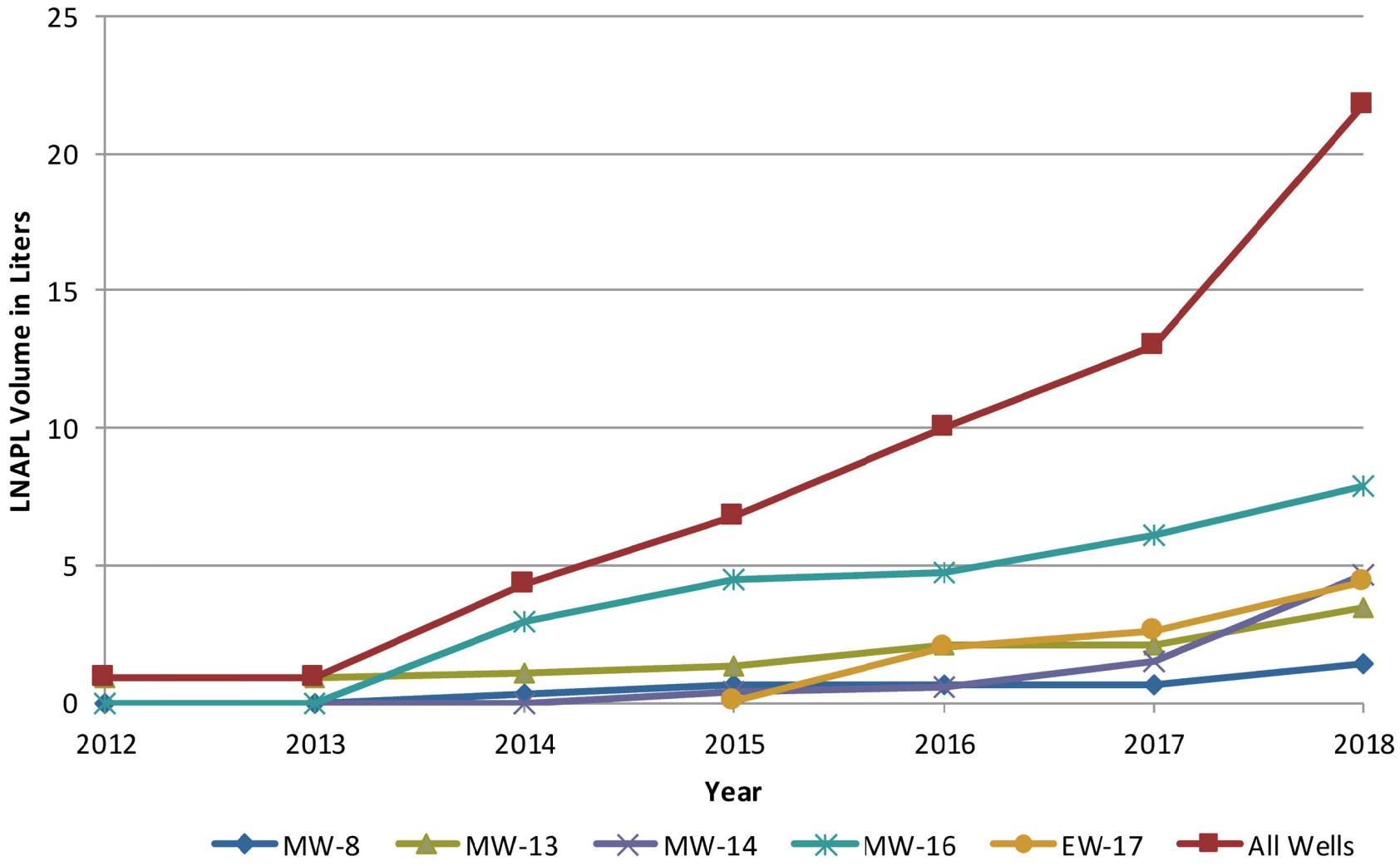
1. Well MW-6, installed in March 2011, provides early warning of potential arsenic migration.
2. Well MW-10, installed in December 2011, is the conditional point of compliance for arsenic in groundwater.

Arsenic in Wells MW-6 and MW-10

2018 Annual Report

Crownhill Elementary, Bremerton, Washington

Aspect Consulting	Dec-2018	BY: DAH/SCC	FIGURE NO. 2
	PROJECT NO. 100094	REVISED BY: -	



Cumulative LNAPL Removal Over Time

2018 Annual Report

Crownhill Elementary, Bremerton, Washington

Aspect CONSULTING	Dec-2018	BY: DAH/SCC	FIGURE NO. 3
	PROJECT NO. 100094	REVISED BY: -	

APPENDIX A

June 2018 Inspection Record and Photos

Aspect CONSULTING

Project Name: **Crownhill Elementary School**

Project No.: 100094

Weather Conditions: Sunny, 60s

Date: 22 June 2018

Inspector's Name: Matthew van der Ahe

Inspector's Signature: [signature]

Inspector's Title/Affiliation: Project Geologist, Aspect Consulting, LLC

FORM 1 - INSPECTION RECORD

INSPECTION ITEM	YES	NO	COMMENTS/NOTES
1. North Environmental Covenant Area			
a. Building or pavement modifications since last inspection?	○	●	
b. Pavement deterioration/damage along Bertha Ave NW?[1]	●	○	Soil visible in bottom of 3 potholes in parking area. See photos.
c. Evidence of soil disturbance?	○	●	
d. Geotextile fabric visible in interim action area?	○	●	
2. South Environmental Covenant Area			
a. Building or pavement modifications since last inspection?	○	●	
b. Evidence of soil disturbance?	○	●	
c. Geotextile fabric visible in interim action areas?	○	●	
3. Other Inspection Items			
a. Are all wells (MW-1 through EW-17) accessible?	●	○	
b. Evidence of well monument damage/tampering?	○	●	
c. HVAC system operates continuously during school day?[2]	●	○	Steve, custodian, says he hears HVAC system switch on every morning

Deficient Action Items & Other Comments: Section 1 of a Cover System Maintenance Record (Form 2) will be completed addressing plans for pothole repair, and the form submitted to Ecology.

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, 6/22/18 site inspection

Photo Location 2, 6/22/18 site inspection

Photo Location 3, 6/22/18 site inspection

Photo Location 4, 6/22/18 site inspection

APPENDIX B

December 2018 Inspection Record and Photos

Aspect CONSULTING

Project Name: **Crownhill Elementary School**

Project No.: 100094

Weather Conditions: Sunny, 40s

Date: 04 December 2018

Inspector's Name: Matthew Lewis

Inspector's Signature: Matthew M. Lewis

Inspector's Title/Affiliation: Staff Geologist, Aspect Consulting, LLC

FORM 1 - INSPECTION RECORD

INSPECTION ITEM	YES	NO	COMMENTS/NOTES
1. North Environmental Covenant Area			
a. Building or pavement modifications since last inspection?	●	○	Potholes have been patched with new asphalt. See photos.
b. Pavement deterioration/damage along Bertha Ave NW?[1]	○	●	
c. Evidence of soil disturbance?	○	●	
d. Geotextile fabric visible in interim action area?	○	●	
2. South Environmental Covenant Area			
a. Building or pavement modifications since last inspection?	○	●	
b. Evidence of soil disturbance?	○	●	
c. Geotextile fabric visible in interim action areas?	○	●	
3. Other Inspection Items			
a. Are all wells (MW-1 through EW-17) accessible?	●	○	
b. Evidence of well monument damage/tampering?	○	●	
c. HVAC system operates continuously during school day?[2]	●	○	System is always circulating air, with heating and cooling as needed.

Deficient Action Items & Other Comments: HVAC system operation confirmed by conversation with custodian on 12/4/2018.

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, 12/4/18 site inspection

Photo Location 1 showing July 2018 asphalt repair area, 12/4/18 site inspection

Photo Location 2, 12/4/18 site inspection

Photo Location 3, 12/4/18 site inspection

Photo Location 4, 12/4/18 site inspection

APPENDIX C

Cover System Maintenance Record and Photos (July 2018 Asphalt Repair)

Aspect CONSULTING

Revision: December 2015

Project Name: **Crownhill Elementary School**

Project No.: 100094

FORM 2 - COVER SYSTEM MAINTENANCE RECORD

Record No.: 2018-01

SECTION 1

Problem Description:

During the routine semi-annual cap inspection on 6/22/18, three potholes in need of repair were observed in the Bertha Ave parking area. See attached photos.

David Herrington at BSD will coordinate pothole repair. The work is expected to be completed in July 2018.

Date Deficiency Observed: 6/22/18

Deficiency Reported By: M. von der Ahe

Photos Attached:
- Potholes_streetview.pdf
- pothole1alt.jpg
- pothole2alt.jpg
- pothole3.jpg

SECTION 2

Maintenance Performed:

The pothole repair work was completed on July 3, 2018. See attached photo. Note that BSD directed the contractor to make asphalt repairs in other areas of the parking lot as well.

Firm Performing Maintenance: Agate Asphalt

Maintenance Start Date: 7/3/18

Maintenance Completion Date: 7/3/18

Photo Attached:
- pothole repair done_3Jul18.jpg

Approved By

Printed Name: David Heffner

Signature: David Heffner

Title/Affiliation: Aspect Consulting, LLC / Associate Engineer

Date: 7/6/18


Potholes in Parking Area
Crownhill Elementary School
Legend
#3 (new)
#2
#1
Dave Heffner
Aspect Consulting, LLC
Google earth
© 2013 Google
7.17 ft

APPENDIX D

September 2018 Playground Equipment Installation

APPENDIX D-1

Soil Sampling and Management Plan for Play Equipment Installation

Soil Sampling and Management Plan for Play Equipment Installation
Crownhill Elementary School Site

Aspect Project No. 100094

Introduction and Background

Bremerton School District (BSD) plans to install new play equipment in the Environmental Covenant Areas at the Crownhill Elementary School Site. Figure 1 shows proposed locations for the four pieces of equipment (a *Rev8* and a *Ropeventure Sky5* in the north playground area, and two *Comet1*'s in the south playground area). An excavator with an auger attachment will be used to remove soil to accommodate concrete footings. Footing detail drawings are provided as Appendix A. Table 1 lists the number of footing holes required at each location and estimates excavation depths and soil quantities to be removed based on the footing detail drawings. A total of nine holes will need to be dug, to depths ranging from approximately 2.5 to 4.75 feet below ground surface (bgs).

Ecology's Cleanup Action Plan (CAP, dated 12/10/14) for the site identifies ten constituents of concern (COCs), including six metals (antimony, arsenic, chromium III, copper, lead, and zinc), total petroleum hydrocarbon (TPH) in the diesel and motor oil ranges, trichloroethene (TCE), and carcinogenic polycyclic aromatic hydrocarbons (cPAHs). During the Remedial Investigation (RI), soil contamination was assessed using a direct-push probe to collect samples over a 50-foot grid pattern at three depth intervals: 0 to 3, 6 to 9, and 12 to 15 feet bgs. Soil samples were analyzed for arsenic, lead, and TPH in the diesel and motor oil ranges, and selected samples were also analyzed for other COCs. Figure 1 shows the six RI sampling locations that are closest to where the play equipment will be installed. Table 2 summarizes sampling results and Appendix B provides boring logs for those six explorations. Table 2 also lists the soil cleanup levels identified in the CAP. Only one sample had a COC detection that exceeded the corresponding cleanup level: the soil sample collected from 6 to 9 feet bgs at location NG-G9 contained lead at a concentration of 277 milligrams per kilogram (mg/kg), which marginally exceeds the soil cleanup level of 250 mg/kg.

The direct contact soil screening level for TPH in the diesel and motor oil ranges is 2,000 mg/kg (same as the soil cleanup level), a concentration that is generally detectable in the field through a combination of visual, olfactory, and photo-ionization detector (PID) monitoring.

The soil cleanup levels for TCE and cPAHs were exceeded in a single sample (SG-J7, 0- to 3-foot depth), which was collected at the location of the 2012 soil removal interim action.

Soil Sampling and Management Strategy to Ensure Compliance with Environmental Covenant

The Environmental Covenant for the school property places restrictions on excavating soil from depths greater than 1 foot bgs within the Environmental Covenant Areas. To comply with the requirements of the Environmental Covenant, Aspect Consulting, LLC (Aspect) proposes to conduct soil sampling at all footing locations prior to excavation, to confirm in advance that the soil to be removed does not exceed MTCA Method A cleanup levels. The proposed sequential steps to complete the work are as follows:

1. BSD will coordinate with the vendor's equipment installer to confirm required excavation depths and clearly mark the footing locations on the ground surface.
2. Aspect will mobilize a small direct-push drill rig with an operator who is 40-hour-trained for hazardous waste activities to collect soil samples at the center of each of the nine footing locations. Table 1 shows the proposed number of samples to be collected and their depths[1]. During drilling, an Aspect field technician will monitor the removed soil for evidence of

[1] Bottom sample depths will correspond to the required footing excavation depths, and may be adjusted based on input from the vendor's equipment installer.

petroleum hydrocarbon contamination[2]. The ten soil samples will be submitted for laboratory analysis of the six metal COCs by EPA Method 6010 and, if there is evidence of petroleum hydrocarbon contamination at that location, for TPH in the diesel and motor oil ranges by Method NWTPH-Dx. Sampling results will be submitted to Ecology prior to footing excavation.

3. If all sampling results are below the soil cleanup levels for the six metal COCs (and for TPH in the diesel and motor oil ranges if analyzed), the footings will be excavated by the vendor's equipment installer (who is not 40-hour-trained for hazardous waste activities) under the direct supervision of an Aspect field technician. Aspect will ensure that excavation occurs only in the locations sampled in Step 2, and extends no deeper than the sample depths. Aspect will mobilize a roll-off container to receive the excavated soil, and will use the soil sampling results to profile the soil for offsite disposal in an appropriate permitted landfill.

If sampling results indicate a cleanup level exceedance, BSD will consult with Ecology, and will likely propose to change the location of that particular piece of play equipment. Steps 1 and 2 would then be repeated for the new equipment location.

Removal of Existing Play Structure from the South Playground

The planned work also includes removal of one play structure from the south playground, to make room for the two new *Comet1'*s. The structure is supported by six posts. Removal will be accomplished by digging around each post to a depth of approximately 6 inches and then cutting the post below grade. The bottom portion of each post will be left in place, and soil below 1-foot depth will not be disturbed. The work will be supervised by BSD's Facilities Supervisor, and workers will be notified of subsurface conditions.

Dave Heffner, P.E.
Aspect Consulting, LLC

Attachments:
Table 1 – Excavation Depth/Volume Estimates and Proposed Pre-Excavation Soil Sampling
Table 2 – Nearby Soil Quality Data from Remedial Investigation
Figure 1 – Site Plan
Appendix A – Play Equipment Footing Detail Drawings
Appendix B – Remedial Investigation Boring Logs

S:\Bremerton School District\Remedy Implementation\2018 Activities\PlayEquip Install\Ecology submittal\SoilMgmtPlan_rev2.doc

[2] Monitoring will include placing soil samples in zip-lock bags and then using a PID to monitor head-space.

Table 1 - Excavation Depth/Volume Estimates and Proposed Pre-Excavation Soil Sampling

Play Equipment Installation, Crownhill Elementary School, Bremerton, Washington

Equipment ID	No. of Footing Holes	Estimated Excavation Depth[1] (ft)	Estimated Soil Quantities			Pre-Excavation Soil Sampling	
			In-Place Volume (CY)	Excavated Volume[2] (CY)	Weight[3] (tons)	No. of Samples for Laboratory Analysis[4]	Sample Depths[1] (ft)
North Playground Area							
Rev8	1	4.75	4.4	5.5	7.0	2	3.0 and 4.75
Ropeventure Sky5	6	3.0	6.0	7.5	9.6	6	3.0
South Playground Area							
Comet1 (2 of these)	2	2.5	1.3	1.6	2.1	2	2.5
Totals	**9**	--	**11.7**	**14.6**	**18.7**	**10**	--

CY cubic yards

Notes:

1) Depth is measured from the soil surface and does not include any overlying layer of wood chips or other resilient material.
2) Excavated soil volume is estimated assuming a 25 percent "swell" factor (i.e., 1.25 x in-place volume).
3) Soil weight is estimated assuming an in-place soil density of 1.6 tons per cubic yard.
4) All soil samples will be analyzed for the six metal COCs by EPA Method 6010. If evidence of petroleum hydrocarbons is observed at any sampling location, samples collected from that location will also be analyzed for total petroleum hydrocarbon in the diesel and motor oil ranges by Method NWTPH-Dx.

Table 2 - Nearby Soil Quality Data from Remedial Investigation

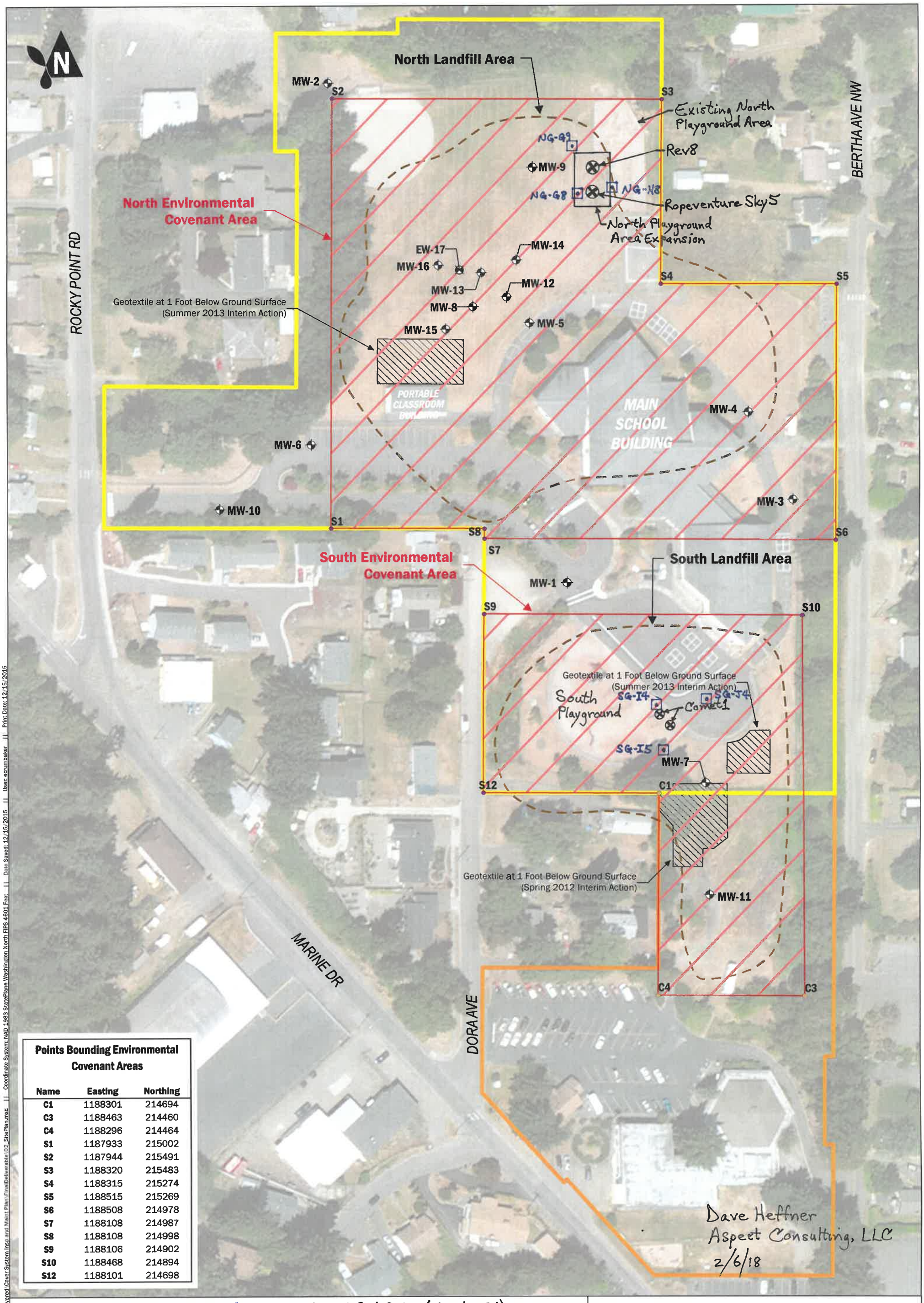
Play Equipment Installation, Crownhill Elementary School, Bremerton, Washington

Sample Location	Sample Depth	Sample Date	Constituent of Concern[1,2]					
			Diesel-Range TPH (mg/kg)	Motor-Oil-Range TPH (mg/kg)	Arsenic (mg/kg)	Lead (mg/kg)	Trichloroethene (mg/kg)	cPAHs TEF[3] (mg/kg)
Site-Specific Soil Cleanup Level[1]			2000	2000	20	250	0.03	0.14
NG-G8	(0 - 3 ft.)	3/24/11	50 U	250 U	1.33	8.17	0.03 U	0.010
NG-G8	(6 - 9 ft.)	3/24/11	50 U	250 U	2.87	7.72	0.03 U	< 0.010
NG-G8	(12 - 15 ft.)	3/24/11	50 U	250 U	1.61	43.9	0.03 U	0.017
NG-G9	(0 - 3 ft.)	3/25/11	50 U	250 U	1.63	3.11	--	--
NG-G9	(6 - 9 ft.)	3/25/11	200 J	1600	6.71	277	--	--
NG-G9	(12 - 15 ft.)	3/25/11	50 U	250 U	1.67	2.51	--	--
NG-H8	(0 - 3 ft.)	3/25/11	50 U	250 U	1.49	3.28	--	--
NG-H8	(6 - 9 ft.)	3/25/11	50 U	250 U	1.29	3.19	--	--
NG-H8	(12 - 15 ft.)	3/25/11	50 U	250 U	1.08	4.23	--	--
SG-I4	(0 - 3 ft.)	3/31/11	50 U	250 U	4.09	109	--	--
SG-I4	(6 - 9 ft.)	3/31/11	50 U	250 U	1 U	1.12	--	--
SG-I4	(12 - 15 ft.)	3/31/11	50 U	250 U	1 U	1 U	--	--
SG-I5	(0 - 3 ft.)	3/30/11	50 U	250 U	1.73	27.8	--	--
SG-I5	(6 - 9 ft.)	3/30/11	50 U	250 U	1 U	1.47	--	--
SG-I5 (Dup)	(6 - 9 ft.)	3/30/11	50 U	250 U	1 U	1.47	--	--
SG-I5	(12 - 15 ft.)	3/30/11	50 U	250 U	1.05	1.65	--	--
SG-J4	(0 - 3 ft.)	3/30/11	50 U	250 U	2.45	92.3	--	--
SG-J4	(6 - 9 ft.)	3/30/11	50 U	250 U	3.51	106	--	--
SG-J4	(12 - 15 ft.)	3/30/11	50 U	250 U	1 U	1.31	--	--

-- sample was not analyzed for this constituent
cPAH carcinogenic polycyclic aromatic hydrocarbon
mg/kg milligrams per kilogram
TEF toxicity equivalency factor
TPH total petroleum hydrocarbon
U not detected at the indicated detection limit

Notes:

1. Constituents of concern and site-specific soil cleanup levels were established in Ecology's Cleanup Action Plan dated December 10, 2014. Red-shading indicates an exceedance of the site-specific soil cleanup level.
2. Constituents of concern not listed in this table (antimony, chromium III, copper, and zinc) were not included in the analyses of any of the listed samples.
3. The cPAHs TEF is calculated from the concentrations of seven cPAHs, using the method described in WAC 173-340-708. Non-detected cPAHs are included in in the calculation at one-half the detection limit.



