


General Chemistry Analysis
Report and Summary QC Forms

ARI Job ID: ZR94

SAMPLE RESULTS-CONVENTIONALS
ZR94-Geoengineers



Matrix: Water
Data Release Authorized: 
Reported: 01/13/15

Project: Gas Works Park-Play Area Inv
Event: 0186-846-01
Date Sampled: 12/15/14
Date Received: 12/15/14


Client ID: MW-36D-141215
ARI ID: 15-234 ZR94A

Analyte	Date Batch	Method	Units	RL	Sample
Total Suspended Solids	01/09/15 010915#1	SM2540D	mg/L	10.0	166

RL Analytical reporting limit
U Undetected at reported detection limit

REPLICATE RESULTS-CONVENTIONALS
ZR94-Geoengineers




Matrix: Water
Data Release Authorized: 
Reported: 01/13/15

Project: Gas Works Park-Play Area Inv
Event: 0186-846-01
Date Sampled: 12/15/14
Date Received: 12/15/14

Analyte	Method	Date	Units	Sample	Replicate(s)	RPD/RSD
ARI ID: ZR94A Client ID: MW-36D-141215						
Total Suspended Solids	SM2540D	01/09/15	mg/L	166	165	0.6%

LAB CONTROL RESULTS-CONVENTIONALS
ZR94-Geoengineers




Matrix: Water
Data Release Authorized: 
Reported: 01/13/15

Project: Gas Works Park-Play Area Inv
Event: 0186-846-01
Date Sampled: NA
Date Received: NA

Analyte/Method	QC ID	Date	Units	LCS	Spike Added	Recovery
Total Suspended Solids SM2540D	ICVL	01/09/15	mg/L	49.1	50.0	98.2%

METHOD BLANK RESULTS-CONVENTIONALS
ZR94-Geoengineers



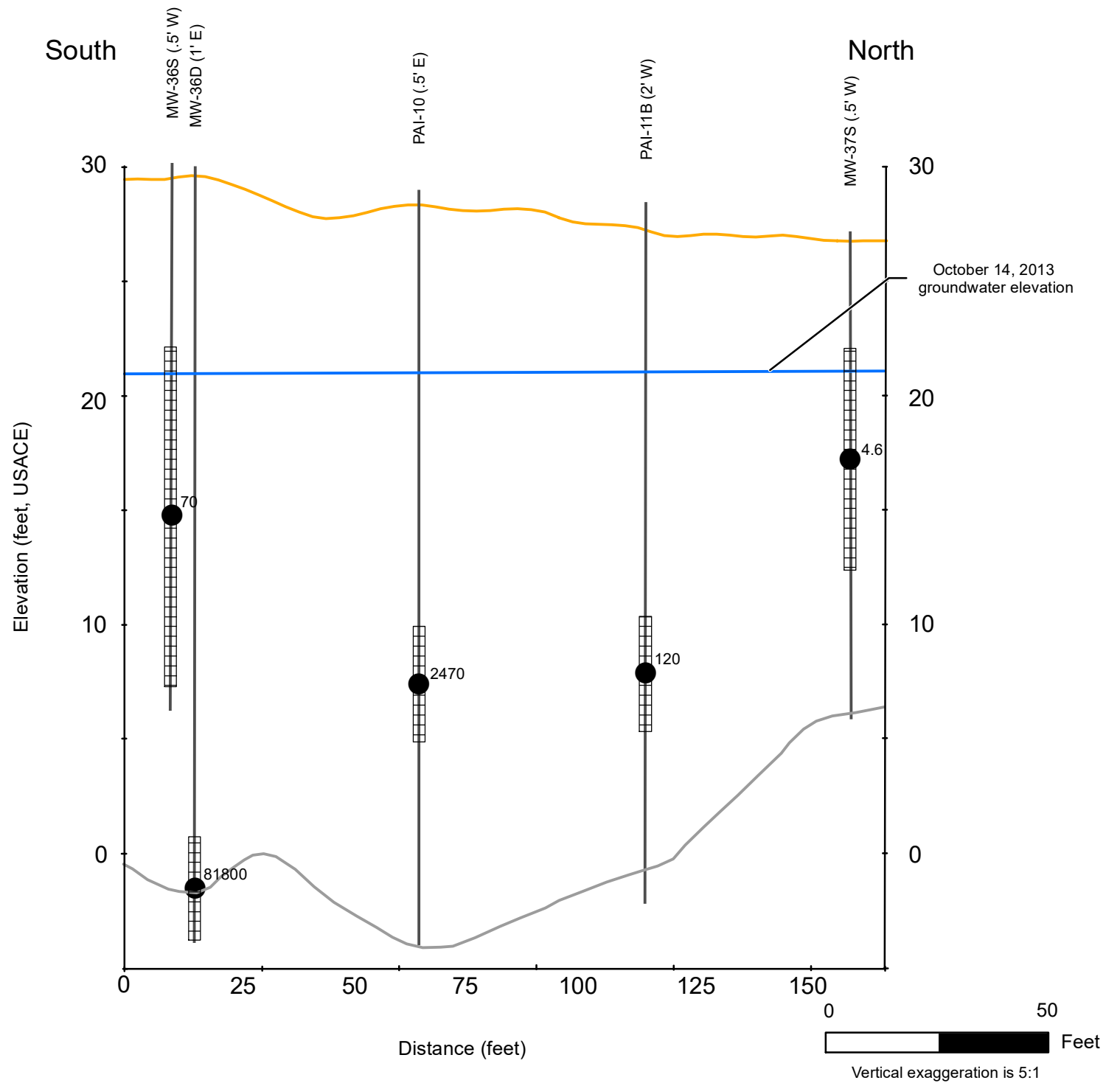
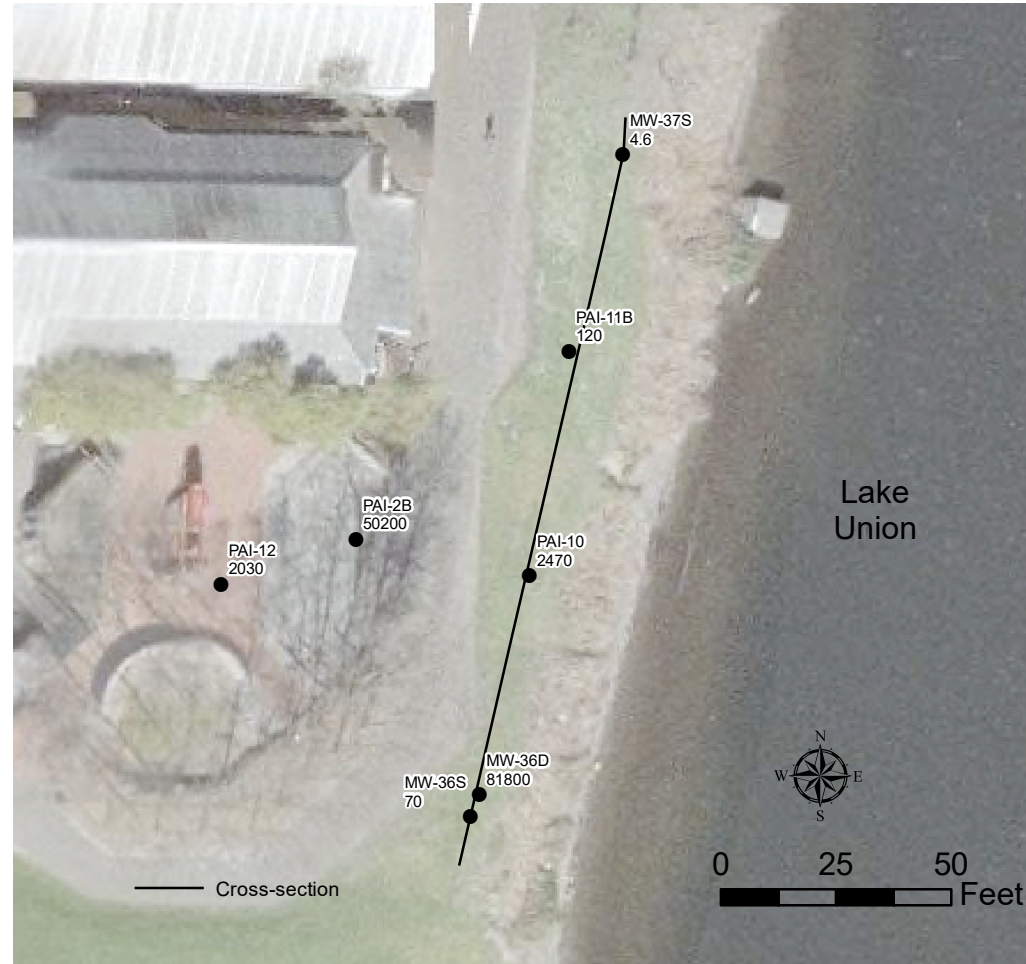
Matrix: Water
Data Release Authorized: 
Reported: 01/13/15

Project: Gas Works Park-Play Area Inv
Event: 0186-846-01
Date Sampled: NA
Date Received: NA

Analyte	Method	Date	Units	Blank	ID
Total Suspended Solids	SM2540D	01/09/15	mg/L	< 1.0 U	

ATTACHMENT 2B-1-4
Applied Speciation and Horizon Lab Data Packages

Path: \\sea\projects\0186846\GIS\Environ\Analyses\Arsenic\MXD\01868460C_Arsenic_GW_wPAI_XSection_MW36s_MW37s.mxd
 Map Revised: 10 November 2021 glohrmeyer
 Office: SEA



Notes:
 1. All arsenic groundwater results are from PAI (December 2014) except MW-37S result which is from Supplemental Investigation (October 2013).
 2. "PAI" locations were borings/temporary wells where grab groundwater samples were collected; "MW" locations are monitoring wells. All samples were field-filtered.
 3. Basemap: 2005 USGS aerial photograph. Does not show current conditions.

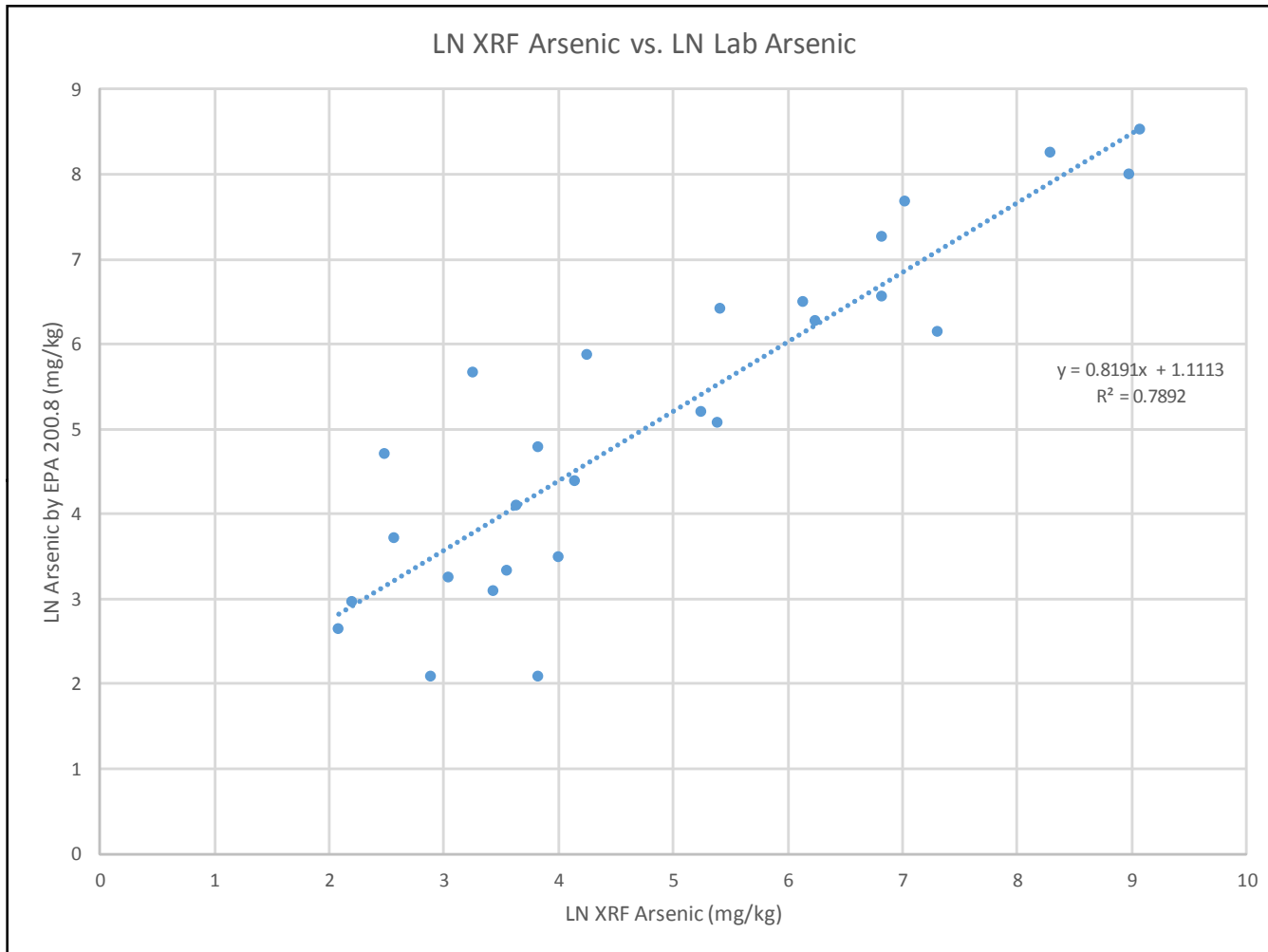
DISCLAIMER: This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. The locations of all features are approximate. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

Dissolved Arsenic Groundwater Concentration (ug/L)^{1, 2}


- Analytical Result (Mid-point of Screen Interval)
- Screen Interval
- Approximate Ground Surface
- Approximate Groundwater Elevation
- Approximate Top of Till

Arsenic in Groundwater	
Play Area Investigation Data Report Gas Works Park Site Seattle, Washington	
	Figure 2B-1-5

ATTACHMENT 2B-1-5
XRF Soil Arsenic Data



Notes:
1. X-ray fluorescent (XRF) analyzer raw data are included as Attachment Y-5.

Arsenic in Soil - XRF Field Readings vs. Analytical Results	
Play Area Investigation Data Report Gas Works Park Site Seattle, Washington	
	Figure 2B-1-6

APPENDIX 2B-2
2014 Former Thylox Process Area Geochemical Evaluation

APPENDIX 2B-2
Former Thylox Process Area Geochemical Evaluation

The resulting groundwater and soil data are summarized in the next section, followed by site-specific discussion of arsenic fate and transport based on analysis and interpretation of this data¹.

RESULTS AND DISCUSSION

Arsenic in Soil

The distribution of arsenic in soil in the vicinity of the Play Area is summarized in map view in Figure 2 and in two cross-sections perpendicular and parallel to the Lake Union shoreline (Figures 3 and 4, respectively). Maximum arsenic concentrations (greater than 2,000 mg/kg) are approximately centered beneath the former Thylox process area (Figure 2). The cross-sections show that elevated soil arsenic concentrations are generally limited to the Fill unit. The maximum vertical extent of elevated arsenic detections coincide with the base of the Fill, which is marked by thin clay/silt horizons which appear to have acted as a barrier to downward contaminant migration. The impacted soil thickness decreases towards the shoreline and is confined to approximately the lower 5 feet of the Fill near the shoreline.

Arsenic in Groundwater

The distribution of arsenic in groundwater beneath and downgradient of the former Thylox process buildings is summarized in two cross-sections running approximately perpendicular and parallel to groundwater flow (Figures 5 and 6, respectively). As with soil, near the former Thylox process area, the highest groundwater concentrations (greater than 50,000 µg/L) are detected in the lower part of the Fill unit (PAI-2), whereas near the shoreline, the highest groundwater arsenic concentrations are detected in the underlying Outwash unit (MW-36D), where soil concentrations are not similarly elevated.

Groundwater Geochemistry

Groundwater chemistry data are summarized in Table 1. Subsurface conditions are generally moderately to strongly reducing within the Fill unit in the vicinity and downgradient of the former Thylox process area and in the Outwash near MW-36D, based on low positive to

¹ Data were included in the Supplemental Investigation Data Report Addendum submitted to Ecology (GeoEngineers, May 2015).

negative oxidation-reduction potential (ORP), elevated detections of sulfide, and detection of dissolved iron and manganese.

Table 1. Groundwater Geochemistry

Parameter	Units	Location					
		PAI-12	PAI-2B	MW-36D	PAI-10	PAI-11B	MW-36S
Ground Surface Elevation	ft USACE	34.20	28.78	29.99	29.87	28.43	30.13
Start Depth	ft bgs	13.27	14.79	29.3	19.09	18.09	8
End Depth	ft bgs	18.27	19.79	33.8	24.09	23.09	22.8
Depth to Groundwater	ft bgs	14.00	8.45	9.17	8.85	8.25	9.46
Groundwater Elevation	ft	20.20	20.33	20.82	21.02	20.18	20.67
Observed Geology		Fill	Fill	Qvr	Fill	Fill	Fill
Field Parameters							
Temperature	degrees C	13.6	15.1	13.5	14.3	14	15.2
Conductivity	µS/cm	378	830	3,120	445	388	350
pH	--	5.79	6.3	8.92	6.37	6.43	6.19
Oxidation-Reduction Potential	mV	8.8	-147	-178	-173.1	-22.4	3.1
Dissolved Oxygen	mg/L	1.98	0.51	1.67	0.24	0.2	0.77
Turbidity	NTU	0.52	9.54	error	4.73	14.5	3.2
Dissolved Metals							
Arsenic	µg/L	2,030	50,200	81,800 J	2,470	120	70 J
Iron	µg/L	3,660	800	1,600	1,010	390	14,100
Ferrous Iron	µg/L	3,720	551	220	957	388	13,100
Manganese	µg/L	200	120	38	365	483	407
Cations							
Calcium	mg/L	63.6	45.9	3.2	63	60.5	41.6
Magnesium	mg/L	4.87	5.6	2.2	10.2	14.2	7.06
Potassium	mg/L	2	3	3	3.25	4.4	2.7
Sodium	mg/L	15.1	166	979	46.5	20.9	27.9
Anions							
Chloride	mg/L	3.2	8.5	15.2	5.7	7.6	4.2
Nitrate-N	mg/L	1.1	1 U	0.5 U	0.1 U	0.1 U	0.1 U
Sulfate	mg/L	122	202	604	35.1	1.4	29.2
Sulfide	mg/L	38.5	84.4	141	39.1	1.66 J	0.512
Total Alkalinity	mg/L CaCO ₃	74.4	306	1,000	243	244	166
Bicarbonate	mg/L CaCO ₃	74.4	306	893	243	244	166
Carbonate	mg/L CaCO ₃	1 U	1 U	112	1 U	1 U	1 U
Hydroxide	mg/L CaCO ₃	1 U	1 U	1 U	1 U	1 U	1 U
Total Organic Carbon	mg/L	NA	NA	7.09	NA	NA	10.5
Dissolved Organic Carbon	mg/L	NA	NA	6.85 J	NA	NA	8.32 J
Total Dissolved Solids	mg/L	302	801	2,940	388	154	288
Total Suspended Solids	mg/L	NA	NA	166	NA	NA	NA

Notes:

NA - not analyzed

J - estimated value

U - not detected; value is method detection limit

Conditions are mildly reducing in the shallower Fill (MW-36S) and at the fringe of the arsenic plume (PAI-11B). Conditions are generally mildly acidic (pH≈6) within the Fill unit, but alkaline at MW-36D (pH 8.9). Groundwater pH strongly influences arsenic mobility.

Arsenic Speciation in Groundwater

Arsenic speciation was determined in samples from selected locations by Applied Speciation and Consulting Inc. using IC-ICP-CRC-MS. The results, presented in Table 2, indicate that dissolved arsenic speciation is dominated by arsenite [As(III)] with minor arsenate [As(V)]. Organoarsenic species (MMAA, DMAA) were not detected in any samples.

Table 2. Arsenic Speciation in Groundwater

Arsenic Species	Units	Location					
		PAI-12	PAI-2B	MW-36D	PAI-10	PAI-11B	MW-36S
As(III)	µg/L	702	42,900	39,700	482	28.9	37.7
As (V)	µg/L	141	1,200	790 J	15.4 J	1.74	6.41
DMAA	µg/L	2.3 U	120 U	230 U	4.6 U	0.23 U	0.46 U
MMAA	µg/L	2.1 U	110 U	210 U	4.2 U	0.21 U	0.42 U
Unknown 1*	µg/L	144	1,100	3,920	102	14.2	0.42 U
Unknown 2*	µg/L	7.9 J	620	1,210	128	2.94	0.42 U
Unknown 3*	µg/L	120	10,500	19,400	2,240	52.5	0.42 U
Unknown 4*	µg/L	19.4	680	18,700	8.2 J	7.6	1.65 J
Sum	µg/L	1,126	57,000	82,930	2,960	107.9	45.8

Notes:

J - estimated value; true value is less than reporting limit and greater than method detection limit.

U - not detected; value is method detection limit.

* - based on elution times, these are most likely thioarsenate species ($AsO_{4-x}S_x$, where x = 1 to 4).

Four unidentified peaks corresponding to unknown arsenic species were also detected and quantified in most samples. Consultation with Applied Speciation and Consulting Inc. analysts indicated that based on elution times, these peaks were likely to be thioarsenate species with the general stoichiometry $AsO_{4-x}S_x$, where x can take on values between 1 and 4.

Figure 7 summarizes the distribution of arsenite, arsenate and thioarsenates in the samples analyzed. The highest thioarsenate concentrations are found at PAI-2B (near the former Thylox process area) and MW-36D. Thioarsenate concentrations generally track with arsenite concentrations.

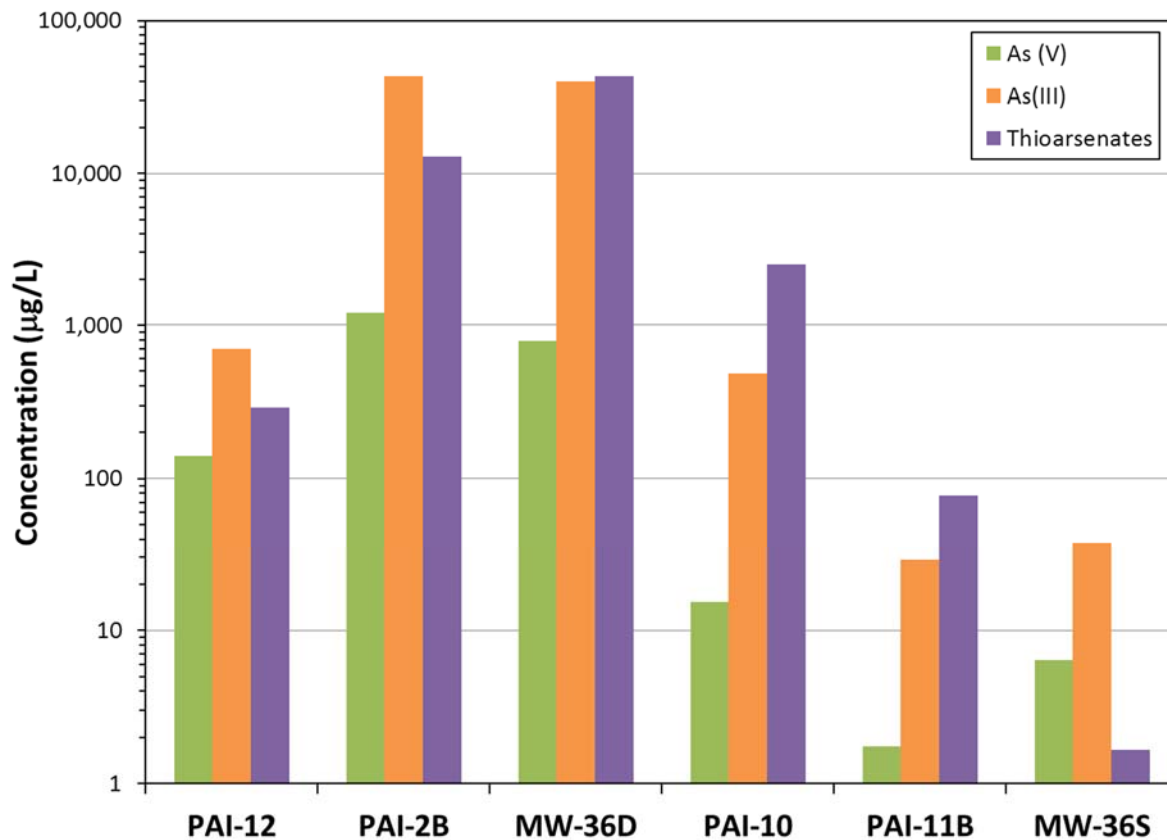


Figure 7. Arsenic speciation in groundwater samples. Thioarsenates represent the concentration sum of four unidentified arsenic peaks as discussed in the text.

Sequential Extraction of Arsenic in Soil

Selected soil samples from exploration boreholes were submitted to Applied Speciation and Consulting for selective sequential extraction analysis following a published protocol (Wenzel et al. 2001). This procedure separates arsenic present in a soil sample into five fractions, using a series of different extraction fluids and conditions, and determines the concentrations in each fraction. The five fractions are operationally defined as:

- F1: weakly or non-specifically adsorbed
- F2: strongly or specifically adsorbed
- F3: amorphous hydrous oxide-bound
- F4: crystalline hydrous oxide-bound
- F5: residual

The mobility of arsenic decreases from F1 to F5. The F1 and F2 fractions represent arsenic bound to mineral grain surfaces, while F3 through F5 include arsenic sequestered within increasingly insoluble mineral phases. The residual fraction is extracted by nitric acid and

hydrogen peroxide digestion. The F5 extraction step targets the least soluble forms of arsenic present in a sample that are not extracted by the previous extraction steps. Because peroxide oxidizes metal sulfides, arsenic sulfides are expected to be included in the F5 fraction. Sequential extraction results for arsenic are shown in Table 3. To support the geochemical interpretation of the arsenic data, the extracts were also analyzed for iron (Table 4) and sulfur species (Table 5).

Table 3. Sequential Extraction Results for Arsenic in Soil

Location	Depth Interval (ft bgs)	Observed Geology	Arsenic Concentration in Fraction ¹ (mg/kg)					
			F1	F2	F3	F4	F5	Sum
PAI-2B	17.5' - 18.0'	Fill	354	180	24.7	78.5	9,110	9,750
PAI-2B	19.0' - 19.5'	Fill	7.86	8.07	3.10	2.89	37.6	59.5
PAI-3B	33.5' - 34.0'	Qvr	6.84	0.83	0.72	0.58	3.23	12.2
PAI-10	31.5' - 32.0'	Qvr	4.68	1.60	1.11	0.49	3.71	11.6
PAI-11	12.0' - 12.5'	Fill	0.56 J	2.03	1.47	0.57 J	19.2	23.8
PAI-11	22.0' - 22.5'	Qvr	1.93	3.75	0.79	0.85	35.4	42.7
PAI-12	8.5' - 9.0'	Fill	18.5	40.6	108	26.8	93	287
PAI-12	13.5' - 14.0'	Fill	20.3	908	4,790	2,620	750	9,090

Note:

1. Fractions determined according to the sequential extraction protocol of Wenzel et al (2001). The operational definition of the fractions and the extraction fluids used are as follows:

- F1 - non-specifically adsorbed (ammonium sulfate)
- F2 - specifically adsorbed (ammonium phosphate)
- F3 - amorphous and poorly crystalline iron oxyhydroxides (ammonium oxalate)
- F4 - crystalline iron oxyhydroxides (ammonium oxalate/ascorbic acid)
- F5 - residual phases (nitric acid/hydrogen peroxide digestion)

Table 4. Sequential Extraction Results for Iron in Soil

Location	Depth Interval (ft bgs)	Observed Geology	Iron Concentration in Fraction ¹ (mg/kg)					
			F1	F2	F3	F4	F5	Sum
PAI-2B	17.5' - 18.0'	Fill	55.1	255	718	532	6,120	7,680
PAI-2B	19.0' - 19.5'	Fill	12.1 J	180	799	491	11,900	13,400
PAI-3B	33.5' - 34.0'	Qvr	4.6 J	338	1,200	715	5,970	8,230
PAI-10	31.5' - 32.0'	Qvr	17.1	159	1,480	715	6,640	9,010
PAI-11	12.0' - 12.5'	Fill	208	508	2,430	731	12,700	16,600
PAI-11	22.0' - 22.5'	Qvr	36.8	392	1,170	834	13,800	16,200
PAI-12	8.5' - 9.0'	Fill	35.0	19.2 J	542	1,380	1,630	3,610
PAI-12	13.5' - 14.0'	Fill	5.6 J	32.6	19,200	4,300	4,870	28,400

Note:

1. See note in Table 3 for explanation.

Table 5. Sulfur Speciation in Soil

Location	Depth Interval (ft bgs)	Observed Geology	Sulfide ¹ (mg/kg)	Acid Insoluble Sulfur ² (mg/kg)
PAI-2B	17.5' - 18.0'	Fill	851	1,200
PAI-2B	19.0' - 19.5'	Fill	5.46	6,300
PAI-3B	33.5' - 34.0'	Qvr	4.4	3,700
PAI-10	31.5' - 32.0'	Qvr	2,880	13,100
PAI-11	12.0' - 12.5'	Fill	918	2,800
PAI-11	22.0' - 22.5'	Qvr	105	300
PAI-12	8.5' - 9.0'	Fill	10.8	400
PAI-12	13.5' - 14.0'	Fill	752	5,600

Notes:

1. Includes dissolved sulfide and acid soluble solid phase sulfides such as FeS.
2. Includes forms such as elemental sulfur, pyrite, and arsenic sulfides.

The relationship between arsenic concentrations and the proportion of arsenic present in the more mobile adsorbed fractions (F1 and F2) is shown in Figure 8. Note that the proportions of adsorbed and more tightly bound arsenic (fractions F3 through F5) are approximately equal in samples with total arsenic concentrations less than 20 mg/kg, while samples with higher total arsenic concentrations have most of the arsenic (up to 94 %) bound up in the more immobile fractions. This relationship indicates that much of the arsenic introduced into soils beneath and downgradient of the Thylox process area has been sequestered in relatively immobile phases.

Arsenic has a strong affinity to be adsorbed by surface binding sites on iron oxides and oxyhydroxides, and these phases are known to play an important role in the fate and transport of arsenic. Sequential extraction results for iron provide a line of evidence supporting the existence of iron oxyhydroxides in the aquifer soils. The ubiquitous presence of amorphous and crystalline iron oxyhydroxides in the soil samples investigated is demonstrated by the concentrations of iron present in the F3 and F4 fractions (Table 4).

In addition to surface adsorption on iron oxides and other minerals in the soil matrix, arsenic can also be more tightly incorporated within iron oxide minerals over time, such that it is less available to partition to groundwater. Figure 9 shows a very strong correlation between arsenic and iron in the iron oxyhydroxide fractions (F3 and F4), indicating that arsenic in these fractions is structurally incorporated in iron oxyhydroxide phases. The F3 and F4

arsenic fractions are considered relatively unreactive as they may only be mobilized if the host iron oxide phases are dissolved or decomposed.

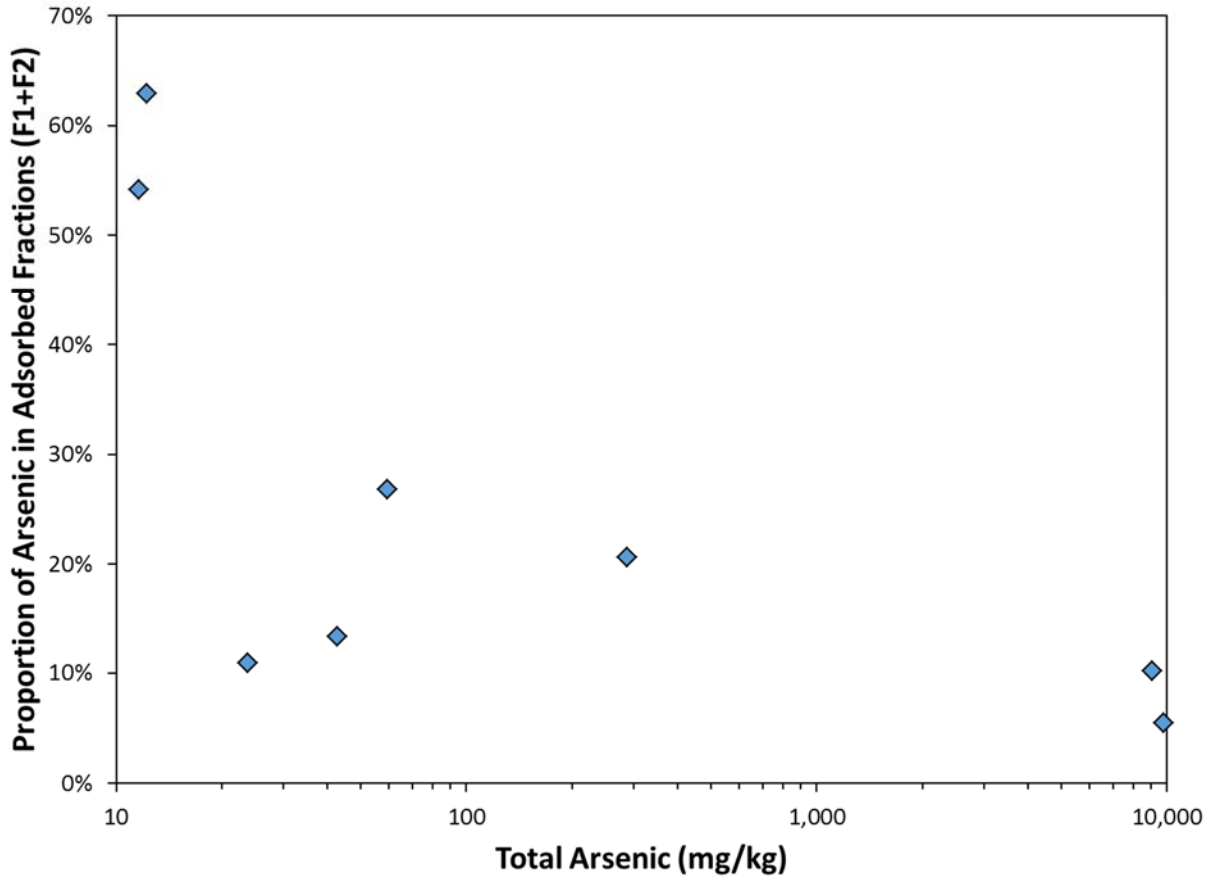


Figure 8. Relationship between total arsenic concentration in soil and percentage extracted in adsorbed fractions (F1 + F2).

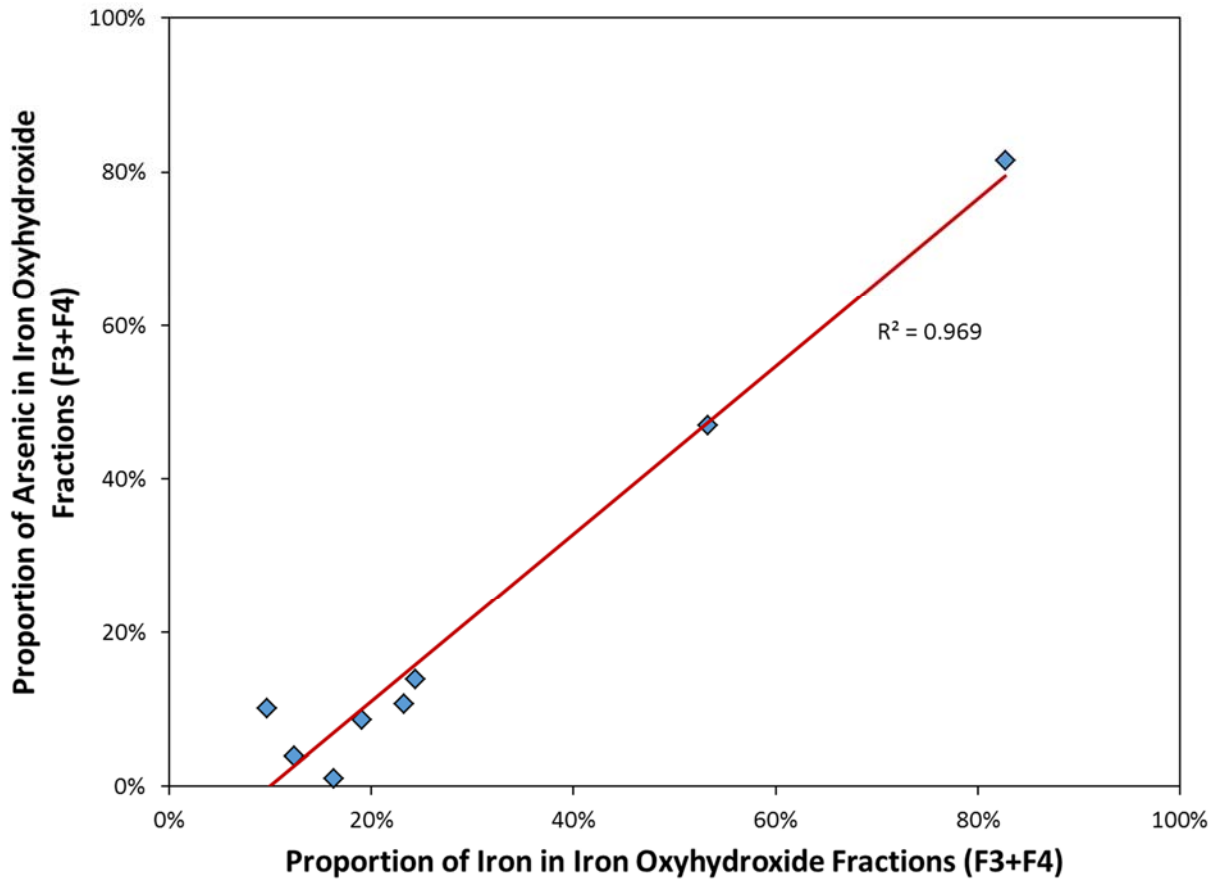


Figure 9. Relationship between the proportions of arsenic and iron extracted in the iron oxyhydroxide fractions (F3 + F4).

The concentration of arsenic in the residual fraction (F5) increases with total soil arsenic concentration, as shown in Figure 10. This indicates that the bulk of the soil contamination resulting from past releases from the Thylox process area is sequestered in immobile phases.

Relatively insoluble arsenic sulfide solid phases are expected to be stable under the strongly reducing sulfidic conditions present at the site. As discussed earlier in this section, the residual arsenic fraction likely includes arsenic sulfides. The solubility of arsenic sulfide phases such as orpiment [As_2S_3] increases with increasing pH (i.e. they are relatively insoluble under acid conditions). The detection of sulfide and acid insoluble sulfur in the sequential extraction samples (Table 5) supports the interpretation that the F5 fraction represents arsenic sulfide phases.

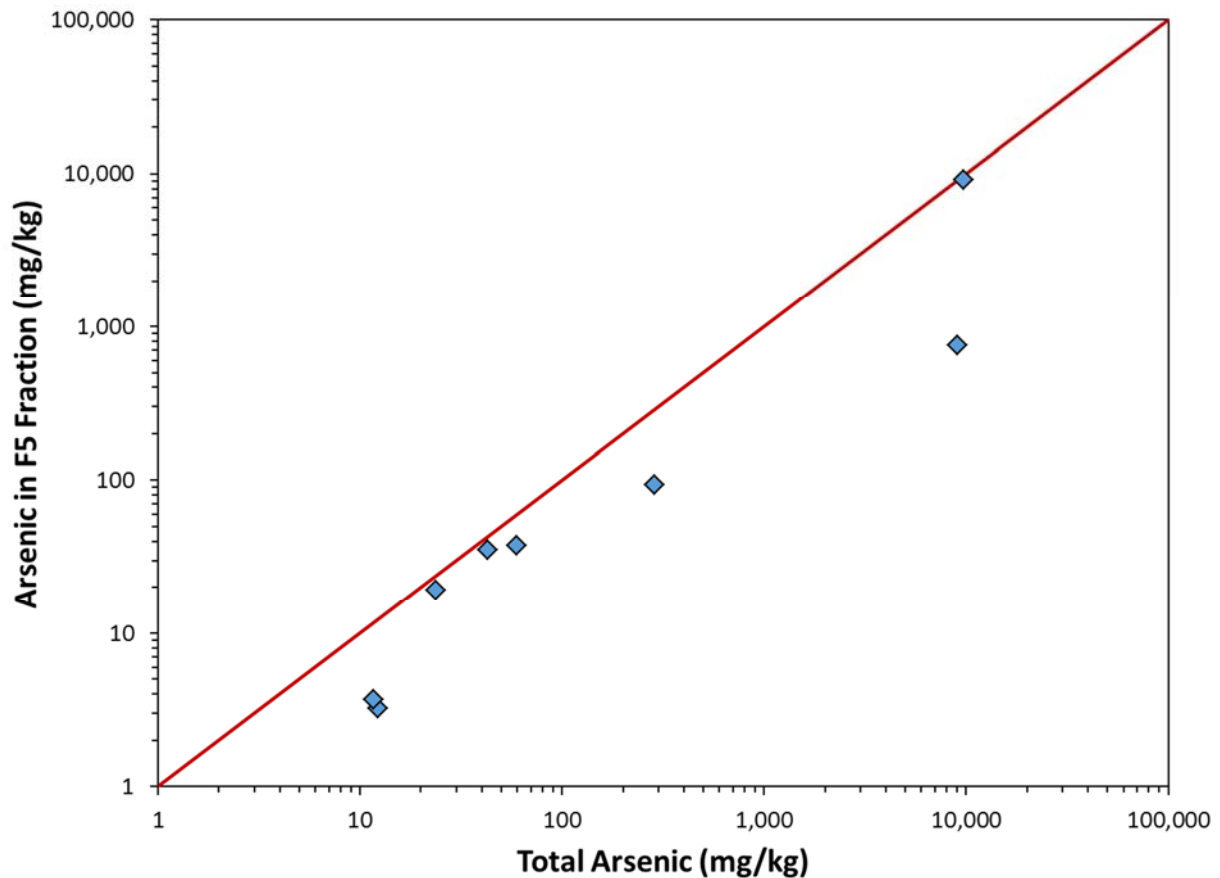


Figure 10. Relationship between arsenic in the residual fraction (F5) and total arsenic concentrations.

Geochemical Modeling

Geochemical speciation modeling was performed to evaluate potential mineral solubility controls on concentrations of arsenic and other dissolved constituents in groundwater. Speciation models were developed with the Geochemist's Workbench using groundwater analyses (Table 1) as input and the *minteq.dat* thermodynamic database, augmented with thermodynamic data for thioarsenate and thioarsenite species².

Selected results are presented in Table 6. Groundwater samples from PAI-12, PAI-2B, MW-36D and PAI-10 are close to saturation or supersaturated with respect to one or more arsenic

² Helz, G.R., and J.A. Tossell (2008) Thermodynamic model for arsenic speciation in sulfidic waters: A novel use of ab initio computations. *Geochimica et Cosmochimica Acta* 72(18):4457-4468.

sulfide minerals, indicating the potential for these phases to precipitate at these locations and control dissolved arsenic concentrations.

Table 6. Calculated Saturation States for Selected Solid Phases in Groundwater

Solid Phase	Location					
	PAI-12	PAI-2B	MW-36D	PAI-10	PAI-11B	MW-36S
As ₂ S ₃ (orpiment)	0.40	5.08	1.45	-0.80	-1.35	-5.28
As ₂ S ₃ (amorphous)	-1.08	3.60	-0.03	-2.28	-2.83	-6.76
AsS (realgar)	0.45	3.46	3.54	-0.05	-0.60	-3.79
Sulfur	-4.41	-5.76	-9.55	-4.60	-4.07	-1.60
Mackinawite	-0.48	-0.67	2.26	-0.45	-0.93	-0.73
FeS (ppt)	-1.21	-1.38	1.54	-1.17	-1.66	-1.45
Siderite	-2.69	-2.02	-0.01	-2.62	-1.72	-0.01
Calcite	-2.11	-1.20	0.47	-1.00	-0.94	-1.48

Notes:

1. Positive values (in bold type with gray shading) indicate water is supersaturated with respect to the solid phase and there is a potential for the solid to precipitate out.
2. Negative values indicate undersaturation. If present in the matrix, the solid phase would tend to dissolve into the water.
3. Values close to 0 (in bold type, no shading) indicate water is in apparent equilibrium with the solid phase.

The relative insolubility of arsenic sulfides can effectively limit dissolved arsenic concentrations in groundwater under reducing conditions, but solubility of arsenic sulfides is a function of pH, dissolved sulfide concentration, and the nature of the solid phase (e.g. amorphous As₂S₃ is more soluble than orpiment). The calculated solubility of arsenic sulfides as a function of pH and sulfide concentration is shown in Figure 11. The solubility of arsenic sulfides increases with increasing pH. At low sulfide concentrations, arsenic solubility increases with decreasing dissolved sulfide concentrations, while at higher dissolved sulfide levels, arsenic solubility increases due to the formation of soluble arsenic sulfide complex ions.