Points Bounding Environmental Covenant Areas

Name	Easting	Northing
C1	1188301	214694
C3	1188463	214460
C4	1188296	214464
S1	1187933	215002
S2	1187944	215491
S3	1188320	215483
S4	1188315	215274
S5	1188515	215269
S6	1188508	214978
S7	1188108	214987
S8	1188108	214998
S9	1188106	214902
S10	1188468	214894
S12	1188101	214698

Monitoring Well

Extraction Well

Area of Environmental Covenant Soil and Structure Prohibitions

Interpreted Extent of Landfill Activity

NG-G8 RI Direct Push Probe (March 2011)

Proposed Location of New Play Equipment

Bremerton School District Property Boundary

Bremerton United Methodist Church Property Boundary

0 100 200
Feet

Site Plan

Cover System Inspection and Maintenance Plan
Crownhill Elementary, Bremerton, Washington

Aspect CONSULTING

DEC-2015	BY: PPW	FIGURE NO. 1
PROJECT NO. 100094	REV BY: SCC / EAC	

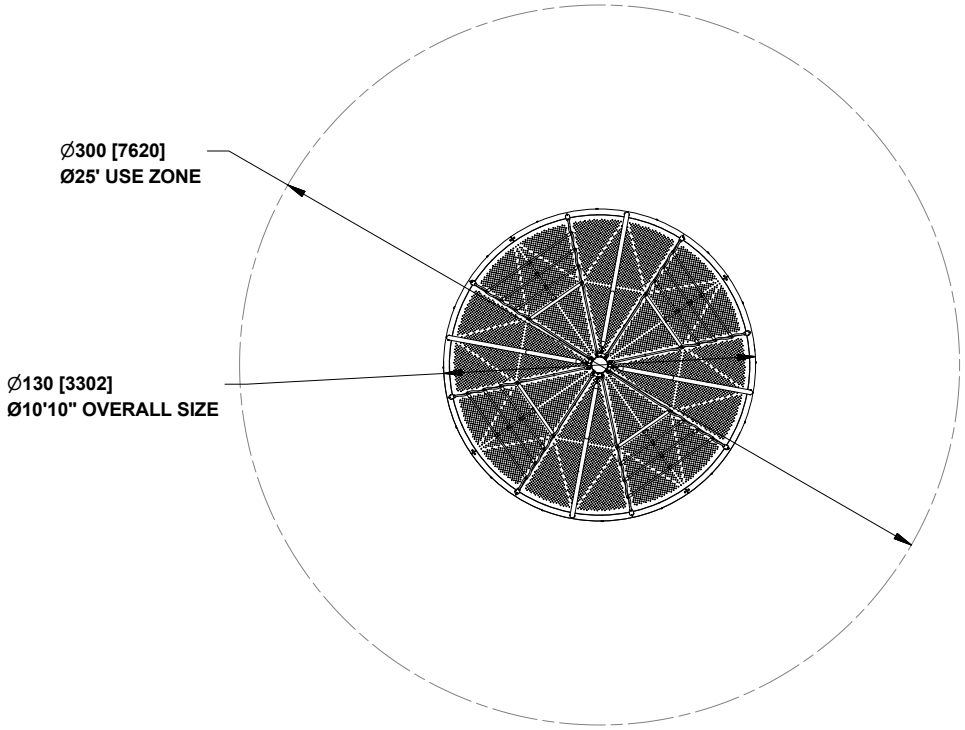
GIS Path: T:\projects_8\CrownHillElementary\Delivered Cover System Insp and Maint Plan\FinalDeliverable\02_SitePlan.mxd || Coordinate System: NAD 1983 StatePlane Washington North FIPS 4601 Feet || Date Saved: 12/15/2015 || User: ecrumbaker || Print Date: 12/15/2015

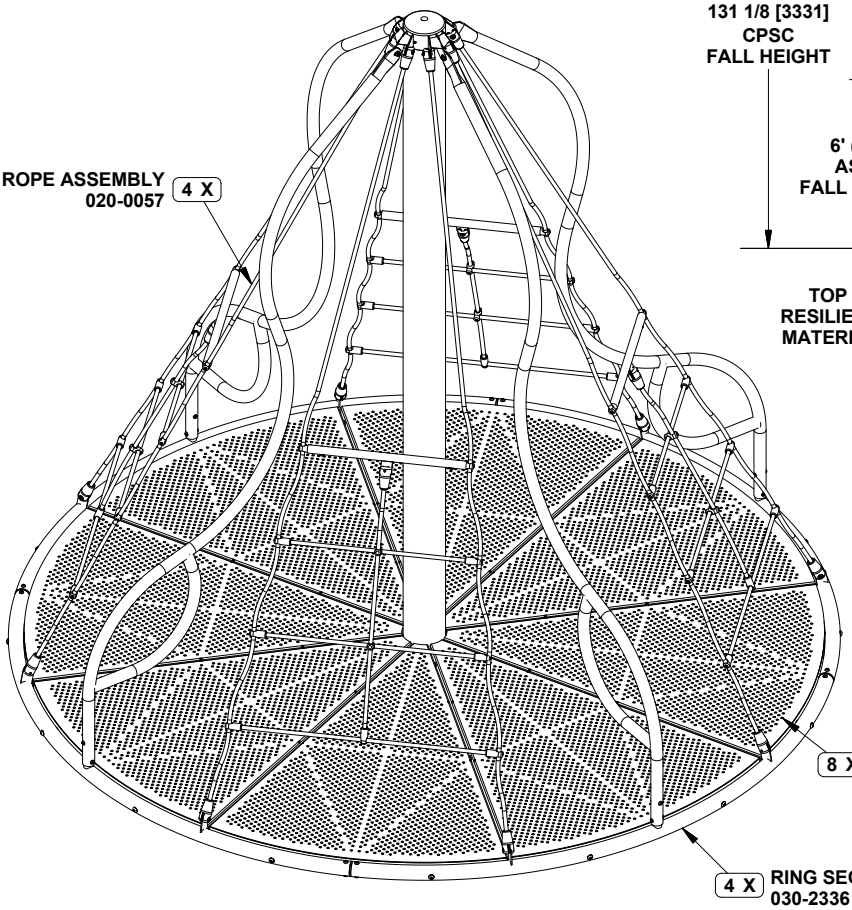
APPENDIX A

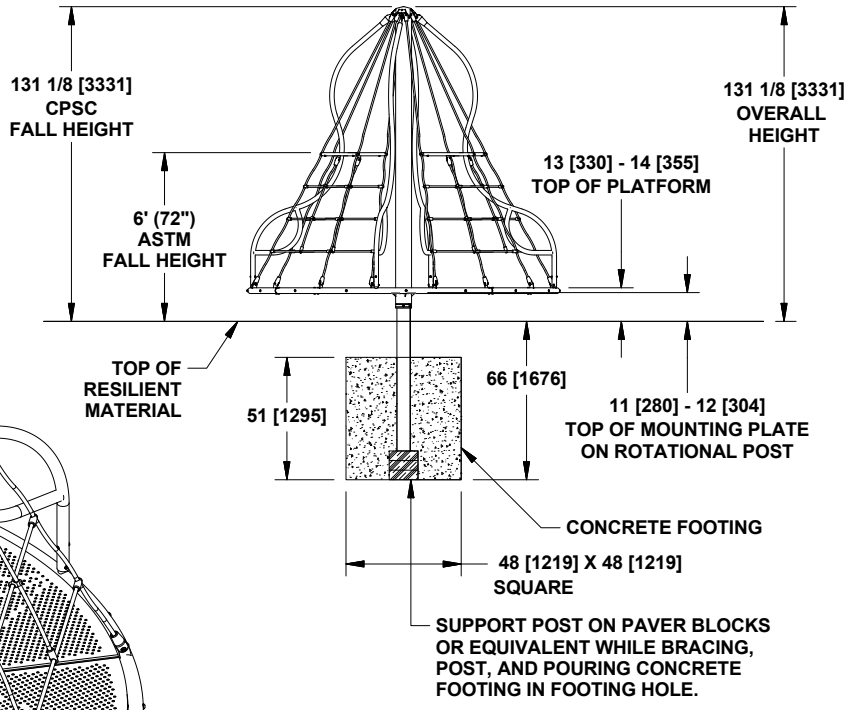
Play Equipment Footing Detail Drawings

Burke

UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE INCHES WITH MILLIMETER EQUIVALENT INSIDE [ ] BRACKETS.



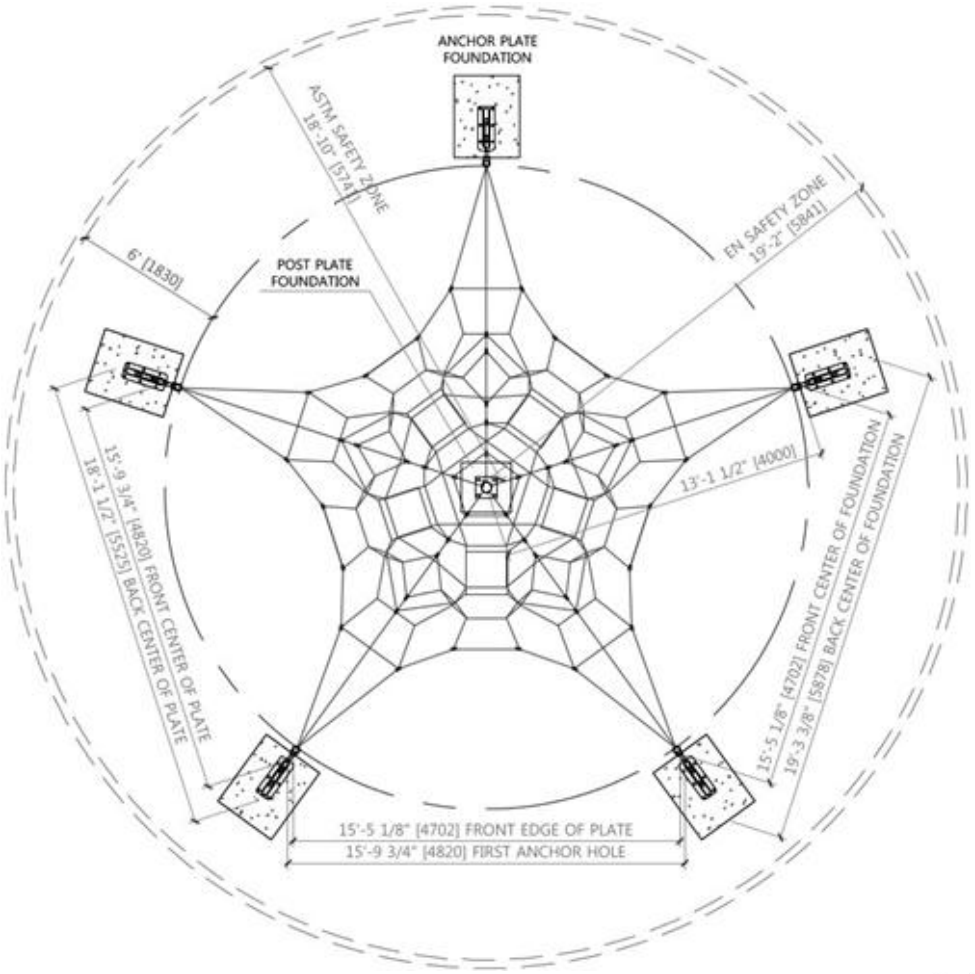




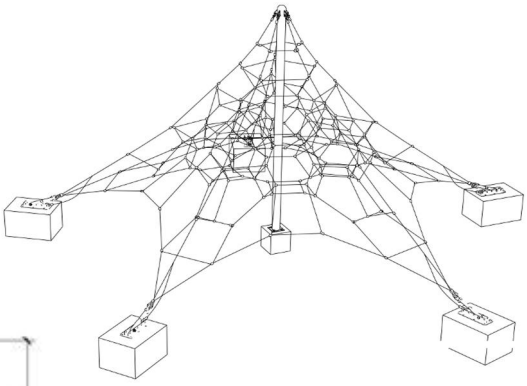
FOOTING ELEVATION VIEW

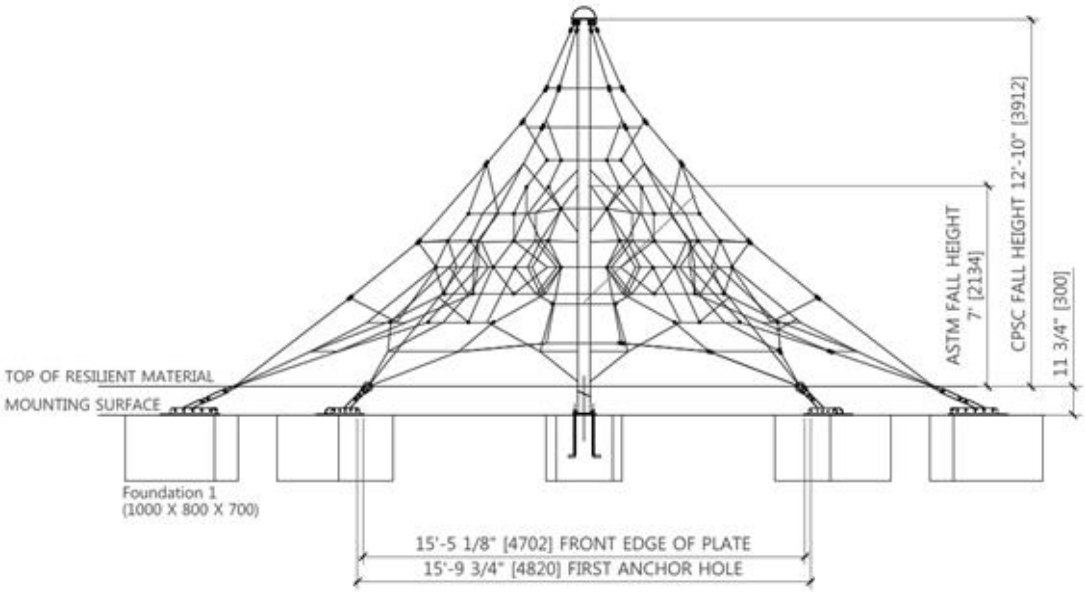
560-0576
REV8

UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE INCHES WITH MILLIMETER EQUIVALENT INSIDE [ ] BRACKETS.



ELEVATION VIEW

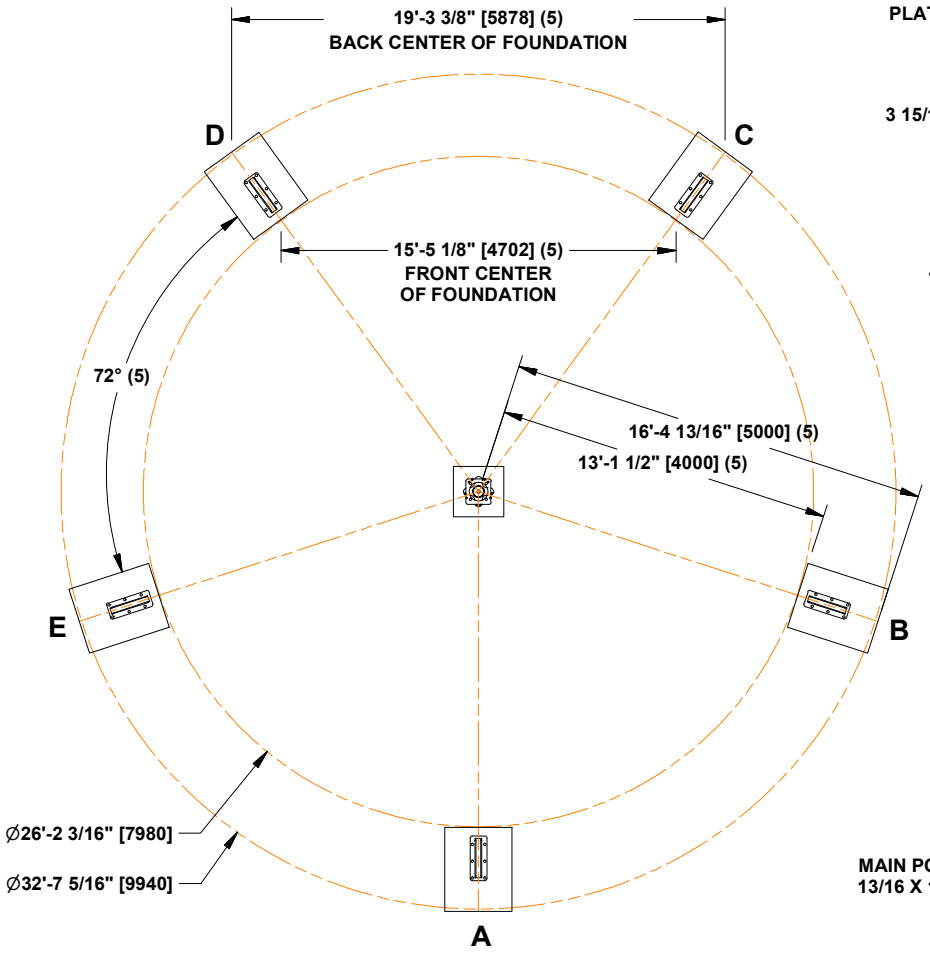




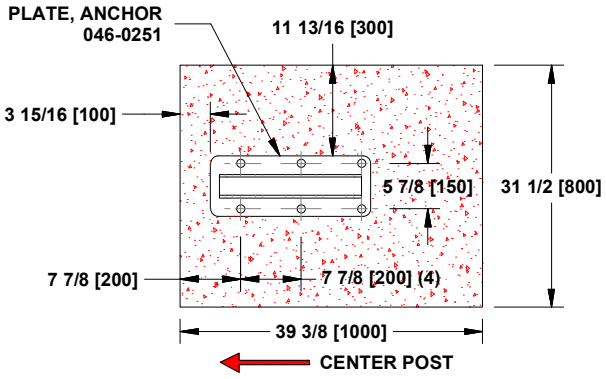
560-0585
ROPEVENTURE SKY5

BCI Burke Company, LLC P.O. Box 549 Fond du Lac, WI 54936-0549 Telephone 920-921-9220

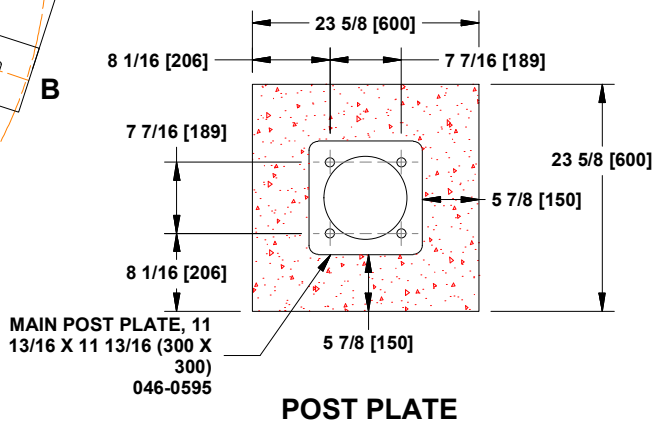
UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE INCHES WITH MILLIMETER EQUIVALENT INSIDE [ ] BRACKETS.



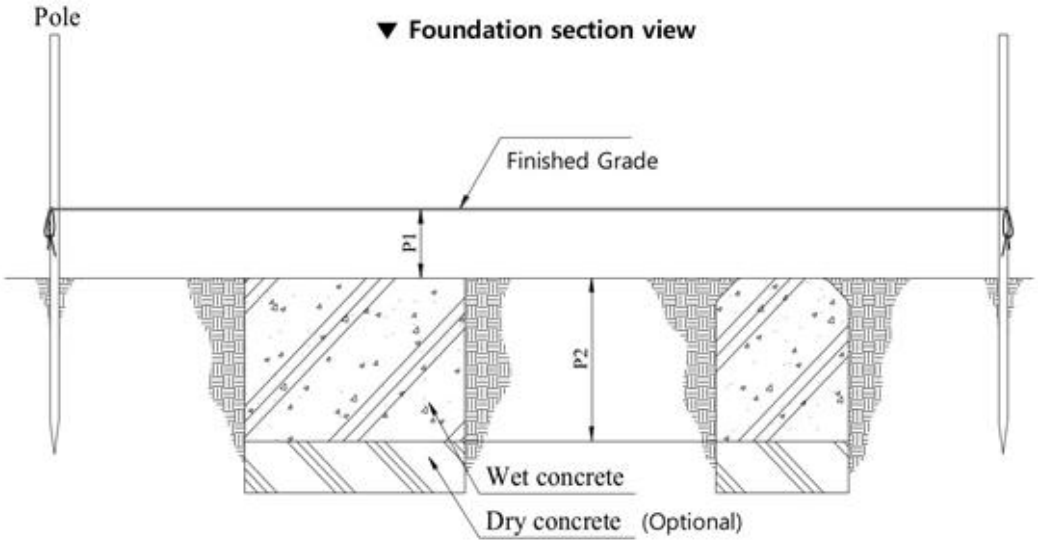
FOOTING LOCATIONS



ANCHOR PLATE
FOUNDATION DETAIL



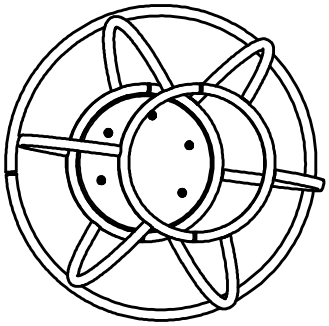
POST PLATE
FOUNDATION DETAIL



P1 = Depth of finished Grade (12" / 300mm)
P2 = Depth of concrete footing (27-½" / 700mm)

560-0585
ROPEVENTURE SKY5

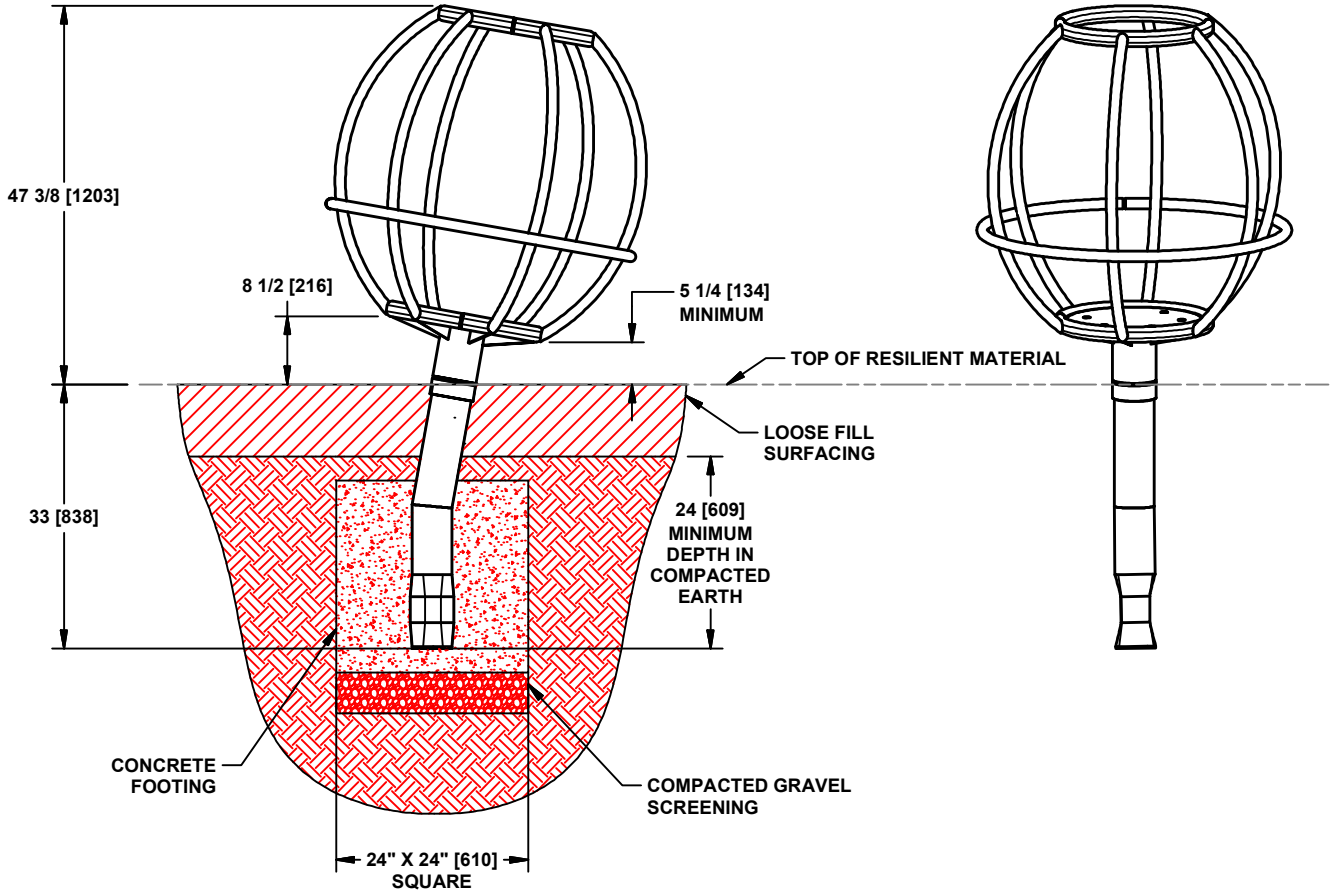
***THIS PAGE SHOULD BE USED WHEN LOOSE FILL MATERIAL IS BEING USED FOR RESILIENT MATERIAL.**



TOP VIEW

SIDE VIEW

FRONT VIEW



560-2586
COMET I

APPENDIX B

Remedial Investigation Boring Logs

Boring Log

Aspect CONSULTING

Project Number	Boring Number	Sheet
100094	NG-G8	1 of 1

Project Name: Crownhill Elementary School
Ground Surface Elev: 138.3
Location: 1500 Rocky Point Road, Bremerton WA 98312
Driller/Method: Cascade Drilling-Eli / Limited access direct push
Depth to Water (ft BGS):
Sampling Method: Continuous core
Start/Finish Date: 3/24/2011

Depth / Elevation (feet)	Borehole Completion	Sample Type/ID	Tests	PID (ppm)	Drive/ Recovery	Material Type	Description	Depth (ft)
138	Topsoil.						Grass over topsoil.	
137		NG-G8-0-3	NWTPH-Dx, total As, total Pb	0			Moist, brown, silty SAND (SM); trace gravel; poorly graded fine-to-medium sand.	1
136				0				2
135				0				3
134				0			2" SAND (SP) lens; poorly graded fine-to-medium sand.	4
133							Wet, gray, slightly gravelly, very silty SAND (SM); poorly graded fine-to-medium sand, subround gravel; occasional charcoal flecks.	5
132				0				6
131	Hole backfilled with bentonite chips.	NG-G8-6-9	NWTPH-Dx, total As, total Pb	0				7
130								8
129				0				9
128							Wet, dark gray brown, slightly silty, gravelly SAND (SP-SM).	10
127				0				11
126								12
125		NG-G8-12-15	NWTPH-Dx, total As, total Pb	0				13
124								14
123							Bottom of boring at 15' BGS.	15
122								16
121								17
120								18
119								19

Sampler Type:
○ No Recovery
▮ Continuous Core

PID - Photoionization Detector (Headspace Measurement)
▼ Static Water Level
▽ Water Level (ATD)

Logged by: AET
Approved by: RRH
Figure No.

_ENV BORING LOG CROWNHILL.GPJ May 24, 2012

Boring Log

Aspect CONSULTING

Project Number	Boring Number	Sheet
100094	NG-G9	1 of 1

Project Name: Crownhill Elementary School
Ground Surface Elev: 138.8
Location: 1500 Rocky Point Road, Bremerton WA 98312
Driller/Method: Cascade Drilling-Frank / Direct Push
Depth to Water (ft BGS):
Sampling Method: Continuous core
Start/Finish Date: 3/25/2011

Depth / Elevation (feet)	Borehole Completion	Sample Type/ID	Tests	PID (ppm)	Drive/ Recovery	Material Type	Description	Depth (ft)
0 / 138	Topsoil						Grass over topsoil	0
1 / 138		NG-G9-0-3	NWTPH-Dx, total As, total Pb				Slightly moist, brown, very silty SAND (SM); fine sand	1
2 / 137							Gravel at 2'	2
3 / 136							Moist, brown SAND (SP); poorly graded fine-to-medium sand.	3
4 / 135								4
5 / 134	▽ 3/25/2011						Becomes wet at 5'	5
6 / 133								6
7 / 132	Hole backfilled with bentonite chips.	NG-G9-6-9	NWTPH-Dx, total As, total Pb					7
8 / 131								8
9 / 130							Landfill material including glass, ceramic, wood, burnt debris	9
10 / 129							Wet, brown SAND (SP); trace gravel, fine-to-medium sand.	10
11 / 128								11
12 / 127								12
13 / 126							Grades to fine sand	13
14 / 125		NG-G9-12-15	NWTPH-Dx, total As, total Pb				Silt layer from 13.5' to 14'	14
15 / 124							Bottom of boring at 15' BGS.	15
16 / 123								16
17 / 122								17
18 / 121								18
19 / 120								19
119								

Sampler Type:
○ No Recovery
▌▌ Continuous Core

PID - Photoionization Detector (Headspace Measurement)
▼ Static Water Level
▽ Water Level (ATD)

Logged by: MAR
Approved by: RRH
Figure No.

_ENV BORING LOG CROWNHILL.GPJ May 24, 2012

Boring Log

Aspect CONSULTING

Project Number	Boring Number	Sheet
100094	NG-H8	1 of 1

Project Name: Crownhill Elementary School
Ground Surface Elev: 138.6
Location: 1500 Rocky Point Road, Bremerton WA 98312
Driller/Method: Cascade Drilling-Eli / Limited access direct push
Depth to Water (ft BGS):
Sampling Method: Continuous core
Start/Finish Date: 3/25/2011

Depth / Elevation (feet)	Borehole Completion	Sample Type/ID	Tests	PID (ppm)	Drive/ Recovery	Material Type	Description	Depth (ft)
0 / 138	Bark.					Bark	Bark over pea gravel.	0
1 / 137		NG-H8-0-3	NWTPH-Dx, total As, total Pb	0		Sand	Moist, brown, slightly silty, slightly gravelly SAND (SP); poorly graded fine-to-medium sand.	1
2 / 136				0				2
3 / 135								3
4 / 134						Silt	Moist, brown, gravelly, sandy SILT (ML).	4
5 / 133				0				5
6 / 132						Sand	Moist, brown, slightly silty, slightly gravelly SAND (SP); poorly graded fine-to-medium sand.	6
7 / 131	Hole backfilled with bentonite chips.	NG-H8-6-9	NWTPH-Dx, total As, total Pb	0				7
8 / 130				0				8
9 / 129								9
10 / 128				0			Wood and charcoal.	10
11 / 127							Moist, brown gray with iron stain SAND (SP); trace gravel, trace silt, fine-to-medium sand.	11
12 / 126				0				12
13 / 125								13
14 / 124		NG-H8-12-15	NWTPH-Dx, total As, total Pb	0				14
15 / 123							Bottom of boring at 15' BGS.	15
16 / 122								16
17 / 121								17
18 / 120								18
19 / 119								19

Sampler Type:
- No Recovery
- Continuous Core

PID - Photoionization Detector (Headspace Measurement)
- Static Water Level
- Water Level (ATD)

Logged by: AET
Approved by: RRH
Figure No.

_ENV BORING LOG CROWNHILL.GPJ May 24, 2012

Boring Log

Aspect CONSULTING

Project Number	Boring Number	Sheet
100094	SG-I4	1 of 1

Project Name: Crownhill Elementary School
Ground Surface Elev: 141.1
Location: 1500 Rocky Point Road, Bremerton WA 98312
Driller/Method: Cascade Drilling-Eli / Limited access direct push
Depth to Water (ft BGS):
Sampling Method: Continuous core
Start/Finish Date: 3/31/2011

Depth / Elevation (feet)	Borehole Completion	Sample Type/ID	Tests	PID (ppm)	Drive/ Recovery	Material Type	Description	Depth (ft)
141	Bark.						Bark over topsoil.	
140		SG-I4-0-3	NWTPH-Dx, total As, total Pb	0			Moist, brown, slightly gravelly, silty SAND (SM); poorly graded fine-to-medium sand.	1
139								2
138								3
137				0				4
136								5
135							Moist, gray brown SAND (SP); trace gravel; poorly graded fine-to-medium sand, predominantly medium.	6
134	Hole backfilled with bentonite chips.	SG-I4-6-9	NWTPH-Dx, total As, total Pb	0				7
133								8
132				0				9
131								10
130								11
129				0				12
128		SG-I4-12-15	NWTPH-Dx, total As, total Pb	0			Moist, gray brown, sandy GRAVEL (GP).	13
127								14
126							Bottom of boring at 15' BGS.	15
125								16
124								17
123								18
122								19

Sampler Type:
- No Recovery
- Continuous Core

PID - Photoionization Detector (Headspace Measurement)
- Static Water Level
- Water Level (ATD)

Logged by: AET
Approved by: RRH
Figure No.

_ENV BORING LOG CROWNHILL.GPJ May 24, 2012

Aspect CONSULTING

Boring Log

Project Number	Boring Number	Sheet
100094	SG-I5	1 of 1

Project Name: Crownhill Elementary School
Ground Surface Elev: 141
Location: 1500 Rocky Point Road, Bremerton WA 98312
Driller/Method: Cascade Drilling-Eli / Limited access direct push
Depth to Water (ft BGS):
Sampling Method: Continuous core
Start/Finish Date: 3/30/2011

Depth / Elevation (feet)	Borehole Completion	Sample Type/ID	Tests	PID (ppm)	Drive/ Recovery	Material Type	Description	Depth (ft)
0 – 141	Topsoil						Grass over topsoil	0
1 – 140		SG-I5-0-3	NWTPH-Dx, total As, total Pb	0			Moist, brown, silty SAND (SM).	1
2 – 139								2
3 – 138				0				3
4 – 137								4
5 – 136							Moist, brown gray SAND (SP); trace gravel; fine-to-medium sand.	5
6 – 135				0				6
7 – 134	Hole backfilled with bentonite chips.							7
8 – 133		SG-I5-6-9 (dup)	NWTPH-Dx, total As, total Pb					8
9 – 132				0				9
10 – 131								10
11 – 130								11
12 – 129				0				12
13 – 128		SG-I5-12-15	NWTPH-Dx, total As, total Pb	0				13
14 – 127								14
15 – 126				0			Bottom of boring at 15' BGS.	15
16 – 125								16
17 – 124								17
18 – 123								18
19 – 122								19

Sampler Type:
○ No Recovery
▮ Continuous Core

PID - Photoionization Detector (Headspace Measurement)
▼ Static Water Level
▽ Water Level (ATD)

Logged by: AET
Approved by: RRH
Figure No.

_ENV BORING LOG CROWNHILL.GPJ May 24, 2012

Boring Log

Aspect CONSULTING

Project Number	Boring Number	Sheet
100094	SG-J4	1 of 1

Project Name: Crownhill Elementary School
Ground Surface Elev: 139.1
Location: 1500 Rocky Point Road, Bremerton WA 98312
Driller/Method: Cascade Drilling-Frank / Direct Push
Depth to Water (ft BGS):
Sampling Method: Continuous core
Start/Finish Date: 3/30/2011

Depth / Elevation (feet)	Borehole Completion	Sample Type/ID	Tests	PID (ppm)	Drive/ Recovery	Material Type	Description	Depth (ft)
139	Asphalt.						Asphalt.	
138		SG-J4-0-3	NWTPH-Dx, total As, total Pb	0			Moist, gray to brown, gravelly, very silty SAND (SM); poorly graded fine-to-medium sand.	1
137				0				2
136				0				3
135				0				4
134				0				5
133				0				6
132	Hole backfilled with bentonite chips.	SG-J4-6-9	NWTPH-Dx, total As, total Pb	0				7
131				0				8
130				0				9
129				0				10
128				0			Moist, brown gray, silty, gravelly SAND (SW); fine to coarse sand.	11
127				0				12
126		SG-J4-12-15	NWTPH-Dx, total As, total Pb	0				13
125				0			Grades to Moist, brown gray SAND (SP).	14
124				0			Bottom of boring at 15' BGS.	15
123								16
122								17
121								18
120								19

Sampler Type:
- ○ No Recovery
- ▮ Continuous Core

PID - Photoionization Detector (Headspace Measurement)
- ▼ Static Water Level
- ▽ Water Level (ATD)

Logged by: MAR
Approved by: RRH
Figure No.

_ENV BORING LOG CROWNHILL.GPJ May 24, 2012

APPENDIX D-2

Ecology Approval Letter for Play Equipment Installation

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
Northwest Regional Office • 3190 160th Ave SE • Bellevue, WA 98008-5452 • 425-649-7000
711 for Washington Relay Service • Persons with a speech disability can call 877-833-6341

June 11, 2018

David Herrington
Director of Facilities and Operations
Bremerton School District
200 Bruenn Avenue
Bremerton, WA 98312-3108

Re: Request to add playground equipment to Crownhill Elementary School grounds

- **Site Name:** Crownhill Elementary School
- **Site Address:** 1500 Rocky Point Road NW, Bremerton, WA 98312-2652
- **Cleanup Site ID:** 4487
- **Facility/Site ID:** 99722456
- **Agreed Order No.:** DE 11107

Dear Mr. Herrington:

This letter is in regard to the request to install playground equipment at Crownhill Elementary School where the Crownhill Elementary School Site is located. The site is under an agreed order which requires institutional controls restricting land use and disturbances to the ground cover (cap) at the site unless certain requirements are met. Specifically, these requirements may be found in the environmental covenant and Cover System Inspection And Maintenance Plan (I&M Plan) developed under the final Cleanup Action Plan for this site.

The I&M Plan has the following requirements for excavation of potentially contaminated materials:

For invasive work exceeding 1-foot depth:

1. provide notice to and receive approval from Ecology's project manager prior to performing the work;
2. use personnel with hazardous waste health and safety training (per 29 CFR 1910.120);
3. notify such personnel of subsurface conditions (summarized above); and contractors performing the work must develop, implement, maintain, and enforce their own site-specific health and safety plan (HASP).

Invasive work in soil must not result in a reduction in the thickness of the "clean" cover soil layer. Additional considerations include:

For invasive work in which potentially contaminated materials will be exposed/excavated, Ecology will likely require a project-specific work plan (separate from the contractor's HASP) describing the procedures and protocols to be followed in performing the work. Specific items that may need to be addressed in the work plan include the following:

- **Erosion, Sedimentation, and Dust Control.** When potentially contaminated materials are exposed/excavated, temporary erosion and sedimentation control (TESC) practices compliant with applicable state and local laws, regulations, ordinances, and permits must be followed. In addition, construction best management practices (BMPs) must be implemented to minimize generation of dust in accordance with applicable state and local laws, regulations, ordinances, and permits.

- **Materials Handling On Site.** Potentially contaminated materials that are excavated and temporarily managed on site must be stockpiled or placed into appropriate covered containers (e.g., drums). Access to stockpiles/containers must be restricted. Stockpiles must be constructed and maintained to prevent erosion, contact with stormwater runoff, dust generation, and worker contact. Each stockpile must be underlain by a low-permeability liner and covered with a liner when not in use.

- **Testing and Final Disposition of Excavated Materials.** Samples will be collected from stockpiles/containers of potentially contaminated materials for chemical testing. For off-site disposal, the disposal facility will have specific waste profiling requirements that must be satisfied before transport and disposal is allowed. Transport and off-site disposal of all waste materials must be conducted in accordance with Chapter 173-303 WAC and other applicable federal, state, and local laws, regulations, ordinances, and permits. The property owner will be the generator for all waste materials generated on their property. Depending on project-specific circumstances and subject to Ecology approval, backfilling/reuse of excavated materials may also be pursued, in which case chemical testing to support on-site backfilling/reuse will be proposed in the work plan.

Ecology's review of this installation request included the following documents:

- Soil Sampling and Management Plan for Play Equipment Installation Crownhill Elementary School Site (Aspect Consulting report, revision 2/27/18)
- Soil Sampling and Management Plan for Play Equipment Installation Crownhill Elementary School Site (Aspect Consulting report, Revision 1 – 03/02/18)
- Soil Sampling and Management Plan for Play Equipment Installation Crownhill Elementary School Site (Aspect Consulting report, Revision 2 – 03/14/18)
- Email dated 4/23/2018 from Dave Heffner, Aspect Consulting, reporting soil sampling results at proposed play equipment locations conducted last 4/4/2018
- Email dated 5/25/2018 from Dave Heffner, Aspect Consulting, reporting Round 2 soil sampling results at proposed play equipment locations conducted last 5/2/2018

- Email dated 6/1/2018 from Dave Heffner, Aspect Consulting, containing maps of the New Play Equipment locations and sampling results at the north and south playground areas (including equipment to be removed).

Based on the reported results and email exchanges, it is Ecology's understanding that the soil to be excavated for the footings of all of the proposed playground equipment will be at the same spots as soil sample locations from the Round 2 sampling event. Thus, all excavated soil from playground equipment installation is not expected to exceed site cleanup levels and the sampling results will be used to profile the excavated soil for offsite disposal in an appropriate permitted landfill. Installed footings or foundations for the equipment are expected to exactly coincide with sample locations determined to be below cleanup levels and will not deviate from their spatial locations and depths.

Ecology has determined that, based on the information provided, a variance to the requirements of the environmental covenant and I&M shall be granted only in this instance. Ecology concurs with the request to install the playground equipment and remove existing play structures detailed in the Soil Sampling and Management Plan for Play Equipment Installation document and equipment locations maps from the 6/1/2018 email communication. If any of the information provided to Ecology is not true, in error, or if the work is not followed or executed in accordance with the Revision 2 Soil Sampling Management Plan and expectations Ecology laid out in this letter, this determination shall be rescinded and Ecology and the School District shall meet to discuss next steps.

Should you have any questions, please do not hesitate to contact me at 425-649-7094 or jerome.cruz@ecy.wa.gov.