The saturation state of groundwater with arsenic sulfides was also confirmed by direct observations during sampling of well MW-36D. Upon collection of a filtered groundwater sample into a sample bottle containing acid preservative, a precipitate with the bright yellow color characteristic of orpiment formed in the sample container. Subsequent analysis of the particulate material recovered from the sample bottle showed that arsenic was a main chemical component of the precipitate. As shown in Figure 11, the effect of the acid

preservative lowering the pH of groundwater samples from MW-36D would induce precipitation of orpiment.

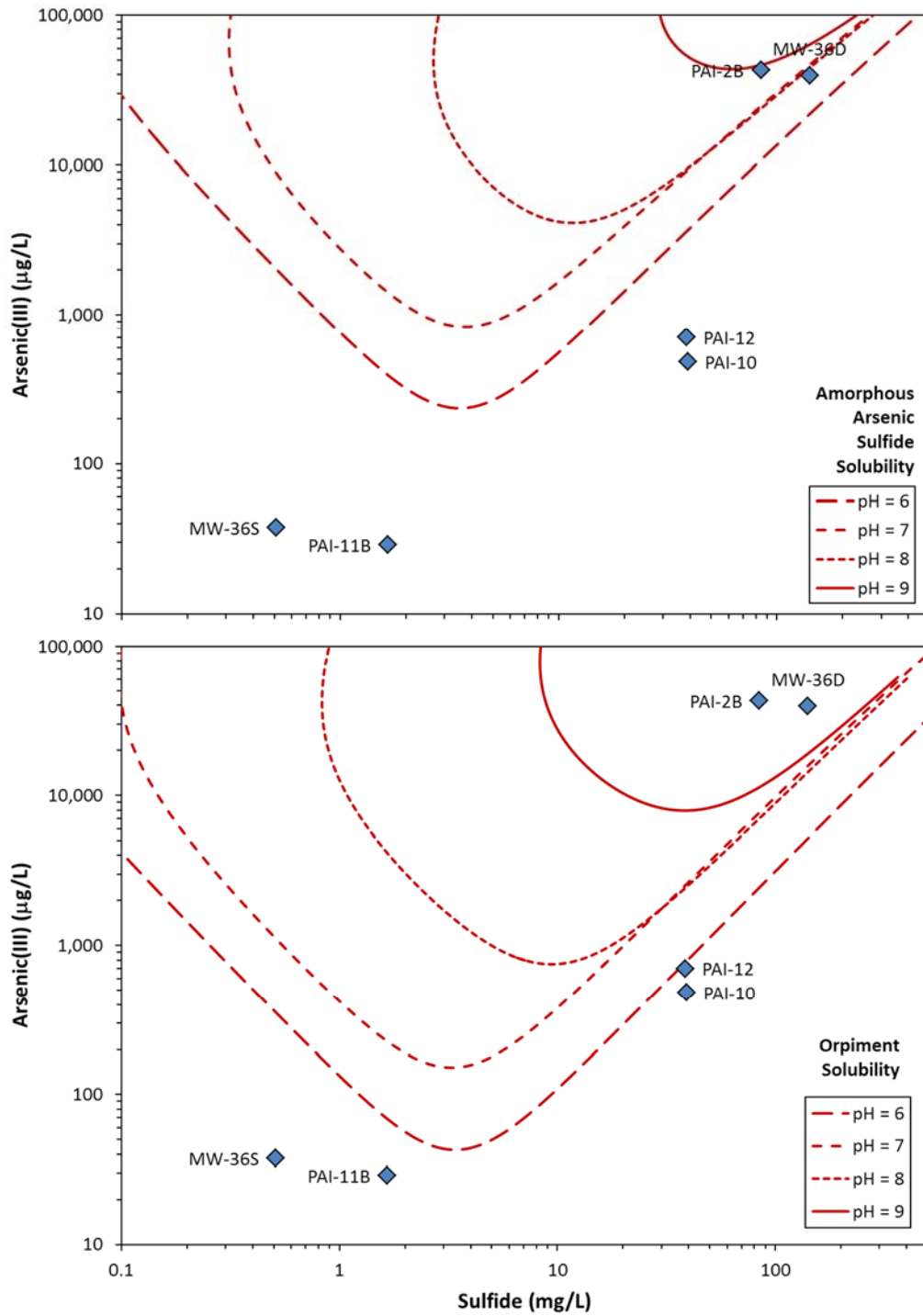


Figure 11. Calculated solubility of solid phase arsenic sulfides as a function of dissolved sulfide concentration and pH. Top: amorphous As_2S_3 ; bottom: orpiment (crystalline As_2S_3).

Soil-Water Partition Coefficient for Arsenic

The soil-water partition coefficient (K_D) describes the distribution of a chemical constituent between the dissolved and solid phase, and is a key model parameter required for simulating fate and transport of contaminants in groundwater. K_D values for arsenic calculated from co-located soil and groundwater sampling results in the eastern half of Gas Works Park are summarized in Table 7.

Table 7. Site-Specific Soil-Water Partition Coefficients for Arsenic

Location	Geology	Soil	Groundwater		K_D (L/kg)
		Arsenic ¹ (mg/kg)	Arsenic ($\mu\text{g/L}$)	pH	
MW-33S	Fill	5.2	1.5	6.43	3,467
MW-34S	Fill	6.6	6.6	6.46	1,000
MW-35S	Fill	25.5	3.4	6.73	7,500
MW-36S	Fill	54.2	70	6.19	774
MW-37S	Fill	30.5	4.6	6.39	6,630
MW-38S	Fill	27.7	47.2	5.95	587
MW-40S	Fill	6.7	4.4	6.00	1,523
PAI-2B	Fill	4,903	50,200	6.30	98
PAI-10	Fill	147 ²	2,470	6.37	60
PAI-11B	Fill	130 ²	120	6.43	1,083
PAI-12	Fill	9,088	2,030	5.79	4,477
MW-36D	Qvr	12.9	81,800	8.92	0.16
MW-39D	Qva/Qpgt	1.3	2.8	7.34	464

Notes:

1. Soil results within well screen interval
2. Average across interval from field XRF

In areas where geochemical modeling indicates that arsenic sulfides may be present (PAI-2B, PAI-10, PAI-12, and MW-36D), calculated K_D values are highly variable (range from 0.16 to 4,477 L/kg) and likely reflect variable amounts of arsenic sulfides precipitated in the soil matrix (total arsenic in co-located soil at these locations ranges from 12.9 to 9,088 mg/kg). The extremely low K_D value determined for MW-36D is due in part to local geochemical conditions, including alkaline pH and elevated dissolved sulfide, which stabilize thioarsenate species in groundwater.

In other areas where arsenic sulfides are not stable based on geochemical modeling, arsenic partitioning is likely to be controlled by adsorption on iron oxides and other matrix minerals.

In these areas, K_D values are less variable (in the Fill unit, K_D 's range from 587 to 7,500 L/kg with a mean of 2,821 L/kg), consistent with adsorption as the main process controlling partitioning. A K_D for arsenic of 2,821 L/kg may be considered a representative value for describing arsenic partitioning between soil and groundwater in the Fill unit. Similarly, a K_D of 464 L/kg is derived for the Q_{yr}/Q_{va} (Outwash) unit.

Fate and Transport Summary

During past MGP operations, releases of thioarsenate solution from the Thylox process area infiltrated into underlying soil and resulted in groundwater contamination. Under the mildly acidic pH conditions existing within the Fill unit, thioarsenates are transformed to dissolved arsenite and sulfide. Increasing concentrations of arsenite and sulfide eventually result in saturation of groundwater with respect to arsenic sulfides (e.g. orpiment) and precipitation of these solid phases within the soil matrix, resulting in soil arsenic concentrations as high as 20,000 mg/kg. The arsenic sequestered in these solid phases is considered relatively stable and unlikely to be mobilized under existing reducing geochemical conditions. Dissolved arsenic concentrations in these areas are controlled by the solubility of arsenic sulfides such as orpiment which is primarily a function of pH and dissolved sulfide concentration (as illustrated in Figure 11). Outside these areas, arsenic transport is controlled mainly by adsorption and incorporation in iron oxyhydroxide minerals present in the Fill. Arsenic partitioning in these areas can be described with mean K_D values of 2,821 L/kg for the Fill unit and 464 L/kg for the Outwash unit.

Map Revised: 27 May 2015 maugust
 Path: \\sea\projects\0186846\GIS\Environment\Analyses\MXD\018684600_Exploration_PAI_data_report.mxd
 Office: SEA



Legend

- Cross-Section
- Shoreline
- ▭ Play Area Improvement Footprint
- ▭ Former Thylox Process Structures
- ▭ Former Subsurface Structures

Previous Explorations

- Previous Exploration
- ⊕ Previous Exploration (Monitoring Well)

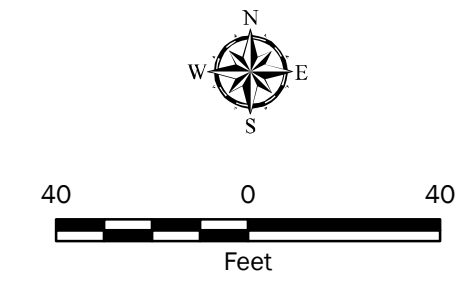
Play Area Investigation

- Exploration Location
- Exploration Location (Groundwater Sample Collected)
- ⊕ Exploration Location (Monitoring Well) (Groundwater Sample Collected)

Projection: NAD 1983 StatePlane Washington North FIPS 4601 Feet

Notes:

- Reference: Richard Haag Associates, 1974: former Thylox process structures. Seattle Parks and Recreation: 2014 Play Area Improvement footprint.
- The locations of all features shown are approximate.
- This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

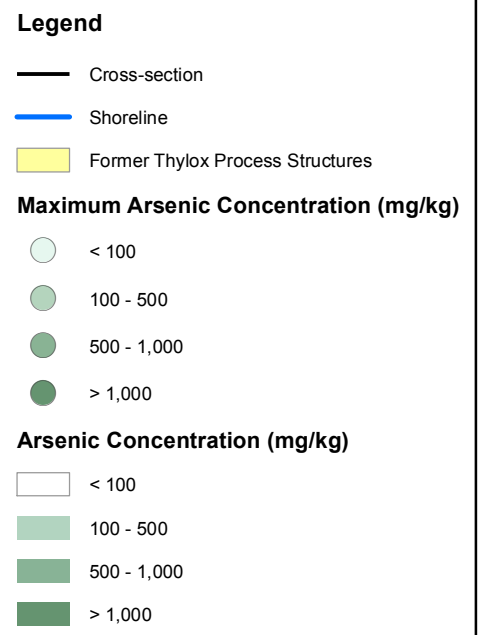
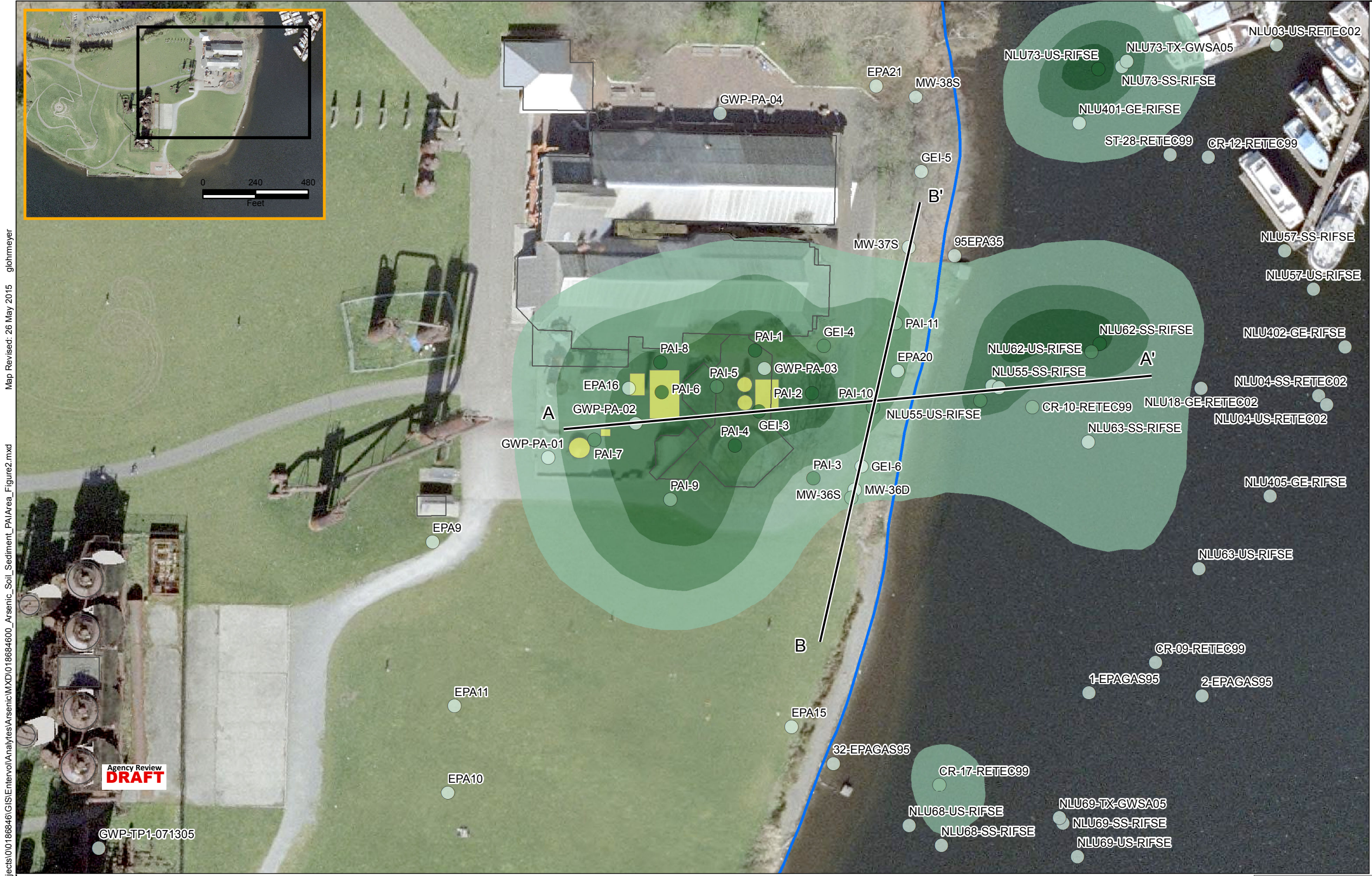


Exploration Locations

Play Area Investigation Data Report
 Gas Works Park Site
 Seattle, Washington

GEOENGINEERS

Figure 1



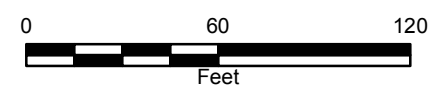
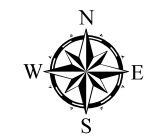
Map Revised: 26 May 2015 glohnmeyer
 Path: \\sea\projects\010186846\GIS\Environment\Analysis\Arsenic\MXD\018684600_Arsenic_Soil_Sediment_PA\Area_Figure2.mxd
 Office: SEA

Agency Review
DRAFT

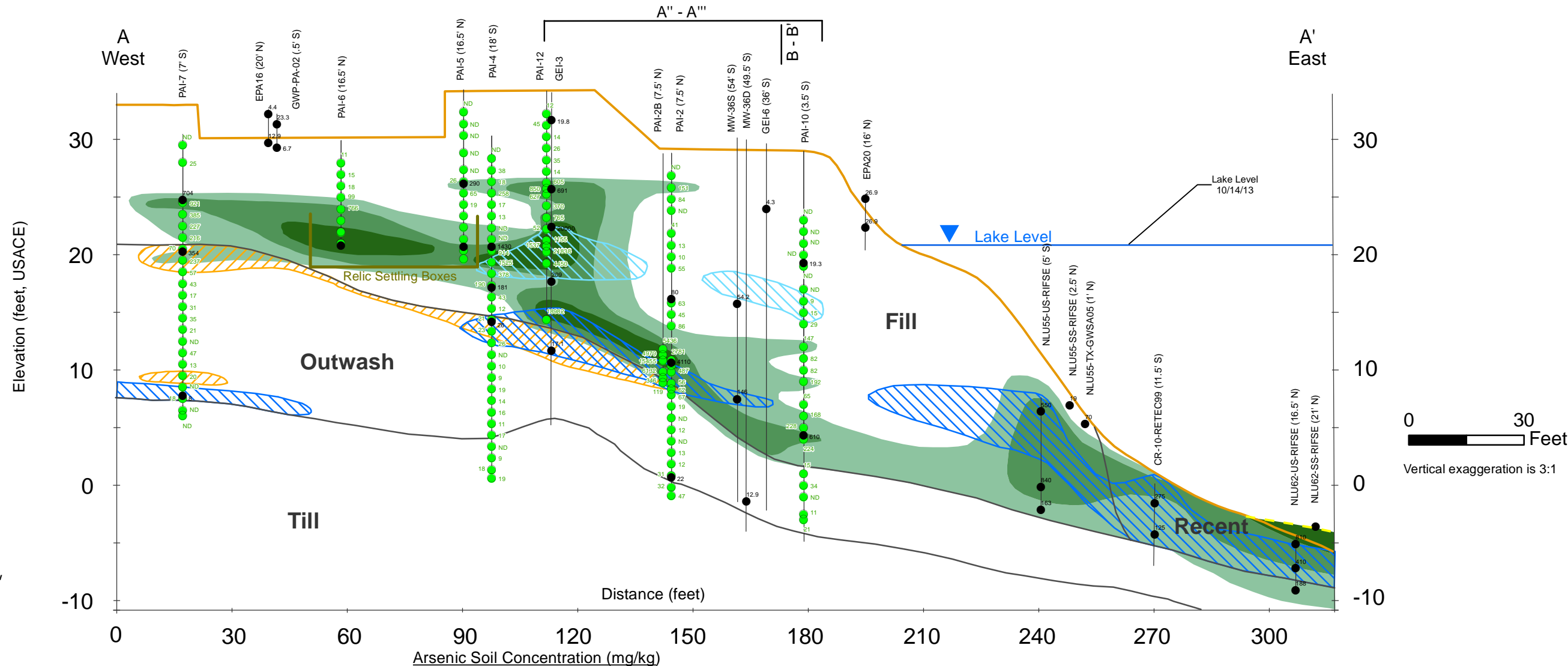
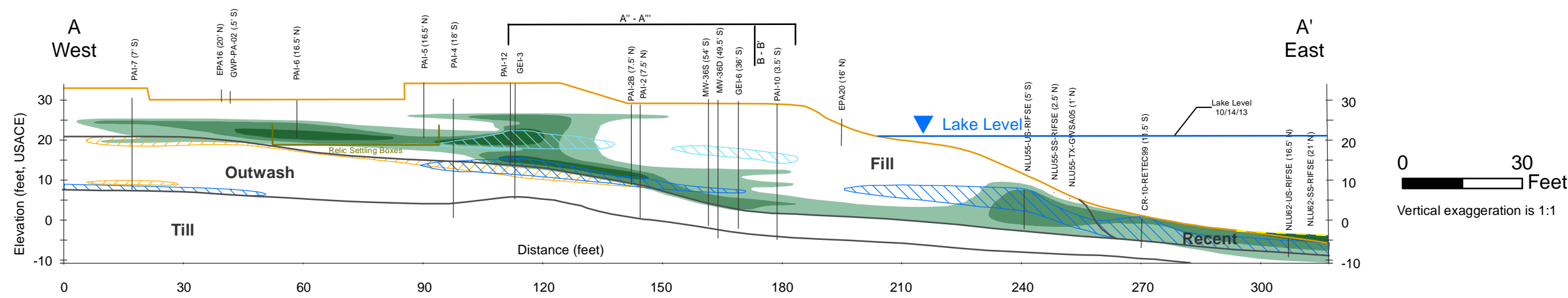
Projection: NAD 1983 StatePlane Washington North FIPS 4601 Feet

Notes:

1. Concentration contours are inferred and do not reflect surface conditions.
2. The locations of all features shown are approximate.
3. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document.
4. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.



Arsenic in Soil and Sediment	
Gas Works Park Site Seattle, Washington	
	Figure 2



Agency Review
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Notes:
 1. Cross-section posts raw XRF data. XRF analyzer field reading and analytical results show an overall strong linear correlation (r around 0.9).
 2. ND = result is less than the limit of detection (< LOD). LOD is defined as three times the error on the counting statistics of the measurement. Detection limit for Arsenic is 9 mg/kg.
 3. The locations of all features shown are approximate.
 4. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

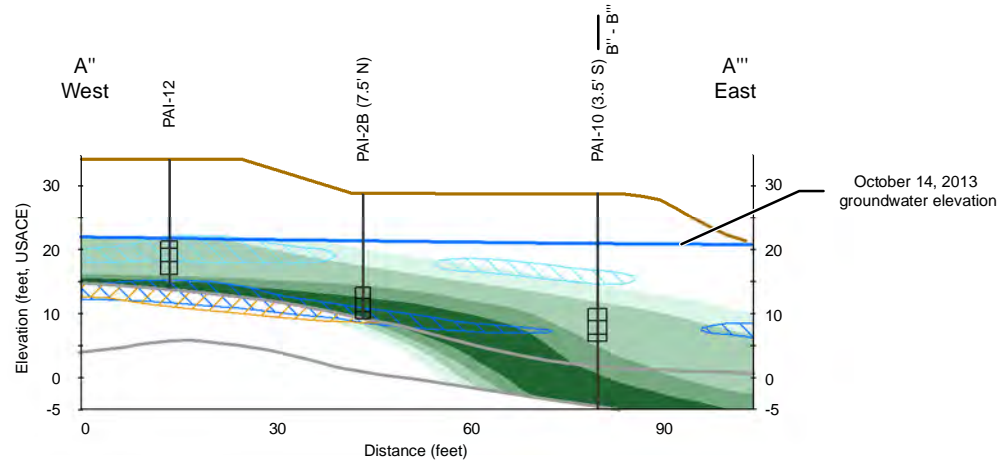
- Analytical Result
 - XRF Analyzer Field Reading
 - ~ Approximate Ground Surface
 - ~ Approximate Geologic Contact
 - Clay/Silty Horizon
 - LNAPL - Impacted Soil
 - DNAPL or Tar - Impacted Soil/Sediment
- Arsenic Concentration (mg/kg)**
- < 100
 - 100 - 500
 - 500 - 1,000
 - > 1,000

**Arsenic in Soil and Sediment
 Cross-section A-A'**

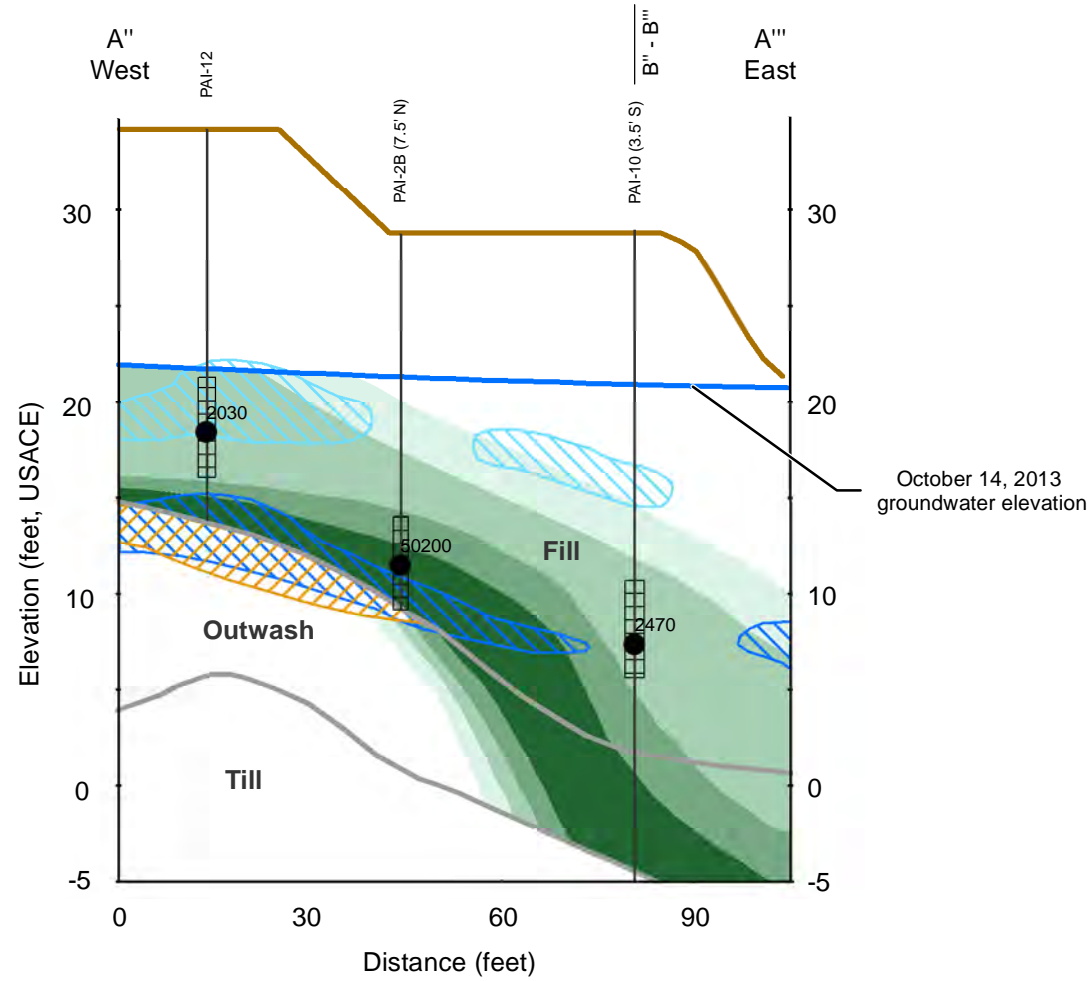
Gas Works Park Site
 Seattle, Washington

GEOENGINEERS

Figure 3



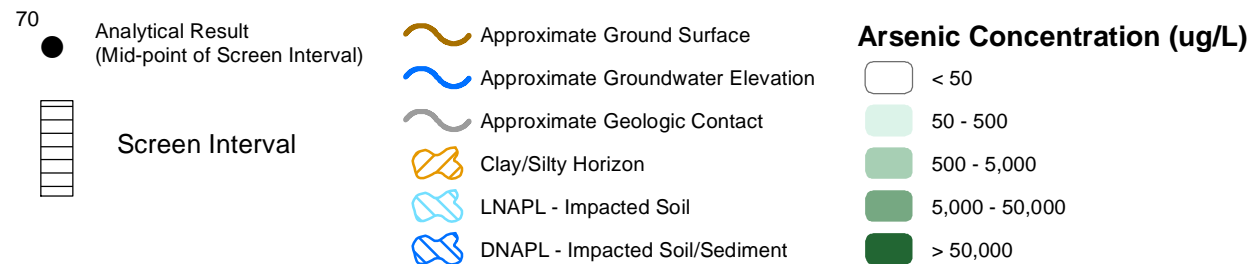
0 30 Feet
Vertical exaggeration is 1:1



0 30 Feet
Vertical exaggeration is 3:1

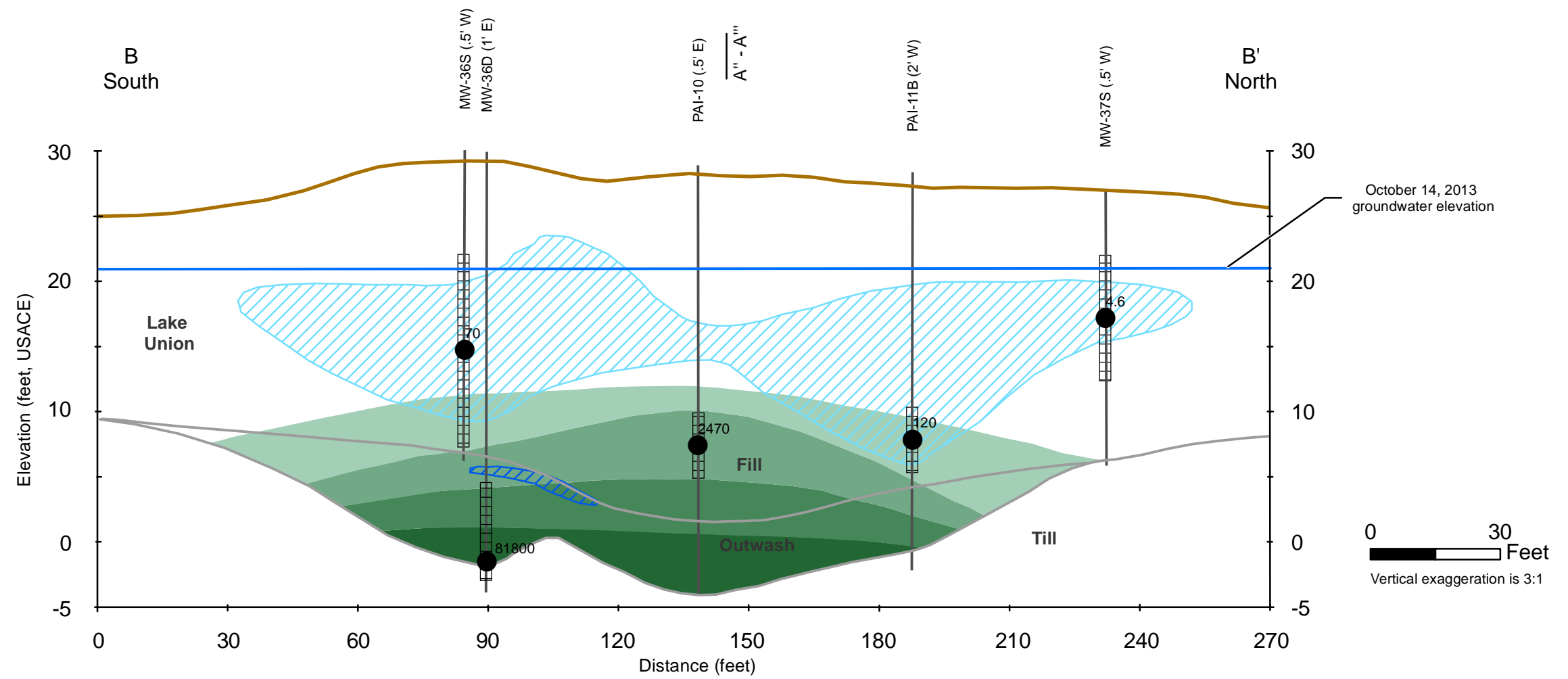
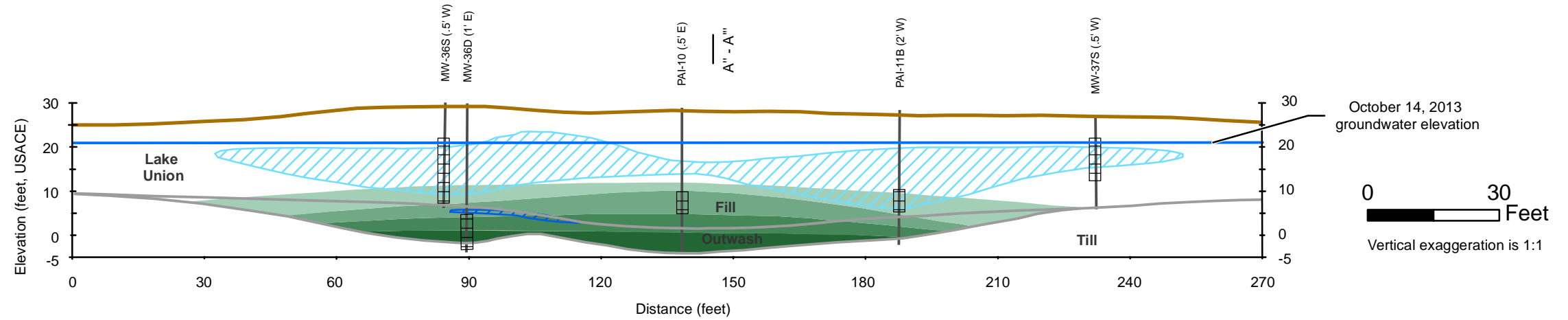
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Dissolved Arsenic Groundwater Concentration (ug/L)^{1, 2}



Notes:
1. All arsenic groundwater results are from PAI (December 2014) except MW-37S result which is from Supplemental Investigation (October 2013).
2. "PAI" locations were borings/temporary wells where grab groundwater samples were collected; "MW" locations are monitoring wells. All samples were field-filtered.
3. The locations of all features shown are approximate.
4. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document.
GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

Arsenic in Groundwater Cross-section A'' - A'''	
Gas Works Park Site Seattle, Washington	
GEOENGINEERS	Figure 5



Agency Review
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Dissolved Arsenic Groundwater Concentration (ug/L)^{1,2}

- Analytical Result (Mid-point of Screen Interval)
- ▭ Screen Interval

- Approximate Ground Surface
- Approximate Groundwater Elevation
- Approximate Geologic Contact
- ▨ LNAPL - Impacted Soil
- ▨ DNAPL - Impacted Soil/Sediment

- Arsenic Concentration (ug/L)**
- < 50
 - 50 - 500
 - 500 - 5,000
 - 5,000 - 50,000
 - > 50,000

Notes:
 1. All arsenic groundwater results are from PAI (December 2014) except MW-37S result which is from Supplemental Investigation (October 2013).
 2. "PAI" locations were borings/temporary wells where grab groundwater samples were collected; "MW" locations are monitoring wells. All samples were field-filtered.
 3. The locations of all features shown are approximate.
 4. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document.
 GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

Arsenic in Groundwater Cross-section B - B'	
Gas Works Park Site Seattle, Washington	
	Figure 6

APPENDIX 2B-3
Supplemental Investigation Data Report
2016 Play Area Investigation

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Attachment 2B-3-5. Data Validation Memos and Lab Data Packages (CD)

Attachment 2B-3-6. Soil XRF Arsenic Data

1.0 SUMMARY

A supplemental investigation of groundwater and soil was performed in the Play Area at the Gas Works Park Site (GWPS) to obtain additional information on the extent of arsenic in soil and groundwater. Information from this 2016 Play Area investigation (PAI) and previous investigations was used to design and operate the groundwater treatment system installed at the Play Area in 2017. This report presents investigation background, field methods, and results of the 2016 PAI.

2.0 INTRODUCTION

This report summarizes the results of the 2016 PAI performed at the GWPS in Seattle, Washington (Figure 2B-3-1). The investigation was performed in the Play Area on the eastern portion of the GWPS uplands (Figure 2B-3-2). The work described in this report was conducted under the March 18, 2005, Agreed Order DE 2008 between Puget Sound Energy (PSE), the City of Seattle (City), and the Washington State Department of Ecology (Ecology) for the Gas Works Park Sediment Site. Ecology approved modification of the Agreed Order in 2013 to expand the area of investigation to include adjacent upland areas that may impact sediment (Figure 2B-3-2), including the Play Area.

The 2016 PAI was conducted in compliance with the Supplemental Investigation Work Plan (SIWP) (GeoEngineers 2013), which Ecology approved on March 11, 2013, and with two addenda (Sampling and Analysis Plan [SAP] and Quality Assurance Project Plan [QAPP] Addenda Nos. 1 and 2) (GeoEngineers 2014, 2016c), approved by Ecology on December 4, 2014, and August 31, 2016, respectively. The field work was completed between September 12 through October 21, 2016.

The purpose of the 2016 PAI was to further characterize arsenic in groundwater and soil within the Play Area. The findings will inform the lateral and vertical placement of injection and monitoring wells for arsenic treatment and performance monitoring.

The investigation objectives included:

- Evaluate the vertical and lateral extent of dissolved arsenic concentrations in groundwater at the Play Area. Specifically, to identify the area and depth of arsenic for treatment and provide a basis for the identification of groundwater injection and monitoring well locations.
- Characterize groundwater geochemistry (e.g., sulfide concentration) and hydraulic conditions (e.g., hydraulic conductivity) to inform the design of the groundwater injection program.
- Evaluate dissolved arsenic concentrations at the shoreline to identify groundwater monitoring locations downgradient of the groundwater injection area.

The investigation was completed before Seattle Parks and Recreation (SPR) renovation of the Play Area planned for fall 2017.

3.0 BACKGROUND

In 2013, work performed in accordance with the original SIWP found elevated concentrations of arsenic in soil and groundwater samples collected from the Play Area and nearby locations, including along the eastern shoreline. As a result, the 2013 Supplemental Investigation SAP and QAPP were amended in 2014 to obtain additional data to evaluate the nature and extent of arsenic in soil and groundwater at the Play Area. The amendment also included sequential extraction testing and characterization of arsenic species in groundwater to support a geochemical evaluation of arsenic leachability and sequestration. The results of the 2013 Supplemental Investigation are presented in Appendix 2A of this remedial investigation/feasibility study (RI/FS) report. The subsequent 2014 PAI and geochemical evaluation results are presented in Appendices 2B-1 and 2B-2 of this RI/FS report, respectively.

The Supplemental Investigation SAP and QAPP were amended again in 2016 to further characterize arsenic in soil and groundwater within the Play Area to inform arsenic treatment and performance monitoring. This report summarizes the results of this additional Play Area investigation work.

4.0 FIELD ACTIVITIES

The 2016 PAI was conducted in accordance with the Ecology-approved SIWP and SAP and QAPP Addenda Nos. 1 and 2 (GeoEngineers 2013, 2014, 2016c), except as discussed in Section 4.6. Field activities consisted of drilling, soil sampling, installation of temporary wells, groundwater sampling, and advancement of Hydraulic Profiling Tool (HPT) explorations. Exploration locations, including those of previous investigations, are shown on Figure 2B-3-3. Cascade Drilling and Technical Services conducted the drilling and HPT work.

Prior to drilling, onsite utilities were located using the Utility Notification Center One-Call, a private utility locator from Applied Professional Services (APS), and SPR utility crews. APS also performed a non-conductible subsurface storm drain survey to mark the storm drains¹ in the investigation footprint. Before drilling, the top 2 feet of soil at each location was excavated using a post hole digger to avoid shallow utilities including SPR's irrigation system.

The investigation targeted locations prioritized in the SAP Addendum No. 2 within and upgradient of the known arsenic plume at the Play Area and along the shoreline (Appendix 2B). Analytical results, which were available within same day turn-around time, were used to select step-out locations for evaluation of the lateral extent of dissolved arsenic.

4.1. Drilling and Field Screening

Explorations were advanced using direct push and sonic drilling methods through fill, silt (if present), and outwash, and to terminate in till. Boring logs are included in Attachment 2B-3-1.

Before entering the GWPS, the drilling rigs and equipment were visually inspected for signs of contamination. Most borings were advanced using a track-mounted Geoprobe® 7730 DT direct-push rig equipped with 1.5-inch inner diameter (ID) by 2.25-inch outer diameter (OD) sampler. A track-mounted

¹ Storm Drain C is present at the Play Area and Storm Drain D is immediately south of the Play Area. See RI Figure 3-21 for storm drain locations.

Sonic DB320 sonic rig (Sonic) was used at locations intercepting subsurface obstructions that could not be penetrated using the direct-push rig. Sonic was used to penetrate through subsurface concrete obstructions at PAI-21BS, PAI-21BD, PAI-31S, PAI-31D, PAI-33S, PAI-33M and PAI-33D, and to fully penetrate the glacial outwash unit at PAI-32D. Sonic soil sampling used a 4.06-inch ID and 4.5-inch OD sampler.

Lithology and field screening observations were recorded on the boring logs. Lithology, geologic unit contacts, and field screening observations were used to determine vertical placement of screens for collecting groundwater samples.

Total arsenic concentrations in soil were measured in the field with a handheld x-ray fluorescence (XRF) analyzer. Measurements were taken at approximately 12-inch intervals from the surface to the base of each boring. XRF results for arsenic are presented on the boring logs and compiled in Attachment 2B-3-1.

Soil was also field-screened for evidence of possible contamination using four additional methods: visual screening, water sheen screening, headspace vapor screening, and shake testing. Results are recorded on the boring logs.

4.1.1. Soil Sampling

Soil samples were collected using clean, unused disposable polyvinyl chloride (PVC) sleeves and bags. Soil samples were generally collected across the screen intervals. Additional soil samples were collected to visually characterize nonaqueous phase liquid (NAPL) impacted zones. Soil samples for chemical analysis were collected within the screen interval only. The latter samples were placed into laboratory-supplied containers, lightly packed, and capped with a plastic lid. The samples were stored on ice and delivered under chain-of-custody to the analytical laboratories. Analysis was completed according to the Ecology-approved SIWP and SAP and QAPP Addenda Nos. 1 and 2 (GeoEngineers 2013, 2014, 2016c). Soil analyses and results are presented in Section 5.1.

4.1.2. AS/SVE Liner

Drilling of certain step-out locations occurred within the footprint of the former air sparge/soil vapor extraction (AS/SVE) system located south of the Play Area. The in-situ groundwater air sparging and soil vapor extraction system, which was installed in 2001 and operated to reduce benzene concentrations in soil and groundwater, includes a subsurface geomembrane liner. In three locations (PAI-27S, PAI-27D and PAI-29), this SVE liner was intentionally breached to advance explorations. Prior to drilling at each location, the driller used hand tools to excavate to the AS/SVE liner, cut the liner, and excavate 1 foot below the liner. Layfield Environmental Containment was contracted to repair the liner by slipping new geomembrane pieces under the existing liner and using extrusion weld methods to create a seal. Layfield's report is included as Attachment 2B-3-2.

4.2. Temporary Wells

Groundwater sampling was conducted to evaluate the lateral and vertical extent of arsenic and to characterize upgradient and shoreline conditions. Groundwater samples were collected from the temporary wells at the locations shown on Figure 2B-3-3. Temporary well screen intervals and the screened geologic unit are presented in Table 2B-3-1.

Temporary wells were placed in the borings to monitor groundwater, generally at the base of the fill and outwash units. Where possible, screens were installed in the fill unit to allow groundwater sampling from the interval between the groundwater table observed at time of drilling and the field-interpreted base of the fill. Screen intervals were adjusted as follows based on field conditions:

■ Fill

- If the silt layer separating overlying fill from outwash deposits was encountered, the base of screen was installed above the silt.
- Screen intervals were adjusted based on XRF analyses to target the elevation of the highest arsenic concentrations identified in soil.
- Screen intervals were adjusted to avoid NAPL-impacted intervals and zones of potentially mobile NAPL.
- Screen intervals were adjusted to target coarser grained soils.

■ Outwash – The base of the well screens was co-located with the field-interpreted outwash-till contact.

Separate borings were drilled where both fill and outwash groundwater samples were collected. Logs with lithology and field screening information are included as Attachment 2B-3-1. PAI explorations ending with an S (shallow) indicate fill explorations and those ending with a D (deep) indicate outwash explorations.² After the deep boring was drilled and after the log and field screening results were evaluated, the temporary screen depth was selected, and a groundwater sample was collected. When the deep boring was completed, an adjacent shallow boring was then advanced to the targeted depth in the fill, the temporary screen was placed, and a shallow groundwater sample was collected.

Seventeen fill (shallow) and 17 outwash (deep) temporary wells were completed. There were four explorations in which a temporary well was not installed:

- Borings PAI-18, PAI-18B, and PAI-21 met refusal on subsurface concrete Refusal occurred 3 feet below ground surface at PAI-18B, and a boring log was not generated.
- Boring PAI-29 which was drilled to the till surface remained dry.

Once the vertical placement of the screen was determined, the probe rods were extracted from the hole, then an expendable drive point was attached to the leading rod and was lowered to the specified depth for the base of screen. Prepacked screens 2 or 5 feet long connected to blank PVC risers were then lowered through the 1.5-inch ID probe rods. Once the prepacked screen reached the specified depth, the screen and riser assembly was pushed and locked into position on the drive point. The probe rods were then raised to expose the desired screen length.

Most temporary wells advanced with a Geoprobe® included 0.75-inch ID by 1.4-inch OD prepacked screens consisting of Schedule 40 PVC pipe with 0.010-inch slots surrounded by stainless steel wire mesh with 0.011-inch openings and 20/40 silica sand filter pack between the slotted PVC and wire mesh. The

² There is one exploration ending in M (middle) for a second, deeper fill boring.

exceptions were PAI-20S and PAI-20D, which were constructed with 0.75-inch ID Schedule 40 PVC pipe with 0.010-inch slot screens.

Temporary wells placed in the Sonic borings included 2-inch ID by 3.4-inch OD prepacked screens consisting of Schedule 40 PVC pipe with 0.010-inch slots surrounded by stainless steel wire mesh with 0.011-inch openings and 20/40 silica sand pack between the slotted PVC and wire mesh. Specifications for the prepacked screens are included in Attachment 2B-3-3.

Prior to sampling, the temporary wells were purged using a peristaltic pump. During low-flow sampling, field measurements were collected using water quality instruments. Groundwater elevations and stabilized groundwater parameters for each location are shown in Table 2B-3-1. Groundwater elevations in Table 2B-3-1 are based on the depth to water measured in the temporary wells before purging and sampling. Measurable NAPL was observed in PAI-20S, PAI-20AS and PAI-21BS, and trace NAPL was observed in tubing used at PAI-33M. Tubing was set near the base of the screens to avoid light NAPL (LNAPL).