Sincerely,

Jerome Cruz
Site Manager
Toxics Cleanup Program, Northwest Regional Office

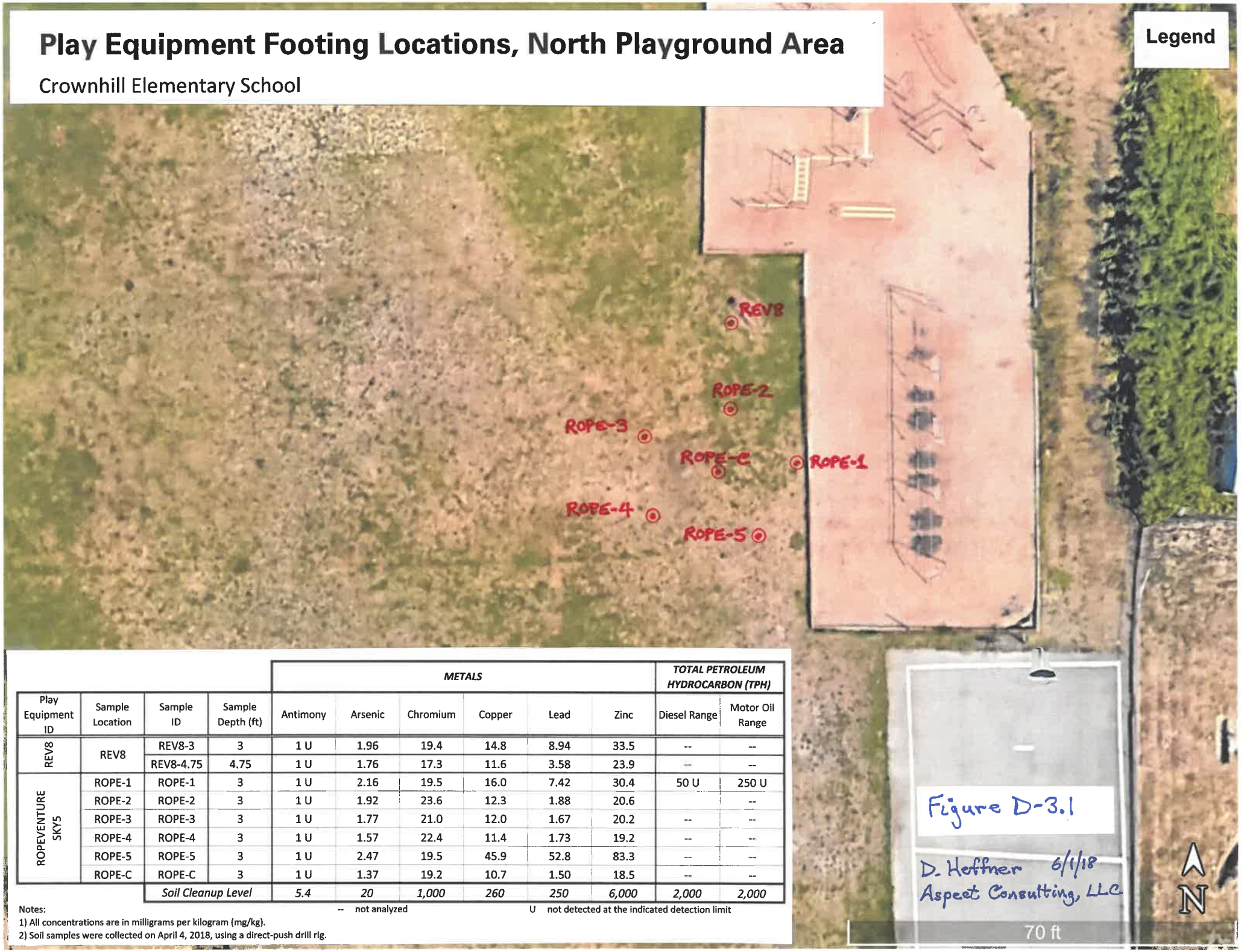
cc: Ching-Pi Wang, Toxics Cleanup Program, Northwest Regional Office
Ann Essko, Office of the Attorney General
Dave Heffner, Aspect Consulting
Ecology Site File

APPENDIX D-3

Play Equipment Soil Sampling Locations and Results Summary

Play Equipment Footing Locations, North Playground Area

Crownhill Elementary School



Play Equipment ID	Sample Location	Sample ID	Sample Depth (ft)	METALS						TOTAL PETROLEUM HYDROCARBON (TPH)	
				Antimony	Arsenic	Chromium	Copper	Lead	Zinc	Diesel Range	Motor Oil Range
REV8	REV8	REV8-3	3	1 U	1.96	19.4	14.8	8.94	33.5	--	--
		REV8-4.75	4.75	1 U	1.76	17.3	11.6	3.58	23.9	--	--
ROPEVENTURE SKY5	ROPE-1	ROPE-1	3	1 U	2.16	19.5	16.0	7.42	30.4	50 U	250 U
	ROPE-2	ROPE-2	3	1 U	1.92	23.6	12.3	1.88	20.6		--
	ROPE-3	ROPE-3	3	1 U	1.77	21.0	12.0	1.67	20.2	--	--
	ROPE-4	ROPE-4	3	1 U	1.57	22.4	11.4	1.73	19.2	--	--
	ROPE-5	ROPE-5	3	1 U	2.47	19.5	45.9	52.8	83.3	--	--
	ROPE-C	ROPE-C	3	1 U	1.37	19.2	10.7	1.50	18.5	--	--
	Soil Cleanup Level			*5.4*	*20*	*1,000*	*260*	*250*	*6,000*	*2,000*	*2,000*

Notes:

-- not analyzed

U not detected at the indicated detection limit

1) All concentrations are in milligrams per kilogram (mg/kg).

2) Soil samples were collected on April 4, 2018, using a direct-push drill rig.

Play Equipment Footing Locations, South Playground Area

Crownhill Elementary School

Play Equipment ID[2]	Sample Location	Sample ID[3]	Sample Depth (ft)	METALS					
				Antimony	Arsenic	Chromium	Copper	Lead	Zinc
COMET	COMET-E	HA-1-2.5	2.5	1 U	1.59	11.8	18.5	17.2	47.2
COMET	COMET-W	COMET-W	2.5	1 U	1.40	12.5	14.0	1.69	19.5
		Soil Cleanup Level		*5.4*	*20*	*1,000*	*260*	*250*	*6,000*

Notes:

U not detected at the indicated detection limit

1) All concentrations are in milligrams per kilogram (mg/kg).
2) Two identical pieces of play equipment will be installed.
3) Sample COMET-W was collected on April 4, 2018, using a direct-push drill rig. Sample HA-1-2.5 was collected on May 2, 2018, using a hand auger.

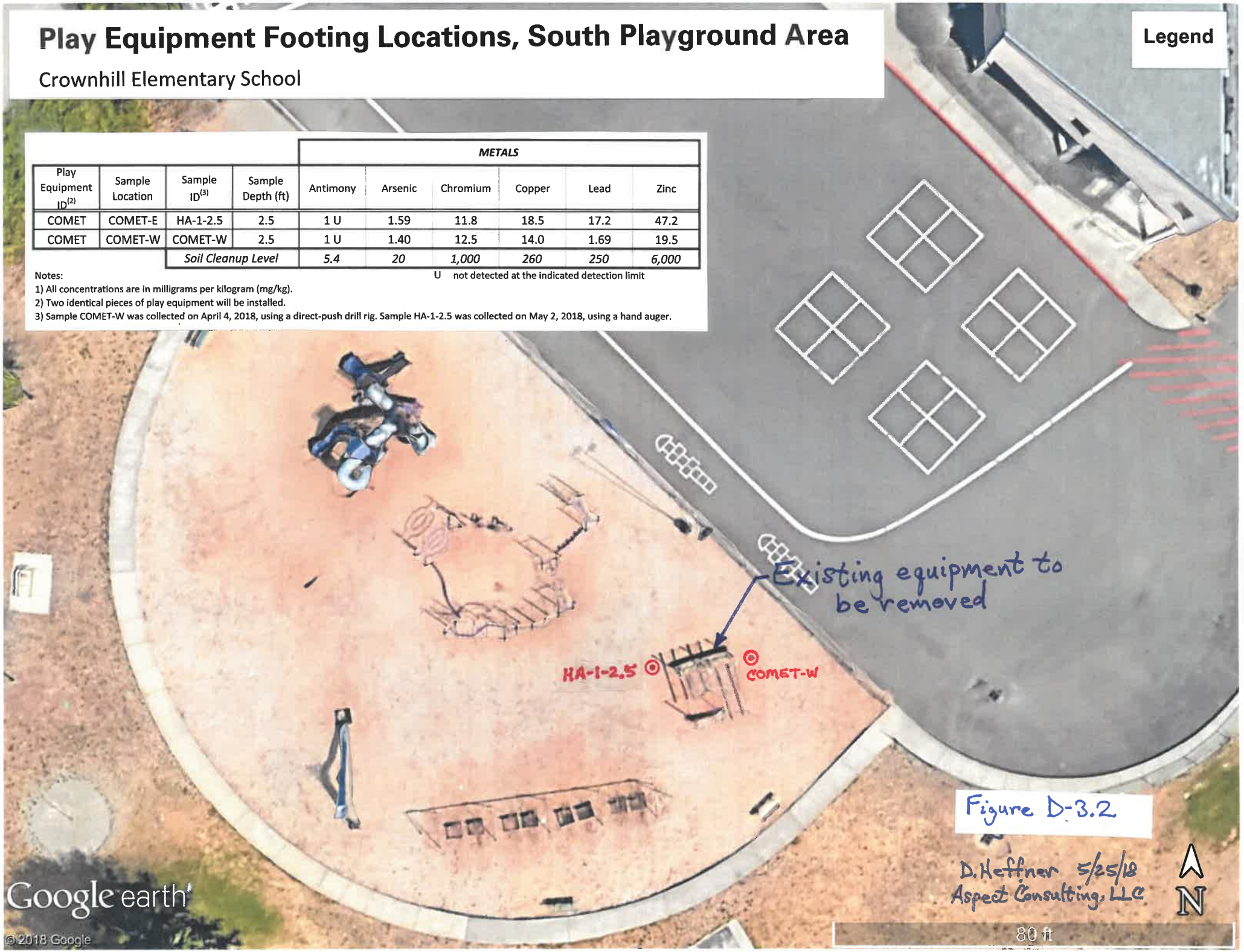


Figure D-3.2

D. Heffner 5/25/18
Aspect Consulting, LLC

Soil Sampling Locations Not Used, South Playground Area

Crownhill Elementary School

Legend

Sample ID[2]	Sample Depth (ft)	METALS					
		Antimony	Arsenic	Chromium	Copper	Lead	Zinc
COMET-E	2.5	2.87	5.63	33.7	47.6	785	436
HA-3-2.5	2.5	1.30	4.94	19.7	31.5	47.3	77.9
HA-4-2.5	2.5	1.89	3.61	21.7	61.3	119	155
HA-5-2.5	2.5	1 U	1.90	18.0	26.9	35.7	45.0
Soil Cleanup Level		*5.4*	*20*	*1,000*	*260*	*250*	*6,000*

U not detected at the indicated detection limit

Notes:

1) All concentrations are in milligrams per kilogram (mg/kg). Shading indicates an exceedance of the corresponding soil cleanup level.
2) Sample COMET-E was collected on April 4, 2018, using a direct-push drill rig. The other three samples were collected on May 2, 2018, using a hand auger.

HA-5-2.5

HA-4-2.5

COMET-E

HA-3-2.5

Figure D-3,3

Aspect Consulting, LLC

N

80 ft

Google earth

APPENDIX E

Ecology Letter Regarding Contaminants of Concern for Soil

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
PO Box 47600 • Olympia, WA 98504-7600 • 360-407-6000
711 for Washington Relay Service • Persons with a speech disability can call 877-833-6341

September 21, 2018

To Whom It May Concern:

Re: Contaminants of Concern for Soil at the following Contaminated Site:

- **Site Name:** Crownhill Elementary School
- **Site Address:** 1500 Rocky Point Rd NW, Bremerton, WA 98312-2652
- **Cleanup Site ID:** 4487
- **Facility/Site ID:** 99722456

This letter provides written notification of the Contaminants of Concern for soil at this site based on information gathered from the remedial investigation and feasibility study required at the site by Agreed Order No. DE 7916 (Order) under the Model Toxics Control Act (MTCA), Chapter 70.105D RCW. The remedial investigation was completed in 2012 (see Aspect, 2013, Remedial Investigation Report, Crownhill Elementary School, prepared for Bremerton School District, dated October 2013).

The remedial investigation analyzed for a wide range of contaminants in soil: Total Petroleum Hydrocarbons - diesel and oil range, RCRA metals, volatile organic compounds, polycyclic aromatic hydrocarbons, polychlorinated biphenyls, semi-volatile organics. Please see Attachment 1.

Attachment 2 to this letter is Table 5 “Soil Quality Data Summary” from the remedial investigation report, which shows the chemicals detected in soil at the site and includes those which exceeds MTCA cleanup levels.

Based on the remedial investigation, the following Contaminants of Concern were identified for soil:

- Total Petroleum Hydrocarbon - Diesel range
- Total Petroleum Hydrocarbon - Oil range
- Antimony
- Arsenic
- Chromium III
- Copper
- Lead

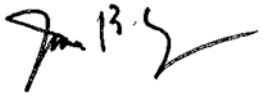
- Zinc
- Trichloroethene (TCE)
- cPAHs TEF

This letter does not address the procedures and compliance criteria for disposal of contaminated soils according to Washington State Dangerous Waste Regulations (Chapter 173-303 WAC).

This letter is not an Ecology approval for dangerous waste designation or disposal of contaminated soils that may be generated or already excavated from the site. Solid waste or hazardous waste disposal facilities may have specific waste profiling requirements that must be satisfied before transport and disposal is allowed. These facilities can use the information in this letter as they see fit.

If you have any questions regarding this letter, please don't hesitate to contact me at 425-649-7094 or jerome.cruz@ecy.wa.gov.

Sincerely,



Jerome B. Cruz
Site Manager
Toxics Cleanup Program, Northwest Regional Office

Enclosures

ATTACHMENT 1

Soil Sample Analytes and Laboratory Methods
Crownhill Elementary School Site 100094

Sources Reviewed:

- Aspect, 2014. Remedial Investigation, Crownhill Elementary School, Aspect Consulting, LLC, November 2014 Final.
- Terracon, 2010. Draft Remedial Investigation, Agency Review Draft, Crownhill Elementary School, Terracon Consultants, Inc., May 4, 2010.

Analytes	***Laboratory Method***
Petroleum hydrocarbons	EPA Method 418.1
Petroleum hydrocarbons	Method WTPH-HCID
Diesel-range petroleum hydrocarbons	Method NWTPH-Dx
Volatile organic compounds (VOCs)	EPA Method 8010/8020
VOCs	EPA Method 8240
VOCs	EPA Method 8260
Semivolatile organic compounds	EPA Method 8270
Polycyclic aromatic hydrocarbons (PAHs)	EPA Method 8270D SIM
Polychlorinated Biphenyls (PCB) as Arochlor 1254	GC/ECD (modified 8080)
PCB Aroclor	EPA Method 8082
Total organic carbon (TOC)	EPA Method 9060
TCLP Analyses:	
PCB as Arochlor 1254	GC/ECD per 40 CFR Part 261
RCRA 8 metals	EPA Method 1311
Ag, As, Ba, Cd, Cr, Cu, Hg, Ni, Pb, Se, Zn	EPA Method 200.8
Total Metals Analyses:	
RCRA 8	EPA Method 200.8
Ag, As, Ba, Cd, Cr, Cu, Pb, Sb, Se, V, Zn	EPA Method 6010
Hg	EPA Method 7470
Hexavalent chromium	EPA Method 7196

Dave Heffner
Aspect Consulting, LLC 9/20/18

ATTACHMENT 2

Table 5 - Soil Quality Data Summary

Remedial Investigation, Crownhill Elementary, Bremerton, Washington

Constituent (by Group)[2]	Number of Sample Locations	Number of Samples	Number of Detected Results	Maximum Detected Value (mg/kg)	Soil Screening Level[3] (mg/kg)	Exceedances of Soil Screening Level	
						Number of Samples	% of Samples
Total Petroleum Hydrocarbon (TPH)							
Diesel Range	*210*	*597*	*53*	*27000*	*2000*	*16*	*3*
Motor Oil Range	*210*	*597*	*80*	*72000*	*2000*	*19*	*3*
Metals							
Antimony	*40*	*54*	*25*	*544*	*5.4*	*24*	*44*
Arsenic	*237*	*611*	*500*	*63.1*	*20*	*39*	*6*
Chromium III	*5*	*17*	*17*	*1710*	*1000*	*5*	*29*
Copper	*40*	*54*	*37*	*6820*	*260*	*17*	*31*
Lead	*236*	*608*	*580*	*26300*	*250*	*73*	*12*
Vanadium	5	17	17	382	560	0	0
Zinc	*5*	*17*	*17*	*14600*	*6000*	*4*	*24*
Volatile Organic Compounds							
Toluene	9	29	1	0.06	7	0	0
Trichloroethene (TCE)	*9*	*29*	*1*	*0.1*	*0.0032*	*1*	*3*
Polycyclic Aromatic Hydrocarbons (PAHs)							
Acenaphthene	13	33	1	0.056	98	0	0
Anthracene	13	33	2	2.7	2200	0	0
Fluoranthene	13	33	8	46	630	0	0
Fluorene	13	33	1	0.42	101	0	0
Pyrene	13	33	9	54	655	0	0
cPAHs TEF[4]	*13*	*33*	*9*	*26*	*0.14*	*1*	*3*
Polychlorinated Biphenyls (PCBs)							
Aroclor 1254	9	29	2	0.5	0.5	0	0
Aroclor 1260	9	29	1	0.4	0.5	0	0
Other Semi-Volatile Organics							
Benzyl butyl phthalate	9	28	1	0.06	910	0	0
Di-n-butyl phthalate	9	28	1	0.22	58	0	0
Hexachlorobenzene	9	28	1	0.034	0.088	0	0
2-Methylnaphthalene	9	28	1	2.3	320	0	0
Naphthalene	13	33	2	0.96	4.5	0	0

cPAH carcinogenic PAH TEF toxicity equivalency factor

Notes

1) Samples from soils removed as part of the Interim Action are not counted in the number of detects, maximums, and exceedances.

2) Constituents in italics have been detected at concentrations exceeding the corresponding screening level, and are therefore identified as constituents of potential concern (COPCs).

3) Soil screening levels are developed in Table 2.

4) The cPAHs TEF is calculated from the concentrations of seven carcinogenic PAHs, using the method described in WAC 173-340-708.

APPENDIX F

Ecology Letter Confirming Completion of Cleanup under Agreed Order

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
Northwest Regional Office • 3190 160th Ave SE • Bellevue, WA 98008-5452 • 425-649-7000
711 for Washington Relay Service • Persons with a speech disability can call 877-833-6341

October 15, 2018

David Herrington
Director of Facilities and Operations
Bremerton School District
200 Bruenn Avenue
Bremerton, WA 98312-3108

Re: Status of Agreed Order No. DE 11107 and No Further Action to complete Cleanup of the following Contaminated Site:

- **Site Name:** Bremerton School District Crownhill Elementary School Site
- **Site Address:** 1500 Rocky Point Road NW, Bremerton, WA 98312-2652
- **Cleanup Site ID:** 4487
- **Facility/Site ID:** 99722456

Dear David Herrington:

Thank you for working with the Washington State Department of Ecology (Ecology) on Bremerton School District Crownhill Elementary School Site (Site) under the Model Toxics Control Act (MTCA), Chapter 70.105D RCW, and Agreed Order No. DE 11107, which became effective on April 9, 2015.

This letter provides written notification that, under MTCA and the Agreed Order, 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. This letter also describes the status of the Agreed Order and the Site.

Completion of Cleanup Required by Agreed Order

The remedial actions required by the Agreed Order are specified in Section VII (Work to Be Performed) and detailed in the Cleanup Action Plan (Exhibit G). Bremerton School District (BSD) was required to implement a final cleanup action plan in accordance with WAC 173-340 with respect to contamination associated with a former Kitsap County landfill at the Site. After inspecting the Site and reviewing the supporting documentation, Ecology has determined that the active cleanup required at the Site under the Agreed Order has been satisfactorily completed,

with the exception of removal of LNAPL and continuous HVAC system operation during the school day.

Post-Cleanup Remedial Actions Required by Agreed Order

Although the cleanup of contamination at the Site has been largely completed, further remedial action is still necessary under MTCA and required under the Agreed Order to remove LNAPL, operate the HVAC system during school hours, and control and monitor the remaining contamination at the Site. BSD's responsibilities are specified in Section VII (Work to Be Performed) and detailed in the Cleanup Action Plan, Environmental Covenants, Groundwater/LNAPL Monitoring and Contingency Plan, a LNAPL Removal Work Plan, and a Cover System Inspection and Maintenance Plan (I&M Plan).

Periodic Reviews of Post-Cleanup Conditions Required by Agreed Order

Ecology will conduct periodic reviews of post-cleanup conditions at the Site to ensure they remain protective of human health and the environment. This requires continued access to the Site, as provided in Section VIII.E (Access) of the Agreed Order. BSD's responsibilities are specified in Section VIII.R (Periodic Review) of the Agreed Order. Any costs incurred by Ecology in conducting periodic reviews may be recovered from BSD.

Status of Agreed Order

Although the active cleanup of contamination at the Site has largely been completed, further implementation of the final remedy (including LNAPL removal, continuous operation of the HVAC system during school hours, and institutional controls and monitoring) is still necessary under MTCA and required by the Agreed Order to control and monitor the remaining contamination and periodically review the conditions at the Site. The Agreed Order will remain in effect until the required post-cleanup remedial actions are completed or are no longer necessary under MTCA.

This letter summarizes BSD's remaining responsibilities under the Agreed Order; it does not alter or expand BSD's responsibilities under the Order.

No Further Action Determination

Ecology has determined that no further active remedial action is necessary to clean up contamination at the Site under MTCA other than LNAPL removal and operation of the HVAC system during the school day. In addition, further operation and maintenance of the final remedy (including institutional controls and monitoring) is still necessary under MTCA to control and monitor the remaining contamination and periodically review the conditions at the Site.

Delisting of the Site

The Site cannot be removed from the Hazardous Sites List because it is a containment site which requires the continuing active remedial work of LNAPL removal and continuous HVAC system operation during the school day. In accordance with Ecology Policy 330B "Removal of Sites from the Hazardous Sites List", the Site will remain on the list indefinitely.

Future Communication

Thank you and congratulations on your work in cleaning up the Site. We look forward to continuing to work with you to make sure your investment in the Site is protected over the long term. Should you have any questions, please do not hesitate to contact Ecology's cleanup project manager for the Site, Jerome Cruz, at (425) 649-7094 or jerome.cruz@ecy.wa.gov.

Sincerely,

Robert W. Warren
Section Manager
Toxics Cleanup Program, NWRO

cc: Dave Heffner, Aspect Consulting, LLC, Associate Remediation Engineer
Doug Hillman, Aspect Consulting, LLC, Principal Hydrogeologist
Ann Essko, Office of the Attorney General
Beth McKee, Ecology
Ecology Site File

APPENDIX G

Laboratory Reports, 2018 Soil and Groundwater Sampling (in Chronological Order)

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

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

3012 16th Avenue West
Seattle, WA 98119-2029
(206) 285-8282
fbi@isomedia.com
www.friedmanandbruya.com

April 13, 2018

Dave Heffner, Project Manager
Aspect Consulting, LLC
401 2nd Ave S, Suite 201
Seattle, WA 98104

Dear Mr Heffner:

Included are the results from the testing of material submitted on April 6, 2018 from the Crownhill 100094, F&BI 804105 project. There are 11 pages included in this report. Any samples that may remain are currently scheduled for disposal in 30 days. 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: data@aspectconsulting.com
ASP0413R.DOC

CASE NARRATIVE

This case narrative encompasses samples received on April 6, 2018 by Friedman & Bruya, Inc. from the Aspect Consulting, LLC Crownhill 100094, F&BI 804105 project. Samples were logged in under the laboratory ID's listed below.

Laboratory ID	Aspect Consulting, LLC
804105 -01	MW-5-04052018
804105 -02	MW-6-04052018
804105 -03	MW-10-04052018
804105 -04	MW-15-04052018

All quality control requirements were acceptable.

Date of Report: 04/13/18
Date Received: 04/06/18
Project: Crownhill 100094, F&BI 804105
Date Extracted: 04/10/18
Date Analyzed: 04/10/18

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 47-140)
MW-5-04052018 804105-01	2,600 x	1,100 x	97
MW-10-04052018 804105-03	<50	<250	108
MW-15-04052018 804105-04	53 x	<250	120
Method Blank 08-760 MB2	<50	<250	99

Analysis For Total Metals By EPA Method 200.8

Client ID:	MW-6-04052018	Client:	Aspect Consulting, LLC
Date Received:	04/06/18	Project:	Crownhill 100094, F&BI 804105
Date Extracted:	04/10/18	Lab ID:	804105-02
Date Analyzed:	04/10/18	Data File:	804105-02.045
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	29.7

Analysis For Total Metals By EPA Method 200.8

Client ID:	MW-10-04052018	Client:	Aspect Consulting, LLC
Date Received:	04/06/18	Project:	Crownhill 100094, F&BI 804105
Date Extracted:	04/10/18	Lab ID:	804105-03
Date Analyzed:	04/10/18	Data File:	804105-03.046
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	1.86

Analysis For Total Metals By EPA Method 200.8

Client ID:	Method Blank	Client:	Aspect Consulting, LLC
Date Received:	NA	Project:	Crownhill 100094, F&BI 804105
Date Extracted:	04/10/18	Lab ID:	I8-219 mb2
Date Analyzed:	04/10/18	Data File:	I8-219 mb2.039
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

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

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	MW-10-04052018	Client:	Aspect Consulting, LLC
Date Received:	04/06/18	Project:	Crownhill 100094, F&BI 804105
Date Extracted:	04/09/18	Lab ID:	804105-03
Date Analyzed:	04/09/18	Data File:	040910.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	101	57	121
Toluene-d8	103	63	127
4-Bromofluorobenzene	100	60	133

Compounds:	Concentration ug/L (ppb)
Trichloroethene	<1

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	Method Blank	Client:	Aspect Consulting, LLC
Date Received:	Not Applicable	Project:	Crownhill 100094, F&BI 804105
Date Extracted:	04/09/18	Lab ID:	08-0744 mb
Date Analyzed:	04/09/18	Data File:	040909.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	100	57	121
Toluene-d8	103	63	127
4-Bromofluorobenzene	100	60	133

Compounds:	Concentration ug/L (ppb)
Trichloroethene	<1

Date of Report: 04/13/18
Date Received: 04/06/18
Project: Crownhill 100094, F&BI 804105

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	88	88	58-134	0

Date of Report: 04/13/18
Date Received: 04/06/18
Project: Crownhill 100094, F&BI 804105

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER SAMPLES FOR TOTAL METALS USING EPA METHOD 200.8

Laboratory Code: 804109-03 (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	11.4	103	109	70-130	6

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Arsenic	ug/L (ppb)	10	101	85-115

Date of Report: 04/13/18
Date Received: 04/06/18
Project: Crownhill 100094, F&BI 804105

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

Laboratory Code: 804105-03 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Acceptance Criteria
Trichloroethene	ug/L (ppb)	50	<1	99	66-135

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)	50	97	103	80-120	6

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 compound 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. Compounds in the sample matrix interfered with the quantitation of the analyte.

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.

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

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

3012 16th Avenue West
Seattle, WA 98119-2029
(206) 285-8282
fbi@isomedia.com
www.friedmanandbruya.com

April 13, 2018

Dave Heffner, Project Manager
Aspect Consulting, LLC
401 2nd Ave S, Suite 201
Seattle, WA 98104

Dear Mr Heffner:

Included are the results from the testing of material submitted on April 5, 2018 from the Crownhill 100094, F&BI 804057 project. There are 20 pages included in this report. Any samples that may remain are currently scheduled for disposal in 30 days. 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: data@aspectconsulting.com
ASP0413R.DOC

CASE NARRATIVE

This case narrative encompasses samples received on April 5, 2018 by Friedman & Bruya, Inc. from the Aspect Consulting, LLC Crownhill 100094, F&BI 804057 project. Samples were logged in under the laboratory ID's listed below.

Laboratory ID	Aspect Consulting, LLC
804057 -01	Rev8-3
804057 -02	Rev8-4.75
804057 -03	Rope-C-3
804057 -04	Rope-1-3
804057 -05	Rope-2-3
804057 -06	Rope-3-3
804057 -07	Rope-4-3
804057 -08	Rope-5-3
804057 -09	Comet-E-2.5
804057 -10	Comet-W-2.5
804057 -11	McKinney-20180404

All quality control requirements were acceptable.

Date of Report: 04/13/18
Date Received: 04/05/18
Project: Crownhill 100094, F&BI 804057
Date Extracted: 04/05/18
Date Analyzed: 04/06/18

RESULTS FROM THE ANALYSIS OF SOIL SAMPLES FOR TOTAL PETROLEUM HYDROCARBONS AS DIESEL AND MOTOR OIL USING METHOD NWTPH-Dx
Sample Extracts Passed Through a Silica Gel Column Prior to Analysis
Results Reported on a Dry Weight Basis
Results Reported as mg/kg (ppm)

Sample ID Laboratory ID	Diesel Range (C_{10}-C_{25})	Motor Oil Range (C_{25}-C_{36})	Surrogate (% Recovery) (Limit 53-144)
Rope-1-3 804057-04	<50	<250	91
Method Blank 08-724 MB	<50	<250	91

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 6020A

Client ID:	Rev8-3	Client:	Aspect Consulting, LLC
Date Received:	04/05/18	Project:	Crownhill 100094, F&BI 804057
Date Extracted:	04/10/18	Lab ID:	804057-01
Date Analyzed:	04/10/18	Data File:	804057-01.072
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Antimony	<1
Arsenic	1.96
Chromium	19.4
Copper	14.8
Lead	8.94
Zinc	33.5

Analysis For Total Metals By EPA Method 6020A

Client ID:	Rev8-4.75	Client:	Aspect Consulting, LLC
Date Received:	04/05/18	Project:	Crownhill 100094, F&BI 804057
Date Extracted:	04/10/18	Lab ID:	804057-02
Date Analyzed:	04/10/18	Data File:	804057-02.073
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Antimony	<1
Arsenic	1.76
Chromium	17.3
Copper	11.6
Lead	3.58
Zinc	23.9

Analysis For Total Metals By EPA Method 6020A

Client ID:	Rope-C-3	Client:	Aspect Consulting, LLC
Date Received:	04/05/18	Project:	Crownhill 100094, F&BI 804057
Date Extracted:	04/10/18	Lab ID:	804057-03
Date Analyzed:	04/10/18	Data File:	804057-03.074
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Antimony	<1
Arsenic	1.37
Chromium	19.2
Copper	10.7
Lead	1.50
Zinc	18.5

Analysis For Total Metals By EPA Method 6020A

Client ID:	Rope-1-3	Client:	Aspect Consulting, LLC
Date Received:	04/05/18	Project:	Crownhill 100094, F&BI 804057
Date Extracted:	04/10/18	Lab ID:	804057-04
Date Analyzed:	04/10/18	Data File:	804057-04.082
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Antimony	<1
Arsenic	2.16
Chromium	19.5
Copper	16.0
Lead	7.42
Zinc	30.4

Analysis For Total Metals By EPA Method 6020A

Client ID:	Rope-2-3	Client:	Aspect Consulting, LLC
Date Received:	04/05/18	Project:	Crownhill 100094, F&BI 804057
Date Extracted:	04/10/18	Lab ID:	804057-05
Date Analyzed:	04/10/18	Data File:	804057-05.083
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Antimony	<1
Arsenic	1.92
Chromium	23.6
Copper	12.3
Lead	1.88
Zinc	20.6

Analysis For Total Metals By EPA Method 6020A

Client ID:	Rope-3-3	Client:	Aspect Consulting, LLC
Date Received:	04/05/18	Project:	Crownhill 100094, F&BI 804057
Date Extracted:	04/10/18	Lab ID:	804057-06
Date Analyzed:	04/10/18	Data File:	804057-06.084
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Antimony	<1
Arsenic	1.77
Chromium	21.0
Copper	12.0
Lead	1.67
Zinc	20.2

Analysis For Total Metals By EPA Method 6020A

Client ID:	Rope-4-3	Client:	Aspect Consulting, LLC
Date Received:	04/05/18	Project:	Crownhill 100094, F&BI 804057
Date Extracted:	04/10/18	Lab ID:	804057-07
Date Analyzed:	04/10/18	Data File:	804057-07.085
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Antimony	<1
Arsenic	1.57
Chromium	22.4
Copper	11.4
Lead	1.73
Zinc	19.2

Analysis For Total Metals By EPA Method 6020A

Client ID:	Rope-5-3	Client:	Aspect Consulting, LLC
Date Received:	04/05/18	Project:	Crownhill 100094, F&BI 804057
Date Extracted:	04/10/18	Lab ID:	804057-08
Date Analyzed:	04/10/18	Data File:	804057-08.086
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Antimony	<1
Arsenic	2.47
Chromium	19.5
Copper	45.9
Lead	52.8
Zinc	83.3

Analysis For Total Metals By EPA Method 6020A

Client ID:	Comet-E-2.5	Client:	Aspect Consulting, LLC
Date Received:	04/05/18	Project:	Crownhill 100094, F&BI 804057
Date Extracted:	04/10/18	Lab ID:	804057-09
Date Analyzed:	04/10/18	Data File:	804057-09.094
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Antimony	2.87
Arsenic	5.63
Chromium	33.7
Copper	47.6
Lead	611 ve
Zinc	436

Analysis For Total Metals By EPA Method 6020A

Client ID:	Comet-E-2.5	Client:	Aspect Consulting, LLC
Date Received:	04/05/18	Project:	Crownhill 100094, F&BI 804057
Date Extracted:	04/10/18	Lab ID:	804057-09 x10
Date Analyzed:	04/11/18	Data File:	804057-09 x10.081
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Lead	785

Analysis For Total Metals By EPA Method 6020A

Client ID:	Comet-W-2.5	Client:	Aspect Consulting, LLC
Date Received:	04/05/18	Project:	Crownhill 100094, F&BI 804057
Date Extracted:	04/10/18	Lab ID:	804057-10
Date Analyzed:	04/10/18	Data File:	804057-10.095
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Antimony	<1
Arsenic	1.40
Chromium	12.5
Copper	14.0
Lead	1.69
Zinc	19.5

Analysis For Total Metals By EPA Method 6020A

Client ID:	Method Blank	Client:	Aspect Consulting, LLC
Date Received:	NA	Project:	Crownhill 100094, F&BI 804057
Date Extracted:	04/10/18	Lab ID:	I8-221 mb
Date Analyzed:	04/10/18	Data File:	I8-221 mb.053
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Antimony	<1
Arsenic	<1
Chromium	<5
Copper	<5
Lead	<1
Zinc	<5

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	McKinney-20180404	Client:	Aspect Consulting, LLC
Date Received:	04/05/18	Project:	Crownhill 100094, F&BI 804057
Date Extracted:	04/05/18	Lab ID:	804057-11
Date Analyzed:	04/05/18	Data File:	040514.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	103	57	121
Toluene-d8	99	63	127
4-Bromofluorobenzene	98	60	133

Compounds:	Concentration ug/L (ppb)
Trichloroethene	<1

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	Method Blank	Client:	Aspect Consulting, LLC
Date Received:	Not Applicable	Project:	Crownhill 100094, F&BI 804057
Date Extracted:	04/05/17	Lab ID:	08-0687 mb
Date Analyzed:	04/05/18	Data File:	040512.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	99	57	121
Toluene-d8	101	63	127
4-Bromofluorobenzene	100	60	133

Compounds:	Concentration ug/L (ppb)
Trichloroethene	<1

Date of Report: 04/13/18
Date Received: 04/05/18
Project: Crownhill 100094, F&BI 804057

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

Laboratory Code: 804049-04 (Matrix Spike Silica Gel)

Analyte	Reporting Units	Spike Level	Sample Result (Wet Wt)	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Diesel Extended	mg/kg (ppm)	5,000	<50	92	96	64-133	4

Laboratory Code: Laboratory Control Sample Silica Gel

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Diesel Extended	mg/kg (ppm)	5,000	94	58-147

Date of Report: 04/13/18
Date Received: 04/05/18
Project: Crownhill 100094, F&BI 804057

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF SOIL SAMPLES FOR TOTAL METALS USING EPA METHOD 6020A

Laboratory Code: 804155-01 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result (Wet wt)	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Antimony	mg/kg (ppm)	20	<1	104	105	75-125	1
Arsenic	mg/kg (ppm)	10	1.56	101	106	75-125	5
Chromium	mg/kg (ppm)	50	17.0	96	102	75-125	6
Copper	mg/kg (ppm)	50	8.96	89	91	75-125	2
Lead	mg/kg (ppm)	50	2.06	95	96	75-125	1
Zinc	mg/kg (ppm)	50	19.5	97	96	75-125	1

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Antimony	mg/kg (ppm)	20	105	80-120
Arsenic	mg/kg (ppm)	10	99	80-120
Chromium	mg/kg (ppm)	50	100	80-120
Copper	mg/kg (ppm)	50	99	80-120
Lead	mg/kg (ppm)	50	97	80-120
Zinc	mg/kg (ppm)	50	102	80-120

Date of Report: 04/13/18
Date Received: 04/05/18
Project: Crownhill 100094, F&BI 804057

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

Laboratory Code: 804050-01 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Acceptance Criteria
Trichloroethene	ug/L (ppb)	50	<1	96	66-135

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)	50	103	102	80-120	1

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 compound 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. Compounds in the sample matrix interfered with the quantitation of the analyte.

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.

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

James E. Bruya, Ph.D.
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May 14, 2018

Dave Heffner, Project Manager
Aspect Consulting, LLC
401 2nd Ave S, Suite 201
Seattle, WA 98104

Dear Mr Heffner:

Included are the results from the testing of material submitted on May 3, 2018 from the Crownhill 100094, F&BI 805069 project. There are 12 pages included in this report. Any samples that may remain are currently scheduled for disposal in 30 days. 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: data@aspectconsulting.com
ASP0514R.DOC

CASE NARRATIVE

This case narrative encompasses samples received on May 3, 2018 by Friedman & Bruya, Inc. from the Aspect Consulting, LLC Crownhill 100094, F&BI 805069 project. Samples were logged in under the laboratory ID's listed below.

Laboratory ID	Aspect Consulting, LLC
805069 -01	MW9-20180502
805069 -02	HA-1-2.5
805069 -03	HA-3-2.5
805069 -04	HA-4-2.5
805069 -05	HA-5-2.5

All quality control requirements were acceptable.

Analysis For Total Metals By EPA Method 6020B

Client ID:	HA-1-2.5	Client:	Aspect Consulting, LLC
Date Received:	05/03/18	Project:	Crownhill 100094, F&BI 805069
Date Extracted:	05/10/18	Lab ID:	805069-02
Date Analyzed:	05/10/18	Data File:	805069-02.065
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Antimony	<1
Arsenic	1.59
Chromium	11.8
Copper	18.5
Lead	17.2
Zinc	47.2

Analysis For Total Metals By EPA Method 6020B

Client ID:	HA-3-2.5	Client:	Aspect Consulting, LLC
Date Received:	05/03/18	Project:	Crownhill 100094, F&BI 805069
Date Extracted:	05/10/18	Lab ID:	805069-03
Date Analyzed:	05/10/18	Data File:	805069-03.066
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Antimony	1.30
Arsenic	4.94
Chromium	19.7
Copper	31.5
Lead	47.3
Zinc	77.9

Analysis For Total Metals By EPA Method 6020B

Client ID:	HA-4-2.5	Client:	Aspect Consulting, LLC
Date Received:	05/03/18	Project:	Crownhill 100094, F&BI 805069
Date Extracted:	05/10/18	Lab ID:	805069-04
Date Analyzed:	05/10/18	Data File:	805069-04.069
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Antimony	1.89
Arsenic	3.61
Chromium	21.7
Copper	61.3
Lead	115 ve
Zinc	155

Analysis For Total Metals By EPA Method 6020B

Client ID:	HA-4-2.5	Client:	Aspect Consulting, LLC
Date Received:	05/03/18	Project:	Crownhill 100094, F&BI 805069
Date Extracted:	05/10/18	Lab ID:	805069-04 x10
Date Analyzed:	05/10/18	Data File:	805069-04 x10.121
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Antimony	<10
Arsenic	<10
Chromium	23.0
Copper	68.5
Lead	119
Zinc	169

Analysis For Total Metals By EPA Method 6020B

Client ID:	HA-5-2.5	Client:	Aspect Consulting, LLC
Date Received:	05/03/18	Project:	Crownhill 100094, F&BI 805069
Date Extracted:	05/10/18	Lab ID:	805069-05
Date Analyzed:	05/10/18	Data File:	805069-05.070
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Antimony	<1
Arsenic	1.90
Chromium	18.0
Copper	26.9
Lead	35.7
Zinc	45.0

Analysis For Total Metals By EPA Method 6020B

Client ID:	Method Blank	Client:	Aspect Consulting, LLC
Date Received:	Not Applicable	Project:	Crownhill 100094, F&BI 805069
Date Extracted:	05/10/18	Lab ID:	I8-298 mb2
Date Analyzed:	05/10/18	Data File:	I8-298 mb2.064
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Antimony	<1
Arsenic	<1
Chromium	<1
Copper	<5
Lead	<1
Zinc	<5

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	MW9-20180502	Client:	Aspect Consulting, LLC
Date Received:	05/03/18	Project:	Crownhill 100094, F&BI 805069
Date Extracted:	05/03/18	Lab ID:	805069-01
Date Analyzed:	05/03/18	Data File:	050316.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	100	57	121
Toluene-d8	98	63	127
4-Bromofluorobenzene	101	60	133

Compounds:	Concentration ug/L (ppb)
Trichloroethene	7.1

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	Method Blank	Client:	Aspect Consulting, LLC
Date Received:	Not Applicable	Project:	Crownhill 100094, F&BI 805069
Date Extracted:	05/03/18	Lab ID:	08-0909 mb
Date Analyzed:	05/03/18	Data File:	050307.D
Matrix:	Water	Instrument:	GCMS4
Units:	ug/L (ppb)	Operator:	JS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	100	57	121
Toluene-d8	98	63	127
4-Bromofluorobenzene	99	60	133

Compounds:	Concentration ug/L (ppb)
Trichloroethene	<1

Date of Report: 05/14/18
Date Received: 05/03/18
Project: Crownhill 100094, F&BI 805069

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

Laboratory Code: 805139-01 rex (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result (Wet wt)	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Antimony	mg/kg (ppm)	20	<1	92	93	75-125	1
Arsenic	mg/kg (ppm)	10	2.49	102	102	75-125	0
Chromium	mg/kg (ppm)	50	13.0	96	100	75-125	4
Copper	mg/kg (ppm)	50	7.31	93	93	75-125	0
Lead	mg/kg (ppm)	50	3.47	101	101	75-125	0
Zinc	mg/kg (ppm)	50	25.1	98	99	75-125	1

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Antimony	mg/kg (ppm)	20	85	80-120
Arsenic	mg/kg (ppm)	10	84	80-120
Chromium	mg/kg (ppm)	50	91	80-120
Copper	mg/kg (ppm)	50	88	80-120
Lead	mg/kg (ppm)	50	86	80-120
Zinc	mg/kg (ppm)	50	91	80-120

Date of Report: 05/14/18
Date Received: 05/03/18
Project: Crownhill 100094, F&BI 805069

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

Laboratory Code: 805069-01 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Acceptance Criteria
Trichloroethene	ug/L (ppb)	50	7.1	95	66-135

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)	50	98	96	80-120	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 compound 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. Compounds in the sample matrix interfered with the quantitation of the analyte.