Groundwater samples were collected once the water quality parameters varied by less than 10 percent among three consecutive measurements during development. Water quality parameters at four of the sampling locations were not stabilized prior to sampling because of low water volume and recharge in the well as described in Section 4.6 below. Filtered³ groundwater samples were collected in laboratory-supplied containers and submitted for chemical analysis. The samples were maintained on ice and delivered under chain of custody to analytical laboratories. Analysis was completed according to the SIWP and addenda (GeoEngineers 2013, 2014, 2016c). Field quality control samples were collected, including temperature blanks and field duplicates. Groundwater analysis and results are presented in Section 5.1. The screens were removed and disposed of after sampling, and the borings were grouted.

The resulting groundwater analytical data supplement groundwater data collected from four temporary wells installed in fill during the 2014 PAI and monitoring wells MW-36S and MW-36D installed during the 2013 Supplemental Investigation.

4.3. Hydraulic Profiling Tool

The investigation included five HPT explorations to estimate hydraulic conductivity in fill and outwash units. Locations of the HPT explorations are shown on Figure 2B-3-3. HPT logs and the final data report for HPT services are included as Attachment 2B-3-4. Results are presented in Section 5.3.

Dissipation tests were performed below the water table to normalize the pressures recorded. To conduct the dissipation tests, the water pump was shut off and the pressure decline was recorded over time until the pressure was equal to atmospheric pressure plus the static water pressure in the formation. In post-processing of the HPT data and calculation of hydraulic conductivity, the dissipation results were used to remove the influence of atmospheric pressure and formational static water pressure from the pressure measured by the HPT. Multiple dissipation tests were conducted at several of the HPT explorations (see page 4 of final report in Attachment 2B-3-4), but only tests in which the injection pressure dissipated quickly

³ Except groundwater sample PAI-20S-190912 from PAI-20S, which was unfiltered because NAPL clogged the filter.

are presented on the HPT logs; these tests are marked by black triangles on the logs. The static water level is presented on the HPT logs as a red dot.

4.4. Survey

Exploration locations, including those where refusal was encountered or multiple attempts were made, were surveyed on December 21, 2016, by True North Land Surveying of Seattle, Washington. Elevations were surveyed to the nearest 0.001 foot and horizontal coordinates were surveyed to the nearest 0.1 foot. Elevations were referenced to the U.S. Army Corps of Engineers (USACE) (Locks) datum. Horizontal coordinates were referenced to the North American Vertical Datum 83 (NAD83), Washington State Plane North coordinate system. Coordinates are shown in the boring logs (Attachment 2B-3-1).

4.5. Investigation-derived Waste

Investigation-derived waste (IDW), including soil cuttings, groundwater, decontamination water, disposable sampling supplies and disposable personal protective equipment, was placed in labeled 55-gallon steel drums. The drums were sealed, chained to each other, and stored several feet from structures within the Cracking Towers fenced area. Fifteen 55-gallon drums of IDW were generated during the 2016 investigation: seven for soil, four for purge water, and four for decontamination water. Disposal to an approved offsite facility was managed as part of the injection infrastructure installation.

4.6. Deviations

The deviations from the Ecology-approved SIWP and SAP and QAPP Addenda Nos. 1 and 2 (GeoEngineers 2013, 2014, 2016c) are noted:

- Addendum No. 2 (GeoEngineers 2016c) proposed a single boring for fill and outwash groundwater samples in the same location. However, separate borings were drilled for the fill and outwash temporary well installations.
- Addendum No. 2 (GeoEngineers 2016c) proposed collection of discrete groundwater samples using a dual tube system and clean single-use 3/4-inch-diameter PVC screen. However, a different collection method was used. Deviation from the dual tube system was based on the driller's site experience with the macro core system, which was successful at reaching the target sampling depths. PVC screens without sand prepack were used at the first two locations (PAI-20S and PAI-20D); however, the sample filters readily clogged. To reduce fines and suspended solids in the sample, sand prepack screens were used for the remainder of the investigation.
- During groundwater sampling, four locations (PAI-20S, PAI-23S, PAI-24S, and PAI-30S) went dry soon after the start of purging. At these locations, field staff prioritized collecting volume for analysis rather than stabilizing the parameters. Because of the limited volume of water present in the screen, low recharge rates or time constraints at these locations, samples were collected before field parameters stabilized.
- Electrical conductivity was not measured during HPT exploration because of equipment malfunction.

5.0 INVESTIGATION RESULTS

This section presents analytical results from the 2016 PAI. It also presents field screening XRF arsenic results and HPT results.

5.1. Analytical Results

Chain of custody reports, laboratory reports and data validation reports are provided in Attachment 2B-3-5.

5.1.1. Soil

Soil samples were submitted to Fremont Analytical, Inc. in Seattle for particle size analysis by ASTM International (ASTM) Method D422 and chemical oxygen demand (COD) analysis by Standard Method (SM) 5220C. Under subcontract to Fremont Analytical, ALS Laboratory performed the COD analysis. Soil analytical results are presented in Table 2B-3-1. Thirty-nine soil samples were analyzed for COD and 36 samples were analyzed for particle size.

Soil samples were generally collected at depths corresponding to the screen interval of the temporary wells in each boring. Results for fill and outwash soil samples are summarized below:

Parameter	Average in Fill Soil Samples	Average in Outwash ⁴ Soil Samples
Total Solids (%)	76	89
Chemical Oxygen Demand (mg/kg)	67,000	3,200
Grain Size <72.5 µm (%)	1.5	3.8

5.1.2. Groundwater

Groundwater samples were submitted to Fremont Analytical for chemical analysis of dissolved metals (arsenic and iron) by U.S. Environmental Protection Agency (EPA) Method 200.8, sulfide by SM 4500-S2-F and COD by SM 5220D. Selected groundwater samples were submitted to Analytical Resources Inc. for chemical analysis of sulfide by SM 4500-S2-D. Seventeen samples, plus one duplicate, were collected from fill and 17 samples plus two duplicates were collected from outwash. Analytical results are presented in Table 2B-3-2.

Figures 2B-3-4 and 2B-3-5 depict the interpreted concentrations of dissolved arsenic in groundwater, fill and outwash respectively, within the investigation area. In fill, dissolved arsenic concentrations in groundwater samples range from 30 micrograms per liter (µg/L) to 50,200 µg/L; the highest concentration was detected in the groundwater sample from PAI-2B during the 2014 PAI. In outwash, dissolved arsenic concentrations in groundwater samples ranged from 39 µg/L to 81,800 µg/L; the highest concentration was detected at MW-36D. The estimated lateral extent of dissolved arsenic from fill and outwash groundwater samples was reported to Ecology in December 2016 (GeoEngineers 2016b).

⁴ PAI-20-20-25 and PAI-32-21-23.4 extended from outwash to pre-Fraser till, however, in each case most of the sample was outwash thereby, included in the outwash average.

The sample collected from PAI-21BS (sample ID PAI-21BS-161017) consisted of NAPL; the arsenic and iron groundwater analytical results shown in Table 2B-3-2 are reported in milligrams per kilogram (mg/kg), rather than µg/L.

The arsenic concentrations in groundwater are below the maximum of 81,800 µg/L arsenic detected in the sample collected from MW-36D in December 2014. The highest detected arsenic concentration from an outwash location is 23,400 µg/L (PAI-14D) and highest in fill is 10,500 µg/L (PAI-22S). However, the average concentrations of dissolved arsenic in the fill and outwash are similar, summarized below with other results:

Parameter	Average Concentration in Fill Groundwater	Average Concentration in Outwash ⁵ Groundwater
Arsenic (µg/L)	2,497	2,740
Iron (µg/L)	9,093	8,930
Sulfide (mg/L)	27	9.7
Chemical Oxygen Demand (mg/L)	106	152

5.2. Soil XRF Results

Arsenic XRF field screening was used to characterize the vertical distribution of arsenic in soil. Soil arsenic XRF field measurements and laboratory results showed a generally strong positive correlation during the 2014 PAI (RI/FS Appendix 2B-1). The XRF arsenic data are presented on the boring logs (Attachment 2B-3-1) and tabulated in Attachment 2B-3-6.

5.3. HPT Results

Five HPT explorations were completed as part of this investigation (see Figure 2B-3-3 and Attachment 2B-3-4). HPT logs in Attachment 2B-3-4 plot field measurements and calculated values for pressure and hydraulic conductivity. The left two columns (pressure and flow) are measured values and the right two columns (corrected pressure and estimated hydraulic conductivity) are calculated values.

Based on the geologic contacts observed in nearby boring, the average estimated hydraulic conductivity for fill and outwash from HPT measurements is as follows:

⁵ The screens for PAI-15D, PAI-31D and PAI-32D extended from outwash to pre-Fraser Diamicton or Till, however, in each case most of the screen was in outwash thereby included in the outwash average.

Location	Fill		Outwash	
	Estimated Depth Interval ⁶ (feet BGS)	Average Hydraulic Conductivity ⁷ (ft/day)	Estimated Depth Interval ⁶ (feet BGS)	Average Hydraulic Conductivity ⁷ (ft/day)
HPT-1a	8.5 – 16.0	28	16.0 – 24.2	19
HPT-2	13.9 – 16.5	70	20.0 – 28.8	30
HPT-3	12.7 – 18.0	102	22.0 – 34.8	34
HPT-4	9.0 – 20.0	77	21.0 – 27.6	30
HPT-5	11.0 – 13.0	36	13.5 – 21.9	36

Average hydraulic conductivities from HPT explorations in fill on the eastern portion of the Play Area (HPT-2, HPT-3 and HPT-4) are higher than average hydraulic conductivities from HPT explorations in fill on the western portion of the Play Area (HPT-1a and HPT-5). In outwash, the average estimated hydraulic conductivities are relatively uniform across the five HPT exploration locations.

6.0 REFERENCES

- GeoEngineers, Inc. 2013. Supplemental Investigation Work Plan, Gas Works Park Site, Seattle, Washington. March 13, 2013.
- GeoEngineers, Inc. 2014. Sampling and Analysis Plan and Quality Assurance Project Plan Addendum No. 1, Supplemental Upland Investigation (Play Area Investigation), Gas Works Park Site, Seattle, Washington. December 5, 2014.
- GeoEngineers, Inc. 2016b. Gas Works Park Site Play Area Injection Infrastructure Groundwater Monitoring Well Network Technical Memorandum. December 19, 2016.
- GeoEngineers, Inc. 2016c. Sampling and Analysis Plan and Quality Assurance Project Plan Addendum No. 2, Supplemental Upland Investigation (Play Area Supplemental Investigation), Gas Works Park Site, Seattle, Washington. August 18, 2016.
- GeoEngineers, Inc. 2017. Play Area Groundwater Treatment Interim Action Work Plan, Gas Works Park Site, Seattle, Washington. August 1, 2017.

⁶ Geologic unit depths were to be based on the interpretation of lithology from soil electrical conductivity (EC) measured by the HPT. EC data were not recorded due to an equipment malfunction. As a result, geologic contact depths were estimated from nearby borings; estimated depths may differ from depths encountered by the HPT.

⁷Pressure and flow data used to calculate hydraulic conductivity were recorded at 0.05-foot intervals. The calculated hydraulic conductivities were averaged over the estimated depth interval of the geologic unit for each HPT location.

Table 2B-3-1
Soil Analytical and Test Results
 Gas Works Park Site
 Seattle, Washington

Exploration	Sample ID	Sample Elevation (feet USACE)	Observed Geology	Conventional		Grain Size															
				Total Solids %	Chemical Oxygen Demand mg/kg	76200 µm (Gravel)	76200-50800 µm (Gravel)	50800-38100 µm (Gravel)	38100-25400 µm (Gravel)	25400-19000 µm (Gravel)	19050-9525 µm (Gravel)	9525- 4750 µm (Gravel)	4750- 2000µm (Coarse Sand)	2000-850 µm (Medium Sand)	850-425 µm (Medium Sand)	425-250 µm (Fine Sand)	250-106 µm (Fine Sand)	106-62.5 µm (Fine Sand)	72.5-45 µm (Silt)	45-34 µm (Silt)	<34 µm (Silt & Clay)
PAI-13D	PAI-13-28-33	2.5 to -2.5	Qva	88.8	2,260	0	0	0	0	5.9	10.6	6.21	6.17	5	7.83	12.8	23.8	7.81	7.97	3.88	1.53
PAI-14D	PAI-14-20-21.8	8.9 to 7.1	Fill	NA	NA	0	0	0	0	3.51	32.4	20.8	18.9	9.38	4.28	2.47	3.37	1.13	1.27	0.508	0.688
PAI-14D	PAI-14-22-22.5	6.9 to 6.4	Fill	79.4	39,300 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PAI-14D	PAI-14-28-33	0.9 to -4.1	Qva	89.0	2,980	0	0	0	0	10.2	13.9	7.66	6.79	4.52	6.39	10.9	19.4	6.21	7.25	5.74	0.792
PAI-15D	PAI-15-15-17.4	15.4 to 13.0	Fill	61.3	154,000 J	0	0	0	0	8.09	27.6	17.5	18.6	13.4	12	1.94	0.0805	0.00636	0	0	0
PAI-15D	PAI-15-17.4-17.6	13.0 to 12.8	Fill	50.1	37,300	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PAI-15D	PAI-15-30-32.5	0.4 to -2.1	Qva	90.3	2,720 J	0	0	0	0	7.98	6.91	7.5	4.79	4.66	7.53	13.8	26.6	7.73	7.25	3.26	1.84
PAI-15D	DUP-1 (PAI-15-30-32.5)	0.4 to -2.1	Qva	90.6	2,370 J	0	0	0	0	12.2	12.5	9.28	6.4	4.3	6.22	11.1	21.4	5.96	6.16	2.24	2.07
PAI-16D	PAI-16-11.5-15.8	22.4 to 18.1	Fill	63.7	220,000	0	0	0	0	22.2	26.2	15.3	12.52	8.21	6.24	4.83	3.82	0.147	0.0235	0.00735	0.00588
PAI-16D	PAI-16-28-33	5.9 to 0.9	Qva	90.5	2,340	0	0	0	0	4.46	10.3	6.15	4.75	4.24	6.73	12	25.7	10.5	10.6	3.67	0.69
PAI-17D	PAI-17-14-15.8	20.0 to 18.2	Fill	60.0	180,000	0	0	0	0	7.04	29.7	17.5	15.8	10.6	7.53	5.26	6.16	1.73	1.64	0.836	0.468
PAI-17D	PAI-17-15.8-16.1	18.2 to 17.9	Fill	57.8	204,000 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PAI-17D	PAI-17-26.5-29	7.5 to 5.0	Qvr	90.3	2,560	0	0	0	0	10.5	7.48	4.74	4.71	6.05	6.6	12	24.9	9.71	10.1	2.48	0.531
PAI-19D	PAI-19-11-12	18.9 to 17.9	Fill	81.8	51,300	0	0	0	0	5.65	14.8	10	11.1	10.5	15.1	13.4	11.7	2.36	2.07	16	1.46
PAI-19D	PAI-19-22.5-24.5	7.4 to 5.4	Qvr	91.0	2,630	0	0	0	0	20.7	16.5	6.26	5.13	3.62	4.7	7.77	16.6	5.82	7.19	4.21	1.3
PAI-19D	PAI-19-24.5-25	5.4 to 4.9	Qvr	90.0	3,070	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PAI-20D	PAI-20-13.5-15	16.4 to 14.9	Fill	90.7	11,800	0	0	0	0	20.2	13.1	7.53	7.51	6.57	7.7	9.32	15.2	4.58	3.7	3.83	0.626
PAI-20D	PAI-20-20-25	9.9 to 4.9	Qva/Qpgt	91.3	5,970 J	0	0	0	0	1	10.7	5.6	5.51	4.84	7.66	13.7	28.8	10.5	7.43	3.69	0.165
PAI-21BD	PAI-21B-15.8-16.5	8.5 to 17.8	Fill	89.2	59,200	0	0	0	0	59.9	7.62	5.24	6.17	6.8	5.65	2.88	2.85	1.03	0.945	0.908	0.0247
PAI-21BD	PAI-21B-23-28	11.3 to 6.3	Qvr	89.2	2,110	0	0	0	0	18.9	5.53	5.07	5.55	4.9	7.63	12.8	22.9	6.62	5.63	3.8	0.766
PAI-22D	PAI-22-12-13	20.6 to 19.6	Fill	88.8	9,540	0	0	0	0	10.4	21.2	10	11.1	8.33	9.05	10	11.5	2.63	2.56	1.03	2.11
PAI-22D	PAI-22-23-25	9.6 to 7.6	Qvr	83.1	3,400	0	0	0	0	1.58	0	0.384	1.03	1.19	0.972	7.11	50.5	15.4	14.8	3.74	2.72
PAI-23D	PAI-23-8-8.7	22.2 to 21.5	Fill	NA	NA	0	0	0	0	6.37	23.9	8.87	13	9.37	7.99	9.38	11.5	4.2	3.88	0.932	0.524
PAI-23D	PAI-23-9.2-9.8	21.0 to 20.4	Fill	83.1	16,300 J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PAI-23D	PAI-23-26-28	4.2 to 2.2	Qva	89.0	3,580 J	0	0	0	0	6.4	3.47	5.05	4.91	3.99	6.84	14.1	30.7	10.8	8.19	4.86	0.441
PAI-24D	PAI-24-10-11	20.5 to 19.5	Fill	76.7	7,900 J	0	0	0	0	0	0.685	1.77	20.6	34.8	14.5	8.13	9.14	6.32	3.34	0.785	0.0693
PAI-24D	PAI-24-21.3-22.3	9.2 to 8.2	Qva	84.8	6,920 J	0	0	0	0	0	1.29	2.14	4.66	6.19	15.7	24	31.7	9.93	3.72	0.15	0.0701
PAI-26D	PAI-26-11.6-12.3	20.0 to 19.3	Fill	57.1	131,000 J	0	0	0	0	16.9	13	12.6	16.2	11.9	9.24	7.59	8.17	1.55	1.46	0.686	0.699
PAI-26D	PAI-26-20.25-25.25	11.3 to 6.3	Qva	90.9	3,490 J	0	0	0	0	8.91	19	4.1	7.38	5.62	6.61	10.8	18.1	7.43	7.98	2.73	1.28
PAI-27D	PAI-27-10-12.5	15.8 to 13.3	Fill	89.4	43,200 J	0	0	0	0	11	31.2	16.1	17.8	9.89	5.27	2.84	2.99	0.842	0.857	0.368	0.602
PAI-27D	PAI-27-25.5-26.5	0.3 to -0.7	Qvr	89.9	4,600 J	0	0	0	0	2.65	6.51	8.26	7	5.57	9.43	16.4	26.8	7.05	6.68	2.54	0.963
PAI-28S	PAI-28-10.0-11.0	20.3 to 19.3	Fill	84.2	3,880	0	0	0	0	13.9	11.2	10.6	12.7	10.6	11.9	12.2	11.4	2.25	1.91	0.84	0.45
PAI-29	PAI-29-7.9-8.4	25.7 to 25.2	Fill	82.6	4,060	0	0	0	0	9.28	11.1	22.3	19.1	10.9	7.55	5.82	7.72	2.31	2.21	0.855	0.784
PAI-30S	PAI-30-8-9	25.7 to 24.7	Fill	77.5	38,000	0	0	0	0	3.8	15.2	8.62	14.6	13	12.1	10.4	11.4	3.59	3.92	2.15	0.832
PAI-31D	PAI-31-15-16.5	14.9 to 13.4	Fill	89.4	9,850	0	0	0	0	17.3	13.7	10.6	7.41	6.53	9.02	11.2	14.8	5.56	3.17	0.477	0.196
PAI-31D	PAI-31-27-29.5	2.9 to 0.4	Qpgt	92.2	2,140	0	0	0	0	1.19	8.01	4.04	4.98	4.46	7.14	14.6	33	12.1	8.63	1.37	0.388
PAI-32D	PAI-32-21-23.4	8.7 to 6.3	Qva/Qpgt	80.9	1,640	0	0	0	0	3.04	4.53	4.33	7.52	7.67	10.3	16.5	31.6	10.4	3.49	0.399	0.081
PAI-32D	PAI-32-23.4-26	6.3 to 3.7	Qpgt	93.8	2,260	0	0	0	0	4.21	7.91	7.08	9.73	7.67	9.24	14	23.2	8.94	5.88	1.31	0.614
PAI-33D	PAI-33-11.5-12.5	22.5 to 21.5	Fill	79.7	19,200	0	0	0	0	25.3	12.8	9.76	8.22	6.94	9.72	8.01	10.4	2.95	2.67	2.2	0.886
PAI-33D	PAI-33-12.5-15	21.5 to 19.0	Fill	70.9	107,000	0	0	0	0	18.1	12.7	9.47	11.66	9.9	10.5	9.89	9.78	2.9	3.24	1.56	0.169
PAI-33D	PAI-33-25-30	9.0 to 4.0	Qvr/Qva	89.2	1,650	0	0	0	0	3.45	8.17	8.08	6.13	5.24	7.89	14.6	32	8.48	4.9	0.62	0.0815

Notes:
 mg/kg = milligrams per kilogram
 NA = not analyzed or not tested
 Qva = Vashon Advance Outwash
 Qvr = Vashon Recessional Outwash
 Qpgt = Pre-Fraser Till
 µm = micron
 USACE = U.S. Army Corps of Engineers (Locks) vertical datum
 Analytical and Testing Methods:
 Grain Size – ASTM Method D422
 Chemical Oxygen Demand – SM 5220C-Modified
 Percent Solids – 160.3 Modified

Table 2B-3-2
Groundwater Water Quality Parameters & Analytical Results
 Gas Works Park Site
 Seattle, Washington

Exploration ¹	Sample ID	Ground Surface	Screen Start	Screen End	Groundwater ²	Tubing Intake	Observed Geology in Screen Interval	Field-Measured Water Quality Parameters ³					Groundwater Analytical Results ⁴					
								pH	Specific Conductance	Turbidity	Dissolved Oxygen	ReDox Potential	Total Dissolved Solids	Filtered/Unfiltered	Arsenic	Iron	Sulfide	Chemical Oxygen Demand
									µS/cm	NTU	mg/L	millivolts	g/L		µg/L	µg/L	mg/L	mg/L
					Elevation (feet USACE)													
PAI-13D	PAI-13D-160914	30.51	2.51	-2.49	17.71	-1.49	Qva	9.31	2,778	120.4	-	-325.0	1.81	Filtered	8,460	2,090	68.8	372
PAI-14D	PAI-14D-160914	28.89	0.89	-4.11	8.47	-1.11	Qvr/Qva	9.13	1,988	370.0	-	-115.2	1.28	Filtered	23,400	1,020	33.2	266
PAI-15S	PAI-15S-160927	30.11	15.41	10.41	20.26	10.81	Fill	6.53	421.5	41.9	0.69	-224.8	-	Filtered	725	1,970	8.65	67.7
PAI-15D	PAI-15D-160927	30.44	-0.17	-2.67	10.79	-2.36	Qva/Qpgd	8.14	1,325	932.0	0.50	-307.4	-	Filtered	407	35,700	9.36	187
PAI-16S	PAI-16S-190915	33.79	17.79	15.79	20.04	16.79	Fill	6.48	827	38.4	0.35	-322.7	-	Filtered	1,000	2,500	60.4	192
PAI-16D	PAI-16D-190915	33.87	5.87	0.87	14.37	2.87	Qva	7.26	926	27.4	0.52	-123.3	-	Filtered	586	2,880	3.00	63.4
PAI-17S	PAI-17S-190615	34.16	20.16	18.16	20.36	18.36	Fill	5.90	519	56.3	0.41	-164.5	-	Filtered	1,490	10,600	13.0	76.6
PAI-17D	PAI-17D-190615	33.96	9.96	4.96	20.21	5.96	Qvr/Qva	6.98	738	129.7	0.36	-155.0	-	Filtered	758	24,000	3.20	99.8
PAI-18	concrete refusal	33.89	dry ⁵															
PAI-19S	PAI-19S-190913	29.76	18.76	14.76	19.66	16.76	Fill	8.29	1,058	835.0	1.38	-103.1	0.690	Filtered	3,510	2,130	27.6	325
PAI-19D	PAI-19D-190913	29.88	7.38	4.88	14.28	5.88	Qvr	7.06	840	644.0	1.25	-120.3	0.550	Filtered	143	11,700	0.119	J 114
PAI-20S	PAI-20S-190912	29.92	16.92	14.92	16.32	15.42	Fill	measurable NAPL in well ⁶					Unfiltered	NA	NA	280	J	NA
PAI-20AS	PAI-20S-190913	30.12	20.12	15.12	16.72	15.42	Fill	measurable NAPL in well ⁶					Filtered	4,460	1,770	32.0	J	193
PAI-20D	PAI-20D-190912	29.88	9.88	4.88	13.78	4.88	Qva	slow recharge ⁷					Filtered	841	3,940	9.20	J	143
PAI-21	concrete refusal	34.17	dry ⁵															
PAI-21BS	PAI-21BS-161017	34.24	20.24	17.74	18.29	17.74	Fill	measurable NAPL in well ⁶					Filtered	25.9 ⁸	41.4 ⁸	2.00	U	12,700
PAI-21BD	PAI-21BD-161017	34.26	11.26	6.26	20.83	6.76	Qvr	8.73	627	573.1	0.78	-125.2	0.410	Filtered	1,440	970	0.499	10.0
PAI-22S	PAI-22S-190916	32.54	20.54	19.54	21.24	19.54	Fill	5.51	117	192.4	-	-1.7	-	Filtered	10,500	6,150	4.80	10.7
PAI-22D	PAI-22D-190916	32.64	9.64	7.64	21.19	8.14	Qvr	6.71	456	28.7	0.42	-126.1	-	Filtered	39.3	5,940	0.600	28.6
PAI-23S	PAI-23S-160926	30.25	21.75	20.75	21.88	21.05	Fill	6.44	slow recharge ⁷					Filtered	5,740	208	0.107	NA
PAI-23D	PAI-23D-160926	30.17	4.37	2.37	19.69	3.17	Qva	6.80	1,423	44.3	0.91	-99.8	-	Filtered	106	23,300	0.0680	NA
PAI-23D	D-160926	analytical duplicate of PAI-23D-160926											Filtered	104	22,900	0.0720	NA	
PAI-24S	PAI-24S-160926	30.66	20.86	19.86	20.86	20.16	Fill	6.72	slow recharge ⁷					Filtered	2,390	4,630	0.0550	45.2
PAI-24D	PAI-24D-160926	30.53	9.03	8.03	19.29	8.53	Qva	6.91	588	609.4	0.90	-128.1	-	Filtered	88.5	9,490	0.0650	54.5
PAI-25D	PAI-25D-160927	28.23	1.10	-0.40	13.54	0.23	Qvr	7.46	2,071	121.7	1.40	-154.4	-	Filtered	909	6,190	35.2	736
PAI-26S	PAI-26S-190928	31.55	20.15	19.15	20.13	19.55	Fill	6.08	749	49.2	0.87	-19.0	0.490	Filtered	898	75,800	0.0950	49.2
PAI-26S	D-160928	analytical duplicate of PAI-26S-190928											Filtered	904	72,300	0.0960	43.9	
PAI-26D	PAI-26D-190928	31.57	11.32	6.32	20.25	6.57	Qva	6.79	776	25.7	1.00	-109.7	0.500	Filtered	513	13,100	0.0860	24.0
PAI-27S	PAI-27S-160928	25.91	16.41	13.41	20.29	13.71	Fill	6.34	473	32.1	1.16	-122.2	0.310	Filtered	29.6	9,480	1.00	70.4
PAI-27D	PAI-27D-160928	25.84	0.54	-0.46	17.68	-0.16	Qvr	7.38	1,243	25.4	1.12	-176.2	0.800	Filtered	647	3,860	0.154	133
PAI-28S	PAI-28S-160929	30.30	24.30	19.30	22.29	20.30	Fill	6.98	292	37.4	8.11	-56.3	0.190	Filtered	544	3,870	0.210	28.0
PAI-29	shallow Till refusal	33.64	dry ⁵															
PAI-30S	PAI-30S-160929	33.75	28.75	24.75	25.85	24.80	Fill	slow recharge ⁷					Filtered	140	8,150	0.0500	26.7	
PAI-31S	PAI-31-S-161018	30.00	15.00	13.50	17.60	14.00	Fill	9.08	1,036	543.9	0.20	-336.1	0.670	Filtered	733	576	3.58	143
PAI-31D	PAI-31-D-161018	29.87	2.87	0.37	6.97	0.87	Qva/Qpgt	7.77	11.5	717.8	0.22	-302.4	0.740	Filtered	225	2,690	0.0500	26.7
PAI-32D	PAI-32-D-161018	29.72	8.72	3.72	11.08	4.22	Qvr/Qpgt	7.47	873	538.5	0.96	-198.0	0.570	Filtered	471	3,640	0.0500	77.0
PAI-33S	PAI-33-S-161019	33.98	23.98	18.98	19.98	19.98	Fill	6.73	635	912.7	0.90	-100.4	0.410	Filtered	3,890	15,600	1.76	78.3
PAI-33M ⁶	PAI-33-M-161019	34.07	19.07	14.07	19.05	15.07	Fill	8.82	1,240	136.4	0.19	-290.1	0.810	Filtered	3,870	2,010	20.9	179
PAI-33D	PAI-33-D-161019	34.01	9.01	4.01	18.07	5.01	Qvr/Qva	7.91	984	228.8	0.22	-227.3	0.640	Filtered	7,560	1,300	0.475	90.2
PAI-33D	DUP-161019	analytical duplicate of PAI-33-D-161019											Filtered	7,210	1,390	0.449	79.6	

Notes:

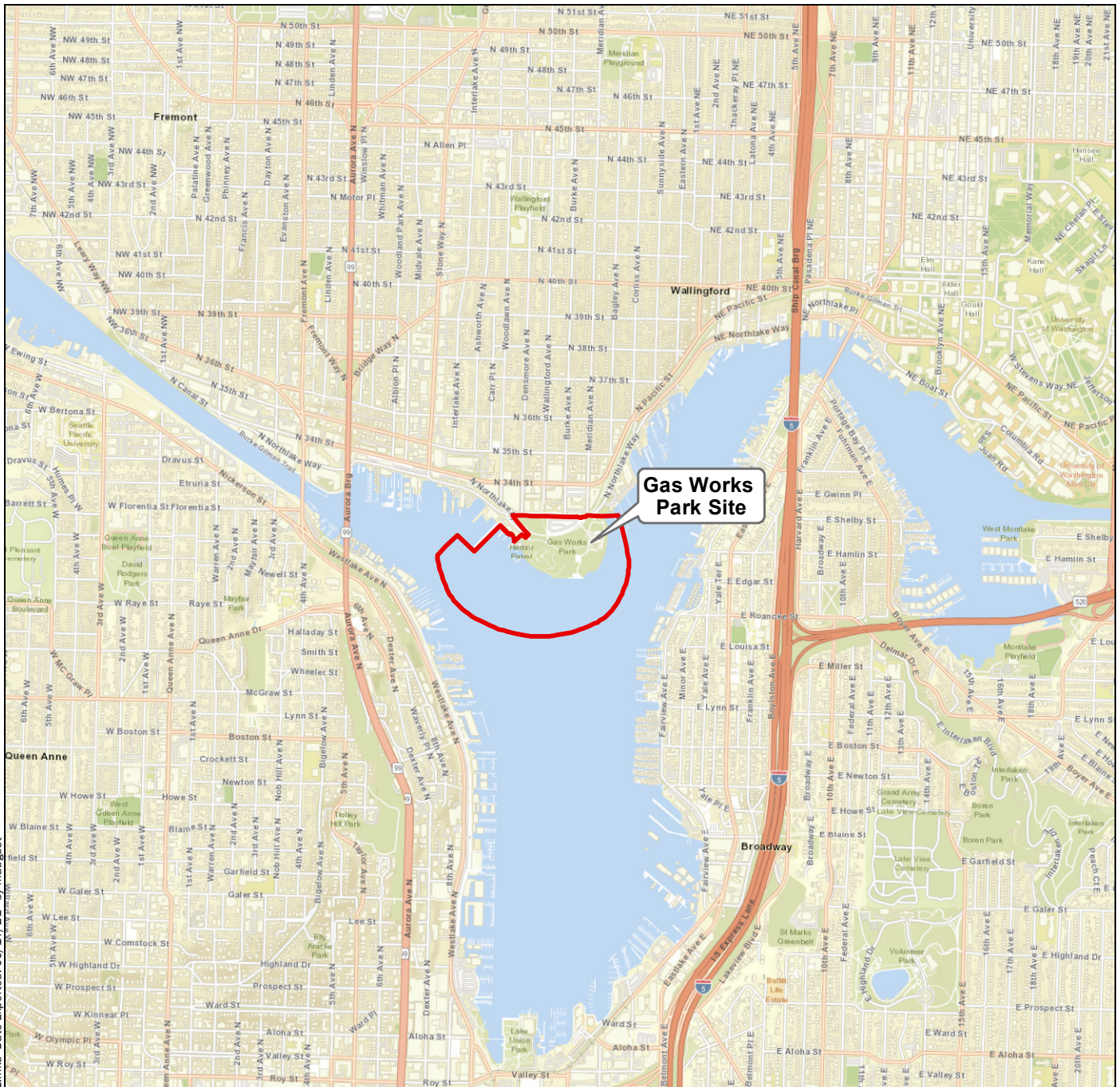
1. Most temporary wells were constructed of ¾-inch diameter, schedule 40 PVC pipe with prepacked sand 0.010-inch slot well screen. However, temporary wells PAI-20S-190912 and PAI-20D-190912 were collected from constructed of ¾-inch diameter, schedule 40 PVC pipe 0.010-inch slot well screens without the prepacked sand.
2. Groundwater elevations are based on the ground surface and depth to water measured in the temporary wells.
3. Parameters were recorded after low-flow purging.
4. Samples were collected after low-flow purging and field filtered using a 0.45-micron in-line filter. The exception was PAI-20-S-160912, which was unfiltered because NAPL clogged the filter.
5. Refusal prior to reaching groundwater.
6. Measurable NAPL in well, parameters were not collected. Trace NAPL was also observed in tubing of PAI-33M-161019.
7. Slow recharge, unable to measure parameters due to low volume after purging.
8. PAI-21BS arsenic and iron results presented in mg/kg for nonaqueous phase liquid sample.

-- = no reading
g/L = grams per liter
J = result estimated
mg/kg = milligrams per kilogram
mg/L = milligrams per liter
NA = not analyzed
NAPL = non-aqueous phase liquid
NTU = nephelometric turbidity units

Qva = Vashon Advance Outwash
Qvr = Vashon Recessional Outwash
Qpgd = Pre-Fraser Diamict
Qpgt = Pre-Fraser Till
U = not detected
µg/L = micrograms per liter
USACE = U.S. Army Corps of Engineers (Locks) vertical datum
µS/cm = microsiemens per centimeter

Analytical and Testing Methods:

Arsenic and Iron – EPA Method 200.8
Sulfide – SM 4500-S2-F or SM 4500-S2-D
Chemical Oxygen Demand – SM 5220D

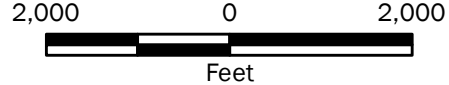
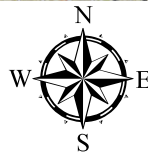


Gas Works Park Site

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— Area of Investigation



Vicinity Map

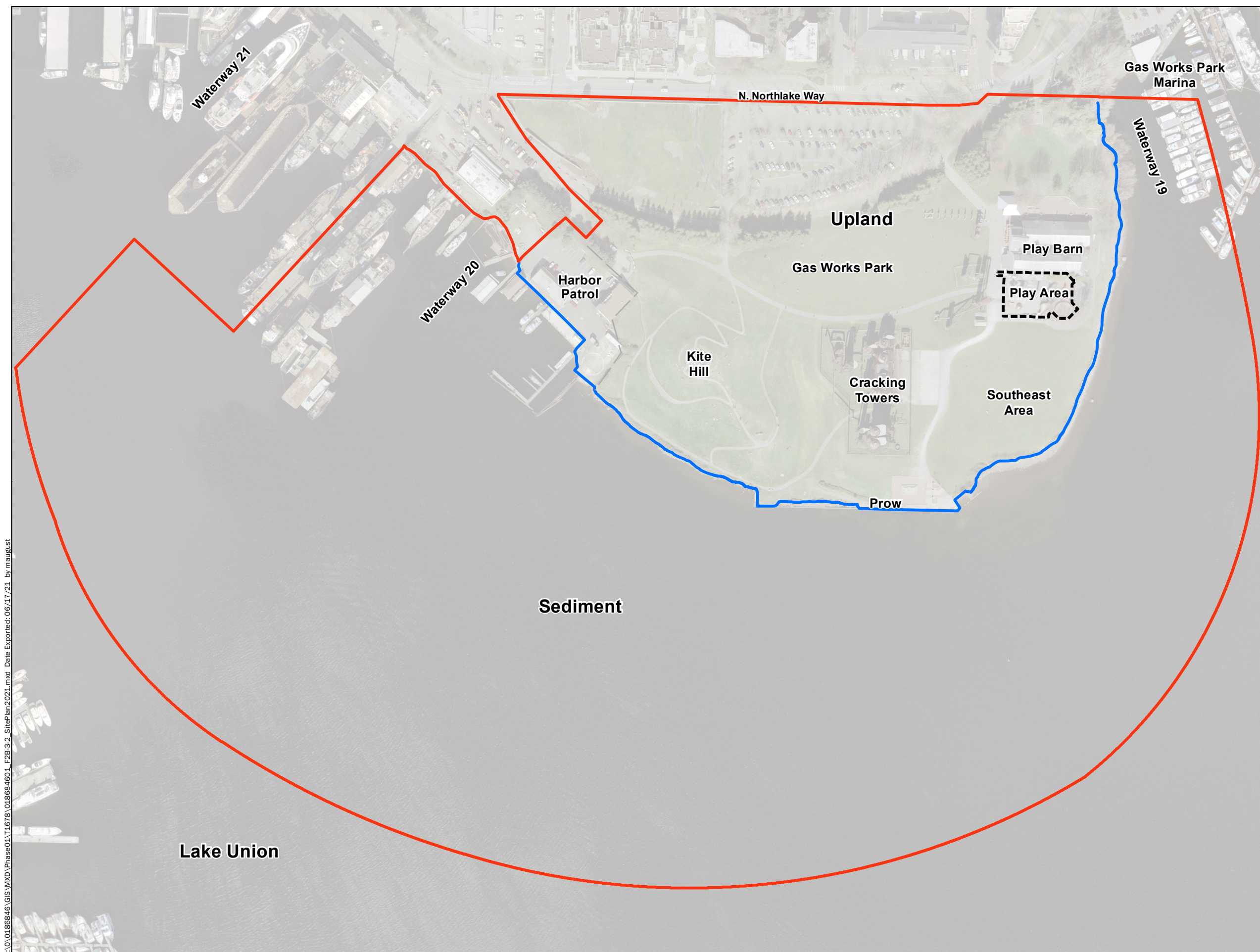
Gas Works Park Site
Seattle, Washington



Figure 2B-3-1

- Notes:**
1. Gas Works Park Site boundary is the Area of Investigation.
 2. Basemap - ESRI, 2021.
 3. Projection: NAD 1983 StatePlane Washington North FIPS 4601 Feet.

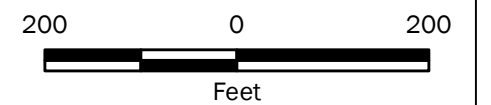
DISCLAIMER: This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. The locations of all features are approximate. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.



- Legend**
- Area of Investigation
 - Shoreline (OHWM)
 - Play Area Renovation Footprint

- Notes:**
1. The AOI is documented in the 2013 Amendment of Agreed Order DE 2008 (Ecology 2013).
 2. Basemap 2005 USGS aerial photograph. Does not show current conditions.
 3. Projection: NAD 1983 StatePlane Washington North FIPS 4601 Feet.

DISCLAIMER: This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. The locations of all features are approximate. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

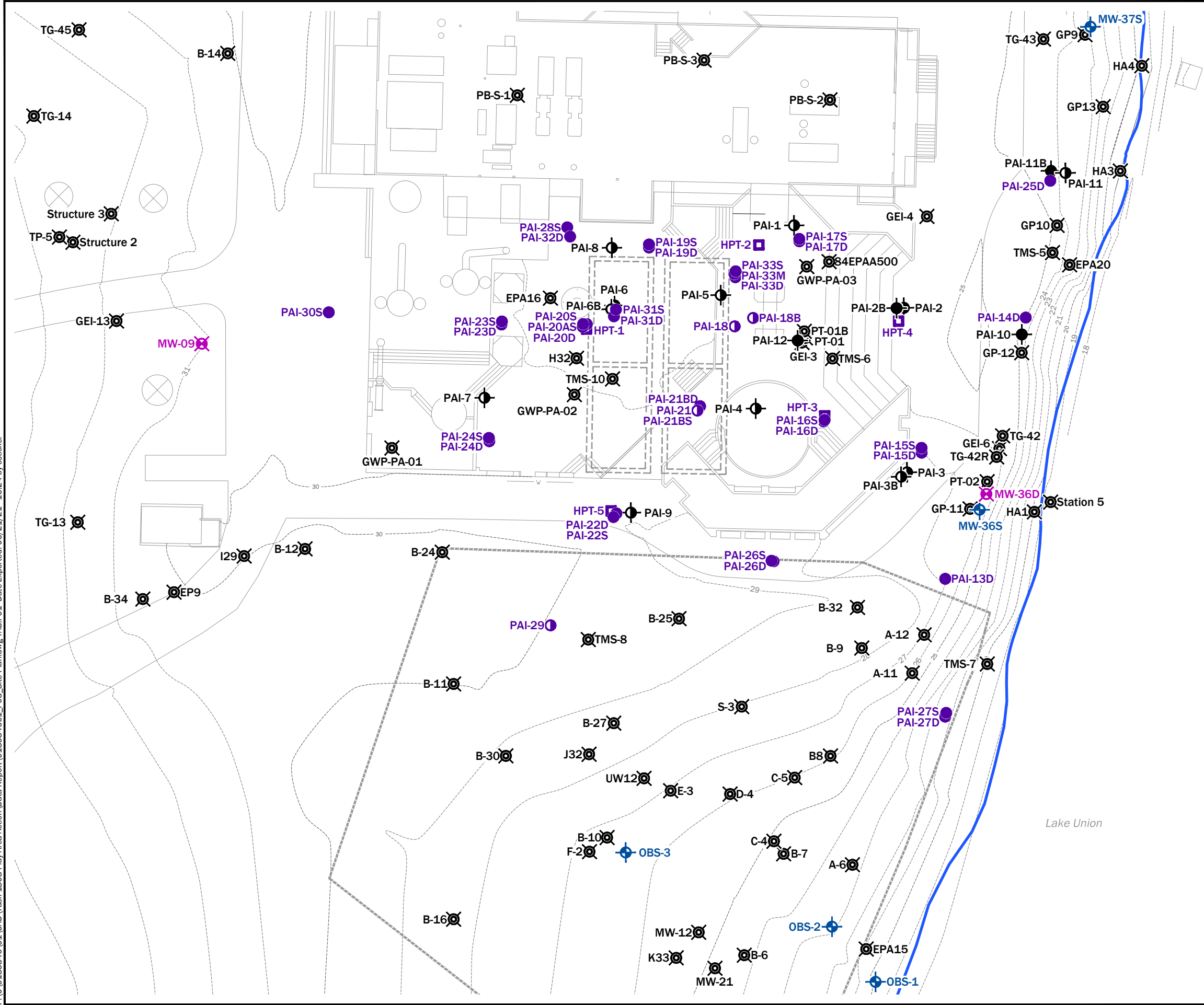


Site Plan

Gas Works Park Site
Seattle, Washington

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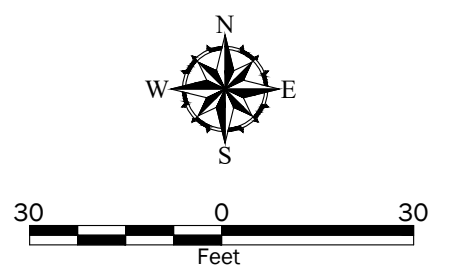
P:\0186846\01\CAD\Task 1808 Play Area Action\Data Report\018684601_F03_Site Plan.dwg TAB:F01 Date Exported: 06/21/21 - 16:24 by cstckel



- Legend**
- Shoreline (OHWM)
 - Approximate Air Sparging/Soil Vapor Extraction Liner Limits
 - Former Subgrade Tank (Subgrade Concrete Rubble)
 - HPT-1 2016 Hydraulic Profiling Tool Exploration
 - PAI-18 2016 Subsurface Exploration (Soil)
 - PAI-21 2016 Subsurface Exploration (Soil and Groundwater)
 - PAI-4 2014 Subsurface Exploration (Soil)
 - PAI-2B 2014 Subsurface Exploration (Soil and Groundwater)
 - B-10 Pre-2014 Subsurface Exploration
 - MW-36S Fill Monitoring Well
 - MW-36D Outwash Monitoring Well

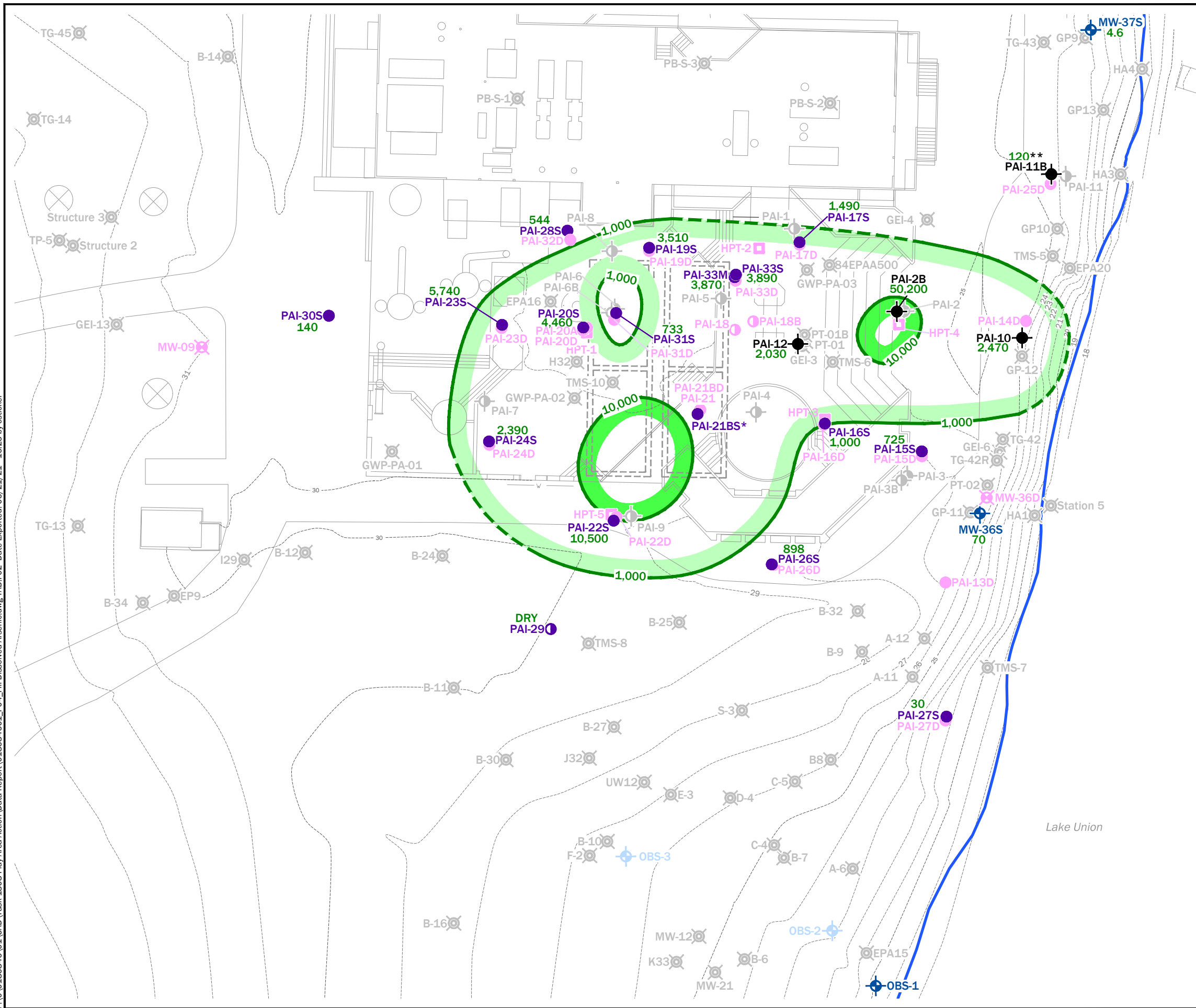
- Data Source Notes:**
1. Existing conditions survey by Seattle Parks and Recreation, November 2002
 2. Earthwork & Demolition plan by Department of Parks and Recreation, July 1974

DISCLAIMER: This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. The locations of all features are approximate. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.