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.

805069

SAMPLE CHAIN OF CUSTODY

ME 05-03-18 1 vw1/1BI2

Page # 1 of 1

Send Report To Dave Heffner

Company Aspect Consulting LLC

Address

City, State, ZIP

Phone # 206-838-5831 Fax #

Email Address dheffner@aspectconsulting.com

SAMPLERS *(signature)*
Matthew von der Ahe

PROJECT NAME/NO.
Crownhill 100094

PO #

PROJECT ADDRESS

✓ ELECTRONIC DATA REQUESTED

TURNAROUND TIME
✓ Standard Turnaround
RUSH
Rush charges authorized by:

SAMPLE DISPOSAL
- Dispose after 30 days
- Return samples
- Will call with instructions

Samples Received at ____ °C

Sample ID	Lab ID	Date	Time	Sample Type	# of containers	ANALYSES REQUESTED: TPH-Diesel	TPH-Gasoline	BTEX by 8021B	VOCs by 8260	SVOCs by 8270	HFS	TCE	Sb,As,Cr,Cu,Pb,Zn				Notes
MW9-20180502	01 A-C	5/2	16:00	WATER	3							✓					
HA-1-2.5	02	5/2	09:35	SOIL	1								✓				
HA-3-2.5	03	5/2	09:45	SOIL	1								✓				
HA-4-2.5	04	5/2	11:45	SOIL	1								✓				
HA-5-2.5	05	5/2	12:05	SOIL	1								✓				

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

FORMS\COC\COC.DOC

	SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by:	MVDA	Matthew von der Ahe	Aspect Consulting LLC	5/3	12:00
Received by:		DAVID NICACIO	FEDEX	5/3/18	1:15
Relinquished by:		Elizabeth Webber-Bruya	FBI	5/3/18	1855
Received by:					

Samples received at 5 °C

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

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

3012 16th Avenue West
Seattle, WA 98119-2029
(206) 285-8282
fbi@isomedia.com
www.friedmanandbruya.com

October 23, 2018

Dave Heffner, Project Manager
Aspect Consulting, LLC
401 2nd Ave S, Suite 201
Seattle, WA 98104

Dear Mr Heffner:

Included is the amended report from the testing of material submitted on October 2, 2018 from the Crownhill 100094, F&BI 810043 project. Per the project scope, pyridine was added to the SVOC list as a library search compound.

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: Data Aspect
ASP1015R.DOC

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

James E. Bruya, Ph.D.
Yelena Aravkina, M.S.
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Eric Young, B.S.

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October 15, 2018

Dave Heffner, Project Manager
Aspect Consulting, LLC
401 2nd Ave S, Suite 201
Seattle, WA 98104

Dear Mr Heffner:

Included are the results from the testing of material submitted on October 2, 2018 from the Crownhill 100094, F&BI 810043 project. There are 14 pages included in this report. Any samples that may remain are currently scheduled for disposal in 30 days. 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: Data Aspect
ASP1015R.DOC

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

CASE NARRATIVE

This case narrative encompasses samples received on October 2, 2018 by Friedman & Bruya, Inc. from the Aspect Consulting, LLC Crownhill 100094, F&BI 810043 project. Samples were logged in under the laboratory ID's listed below.

Laboratory ID	Aspect Consulting, LLC
810043 -01	COMP091018

The sample was sent to Fremont Analytical for reactive sulfide analysis. The report is enclosed.

Benzoic acid was detected in the 8270D method blank at a level greater than 1/10 the concentration detected in the samples. The data were flagged accordingly.

Methylene chloride was detected in the 8260C analysis. The data were flagged as due to laboratory contamination.

All other quality control requirements were acceptable.

Analysis For Semivolatile Compounds By EPA Method 8270D

Client Sample ID:	COMP091018	Client:	Aspect Consulting, LLC
Date Received:	10/02/18	Project:	Crownhill 100094, F&BI 810043
Date Extracted:	10/04/18	Lab ID:	810043-01
Date Analyzed:	10/05/18	Data File:	100511.D
Matrix:	TCLP Extract	Instrument:	GCMS8
Units:	ug/L (ppb)	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
2-Fluorophenol	70	15	99
Phenol-d6	46	11	65
Nitrobenzene-d5	100	50	150
2-Fluorobiphenyl	96	50	150
2,4,6-Tribromophenol	104	50	150
Terphenyl-d14	86	50	150

Compounds:	Concentration ug/L (ppb)	Compounds:	Concentration ug/L (ppb)
Phenol	<2	2,6-Dinitrotoluene	9.2
Bis(2-chloroethyl) ether	<0.2	3-Nitroaniline	<20
2-Chlorophenol	<2	Acenaphthene	<0.02
1,3-Dichlorobenzene	<0.2	2,4-Dinitrophenol	<6
1,4-Dichlorobenzene	<0.2	Dibenzofuran	<0.2
1,2-Dichlorobenzene	<0.2	2,4-Dinitrotoluene	<1
Benzyl alcohol	<2	4-Nitrophenol	<6
2,2'-Oxybis(1-chloropropane)	<0.2	Diethyl phthalate	<2
2-Methylphenol	<2	Fluorene	<0.02
Hexachloroethane	<0.2	4-Chlorophenyl phenyl ether	<0.2
N-Nitroso-di-n-propylamine	<0.2	N-Nitrosodiphenylamine	<0.2
3-Methylphenol + 4-Methylphenol	<4	4-Nitroaniline	<20
Nitrobenzene	<0.2	4,6-Dinitro-2-methylphenol	<6
Isophorone	<0.2	4-Bromophenyl phenyl ether	<0.2
2-Nitrophenol	<2	Hexachlorobenzene	<0.2
2,4-Dimethylphenol	<2	Pentachlorophenol	<1
Benzoic acid	12 fb	Phenanthrene	<0.02
Bis(2-chloroethoxy)methane	<0.2	Anthracene	<0.02
2,4-Dichlorophenol	<2	Carbazole	<0.2
1,2,4-Trichlorobenzene	<0.2	Di-n-butyl phthalate	<2
Naphthalene	<0.02	Fluoranthene	<0.02
Hexachlorobutadiene	<0.2	Pyrene	<0.02
4-Chloroaniline	<20	Benzyl butyl phthalate	<2
4-Chloro-3-methylphenol	<2	Benz(a)anthracene	<0.02
2-Methylnaphthalene	<0.02	Chrysene	<0.02
1-Methylnaphthalene	<0.02	Bis(2-ethylhexyl) phthalate	<3.2
Hexachlorocyclopentadiene	<0.6	Di-n-octyl phthalate	<2
2,4,6-Trichlorophenol	<2	Benzo(a)pyrene	<0.02
2,4,5-Trichlorophenol	<2	Benzo(b)fluoranthene	<0.02
2-Chloronaphthalene	<0.2	Benzo(k)fluoranthene	<0.02
2-Nitroaniline	<1	Indeno(1,2,3-cd)pyrene	<0.02
Dimethyl phthalate	<2	Dibenz(a,h)anthracene	<0.02
Acenaphthylene	<0.02	Benzo(g,h,i)perylene	<0.02
Pyridine	<2 L		

Analysis For Semivolatile Compounds By EPA Method 8270D

Client Sample ID:	Method Blank	Client:	Aspect Consulting, LLC
Date Received:	Not Applicable	Project:	Crownhill 100094, F&BI 810043
Date Extracted:	10/04/18	Lab ID:	08-2208 mb2
Date Analyzed:	10/05/18	Data File:	100510.D
Matrix:	TCLP Extract	Instrument:	GCMS8
Units:	ug/L (ppb)	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
2-Fluorophenol	70	15	99
Phenol-d6	44	11	65
Nitrobenzene-d5	103	50	150
2-Fluorobiphenyl	103	50	150
2,4,6-Tribromophenol	104	50	150
Terphenyl-d14	91	50	150

Compounds:	Concentration ug/L (ppb)	Compounds:	Concentration ug/L (ppb)
Phenol	<2	2,6-Dinitrotoluene	<1
Bis(2-chloroethyl) ether	<0.2	3-Nitroaniline	<20
2-Chlorophenol	<2	Acenaphthene	<0.02
1,3-Dichlorobenzene	<0.2	2,4-Dinitrophenol	<6
1,4-Dichlorobenzene	<0.2	Dibenzofuran	<0.2
1,2-Dichlorobenzene	<0.2	2,4-Dinitrotoluene	<1
Benzyl alcohol	<2	4-Nitrophenol	<6
2,2'-Oxybis(1-chloropropane)	<0.2	Diethyl phthalate	<2
2-Methylphenol	<2	Fluorene	<0.02
Hexachloroethane	<0.2	4-Chlorophenyl phenyl ether	<0.2
N-Nitroso-di-n-propylamine	<0.2	N-Nitrosodiphenylamine	<0.2
3-Methylphenol + 4-Methylphenol	<4	4-Nitroaniline	<20
Nitrobenzene	<0.2	4,6-Dinitro-2-methylphenol	<6
Isophorone	<0.2	4-Bromophenyl phenyl ether	<0.2
2-Nitrophenol	<2	Hexachlorobenzene	<0.2
2,4-Dimethylphenol	<2	Pentachlorophenol	<1
Benzoic acid	11 lc	Phenanthrene	<0.02
Bis(2-chloroethoxy)methane	<0.2	Anthracene	<0.02
2,4-Dichlorophenol	<2	Carbazole	<0.2
1,2,4-Trichlorobenzene	<0.2	Di-n-butyl phthalate	<2
Naphthalene	<0.02	Fluoranthene	<0.02
Hexachlorobutadiene	<0.2	Pyrene	<0.02
4-Chloroaniline	<20	Benzyl butyl phthalate	<2
4-Chloro-3-methylphenol	<2	Benz(a)anthracene	<0.02
2-Methylnaphthalene	<0.02	Chrysene	<0.02
1-Methylnaphthalene	<0.02	Bis(2-ethylhexyl) phthalate	<3.2
Hexachlorocyclopentadiene	<0.6	Di-n-octyl phthalate	<2
2,4,6-Trichlorophenol	<2	Benzo(a)pyrene	<0.02
2,4,5-Trichlorophenol	<2	Benzo(b)fluoranthene	<0.02
2-Chloronaphthalene	<0.2	Benzo(k)fluoranthene	<0.02
2-Nitroaniline	<1	Indeno(1,2,3-cd)pyrene	<0.02
Dimethyl phthalate	<2	Dibenz(a,h)anthracene	<0.02
Acenaphthylene	<0.02	Benzo(g,h,i)perylene	<0.02
Pyridine	<2 L		

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	COMP091018	Client:	Aspect Consulting, LLC
Date Received:	10/02/18	Project:	Crownhill 100094, F&BI 810043
Date Extracted:	10/08/18	Lab ID:	810043-01 1/200
Date Analyzed:	10/09/18	Data File:	100909.D
Matrix:	TCLP Extract	Instrument:	GCMS9
Units:	ug/L (ppb)	Operator:	MS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	101	50	150
Toluene-d8	99	50	150
4-Bromofluorobenzene	95	50	150

Compounds:	Concentration ug/L (ppb)	Compounds:	Concentration ug/L (ppb)
Dichlorodifluoromethane	<200	1,3-Dichloropropane	<200
Chloromethane	<2,000	Tetrachloroethene	<200
Vinyl chloride	<40	Dibromochloromethane	<200
Bromomethane	<200	1,2-Dibromoethane (EDB)	<200
Chloroethane	<200	Chlorobenzene	<200
Trichlorofluoromethane	<200	Ethylbenzene	<200
Acetone	<10,000	1,1,1,2-Tetrachloroethane	<200
1,1-Dichloroethene	<200	m,p-Xylene	<400
Hexane	<200	o-Xylene	<200
Methylene chloride	1,400 lc	Styrene	<200
Methyl t-butyl ether (MTBE)	<200	Isopropylbenzene	<200
trans-1,2-Dichloroethene	<200	Bromoform	<200
1,1-Dichloroethane	<200	n-Propylbenzene	<200
2,2-Dichloropropane	<200	Bromobenzene	<200
cis-1,2-Dichloroethene	<200	1,3,5-Trimethylbenzene	<200
Chloroform	<200	1,1,2,2-Tetrachloroethane	<200
2-Butanone (MEK)	<2,000	1,2,3-Trichloropropane	<200
1,2-Dichloroethane (EDC)	<200	2-Chlorotoluene	<200
1,1,1-Trichloroethane	<200	4-Chlorotoluene	<200
1,1-Dichloropropene	<200	tert-Butylbenzene	<200
Carbon tetrachloride	<200	1,2,4-Trimethylbenzene	<200
Benzene	<70	sec-Butylbenzene	<200
Trichloroethene	<200	p-Isopropyltoluene	<200
1,2-Dichloropropane	<200	1,3-Dichlorobenzene	<200
Bromodichloromethane	<200	1,4-Dichlorobenzene	<200
Dibromomethane	<200	1,2-Dichlorobenzene	<200
4-Methyl-2-pentanone	<2,000	1,2-Dibromo-3-chloropropane	<2,000
cis-1,3-Dichloropropene	<200	1,2,4-Trichlorobenzene	<200
Toluene	<200	Hexachlorobutadiene	<200
trans-1,3-Dichloropropene	<200	Naphthalene	<200
1,1,2-Trichloroethane	<200	1,2,3-Trichlorobenzene	<200
2-Hexanone	<2,000		

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	Method Blank	Client:	Aspect Consulting, LLC
Date Received:	Not Applicable	Project:	Crownhill 100094, F&BI 810043
Date Extracted:	10/08/18	Lab ID:	08-2227 mb 1/200
Date Analyzed:	10/09/18	Data File:	100908.D
Matrix:	TCLP Extract	Instrument:	GCMS9
Units:	ug/L (ppb)	Operator:	MS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	100	50	150
Toluene-d8	99	50	150
4-Bromofluorobenzene	96	50	150

Compounds:	Concentration ug/L (ppb)	Compounds:	Concentration ug/L (ppb)
Dichlorodifluoromethane	<200	1,3-Dichloropropane	<200
Chloromethane	<2,000	Tetrachloroethene	<200
Vinyl chloride	<40	Dibromochloromethane	<200
Bromomethane	<200	1,2-Dibromoethane (EDB)	<200
Chloroethane	<200	Chlorobenzene	<200
Trichlorofluoromethane	<200	Ethylbenzene	<200
Acetone	<10,000	1,1,1,2-Tetrachloroethane	<200
1,1-Dichloroethene	<200	m,p-Xylene	<400
Hexane	<200	o-Xylene	<200
Methylene chloride	<1,000	Styrene	<200
Methyl t-butyl ether (MTBE)	<200	Isopropylbenzene	<200
trans-1,2-Dichloroethene	<200	Bromoform	<200
1,1-Dichloroethane	<200	n-Propylbenzene	<200
2,2-Dichloropropane	<200	Bromobenzene	<200
cis-1,2-Dichloroethene	<200	1,3,5-Trimethylbenzene	<200
Chloroform	<200	1,1,2,2-Tetrachloroethane	<200
2-Butanone (MEK)	<2,000	1,2,3-Trichloropropane	<200
1,2-Dichloroethane (EDC)	<200	2-Chlorotoluene	<200
1,1,1-Trichloroethane	<200	4-Chlorotoluene	<200
1,1-Dichloropropene	<200	tert-Butylbenzene	<200
Carbon tetrachloride	<200	1,2,4-Trimethylbenzene	<200
Benzene	<70	sec-Butylbenzene	<200
Trichloroethene	<200	p-Isopropyltoluene	<200
1,2-Dichloropropane	<200	1,3-Dichlorobenzene	<200
Bromodichloromethane	<200	1,4-Dichlorobenzene	<200
Dibromomethane	<200	1,2-Dichlorobenzene	<200
4-Methyl-2-pentanone	<2,000	1,2-Dibromo-3-chloropropane	<2,000
cis-1,3-Dichloropropene	<200	1,2,4-Trichlorobenzene	<200
Toluene	<200	Hexachlorobutadiene	<200
trans-1,3-Dichloropropene	<200	Naphthalene	<200
1,1,2-Trichloroethane	<200	1,2,3-Trichlorobenzene	<200
2-Hexanone	<2,000		

Analysis for TCLP Metals By EPA Method 6020B and 1311

Client ID:	COMP091018	Client:	Aspect Consulting, LLC
Date Received:	10/02/18	Project:	Crownhill 100094, F&BI 810043
Date Extracted:	10/04/18	Lab ID:	810043-01
Date Analyzed:	10/05/18	Data File:	810043-01.092
Matrix:	Soil/Solid	Instrument:	ICPMS2
Units:	mg/L (ppm)	Operator:	SP

Analyte:	Concentration mg/L (ppm)	TCLP Limit
Arsenic	<1	5.0
Barium	<1	100
Cadmium	<1	1.0
Chromium	<1	5.0
Lead	<1	5.0
Mercury	<0.1	0.2
Selenium	<1	1.0
Silver	<1	5.0

Analysis for TCLP Metals By EPA Method 6020B and 1311

Client ID:	Method Blank	Client:	Aspect Consulting, LLC
Date Received:	Not Applicable	Project:	Crownhill 100094, F&BI 810043
Date Extracted:	10/04/18	Lab ID:	I8-669 mb
Date Analyzed:	10/05/18	Data File:	I8-669 mb.090
Matrix:	Soil/Solid	Instrument:	ICPMS2
Units:	mg/L (ppm)	Operator:	SP

Analyte:	Concentration mg/L (ppm)	TCLP Limit
Arsenic	<1	5.0
Barium	<1	100
Cadmium	<1	1.0
Chromium	<1	5.0
Lead	<1	5.0
Mercury	<0.1	0.2
Selenium	<1	1.0
Silver	<1	5.0

Analysis For PCBs By EPA Method 8082A

Client Sample ID:	COMP091018	Client:	Aspect Consulting, LLC
Date Received:	10/02/18	Project:	Crownhill 100094, F&BI 810043
Date Extracted:	10/03/18	Lab ID:	810043-01 1/6
Date Analyzed:	10/04/18	Data File:	100339.D
Matrix:	Soil	Instrument:	GC7
Units:	mg/kg (ppm) Dry Weight	Operator:	ML

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
TCMX	80	29	154

Compounds:	Concentration mg/kg (ppm)
Aroclor 1221	<0.02
Aroclor 1232	<0.02
Aroclor 1016	<0.02
Aroclor 1242	<0.02
Aroclor 1248	<0.02
Aroclor 1254	<0.02
Aroclor 1260	<0.02
Aroclor 1262	<0.02
Aroclor 1268	<0.02

Analysis For PCBs By EPA Method 8082A

Client Sample ID:	Method Blank	Client:	Aspect Consulting, LLC
Date Received:	Not Applicable	Project:	Crownhill 100094, F&BI 810043
Date Extracted:	10/03/18	Lab ID:	08-2205 mb2 1/6
Date Analyzed:	10/03/18	Data File:	100332.D
Matrix:	Soil	Instrument:	GC7
Units:	mg/kg (ppm) Dry Weight	Operator:	ML

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
TCMX	80	29	154

Compounds:	Concentration mg/kg (ppm)
Aroclor 1221	<0.02
Aroclor 1232	<0.02
Aroclor 1016	<0.02
Aroclor 1242	<0.02
Aroclor 1248	<0.02
Aroclor 1254	<0.02
Aroclor 1260	<0.02
Aroclor 1262	<0.02
Aroclor 1268	<0.02

Date of Report: 10/15/18
Date Received: 10/02/18
Project: Crownhill 100094, F&BI 810043

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF TCLP Extract SAMPLES FOR SEMIVOLATILES BY EPA METHOD 8270D

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
Phenol	ug/L (ppb)	10	47	44	10-86	7
Bis(2-chloroethyl) ether	ug/L (ppb)	10	100	99	70-130	1
2-Chlorophenol	ug/L (ppb)	10	94	97	58-123	3
1,3-Dichlorobenzene	ug/L (ppb)	10	94	89	66-113	5
1,4-Dichlorobenzene	ug/L (ppb)	10	96	91	70-130	5
1,2-Dichlorobenzene	ug/L (ppb)	10	97	93	70-130	4
Benzyl alcohol	ug/L (ppb)	10	90	92	56-114	2
2,2'-Oxybis(1-chloropropane)	ug/L (ppb)	10	93	91	51-124	2
2-Methylphenol	ug/L (ppb)	10	82	87	38-100	6
Hexachloroethane	ug/L (ppb)	10	94	90	64-117	4
N-Nitroso-di-n-propylamine	ug/L (ppb)	10	101	98	70-130	3
3-Methylphenol + 4-Methylphenol	ug/L (ppb)	10	81	86	44-110	6
Nitrobenzene	ug/L (ppb)	10	98	99	70-130	1
Isophorone	ug/L (ppb)	10	100	101	70-130	1
2-Nitrophenol	ug/L (ppb)	10	92	95	70-130	3
2,4-Dimethylphenol	ug/L (ppb)	10	78	87	12-127	11
Benzoic acid	ug/L (ppb)	65	35	36	10-102	3
Bis(2-chloroethoxy)methane	ug/L (ppb)	10	100	100	70-130	0
2,4-Dichlorophenol	ug/L (ppb)	10	99	103	70-130	4
1,2,4-Trichlorobenzene	ug/L (ppb)	10	99	94	70-130	5
Naphthalene	ug/L (ppb)	10	94	92	70-130	2
Hexachlorobutadiene	ug/L (ppb)	10	91	90	65-115	1
4-Chloroaniline	ug/L (ppb)	20	96	104	49-129	8
4-Chloro-3-methylphenol	ug/L (ppb)	10	96	105	65-133	9
2-Methylnaphthalene	ug/L (ppb)	10	95	96	70-130	1
1-Methylnaphthalene	ug/L (ppb)	10	93	93	70-130	0
Hexachlorocyclopentadiene	ug/L (ppb)	10	64	75	36-112	16
2,4,6-Trichlorophenol	ug/L (ppb)	10	99	104	70-130	5
2,4,5-Trichlorophenol	ug/L (ppb)	10	100	100	70-130	0
2-Chloronaphthalene	ug/L (ppb)	10	100	100	70-130	0
2-Nitroaniline	ug/L (ppb)	10	98	99	64-143	1
Dimethyl phthalate	ug/L (ppb)	10	100	99	70-130	1
Acenaphthylene	ug/L (ppb)	10	101	101	70-130	0
2,6-Dinitrotoluene	ug/L (ppb)	10	102	98	70-130	4
3-Nitroaniline	ug/L (ppb)	20	89	93	59-130	4
Acenaphthene	ug/L (ppb)	10	95	94	70-130	1
2,4-Dinitrophenol	ug/L (ppb)	10	96	99	63-137	3
Dibenzofuran	ug/L (ppb)	10	98	98	70-130	0
2,4-Dinitrotoluene	ug/L (ppb)	10	98	100	70-130	2
4-Nitrophenol	ug/L (ppb)	10	50	50	10-89	0
Diethyl phthalate	ug/L (ppb)	10	106	101	67-128	5
Fluorene	ug/L (ppb)	10	100	99	70-130	1
4-Chlorophenyl phenyl ether	ug/L (ppb)	10	101	100	70-130	1
N-Nitrosodiphenylamine	ug/L (ppb)	10	98	98	70-130	0
4-Nitroaniline	ug/L (ppb)	20	91	95	66-134	4
4,6-Dinitro-2-methylphenol	ug/L (ppb)	10	102	108	69-138	6
4-Bromophenyl phenyl ether	ug/L (ppb)	10	159 vo	158 vo	70-130	1
Hexachlorobenzene	ug/L (ppb)	10	87	88	70-130	1
Pentachlorophenol	ug/L (ppb)	10	91	95	70-130	4
Phenanthrene	ug/L (ppb)	10	94	95	70-130	1
Anthracene	ug/L (ppb)	10	95	96	70-130	1
Carbazole	ug/L (ppb)	10	104	105	70-130	1
Di-n-butyl phthalate	ug/L (ppb)	10	107	107	70-130	0
Fluoranthene	ug/L (ppb)	10	100	102	70-130	2
Pyrene	ug/L (ppb)	10	103	100	70-130	3
Benzyl butyl phthalate	ug/L (ppb)	10	99	101	70-130	2
Benz(a)anthracene	ug/L (ppb)	10	98	99	70-130	1
Chrysene	ug/L (ppb)	10	98	99	70-130	1
Bis(2-ethylhexyl) phthalate	ug/L (ppb)	10	102	106	70-130	4
Di-n-octyl phthalate	ug/L (ppb)	10	95	103	67-147	8
Benzo(a)pyrene	ug/L (ppb)	10	97	98	70-130	1
Benzo(b)fluoranthene	ug/L (ppb)	10	95	97	70-130	2
Benzo(k)fluoranthene	ug/L (ppb)	10	96	98	70-130	2
Indeno(1,2,3-cd)pyrene	ug/L (ppb)	10	107	110	66-137	3
Dibenz(a,h)anthracene	ug/L (ppb)	10	103	107	63-142	4
Benzo(g,h,i)perylene	ug/L (ppb)	10	99	102	60-139	3

Date of Report: 10/15/18
Date Received: 10/02/18
Project: Crownhill 100094, F&BI 810043

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATCLP EXTRACT SAMPLES FOR VOLATILES BY EPA METHOD 8260C

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
Dichlorodifluoromethane	ug/L (ppb)	50	111	103	50-157	7
Chloromethane	ug/L (ppb)	50	96	90	62-130	6
Vinyl chloride	ug/L (ppb)	50	105	99	70-128	6
Bromomethane	ug/L (ppb)	50	101	103	62-188	2
Chloroethane	ug/L (ppb)	50	108	102	66-149	6
Trichlorofluoromethane	ug/L (ppb)	50	109	105	70-132	4
Acetone	ug/L (ppb)	250	96	94	44-145	2
1,1-Dichloroethene	ug/L (ppb)	50	104	98	75-119	6
Hexane	ug/L (ppb)	50	105	103	51-153	2
Methylene chloride	ug/L (ppb)	50	115	100	63-132	14
Methyl t-butyl ether (MTBE)	ug/L (ppb)	50	97	95	70-122	2
trans-1,2-Dichloroethene	ug/L (ppb)	50	100	96	76-118	4
1,1-Dichloroethane	ug/L (ppb)	50	102	99	77-119	3
2,2-Dichloropropane	ug/L (ppb)	50	101	102	62-141	1
cis-1,2-Dichloroethene	ug/L (ppb)	50	100	98	76-119	2
Chloroform	ug/L (ppb)	50	98	96	78-117	2
2-Butanone (MEK)	ug/L (ppb)	250	91	96	49-147	5
1,2-Dichloroethane (EDC)	ug/L (ppb)	50	102	103	78-114	1
1,1,1-Trichloroethane	ug/L (ppb)	50	102	101	80-116	1
1,1-Dichloropropene	ug/L (ppb)	50	99	98	78-119	1
Carbon tetrachloride	ug/L (ppb)	50	104	101	72-128	3
Benzene	ug/L (ppb)	50	95	94	75-116	1
Trichloroethene	ug/L (ppb)	50	98	98	72-119	0
1,2-Dichloropropane	ug/L (ppb)	50	98	99	79-121	1
Bromodichloromethane	ug/L (ppb)	50	102	102	76-120	0
Dibromomethane	ug/L (ppb)	50	92	94	79-121	2
4-Methyl-2-pentanone	ug/L (ppb)	250	95	101	54-153	6
cis-1,3-Dichloropropene	ug/L (ppb)	50	98	100	76-128	2
Toluene	ug/L (ppb)	50	97	98	79-115	1
trans-1,3-Dichloropropene	ug/L (ppb)	50	95	98	76-128	3
1,1,2-Trichloroethane	ug/L (ppb)	50	95	98	78-120	3
2-Hexanone	ug/L (ppb)	250	88	97	49-147	10
1,3-Dichloropropane	ug/L (ppb)	50	92	95	81-115	3
Tetrachloroethene	ug/L (ppb)	50	96	96	78-109	0
Dibromochloromethane	ug/L (ppb)	50	100	102	63-140	2
1,2-Dibromoethane (EDB)	ug/L (ppb)	50	93	98	82-118	5
Chlorobenzene	ug/L (ppb)	50	93	94	80-113	1
Ethylbenzene	ug/L (ppb)	50	93	95	83-111	2
1,1,1,2-Tetrachloroethane	ug/L (ppb)	50	102	101	76-125	1
m,p-Xylene	ug/L (ppb)	100	93	95	84-112	2
o-Xylene	ug/L (ppb)	50	97	98	81-117	1
Styrene	ug/L (ppb)	50	95	98	83-121	3
Isopropylbenzene	ug/L (ppb)	50	96	97	81-122	1
Bromoform	ug/L (ppb)	50	99	101	40-161	2
n-Propylbenzene	ug/L (ppb)	50	96	96	81-115	0
Bromobenzene	ug/L (ppb)	50	95	96	80-113	1
1,3,5-Trimethylbenzene	ug/L (ppb)	50	99	98	83-117	1
1,1,2,2-Tetrachloroethane	ug/L (ppb)	50	95	97	79-118	2
1,2,3-Trichloropropane	ug/L (ppb)	50	98	99	74-116	1
2-Chlorotoluene	ug/L (ppb)	50	96	95	79-112	1
4-Chlorotoluene	ug/L (ppb)	50	98	98	80-116	0
tert-Butylbenzene	ug/L (ppb)	50	100	98	81-119	2
1,2,4-Trimethylbenzene	ug/L (ppb)	50	99	98	81-121	1
sec-Butylbenzene	ug/L (ppb)	50	99	97	83-123	2
p-Isopropyltoluene	ug/L (ppb)	50	99	97	81-122	2
1,3-Dichlorobenzene	ug/L (ppb)	50	97	97	80-115	0
1,4-Dichlorobenzene	ug/L (ppb)	50	92	93	77-112	1
1,2-Dichlorobenzene	ug/L (ppb)	50	95	94	79-115	1
1,2-Dibromo-3-chloropropane	ug/L (ppb)	50	102	102	62-133	0
1,2,4-Trichlorobenzene	ug/L (ppb)	50	101	100	75-119	1
Hexachlorobutadiene	ug/L (ppb)	50	99	97	70-116	2
Naphthalene	ug/L (ppb)	50	101	100	72-131	1
1,2,3-Trichlorobenzene	ug/L (ppb)	50	93	93	74-122	0

Date of Report: 10/15/18
Date Received: 10/02/18
Project: Crownhill 100094, F&BI 810043

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF SOIL/SOLID SAMPLES FOR TCLP METALS USING EPA METHODS 6020B AND 1311

Laboratory Code: 810043-01 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Arsenic	mg/L (ppm)	1.0	<1	90	90	75-125	0
Barium	mg/L (ppm)	5.0	<1	103	103	75-125	0
Cadmium	mg/L (ppm)	0.5	<1	102	102	75-125	0
Chromium	mg/L (ppm)	2.0	<1	101	101	75-125	0
Lead	mg/L (ppm)	1.0	<1	90	91	75-125	1
Mercury	mg/L (ppm)	1.0	<0.1	90	91	75-125	1
Selenium	mg/L (ppm)	0.5	<1	92	93	75-125	1
Silver	mg/L (ppm)	0.5	<1	79	79	75-125	0

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Arsenic	mg/L (ppm)	1.0	101	80-120
Barium	mg/L (ppm)	5.0	101	80-120
Cadmium	mg/L (ppm)	0.5	101	80-120
Chromium	mg/L (ppm)	2.0	102	80-120
Lead	mg/L (ppm)	1.0	98	80-120
Mercury	mg/L (ppm)	1.0	87	80-120
Selenium	mg/L (ppm)	0.5	100	80-120
Silver	mg/L (ppm)	0.5	83	80-120

Date of Report: 10/15/18
Date Received: 10/02/18
Project: Crownhill 100094, F&BI 810043

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF SOIL SAMPLES FOR POLYCHLORINATED BIPHENYLS AS AROCLOR 1016/1260 BY EPA METHOD 8082A

Laboratory Code: 809525-11 1/6 (Matrix Spike) 1/6

Analyte	Reporting Units	Spike Level	Sample Result (Wet Wt)	Percent Recovery MS	Control Limits
Aroclor 1016	mg/kg (ppm)	0.5	<0.02	85	38-122
Aroclor 1260	mg/kg (ppm)	0.5	<0.02	97	39-131

Laboratory Code: Laboratory Control Sample 1/6

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
Aroclor 1016	mg/kg (ppm)	0.5	91	96	55-130	5
Aroclor 1260	mg/kg (ppm)	0.5	109	110	58-133	1

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 compound 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. Compounds in the sample matrix interfered with the quantitation of the analyte.

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.

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

Friedman & Bruya
Michael Erdahl
3012 16th Ave. W.
Seattle, WA 98119

RE: 810043
Work Order Number: 1810162

October 12, 2018

Attention Michael Erdahl:

Fremont Analytical, Inc. received 1 sample(s) on 10/3/2018 for the analyses presented in the following report.

Sample Moisture (Percent Moisture)
Sulfide by SM4500-S2-F (MOD)

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,

Mike Ridgeway
Laboratory Director

Date: *10/12/2018*

CLIENT: Friedman & Bruya
Project: 810043
Work Order: 1810162

Work Order Sample Summary

Lab Sample ID	Client Sample ID	Date/Time Collected	Date/Time Received
1810162-001	COMP091018	09/10/2018 3:30 PM	10/03/2018 12:22 PM

Case Narrative

WO#: **1810162**
Date: **10/12/2018**

CLIENT: Friedman & Bruya
Project: 810043

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 (<20%RSD, <20% Drift or minimum RRF)
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
HEM - Hexane Extractable Material
ICV - Initial Calibration Verification
LCS/LCSD - Laboratory Control Sample / Laboratory Control Sample Duplicate
MB or MBLANK - Method Blank
MDL - Method Detection Limit
MS/MSD - Matrix Spike / Matrix Spike Duplicate
PDS - Post Digestion Spike
Ref Val - Reference Value
RL - Reporting Limit
RPD - Relative Percent Difference
SD - Serial Dilution
SGT - Silica Gel Treatment
SPK - Spike
Surr - Surrogate

Analytical Report

Work Order: **1810162**
Date Reported: **10/12/2018**

Client: Friedman & Bruya
Collection Date: 9/10/2018 3:30:00 PM
Project: 810043
Lab ID: 1810162-001
Matrix: Soil
Client Sample ID: **COMP091018**

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Sample Moisture (Percent Moisture)				Batch ID: R46799		Analyst: CJ
Percent Moisture	18.4	0.500		wt%	1	10/9/2018 11:26:00 AM
Sulfide by SM4500-S2-F (MOD)				Batch ID: R46903		Analyst: GM
Sulfide, Reactive pH2	ND	0.613		mg/Kg-dry	1	10/12/2018 12:31:00 PM
Sulfide, Reactive pH7	ND	0.613		mg/Kg-dry	1	10/12/2018 12:31:00 PM
Sulfide, Reactive pH12	ND	0.613		mg/Kg-dry	1	10/12/2018 12:31:00 PM

NOTES:
pH 12 - Adjusted with a drop of 1:1 NaOH; no noticeable reaction:
1) No noticeable/visible reaction upon receipt and visual inspection
2) No reaction with water
3) No noticeable vapor/gases with adjusted pH

pH 2 - Adjusted with a drop of 1:1 HCl; no noticeable reaction
1) No noticeable/visible reaction upon receipt and visual inspection
2) No reaction with water
3) No noticeable vapor/gases with adjusted pH

ph 7 - No adjustment needed
1) No noticeable/visible reaction upon receipt and visual inspection
2) No reaction with water
3) No noticeable vapor/gases with adjusted pH

Work Order: 1810162
CLIENT: Friedman & Bruya
Project: 810043

QC SUMMARY REPORT

Sulfide by SM4500-S2-F (MOD)

Sample ID	**MB-R46903**	SampType:	**MBLK**	Units:	**mg/Kg**	Prep Date:	**10/12/2018**	RunNo:	**46903**
Client ID:	**MBLKS**	Batch ID:	**R46903**			Analysis Date:	**10/12/2018**	SeqNo:	**912329**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfide	ND	0.500									

Sample ID	**LCS-R46903**	SampType:	**LCS**	Units:	**mg/Kg**	Prep Date:	**10/12/2018**	RunNo:	**46903**
Client ID:	**LCSS**	Batch ID:	**R46903**			Analysis Date:	**10/12/2018**	SeqNo:	**912330**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfide	2.02	0.500	2.000	0	101	65	135				

Sample ID	**LCSD-R46903**	SampType:	**LCSD**	Units:	**mg/Kg**	Prep Date:	**10/12/2018**	RunNo:	**46903**
Client ID:	**LCSS02**	Batch ID:	**R46903**			Analysis Date:	**10/12/2018**	SeqNo:	**912334**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfide	2.15	0.500	2.000	0	108	65	135	2.000	7.23	20	

Work Order: 1810162
CLIENT: Friedman & Bruya
Project: 810043

QC SUMMARY REPORT

Sample Moisture (Percent Moisture)

Sample ID **1810130-007ADUP**	SampType: **DUP**	Units: **wt%**	Prep Date: **10/9/2018**	RunNo: **46799**
Client ID: **BATCH**	Batch ID: **R46799**		Analysis Date: **10/9/2018**	SeqNo: **910306**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Percent Moisture	15.9	0.500						15.59	2.20	20	

Sample ID **1810198-001ADUP**	SampType: **DUP**	Units: **wt%**	Prep Date: **10/9/2018**	RunNo: **46799**
Client ID: **BATCH**	Batch ID: **R46799**		Analysis Date: **10/9/2018**	SeqNo: **910310**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Percent Moisture	11.8	0.500						12.50	6.02	20	

Sample Log-In Check List

Client Name:	**FB**	Work Order Number:	**1810162**
Logged by:	**Brianna Barnes**	Date Received:	**10/3/2018 12:22:00 PM**

Chain of Custody

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

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 Required ☑
6.	Was an attempt made to cool the samples?	Yes ☑	No ☐	NA ☐
7.	Were all items received at a temperature of >0°C to 10.0°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 ☐ Zn Acetate
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
Cooler	3.2
Sample	4.9

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

SUBCONTRACT SAMPLE CHAIN OF CUSTODY

1810162

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 Fax # (206) 283-5044

SUBCONTRACTER Fremont

PROJECT NAME/NO.	PO #
810043	A 540

REMARKS

Please Email Results

TURNAROUND TIME

☒ Standard (~~2 Weeks~~) 1 Week.

☐ 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	Sample Type	# of containers	ANALYSES REQUESTED: Total Fe	Hardness	Sulfate	Reactive Sulfide / Nitrate	Nitrite	Alkalinity	Sulfide	TKN	Total Phosphorus	Dissolved Gasses	Notes
COMP091018		9/10/16	1530	Soil	1				X							

Page 9 of 9

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	10/3/16	10:30AM
Received by:		Nicole Greene	FAI	10/3	12:22
Relinquished by:					
Received by:					

810043

SAMPLE CHAIN OF CUSTODY

ME 10-02-18

VSP3/BI1

Report To Dave Heffner

Company Aspect Consulting

Address 401 2nd Ave S. #201

City, State, ZIP Seattle, WA 98104

Phone 206-838-5831 Email dheffner@aspectconsulting.com

SAMPLERS (*signature*) Dave Heffner

PROJECT NAME: Crownhill

PO #: 100094

REMARKS

INVOICE TO: AP

Page # 1 of 1

TURNAROUND TIME
- [x] Standard Turnaround
- [ ] RUSH
- Rush charges authorized by:

SAMPLE DISPOSAL
- [x] Dispose after 30 days
- [ ] Archive Samples
- [ ] Other

Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	ANALYSES REQUESTED: TPH-HCID	TPH-Diesel	TPH-Gasoline	BTEX by 8021B	VOCs by 8260C	SVOCs by 8270D	PAHs 8270D SIM	TCLP Volatiles	TCLP Semi-Volatiles	TCLP Metals (RCRA)	Total PCBs	Reactive Sulfide	Notes
COMP091018	01 A-F	9/10/18	1530	Soil	6								X	X	X	X	X	

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by: Dave Heffner	Dave Heffner	Aspect	10/2/18	8:10
Received by:	DAVID NICACIO	FEDEX	10/2/18	2:19
Relinquished by:	Liz Mesbergen	FTB1	10/2/18	15:35
Received by:		Samples received at		3 °C

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

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

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

3012 16th Avenue West
Seattle, WA 98119-2029
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November 5, 2018

Dave Heffner, Project Manager
Aspect Consulting, LLC
401 2nd Ave S, Suite 201
Seattle, WA 98104

Dear Mr Heffner:

Included are the results from the testing of material submitted on October 26, 2018 from the Crownhill Elem. 100094, F&BI 810513 project. There are 17 pages included in this report. Any samples that may remain are currently scheduled for disposal in 30 days. 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: Data Aspect
ASP1105R.DOC

CASE NARRATIVE

This case narrative encompasses samples received on October 26, 2018 by Friedman & Bruya, Inc. from the Aspect Consulting, LLC Crownhill Elem. 100094, F&BI 810513 project. Samples were logged in under the laboratory ID's listed below.

Laboratory ID	Aspect Consulting, LLC
810513 -01	MW-9-102618
810513 -02	MW-15-102618
810513 -03	MW-6-102618
810513 -04	MW-10-102618
810513 -05	MW-12-102618
810513 -06	McKinney-102618
810513 -07	Drum-102618

A 6020A internal standard failed the acceptance criteria for sample Drum-102618 due to matrix interferences. The data were flagged accordingly. The sample was diluted and reanalyzed.

All other quality control requirements were acceptable.