Upland Explorations	
Gas Works Park Site Seattle, Washington	
	Figure 2B-3-3

P:\0186846\01\CAD\Task 1808 Play Area Action\Data Report\018684601_F04_Fill Dissolved Arsenic.dwg TAB:F02 Date Exported: 06/21/21 - 16:25 by cstickle



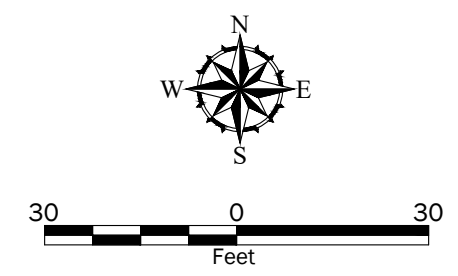
Legend

- Shoreline (OHWM)
- Former Subgrade Tank (Subgrade Concrete Rubble)
- HPT-1 2016 Hydraulic Profiling Tool Exploration
- PAI-29 2016 Fill Subsurface Exploration (Soil)
- PAI-18 2016 Subsurface Exploration (Soil)
- PAI-17S 2016 Fill Subsurface Exploration (Soil and Groundwater)
- PAI-17D 2016 Subsurface Exploration (Soil and Groundwater)
- PAI-4 2014 Subsurface Exploration (Soil)
- PAI-11B 2014 Fill Subsurface Exploration (Soil and Groundwater)
- B-10 Pre-2014 Subsurface Exploration
- MW-36S 2016 Fill Monitoring Well
- MW-36D 2016 Outwash Monitoring Well
- 1,000 Interpolated Fill Dissolved Arsenic Concentration Contour (Dashed Where Inferred) (µg/L)
- 10,500 Fill Dissolved Arsenic Concentration (µg/L)
- * Well Contained NAPL - Result Not Used for Contouring
- ** Temporary Well Screen Spanned Fill and Outwash

Data Source Notes:

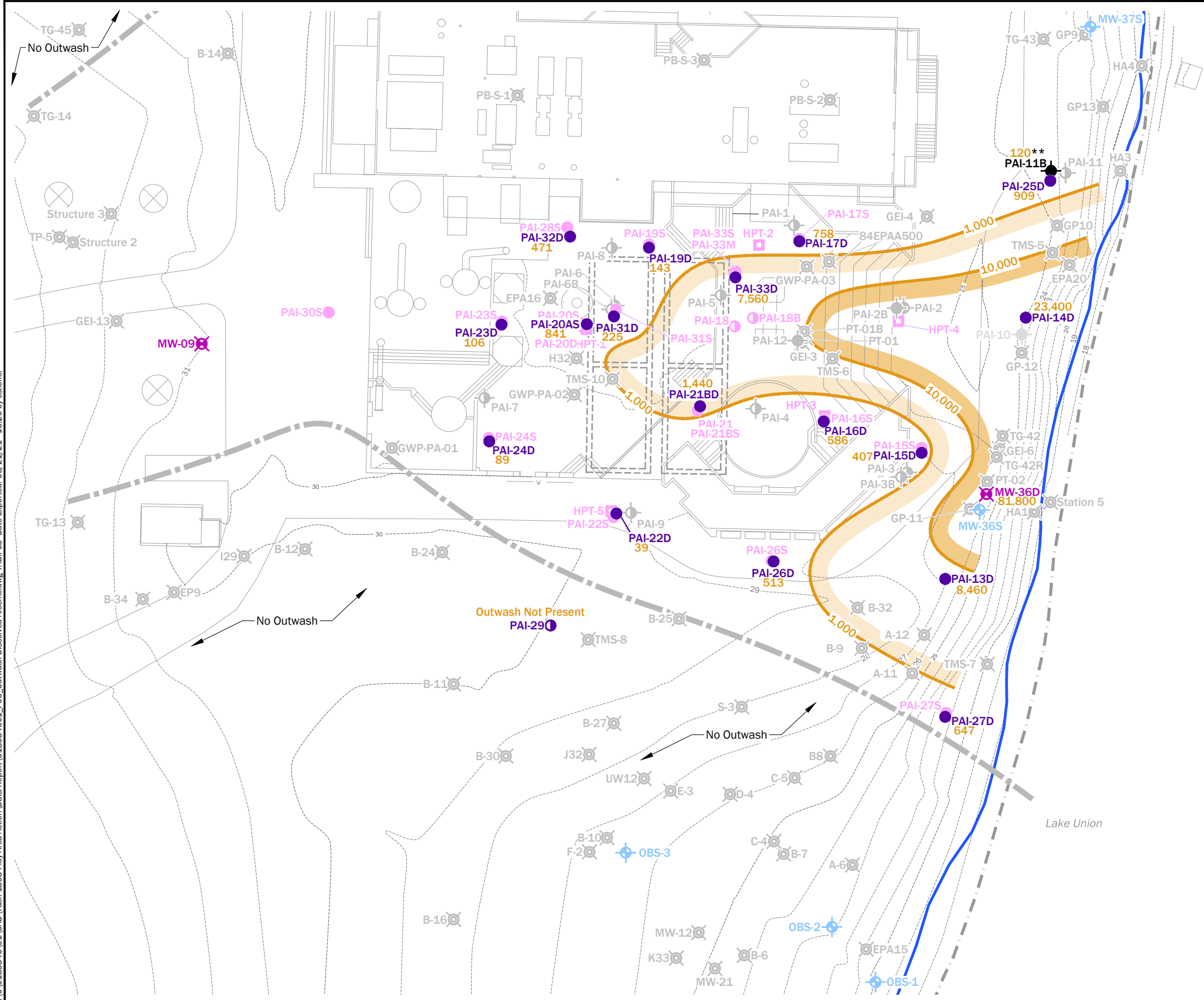
1. Existing conditions survey by Seattle Parks and Recreation, November 2002.
2. Construction Completion Report by Thermo RETEC, January 2001.
3. Earthwork & Demolition plan by Department of Parks and Recreation, July 1974.

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Fill Dissolved Arsenic	
Gas Works Park Site Seattle, Washington	
	Figure 2B-3-4

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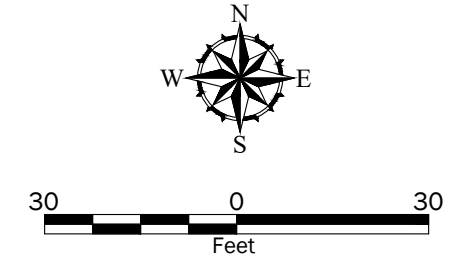
Legend

- Shoreline (OHWM)
- Former Subgrade Tank (Subgrade Concrete Rubble)
- HPT-1 2016 Hydraulic Profiling Tool Exploration
- PAI-29 2016 Till Subsurface Exploration (Soil)
- PAI-18 2016 Subsurface Exploration (Soil)
- PAI-17D 2016 Outwash 2016 Subsurface Exploration (Soil and Groundwater)
- PAI-17S 2016 Subsurface Exploration (Soil and Groundwater)
- PAI-4 2014 Subsurface Exploration (Soil)
- PAI-11B 2014 Outwash 2014 Subsurface Exploration (Soil and Groundwater)
- PAI-2B 2014 Subsurface Exploration (Soil and Groundwater)
- B-10 Pre-2014 Subsurface Exploration
- MW-36S Fill Monitoring Well
- MW-36D Outwash Monitoring Well
- 1,000 Interpreted Outwash Dissolved Arsenic Concentration Contour (µg/L)
- 10,500 Outwash Dissolved Arsenic Concentration (µg/L)
- ** Temporary Well Screen Spanned Fill and Outwash
- Estimated Lateral Extent of Outwash

Data Source Notes:

- Existing conditions survey by Seattle Parks and Recreation, November 2002.
- Construction Completion Report by Thermo RETEC, January 2001.
- Earthwork & Demolition plan by Department of Parks and Recreation, July 1974.

DISCLAIMER: This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. The locations of all features are approximate. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication



Outwash Dissolved Arsenic

Gas Works Park Site
Seattle, Washington

GEOENGINEERS

Figure 2B-3-5

ATTACHMENT 2B-3-1
Boring Logs

SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			SYMBOLS		TYPICAL DESCRIPTIONS
			GRAPH	LETTER	
COARSE GRAINED SOILS	GRAVEL AND GRAVELLY SOILS	CLEAN GRAVELS <small>(LITTLE OR NO FINES)</small>		GW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES
		GRAVELS WITH FINES <small>(APPRECIABLE AMOUNT OF FINES)</small>		GP	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES
		GRAVELS WITH FINES <small>(APPRECIABLE AMOUNT OF FINES)</small>		GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
	SAND AND SANDY SOILS	CLEAN SANDS <small>(LITTLE OR NO FINES)</small>		SW	WELL-GRADED SANDS, GRAVELLY SANDS
		SANDS WITH FINES <small>(APPRECIABLE AMOUNT OF FINES)</small>		SP	POORLY-GRADED SANDS, GRAVELLY SAND
		SANDS WITH FINES <small>(APPRECIABLE AMOUNT OF FINES)</small>		SM	SILTY SANDS, SAND - SILT MIXTURES
FINE GRAINED SOILS	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS, ROCK FLOUR, CLAYEY SILTS WITH SLIGHT PLASTICITY
		LIQUID LIMIT LESS THAN 50		CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
		LIQUID LIMIT LESS THAN 50		OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS SILTY SOILS
		LIQUID LIMIT GREATER THAN 50		CH	INORGANIC CLAYS OF HIGH PLASTICITY
		LIQUID LIMIT GREATER THAN 50		OH	ORGANIC CLAYS AND SILTS OF MEDIUM TO HIGH PLASTICITY
HIGHLY ORGANIC SOILS				PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

NOTE: Multiple symbols are used to indicate borderline or dual soil classifications

Sampler Symbol Descriptions

	2.4-inch I.D. split barrel
	Standard Penetration Test (SPT)
	Shelby tube
	Piston
	Direct-Push
	Bulk or grab
	Continuous Coring

Blowcount is recorded for driven samplers as the number of blows required to advance sampler 12 inches (or distance noted). See exploration log for hammer weight and drop.

A "P" indicates sampler pushed using the weight of the drill rig.

A "WOH" indicates sampler pushed using the weight of the hammer.

NOTE: The reader must refer to the discussion in the report text and the logs of explorations for a proper understanding of subsurface conditions. Descriptions on the logs apply only at the specific exploration locations and at the time the explorations were made; they are not warranted to be representative of subsurface conditions at other locations or times.

ADDITIONAL MATERIAL SYMBOLS

SYMBOLS		TYPICAL DESCRIPTIONS
GRAPH	LETTER	
	AC	Asphalt Concrete
	CC	Cement Concrete
	CR	Crushed Rock/Quarry Spalls
	TS	Topsoil/Forest Duff/Sod

Groundwater Contact



Measured groundwater level in exploration, well, or piezometer



Measured free product in well or piezometer

Graphic Log Contact



Distinct contact between soil strata



Approximate contact between soil strata

Material Description Contact



Contact between geologic units



Contact between soil of the same geologic unit

Laboratory / Field Tests

%F	Percent fines
%G	Percent gravel
AL	Atterberg limits
CA	Chemical analysis
CP	Laboratory compaction test
CS	Consolidation test
DS	Direct shear
HA	Hydrometer analysis
MC	Moisture content
MD	Moisture content and dry density
OC	Organic content
PM	Permeability or hydraulic conductivity
PI	Plasticity index
PP	Pocket penetrometer
PPM	Parts per million
SA	Sieve analysis
TX	Triaxial compression
UC	Unconfined compression
VS	Vane shear

Sheen Classification

NS	No Visible Sheen
SS	Slight Sheen
MS	Moderate Sheen
HS	Heavy Sheen
NT	Not Tested

KEY TO EXPLORATION LOGS



FIGURE 1-1

Start Drilled	9/14/2016	End	9/14/2016	Total Depth (ft)	35	Logged By	GRL	Checked By	SBS	Driller	Cascade Drilling	Drilling Method	Continuous
Surface Elevation (ft) Vertical Datum	30.51 USACE (Locks)			Hammer Data	N/A			Drilling Equipment	Geoprobe 7730 DT				
Easting (X) Northing (Y)	1270773.34 239066.13			System Datum	WA State Plane, North NAD83 (feet)			Groundwater Date Measured	9/14/2016	Depth to Water (ft)	12.80	Elevation (ft)	17.71
Notes: Hand-augered from 0 to 2 feet bgs.													

Elevation (feet)	FIELD DATA						MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
	Depth (feet)	Interval Recovered (in)	Blows/foot	Collected Sample	Sample Name Testing	Water Level				
0							SM			XRF Readings "As = X ppm"
		36						NS	<1	
								NS	<1	As = 36 ppm (±8)
5		48					ML	NS	1.1	
							SP-SM	NS	<1	As = <51 ppm
								NS	3.9	As = <27 ppm Naphthalene-like odor
							SOOT	NS	2.8	As = <14 ppm
							GP	SS	448	Groundwater encountered at 7.7 feet during drilling
							AC	MS	477.3	As = <27 ppm Patch-like sheen
							GP			As = <12 ppm
										As = <19 ppm
10		44					SOOT	NS	2.7	As = <24 ppm
							SP	NS (SP)	81.1	As = <15 ppm (SP)
								SS (AC)		As = <12 ppm (AC)
							SP	SS	442.3	As = <22 ppm; blocky sheen
									437.9	As = <17 ppm
15		48					SP	SS	189.9	As = <23 ppm; blocky, patch-like sheen
							SP	NS		
								NS	21.8	As = <28 ppm
								NS	13.3	
							GP	NS	22.3	As = 72 ppm (±13)

Note: Please see Figure 1-1 for explanation of symbols

Log of Boring PAI-13D



Project: Puget Sound Energy GWPS
 Project Location: Gas Works Park, Seattle, Washington
 Project Number: 0186-846-01

Date: 6/30/17 File: P:\00186846\GINT\018684601.GPJ DBLibrary\Library\GEOENGINEERS_DF_STD_US_GLB\GEGE_ENVIRONMENTAL_STANDARD

Elevation (feet)	FIELD DATA					MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
	Depth (feet)	Interval Recovered (in)	Blows/foot	Collected Sample	Sample Name Testing				
20	54								As = <48 ppm
								SS 36	Blocky sheen
								GP-GM	Gray and black stained fine to coarse gravel with silt and sand (dense, wet) (Qvr)
								NS 4.9	As = 46 ppm (±15)
								SM	Black stained silty fine sand with occasional gravel (medium dense, wet) (Qvr)
								NS 2.9	As = <40 ppm
								NS 2.1	
25	48							GP-GM	Dark gray to black fine to coarse gravel with silt and sand (dense, wet) (Qvr)
								NS 2.3	As = <25 ppm
								NS 1.9	As = <23 ppm
								SP-SM	Dark gray to black fine to medium sand with silt (dense, wet) (advance outwash [Qva])
								NS 2	As = <16 ppm
								6	Grades to gray
30	60							NS	As = 29 ppm (±8)
								NS 2.9	As = 33 ppm (±8)
								NS 4.2	
								NS <1	As = <25 ppm Sulfur-like odor
								NS 2.9	As = 77 ppm (±9)
35									As = 77 ppm (±9)

PAI-13-28-33 CA

Temporary pre-pack well screen installed from 28 to 33 feet below ground surface (bgs); grab groundwater sample PAI-13D-160914 collected.

Note: Please see Figure 1-1 for explanation of symbols

Log of Boring PAI-13D (continued)



Project: Puget Sound Energy GWPS
 Project Location: Gas Works Park, Seattle, Washington
 Project Number: 0186-846-01

Date: 6/30/17 File: P:\00186846\GINT\0186846\01.GPJ D:\Library\Library\GEOENGINEERS_DF_STD_US_GLB\GEGE_ENVIRONMENTAL_STANDARD

Elevation (feet)	FIELD DATA					Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample							
20		36								NS	2.2	As = 95 ppm (±18)
										NS	7.3	As = 405 ppm (±27)
							SM/ML	Dark gray with black staining silty fine to medium sand to sandy silt with trace roots and 1-inch long piece of wood (fill)		NS	6.3	
							GM			NAPL	97.0	As = 187 ppm (±14) Metallic rainbow sheen (jar test LNAPL brown; 90%)
							ML	Dark gray with black staining silty fine gravel with sand (fill)				
							SM	Gray sandy silt with gravel (wet) (fill)		NS	5.7	As = 252 ppm (±18) As = 497 ppm (±28)
								Gray silty fine to medium sand with gravel, grades with occasional agglomerate (fill)				
25		32								NS	16.6	As = 396 ppm (±26)
							SP-SM	Dark gray fine to medium sand with silt and gravel (medium dense, wet) (Qvr)		NS	9.8	As = 248 ppm (±23)
										NS	7.3	As = 155 ppm (±17) Slight sulfur-like odor
30		44						Decreased gravel content		NS	<1	As = <14 ppm
							GP	Gray fine to coarse gravel with trace silt and sand (dense, wet) (Qvr)		NS	<1	As = <37 ppm
							SP-SM	Gray fine to medium sand with silt and occasional gravel (dense, wet) (Qva)		NS	<1	As = 30 ppm (±5)
								Decreased silt content		NS	4.6	As = 36 ppm (±8)
												As = 65 ppm (±9)
35								Temporary pre-pack well screen installed from 28 to 33 feet bgs; grab groundwater sample PAI-14D-160914 collected.				

Note: Please see Figure 1-1 for explanation of symbols

Log of Boring PAI-14D (continued)



Project: Puget Sound Energy GWPS
 Project Location: Gas Works Park, Seattle, Washington
 Project Number: 0186-846-01

Figure 1-3
 Sheet 2 of 2

Start Drilled	9/27/2016	End	9/27/2016	Total Depth (ft)	34	Logged By	GRL ZAS	Checked By	ZAS	Driller	Cascade Drilling	Drilling Method	Continuous	
Surface Elevation (ft)	30.44			Hammer Data	N/A			Drilling Equipment	Geoprobe 7730 DT					
Vertical Datum	USACE (Locks)			System Datum	WA State Plane, North NAD83 (feet)			Groundwater	Date Measured	9/27/2016	Depth to Water (ft)	19.65	Elevation (ft)	10.79
Easting (X)	1270766.29			System Datum	WA State Plane, North NAD83 (feet)			Groundwater	Date Measured	9/27/2016	Depth to Water (ft)	19.65	Elevation (ft)	10.79
Northing (Y)	239103.83			System Datum	WA State Plane, North NAD83 (feet)			Groundwater	Date Measured	9/27/2016	Depth to Water (ft)	19.65	Elevation (ft)	10.79
Notes: Hand-augered from 0 to 2 feet bgs.														

Elevation (feet)	FIELD DATA					Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
	Depth (feet)	Interval Recovered (in)	Blows/foot	Collected Sample	Sample Name Testing						
0	50					AC	1.5-inches asphalt concrete			XRF Readings "As = X ppm"	
						SP-SM	Brown fine to coarse sand with silt and occasional gravel (loose, moist) (fill)				
						CC	Grades to dark brown				
						SP-SM	Degraded concrete (medium dense, moist) (fill)	NS	<1	As = 27 ppm (±8)	
						SP	Brown fine to coarse sand with silt and occasional gravel (loose, moist) (fill)	NS	<1	As = 72 ppm (±11)	
							Brown to dark brown fused, light weight vesicular agglomerate (fine to coarse sand-sized) with trace light colored platy fused agglomerate (loose, moist) (fill)	NS	<1	As = 30 ppm (±7)	
5	36						Becomes dark brown to dark gray	NS	<1	As = <18 ppm	
								NS	<1	As = <25 ppm	
								NS	<1	As = <26 ppm	
								NS	1.3	As = 21 ppm (±5)	
10	30					GP	Multi-colored fused, light weight vesicular agglomerate (fine to coarse sand- to fine to coarse gravel-sized) with sand (loose, wet) (fill)	NS	<1	Groundwater encountered at 9.9 feet during drilling	
								HS	<1	As = 23 ppm (±6)	
								MS	<1	As = 176 ppm (±9)	
								SS	<1	As = 48 ppm (±10); sheen has color	
										As = 51 ppm (±9); sheen has no color	
										As = 23 ppm (±6)	
								NS	<1	As = <22 ppm	
15	36							NS	<1	As = 103 ppm (±8)	
								NS	<1	As = 105 ppm (±10)	
								NS	<1	As = 110 ppm (±11)	
								SS	10	As = 453 ppm (±17); platy sheen, jar test dark brown NAPL covered 80% of water surface in jar, some color	
							With wood, becomes medium dense	NAPL	50.3	As = 278 ppm (±10)	
							Gray fine to coarse gravel with sand (medium dense, wet) (fill)	NAPL	20.1	As = 35 ppm (±7)	

Note: Please see Figure 1-1 for explanation of symbols

Log of Boring PAI-15D



Project: Puget Sound Energy GWPS
 Project Location: Gas Works Park, Seattle, Washington
 Project Number: 0186-846-01

Figure 1-4
 Sheet 1 of 2

Date: 9/20/17 File: P:\00186846\GINT\0186846\01.GPJ DBLibrary\Library\GEOENGINEERS_DF_STD_US_GLB\GEGE_ENVIRONMENTAL_STANDARD

Elevation (feet)	FIELD DATA					Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample							
20		60					SP	Gray fine to medium sand with trace silt and occasional gravel (medium dense, wet) (Qvr)	NS	7.5	As = <23 ppm	
							SP-SM	Gray fine to medium sand with silt and occasional gravel (medium dense to dense, wet) (Qvr)	NS	12	As = <20 ppm	
									NS	20.1	As = 17 ppm (±5)	
									NS	33.1	As = 16 ppm (±5)	
							SM	Gray silty fine to medium sand with occasional gravel (dense, wet) (Qvr)	NS	33.5	As = <15 ppm	
25		60							NS	<1	As = 30 ppm (±6)	
									NS	14.5	As = <15 ppm	
								Grades siltier	NS	19	As = <14 ppm	
							SP-SM	Gray fine to medium sand with silt (dense, wet) (Qva)	NS	20.1	As = <15 ppm	
							GP	Gray fine to coarse gravel with trace silt and sand (dense, wet) (Qva)	NS	6.1	As = <64 ppm	
							SP-SM	Gray fine to medium sand with silt (dense, wet) (Qva)	NS	4.8	As = 22 ppm (±6) As = 33 ppm (±9)	
							ML	Gray sandy silt (hard, moist) (pre-Fraser diamict [Qpgd])	NS	<1	As = 40 ppm (±7)	
								Grades to trace sand			As = 79 ppm (±9) As = 90 ppm (±10)	

PAI-15-30-32.5 CA
 DUP-1 30-32.5 CA

Temporary pre-pack well screen installed from 30.6 to 33.1 feet bgs; grab groundwater sample PAI-15D-160927 collected.

Note: Please see Figure 1-1 for explanation of symbols

Date: 6/30/17 File: P:\00188846\GINT\018884601.GPJ D:\Library\Library\GEOENGINEERS_DF_STD_US_GLB\GEBL_ENVIRONMENTAL_STANDARD

Log of Boring PAI-15D (continued)



Project: Puget Sound Energy GWPS
 Project Location: Gas Works Park, Seattle, Washington
 Project Number: 0186-846-01


Drilled	Start 9/27/2016	End 9/27/2016	Total Depth (ft)	20	Logged By Checked By	GRL ZAS	Driller	Cascade Drilling	Drilling Method	Continuous
Surface Elevation (ft) Vertical Datum	30.11 USACE (Locks)			Hammer Data	N/A			Drilling Equipment	Geoprobe 7730 DT	
Easting (X) Northing (Y)	1270766.25 239105.28			System Datum	WA State Plane, North NAD83 (feet)			Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)
Notes: Hand-augered from 0 to 2 feet bgs.								9/27/2016	9.85	20.26

Elevation (feet)	FIELD DATA						MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
	Depth (feet)	Interval Recovered (in)	Blows/foot	Collected Sample	Sample Name Testing	Water Level				
0										See adjacent boring PAI-15D for soil descriptions
5										
10						▼				
15										
20										

Note: Please see Figure 1-1 for explanation of symbols

Temporary pre-pack well screen installed from 14.7 to 19.7 feet bgs; grab groundwater sample PAI-15S-160927 collected.

Log of Boring PAI-15S

	Project:	Puget Sound Energy GWPS	Figure 1-5 Sheet 1 of 1
	Project Location:	Gas Works Park, Seattle, Washington	
	Project Number:	0186-846-01	

Date: 9/20/17 File: P:\00186846\GINT\018684601.GPJ DBLibrary\Library\GEOENGINEERS_DF_STD_US_GLB\GEGE_ENVIRONMENTAL_STANDARD

Start Drilled	9/15/2016	End	9/15/2016	Total Depth (ft)	33	Logged By	GRL	Checked By	SBS	Driller	Cascade Drilling	Drilling Method	Continuous	
Surface Elevation (ft)	33.87			Hammer Data	N/A			Drilling Equipment	Geoprobe 7730 DT					
Vertical Datum	USACE (Locks)			System Datum	WA State Plane, North NAD83 (feet)			Groundwater	Date Measured	9/15/2016	Depth to Water (ft)	19.50	Elevation (ft)	14.37
Easting (X)	1270737.01			Notes: Hand-augered from 0 to 1½ feet bgs.										
Northing (Y)	239113.2													

Elevation (feet)	FIELD DATA					Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
	Depth (feet)	Interval Recovered (in)	Blows/foot	Collected Sample	Sample Name Testing						
0						BRICK	1.5 inch brick paved surface	NS	<1	XRF Readings "As = X ppm"	
						SP	Brown fine to coarse sand (loose, moist) (fill)	NS	<1		
							Grades to occasional gravel, medium dense	NS	<1	As = <25 ppm	
	32					GP	Gray and brown fine to coarse gravel with trace silt, sand and trace roots (medium dense, moist) (fill)	NS	<1	As = <26 ppm	
						SM	1-inch layer brown silty fine to coarse sand with trace organic matter (medium dense, moist) (fill)	NS	<1	As = <30 ppm	
						SP	Brown fine to coarse sand with trace silt and occasional gravel (fill)	NS	<1	As = <69 ppm	
	60					SM	Becomes light brown	NS	<1	As = <43 ppm	
						ML	Brown silty fine to coarse sand with occasional gravel (fill)	NS	<1	As = <64 ppm	
						GM	2-inch layer of wood	NS	<1	As = <41 ppm	
						GP	Brown silt with trace sand and occasional gravel (fill)	NS	<1	As = <76 ppm	
						SOOT	Brown silty fine to coarse gravel with trace pockets of soot and trace brick dust (fill)	NS	<1	As = <22 ppm	
						SP	Gray coarse gravel with trace brick dust (fill)	NS	<1	As = <25 ppm	
							Black soot with trace black fused agglomerate (fill); pink/gray color towards bottom	NS	2.1	As = <17 ppm	
							Black fused vesicular agglomerate (fine sand- to fine gravel-sized), light weight with trace soot (loose, moist) (fill)	NS	1.1	As = 101 ppm (±11)	
							Grades to multi-colored (black, tan, white, orange)	NS	<1	As = 148 ppm (±13)	
							Grades to black	HS	2.7	Slight hydrocarbon-like odor from 13 to 15 feet	
							Grades to more fine	HS	2.7	Groundwater encountered at 13 feet during drilling	
						GP	Black fused agglomerate (fine gravel-sized, occasional coarse sand- and coarse gravel-sized) (loose, wet) (fill)	NAPL	5.9	As = 974 ppm (±29) Coated with NAPL	
								NAPL	132.6	As = 1,406 ppm (±39); very thin NAPL layer	
								NAPL	629.8	Naphthalene-like odor	
						ML	Olive green silt with sand and olive green coated black fused agglomerate with trace organic matter (weathered wood) (very soft, wet) (fill)	HS	172.5	As = 1,372 ppm (±65)	
							Grades to black	HS	16.2	As = 248 ppm (±9)	
						MH	Gray silt with trace fibrous organic matter (soft, wet) (Qvr)	NS	152.3	As = 216ppm (±53)	
								NS	118.6	As = 49ppm (±12)	

Note: Please see Figure 1-1 for explanation of symbols

Log of Boring PAI-16D



Project: Puget Sound Energy GWPS
 Project Location: Gas Works Park, Seattle, Washington
 Project Number: 0186-846-01

Figure 1-6
 Sheet 1 of 2

Date: 6/30/17 File: P:\00186846\GINT\0186846\GEOENGINEERS_DF_STD_US_GLB\GIEE_ENVIRONMENTAL_STANDARD.GPJ DBLibraryLibrary\GEOENGINEERS

Elevation (feet)	FIELD DATA						MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS	
	Depth (feet)	Interval Recovered (in)	Blows/foot	Collected Sample	Sample Name Testing	Water Level					Graphic Log
20							ML	Gray silt interbedded with fine to medium sand (soft, wet) (Qvr)	NS	179.2	As = 39 ppm (±11)
									NS	30.3	As = 87 ppm (±17)
							GM	Gray silty fine to coarse gravel with sand (medium dense, wet) (Qvr)	NS	17.2	As = 30 ppm (±9)
							SP-SM	Gray fine to medium sand with silt (dense, wet) (Qvr)	NS	8.7	As = <19 ppm
10		48						Grades with gravel Grades with occasional gravel		19.0	As = <22 ppm
								Grades coarser Grades finer	NS	9.8	As = <19 ppm
25							SP	Gray fine to medium sand with trace silt and occasional gravel (dense, wet) (Qva)	NS	2.7	As = <21 ppm
							SP-SM	Gray fine to medium sand with silt and occasional gravel (dense, wet) (Qva)	NS	3.4	As = <36 ppm
									NS	13.0	As = 73 ppm (±18)
									NS	9.8	As = <22 ppm
30		60							NS	16.3	As = <20 ppm
									NS	7.2	As = <19 ppm
									NS	10.4	As = <24 ppm
											As = <13 ppm

PAI-16-28-33 CA

Temporary pre-pack well screen installed from 28 to 33 feet bgs; grab groundwater sample PAI-16D-160915 collected.

Note: Please see Figure 1-1 for explanation of symbols

Log of Boring PAI-16D (continued)




Project: Puget Sound Energy GWPS
 Project Location: Gas Works Park, Seattle, Washington
 Project Number: 0186-846-01

Date: 6/30/17 File: P:\00186846\GINT\0186846\01.GPJ DBLibrary\Library\GEOENGINEERS_DF_STD_US_GLB\GEBL_ENVIRONMENTAL_STANDARD

Drilled	Start 9/15/2016	End 9/15/2016	Total Depth (ft)	18	Logged By Checked By	GRL SBS	Driller	Cascade Drilling	Drilling Method	Continuous
Surface Elevation (ft) Vertical Datum	33.79 USACE (Locks)			Hammer Data	N/A			Drilling Equipment	Geoprobe 7730 DT	
Easting (X) Northing (Y)	1270737.28 239113.61			System Datum	WA State Plane, North NAD83 (feet)			Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)
Notes: Hand-augered from 0 to 1½ feet bgs.								9/15/2016	13.75	20.04

Elevation (feet)	FIELD DATA						MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
	Depth (feet)	Interval Recovered (in)	Blows/foot	Collected Sample	Sample Name Testing	Water Level				
0										See adjacent boring PAI-16D for soil descriptions.
5										
10										
15						▼				
<p>Temporary pre-pack well screen installed from 16 to 18 feet bgs; grab groundwater sample PAI-16S-190915 collected.</p>										
<p>Note: Please see Figure 1-1 for explanation of symbols</p>										

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Log of Boring PAI-16S		
	Project:	Puget Sound Energy GWPS
	Project Location:	Gas Works Park, Seattle, Washington
	Project Number:	0186-846-01
		Figure 1-7 Sheet 1 of 1

Start Drilled	9/15/2016	End	9/15/2016	Total Depth (ft)	35	Logged By	GRL	Checked By	SBS	Driller	Cascade Drilling	Drilling Method	Continuous	
Surface Elevation (ft)	33.96			Hammer Data	N/A			Drilling Equipment	Geoprobe 7730 DT					
Vertical Datum	USACE (Locks)			System Datum	WA State Plane, North NAD83 (feet)			Groundwater	Date Measured	9/15/2016	Depth to Water (ft)	13.75	Elevation (ft)	20.21
Easting (X)	1270729.73			Notes: Hand-augered from 0 to 1 foot bgs.										
Northing (Y)	239167.06													

Elevation (feet)	FIELD DATA					Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
	Depth (feet)	Interval Recovered (in)	Blows/foot	Collected Sample	Sample Name Testing						
0						BRICK	1.5 inch brick paved surface	NS	<1	XRF Readings "As = X ppm"	
	48					SP-SM	Brown fine to medium sand with silt and occasional gravel (medium dense, moist) (fill)	SS	<1	As = <28 ppm	
							Grades to orange		<1	As = <15 ppm	
						ML	Gray silt with fine sand occasional gravel (medium stiff, moist) (fill)	NS	<1	As = <25 ppm	
						SM	Brown silty fine to medium sand with occasional gravel, glass-like fragments, trace brick dust, trace ash, trace wood (loose, moist) (fill)	NS	<1	As = <23 ppm	
						CC	Concrete	NS	<1	As = <30 ppm	
						SOOT	Black soot with silty fine to medium sand and trace wood (medium dense, moist) (fill)		<1	As = <28 ppm	
	50					GP	Black, tan and white vesicular agglomerate (fine gravel-sized) (fill)		<1	As = 84 ppm (±14)	
						ML	Gray silt with trace wood (medium stiff, moist) (fill)	SS	<1	As = <15 ppm	
						SM	Dark gray silty fine sand with soot (loose, moist) (fill)		<1		
						SOOT	Gray silty fine to medium sand with occasional gravel and one piece of clear glass (loose, moist) (fill)	NS	<1	As = 427 ppm (±22)	
						SP	Black soot with fine sand and fused agglomerate (loose, moist) (fill)	SS	17.3	As = 641 ppm (±35)	
							Black with orange fused vesicular, glassy agglomerate (medium sand- to fine gravel-sized) with occasional gravel (loose, moist) (fill)	SS	1.8	As = 934 ppm (±36) As = 3,779 ppm (±106)	
	21					ML	Dark gray sandy silt (fill)	MS	8.1	As = 39 ppm (±10); sheen popping, no color	
						SP	Multi-colored fused vesicular agglomerate: medium sand- to fine gravel-sized occasionally vitreous (loose, moist) (fill)	NS	3.4	As = 3,960 ppm (±144)	
								NS	2	As = 2,512 ppm (±78)	
						ML	Gray sandy silt with trace organic matter (fill)		2.4	As = <24 ppm	
						SP	Orange with black fused agglomerate (medium sand- to coarse gravel-sized) (loose, moist) (fill)		1.2	As = 1,599 ppm (±46)	
						GP	Black fused agglomerate with occasional gravel (fill)		68.2	Groundwater encountered at 13.3 feet during drilling As = 480 ppm (±27)	
	55								67.3	As = 2,049 ppm (±69)	
						GM/ML	Olive green agglomerate, silt and black soot and NAPL (fill)	NAPL	44.6	Strong naphthalene-like odor As = 6,678 ppm (±218)	
						SM	Gray silty fine to medium sand with soot (fill)		490.1	Strong hydrocarbon-like odor	
						ML	Gray silt with trace black decaying organic matter (Qvr)		63.9	Jar test: LNAPL brown blebs; stains sides of jar As = 710 ppm (±42) As = 199 ppm (±13)	
	0					SP-SM	Dark gray silty fine to medium sand (loose, wet) (Qvr)				

Note: Please see Figure 1-1 for explanation of symbols

Log of Boring PAI-17D



Project: Puget Sound Energy GWPS
 Project Location: Gas Works Park, Seattle, Washington
 Project Number: 0186-846-01

Figure 1-8
 Sheet 1 of 2

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Elevation (feet)	FIELD DATA					Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample							
20		60								SS	12.2	As = 117 ppm (±21); blocky sheen with black staining
							ML	Dark gray sandy silt (soft, wet) (Qvr)	NS	6.6		As = 75 ppm (±10)
							GP	Dark gray fine gravel with sand (medium dense, wet) (Qvr)				
							SP-SM/SM	Dark gray fine to medium sand with silt and occasional gravel to silty fine to medium sand with occasional gravel (medium dense, wet) (Qvr)	NS	17.8		As = 59 ppm (±8)
												As = 29 ppm (±8)
							ML	Gray sandy silt (soft, wet) (Qvr)	NS	17.8		
							SM	Dark gray to black silty fine to medium sand with occasional gravel (medium dense, wet) (Qvr)	NS	4.8		As = 32 ppm (±10)
25		60						Grades to gray	NS	8.8		As = 74 ppm (±8)
							ML	Gray sandy silt (very soft, wet) (Qvr)	NS	1.1		As = 17 ppm (±5)
							SM	Gray silty fine to medium sand (medium dense, wet) (Qvr)	NS	12.2		As = 16 ppm (±5)
							SM	Gray silty fine to medium sand (dense, moist) (Qva)	NS	6.6		As = <19 ppm
							SM	Gray silty fine sand with occasional gravel (very dense, moist) (pre-Fraser till [Qpgt])	NS	4.2		As = <19 ppm As = <15 ppm
30		48						1-cm layer of gray sandy silt (very stiff, moist)	NS	1.4		As = 133 ppm (±37)
								1-cm layer of gray sandy silt (very stiff, moist)	NS	3.6		As = 59 ppm (±13)
								1-cm layer of gray sandy silt (very stiff, moist)	NS	1.4		As = 37 ppm (±10)
									NS	7.0		As = 42 ppm (±8)
										3.3		As = 38 ppm (±5)

PAI-17-26.5-29 CA

Temporary pre-pack well screen installed from 24 to 29 feet bgs; grab groundwater sample PAI-17D-190615 collected.

Note: Please see Figure 1-1 for explanation of symbols

Log of Boring PAI-17D (continued)



Project: Puget Sound Energy GWPS
 Project Location: Gas Works Park, Seattle, Washington
 Project Number: 0186-846-01

Date: 6/30/17 File: P:\00186846\GINT\018684601.GPJ D:\Library\Library\GEOENGINEERS_DF_STD_US_GLB\GEBE_ENVIRONMENTAL_STANDARD

Drilled	Start 9/15/2016	End 9/15/2016	Total Depth (ft)	18	Logged By Checked By	GRL SBS	Driller	Cascade Drilling	Drilling Method	Continuous
Surface Elevation (ft) Vertical Datum	34.16 USACE (Locks)			Hammer Data	N/A			Drilling Equipment	Geoprobe 7730 DT	
Easting (X) Northing (Y)	1270729.71 239167.75			System Datum	WA State Plane, North NAD83 (feet)			Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)
Notes: Hand-augered from 0 to 1 foot bgs.								9/15/2016	13.80	20.36

Elevation (feet)	FIELD DATA						MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
	Depth (feet)	Interval Recovered (in)	Blows/foot	Collected Sample	Sample Name Testing	Water Level				
0										See adjacent boring PAI-17D for soil descriptions
5										
10										
15										
										Temporary pre-pack well screen installed from 14 to 16 feet bgs; grab groundwater sample PAI-17S-190615 collected.

Note: Please see Figure 1-1 for explanation of symbols

Log of Boring PAI-17S



Project: Puget Sound Energy GWPS
 Project Location: Gas Works Park, Seattle, Washington
 Project Number: 0186-846-01

Figure 1-9
 Sheet 1 of 1

Date: 9/20/17 File: P:\00186846\GINT\0186846\01.GPJ DBLibrary\Library\GEOENGINEERS_DF_STD_US_GLB\GEBE_ENVIRONMENTAL_STANDARD

Start Drilled	9/16/2016	End	9/16/2016	Total Depth (ft)	15	Logged By	GRL	Checked By	SBS	Driller	Cascade Drilling	Drilling Method	Continuous
Surface Elevation (ft)	33.89			Hammer Data	N/A			Drilling Equipment	Geoprobe 7730 DT				
Vertical Datum	USACE (Locks)			System Datum	WA State Plane, North NAD83 (feet)			Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)			
Easting (X)	1270710.42			Notes: Refusal at 15 feet below ground surface on concrete. Another boring (PAI-18B) attempted nearby, but refusal was encountered at 5 feet on concrete.				Not encountered					
Northing (Y)	239141.61												

Elevation (feet)	FIELD DATA					Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample						
0			48				BRICK	1.5-inch brick paved surface			XRF Readings "As = X ppm"
							SP	Brown fine to coarse sand (loose, moist) (fill)			
							SP	Brown to light brown fine to coarse sand with trace silt and gravel (loose, moist) (fill)	NS	<1	As = <38 ppm
							SM	Grades to dark brown			
							SM	Dark brown silty fine to coarse sand with gravel, trace brick debris (loose, moist) (fill)	NS	<1	As = 31 ppm (±9)
								Fine gravel-sized angular briquette-like pieces			
								Trace very fine roots	NS	<1	As = 64 ppm (±9)
5			54				SM	Black sooty silty fine sand (loose, moist) (fill)			
							SP	Brown fine to coarse sand with occasional gravel and trace silt (loose, moist) (fill)	NS	<1	As = 30 ppm (±9)
							SP	Dark gray fine to medium sand with trace silt, occasional gravel and trace organic matter (very fine roots) (loose, moist) (fill)			
							SP-SM	Brown to light brown fine sand with silt and trace organic matter (very fine roots) (fill)	NS	<1	As = <25 ppm
							SP	Grades to no roots			
							SP	Grades with occasional gravel	NS	<1	As = 85 ppm (±16)
							SP	Trace decaying wood			
							SP	Grades to light brown			
							SP	Dark gray fine to coarse sand with occasional gravel, black vesicular fused lightweight and heavier agglomerate, occasionally glassy metallic (loose, moist) (fill)	NS	<1	As = 13 ppm (±3)
10			36				SP-SM	Brown to dark brown fine to coarse sand with silt (loose, moist) (fill)	NS	<1	As = <58 ppm
							SM	Black silty fine to coarse sand with orange fused non-vesicular agglomerate (loose, moist) (fill)	NS	<1	As = 79 ppm (±11)
							SOOT	Black soot with occasional gravel, trace metallic fused agglomerate (medium stiff, moist) (fill)	NS	<1	As = 541 ppm (±27)
							ML	Black soot with occasional gravel, trace metallic fused agglomerate (medium stiff, moist) (fill)	NS	<1	As = 941 ppm (±42)
							ML	Grades with fine sand	NAPL	250.1	Strong naphthalene-like odor from 12.5 to 13.5
							ML	Dark gray sandy silt (fill)			As = 410 ppm (±19)
							ML	1-inch layer of dark gray with minor green	SS	74.1	Slight hydrocarbon-like odor
							ML	Dark gray to black NAPL coated sandy silt with decaying wood debris and one piece of plywood (fill)			As = 393 ppm (±24)
15			10				ML	Dark gray to black NAPL coated sandy silt with decaying wood debris and one piece of plywood (fill)			As = 434 ppm (±47)
								Light and dark gray mottled silt with occasional gravel (medium stiff, moist) (fill)			

Note: Please see Figure 1-1 for explanation of symbols

Log of Boring PAI-18



Project: Puget Sound Energy GWPS
 Project Location: Gas Works Park, Seattle, Washington
 Project Number: 0186-846-01

Date: 9/30/17 File: P:\00186846\GINT\0186846\01.GPJ DBLibrary\Library\GEOENGINEERS_DF_STD_US_GLB\GIE6_ENVIRONMENTAL_STANDARD

Start Drilled	9/13/2016	End	9/13/2016	Total Depth (ft)	25	Logged By	GRL	Checked By	SBS	Driller	Cascade Drilling	Drilling Method	Continuous	
Surface Elevation (ft)	29.88			Hammer Data	N/A			Drilling Equipment	Geoprobe 7730 DT					
Vertical Datum	USACE (Locks)			System Datum	WA State Plane, North NAD83 (feet)			Groundwater	Date Measured	9/13/2016	Depth to Water (ft)	15.60	Elevation (ft)	14.28
Easting (X)	1270684.79			Notes: Hand-augered from 0 to 2 feet bgs.										
Northing (Y)	239165.17													

Elevation (feet)	FIELD DATA					Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
	Depth (feet)	Interval Recovered (in)	Blows/foot	Collected Sample	Sample Name Testing						
0							SP	Gray fine to coarse sand with trace silt (loose, moist) (fill)			XRF Readings "As = X ppm"
		30					SP	Brown fine to coarse sand with occasional gravel, trace silt and trace organic matter (fine roots) (loose, moist) (fill)			As = <35 ppm Slight hydrocarbon-like odor from 2 to 7 feet
							SM	Dark gray silty fine to coarse sand with occasional gravel and brick fragments (loose to medium dense, moist) (fill)	NS	<1	As = <42 ppm
								Grades with gravel, trace wood and fine roots	NS	25.6	As = <28 ppm
5									SS	67.8	
		42							SS	14.8	As = 870 ppm (±60)
									SS		
									HS	21.8	As = 1,131 ppm (±54) Moderate hydrocarbon-like odor from 7 to 9 feet
									SS	163.8	As = 1,177 ppm (±50); platy, organic sheen
10							ML	Gray silt (soft, moist) (fill)	SS	51.0	As = 43 ppm (±7) Slight hydrocarbon-like odor
							SP-SM	Dark brown fine to coarse sand with silt and occasional gravel (loose, wet) (fill)			As = 80 ppm (±17) Groundwater encountered at 10.1 feet during drilling
		48					ML	Gray sandy silt with occasional gravel (medium stiff, wet) (fill)	MS	64.8	As = 428 ppm (±40) Moderate hydrocarbon-like odor from 11 to 15 feet
							SM	Dark gray silty fine to medium sand with occasional gravel (medium dense, wet) (fill)	MS	131.6	As = 222 ppm (±12)
									HS	89.5	As = <32 ppm As = 70 ppm (±13); popping, orange metallic sheen
									HS	155.6	As = 54 ppm (±8)
15							SP	Black fine to medium sand with occasional gravel, trace silt and trace ash (loose, wet) (fill)	NS	54.8	
		60							NS	8.9	As = 98 ppm (±10)
									NS	14.8	As = <27 ppm
							SP-SM	Gray fine to coarse sand with silt and gravel (medium dense to dense, moist) (Qvr)	NS	9.0	As = 71 ppm (±16)
									NS	8.1	As = 28 ppm (±8)
									NS	24.7	
20									NS	34.6	As = <18 ppm

Note: Please see Figure 1-1 for explanation of symbols

Log of Boring PAI-19D



Project: Puget Sound Energy GWPS
 Project Location: Gas Works Park, Seattle, Washington
 Project Number: 0186-846-01

Figure 1-11
 Sheet 1 of 2

Date: 9/20/17 File: P:\00186846\GINT\0186846\01.GPJ DBLibrary\Library\GEOENGINEERS_DF_STD_US_GLB\GEGE_ENVIRONMENTAL_STANDARD

Elevation (feet)	FIELD DATA					Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample							
20		60					ML	Gray silt with trace sand (very soft, wet) (Qvr)	NS	27.1	As = <17 ppm	
							SP-SM	Gray fine to medium sand with silt and occasional gravel (medium dense, moist) (Qvr)	NS	5.3	As = 329 ppm (±22)	
							NS		NS	5.6	As = <13 ppm	
							SM	Gray silty fine sand with occasional gravel (medium dense, moist) (Qvr)	NS	3.4	As = <10 ppm	
							SP-SM	Dark gray fine to medium sand with silt and occasional gravel (medium dense, moist) (Qvr)	NS	5.6	As = <23 ppm	
25							SP	Dark gray fine to medium sand with trace silt and occasional gravel (medium dense, moist) (Qvr)	NS	5.6	As = <23 ppm	
<p>PAI-19-22.5-24.5 CA</p> <p>PAI-19-24.5-25 CA</p> <p>Temporary pre-pack well screen installed from 22.5 to 25 feet bgs; grab groundwater sample PAI-19D-190913 collected.</p>												

Note: Please see Figure 1-1 for explanation of symbols

Log of Boring PAI-19D (continued)



Project: Puget Sound Energy GWPS
 Project Location: Gas Works Park, Seattle, Washington
 Project Number: 0186-846-01

Figure 1-11
 Sheet 2 of 2

Drilled	Start 9/13/2016	End 9/13/2016	Total Depth (ft)	15	Logged By Checked By	GRL SBS	Driller	Cascade Drilling	Drilling Method	Continuous
Surface Elevation (ft) Vertical Datum	29.76 USACE (Locks)		Hammer Data	N/A			Drilling Equipment	Geoprobe 7730 DT		
Easting (X) Northing (Y)	1270684.79 239166.09		System Datum	WA State Plane, North NAD83 (feet)			Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)	
Notes: Hand-augered from 0 to 2 feet bgs.							9/13/2016	10.10	19.66	

Elevation (feet)	FIELD DATA						MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
	Depth (feet)	Interval Recovered (in)	Blows/foot	Collected Sample	Sample Name Testing	Water Level				
0										See adjacent boring PAI-19D for soil descriptions
5										
10										
15										Temporary pre-pack well screen installed from 11 to 15 feet bgs; grab groundwater sample PAI-19S-190913 collected.

Note: Please see Figure 1-1 for explanation of symbols

Log of Boring PAI-19S



Project: Puget Sound Energy GWPS
 Project Location: Gas Works Park, Seattle, Washington
 Project Number: 0186-846-01

Figure 1-12
 Sheet 1 of 1

Date: 6/30/17 File: P:\00186846\GINT\018684601.GPJ DBLibrary\Library\GEOENGINEERS_DF_STD_US_GLB\GEGE_ENVIRONMENTAL_STANDARD

Start Drilled	9/12/2016	End	9/12/2016	Total Depth (ft)	25	Logged By	GRL	Checked By	SBS	Driller	Cascade Drilling	Drilling Method	Continuous	
Surface Elevation (ft)	29.88			Hammer Data	N/A			Drilling Equipment	Geoprobe 7730 DT					
Vertical Datum	USACE (Locks)			System Datum	WA State Plane, North NAD83 (feet)			Groundwater	Date Measured	9/12/2016	Depth to Water (ft)	16.10	Elevation (ft)	13.78
Easting (X)	1270664.98			System Datum	WA State Plane, North NAD83 (feet)			Groundwater	Date Measured	9/12/2016	Depth to Water (ft)	16.10	Elevation (ft)	13.78
Northing (Y)	239141.46			System Datum	WA State Plane, North NAD83 (feet)			Groundwater	Date Measured	9/12/2016	Depth to Water (ft)	16.10	Elevation (ft)	13.78
Notes: Hand-augered from 0 to 2 feet bgs.														

Elevation (feet)	FIELD DATA					Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
	Depth (feet)	Interval Recovered (in)	Blows/foot	Collected Sample	Sample Name Testing							
0							SP	Gray fine to coarse sand with trace silt (loose, moist) (fill)	NS		XRF Readings "As = X ppm"	
							WD	2-inch plywood	SS	7.0	Sheen 1% coverage Slight hydrocarbon-like odor	
		34					SM	Dark gray silty fine to coarse sand with occasional gravel (medium dense, moist) (fill)	NS		As = <30 ppm	
								Grades with trace roots	NS	8.4	As = <22 ppm	
5		40							NS		As = <24 ppm	
									NS	2.0	As = <19 ppm	
									NS	40.1	As = <16 ppm	
							GP	Light gray fine to coarse gravel with sand and trace silt (medium dense, moist) (fill)	NS	388.8	As = 183 ppm (±16)	
10		48					SM	Dark gray silty fine to coarse sand with occasional gravel (medium dense, moist) (fill)	HS	65.0	Jar test: dark brown NAPL covered 5% of water surface Moderate hydrocarbon-like odor As = 54 ppm (±7)	
									NS	25.2	As = <26 ppm Slight hydrocarbon-like odor from 11 to 14 feet	
							SP	Gray fine to coarse sand with occasional gravel and trace silt (medium dense, moist) (fill)	SS	818.5	As = 59 ppm (±10)	
							ML	Dark gray silt with 4-inch and 6-inch long planar wood fragments (medium stiff, wet) (fill)	NS	98.8	As = <33 ppm Groundwater encountered at 13.4 feet during drilling	
							SM	Dark gray silty fine to coarse sand with gravel (medium dense, wet) (fill)	MS	735.6	As = <34 ppm As = <23 ppm	
15		60							NS	92.6	Jar test: dark brown NAPL covered 10% of water surface Moderate hydrocarbon-like odor As = <28 ppm	
							SP-SM	Dark gray fine to medium sand with silt and occasional gravel (medium dense to dense, wet) (Qvr)	NS	189.8	As = <28 ppm	
									NS	202.2	As = <32 ppm Slight hydrocarbon-like odor from 16 to 20 feet	
									NS	77.4	As = <15 ppm	
									NS	142.3	As = <21 ppm	
									NS	90.2	As = <39 ppm	
20									NS	50.4	As = 54 ppm (±8)	

Note: Please see Figure 1-1 for explanation of symbols

Log of Boring PAI-20D



Project: Puget Sound Energy GWPS
 Project Location: Gas Works Park, Seattle, Washington
 Project Number: 0186-846-01

Figure 1-13
 Sheet 1 of 2

Date: 6/30/17 File: P:\00186846\GINT\0186846\1.GPJ DBLibrary\Library\GEOENGINEERS_DF_STD_US_GLB\GIE_ENVIRONMENTAL_STANDARD

Elevation (feet)	FIELD DATA						MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS				
	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name Testing					Water Level	Graphic Log	Group Classification	
20		38							SP-SM	Dark gray fine to medium sand with silt and occasional gravel (dense, wet) (Qva)				
												NS	3.3	As = <25 ppm
												NS	5.2	As = 17 ppm (±4)
												NS	1.1	As = 38 ppm (±7)
25									SP-SM	Dark gray fine to medium sand with silt and occasional gravel (very dense, wet) (Qpgt)		NS	2.3	As = <13 ppm
Temporary PVC well screen installed from 20 to 25 feet bgs; grab groundwater sample PAI-20D-190912 collected.														

Note: Please see Figure 1-1 for explanation of symbols

Log of Boring PAI-20D (continued)



Project: Puget Sound Energy GWPS
 Project Location: Gas Works Park, Seattle, Washington
 Project Number: 0186-846-01

Figure 1-13
 Sheet 2 of 2

Drilled	Start 9/13/2016	End 9/13/2016	Total Depth (ft)	15	Logged By Checked By	GRL SBS	Driller	Cascade Drilling	Drilling Method	Continuous
Surface Elevation (ft) Vertical Datum	30.12 USACE (Locks)			Hammer Data	N/A			Drilling Equipment	Geoprobe 7730 DT	
Easting (X) Northing (Y)	1270666.21 239142.27			System Datum	WA State Plane, North NAD83 (feet)			Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)
Notes: Hand-augered from 0 to 2 feet bgs.								9/13/2016	13.40	16.72

Elevation (feet)	FIELD DATA						MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
	Depth (feet)	Interval Recovered (in)	Blows/foot	Collected Sample	Sample Name Testing	Water Level				
0										See adjacent boring PAI-20D for soil descriptions
5										
10										
15										Temporary pre-pack well screen installed from 10 to 15 feet bgs; grab groundwater sample PAI-20S-190913 collected.

Note: Please see Figure 1-1 for explanation of symbols

Log of Boring PAI-20AS



Project: Puget Sound Energy GWPS
 Project Location: Gas Works Park, Seattle, Washington
 Project Number: 0186-846-01

Figure 1-14
 Sheet 1 of 1

Date: 6/30/17 File: P:\00186846\GINT\0186846\01.GPJ DBLibrary\Library\GEOENGINEERS_DF_STD_US_GLB\GEGE_ENVIRONMENTAL_STANDARD

Drilled	Start 9/12/2016	End 9/12/2016	Total Depth (ft)	15	Logged By Checked By	GRL SBS	Driller	Cascade Drilling	Drilling Method	Continuous
Surface Elevation (ft) Vertical Datum	29.92 USACE (Locks)		Hammer Data	N/A			Drilling Equipment	Geoprobe 7730 DT		
Easting (X) Northing (Y)	1270665.11 239142.29		System Datum	WA State Plane, North NAD83 (feet)			Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)	
Notes: Hand-augered from 0 to 2 feet bgs.							9/12/2016	13.60	16.32	

Elevation (feet)	FIELD DATA						MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
	Depth (feet)	Interval Recovered (in)	Blows/foot	Collected Sample	Sample Name Testing	Water Level				
0										See adjacent boring PAI-20D for soil descriptions
5										
10										
15										Temporary PVC well screen installed from 13 to 15 feet bgs; grab groundwater sample PAI-20S-190912 collected.

Note: Please see Figure 1-1 for explanation of symbols

Log of Boring PAI-20S



Project: Puget Sound Energy GWPS
 Project Location: Gas Works Park, Seattle, Washington
 Project Number: 0186-846-01

Figure 1-15
 Sheet 1 of 1

Date: 9/20/17 File: P:\00186846\GINT\0186846\01.GPJ DBLibrary\Library\GEOENGINEERS_DF_STD_US_GLB\GEBE_ENVIRONMENTAL_STANDARD

Start Drilled	9/16/2016	End	9/16/2016	Total Depth (ft)	16	Logged By	GRL	Checked By	SBS	Driller	Cascade Drilling	Drilling Method	Continuous
Surface Elevation (ft) Vertical Datum	34.17 USACE (Locks)			Hammer Data	N/A			Drilling Equipment	Geoprobe 7730 DT				
Easting (X) Northing (Y)	1270699.24 239116.44			System Datum	WA State Plane, North NAD83 (feet)			Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)			
Notes: Refusal at 16 feet below ground surface on concrete.								Not encountered					

Elevation (feet)	FIELD DATA						MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS	
	Depth (feet)	Interval Recovered (in)	Blows/foot	Collected Sample	Sample Name Testing	Water Level					
0		46					BRICK	1.5-inch brick paved surface	NS	<1	XRF Readings "As = X ppm" As = <23 ppm
							SP	Brown fine to coarse sand with trace silt (loose, moist) (fill)			
							GP	Light brown fine to coarse gravel with sand and trace silt (medium dense, moist) (fill)			
5		60					SP	Light brown fine to coarse sand with occasional gravel (loose, moist) (fill)	NS	<1	As = <26 ppm
							SM	Gray-brown silty fine to coarse sand with gravel, trace organic matter (fine roots) and brick fragments; agglomerate grades out at 6.4 feet (medium dense, moist) (fill)	NS	<1	As = 17 ppm (±6)
							SM	Trace black glassy material	NS	<1	As = <29 ppm
							GP	Gray to black silty fine sand with trace decomposing wood (loose, moist) (fill)	NS	<1	As = 144 ppm (±14)
							SM	Light gray fine gravel with sand (loose, moist) (fill)	NS	<1	As = 161 ppm (±13)
10		28					SM	Black silty sooty fine to medium sand to sandy silt, occasional metallic agglomerate, occasionally vesicular and glassy (loose, moist) (fill)	NS	<1	As = 39 ppm (±11)
							SM	Grades with trace wood at 10 feet	NS	8.9	As = 75 ppm (±22)
							SM	Dark gray soot, grades orange at 10.25 feet	NS	<1	As = 37 ppm (±7)
							SM	White mortar-like material at 10.5 feet	NS	1.8	As = 270 ppm (±21)
							SM	Stratified red brick and black soot at 10.75 feet	SS	17.4	Strong naphthalene-like odor
							SM	Grades with black agglomerate at 11.2 feet	NS	<1	As = <20 ppm
							SM	White mortar-like material at 11.5 feet	SS	17.4	As = 210 ppm (±17)
							SM	Orange and white fused agglomerate: medium sand- to coarse gravel-sized (loose, moist) (fill)	NS	4.5	As = <24 ppm
							GP	Brown and gray fine to coarse gravel with sand and trace silt (loose, moist) (fill)	NS	5.6	
							GP	Grades with trace brick dust	NS	5.5	As = 23 ppm (±7)
							ML	Dark gray silt with occasional gravel (moist) (fill)	NS	5.5	As = 168 ppm (±18)
15							GP	Gray fine to coarse gravel with sand (loose, moist) (fill)	MS	483.6	As = 502 ppm (±31); metallic sheen that dissipates
							GP	Dark gray silt with occasional gravel (moist) (fill)	MS	48.1	As = 270 ppm (±20)
							GP	Gray fine to coarse gravel with sand (loose, moist) (fill)	SS	18.6	
							GP	Gray fine to coarse gravel with sand (loose, moist) (fill)	NS	18.6	As = 116 ppm (±13)

Note: Please see Figure 1-1 for explanation of symbols

Log of Boring PAI-21



Project: Puget Sound Energy GWPS
 Project Location: Gas Works Park, Seattle, Washington
 Project Number: 0186-846-01

Figure 1-16
 Sheet 1 of 1

Date: 9/30/17 File: P:\00186846\GINT\018684601.GPJ D:\Library\Library\GEOENGINEERS_DF_STD_US_GLB\GIEE_ENVIRONMENTAL_STANDARD

Start Drilled	10/17/2016	End	10/17/2016	Total Depth (ft)	30	Logged By	MWB	Checked By	ZAS	Driller	Cascade Drilling	Drilling Method	Continuous	
Surface Elevation (ft)	34.26			Hammer Data	N/A			Drilling Equipment	Sonic DB320					
Vertical Datum	USACE (Locks)			System Datum	WA State Plane, North NAD83 (feet)			Groundwater	Date Measured	10/17/2016	Depth to Water (ft)	13.43	Elevation (ft)	20.83
Easting (X)	1270700.07			Notes: Hand-augered from 0 to 2 feet bgs.										
Northing (Y)	239117.73													

Elevation (feet)	FIELD DATA						MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS				
	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name Testing					Water Level	Graphic Log	Group Classification	
0		60												
										BRICK	1.5-inch brick paved surface			XRF Readings "As = X ppm"
										SP	Light brown fine sand with gravel and cobbles up to 3 inches (loose, moist) (fill)			
										NS		<1		As = <38 ppm
										SP	Brown sand with gravel and cobbles up to 4 inches (loose, moist) (fill)			
										NS		<1		As = <45 ppm
5		60								SP	Brown fine to medium sand with gravel and cobbles up to 5 inches (loose, wet) (fill)			
										NS		<1		As = <43 ppm
										SP	Light brown fine to medium sand with gravel (loose, moist) (fill)			
										NS		<1		As = <17 ppm
										SP-SM	Gray to black sand with silt, gravel, wood material and asphaltic debris (fill)			
										NS		<1		As = <28 ppm
10		60								ASH	Ash with brick fragments (loose, moist) (fill)			
										SP	Black-brown fine sand with gravel, cobbles up to 4 inches and wood debris (fill)	SS	10.0	As = 317 ppm (±23); slight blocky sheen, burnt odor
										NS		123.9		As = <94 ppm
										NS		235.6		
										SOOT	Black ash and soot (fill)			
										NS		210.1		As = <114 ppm
										SP	Gray fine sand with gravel (loose, moist) (fill)			
										WD	Black fibrous wood 3-inches long with silt and gravel (fill)			Groundwater encountered at 14 feet during drilling
15		60								CC	Light gray fine sand with gravel and ash - concrete (loose, moist) (fill)	NS	268.4	As = 620 ppm (±30)
										NS		201.3		As = <46 ppm
										SP	Brown fine to medium sand with gravel (loose, wet) (fill)	HS	245.2	As = <73 ppm; heavy sheen/rainbow; shake test 10% orange blebs
										SP-SM	Gray fine to medium sand with silt, gravel and cobbles up to 4 inches (loose, moist) (Qvr)	SS	104.6	As = <20 ppm; slightly blocky sheen
										NS		135.5		As = <73 ppm
20										NS		110.3		As = <21 ppm

Note: Please see Figure 1-1 for explanation of symbols

Log of Boring PAI-21BD



Project: Puget Sound Energy GWPS
 Project Location: Gas Works Park, Seattle, Washington
 Project Number: 0186-846-01

Figure 1-17
 Sheet 1 of 2

Date: 6/30/17 File: P:\00186846\GINT\0186846\01.GPJ DBLibrary\Library\GEOENGINEERS_DF_STD_US_GLB\GIEB_ENVIRONMENTAL_STANDARD

Elevation (feet)	FIELD DATA						MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
	Depth (feet)	Interval Recovered (in)	Blows/foot	Collected Sample	Sample Name Testing	Water Level				
20	60							NS	23.4	As = <49 ppm
								MS	17.3	As = <65 ppm
25	60							NS	7.0	As = <29 ppm
								NS	20.1	As = <29 ppm
										As = <24 ppm
							SM	MS	41.5	As = <24 ppm; sheen with gray, blocky edges
									7	As = 23 ppm (±7); shake test 10% dark brown-black blebs
30								NS	3.7	As = <24 ppm

PAL-21B-23-28 CA

Temporary pre-pack well screen installed from 23 to 28 feet bgs; grab groundwater sample PAI-21BD-161017 collected.

Note: Please see Figure 1-1 for explanation of symbols

Log of Boring PAI-21BD (continued)



Project: Puget Sound Energy GWPS
 Project Location: Gas Works Park, Seattle, Washington
 Project Number: 0186-846-01

Date: 6/30/17 File: P:\00186846\GINT\018684601.GPJ DBLibrary\Library\GEOENGINEERS_DF_STD_US_GLB\GEGE_ENVIRONMENTAL_STANDARD

Start Drilled	10/17/2016	End	10/17/2016	Total Depth (ft)	16.5	Logged By	MWB	Checked By	ZAS	Driller	Cascade Drilling	Drilling Method	Continuous	
Surface Elevation (ft)	34.24			Hammer Data	N/A			Drilling Equipment	Sonic DB320					
Vertical Datum	USACE (Locks)			System Datum	WA State Plane, North NAD83 (feet)			Groundwater	Date Measured	10/17/2016	Depth to Water (ft)	15.95	Elevation (ft)	18.29
Easting (X)	1270699.26			Notes: Hand-augered from 0 to 2 feet bgs.										
Northing (Y)	239116.46													

Elevation (feet)	FIELD DATA						MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
	Depth (feet)	Interval Recovered (in)	Blows/foot	Collected Sample	Sample Name Testing	Water Level				
0										See adjacent boring PAI-21BD for soil descriptions.
5										
10										
15										
										Temporary PVC well screen installed from 14 to 16.5 feet bgs; grab groundwater sample PAI-21BS-161017 collected.

Note: Please see Figure 1-1 for explanation of symbols

Log of Boring PAI-21BS



Project: Puget Sound Energy GWPS
 Project Location: Gas Works Park, Seattle, Washington
 Project Number: 0186-846-01

Date: 6/30/17 Path: P:\00186846\GINT\0186846\01.GPJ DBLibrary\Library\GEOENGINEERS_DF_STD_US_GLB\GEBE_ENVIRONMENTAL_STANDARD

Start Drilled	9/16/2016	End	9/16/2016	Total Depth (ft)	29	Logged By	GRL	Checked By	SBS	Driller	Cascade Drilling	Drilling Method	Continuous	
Surface Elevation (ft)	32.64			Hammer Data	N/A			Drilling Equipment	Geoprobe 7730 DT					
Vertical Datum	USACE (Locks)			System Datum	WA State Plane, North NAD83 (feet)			Groundwater	Date Measured	9/16/2016	Depth to Water (ft)	11.45	Elevation (ft)	21.19
Easting (X)	1270675.04			Notes: Hand-augered from 0 to 2 feet bgs.										
Northing (Y)	239085.68													

Elevation (feet)	FIELD DATA					Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
	Depth (feet)	Interval Recovered (in)	Blows/foot	Collected Sample	Sample Name Testing						
0	8					AC	2 inches asphalt concrete	NS	<1	XRF Readings "As = X ppm" As = <24 ppm	
						GP-GM	Brown fine to coarse gravel with silt and sand (medium dense, moist) (fill)	NS	<1	As = <30 ppm	
								NS	<1	As = <18 ppm	
5	54					ML	Black sooty sandy silt with trace brick dust (medium stiff, moist) (fill)	NS	<1	As = 81 ppm (±15)	
						SM	Grades with trace sand	NS	<1	As = <28 ppm	
						ML	Gray and tan silty fine to coarse sand with occasional gravel (medium dense, moist) (fill)	NS	<1	As = <14 ppm	
						SP-SM	(fill)	NS	<1	As = <18 ppm	
						SP	Tan silt (stiff, moist) (fill)	NS	<1	As = 307 ppm (±18); fine yellow powder on surface during sheen test	
						SP-SM	Tan fine to medium sand with silt and occasional gravel (medium dense, moist) (fill)	NS	<1	As = 986 ppm (±47)	
						SM	(fill)	NS	<1	As = 1,272 ppm (±39)	
						ML	Black fine to medium sand with thin layer of brick debris on top (loose, moist) (fill)	NS	<1	As = 618 ppm (±18)	
						GM	Gray fine to medium sand with silt (medium dense, moist) (fill)	SS	<1	As = 852 ppm (±27); gray, blocky sheen	
10	8						Grades brown mottling	NS	<1	As = 518 ppm (±17)	
							Grades gray with light green	NS	<1	As = 309 ppm (±16)	
						SP	Gray-brown silty fine to medium sand with occasional gravel (medium dense, moist) (fill)	NS	<1	As = 381 ppm (±24)	
	60					ML	(fill)	NS	<1	As = 741 ppm (±47)	
						SM	Gray with brown and orange mottling sandy silt with occasional gravel (medium stiff to stiff, moist to wet) (fill)	NS	<1	Groundwater encountered at 12 feet during drilling	
						SM	(fill)	NS	<1	As = 226 ppm (±11)	
						GP-GM	Gray with brown and orange mottling silty gravel (medium dense, moist) (fill)	NS	<1	As = 758 ppm (±32)	
						ML	Gray medium to coarse sand with gravel and trace silt (medium dense, moist) (fill)	NS	<1	As = 206 ppm (±13)	
						ML	(fill)	NS	<1	As = 62 ppm (±6)	
						SP-SM	Dark brown and gray with orange mottling silt with trace sand (medium stiff, moist) (fill)	NS	<1	As = 477 ppm (±38)	
							Gray with dark brown and light green silty fine to medium sand (medium dense, moist) (fill)	NS	<1	Slight burnt plastic odor	
15	60						(fill)	NS	<1	As = 172 ppm (±11)	
							Dark gray to black silty sooty fine to medium sand (medium dense, moist) (fill)	NS	<1	As = 131 ppm (±13)	
							Gray to brown fine to coarse gravel with silt and sand, 1 inch piece of brick (medium dense, wet) (fill)	NS	<1		
							Grades gray with light green	NS	<1		
							Gray sandy silt (medium stiff, wet) (Qvr)	NS	<1		
							Gray silt (medium stiff, wet) (Qvr)	NS	<1	As = 116 ppm (±15)	
							Black stained fine to medium sand with silt and occasional gravel (medium dense, wet) (Qvr)	NS	<1		
20							Grades to gray at 14.5 feet	NS	<1		
							Grades with gravel at 15 feet	NS	<1		

Note: Please see Figure 1-1 for explanation of symbols

Log of Boring PAI-22D



Project: Puget Sound Energy GWPS
 Project Location: Gas Works Park, Seattle, Washington
 Project Number: 0186-846-01

Figure 1-19
 Sheet 1 of 2

Date: 9/20/17 File: P:\00186846\GINT\0186846\01.GPJ DBLibrary\Library\GEOENGINEERS_DF_STD_US_GLB\GEB_ENVIRONMENTAL_STANDARD

Drilled	Start 9/16/2016	End 9/16/2016	Total Depth (ft)	15	Logged By Checked By	GRL SBS	Driller	Cascade Drilling	Drilling Method	Continuous
Surface Elevation (ft) Vertical Datum	32.54 USACE (Locks)			Hammer Data	N/A			Drilling Equipment	Geoprobe 7730 DT	
Easting (X) Northing (Y)	1270674.18 239084.59			System Datum	WA State Plane, North NAD83 (feet)			Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)
Notes: Hand-augered from 0 to 2 feet bgs.								9/16/2016	11.30	21.24

Elevation (feet)	FIELD DATA						MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
	Depth (feet)	Interval Recovered (in)	Blows/foot	Collected Sample	Sample Name Testing	Water Level				
0										See adjacent boring PAI-22D for soil descriptions
30										
5										
10										
12						▼				
15										Temporary pre-pack well screen installed from 12 to 13 feet bgs; grab groundwater sample PAI-22S-190916 collected.

Note: Please see Figure 1-1 for explanation of symbols

Log of Boring PAI-22S



Project: Puget Sound Energy GWPS
 Project Location: Gas Works Park, Seattle, Washington
 Project Number: 0186-846-01

Figure 1-20
 Sheet 1 of 1

Date: 9/20/17 File: P:\00186846\GINT\0186846\01.GPJ DBLibrary\Library\GEOENGINEERS_DF_STD_US_GLB\GEGE_ENVIRONMENTAL_STANDARD

Start Drilled	9/26/2016	End	9/26/2016	Total Depth (ft)	29	Logged By	GRL ZAS	Checked By	ZAS	Driller	Cascade Drilling	Drilling Method	Continuous	
Surface Elevation (ft)	30.17			Hammer Data	N/A			Drilling Equipment	Geoprobe 7730 DT					
Vertical Datum	USACE (Locks)			System Datum	WA State Plane, North NAD83 (feet)			Groundwater	Date Measured	9/26/2016	Depth to Water (ft)	10.48	Elevation (ft)	19.69
Easting (X)	1270640.71			Notes: Hand-augered from 0 to 2 feet bgs.										
Northing (Y)	239142.16													

Elevation (feet)	FIELD DATA					Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
	Depth (feet)	Interval Recovered (in)	Blows/foot	Collected Sample	Sample Name Testing							
0							SP	Brown fine to medium sand with trace organic matter (loose, moist) (fill)			XRF Readings "As = X ppm"	
25							NS		<1	As = <28 ppm		
48							SP-SM	Dark brown fine to medium sand with silt, occasional gravel and trace wood (loose, moist to wet) (fill)	<1	As = <26 ppm		
5							SM	Dark brown silty fine to medium sand with occasional gravel and trace wood (loose, moist to wet) (fill)	<1	As = <24 ppm		
48							NS		<1			
							NS		1.9			
							NS	Grades to gray with gravel, without wood	34.8	As = 24 ppm (±7)		
							SP-SM	Gray fine to medium sand with silt and occasional gravel (loose, wet) (fill)	40.1	As = <31 ppm		
							ML	Dark brown silt with sand (medium stiff, moist) (fill)	65	Groundwater encountered at 8.4 feet during drilling		
							SP-SM	Gray fine to medium sand with silt (loose, wet) (fill)	7	Sheen is blocky		
10							ML	Gray silt (stiff, moist) (Qvr)	<1	As = 194 ppm (±14); sheen has color		
8							ML	Grades to medium stiff with trace organic matter		As = 84 ppm (±11)		
48							GP-GM	Brown fine to coarse gravel with sand and silt (medium dense, wet) (Qvr)	104.8	As = 40 ppm (±8)		
							SP-SM	Gray-brown fine to medium sand with silt and occasional gravel (medium dense, moist to wet) (Qvr)	4.4	Jar test: NAPL at surface is almost 1 mm thick, covers surface		
							SS	Grades to gray		As = 53 ppm (±11)		
							NS	Grades to dark gray	76.2	As = <19 ppm		
							NS		<1	As = 23 ppm (±6)		
15							SS			As = 60 ppm (±11)		
48							SS			As = 104 ppm (±10)		
							SM	Dark gray silty fine to medium sand with occasional gravel (medium dense, wet) (Qvr)	11.8	As = 114 ppm (±13)		
							ML	Dark gray sandy silt with occasional gravel (soft, wet) (Qvr)	24.3	As = 132 ppm (±8)		
							GP-GM	Dark gray fine to coarse gravel with silt and sand (medium dense, wet) (Qvr)		As = 58 ppm (±8)		
							NS		<1			
20							SP-SM	Dark gray fine to medium sand with silt (medium dense, wet) (Qvr)	<1	As = 181 ppm (±13)		

Note: Please see Figure 1-1 for explanation of symbols

Log of Boring PAI-23D



Project: Puget Sound Energy GWPS
 Project Location: Gas Works Park, Seattle, Washington
 Project Number: 0186-846-01

Figure 1-21
 Sheet 1 of 2

Date: 9/20/17 File: P:\00186846\GINT\0186846\01.GPJ DBLibrary\Library\GEOENGINEERS_DF_STD_US_GLB\GEBE_ENVIRONMENTAL_STANDARD

Elevation (feet)	FIELD DATA					Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
	Interval	Recovered (in)	Blows/foot	Collected Sample	Water Level					
20	60					ML	Gray sandy silt with gravel (very stiff, moist) (Qvr)	NS	30.4	As = 85 ppm (±9)
						SP-SM	Gray fine to medium sand with silt and occasional gravel (dense, moist) (Qvr) Grades to wet	NS	6.1	As = <22 ppm
						SM	Grades to moist to wet Gray silty fine to medium sand with occasional gravel (dense, wet) (Qvr)	NS	4.7	As = 109 ppm (±11)
								NS	<1	As = <18 ppm
25	48					SP-SM	Gray fine to medium sand with silt and occasional gravel (medium dense, wet) (Qvr)	NS	<1	As = <18 ppm
						SP-SM	Gray fine to medium sand with silt and occasional gravel (dense, wet) (Qva)	NS	4.7	As = 102 ppm (±10) As = 92 ppm (±11)
								NS	<1	As = 161 ppm (±14)
						ML	Gray sandy silt with occasional gravel (hard, moist) (Qpgd)	NS	<1	As = <28 ppm
								NS	<1	As = <17 ppm

PAI-23-
26-28
CA

Temporary pre-pack well screen installed from 25.8 to 27.8 feet bgs; grab groundwater samples PAI-23D-160926 and D-160926 collected.

Note: Please see Figure 1-1 for explanation of symbols

Log of Boring PAI-23D (continued)



Project: Puget Sound Energy GWPS
 Project Location: Gas Works Park, Seattle, Washington
 Project Number: 0186-846-01

Date: 6/30/17 File: P:\00186846\GINT\0186846\01.GPJ D:\Library\Library\GEOENGINEERS_DF_STD_US_GLB\GEBL_ENVIRONMENTAL_STANDARD

Drilled	Start 9/26/2016	End 9/26/2016	Total Depth (ft)	11	Logged By Checked By	GRL ZAS	Driller	Cascade Drilling	Drilling Method	Continuous
Surface Elevation (ft) Vertical Datum	30.25 USACE (Locks)			Hammer Data	N/A			Drilling Equipment	Geoprobe 7730 DT	
Easting (X) Northing (Y)	1270640.84 239143.07			System Datum	WA State Plane, North NAD83 (feet)			Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)
Notes: Hand-augered from 0 to 2 feet bgs.								9/26/2016	8.37	21.88

Elevation (feet)	FIELD DATA						MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
	Depth (feet)	Interval Recovered (in)	Blows/foot	Collected Sample	Sample Name Testing	Water Level				
0										See adjacent boring PAI-23D for soil descriptions
5										
10										

Temporary pre-pack well screen installed from 8.5 to 9.5 feet bgs; grab groundwater sample PAI-23S-160926 collected.

Note: Please see Figure 1-1 for explanation of symbols

Log of Boring PAI-23S



Project: Puget Sound Energy GWPS
 Project Location: Gas Works Park, Seattle, Washington
 Project Number: 0186-846-01

Figure 1-22
 Sheet 1 of 1

Elevation (feet)	FIELD DATA					MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
	Depth (feet)	Interval Recovered (in)	Blows/foot	Collected Sample	Graphic Log				
20	48			PAI-24-21.3-22.3 CA		SP Gray fine to medium sand with trace silt (dense, wet) (Qva)	NAPL NS	266.8 <1	As = 24 ppm (±7) Jar test: thin brown NAPL at top covers 80% As = 43 ppm (±14)
						ML Grades to dark gray Gray sandy silt with occasional gravel (dense, moist) (Qva)	NS	<1	As = <18 ppm As = <25 ppm
						SM Gray silty fine to medium sand (Qva)	NS	<1	As = <16 ppm
						ML Gray silt with trace sand and occasional gravel (hard, moist) (Qpgd)	NS	<1	As = <21 ppm
							NS	<1	As = <16 ppm

Temporary pre-pack well screen installed from 21.5 to 22.5 feet bgs; grab groundwater sample PAI-24D-160926 collected.

Note: Please see Figure 1-1 for explanation of symbols

Log of Boring PAI-24D (continued)



Project: Puget Sound Energy GWPS
 Project Location: Gas Works Park, Seattle, Washington
 Project Number: 0186-846-01

Figure 1-23
 Sheet 2 of 2

Drilled	Start 9/26/2016	End 9/26/2016	Total Depth (ft)	11	Logged By Checked By	GRL SBS	Driller	Cascade Drilling	Drilling Method	Continuous
Surface Elevation (ft) Vertical Datum	30.66 USACE (Locks)			Hammer Data	N/A			Drilling Equipment	Geoprobe 7730 DT	
Easting (X) Northing (Y)	1270636.94 239108.25			System Datum	WA State Plane, North NAD83 (feet)			Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)
Notes: Hand-augered from 0 to 2 feet bgs.								9/26/2016	9.80	20.86

Elevation (feet)	FIELD DATA						MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
	Depth (feet)	Interval Recovered (in)	Blows/foot	Collected Sample	Sample Name Testing	Water Level				
0										See adjacent boring PAI-24D for soil descriptions
5										
10					▼					

Temporary pre-pack well screen installed from 9.8 to 10.8 feet bgs; grab groundwater sample PAI-24S-160926 collected.

Note: Please see Figure 1-1 for explanation of symbols

Log of Boring PAI-24S



Project: Puget Sound Energy GWPS
 Project Location: Gas Works Park, Seattle, Washington
 Project Number: 0186-846-01

Figure 1-24
 Sheet 1 of 1


Date: 9/20/17 File: P:\00186846\GINT\018684601.GPJ DBLibrary\Library\GEOENGINEERS_DF_STD_US_GLB\GEGE_ENVIRONMENTAL_STANDARD

Drilled	Start 9/27/2016	End 9/27/2016	Total Depth (ft)	29	Logged By Checked By	RNM ZAS	Driller	Cascade Drilling	Drilling Method	Continuous
Surface Elevation (ft) Vertical Datum	28.23 USACE (Locks)			Hammer Data	N/A			Drilling Equipment	Geoprobe 7730 DT	
Easting (X) Northing (Y)	1270804.73 239185.15			System Datum	WA State Plane, North NAD83 (feet)			Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)
Notes: Hand-augered from 0 to 2 feet bgs.								9/27/2016	14.69	13.54

Elevation (feet)	FIELD DATA						MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
	Depth (feet)	Interval Recovered (in)	Blows/foot	Collected Sample	Sample Name Testing	Water Level				
0										See adjacent boring PAI-11 for soil descriptions
5										
10										
15										
20										

Note: Please see Figure 1-1 for explanation of symbols

Date: 9/20/17 File: P:\00188846\GINT\018884601.GPJ DBLibrary\Library\GEOENGINEERS_DF_STD_US_GLB\GEBE_ENVIRONMENTAL_STANDARD

Log of Boring PAI-25D		
	Project:	Puget Sound Energy GWPS
	Project Location:	Gas Works Park, Seattle, Washington
	Project Number:	0186-846-01
		Figure 1-25 Sheet 1 of 2

Date: 6/30/17 File: P:\00186846\GINT\0186846\01.GPJ D:\Library\Library\GEOENGINEERS_DF_STD_US_GLB\GEGE_ENVIRONMENTAL_STANDARD

Elevation (feet)	FIELD DATA						MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name Testing	Water Level				
20										
15										
10										
5										

Temporary pre-pack well screen installed from 27.13 to 28.63 feet; grab groundwater sample PAI-25D-190927 collected.

Note: Please see Figure 1-1 for explanation of symbols

Log of Boring PAI-25D (continued)



Project: Puget Sound Energy GWPS
 Project Location: Gas Works Park, Seattle, Washington
 Project Number: 0186-846-01

Start Drilled 9/27/2016	End 9/27/2016	Total Depth (ft) 29	Logged By Checked By GRL ZAS	Driller Cascade Drilling	Drilling Method Continuous
Surface Elevation (ft) Vertical Datum 31.57 USACE (Locks)	Hammer Data N/A	Drilling Equipment Geoprobe 7730 DT			
Easting (X) Northing (Y) 1270722.02 239071.36	System Datum WA State Plane, North NAD83 (feet)	Groundwater Date Measured 9/27/2016	Depth to Water (ft) 11.32	Elevation (ft) 20.25	
Notes: Hand-augered from 0 to 1½ feet bgs.					

Elevation (feet)	FIELD DATA					Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name Testing						
0						AC	3½-inches asphalt concrete				XRF Readings "As = X ppm" No recovery from 0 to 2 feet
30	32					SP-SM	Brown fine to coarse sand with silt, gravel and trace organic matter (loose, moist) (fill)	NS	<1		
						SM	Gray silty fine to coarse sand with gravel and occasional cobbles (medium dense, moist) (fill)	NS	<1		As = <21 ppm
							Geogrid at 1.5 feet	NS	<1		As = <20 ppm
							Gray sandy silt with gravel and trace wood (medium stiff, moist) (fill)				
							Grades to gray and brown				
						SP	Gray fine to medium sand with trace silt (loose, moist) (fill)	NS	<1		As = <26 ppm
						ML	Gray silt (medium stiff, moist) (fill)	NS	<1		As = 31 ppm (±10)
						ML	Brown silt with organic matter (decaying wood) (soft, moist) (fill)	NS	<1		As = 38 ppm (±12)
5	30					SM	Gray silty fine sand with gravel (loose, moist) (fill)	NS	<1		As = 322 ppm (±20)
						ML	Dark gray sandy silt (fill)	NS	<1		As = 36 ppm (±7); blocky sheen
						GP	Black with occasional light gray and orange fused agglomerate (fine sand- to coarse gravel-sized) (fill)	SS	<1		
							Grades to vesicular fused agglomerate and coarser				As = 16 ppm (±4)
							With fine to medium sand	NS	<1		As = 43 ppm (±8)
						SM/ML	Dark gray silty fine to coarse sand to sandy silt (loose/soft, moist) (fill)	SS	<1		As = <25 ppm
						GP	Black fused agglomerate (loose, wet) (fill)	MS	41.7		As = 382 ppm (±22)
							Dark gray fine gravel with trace silt and sand (loose, wet) (fill)	NS	13.9		Groundwater encountered at 11.3 feet during drilling
						GP	Grades to olive	NS	4.4		As = 295 ppm (±12)
						WD	Brown organic matter (decaying wood) (fill)	NS	<1		As = 349 ppm (±24)
						SP	Gray fine to medium sand with trace silt and organic matter (loose, wet) (Qvr)	NS	<1		As = 883 ppm (±21)
						SP-SM	Grades coarser	NS	<1		As = 203 ppm (±11)
							Gray fine to medium sand with silt, occasional gravel and trace organic matter (medium dense, wet) (Qvr)	NS	<1		As = 252 ppm (±14)
							Grades to dark gray without organic matter	NS	<1		As = 147 ppm (±9)
15	49					SP	Gray and black fine to coarse sand with trace silt and occasional gravel (dense, wet) (Qvr)	NS	<1		As = <22 ppm
						SP-SM	Dark gray fine to medium sand with silt and occasional gravel (dense, wet) (Qvr)	NS	<1		As = 24 ppm (±7)
						SP	1-cm layer dark gray sandy silt with occasional gravel (medium stiff, moist) (Qvr)	NS	<1		As = <28 ppm
						SP-SM	Gray fine to coarse sand with occasional gravel (medium dense, wet) (Qvr)	NS	<1		As = <16 ppm
20							Dark gray fine to medium sand with silt and occasional gravel (dense, wet) (Qva)	NS	<1		As = <23 ppm

Note: Please see Figure 1-1 for explanation of symbols

Log of Boring PAI-26D



Project: Puget Sound Energy GWPS
 Project Location: Gas Works Park, Seattle, Washington
 Project Number: 0186-846-01

Figure 1-26
 Sheet 1 of 2

Date: 9/20/17 File: P:\00186846\GINT\0186846\01.GPJ DBLibrary\Library\GEOENGINEERS_DF_STD_US_GLB\GEBL_ENVIRONMENTAL_STANDARD

Elevation (feet)	FIELD DATA						MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Water Level				
20		60						NS	<1	As = <24 ppm
10								NS	<1	As = 23 ppm (±7)
								NS	<1	As = <20 ppm
								NS	<1	As = <19 ppm
							SP			As = <21 ppm
								NS	<1	As = <19 ppm
25		48					SP-SM			As = <19 ppm
								NS	<1	As = <26 ppm
							ML			As = <24 ppm
								NS	<1	As = <23 ppm
								NS	<1	As = <24 ppm
								NS	<1	As = <23 ppm
								NS	<1	As = 21 ppm (±6)

Temporary pre-pack well screen installed from 20.25 to 25.25 feet bgs; grab groundwater sample PAI-26D-190928 collected.