Date of Report: 11/05/18
Date Received: 10/26/18
Project: Crownhill Elem. 100094, F&BI 810513
Date Extracted: 10/30/18
Date Analyzed: 10/30/18

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-15-102618 810513-02 1/1.2	<60	<300	94
MW-10-102618 810513-04	<50	<250	92
MW-12-102618 810513-05	2,200 x	510 x	99
Method Blank 08-2454 MB	<50	<250	91

Analysis For Total Metals By EPA Method 6020B

Client ID:	MW-6-102618	Client:	Aspect Consulting, LLC
Date Received:	10/26/18	Project:	Crownhill Elem. 100094, F&BI 810513
Date Extracted:	10/30/18	Lab ID:	810513-03
Date Analyzed:	10/30/18	Data File:	810513-03.078
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	23.0

Analysis For Total Metals By EPA Method 6020B

Client ID:	MW-10-102618	Client:	Aspect Consulting, LLC
Date Received:	10/26/18	Project:	Crownhill Elem. 100094, F&BI 810513
Date Extracted:	10/30/18	Lab ID:	810513-04
Date Analyzed:	10/30/18	Data File:	810513-04.081
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	1.84

Analysis For Total Metals By EPA Method 6020B

Client ID:	Drum-102618	Client:	Aspect Consulting, LLC
Date Received:	10/26/18	Project:	Crownhill Elem. 100094, F&BI 810513
Date Extracted:	10/30/18	Lab ID:	810513-07 x2
Date Analyzed:	10/31/18	Data File:	810513-07 x2.070
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	4.15
Barium	67.7
Cadmium	<2
Chromium	9.14 J
Copper	54.4 J
Lead	40.9
Mercury	<2
Nickel	14.6 J
Selenium	<2
Silver	<2
Zinc	2,980 J

Analysis For Total Metals By EPA Method 6020B

Client ID:	Drum-102618	Client:	Aspect Consulting, LLC
Date Received:	10/26/18	Project:	Crownhill Elem. 100094, F&BI 810513
Date Extracted:	10/30/18	Lab ID:	810513-07 x10
Date Analyzed:	10/30/18	Data File:	810513-07 x10.083
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Chromium	11.4
Copper	69.0
Nickel	18.9
Zinc	3,740

Analysis For Total Metals By EPA Method 6020B

Client ID:	Method Blank	Client:	Aspect Consulting, LLC
Date Received:	NA	Project:	Crownhill Elem. 100094, F&BI 810513
Date Extracted:	10/30/18	Lab ID:	I8-739 mb
Date Analyzed:	10/30/18	Data File:	I8-739 mb.066
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	<1
Barium	<1
Cadmium	<1
Chromium	<1
Copper	<5
Lead	<1
Mercury	<1
Nickel	<1
Selenium	<1
Silver	<1
Zinc	<5

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	MW-9-102618	Client:	Aspect Consulting, LLC
Date Received:	10/26/18	Project:	Crownhill Elem. 100094, F&BI 810513
Date Extracted:	10/30/18	Lab ID:	810513-01
Date Analyzed:	10/30/18	Data File:	103038.D
Matrix:	Water	Instrument:	GCMS9
Units:	ug/L (ppb)	Operator:	MS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	100	50	150
Toluene-d8	97	50	150
4-Bromofluorobenzene	99	50	150

Compounds:	Concentration ug/L (ppb)
Trichloroethene	7.9

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	MW-10-102618	Client:	Aspect Consulting, LLC
Date Received:	10/26/18	Project:	Crownhill Elem. 100094, F&BI 810513
Date Extracted:	10/30/18	Lab ID:	810513-04
Date Analyzed:	10/31/18	Data File:	103039.D
Matrix:	Water	Instrument:	GCMS9
Units:	ug/L (ppb)	Operator:	MS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	102	50	150
Toluene-d8	99	50	150
4-Bromofluorobenzene	99	50	150

Compounds:	Concentration ug/L (ppb)
Trichloroethene	<1

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	McKinney-102618	Client:	Aspect Consulting, LLC
Date Received:	10/26/18	Project:	Crownhill Elem. 100094, F&BI 810513
Date Extracted:	10/30/18	Lab ID:	810513-06
Date Analyzed:	10/31/18	Data File:	103040.D
Matrix:	Water	Instrument:	GCMS9
Units:	ug/L (ppb)	Operator:	MS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	99	50	150
Toluene-d8	98	50	150
4-Bromofluorobenzene	100	50	150

Compounds:	Concentration ug/L (ppb)
Trichloroethene	<1

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	Drum-102618	Client:	Aspect Consulting, LLC
Date Received:	10/26/18	Project:	Crownhill Elem. 100094, F&BI 810513
Date Extracted:	10/31/18	Lab ID:	810513-07 1/5
Date Analyzed:	11/01/18	Data File:	110113.D
Matrix:	Water	Instrument:	GCMS9
Units:	ug/L (ppb)	Operator:	MS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	101	50	150
Toluene-d8	97	50	150
4-Bromofluorobenzene	97	50	150

Compounds:	Concentration ug/L (ppb)	Compounds:	Concentration ug/L (ppb)
Dichlorodifluoromethane	<5	1,3-Dichloropropane	<5
Chloromethane	<50	Tetrachloroethene	<5
Vinyl chloride	<1	Dibromochloromethane	<5
Bromomethane	<5	1,2-Dibromoethane (EDB)	<5
Chloroethane	<5	Chlorobenzene	<5
Trichlorofluoromethane	<5	Ethylbenzene	<5
Acetone	710	1,1,1,2-Tetrachloroethane	<5
1,1-Dichloroethene	<5	m,p-Xylene	<10
Hexane	<5	o-Xylene	<5
Methylene chloride	<25	Styrene	<5
Methyl t-butyl ether (MTBE)	<5	Isopropylbenzene	<5
trans-1,2-Dichloroethene	<5	Bromoform	<5
1,1-Dichloroethane	<5	n-Propylbenzene	<5
2,2-Dichloropropane	<5	Bromobenzene	<5
cis-1,2-Dichloroethene	<5	1,3,5-Trimethylbenzene	<5
Chloroform	<5	1,1,2,2-Tetrachloroethane	<5
2-Butanone (MEK)	<50	1,2,3-Trichloropropane	<5
1,2-Dichloroethane (EDC)	<5	2-Chlorotoluene	<5
1,1,1-Trichloroethane	<5	4-Chlorotoluene	<5
1,1-Dichloropropene	<5	tert-Butylbenzene	<5
Carbon tetrachloride	<5	1,2,4-Trimethylbenzene	<5
Benzene	<1.7	sec-Butylbenzene	<5
Trichloroethene	<5	p-Isopropyltoluene	<5
1,2-Dichloropropane	<5	1,3-Dichlorobenzene	<5
Bromodichloromethane	<5	1,4-Dichlorobenzene	<5
Dibromomethane	<5	1,2-Dichlorobenzene	<5
4-Methyl-2-pentanone	<50	1,2-Dibromo-3-chloropropane	<50
cis-1,3-Dichloropropene	<5	1,2,4-Trichlorobenzene	<5
Toluene	<5	Hexachlorobutadiene	<5
trans-1,3-Dichloropropene	<5	Naphthalene	36
1,1,2-Trichloroethane	<5	1,2,3-Trichlorobenzene	<5
2-Hexanone	<50		

Analysis For Volatile Compounds By EPA Method 8260C

Client Sample ID:	Method Blank	Client:	Aspect Consulting, LLC
Date Received:	Not Applicable	Project:	Crownhill Elem. 100094, F&BI 810513
Date Extracted:	10/30/18	Lab ID:	08-2443 mb
Date Analyzed:	10/30/18	Data File:	103018.D
Matrix:	Water	Instrument:	GCMS9
Units:	ug/L (ppb)	Operator:	MS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
1,2-Dichloroethane-d4	103	50	150
Toluene-d8	97	50	150
4-Bromofluorobenzene	98	50	150

Compounds:	Concentration ug/L (ppb)	Compounds:	Concentration ug/L (ppb)
Dichlorodifluoromethane	<1	1,3-Dichloropropane	<1
Chloromethane	<10	Tetrachloroethene	<1
Vinyl chloride	<0.2	Dibromochloromethane	<1
Bromomethane	<1	1,2-Dibromoethane (EDB)	<1
Chloroethane	<1	Chlorobenzene	<1
Trichlorofluoromethane	<1	Ethylbenzene	<1
Acetone	<50	1,1,1,2-Tetrachloroethane	<1
1,1-Dichloroethene	<1	m,p-Xylene	<2
Hexane	<1	o-Xylene	<1
Methylene chloride	<5	Styrene	<1
Methyl t-butyl ether (MTBE)	<1	Isopropylbenzene	<1
trans-1,2-Dichloroethene	<1	Bromoform	<1
1,1-Dichloroethane	<1	n-Propylbenzene	<1
2,2-Dichloropropane	<1	Bromobenzene	<1
cis-1,2-Dichloroethene	<1	1,3,5-Trimethylbenzene	<1
Chloroform	<1	1,1,2,2-Tetrachloroethane	<1
2-Butanone (MEK)	<10	1,2,3-Trichloropropane	<1
1,2-Dichloroethane (EDC)	<1	2-Chlorotoluene	<1
1,1,1-Trichloroethane	<1	4-Chlorotoluene	<1
1,1-Dichloropropene	<1	tert-Butylbenzene	<1
Carbon tetrachloride	<1	1,2,4-Trimethylbenzene	<1
Benzene	<0.35	sec-Butylbenzene	<1
Trichloroethene	<1	p-Isopropyltoluene	<1
1,2-Dichloropropane	<1	1,3-Dichlorobenzene	<1
Bromodichloromethane	<1	1,4-Dichlorobenzene	<1
Dibromomethane	<1	1,2-Dichlorobenzene	<1
4-Methyl-2-pentanone	<10	1,2-Dibromo-3-chloropropane	<10
cis-1,3-Dichloropropene	<1	1,2,4-Trichlorobenzene	<1
Toluene	<1	Hexachlorobutadiene	<1
trans-1,3-Dichloropropene	<1	Naphthalene	<1
1,1,2-Trichloroethane	<1	1,2,3-Trichlorobenzene	<1
2-Hexanone	<10		

Date of Report: 11/05/18
Date Received: 10/26/18
Project: Crownhill Elem. 100094, F&BI 810513

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	96	100	63-142	4

Date of Report: 11/05/18
Date Received: 10/26/18
Project: Crownhill Elem. 100094, F&BI 810513

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

Laboratory Code: 810531-02 (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	98	100	75-125	2
Barium	ug/L (ppb)	50	7.09	103	105	75-125	2
Cadmium	ug/L (ppb)	5	<1	100	101	75-125	1
Chromium	ug/L (ppb)	20	<1	102	104	75-125	2
Copper	ug/L (ppb)	20	<5	100	103	75-125	3
Lead	ug/L (ppb)	10	<1	99	101	75-125	2
Mercury	ug/L (ppb)	5	<1	96	99	75-125	3
Nickel	ug/L (ppb)	20	1.33	95	97	75-125	2
Selenium	ug/L (ppb)	5	<1	101	101	75-125	0
Silver	ug/L (ppb)	5	<1	97	99	75-125	2
Zinc	ug/L (ppb)	50	39.0	89	88	75-125	1

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Arsenic	ug/L (ppb)	10	95	80-120
Barium	ug/L (ppb)	50	100	80-120
Cadmium	ug/L (ppb)	5	98	80-120
Chromium	ug/L (ppb)	20	101	80-120
Copper	ug/L (ppb)	20	99	80-120
Lead	ug/L (ppb)	10	99	80-120
Mercury	ug/L (ppb)	5	91	80-120
Nickel	ug/L (ppb)	20	100	80-120
Selenium	ug/L (ppb)	5	98	80-120
Silver	ug/L (ppb)	5	97	80-120
Zinc	ug/L (ppb)	50	97	80-120

Date of Report: 11/05/18
Date Received: 10/26/18
Project: Crownhill Elem. 100094, F&BI 810513

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

Laboratory Code: 810517-02 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Acceptance Criteria
Dichlorodifluoromethane	ug/L (ppb)	50	<10	104	55-137
Chloromethane	ug/L (ppb)	50	<10	104	61-120
Vinyl chloride	ug/L (ppb)	50	<0.2	107	61-139
Bromomethane	ug/L (ppb)	50	<1	102	20-265
Chloroethane	ug/L (ppb)	50	<1	102	55-149
Trichlorofluoromethane	ug/L (ppb)	50	<1	98	71-128
Acetone	ug/L (ppb)	250	<10	99	48-149
1,1-Dichloroethene	ug/L (ppb)	50	<1	98	71-123
Hexane	ug/L (ppb)	50	<1	107	44-139
Methylene chloride	ug/L (ppb)	50	<5	95	61-126
Methyl t-butyl ether (MTBE)	ug/L (ppb)	50	<1	106	68-125
trans-1,2-Dichloroethene	ug/L (ppb)	50	<1	98	72-122
1,1-Dichloroethane	ug/L (ppb)	50	<1	99	79-113
2,2-Dichloropropane	ug/L (ppb)	50	<1	98	48-157
cis-1,2-Dichloroethene	ug/L (ppb)	50	<1	100	63-126
Chloroform	ug/L (ppb)	50	<1	96	77-117
2-Butanone (MEK)	ug/L (ppb)	250	<10	112	70-135
1,2-Dichloroethane (EDC)	ug/L (ppb)	50	<1	94	70-119
1,1,1-Trichloroethane	ug/L (ppb)	50	<1	99	75-121
1,1-Dichloropropene	ug/L (ppb)	50	<1	101	67-121
Carbon tetrachloride	ug/L (ppb)	50	<1	98	70-132
Benzene	ug/L (ppb)	50	<0.35	98	75-114
Trichloroethene	ug/L (ppb)	50	<1	91	73-122
1,2-Dichloropropane	ug/L (ppb)	50	<1	101	80-111
Bromodichloromethane	ug/L (ppb)	50	<1	96	78-117
Dibromomethane	ug/L (ppb)	50	<1	98	73-125
4-Methyl-2-pentanone	ug/L (ppb)	250	<10	113	79-140
cis-1,3-Dichloropropene	ug/L (ppb)	50	<1	100	76-120
Toluene	ug/L (ppb)	50	<1	98	73-117
trans-1,3-Dichloropropene	ug/L (ppb)	50	<1	99	75-122
1,1,2-Trichloroethane	ug/L (ppb)	50	<1	100	81-116
2-Hexanone	ug/L (ppb)	250	<10	110	74-127
1,3-Dichloropropane	ug/L (ppb)	50	<1	97	80-113
Tetrachloroethene	ug/L (ppb)	50	<1	96	72-113
Dibromochloromethane	ug/L (ppb)	50	<1	93	69-129
1,2-Dibromoethane (EDB)	ug/L (ppb)	50	<1	102	79-120
Chlorobenzene	ug/L (ppb)	50	<1	98	75-115
Ethylbenzene	ug/L (ppb)	50	<1	99	66-124
1,1,1,2-Tetrachloroethane	ug/L (ppb)	50	<1	96	76-130
m,p-Xylene	ug/L (ppb)	100	<2	104	63-128
o-Xylene	ug/L (ppb)	50	<1	103	64-129
Styrene	ug/L (ppb)	50	<1	103	56-142
Isopropylbenzene	ug/L (ppb)	50	<1	104	74-122
Bromoform	ug/L (ppb)	50	<1	94	49-138
n-Propylbenzene	ug/L (ppb)	50	<1	103	65-129
Bromobenzene	ug/L (ppb)	50	<1	99	70-121
1,3,5-Trimethylbenzene	ug/L (ppb)	50	<1	105	60-138
1,1,2,2-Tetrachloroethane	ug/L (ppb)	50	<1	111	79-120
1,2,3-Trichloropropane	ug/L (ppb)	50	<1	105	62-125
2-Chlorotoluene	ug/L (ppb)	50	<1	101	40-159
4-Chlorotoluene	ug/L (ppb)	50	<1	104	76-122
tert-Butylbenzene	ug/L (ppb)	50	<1	105	74-125
1,2,4-Trimethylbenzene	ug/L (ppb)	50	<1	105	59-136
sec-Butylbenzene	ug/L (ppb)	50	<1	106	69-127
p-Isopropyltoluene	ug/L (ppb)	50	<1	106	64-132
1,3-Dichlorobenzene	ug/L (ppb)	50	<1	100	77-113
1,4-Dichlorobenzene	ug/L (ppb)	50	<1	95	75-110
1,2-Dichlorobenzene	ug/L (ppb)	50	<1	100	70-120
1,2-Dibromo-3-chloropropane	ug/L (ppb)	50	<10	99	69-129
1,2,4-Trichlorobenzene	ug/L (ppb)	50	<1	107	66-123
Hexachlorobutadiene	ug/L (ppb)	50	<1	100	53-136
Naphthalene	ug/L (ppb)	50	<1	112	60-145
1,2,3-Trichlorobenzene	ug/L (ppb)	50	<1	101	59-130

Date of Report: 11/05/18
Date Received: 10/26/18
Project: Crownhill Elem. 100094, F&BI 810513

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

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
Dichlorodifluoromethane	ug/L (ppb)	50	101	99	50-157	2
Chloromethane	ug/L (ppb)	50	102	99	62-130	3
Vinyl chloride	ug/L (ppb)	50	105	102	70-128	3
Bromomethane	ug/L (ppb)	50	96	93	62-188	3
Chloroethane	ug/L (ppb)	50	99	97	66-149	2
Trichlorofluoromethane	ug/L (ppb)	50	95	92	70-132	3
Acetone	ug/L (ppb)	250	96	99	44-145	3
1,1-Dichloroethene	ug/L (ppb)	50	98	98	75-119	0
Hexane	ug/L (ppb)	50	102	103	51-153	1
Methylene chloride	ug/L (ppb)	50	95	95	63-132	0
Methyl t-butyl ether (MTBE)	ug/L (ppb)	50	105	104	70-122	1
trans-1,2-Dichloroethene	ug/L (ppb)	50	98	98	76-118	0
1,1-Dichloroethane	ug/L (ppb)	50	98	98	77-119	0
2,2-Dichloropropane	ug/L (ppb)	50	94	89	62-141	5
cis-1,2-Dichloroethene	ug/L (ppb)	50	99	98	76-119	1
Chloroform	ug/L (ppb)	50	96	96	78-117	0
2-Butanone (MEK)	ug/L (ppb)	250	106	116	49-147	9
1,2-Dichloroethane (EDC)	ug/L (ppb)	50	92	95	78-114	3
1,1,1-Trichloroethane	ug/L (ppb)	50	97	94	80-116	3
1,1-Dichloropropene	ug/L (ppb)	50	98	100	78-119	2
Carbon tetrachloride	ug/L (ppb)	50	97	95	72-128	2
Benzene	ug/L (ppb)	50	96	97	75-116	1
Trichloroethene	ug/L (ppb)	50	89	90	72-119	1
1,2-Dichloropropane	ug/L (ppb)	50	99	101	79-121	2
Bromodichloromethane	ug/L (ppb)	50	94	96	76-120	2
Dibromomethane	ug/L (ppb)	50	95	97	79-121	2
4-Methyl-2-pentanone	ug/L (ppb)	250	108	116	54-153	7
cis-1,3-Dichloropropene	ug/L (ppb)	50	97	100	76-128	3
Toluene	ug/L (ppb)	50	96	97	79-115	1
trans-1,3-Dichloropropene	ug/L (ppb)	50	95	99	76-128	4
1,1,2-Trichloroethane	ug/L (ppb)	50	97	99	78-120	2
2-Hexanone	ug/L (ppb)	250	100	112	49-147	11
1,3-Dichloropropane	ug/L (ppb)	50	95	99	81-115	4
Tetrachloroethene	ug/L (ppb)	50	94	95	78-109	1
Dibromochloromethane	ug/L (ppb)	50	91	92	63-140	1
1,2-Dibromoethane (EDB)	ug/L (ppb)	50	98	101	82-118	3
Chlorobenzene	ug/L (ppb)	50	96	97	80-113	1
Ethylbenzene	ug/L (ppb)	50	96	98	83-111	2
1,1,1,2-Tetrachloroethane	ug/L (ppb)	50	95	92	76-125	3
m,p-Xylene	ug/L (ppb)	100	101	102	84-112	1
o-Xylene	ug/L (ppb)	50	102	101	81-117	1
Styrene	ug/L (ppb)	50	100	102	83-121	2
Isopropylbenzene	ug/L (ppb)	50	102	101	81-122	1
Bromoform	ug/L (ppb)	50	91	94	40-161	3
n-Propylbenzene	ug/L (ppb)	50	99	102	81-115	3
Bromobenzene	ug/L (ppb)	50	96	98	80-113	2
1,3,5-Trimethylbenzene	ug/L (ppb)	50	103	103	83-117	0
1,1,2,2-Tetrachloroethane	ug/L (ppb)	50	106	111	79-118	5
1,2,3-Trichloropropane	ug/L (ppb)	50	100	108	74-116	8
2-Chlorotoluene	ug/L (ppb)	50	99	101	79-112	2
4-Chlorotoluene	ug/L (ppb)	50	101	104	80-116	3
tert-Butylbenzene	ug/L (ppb)	50	103	102	81-119	1
1,2,4-Trimethylbenzene	ug/L (ppb)	50	103	104	81-121	1
sec-Butylbenzene	ug/L (ppb)	50	104	103	83-123	1
p-Isopropyltoluene	ug/L (ppb)	50	104	104	81-122	0
1,3-Dichlorobenzene	ug/L (ppb)	50	95	99	80-115	4
1,4-Dichlorobenzene	ug/L (ppb)	50	92	94	77-112	2
1,2-Dichlorobenzene	ug/L (ppb)	50	99	99	79-115	0
1,2-Dibromo-3-chloropropane	ug/L (ppb)	50	97	98	62-133	1
1,2,4-Trichlorobenzene	ug/L (ppb)	50	107	105	75-119	2
Hexachlorobutadiene	ug/L (ppb)	50	98	96	70-116	2
Naphthalene	ug/L (ppb)	50	111	112	72-131	1
1,2,3-Trichlorobenzene	ug/L (ppb)	50	100	100	74-122	0

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 compound 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. Compounds in the sample matrix interfered with the quantitation of the analyte.

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.

810513

SAMPLE CHAIN OF CUSTODY

ME 10-26-18

Page # 1 of 1 AI3/WZ/A04

Report To Dave Heffner

Company Aspect

Address Seattle

City, State, ZIP

Phone Email

SAMPLERS (*signature*) Matthew M Lewis

PROJECT NAME: Crownhill Elem.

PO #: 100094

REMARKS: Metals are not field filtered.

INVOICE TO

TURNAROUND TIME
- [x] Standard Turnaround
- [ ] RUSH
- Rush charges authorized by:

SAMPLE DISPOSAL
- [ ] Dispose after 30 days
- [ ] Archive Samples
- [ ] Other

Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	TPH-HCID	TPH-Diesel	TPH-Gasoline	BTEX by 8021B	VOCs by 8260C	SVOCs by 8270D	PAHs 8270D SIM	Total As	RCRA Metals Total Cu, Ni, Zn			Notes
						ANALYSES REQUESTED											
MW-9-102618	01 A-C	10/26/18	1020	Water	3					X							VOCs = TCE
MW-15-102618	02		1110		1		X										
MW-6-102618	03		1240		1								X				
MW-10-102618	04 A-E		1350		5		X			X			X				VOCs = TCE
MW-12-102618	05		1435		1		X										
McKinney-102618	06 A-C		1430		3					X							VOCs = TCE
Drum-102618	07 A-E		1520	Purge Water	5					X				X	X		very dirty free product ONLY
													Samples received at -3 °C				

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by: Matthew M Lewis	Matthew M. Lewis	Aspect	10/26/18	1640
Received by: JACKSON LUNDGREN		ASPECT	10/26/18	1745
Relinquished by:	JACKSON LUNDGREN	ASPECT	10/26/18	1746
Received by:	Jan Shimazu	FBI	10/26/18	1746

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Ph. (206) 285-8282