Note: Please see Figure 1-1 for explanation of symbols

Log of Boring PAI-26D (continued)



Project: Puget Sound Energy GWPS
 Project Location: Gas Works Park, Seattle, Washington
 Project Number: 0186-846-01

Figure 1-26
 Sheet 2 of 2

Start Drilled	9/28/2016	End	9/28/2016	Total Depth (ft)	30	Logged By	GRL ZAS	Checked By	ZAS	Driller	Cascade Drilling	Drilling Method	Continuous	
Surface Elevation (ft)	25.84			Hammer Data	N/A			Drilling Equipment	Geoprobe 7730 DT					
Vertical Datum	USACE (Locks)			System Datum	WA State Plane, North NAD83 (feet)			Groundwater	Date Measured	9/28/2016	Depth to Water (ft)	8.16	Elevation (ft)	17.68
Easting (X)	1270773.32			Notes: Hand-augered from 0 to 5 feet bgs.										
Northing (Y)	239024.91													

Elevation (feet)	FIELD DATA					Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
	Depth (feet)	Interval Recovered (in)	Blows/foot	Collected Sample	Sample Name Testing							
0							SP-SM	Brown fine to coarse sand with silt, occasional gravel and trace organic matter (roots) (loose, moist) (fill)	NS	<1	XRF Readings "As = X ppm"	
							SP	Brown medium sand (loose, moist) (fill)	NS	<1		
							SM	Grades with trace silt Gray silty fine sand with occasional gravel (medium dense, moist) (fill)	NS	<1		
									NS	<1		
									NS	<1		
5		47					GM	Gray silty fine to coarse gravel with sand (medium dense, moist) (fill)	NS	<1	As = <21 ppm	
							SM	Black sooty silty fused agglomerate (fine to coarse sand-sized) (loose, moist) (fill)	NS	<1	As = 59 ppm (±15)	
							GP	Two very smooth glassy pieces Black fused vesicular agglomerate (fine to coarse gravel-sized with sand-sized) with brick debris (loose, wet) (fill)	NS	78.2	As = <21 ppm	
								Grades without brick debris	HS	326.1	Groundwater encountered at 6.2 feet during drilling As = <22 ppm Jar test: fine sand-sized blebs covering ~20% of surface; trace blebs suspended in water column	
									MS	90	As = 26 ppm (±5)	
										40.1	As = 92 ppm (±11)	
10		40						1-inch layer tan fused agglomerate	NS	24.2	As = 130 ppm (±10)	
								With occasional light colored platy fused agglomerate	MS	1	As = 268 ppm (±20)	
							SM	Gray silty fine to medium sand with occasional gravel (medium dense, wet) (Qvr)	SS	<1	As = 245 ppm (±11)	
									NS	<1	As = 51 ppm (±7)	
15		36							NS	<1	As = 38 ppm (±5)	
							SP-SM	Gray fine to medium sand with silt and occasional gravel (medium dense, wet) (Qvr) Alternates gray and dark gray	NS	<1	As = 87 ppm (±6)	
									NS	<1	As = 16 ppm (±4)	

Note: Please see Figure 1-1 for explanation of symbols

Log of Boring PAI-27D



Project: Puget Sound Energy GWPS
 Project Location: Gas Works Park, Seattle, Washington
 Project Number: 0186-846-01

Figure 1-28
 Sheet 1 of 2

Date: 9/20/17 File: P:\00186846\GINT\0186846\01.GPJ DBLibrary\Library\GEOENGINEERS_DF_STD_US_GLB\GEGE_ENVIRONMENTAL_STANDARD

Elevation (feet)	FIELD DATA					Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample							
20	24						SM	Gray silty fine to medium sand with occasional gravel (medium dense, wet) (Qvr)	NS	<1	As = 15 ppm (±4)	
							SP	Gray fine to medium sand with trace silt and gravel (medium dense, wet) (Qvr)				
							SM	Gray silty fine to medium sand with occasional gravel (medium dense, wet) (Qvr)				
							GM	Gray silty fine to medium sand with occasional gravel (medium dense, wet) (Qvr)				
							ML	Gray silty fine to coarse gravel with sand (dense, wet) (Qvr)				
							SM	Gray silt with sand (stiff, moist) (Qvr)				
							SP-SM	Dark gray silty fine sand (medium dense, wet) (Qvr)				
							SP-SM	Dark gray fine to medium sand with silt and occasional gravel (dense, wet) (Qvr)				
							SM	Gray silty fine to medium sand with occasional gravel (dense, wet) (Qvr)				
							GM	Gray silty fine to coarse gravel with sand (dense, wet) (Qvr)				
25	52						SM	Gray silty fine to medium sand with occasional gravel (dense, wet) (Qvr)	NS	<1	As = 31 ppm (±7)	
							GM	Gray silty fine to coarse gravel with sand (dense, wet) (Qvr)				
							SM	Gray silty fine to coarse gravel with sand (dense, wet) (Qvr)				
							ML	Dark gray silty fine sand with occasional gravel (dense, wet) (Qvr)				
							SM	Gray silt with trace sand and occasional gravel (hard, moist) (Qpgt)				
30							SM	Dark gray to black silty fine to medium sand with occasional gravel (dense, wet) (Qpgt)	NS	<1	As = <14 ppm	
							SM	Dark gray to black silty fine to medium sand with occasional gravel (dense, wet) (Qpgt)				
							SM	Dark gray to black silty fine to medium sand with occasional gravel (dense, wet) (Qpgt)				
Grades finer Temporary pre-pack well screen installed from 25.3 to 26.3 feet bgs; grab groundwater sample PAI-27D-160928 collected.												

PAI-27-25.5-26.5 CA

Note: Please see Figure 1-1 for explanation of symbols

Log of Boring PAI-27D (continued)



Project: Puget Sound Energy GWPS
 Project Location: Gas Works Park, Seattle, Washington
 Project Number: 0186-846-01

Figure 1-28
 Sheet 2 of 2

Drilled	Start 9/28/2016	End 9/28/2016	Total Depth (ft)	12.5	Logged By Checked By	GRL ZAS	Driller	Cascade Drilling	Drilling Method	Continuous
Surface Elevation (ft) Vertical Datum	25.91 USACE (Locks)			Hammer Data	N/A			Drilling Equipment	Geoprobe 7730 DT	
Easting (X) Northing (Y)	1270773.62 239026.05			System Datum	WA State Plane, North NAD83 (feet)			Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)
Notes: Hand-augered from 0 to 5 feet bgs.								9/28/2016	5.62	20.29

Elevation (feet)	FIELD DATA						MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
	Depth (feet)	Interval Recovered (in)	Blows/foot	Collected Sample	Sample Name Testing	Water Level				
0										See adjacent boring PAI-27D for soil descriptions
5										
10										

Temporary pre-pack well screen installed from 9.5 to 12.5 feet bgs; grab groundwater sample PAI-27S-160928 collected.

Note: Please see Figure 1-1 for explanation of symbols

Log of Boring PAI-27S

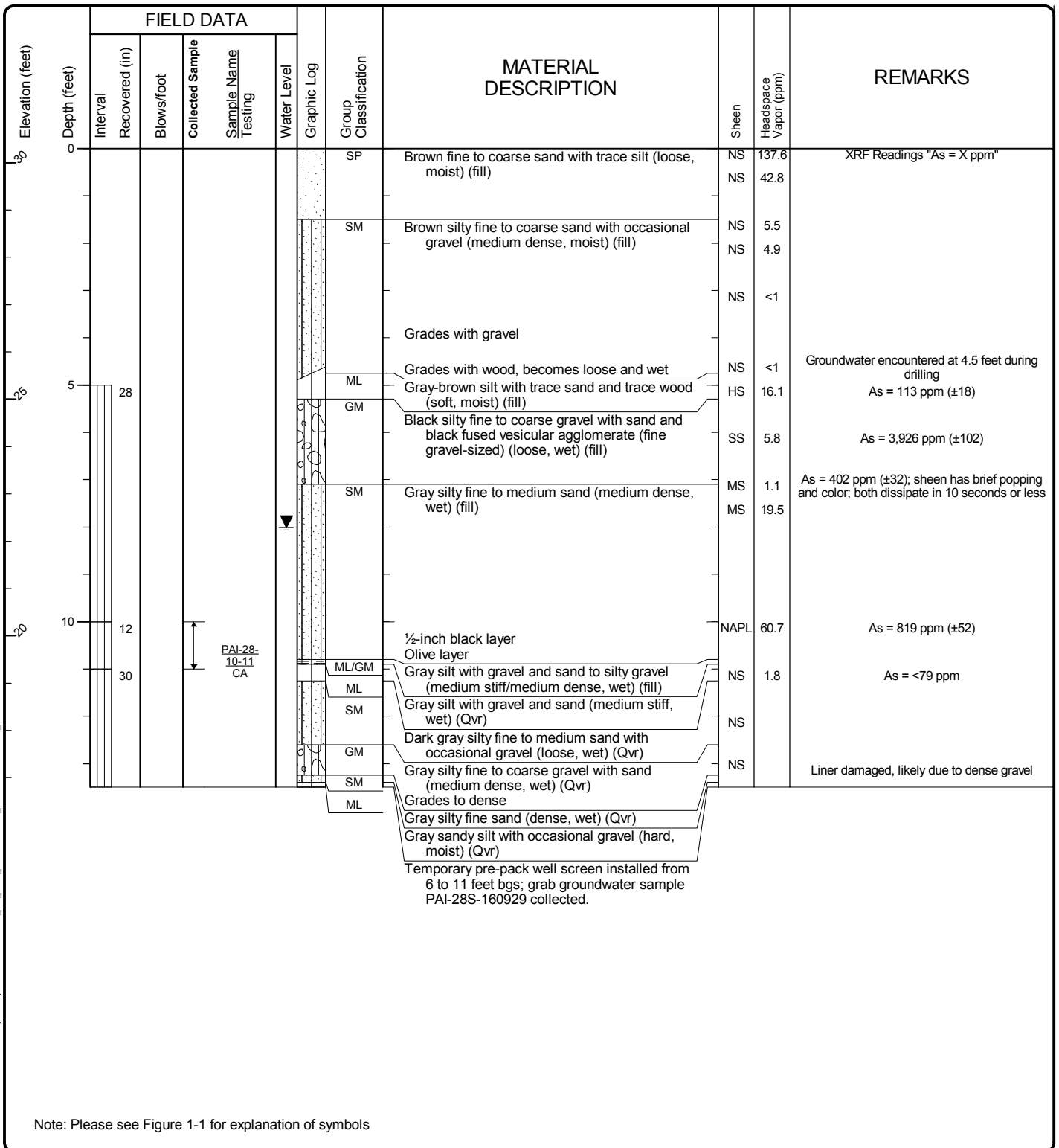


Project: Puget Sound Energy GWPS
 Project Location: Gas Works Park, Seattle, Washington
 Project Number: 0186-846-01

Figure 1-29
 Sheet 1 of 1

Date: 6/30/17 File: P:\00186846\GINT\0186846\01.GPJ DBLibrary\Library\GEOENGINEERS_DF_STD_US_GLB\GEGE_ENVIRONMENTAL_STANDARD

Start Drilled	9/29/2016	End	9/29/2016	Total Depth (ft)	13.5	Logged By	GRL ZAS	Checked By	ZAS	Driller	Cascade Drilling	Drilling Method	Continuous
Surface Elevation (ft) Vertical Datum	30.3 USACE (Locks)			Hammer Data	N/A			Drilling Equipment	Geoprobe 7730 DT				
Easting (X) Northing (Y)	1270660.37 239171.22			System Datum	WA State Plane, North NAD83 (feet)			Groundwater Date Measured	9/29/2016	Depth to Water (ft)	8.01	Elevation (ft)	22.29
Notes: Hand-augered from 0 to 2 feet bgs.													



Note: Please see Figure 1-1 for explanation of symbols

Log of Boring PAI-28S



Project: Puget Sound Energy GWPS
 Project Location: Gas Works Park, Seattle, Washington
 Project Number: 0186-846-01

Figure 1-30
 Sheet 1 of 1

Start Drilled	9/29/2016	End	9/29/2016	Total Depth (ft)	13.4	Logged By	GRL ZAS	Checked By	ZAS	Driller	Cascade Drilling	Drilling Method	Continuous
Surface Elevation (ft) Vertical Datum	33.64 USACE (Locks)			Hammer Data	N/A			Drilling Equipment	Geoprobe 7730 DT				
Easting (X) Northing (Y)	1270655.38 239052.22			System Datum	WA State Plane, North NAD83 (feet)			Groundwater Date Measured	Depth to Water (ft)	Elevation (ft) Not encountered			
Notes: Hand-augered from 0 to 3½ feet bgs.													

Elevation (feet)	FIELD DATA					Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name Testing							
0							SP-SM	Brown fine to medium sand with silt and trace organic matter (fine roots) (loose, moist) (fill)	NS	<1	XRF Readings "As = X ppm"	
							SP	Brown fine to coarse sand with trace silt (loose, moist) (fill) Liner encountered at 1.6 feet	NS	<1		
									NS	<1		
									NS	<1		
30		18					SM	Gray silty fine to coarse sand (medium dense, moist) (fill)	NS	<1	As = 40 ppm (±8)	
							ML	Gray sandy silt with gravel and organic matter (medium stiff, moist) (fill)	NS	<1	As = 78 ppm (±10)	
5		50					SM	Gray silty fine to coarse sand with gravel (medium dense, moist) (fill)	NS	<1	As = <32 ppm	
							SOOT	Black soot with trace silt, sand and organic matter (medium stiff, moist) (fill)	NS	<1	As = 169 ppm (±12)	
							ML	Black soot with trace silt, sand and organic matter (medium stiff, moist) (fill)	NS	<1	As = <20 ppm	
							SM	Brick fragment encountered at 6.4 feet	NS	<1		
							SM	Gray sandy silt with gravel (stiff, moist) (fill)	NS	<1	As = <21 ppm	
							ML	Gray silty fine sand with occasional gravel (dense, moist) (fill)	NS	<1	As = <15 ppm	
							ML	Trace brick dust at 7.2 feet	NS	<1		
10		40					ML	Brown silty fine sand with occasional gravel and trace organic matter (medium dense, moist) (fill)	NS	<1	As = <16 ppm	
							ML	Gray silt with sand, organic matter at top, darker laminae likely decaying organic matter (hard, moist) (Qpgd)	NS	<1	As = <23 ppm	
							SM	Gray with orange mottling sandy silt with occasional gravel (hard, moist) (Qpgd)	NS	<1	As = <26 ppm	
							ML	Grades to no mottling	NS	<1	As = <17 ppm	
							ML	Gray with orange mottling silty fine sand (Qpgd)	NS	<1	As = <17 ppm	
							ML	Grades to no mottling	NS	<1	As = <17 ppm	
							ML	Gray sandy silt with occasional gravel (hard, moist) (Qpgd)	NS	<1	As = <23 ppm	

Note: Please see Figure 1-1 for explanation of symbols

Log of Boring PAI-29



Project: Puget Sound Energy GWPS
 Project Location: Gas Works Park, Seattle, Washington
 Project Number: 0186-846-01

Figure 1-31
 Sheet 1 of 1

Date: 9/20/17 File: P:\00186846\GINT\018684601.GPJ DBLibrary\Library\GEOENGINEERS_DF_STD_US_GLB\GEBL_ENVIRONMENTAL_STANDARD

Start Drilled	9/29/2016	End	9/29/2016	Total Depth (ft)	19	Logged By	GRL ZAS	Checked By	ZAS	Driller	Cascade Drilling	Drilling Method	Continuous
Surface Elevation (ft)	33.75			Hammer Data	N/A			Drilling Equipment	Geoprobe 7730 DT				
Vertical Datum	USACE (Locks)			System Datum	WA State Plane, North NAD83 (feet)			Groundwater Date Measured	9/29/2016	Depth to Water (ft)	7.90	Elevation (ft)	25.85
Easting (X)	1270589.08			Notes:									
Northing (Y)	239145.81												

Elevation (feet)	FIELD DATA					Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample							
0		43					SM	Brown silty fine to coarse sand with gravel (medium dense, moist) (fill)	NS	<1	XRF Readings "As = X ppm"	
							WD	Brown organic matter (decaying small wood pieces) (fill)	NS	<1	As = 79 ppm (±7)	
							SM	Black silty sooty fine to coarse sand with trace fused agglomerate (medium dense) (fill)	NS	<1	As = <29 ppm	
							SM	Black silty fused agglomerate (fine to coarse sand-sized) with sand, soot and occasional gravel (loose, wet) (fill)	NS	<1	Groundwater encountered at 2.8 feet during drilling As = 32 ppm (±8)	
5		30						Grades to very loose				
									NS			
									NS	1.6	As = <35 ppm	
							ML	With gravel Gray-black silt with trace organic matter (medium stiff, moist) (fill)	SS	4.9	As = 81 ppm (±11)	
							ML	One piece of wood encountered Gray silt with occasional gravel (medium stiff, moist) (fill)	SS	10.8	As = 31 ppm (±7)	
10		52					ML	Grades to brown with trace organic matter Grades to dark brown	SS	8.6	As = 54 ppm (±11)	
							ML	Gray silt with occasional gravel (stiff, moist) (Qvr)	SS	9.6	As = <18 ppm	
							SM	Orange and brown mottling Gray silty fine sand with occasional gravel (dense, moist) (Qvr)	SS	29.9	As = <16 ppm	
								Grades to dark gray	SS			
									MS	66.8	As = <21 ppm	
15		48					ML	Gray silt (medium stiff, moist) (Qvr)	SS	83.4	As = <19 ppm	
								Grades sandy and soft, wet	SS		As = 61 ppm (±12)	
							SM	Gray silty fine to medium sand (very loose, wet) (Qvr)	NAPL	185.6	As = <20 ppm; sheen has color Jar test: thin NAPL covers surface, small brown and occasional black blebs cover 20%	
								Grades to loose Grades to medium dense			As = <19 ppm	
							SM	Gray silty fine to medium sand (dense, wet) (Qva)				
								Grades with gravel and very dense Grades to gray with light purple to mauve color			As = <16 ppm	
								Temporary pre-pack well screen installed from 5 to 9 feet bgs; grab groundwater sample PAI-30S-160929 collected.				

Note: Please see Figure 1-1 for explanation of symbols

Log of Boring PAI-30S



Project: Puget Sound Energy GWPS
 Project Location: Gas Works Park, Seattle, Washington
 Project Number: 0186-846-01

Figure 1-32
 Sheet 1 of 1

Date: 9/20/17 File: P:\00186846\GINT\018684601.GPJ DBLibraryLibrary\GEOENGINEERS_DF_STD_US_GLB\GIEE_ENVIRONMENTAL_STANDARD

Start Drilled	10/18/2016	End	10/18/2016	Total Depth (ft)	31	Logged By	MWB	Checked By	ZAS	Driller	Cascade Drilling	Drilling Method	Continuous	
Surface Elevation (ft)	29.87			Hammer Data	N/A			Drilling Equipment	Sonic DB320					
Vertical Datum	USACE (Locks)			System Datum	WA State Plane, North NAD83 (feet)			Groundwater	Date Measured	10/18/2016	Depth to Water (ft)	22.90	Elevation (ft)	6.97
Easting (X)	1270674.32			System Datum	WA State Plane, North NAD83 (feet)			Groundwater	Date Measured	10/18/2016	Depth to Water (ft)	22.90	Elevation (ft)	6.97
Northing (Y)	239144.6			System Datum	WA State Plane, North NAD83 (feet)			Groundwater	Date Measured	10/18/2016	Depth to Water (ft)	22.90	Elevation (ft)	6.97
Notes: Hand-augered from 0 to 2 feet bgs.														

Elevation (feet)	FIELD DATA						MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS		
	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name Testing					Water Level	Graphic Log
0		60						SP-SM	Brown-tan sand with silt and gravel (loose, moist) (fill)	NS	<1	XRF Readings "As = X ppm"
								SP	Gray fine to coarse sand with gravel (loose, moist) (fill)	NS	<1	As = <25 ppm
								ML	Dark gray silt with rounded gravel and trace wood debris (stiff, moist) (fill)	NS	<1	As = <40 ppm
										NS	<1	As = <32 ppm
5		60						AC	Black semi-solid asphaltic material (loose, moist) (fill)	NS	3.4	
								SP	Gray fine sand with gravel (loose, moist) (fill)	SS	41.0	As = <30 ppm; slight blue sheen
								SP	Black fine sand coated with soot and occasional gravel (medium dense, moist) (fill)	NS	97.2	As = <42 ppm
										SS	42.2	As = 151 ppm (±29)
								SP	Black sand with soot, occasional gravel and fibrous wood (loose, moist) (fill)	MS	31.7	As = 231 ppm (±40); rainbow sheen hydrocarbon-like odor
10		60						GP	Black gravel with sand coated in soot (loose, moist) (fill)	NS	125.3	As = 128 ppm (±19)
								ML	Black-gray silt with gravel, occasional sand and soot (stiff, moist) (fill)	NS	68.1	As = 391 ppm (±39)
								CC	Light gray crushed concrete rubble with metal debris (loose, moist) (fill)	NS	14.1	As = <31 ppm
										NS	29.2	
										NS		
15		60						SP-SM	Black fine sand with silt, gravel and large cobbles (loose, wet) (fill)	NS	16.2	As = <34 ppm Groundwater encountered at 15 feet during drilling
										MS	13.8	As = <73 ppm; rainbow sheen popping
								SP-SM	Dark gray fine to medium sand with silt and gravel (medium dense, moist) (Qvr)	NS	27.2	As = <44 ppm As = <40 ppm
										NS	10.7	As = <25 ppm
										NS	6.0	As = <31 ppm
20								SP-SM	Gray fine to medium sand with silt and			

Note: Please see Figure 1-1 for explanation of symbols

Log of Boring PAI-31D



Project: Puget Sound Energy GWPS
 Project Location: Gas Works Park, Seattle, Washington
 Project Number: 0186-846-01

Figure 1-33
 Sheet 1 of 2

Date: 6/30/17 File: P:\00186846\GINT\0186846\01.GPJ DBLibrary\Library\GEOENGINEERS_DF_STD_US_GLB\GEBE_ENVIRONMENTAL_STANDARD

Elevation (feet)	FIELD DATA					Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample							
20		60						occasional gravel (very dense, moist) (Qva)	NS	6.1	As = <19 ppm	
									NS			
									NS	2.4	As = <21 ppm	
							SP-SM	Gray fine sand with silt and occasional gravel (loose, wet) (Qva)	NS	2.8	As = <25 ppm	
							SP-SM	Dark gray fine to medium sand with silt and gravel (loose, moist) (Qva)	NS	4.3	As = <20 ppm	
25		60					SP-SM	Gray fine to medium sand with silt and gravel (medium dense, moist) (Qva)	NS	3.4	As = <29 ppm	
							SP-SM	Gray fine sand with silt, occasional gravel and large cobbles (loose, moist) (Qva)	NS	1.1	As = <20 ppm	
							SP-SM	Gray fine to medium sand with silt and occasional gravel (medium dense, moist) (Qva)	NS	1.0	As = <35 ppm	
							SP-SM	Dark gray to gray fine sand with silt and occasional gravel (very dense, moist to wet) (Qpgt)	NS	<1	As = <34 ppm As = <24 ppm	
							SP-SM	Light gray fine sand with silt and gravel (very dense, moist) (Qpgt)	NS	<1	As = <16 ppm As = <24 ppm	
30		12					SP-SM	Light gray fine sand with silt and gravel (very dense, moist) (Qpgt)	NS	<1	As = <26 ppm	
									NS	<1	As = <26 ppm	

Temporary pre-pack well screen installed from 27 to 29.5 feet bgs; grab groundwater sample PAI-31D-161018 collected.

PAI-31-27-29.5
CA

Note: Please see Figure 1-1 for explanation of symbols

Log of Boring PAI-31D (continued)



Project: Puget Sound Energy GWPS
 Project Location: Gas Works Park, Seattle, Washington
 Project Number: 0186-846-01

Figure 1-33
 Sheet 2 of 2

Start Drilled	10/18/2016	End	10/18/2016	Total Depth (ft)	16.5	Logged By	MWB	Checked By	ZAS	Driller	Cascade Drilling	Drilling Method	Continuous	
Surface Elevation (ft)	30			Hammer Data	N/A			Drilling Equipment	Geoprobe 7730 DT					
Vertical Datum	USACE (Locks)			System Datum	WA State Plane, North NAD83 (feet)			Groundwater	Date Measured	10/18/2016	Depth to Water (ft)	12.40	Elevation (ft)	17.6
Easting (X)	1270674.92			Notes: Hand-augered from 0 to 2 feet bgs.										
Northing (Y)	239146.62													

Elevation (feet)	FIELD DATA						MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
	Depth (feet)	Interval Recovered (in)	Blows/foot	Collected Sample	Sample Name Testing	Water Level				
0										See adjacent boring PAI-31D for soil descriptions
5										
10										
15										
										Temporary pre-pack well screen installed from 15 to 16.5 feet bgs; grab groundwater sample PAI-31S-161018 collected.

Note: Please see Figure 1-1 for explanation of symbols

Log of Boring PAI-31S



Project: Puget Sound Energy GWPS
 Project Location: Gas Works Park, Seattle, Washington
 Project Number: 0186-846-01

Figure 1-34
 Sheet 1 of 1

Date: 6/30/17 File: P:\00186846\GINT\018684601.GPJ DBLibrary\Library\GEOENGINEERS_DF_STD_US_GLB\GEGE_ENVIRONMENTAL_STANDARD

Start Drilled	10/18/2016	End	10/18/2016	Total Depth (ft)	31	Logged By	MWB	Checked By	ZAS	Driller	Cascade Drilling	Drilling Method	Continuous	
Surface Elevation (ft)	29.72			Hammer Data	N/A			Drilling Equipment	Sonic DB320					
Vertical Datum	USACE (Locks)			System Datum	WA State Plane, North NAD83 (feet)			Groundwater	Date Measured	10/18/2016	Depth to Water (ft)	18.64	Elevation (ft)	11.08
Easting (X)	1270661.22			Notes: Hand-augered from 0 to 2 feet bgs.										
Northing (Y)	239168.47													

Elevation (feet)	FIELD DATA						MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS		
	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name Testing					Water Level	Graphic Log
0		60						SP	Brown fine to coarse sand with trace silt (loose, moist) (fill)	NS		XRF Readings "As = X ppm"
								SP-SM	Dark brown sand with silt, occasional gravel and wood debris and 1 inch layer of asphaltic material (loose, moist) (fill)	NS	<1	As = <20 ppm
								NS		NS	<1	
								NS		NS	4.5	As = 34 ppm (±11)
5		60						SP	Black fine sand with gravel coated in soot and cobbles up to 3 inches in diameter (loose, moist) (fill)	NS	11.4	As = 62 ppm (±15)
								GP	Black gravel with sand coated in soot and wood debris (loose, wet) (fill)	NS	7.0	As = 355 ppm (±24)
								SP-SM	Black to dark gray fine sand with silt, gravel, large cobbles and wood debris (medium dense, moist) (fill)	NS	31.6	As = 908 ppm (±29) Groundwater encountered at 7 feet during drilling
								SS		SS	230.7	As = 531 ppm (±30)
								SP-SM	Dark gray fine sand with silt and trace gravel (loose, wet) (fill)	SS	172.9	As = 595 ppm (±24) Hydrocarbon-like odor
10		60						SP-SM	Gray fine sand with silt and occasional gravel (loose, wet) (fill)	NS	76.3	As = 333 ppm (±18)
								SP	Black fine sand with gravel, soot coated (loose, moist) (fill)	NS	1.3	As = 111 ppm (±13)
								SP-SM	Gray sand with silt and coarse gravel (loose, moist) (Qvr)	NS	3.6	As = 402 ppm (±15)
								NS		NS	3.6	As = 294 ppm (±13)
								SP-SM	Dark gray fine to medium sand with silt, gravel and large cobbles up to 6 inches in diameter (loose, moist) (Qvr)	NS	<1	
15		60						NS		NS	8.9	As = 237 ppm (±25)
								NS		NS	9.6	
								NS		NS	11.7	
								SP	Gray fine to medium sand with trace silt and trace gravel (loose, moist) (Qva)	NS	6.2	As = <20 ppm
20								NS		NS	2.5	

Note: Please see Figure 1-1 for explanation of symbols

Log of Boring PAI-32D



Project: Puget Sound Energy GWPS
 Project Location: Gas Works Park, Seattle, Washington
 Project Number: 0186-846-01

Figure 1-35
 Sheet 1 of 2

Date: 6/30/17 File: P:\00186846\GINT\018684601.GPJ DBLibrary\Library\GEOENGINEERS_DF_STD_US_GLB\GIEE_ENVIRONMENTAL_STANDARD

Elevation (feet)	FIELD DATA					Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample							
20		60								NS	32.8	As = 26 ppm (±8)
								SP-SM	Gray fine to medium sand with silt and occasional gravel (medium dense, moist) (Qva)	NS	4.2	As = <19 ppm
								SP-SM	Gray fine to medium sand with silt and occasional gravel (very dense, moist) (Qpgt)	NS	1.8	
								SP-SM	Light gray fine to medium sand with silt and gravel (very dense, moist) (Qpgt)	NS	5.3	As = <34 ppm
										NS	2.0	As = <47 ppm
25		60								NS	4.7	
								SP-SM	Gray fine sand with silt and gravel (very dense, moist) (Qpgt)	NS	1.3	As = <17 ppm
										NS	<1	
										NS	<1	As = <22 ppm
										NS		
30		12								NS		
										NS	<1	As = <26 ppm

Temporary pre-pack well screen installed from 21 to 26 feet bgs; grab groundwater sample PAI-32D-161018 collected.

Note: Please see Figure 1-1 for explanation of symbols

Log of Boring PAI-32D (continued)



Project: Puget Sound Energy GWPS
 Project Location: Gas Works Park, Seattle, Washington
 Project Number: 0186-846-01

Figure 1-35
 Sheet 2 of 2

Start Drilled	10/19/2016	End	10/19/2016	Total Depth (ft)	35	Logged By	MWB	Checked By	ZAS	Driller	Cascade Drilling	Drilling Method	Continuous
Surface Elevation (ft) Vertical Datum	34.01 USACE (Locks)			Hammer Data	N/A			Drilling Equipment	Sonic DB320				
Easting (X) Northing (Y)	1270710.62 239156.29			System Datum	WA State Plane, North NAD83 (feet)			Groundwater Date Measured	10/19/2016	Depth to Water (ft)	15.94	Elevation (ft)	18.07
Notes: Hand-augered from 0 to 2 feet bgs.													

Elevation (feet)	FIELD DATA					Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name Testing						
0	60					BRICK	1.5-inch brick paved surface	NS	<1	XRF Readings "As = X ppm"	
						SP	Brown fine to coarse sand with gravel (loose, moist) (fill)	NS	<1		
						SP-SM	Brown fine sand with silt and gravel (loose, moist) (fill)	NS	<1		
						SP-SM	Black fine sand with silt and gravel coated in soot (loose, moist) (fill)	NS	<1	As = <32 ppm	
						SP-SM	Black with brown-orange mottling fine to medium sand with silt, gravel and metal debris (fill)	NS	<1	As = 71 ppm (±13)	
5	60					SP-SM	Black fine sand with silt and gravel coated in soot (loose, moist) (fill)	NS	<1	As = 49 ppm (±14)	
						SP-SM	Black fine sand with silt, gravel and wood debris (fill)	NS	<1	As = <37 ppm	
						SP	Gray fine sand with gravel and cobbles (fill)	NS	<1	As = <31 ppm	
						SP-SM	Black fine sand with silt and gravel coated in soot (fill)	NS	<1	As = <37 ppm	
						SP	Gray fine to medium sand with gravel (loose, moist) (fill)	NS	<1	As = 268 ppm (±21)	
						SP-SM	Black fine sand with silt and gravel coated in soot (fill)	NS	7.5	As = 899 ppm (±31)	
10	60					SP	Black fine sand with silt and gravel coated in soot (fill)	NS	<1	Groundwater encountered at 9.8 feet during drilling	
						SP-SM	Gray-green fine sand with gravel and trace vesicular metallic agglomerate (medium dense, moist) (fill)	NS	<1	As = 6,252 ppm (±114)	
						SP-SM	(1/2-inch pocket of yellow-coated grains at 9 3/4 feet)	NS	1.4	As = 1,700 ppm (±51)	
						SP-SM	Gray fine sand with silt (loose, wet) (fill)	NS	<1	As = 7,614 ppm (±190)	
						GP	Black stained gravel with sand (loose, wet) (fill)	NS	<1		
						GP	Black stained gravel with sand (loose, wet) (fill)	NS	3.9	As = 7,392 ppm (±197)	
15	60					SP-SM	Brown-gray fine sand with silt coated in NAPL (fill)	NAPL	37.2	Shake test 90% coverage; 1 cm of brown LNAPL	
						ML	Gray silt with trace sand (loose, wet) (fill)	HS	24.8	As = 170 ppm (±13); rainbow sheen	
						SP	Black stained fine to coarse sand with trace silt and gravel, coated in NAPL (fill)	NAPL	300.7	As = 80 ppm (±10); shake test 20% coverage; <1 cm of black LNAPL Strong hydrocarbon-like odor	
						CC	Gray concrete rubble (fill)	MS	<1	As = 892 ppm (±38); blocky rainbow sheen	
20								NS	<1	As = <25 ppm	

Note: Please see Figure 1-1 for explanation of symbols

Log of Boring PAI-33D



Project: Puget Sound Energy GWPS
 Project Location: Gas Works Park, Seattle, Washington
 Project Number: 0186-846-01

Figure 1-36
 Sheet 1 of 2

Date: 6/30/17 File: P:\00186846\GINT\0186846\01.GPJ DBLibrary\Library\GEOENGINEERS_DF_STD_US_GLB\GEBE_ENVIRONMENTAL_STANDARD

Start Drilled	10/19/2016	End	10/19/2016	Total Depth (ft)	15	Logged By	MWB	Checked By	ZAS	Driller	Cascade Drilling	Drilling Method	Continuous	
Surface Elevation (ft)	33.98			Hammer Data	N/A			Drilling Equipment	Geoprobe 7730 DT					
Vertical Datum	USACE (Locks)			System Datum	WA State Plane, North NAD83 (feet)			Groundwater	Date Measured	10/19/2016	Depth to Water (ft)	14.00	Elevation (ft)	19.98
Easting (X)	1270710.71			Notes: Hand-augered from 0 to 2 feet bgs.										
Northing (Y)	239158.07													

Elevation (feet)	FIELD DATA						MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
	Depth (feet)	Interval Recovered (in)	Blows/foot	Collected Sample	Sample Name Testing	Water Level				
0										See adjacent PAI-33D for soil descriptions
5										
10										
15										Temporary pre-pack well screen installed from 10 to 15 feet bgs; grab groundwater sample PAI-33S-161019 collected.

Note: Please see Figure 1-1 for explanation of symbols

Log of Boring PAI-33S



Project: Puget Sound Energy GWPS
 Project Location: Gas Works Park, Seattle, Washington
 Project Number: 0186-846-01

Figure 1-37
 Sheet 1 of 1

Date: 6/30/17 Path: P:\00186846\GINT\0186846\01.GPJ_Database\Library\GEOENGINEERS_DF_STD_US_GLB\GIEE_ENVIRONMENTAL_STANDARD


Start Drilled	10/19/2016	End	10/19/2016	Total Depth (ft)	20	Logged By	MWB	Checked By	ZAS	Driller	Cascade Drilling	Drilling Method	Continuous	
Surface Elevation (ft)	34.07			Hammer Data	N/A			Drilling Equipment	Geoprobe 7730 DT					
Vertical Datum	USACE (Locks)			System Datum	WA State Plane, North NAD83 (feet)			Groundwater	Date Measured	10/19/2016	Depth to Water (ft)	15.02	Elevation (ft)	19.05
Easting (X)	1270710.33			Notes: Hand-augered from 0 to 2 feet bgs.										
Northing (Y)	239157.3													

Elevation (feet)	FIELD DATA						MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
	Depth (feet)	Interval Recovered (in)	Blows/foot	Collected Sample	Sample Name Testing	Water Level				
0										
5										
10										
15										
20										

Temporary pre-pack well screen installed from 15 to 20 feet bgs; grab groundwater sample PAI-33M-161019 collected.

Note: Please see Figure 1-1 for explanation of symbols

Date: 6/30/17 Path: P:\00188846\GINT\018884601.GPJ_Database\Library\GEOENGINEERS_DF_STD_US_GLB\GEGE_ENVIRONMENTAL_STANDARD

Log of Boring PAI-33M		
	Project:	Puget Sound Energy GWPS
	Project Location:	Gas Works Park, Seattle, Washington
	Project Number:	0186-846-01
		Figure 1-38 Sheet 1 of 1

ATTACHMENT 2B-3-2
Gas Works Park Liner Repair (Layfield)



LAYFIELD

USA Corporation, Containment Division

4001 Oakesdale Ave SW, Suite 200
Renton, WA 98057

■ Toll Free: 1 800 796-6868
■ Fax: (425) 254-1575

■ E-Mail: robert.emmons@layfieldgroup.com ■
■ Robert's Phone: (425) 503-6979
Web: www.layfieldgroup.com

Date: October 19th, 2016

Ph: 253-722-2418

To: GeoEngineers, Inc.

Email: sbsmith@geoengineers.com

Attn: Sandra B Smith

Pages (1)

Re: Gas Works Park

Subcontract agreement #0186-846-01 Layfield 093016

Sandy,

Per your request we are forwarding documentation for work completed October 12, 2016.

Layfield crew consisting of Layfield Superintendent, Layfield Technician and acting Layfield PM with the help of Brian Anderson of GeoEngineers located two areas where sod had been placed and holes filled where liner needed repair approximately 6" diameter holes. Layfield crew cut circles in the sod approximately 36" diameter and removed soil down to expose geocomposite. We took care to cut the sod as best we could and place both soil and sod on tarps adjacent to holes.

With the soil removed we cut the geocomposite in slits that we then peeled back to install patches. It was determined we could install the patches best by slipping new EnviroLiner 6030HD liner pieces in under the existing liner. The patches and the existing liner were then sanded with a grinding wheel. While this was done we tested out DemTech extrusion welder with trial extrusion welds to insure adequate adhesion. With the patch areas fully prepped and the extrusion machine tested we welded both patches one after the other. Layfield Superintendent then did a pick test on the patches to assure extrusion weld completion in addition to test welds done to test out equipment prior to patching. See results of Pre-weld coupon testing attached.

Next we folded back the geocomposite and laid a double layer of 8oz geotextile over the slit geocomposite and liner holes filled the holes and placed sod cut-outs back as best we could. We took numerous buckets of water to help settle soil and work dirt around sod. See pictures of respective areas with sod back in place.

If you have any further questions on the work please give me a call.

Best Regards,
Layfield

Robert Emmons
BDM / Project Manager
remmons@layfieldgroup.com
Ph (425) 503-6979



Extending sod cut



Testing out of DemTech extrusion welding machine prior to use to make patches



Example of DemTech Extrusion Welder



Patch #1 closest to Lake



Patch #2



Backfilled and sod replaced Patch #1



Backfilled and sod replaced patch #2

Attachment see Pre-Weld Destructive Sample Information and Daily Field Report



Layfield
Daily Production Report

*FAX SHEETS IN DAILY TO 800-305-6875

Job Name GASWORKS PARK
Job Number _____

Date: 10/12/2016

Equipment Call off # _____

JOB COMPLETE

DAILY JOB SHEET

CHANGE ORDER

FIELD SUPERVISOR: Victor Barney

LABOR									DAILY PRODUCTION					
Employee Name	Description/Bid Item	Position	ST	OT	Total	Travel	Drive	Per-Diem*	Bid Item	Description	Unit	Quantity	MH	SF/MH
V. Barney		Sup	3.5		5.5	1	1		1	1	EA			
Tels Santant		Tech	3.5		5.5	1	1		2	2	LF			
Rob Emmers		PM	3.5						3	3	SF			
									4	4	SF			
									5	5	SF			
									6	6	EA			
									7	7	EA			
									8	8	EA			
									9	9	EA			
									10	10	EA			
									11	11	EA			
									12	Change Order	EA			

Equipment Usage Days													
Vehicle #	Miles	Wedge	Lelester	Extrusion	QA/QC	Comp.	ATV	Generator	Sew Mach	Deploy Bar	Carpet pole	Cargo trl	Deck Trl
Rental	35		1	1	1			1					

PURCHASES **List Daily** Mail in receipts ASAP				
Description	Credit Card	PO#	Cash	Dollar Amount/Comments:

Comments/Subcontracts
 TRAVEL to GASWORKS park N. SEATTLE / repaired 2 holes \$16030 / Dug GRASS cut & dirt / repaired Holes, Tested repairs, put fabric on to of Geocomposite / Filled holes in with dirt & sod. TRAVEL Back to Renton

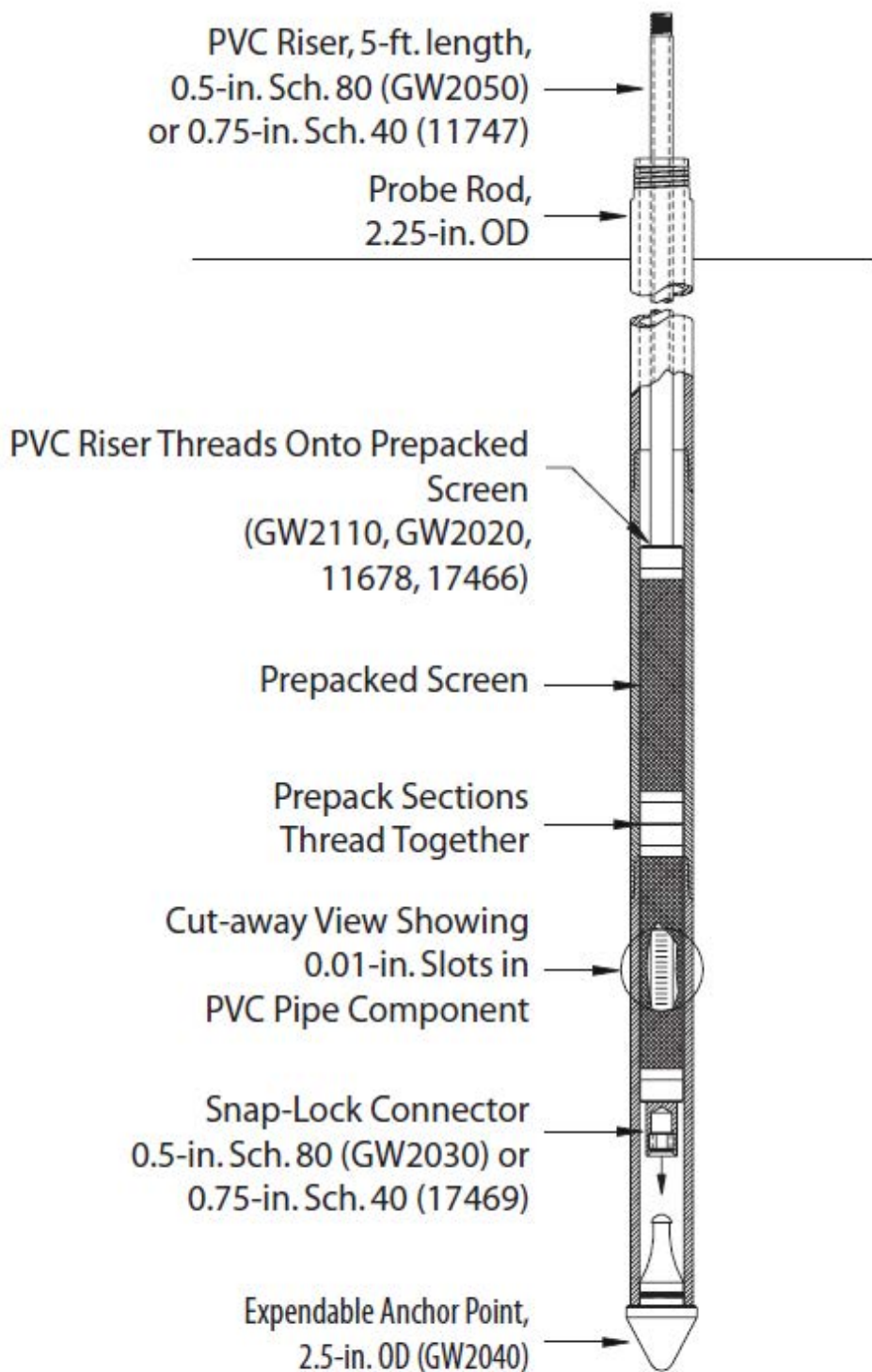
**Per-Diem (X=no, P=yes)

Wind: 0 Precipitation: 0 Cloudy/Clear: clear Accidents: _____

LESC Supervisor: Victor Barney

GC or Owner Signature: Simon Petersen

ATTACHMENT 2B-3-3
Temporary Screen Specifications (Geoprobe®)



Attachment 3. Temporary Well Screen Specifications (Geoprobe 0.75-in x 1.4-in OD Pre-packed Screen Monitoring Wells SOP)

Prepacked Screens Inside Probe Rod String

ATTACHMENT 2B-3-4
Final Data Package for Hydraulic Profiling Tool Services
(Cascade Technical Services)

Final Data Package for Hydraulic Profiling Tool Services

Site Location: Gas Works Park Site– 2101 North Northlake Way, Seattle, WA

Project Number: 302169067

Report Date: October 18, 2016



Prepared for:

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Project Narrative

Cascade Technical Services (Cascade) is pleased to present this data report to GeoEngineers, Inc. for the hydraulic profiling tool (HPT) services that were provided on October 7th, 2016 at your site located at the corner of 2101 North Northlake Way in Seattle, Washington 98103.

The results associated with the data and plots presented in this report were generated in accordance to Cascade's and Geoprobe's Standard Operating Procedures (SOPs) for HPT services.

All field work and data management were completed by trained, scientific professionals and all quality assurance/quality control (QA/QC) measurements associated with these data were found to be within the tolerances set forth in the SOPs for these services. Pressure tests conducted previous to, and subsequent to the HPT borings were found to be within the tolerances set forth for this HPT survey and therefore the data are deemed acceptable for use. Exception/deviations regarding these pressure tests and the related data are noted on the HPT summary table that is part of this report.

This report contains the HPT plots for each of the HPT locations; each plot is scaled to show the responses on the same scale. The scales selected are based on the highest response for each respective data channel.

I certify that the data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hard copy data package has been authorized by the laboratory manager or his designee, as verified by the following signature.

Signature:  _____

Daniel Caputo, Western Regional Manager of Site Characterization Services

Project Site Map and HPT Locations

Approximate boring locations are provided below. Field staff estimated boring locations using reference points observed on site in relation to the same reference points visible in Google Earth map software.



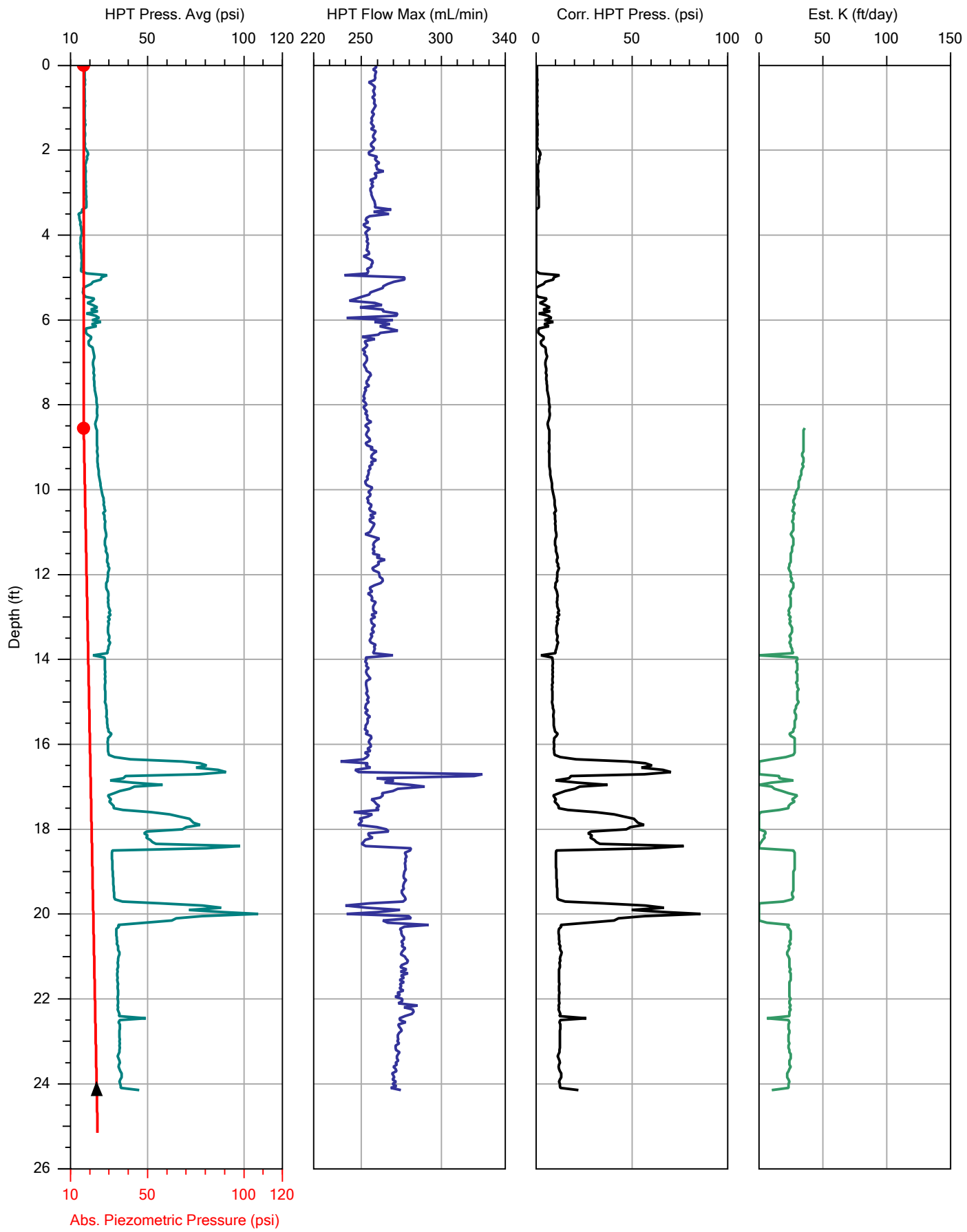
Hydraulic Profiling Tool Data Summary Table

Provided below is a summary of HPT information, including pre-boring pressure tests and any deviations from the standard operating procedure that occurred during the field activities.

HPT Location	Total Depth (ft)	Pre Boring HPT Pressure Tests (psi)				Successful Dissipation Test(s) Depths (ft)	Comments/Deviations
		Top w Q=0	Bottom w Q=0	Pressure Δ w Q=0	Pass/Fail*		
HPT-1a	24.15	17.255	17.032	0.223	PASS	13.85, 24.20	Boring advance to refusal. Electrical conductivity not functional during boring.
HPT-2	28.75	17.340	17.123	0.217	PASS	15.80, 23.80	Boring advance to refusal. Electrical conductivity not functional during boring.
HPT-3	34.80	17.418	17.197	0.221	PASS	22.20	Boring advance to refusal. Electrical conductivity not functional during boring.
HPT-4	27.55	17.474	17.247	0.227	PASS	13.90, 22.00	Boring advance to refusal. Electrical conductivity not functional during boring.
HPT-5	21.90	17.404	17.175	0.229	PASS	13.10	Electrical conductivity not functional during boring.

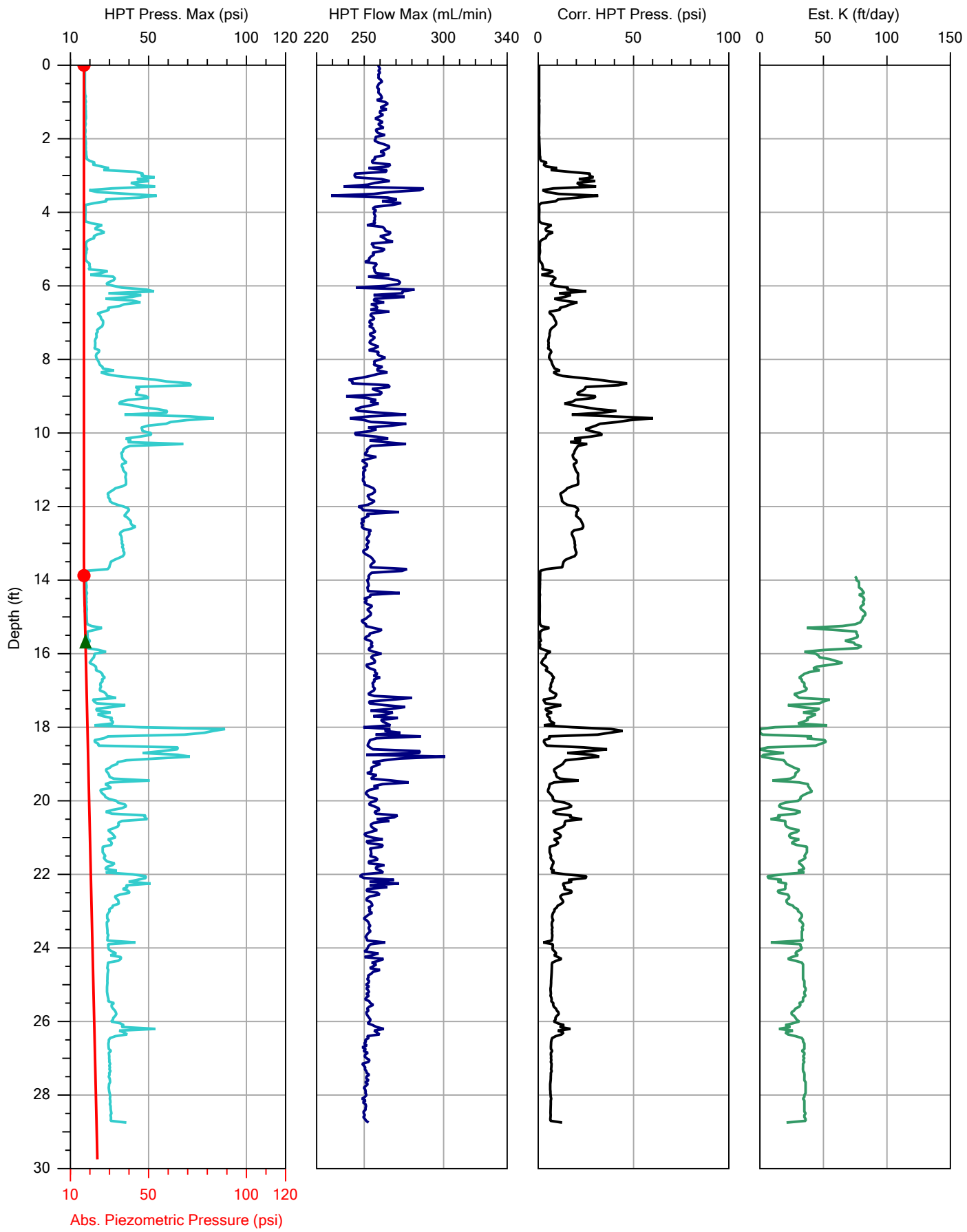
*Pass/Fail criteria is 0.22 psi \pm 10%.

Hydraulic Profiling Tool Data Plots



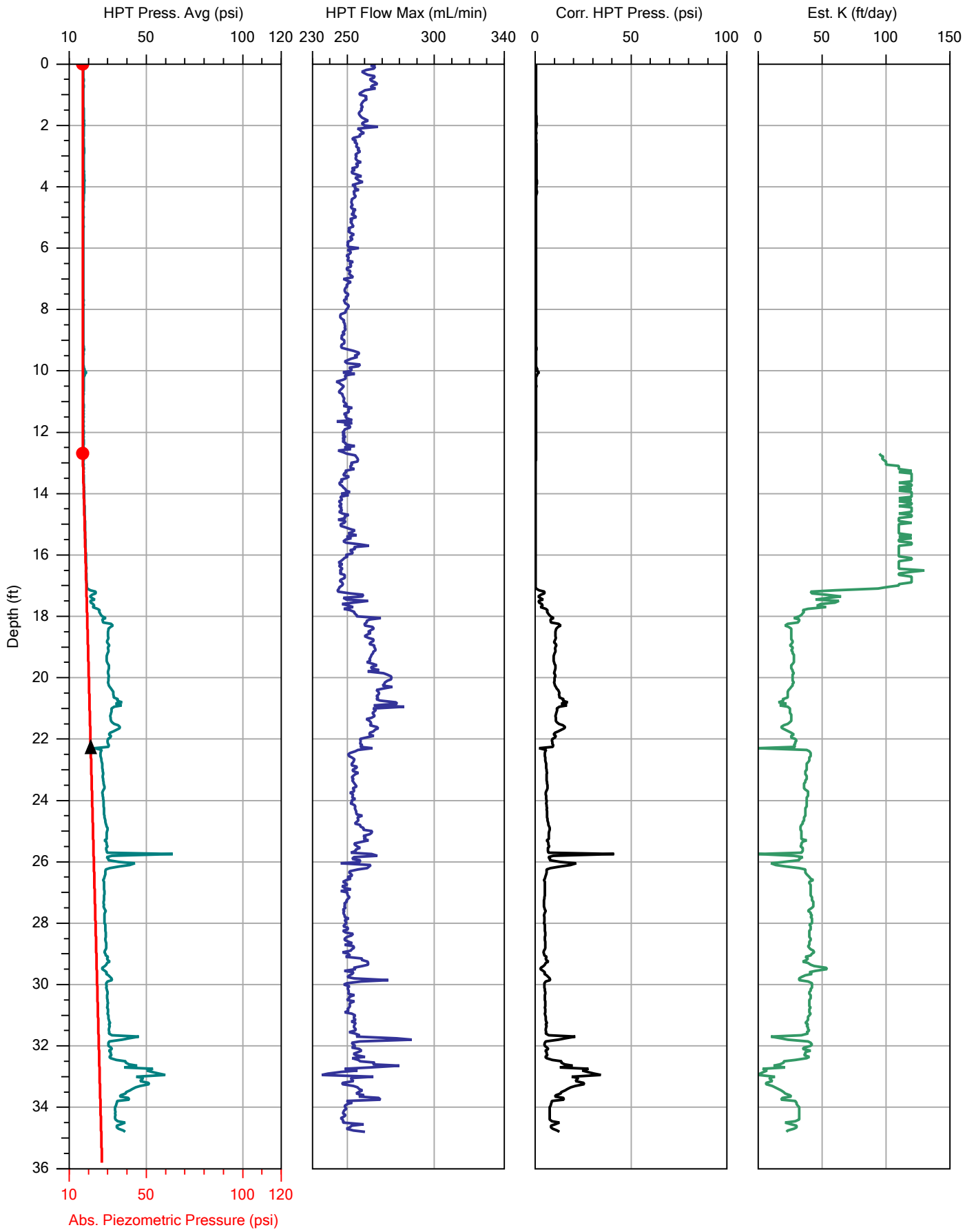
Company:	Cascade	Operator:	ZH
Project ID:	302169067	Client:	GeoEngineers

File:	HPT-1A.MHP
Date:	10/7/2016
Location:	



Company:	Cascade	Operator:	ZH
Project ID:	302169067	Client:	GeoEngineers

File:	HPT-2.MHP
Date:	10/7/2016
Location:	

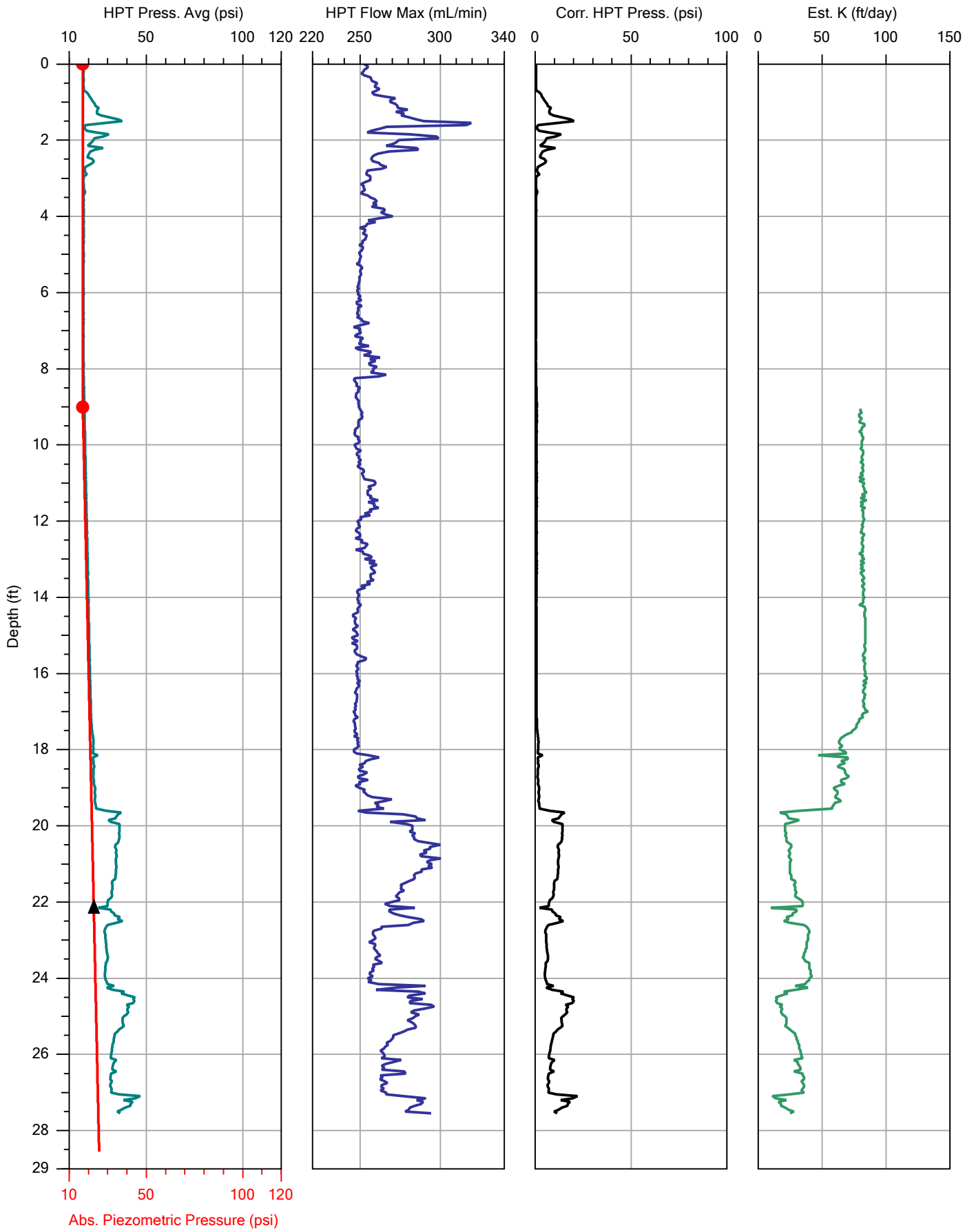


Abs. Piezometric Pressure (psi)



Company:	Cascade	Operator:	ZH
Project ID:	302169067	Client:	GeoEngineers

File:	HPT-3.MHP
Date:	10/7/2016
Location:	

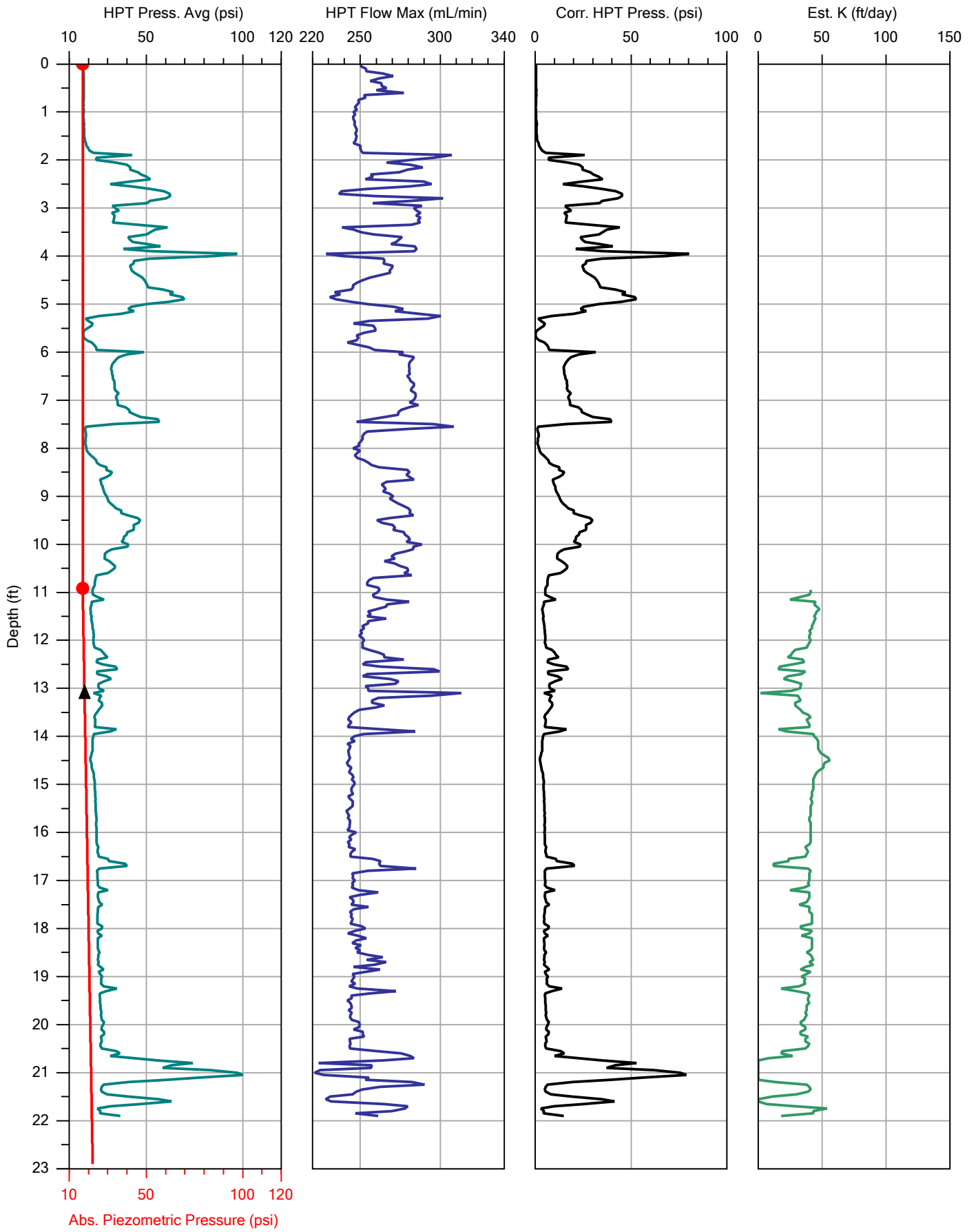


Abs. Piezometric Pressure (psi)



Company:	Cascade	Operator:	ZH
Project ID:	302169067	Client:	GeoEngineers

File:	HPT-4.MHP
Date:	10/7/2016
Location:	



Company:	Cascade	Operator:	ZH
Project ID:	302169067	Client:	GeoEngineers

File:	HPT-5.MHP
Date:	10/7/2016
Location:	

Reference Material

The sections below provide information regarding the Cascade Personnel present at the site during the field activities, the specific equipment used during field activities, and background information on the HPT system.

Cascade Personnel

The following personnel were present during field activities at the Site:

- Mr. Zachary Hilborn, Cascade Technical Services (HRSC Specialist)
- Mr. Kyle Ceruti, Cascade Technical Services (DPT Operator)

Equipment

The following equipment was utilized during field activities at the Site:

- Geoprobe 78 Series Direct Push Drill Rig
- Geoprobe FI 6000 Computer
- K6300 HPT Controller
- 150' HPT Trunkline
- 1.75" O.D. HPT Probe
- 1.75" O.D. Drive Rods

HPT System Overview

The HPT system is designed to evaluate the hydraulic behavior of unconsolidated materials. As the probe is pushed or hammered at 2cm/s, clean water is injected through a screen on the side of the HPT probe at a flow rate usually less than 300 mL/min. The injection pressure, which is monitored and plotted with depth, is an indication of the hydraulic properties of the soil. A relatively low pressure response indicates a relatively large grain size, and the ability to easily transmit water. However, a relatively high pressure response indicates a relatively small grain size, which correlates with the inability to transmit water.

HPT Data Collection

The HPT system collects depth, advancement rate, hydraulic pressure, and flow information. Additional detail regarding each of these parameters is provided below.

- Depth - Data is collected every 0.05 feet, or twenty points per foot.
- Pressure - Pressure data is collected in pounds per square inch (PSI). Pressure is an indication of hydraulic pressure applied to the subsurface by the HPT system. The system collects both the minimum and maximum pressures over each vertical interval.
- Flow - Flow data is collected in milliliters per minute (mL/min). Flow is an indication of the rate water that is pumped out of the membrane at the HPT probe. The system collects both the minimum and maximum flow over each vertical interval.
- Estimated Hydraulic Conductivity (est. K) – Hydraulic conductivity, symbolically represented as K, is an in-situ property that describes the ease with which water can move through pore spaces or fractures. It is dependent on the intrinsic permeability of the material and on the degree of saturation. With respect to the HPT system, the estimated K values are only applicable to the saturated portion of the formation. The estimated K value is calculated using the HPT pressure

and flow data. It is also necessary to collect HPT response test data before and after each boring. Additionally, it is necessary to conduct at least one pressure dissipation test during the logging operation, below the static water table level.

HPT Reference Testing and Dissipation Tests

Reference testing is done to ensure that the HPT pressure transducer is working correctly and to evaluate the condition of the HPT injection screen. The HPT reference test also calculates atmospheric pressure which is required to obtain static water level readings and to determine the estimated K values for the log. HPT reference test utilizes a test tube to specifications such that a valve is located 6 inches above the HPT injection screen and the top of the tube is 6 inches above the valve. When the tube is filled completely with water, the 12 inches of water will supply an additional 0.433 psi of pressure on the injection screen (in addition to atmospheric pressure). When the valve (located 6 inches from the top of the tube and 6 inches from the injection screen) is opened, only 0.217 psi of additional pressure is applied to the HPT injection screen. Therefore, the accuracy of the pressure transducer can be assessed by comparing the pressure reading when the tube is filled and when the tube is filled to the valve. There should be a 0.217 psi difference, this value is checked with and without flow. A tolerance of $\pm 10\%$ is applied for a passing test.

Dissipation tests are conducted to determine the additional static pressure added to the HPT pressure values from water in the formation. To conduct a dissipation test, advancement of the tooling is stopped, the HPT pump is stopped, and flow drops to zero. The pressure applied to the HPT pressure transducer by the injection of water into the formation begins to dissipate. This pressure should dissipate to a value equal to atmospheric pressure plus the static water pressure applied by water in the formation. In post-processing of the HPT log, the dissipation value and the atmospheric pressure determined during HPT reference testing can be used to remove the influence of atmospheric pressure and formational static water pressure from the HPT pressure values. Thereby correcting the HPT pressure to values that only indicates the hydraulic properties of the subsurface material.

ATTACHMENT 2B-3-5
Data Validation Memos and Lab Data Packages

Project:	PSE North Lake Union – 2016 Play Area Investigation (Soil)
File:	00186-846-01
Date:	November 18, 2016
Lab Report:	(Fremont) 1609139, 1609151, 1609167, 1609188, 1609191, 1609211, 1609321, 1609324, 1609335, 1609348, 1610280, 1610297, 1610317

This report presents the results of a United States Environmental Protection Agency (USEPA)-defined Stage 2A validation (USEPA Document 540-R-08-005; USEPA, 2009) of analytical data from the analyses of soil samples obtained from the Play Area Investigation at the Gas Works Park Site. Samples obtained were submitted to Fremont Analytical Inc. (Fremont) of Seattle, Washington for particle size analysis by ASTM Method D422. Soil samples were also analyzed for chemical oxygen demand (COD) by Standard Method 5220C Modified by ALS Environmental (ALS) of Kelso, Washington under subcontract to Fremont.

The objective of this data quality assessment was to review laboratory analytical procedures and QC results to evaluate whether the samples were analyzed using well-defined and acceptable methods that provide quantitation limits below applicable regulatory criteria, the precision and accuracy of the data are well defined and sufficient to provide defensible data, and the quality assurance/quality control (QA/QC) procedures utilized by the laboratory meet acceptable industry practices and standards.

ARI Sample Delivery Groups (SDGs; noted above) were reviewed for the following quality control (QC) elements:

- Chain of Custody
- Holding Times
- Additional/Follow-up Analyses
- Method Blanks and Equipment Rinsate Blanks
- Laboratory Control Samples
- Matrix Spikes/Matrix Spike Duplicates
- Laboratory and Field Duplicates

DATA QUALITY ASSESSMENT SUMMARY

The results for each of the QC elements are summarized below. The data assessment was performed using guidance in two USEPA documents: USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review (USEPA, 2016).

Chain-of-Custody Documentation

Chain-of-custody forms were provided with the laboratory analytical reports. No transcription errors were found, and the appropriate signatures were applied. There were no anomalies mentioned in the sample

receipt forms, as the samples were transported to the laboratory at the appropriate temperatures of between 2 and 6 degrees Celsius.

Holding Times

The holding time is defined as the time that elapses between sample collection and sample analysis. Maximum holding time criteria exist for each analysis to help ensure that the analyte concentrations found at the time of analysis reflect the concentration present at the time of sample collection. Established holding times were met for all analyses.

Method Blanks, Trip Blanks, and Equipment Rinse Blanks

Method blanks are analyzed to ensure that laboratory procedures and reagents do not introduce measurable concentrations of the analytes of interest. Method blanks were analyzed with each batch of samples, at a frequency of one per twenty samples. For all sample batches, method blanks for all applicable methods were analyzed at the required frequency. None of the analytes of interest were detected in any of the method blanks.

Matrix Spikes/Matrix Spike Duplicates

Because the actual analyte concentration in an environmental sample is not known, the accuracy of a particular analysis is usually inferred by performing a matrix spike (MS) analysis. One aliquot of sample is analyzed in the normal manner, and then a second aliquot of the sample is spiked with a known amount of analyte concentration and analyzed. From these analyses, a %R is calculated. Matrix spike duplicates (MSD) analyses are generally performed for organic analyses as a precision check. For some organic analytical methods, a laboratory control sample/ laboratory control sample duplicate (LCS/LCSD) sample set is performed in lieu of a MS/MSD analysis.

Matrix spike analyses should be performed once per analytical batch or every twenty field samples, whichever is more frequent. The recovery criteria for matrix spikes and laboratory control samples are specified in the laboratory documents as are the relative percent difference (RPD) values. The frequency requirements were met for all analyses and the %R/RPD values were within the proper control limits.

Laboratory Control Samples

A laboratory control sample is essentially a blank sample that is spiked with a known amount of analyte concentration and analyzed. It is to be treated much like a matrix spike, without the possibility for matrix interference. As there is no actual sample matrix in the analysis, the analytical expectations for accuracy and precision are usually more rigorous and qualification would apply to all samples in the batch, instead of the parent sample only.

Laboratory control sample analyses should be performed once per analytical batch or every twenty field samples, whichever is more frequent. The recovery criteria for laboratory control samples are specified in the laboratory documents as are the RPD values. The frequency requirements were met for all analyses, and the %R/RPD values were within the proper control limits.

Laboratory Duplicates

Internal laboratory duplicate analyses are performed to monitor the precision of the analyses. Two separate aliquots of a sample are analyzed as distinct samples in the laboratory, and the RPD between the two results is calculated. Duplicate analyses should be performed once per analytical batch. If one or more of the samples used has a concentration greater than five times the reporting limit for that sample, the absolute difference is used instead of the RPD as a measurement of precision.

Laboratory duplicates were analyzed at the proper frequency and the specified acceptance criteria were met, with the following exception:

- **SDGs 1609139(Fremont)/K1611836 (ALS)**
1609191(Fremont)/K1611729 (ALS)
1609321(Fremont)/K1611731 (ALS)
1609324(Fremont)/K1611736 (ALS)
1609335(Fremont)/K1611734 (ALS)
1609348(Fremont)/K1611733 (ALS)

(COD): The laboratory performed an internal duplicate on Sample PAI-20-20-25. The RPD value for COD was greater than the control limit of 20%. The positive result for COD was qualified as estimated (J) in this sample and associated batched Samples PAI-14-22-22.5, PAI-15-15-17.4, PAI-15-30-32.5, Dup-1, PAI-17-15.8-16.1, PAI-20-20-25, PAI-23-26-28, PAI-23-9.2-9.8, PAI-24-10-11, PAI-24-21.3-22.3, PAI-26-11.6-12.3, PAI-26-20.25-25.2, PAI-27-10-12.5, PAI-27-25.5-26.5.

Field Duplicates

Field duplicate samples were collected and analyzed along with the reviewed sample batches. The duplicate samples were analyzed for the same parameters as the associated parent samples. As mentioned above for the laboratory duplicates the RPD is used as the criteria for assessing precision, unless one or more of the samples used has a concentration less than five times the reporting limit for that sample. If either of the sample concentrations were less than this value, the absolute difference is used instead of the RPD as a measurement of precision.

The following field duplicate sample sets were submitted for this sampling event:

- PAI-15-30-32.5/DUP-1

The RPD values for all target analytes were acceptable.

OVERALL ASSESSMENT

As was determined by this data validation, the laboratory followed the specified analytical methods. Accuracy was acceptable, as demonstrated by the LCS and MS/MSD %R values. Precision was acceptable, as demonstrated by the laboratory duplicate, field duplicates, and MS/MSD RPD and absolute difference values, with the exceptions noted above.

Data were qualified as estimated because of a laboratory precision outlier. See table below for a summary of qualifiers.

Based on the data quality review, it is our opinion that the analytical data, including data qualified as noted above, are of acceptable quality for their intended use.

SUMMARY OF DATA QUALIFIERS FOR 2016 PLAY AREA SOIL SAMPLING

Sample ID	Analyte	Qualifier	Reason
PAI-14-22-22.5	Chemical Oxygen Demand	J	Laboratory duplicate Outlier (Precision)
PAI-15-15-17.4	Chemical Oxygen Demand	J	Laboratory duplicate Outlier (Precision)
PAI-15-30-32.5	Chemical Oxygen Demand	J	Laboratory duplicate Outlier (Precision)
PAI-17-15.8-16.1	Chemical Oxygen Demand	J	Laboratory duplicate Outlier (Precision)
PAI-20-20-25	Chemical Oxygen Demand	J	Laboratory duplicate Outlier (Precision)
PAI-23-26-28	Chemical Oxygen Demand	J	Laboratory duplicate Outlier (Precision)
PAI-23-9.2-9.8	Chemical Oxygen Demand	J	Laboratory duplicate Outlier (Precision)
PAI-24-10-11	Chemical Oxygen Demand	J	Laboratory duplicate Outlier (Precision)
PAI-24-21.3-22.3	Chemical Oxygen Demand	J	Laboratory duplicate Outlier (Precision)
PAI-26-11.6-12.3	Chemical Oxygen Demand	J	Laboratory duplicate Outlier (Precision)
PAI-26-20.25-25.25	Chemical Oxygen Demand	J	Laboratory duplicate Outlier (Precision)
PAI-27-10-12.5	Chemical Oxygen Demand	J	Laboratory duplicate Outlier (Precision)
PAI-27-25.5-26.5	Chemical Oxygen Demand	J	Laboratory duplicate Outlier (Precision)
DUP-1	Chemical Oxygen Demand	J	Laboratory duplicate Outlier (Precision)

REFERENCES

U.S. Environmental Protection Agency (USEPA). "National Functional Guidelines for Inorganic Superfund Methods Data Review," OLEM 9355.0-133, EPA-540-R-2016-001, September 2016.

U.S. Environmental Protection Agency (USEPA). "Guidance for Labeling Externally Validated Laboratory Analytical Data for Superfund Use," EPA-540-R-08-005. January 2009.

Project: PSE North Lake Union – 2016 Play Area Supplemental Investigation (Groundwater)
File: 00186-846-01
Date: November 16, 2016
Lab Report(s): (Fremont) 1610317, 1609134, 1609139, 1609151, 1609167, 1609188, 1609191, 1609211, 1609321, 1609324, 1609335, 1609348, 1609367, 1610280, 1610297
(ARI) 16I0420, 16I0504, and 16J0354

This report presents the results of a United States Environmental Protection Agency (USEPA)-defined Stage 2A validation (USEPA Document 540-R-08-005; USEPA, 2009) of analytical data from the analyses of groundwater samples obtained from the Play Area Investigation at the Gas Works Park Site. Samples obtained were submitted to Fremont Analytical Inc. (Fremont) of Seattle, Washington, for chemical analysis of dissolved metals (arsenic and iron) by EPA Method 200.8, sulfide by Standard Method 4500-S2-F, and chemical oxygen demand (COD) by Standard Method 5220D. Additional analyses of groundwater samples were submitted to Analytical Resources, Inc., (ARI) of Tukwila, Washington, for chemical analysis of sulfide by Standard Method 4500-S2-D.

The objective of this data quality assessment was to review laboratory analytical procedures and QC results to evaluate whether the samples were analyzed using well-defined and acceptable methods that provide quantitation limits below applicable regulatory criteria, the precision and accuracy of the data are well defined and sufficient to provide defensible data, and the quality assurance/quality control (QA/QC) procedures utilized by the laboratory meet acceptable industry practices and standards.

The Fremont Sample Delivery Groups (SDGs) or ‘Lab Reports’ noted above were reviewed for the following quality control (QC) elements:

- Chain of Custody
- Holding Times
- Surrogates/Labeled Compounds
- Method and Trip Blanks
- Laboratory Control Samples
- Matrix Spikes/Matrix Spike Duplicates
- Laboratory Duplicates
- Field Duplicates

DATA QUALITY ASSESSMENT SUMMARY

The results for each of the QC elements are summarized below. The data assessment was performed using guidance from the USEPA document: USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review (USEPA, 2016).

Chain-of-Custody Documentation

Chain-of-custody forms were provided with the laboratory analytical reports. No transcription errors were found, and the appropriate signatures were applied. There were no anomalies mentioned in the sample receipt forms, as the samples were transported to the laboratory at the appropriate temperatures of between 0 and 10 degrees Celsius.

Holding Times

The holding time is defined as the time that elapses between sample collection and sample analysis. Maximum holding time criteria exist for each analysis to help ensure that the analyte concentrations found at the time of analysis reflect the concentration present at the time of sample collection. Established holding times were met for all analyses, with the exceptions below:

SDG 1609134 (Sulfide): The sulfide holding time of seven days was exceeded by four days in Sample PAI-20S-160912. The positive result for sulfide was qualified as estimated (J) in this sample.

Surrogate Recoveries

A surrogate compound is a compound that is chemically similar to the analytes of interest, but unlikely to be found in any environmental sample. Surrogates are used for organic analyses only and therefore were not applied to the chemical analyses in this validation report.

Method Blanks and Equipment Blanks

Method blanks are analyzed to ensure that laboratory procedures and reagents do not introduce measurable concentrations of the analytes of interest. Method blanks were analyzed with each batch of samples, at a frequency of one per twenty samples. For all sample batches, method blanks for all applicable methods were analyzed at the required frequency. There were no analytes of interest detected above the contract required quantitation limits in any of the method blanks.

Equipment blanks are analyzed to provide an indication as to whether there has been any equipment cross-contamination in the field sampling process. One equipment blank was collected for this sampling event: RINSE-160929. There was a positive result for arsenic in this blank. However, the associated arsenic results were greater than 5 times the amount found in this blank. No qualifiers were applied.

Matrix Spikes/Matrix Spike Duplicates

Because the actual analyte concentration in an environmental sample is not known, the accuracy of a particular analysis is usually inferred by performing a matrix spike (MS) analysis. One aliquot of sample is analyzed in the normal manner, and then a second aliquot of the sample is spiked with a known amount of analyte concentration and analyzed. From these analyses, a %R is calculated. Matrix spike duplicates (MSD) analyses are generally performed for organic analyses as a precision check. For some organic analytical methods, a laboratory control sample/ laboratory control sample duplicate (LCS/LCSD) sample set is performed in lieu of a MS/MSD analysis.

For inorganics methods, the matrix spike (referred to as a "spiked sample") is typically followed by a post spike sample if any element recoveries were outside the control limits in the "spiked sample".

Matrix spike analyses should be performed once per analytical batch or every twenty field samples, whichever is more frequent. The recovery criteria for matrix spikes and laboratory control samples are specified in the laboratory documents as are the relative percent difference (RPD) values. The frequency requirements were met for all analyses and the %R/RPD values were within the proper control limits, with the exceptions below:

- **SDG 1609211** (Metals): The laboratory performed a MS/MSD on Sample PAI-22-S-160916. The %R values for arsenic were greater than the control limits in the MS/MSD. The %R values were outside the control limits because the parent sample concentrations were greater than four times the amount spiked into the sample. No action was taken.
- **SDG 1610280** (Metals): The laboratory performed a MS/MSD on a sample from a different SDG. The %R values for arsenic were greater than the control limits in the MS and the MSD. The %R values were outside the control limits because the parent sample concentrations were greater than four times the amount spiked into the sample. No action was required because the sample matrix was not representative of the project site.

Laboratory Control Samples

A laboratory control sample is essentially a blank sample that is spiked with a known amount of analyte concentration and analyzed. It is to be treated much like a matrix spike, without the possibility for matrix interference. As there is no actual sample matrix in the analysis, the analytical expectations for accuracy and precision are usually more rigorous and qualification would apply to all samples in the batch, instead of the parent sample only.

Laboratory control sample analyses should be performed once per analytical batch or every twenty field samples, whichever is more frequent. The recovery criteria for laboratory control samples are specified in the laboratory documents as are the RPD values. The frequency requirements were met for all analyses, and the %R/RPD values were within the proper control limits.

Laboratory Duplicates

Internal laboratory duplicate analyses are performed to monitor the precision of the analyses. Two separate aliquots of a sample are analyzed as distinct samples in the laboratory, and the RPD between the two results is calculated. Duplicate analyses should be performed once per analytical batch. If one or more of the samples used has a concentration greater than five times the reporting limit for that sample, the absolute difference is used instead of the RPD as a measurement of precision.

Laboratory duplicates were analyzed at the proper frequency and the specified acceptance criteria were met, with the exceptions below:

SDG 1610280 (Metals): The laboratory performed a laboratory duplicate on a sample from a different internal SDG. The RPD value for iron was greater than the control limits in this sample set. No action was required because the sample matrix was not representative of the project site.

Field Duplicates

Three blind field duplicate samples were submitted to the laboratory to indicate whether the precision of the sampling process was acceptable. Without the laboratory's awareness two separate samples originating from

the same distinct area of the site are submitted and analyzed. Much like an internal laboratory duplicate, the RPD values for all target analytes between the two samples are calculated. Duplicate analyses should be performed once per every 10 samples. If one or more of the samples used has a concentration greater than five times the reporting limit for that sample, the absolute difference is used instead of the RPD as a measurement of precision.

The project specific RPD control limits for groundwater samples is 35% for all target analytes, whereas the absolute difference control limits are simply represented by the highest reporting limit per analyte in the sample pair.

Field duplicates were analyzed at the proper frequency; the specific sampling pairs are listed below:

SDG 1610317: Samples PAI-33-D-161019 and DUP-161019 were submitted as field duplicates. The acceptance criteria mentioned above were met for all target analytes.

SDG 1609321: Samples PAI-23-D-160926 and D-160926 were submitted as field duplicates. The acceptance criteria mentioned above were met for all target analytes.

SDG 1609348: Samples PAI-26-S-160928 and D-160928 were submitted as field duplicates. The acceptance criteria mentioned above were met for all target analytes.

Miscellaneous

SDG 1609139: The positive results for sulfide in Sample PAI-20D-160912 was labeled by the laboratory for the potential of a high bias due to sample matrix interference. The positive result for this sample was qualified as estimated (J) in this sample.

SDG 1609151: The positive results for sulfide in Samples PAI-19-S-160913 and PAI-20-S-160913 were labeled by the laboratory for the potential of a high bias due to sample matrix interference. The positive results for these samples were qualified as estimated (J) in both samples.

SDG 1609167: The positive results for sulfide in Samples PAI-13-D-160914 and PAI-13-D-160914 were labeled by the laboratory for the potential of a high bias due to sample matrix interference. The positive results for these samples were qualified as estimated (J) in both samples.

SDG 1609188: The positive results for sulfide in Samples PAI-16-S-160915, PAI-16-D-160915 and PAI-17-S-160915 were labeled by the laboratory for the potential of a high bias due to sample matrix interference. The positive results for these samples were qualified as estimated (J) in both samples.

SDG 1609191: The positive results for sulfide in Sample PAI-17-D-160915 was labeled by the laboratory for the potential of a high bias due to sample matrix interference. The positive result for this sample was qualified as estimated (J) in the sample.

SDG 1609211: The positive results for sulfide in Samples PAI-22-S-160916 and PAI-22-D-160916 were labeled by the laboratory for the potential of a high bias due to sample matrix interference. The positive results for these samples were qualified as estimated (J) in both samples.

OVERALL ASSESSMENT

As was determined by this data validation, the laboratory followed the specified analytical methods. Accuracy was acceptable, as demonstrated by the LCS and MS/MSD %R values, with the exceptions noted above. Precision was acceptable, as demonstrated by the laboratory duplicate, field duplicates, LCS/LCSD and MS/MSD RPD and absolute difference values, with the exceptions noted above.

Data were qualified as estimated because of holding time outliers, and matrix interference. See table below for a summary of qualifiers.

Based on the data quality review, it is our opinion that the analytical data, including data qualified as noted above, are of acceptable quality for their intended use.

SUMMARY OF DATA QUALIFIERS FOR 2016 PLAY AREA GROUNDWATER SAMPLING

Sample ID	Analyte	Qualifier	Reason
PAI-20S-160912	Sulfide	J	Holding Time Outlier
PAI-19-S-160913	Sulfide	J	Compound Identification (i.e., ion ratio, retention time, relative abundance, etc.)
PAI-20-S-160913	Sulfide	J	Compound Identification (i.e., ion ratio, retention time, relative abundance, etc.)
PAI-20D-160912	Sulfide	J	Compound Identification (i.e., ion ratio, retention time, relative abundance, etc.)
PAI-13-D-160914	Sulfide	J	Compound Identification (i.e., ion ratio, retention time, relative abundance, etc.)
PAI-14-D-160914	Sulfide	J	Compound Identification (i.e., ion ratio, retention time, relative abundance, etc.)
PAI-16-S-160915	Sulfide	J	Compound Identification (i.e., ion ratio, retention time, relative abundance, etc.)
PAI-16-D-160915	Sulfide	J	Compound Identification (i.e., ion ratio, retention time, relative abundance, etc.)
PAI-17-S-160915	Sulfide	J	Compound Identification (i.e., ion ratio, retention time, relative abundance, etc.)
PAI-17-D-160915	Sulfide	J	Compound Identification (i.e., ion ratio, retention time, relative abundance, etc.)
PAI-22-S-160916	Sulfide	J	Compound Identification (i.e., ion ratio, retention time, relative abundance, etc.)
PAI-22-D-160916	Sulfide	J	Compound Identification (i.e., ion ratio, retention time, relative abundance, etc.)

REFERENCES

U.S. Environmental Protection Agency (USEPA). "National Functional Guidelines for Inorganic Superfund Methods Data Review," OLEM 9355.0-133, EPA-540-R-2016-001, September 2016.

U.S. Environmental Protection Agency (USEPA). "Guidance for Labeling Externally Validated Laboratory Analytical Data for Superfund Use," EPA-540-R-08-005. January 2009.



GeoEngineers

Sandra Smith
600 Stewart Street, Suite 1700
Seattle, WA 98101

RE: Gas Works Park Site
Work Order Number: 1609134

October 06, 2016

Attention Sandra Smith:

Fremont Analytical, Inc. received 2 sample(s) on 9/12/2016 for the analyses presented in the following report.

Grain Size by ASTM D422

Sulfide by SM 4500-S2-F

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

CLIENT: GeoEngineers
Project: Gas Works Park Site
Work Order: 1609134

Work Order Sample Summary

Lab Sample ID	Client Sample ID	Date/Time Collected	Date/Time Received
1609134-001	PAI-20S-160912	09/12/2016 2:40 PM	09/12/2016 4:23 PM
1609134-002	PAI-20-13.5-15	09/12/2016 2:30 PM	09/12/2016 4:23 PM

CLIENT: GeoEngineers
Project: Gas Works Park Site

I. SAMPLE RECEIPT:

Samples receipt information is recorded on the attached Sample Receipt Checklist.

II. GENERAL REPORTING COMMENTS:

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

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

III. ANALYSES AND EXCEPTIONS:

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

Qualifiers:

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



Client: GeoEngineers

Collection Date: 9/12/2016 2:40:00 PM

Project: Gas Works Park Site

Lab ID: 1609134-001

Matrix: Groundwater

Client Sample ID: PAI-20S-160912

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
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Sulfide by SM 4500-S2-F

Batch ID: R31948

Analyst: KT

Sulfide	280	11.9	H	mg/L	1	9/23/2016 2:30:00 PM
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NOTES:

MDL - Sample reported to Method Detection Limit (MDL)

Grain Size by ASTM D422

Project: Gas Works Park Site
 Client: GeoEngineers
 Lab Project #: 1609134

Percent Finer (Passing) than the Indicated Size

UOM = Percent

Grain Size Classification	Gravel						Coarse Sand	Medium Sand			Fine Sand			Silt		
	3"	2"	1 1/2"	1"	3/4"	3/8"	#4	#10	#20	#40	#60	#140	#230	#325	#450	
Sieve Size	3"	2"	1 1/2"	1"	3/4"	3/8"	#4	#10	#20	#40	#60	#140	#230	#325	#450	
Particle Size (Microns)	76200	50800	38100	25400	19050	9525	4750	2000	850	425	250	106	75	45	34	
PAI-20-13.5-15	100%	100%	100%	100%	79.8%	66.6%	59.1%	51.6%	45.0%	37.3%	28.0%	12.8%	8.17%	4.46%	0.626%	

Grain Size by ASTM D422

Project: Gas Works Park Site
Client: GeoEngineers
Lab Project #: 1609134

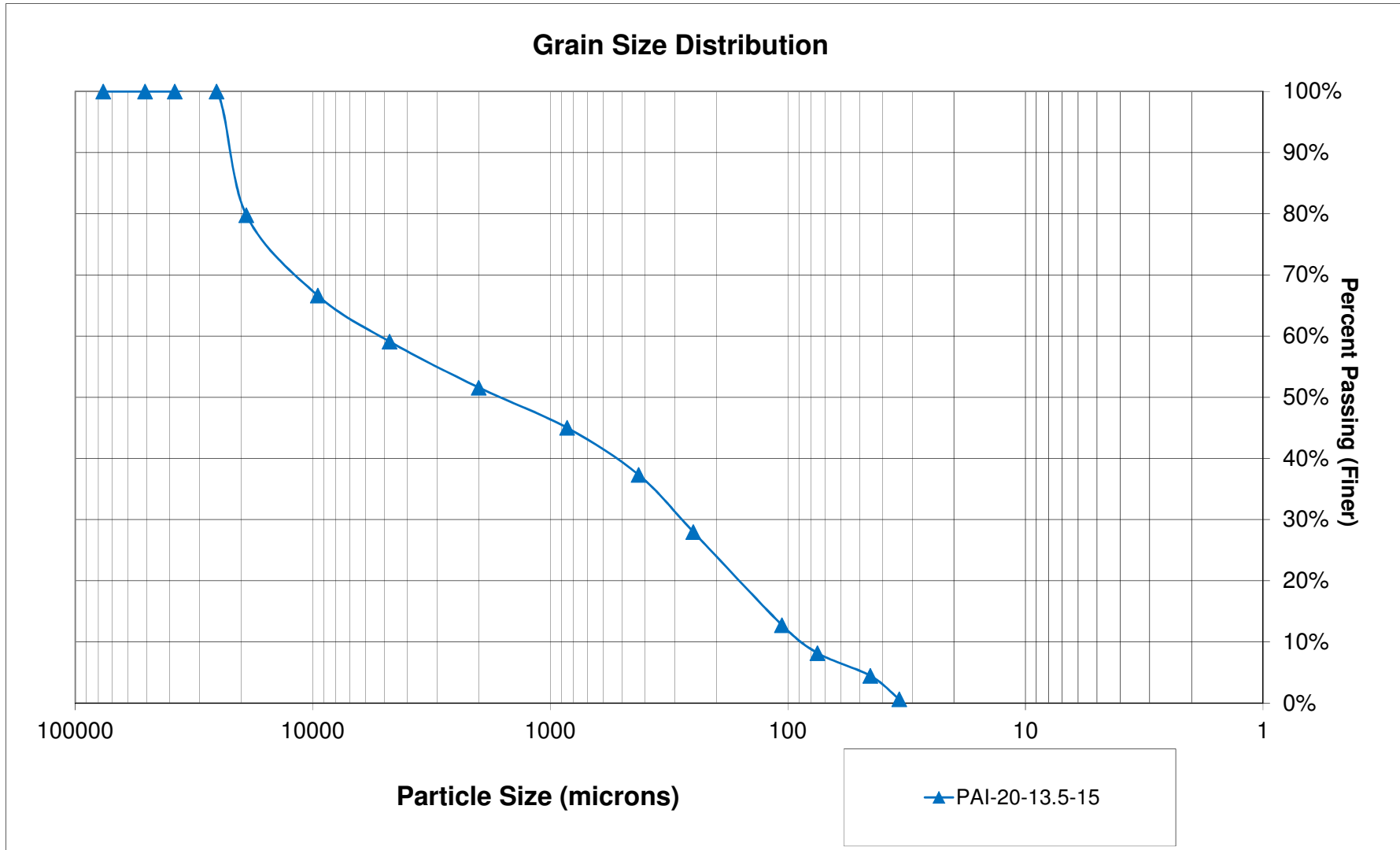
Percent Retained in Each Size Fraction

UOM = Percent

Grain Size Classification	<i>Gravel</i>							<i>Coarse Sand</i>	<i>Medium Sand</i>		<i>Fine Sand</i>			<i>Silt</i>		
	>76200	76200-50800	50800-38100	38100-25400	25400-19000	19050-9525	9525-4750	4750-2000	2000-850	850-425	425-250	250-106	106-62.5	72.5-45	45-34	<34
PAI-20-13.5-15	0.00%	0.00%	0.00%	0.00%	20.2%	13.1%	7.53%	7.51%	6.57%	7.70%	9.32%	15.2%	4.58%	3.70%	3.83%	0.626%

Grain Size by ASTM D422

Project: Gas Works Park Site
 Client: GeoEngineers
 Lab Project #: 1609134





ALS Environmental
ALS Group USA, Corp
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October 03, 2016

Analytical Report for Service Request No: 1610998

Helsea Ward
Fremont Analytical
3600 Fremont Avenue, North
Seattle, WA 98103

RE: COD

Dear Helsea,

Enclosed are the results of the sample(s) submitted to our laboratory September 16, 2016. For your reference, these analyses have been assigned our service request number **K1610998**.

Analyses were performed according to our laboratory's ISO 17025 AP-approved quality assurance program. The test results meet requirements of the current ISO 17025 AP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of ISO 17025 AP-accredited analytes, refer to the certifications section at www.alsglobal.com. All results are intended to be considered in their entirety, and ALS Group USA, Corp. dba ALS Environmental (ALS) is not responsible for use of less than the complete report. Results apply only to the items submitted to the laboratory for analysis and individual items (samples) analyzed, as listed in the report.

Please contact me if you have any questions. My extension is 3375. You may also contact me via email at janet.Malloch@alsglobal.com.

Respectfully submitted,

ALS Group USA, Corp. dba ALS Environmental

Janet Malloch
Project Manager



A S Environmental
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Acronyms

ASTM	American Society for Testing and Materials
A2LA	American Association for Laboratory Accreditation
CARB	California Air Resources Board
CAS Number	Chemical Abstract Service registry Number
CFC	Chlorofluorocarbon
CFU	Colony-Forming Unit
DEC	Department of Environmental Conservation
DEQ	Department of Environmental Quality
DHS	Department of Health Services
DOE	Department of Ecology
DOH	Department of Health
EPA	U. S. Environmental Protection Agency
ELAP	Environmental Laboratory Accreditation Program
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
LOD	Limit of Detection
LOQ	Limit of Quantitation
LUFT	Leaking Underground Fuel Tank
M	Modified
MCL	Maximum Contaminant Level is the highest permissible concentration of a substance allowed in drinking water as established by the USEPA.
MDL	Method Detection Limit
MPN	Most Probable Number
MRL	Method Reporting Limit
NA	Not Applicable
NC	Not Calculated
NCASI	National Council of the Paper Industry for Air and Stream Improvement
ND	Not Detected
NIOSH	National Institute for Occupational Safety and Health
PQL	Practical Quantitation Limit
RCRA	Resource Conservation and Recovery Act
SIM	Selected Ion Monitoring
TPH	Total Petroleum Hydrocarbons
tr	Trace level is the concentration of an analyte that is less than the PQL but greater than or equal to the MDL.

Inorganic Data Qualifiers

- * The result is an outlier. See case narrative.
- # The control limit criteria is not applicable. See case narrative.
- B The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards.
- E The result is an estimate amount because the value exceeded the instrument calibration range.
- J The result is an estimated value.
- U The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
DOD-QSM 4.2 definition : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
- i The MRL/MDL or LOQ/LOD is elevated due to a matrix interference.
- X See case narrative.
- Q See case narrative. One or more quality control criteria was outside the limits.
- H The holding time for this test is immediately following sample collection. The samples were analyzed as soon as possible after receipt by the laboratory.

Metals Data Qualifiers

- # The control limit criteria is not applicable. See case narrative.
- J The result is an estimated value.
- E The percent difference for the serial dilution was greater than 10%, indicating a possible matrix interference in the sample.
- M The duplicate injection precision was not met.
- N The Matrix Spike sample recovery is not within control limits. See case narrative.
- S The reported value was determined by the Method of Standard Additions (MSA).
- U The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
DOD-QSM 4.2 definition : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
- W The post-digestion spike for furnace AA analysis is out of control limits, while sample absorbance is less than 50% of spike absorbance.
 - i The MRL/MDL or LOQ/LOD is elevated due to a matrix interference.
- X See case narrative.
- + The correlation coefficient for the MSA is less than 0.995.
- Q See case narrative. One or more quality control criteria was outside the limits.

Organic Data Qualifiers

- * The result is an outlier. See case narrative.
- # The control limit criteria is not applicable. See case narrative.
- A A tentatively identified compound, a suspected aldol-condensation product.
- B The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards.
- C The analyte was qualitatively confirmed using GC/MS techniques, pattern recognition, or by comparing to historical data.
- D The reported result is from a dilution.
- E The result is an estimated value.
- J The result is an estimated value.
- N The result is presumptive. The analyte was tentatively identified, but a confirmation analysis was not performed.
- P The GC or HPLC confirmation criteria was exceeded. The relative percent difference is greater than 40% between the two analytical results.
- U The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
DOD-QSM 4.2 definition : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
 - i The MRL/MDL or LOQ/LOD is elevated due to a chromatographic interference.
- X See case narrative.
- Q See case narrative. One or more quality control criteria was outside the limits.

Additional Petroleum Hydrocarbon Specific Qualifiers

- F The chromatographic fingerprint of the sample matches the elution pattern of the calibration standard.
- L The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of lighter molecular weight constituents than the calibration standard.
- H The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of heavier molecular weight constituents than the calibration standard.
- O The chromatographic fingerprint of the sample resembles an oil, but does not match the calibration standard.
- Y The chromatographic fingerprint of the sample resembles a petroleum product eluting in approximately the correct carbon range, but the elution pattern does not match the calibration standard.
- Z The chromatographic fingerprint does not resemble a petroleum product.

**ALS Group USA Corp. dba ALS Environmental (ALS) - Kelso
State Certifications, Accreditations, and Licenses**

Agency	Web Site	Number
Alaska DEC UST	http://dec.alaska.gov/applications/eh/ehllabreports/USTLabs.aspx	UST-040
Arizona DHS	http://www.azdhs.gov/lab/license/env.htm	AZ0339
Arkansas - DEQ	http://www.adeq.state.ar.us/techsvs/labcert.htm	88-0637
California DHS (ELAP)	http://www.cdph.ca.gov/certlic/labs/Pages/ELAP.aspx	2795
DOD ELAP	http://www.denix.osd.mil/edqw/Accreditation/AccreditedLabs.cfm	L14-51
Florida DOH	http://www.doh.state.fl.us/lab/EnvLabCert/WaterCert.htm	E87412
Hawaii DOH	Not available	-
ISO 17025	http://www.pjllabs.com/	L16-57
Louisiana DEQ	http://www.deq.louisiana.gov/portal/DIVISIONS/PublicParticipationandPermitSupport/LouisianaLaboratoryAccreditationProgram.aspx	03016
Maine DHS	Not available	WA01276
Minnesota DOH	http://www.health.state.mn.us/accreditation	053-999-457
Montana DPHHS	http://www.dphhs.mt.gov/publichealth/	CERT0047
Nevada DEP	http://ndep.nv.gov/bsdw/labservice.htm	WA01276
New Jersey DEP	http://www.nj.gov/dep/oqa/	WA005
North Carolina DWQ	http://www.dwqlab.org/	605
Oklahoma DEQ	http://www.deq.state.ok.us/CSDnew/labcert.htm	9801
Oregon – DEQ (NELAP)	http://public.health.oregon.gov/LaboratoryServices/EnvironmentalLaboratoryAccreditation/Pages/index.aspx	WA100010
South Carolina DHEC	http://www.scdhec.gov/environment/envserv/	61002
Texas CEQ	http://www.tceq.texas.gov/field/qa/env_lab_accreditation.html	T104704427
Washington DOE	http://www.ecy.wa.gov/programs/eap/labs/lab-accreditation.html	C544
Wyoming (EPA Region 8)	http://www.epa.gov/region8/water/dwhome/wyomingdi.html	-
Kelso Laboratory Website	www.alsglobal.com	NA

Analyses were performed according to our laboratory's NELAP-approved quality assurance program. A complete listing of specific NELAP-certified analytes, can be found in the certification section at www.ALSGlobal.com or at the accreditation bodies web site.

Please refer to the certification and/or accreditation body's web site if samples are submitted for compliance purposes. The states highlighted above, require the analysis be listed on the state certification if used for compliance purposes and if the method/analyte is offered by that state.



Chain of Custody

ALS Environmental—Kelso Laboratory
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Phone (360)577-7222 Fax (360)636-1068
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CHAIN OF CUSTODY RECORD

Omega COCID 263

PAGE: 1

OF: 1

ADDRESS

Fremont Analytical, Inc.
 3600 Fremont Ave. N.
 Seattle, WA 98103
 TEL: 206-352-3790
 FAX: 206-352-7178
 Website: www.fremontanalytical.com

516/0998

SUB CONTRACTOR: ALS		COMPANY: ALS Environmental		SPECIAL INSTRUCTIONS / COMMENTS:			
ADDRESS: 1317 South 13th Avenue		Chemical Oxygen Demand by SM 5220. <i>Email results: MRidgeway@fremontanalytical.com</i> <i>CWard@fremontanalytical.com</i> <u>Low level COO RLS if possible</u>					
CITY, STATE, ZIP: Kelso, WA 98626							
PHONE: (360) 577-7222	FAX:					EMAIL:	
ACCOUNT #:							

ITEM #	SAMPLE ID	CLIENT SAMPLE ID	BOTTLE TYPE	MATRIX	DATE COLLECTED	NUMBER OF CONTAINERS	COMMENTS: Methanol Preserved Weights HOT Sample Notation, Additional Sample Description.
1	1609134-002A TEST_SUB	PAI-20-13.5-15	CLEAR JARS 4 O	Soil	9/12/2016 2:30:00 PM	1	

Relinquished By: <i>[Signature]</i>	Date: 9/15/16	Time: 8:00	Received By: <i>[Signature]</i>	Date: 9/16/16	Time: 9:30
Relinquished By:	Date:	Time:	Received By:	Date:	Time:
Relinquished By:	Date:	Time:	Received By:	Date:	Time:
TAT: Standard <input checked="" type="checkbox"/> RUSH Next BD <input type="checkbox"/> 2nd BD <input type="checkbox"/> 3rd BD <input type="checkbox"/> Note: RUSH requests will incur surcharges!					

REPORT TRANSMITTAL DESIRED:	
<input type="checkbox"/> HARDCOPY (extra cost)	<input type="checkbox"/> FAX <input checked="" type="checkbox"/> EMAIL <input type="checkbox"/> ONLINE
FOR LAB USE ONLY	
Temp of samples _____ °C	Attempt to Cool? _____
Comments: _____	



PC Janet

Cooler Receipt and Preservation Form

Client Fremont Analytical Service Request K16 10998
Received: 9-16-16 Opened: 9-16-16 By: SW Unloaded: 9-16-16 By: SW

- 1. Samples were received via? USPS Fed Ex UPS DHL PDX Courier Hand Delivered
- 2. Samples were received in: (circle) Cooler Box Envelope Other NA
- 3. Were custody seals on coolers? NA Y N If yes, how many and where? 1 Front
If present, were custody seals intact? Y N If present, were they signed and dated? Y N

Raw Cooler Temp	Corrected Cooler Temp	Raw Temp Blank	Corrected Temp Blank	Corr. Factor	Thermometer ID	Cooler/COC ID	Tracking Number	NA	Filed
1.2	1.2	2.4	2.4	0	360	263	12X6192X039861		
1.6	1.7	3.0	3.1	10.1	356	264	12X6192X31944493		
						265			
						266			
						267			
						270			

- 4. Packing material: Inserts Baggies Bubble Wrap Gel Packs Wet Ice Dry Ice Sleeves
- 5. Were custody papers properly filled out (ink, signed, etc.)? NA Y N
- 6. Were samples received in good condition (temperature, unbroken)? Indicate in the table below. NA Y N
If applicable, tissue samples were received: Frozen Partially Thawed Thawed
- 7. Were all sample labels complete (i.e analysis, preservation, etc.)? NA Y N
- 8. Did all sample labels and tags agree with custody papers? Indicate major discrepancies in the table on page 2. NA Y N
- 9. Were appropriate bottles/containers and volumes received for the tests indicated? NA Y N
- 10. Were the pH-preserved bottles (*see SMO GEN SOP*) received at the appropriate pH? Indicate in the table below NA Y N
- 11. Were VOA vials received without headspace? Indicate in the table below. NA Y N
- 12. Was C12/Res negative? NA Y N

Sample ID on Bottle	Sample ID on COC	Identified by:

Sample ID	Bottle Count	Bottle Type	Out of Temp	Head-space	Broke	pH	Reagent	Volume added	Reagent Lot Number	Initials	Time

Notes, Discrepancies, & Resolutions: _____



Total Solids

ALS Environmental—Kelso Laboratory
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Phone (360)577-7222 Fax (360)636-1068
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ALS Group USA, Corp.
dba ALS Environmental

Analytical Report

Client: Fremont Analytical
Project: COD
Sample Matrix: Soil
Analysis Method: 160.3 Modified
Prep Method: None

Service Request: K1610998
Date Collected: 09/12/16
Date Received: 09/16/16
Units: Percent
Basis: As Received

Solids, Total

Sample Name	Lab Code	Result	MRL	MDL	Dil.	Date Analyzed	Q
PAI-20-13.5-15/1609134-002A	K1610998-001	90.7	-	-	1	09/19/16 17:22	

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client: Fremont Analytical
Project: COD
Sample Matrix: Paper
Analysis Method: 160.3 Modified
Prep Method: None

Service Request: K1610998
Date Collected: NA
Date Received: NA

Units: Percent
Basis: As Received

Replicate Sample Summary
Inorganic Parameters

Sample Name:	Lab Code:	MRL	Sample Result	Duplicate Result	Average	RPD	RPD Limit	Date Analyzed
Batch QC	K1610975-001DUP	-	95.5	96.0	95.8	<1	20	09/19/16
Batch QC	K1610996-002DUP	-	88.8	88.7	88.8	<1	20	09/19/16

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.



General Chemistry

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
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www.alsglobal.com

ALS Group USA, Corp.
dba ALS Environmental

Analytical Report

Client: Fremont Analytical
Project: COD
Sample Matrix: Soil
Analysis Method: SM 5220 C Modified
Prep Method: ALS SOP

Service Request: K1610998
Date Collected: 09/12/16
Date Received: 09/16/16
Units: mg/Kg
Basis: Dry

Chemical Oxygen Demand (COD)

Sample Name	Lab Code	Result	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
PAI-20-13.5-15/1609134-002A	K1610998-001	11800	120	-	1	09/29/16	9/28/16	
Method Blank	K1610998-MB	ND U	10	-	1	09/29/16	NA	

ALS Group USA, Corp.

dba ALS Environmental

QA/QC Report

Client: Fremont Analytical
Project: COD
Sample Matrix: Soil

Service Request: K1610998
Date Collected: NA
Date Received: NA
Date Analyzed: 09/29/16

Replicate Sample Summary
General Chemistry Parameters

Sample Name: Batch QC
Lab Code: K1610996-001

Units: mg/Kg
Basis: Dry

<u>Analyte Name</u>	<u>Analysis Method</u>	<u>MRL</u>	<u>MDL</u>	<u>Sample Result</u>	<u>Duplicate Sample K1610996-001DUP Result</u>	<u>Average</u>	<u>RPD</u>	<u>RPD Limit</u>
Chemical Oxygen Demand (COD)	SM 5220 C Modified	130	-	2980	3200	3090	7	20

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client: Fremont Analytical
Project: COD
Sample Matrix: Soil

Service Request: K1610998
Date Collected: N/A
Date Received: N/A
Date Analyzed: 09/29/16
Date Extracted: 09/28/16

Matrix Spike Summary
Chemical Oxygen Demand (COD)

Sample Name: Batch QC
Lab Code: K1610996-001
Analysis Method: SM 5220 C Modified
Prep Method: ALS SOP

Units: mg/Kg
Basis: Dry

Matrix Spike
K1610996-001MS

<u>Analyte Name</u>	<u>Sample Result</u>	<u>Result</u>	<u>Spike Amount</u>	<u>% Rec</u>	<u>% Rec Limits</u>
Chemical Oxygen Demand (COD)	2980	11300	6830	121	75-125

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client: Fremont Analytical
Project: COD
Sample Matrix: Soil

Service Request: K1610998
Date Analyzed: 09/29/16
Date Extracted: NA

Lab Control Sample Summary
Chemical Oxygen Demand (COD)

Analysis Method: SM 5220 C Modified
Prep Method: None

Units: mg/Kg
Basis: Dry
Analysis Lot: 516546

Sample Name	Lab Code	Result	Spike Amount	% Rec	% Rec Limits
Lab Control Sample	K1610998-LCS	231	242	96	85-115

Work Order: 1609134
CLIENT: GeoEngineers
Project: Gas Works Park Site

QC SUMMARY REPORT
Sulfide by SM 4500-S2-F

Sample ID MB-R31948	SampType: MBLK	Units: mg/L			Prep Date: 9/23/2016	RunNo: 31948					
Client ID: MBLKW	Batch ID: R31948				Analysis Date: 9/23/2016	SeqNo: 603839					
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Sulfide ND 0.500

Sample ID LCS-R31948	SampType: LCS	Units: mg/L			Prep Date: 9/23/2016	RunNo: 31948					
Client ID: LCSW	Batch ID: R31948				Analysis Date: 9/23/2016	SeqNo: 603840					
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Sulfide 1.80 0.500 2.000 0 90.0 65 135

Sample ID 1609134-001BDUP	SampType: DUP	Units: mg/L			Prep Date: 9/23/2016	RunNo: 31948					
Client ID: PAI-20S-160912	Batch ID: R31948				Analysis Date: 9/23/2016	SeqNo: 603842					
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Sulfide 240 50.0 280.0 15.4 30 H

Sample ID 1609134-001BMS	SampType: MS	Units: mg/L			Prep Date: 9/23/2016	RunNo: 31948					
Client ID: PAI-20S-160912	Batch ID: R31948				Analysis Date: 9/23/2016	SeqNo: 603843					
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Sulfide 460 50.0 200.0 280.0 90.0 65 135 H

Sample ID 1609134-001BMSD	SampType: MSD	Units: mg/L			Prep Date: 9/23/2016	RunNo: 31948					
Client ID: PAI-20S-160912	Batch ID: R31948				Analysis Date: 9/23/2016	SeqNo: 603844					
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Sulfide 480 50.0 200.0 280.0 100 65 135 460.0 4.26 30 H

Client Name: **GEI**
 Logged by: **Erica Silva**

Work Order Number: **1609134**
 Date Received: **9/12/2016 4:23:00 PM**

Chain of Custody

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

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
 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:	<input type="text" value="Sandy Smith"/>	Date:	<input type="text" value="9/12/2016"/>
By Whom:	<input type="text" value="Chelsea Ward"/>	Via:	<input type="checkbox"/> eMail <input checked="" type="checkbox"/> Phone <input type="checkbox"/> Fax <input type="checkbox"/> In Person
Regarding:	<input type="text"/>		
Client Instructions:	<input type="text" value="Water volume not field filtered as originally intended, analyze for Total Metals"/>		

19. Additional remarks:

Water sample on hold, soil to be analyzed.

Item Information

Item #	Temp °C
Cooler	3.8
Sample	3.8
Temp Blank	4.0

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



3600 Fremont Ave N.
Seattle, WA 98103
Tel: 206-352-3790
Fax: 206-352-7178

Client: GeoEngineers
Address: 600 Stewart Street, Suite 1700
Seattle, WA 98103
City, State, Zip: Seattle, WA 98103
Telephone: 253-722-2418

Matrix Codes: A = Air, AQ = Aqueous, B = Bulk, O = Other, P = Product, S = Soil, SD = Sediment, SL = Sludg, W = Water, DW = Drinking Water, GW = Ground Water, SW = Storm Water, WW = Waste Water

Chain of Custody Record and Laboratory Services Agreement

Date: 9/12/2016

Laboratory Project No (Internal): 1609134

Page: 1 of 1

Project Name: Gas Works Park Site
Project No: 0186-846-01 Task 1803

Location: Seattle
Report To (PM): Sandra Smith / Claudia De La Via

Report To (PM):
PM Email: ssmith@geoengineers.com

geoengineers.com
cclavia@geoengineers.com

Sample Name	Sample Date	Sample Time	Sample Type (Matrix)*	Arsenic (EPA 200.8) field-filtered	Iron (EPA 200.8) field-filtered	Sulfide (4500-S2-F) field-filtered	COD (SM5220) field-filtered	COD (SM5220)	Grain Size (ASTM D422)	SVOCs (EPA 8270 / 625)	PAHs (EPA 8270 - SIM)	PCBs (EPA 8082 / 608)	Metals** (EPA 6020 / 200.8)	Total (T) Dissolved (D)	Comments
1 PAL- 205-160912	9/12	1440	GW	X	X	X	X								Sample not field filtered
2 PAL- 20-13.5-15	9/12	1430	S												
3 PAL-															
4 PAL-															
5 PAL-															
6 PAL-															
7 PAL-															
8 PAL-															
9 PAL-															
10 PAL-															

**Metals Analysis (Circle): MTC-A-5 RCA-8 Priority Pollutants TAL Individual: Ag Al As B Ba Be Ca Cd Co Cr Cu Fe Hg K Mg Mn Mo Na Ni Pb Sb Se Sr Sn Tl U V Zn

***Anions (Circle): Nitrate Nitrite Chloride Sulfate Bromide O-Phosphate Fluoride Nitrate+Nitrite

Sample Disposal: Return to Client Disposal by Lab (Samples will be held for 30 days unless otherwise noted. A fee may be assessed if samples are retained after 30 days.)

I represent that I am authorized to enter into this Agreement with Fremont Analytical on behalf of the Client named above, that I have verified Client's agreement to each of the terms on the front and backside of this Agreement.

Retinquished: Date/Time 9/12/16 16:15 Received: Date/Time 9/12/16 16:23

Special Remarks:
1. Groundwater arsenic and sulfide samples on ASAP TAT.
2. Groundwater Iron and COD plus soil COD and grain size samples on standard TAT.
3. Groundwater and soil RLS per the WO
4. COD = Chemical oxygen demand
5. Run for dissolved metals
TAT -> SameDay, NextDay, 2 Day, 3 Day, STD
Please coordinate with the lab in advance



3600 Fremont Ave N. **Tel: 206-352-3790**
 Seattle, WA 98103 **Fax: 206-352-7178**

Chain of Custody Record and Laboratory Services Agreement

Date: 9/12/2016

Laboratory Project No (Internal): 1609134

Page: 1 of 1

Project Name: Gas Works Park Site

Project No: 0186-946-01 Task 1803

Collected by: GRI/CVD

Location: Seattle

Report To (PM): Sandra Smith / Claudia De La Via

Client: Geoenigneers

Address: 600 Stewart Street, Suite 1700

City, State, zip: Seattle, WA 98103

Telephone: 253.722.2418

Fax: 253.722.2418

Matrix Codes: A = Air, AQ = Aqueous, B = Bulk, O = Other, P = Product, S = Soil, SD = Sediment, SL = Solid, W = Water, PW = Drinking Water, GW = Ground Water, SW = Storm Water, WW = Waste Water

Sample Name	Sample Date	Sample Time	Sample Type (Matrix)*	Analytes											Comments			
				Arsenic (EPA 200.8) field-filtered	Iron (EPA 200.8) field-filtered	Sulfide (4500-S2-F) field-filtered	COD (SM5220) field-filtered	COD (SM5220)	Grain Size (ASTM D422)	SVOCs (EPA 8270 / 625)	PAHs (EPA 8270 - SIM)	PCBs (EPA 8082 / 608)	Metals** (EPA 6020 / 200.8)	Total (T) Dissolved (D)				
1 PAL- 205-160912	9/12	1440	GW	X	X	X	X										Sample not field filtered	
2 PAL- 20-13.5-15	9/12	1430	S															* Proceed w/ soil analysis only per client instructions 9/20/16
3 PAL-																		
4 PAL-																		
5 PAL-																		
6 PAL-																		
7 PAL-																		
8 PAL-																		
9 PAL-																		
10 PAL-																		

***Metals Analysis (Circle): MTCA-5 RCHA-8 Priority Pollutants TAL Individual: Ag Al As B Ba Be Ca Cd Co Cr Cu Fe Hg K Mg Mn Mo Na Ni Pb Ni Pb Ni Sb Se Sr Sn Tl U V Zn

***Anions (Circle): Nitrate Nitrite Chloride Sulfate Bromide O-Phosphate Fluoride Nitrate+Nitrite

Sample Disposal: Return to Client Disposal by Lab (Samples will be held for 30 days unless otherwise noted. A fee may be assessed if samples are retained after 30 days.)

Turn-around times for samples received after 4:00pm will begin on the following business day.

Special Remarks:
 1. Groundwater arsenic and sulfide samples on ASAP TAT.
 2. Groundwater Iron and COD plus soil COD and grain size samples on standard TAT.
 3. Groundwater and soil RIs per the WO
 4. COD = Chemical oxygen demand
 5. Run for dissolved metals

I represent that I am authorized to enter into this Agreement with Fremont Analytical on behalf of the Client named above, that I have verified Client's agreement to each of the terms on the front and backside of this Agreement.

Retinquished: [Signature] Date/Time: 9/12/16 16:15 Received: [Signature] Date/Time: 9/12/16 16:23

Retinquished: [Signature] Date/Time: 9/12/16 16:23 Received: [Signature] Date/Time: 9/12/16 16:23



GeoEngineers

Sandra Smith
600 Stewart Street, Suite 1700
Seattle, WA 98101

RE: Gas Works Park Site
Work Order Number: 1609139

October 13, 2016

Attention Sandra Smith:

Fremont Analytical, Inc. received 2 sample(s) on 9/13/2016 for the analyses presented in the following report.

Chemical Oxygen Demand by SM 5220D
Dissolved Metals by EPA Method 200.8
Grain Size by ASTM D422
Sulfide by SM 4500-S2-F

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: 10/13/2016

CLIENT: GeoEngineers
Project: Gas Works Park Site
Work Order: 1609139

Work Order Sample Summary

Lab Sample ID	Client Sample ID	Date/Time Collected	Date/Time Received
1609139-001	PAI-20D-160912	09/12/2016 5:00 PM	09/13/2016 9:50 AM
1609139-002	PAI-20-20-25	09/12/2016 4:30 PM	09/13/2016 9:50 AM

CLIENT: GeoEngineers
Project: Gas Works Park Site

I. SAMPLE RECEIPT:

Samples receipt information is recorded on the attached Sample Receipt Checklist.

II. GENERAL REPORTING COMMENTS:

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

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

III. ANALYSES AND EXCEPTIONS:

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

1609139-002B

C-COD has been Sub Contracted.



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



Client: GeoEngineers

Collection Date: 9/12/2016 5:00:00 PM

Project: Gas Works Park Site

Lab ID: 1609139-001

Matrix: Groundwater

Client Sample ID: PAI-20D-160912

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
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Dissolved Metals by EPA Method 200.8

Batch ID: 14788 Analyst: TN

Arsenic	841	0.500		µg/L	1	9/13/2016 12:32:18 PM
Iron	3,940	50.0		µg/L	1	9/13/2016 12:32:18 PM

Chemical Oxygen Demand by SM 5220D

Batch ID: R31756 Analyst: MW

Chemical Oxygen Demand	143	10.0		mg/L	1	9/15/2016 2:17:18 PM
------------------------	-----	------	--	------	---	----------------------

Sulfide by SM 4500-S2-F

Batch ID: R31715 Analyst: KT

Sulfide	9.20	0.119	MDL	mg/L	1	9/13/2016 4:10:00 PM
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NOTES:

Possible high bias detection due to matrix interference.
MDL - Sample reported to Method Detection Limit (MDL)

Grain Size by ASTM D422

Project: Gas Works Park Site
 Client: GeoEngineers
 Lab Project #: 1609139

Percent Finer (Passing) than the Indicated Size

UOM = Percent

Grain Size Classification	Gravel						Coarse Sand	Medium Sand			Fine Sand			Silt		
	3"	2"	1 1/2"	1"	3/4"	3/8"	#4	#10	#20	#40	#60	#140	#230	#325	#450	
Sieve Size	3"	2"	1 1/2"	1"	3/4"	3/8"	#4	#10	#20	#40	#60	#140	#230	#325	#450	
Particle Size (Microns)	76200	50800	38100	25400	19050	9525	4750	2000	850	425	250	106	75	45	34	
PAI-20-20-25	100%	100%	100%	100%	99.0%	88.2%	82.6%	77.1%	72.2%	64.5%	50.8%	21.9%	11.3%	3.87%	0.166%	

Grain Size by ASTM D422

Project: Gas Works Park Site
Client: GeoEngineers
Lab Project #: 1609139

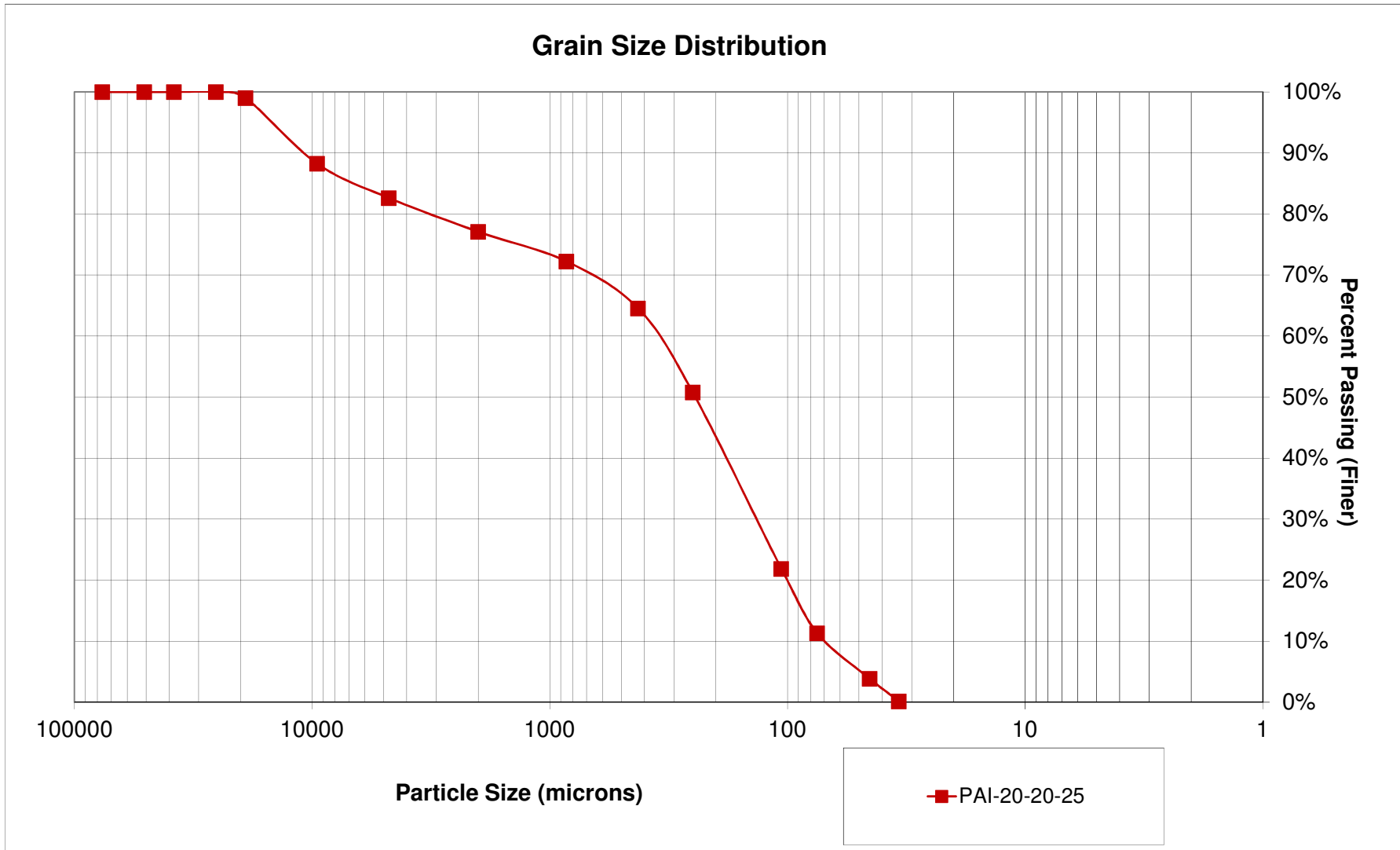
Percent Retained in Each Size Fraction

UOM = Percent

Grain Size Classification	<i>Gravel</i>							<i>Coarse Sand</i>	<i>Medium Sand</i>		<i>Fine Sand</i>			<i>Silt</i>		
	>76200	76200-50800	50800-38100	38100-25400	25400-19000	19050-9525	9525-4750	4750-2000	2000-850	850-425	425-250	250-106	106-62.5	72.5-45	45-34	<34
PAI-20-20-25	0.00%	0.00%	0.00%	0.00%	1.00%	10.7%	5.60%	5.51%	4.84%	7.66%	13.7%	28.8%	10.5%	7.43%	3.69%	0.165%

Grain Size by ASTM D422

Project: Gas Works Park Site
 Client: GeoEngineers
 Lab Project #: 1609139





ALS Environmental
ALS Group USA, Corp
1317 South 13th Avenue
Seattle, WA 98626
T: 1 360 577 7222
F: 1 360 636 1068
www.alsglobal.com

October 11, 2016

Analytical Report for Service Request No: 1611836

Mr. Michael Ridgeway
Fremont Analytical
3600 Fremont Avenue, North
Seattle, WA 98103

RE: COD

Dear Mr. Ridgeway,

Enclosed are the results of the sample(s) submitted to our laboratory October 04, 2016
For your reference, these analyses have been assigned our service request number **K1611836**.

Analyses were performed according to our laboratory's EPA-approved quality assurance program. The test results meet requirements of the current EPA standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of EPA-accredited analytes, refer to the certifications section at www.alsglobal.com. All results are intended to be considered in their entirety, and ALS Group USA, Corp. dba ALS Environmental (ALS) is not responsible for use of less than the complete report. Results apply only to the items submitted to the laboratory for analysis and individual items (samples) analyzed, as listed in the report.

Please contact me if you have any questions. My extension is 3375. You may also contact me via email at Janet.Malloch@alsglobal.com.

Respectfully submitted,

ALS Group USA, Corp. dba ALS Environmental

Janet Malloch
Project Manager



A S Environmental
A S roup SA, orp
1317 South 13th Avenue
also, WA 98626
T : 1 360 577 7222
F : 1 360 636 1068
www.alsglobal.com

Table of Contents

Acronyms

Qualifiers

State Certifications, Accreditations, And Licenses

Chain of Custody

Total Solids

General Chemistry

Acronyms

ASTM	American Society for Testing and Materials
A2LA	American Association for Laboratory Accreditation
CARB	California Air Resources Board
CAS Number	Chemical Abstract Service registry Number
CFC	Chlorofluorocarbon
CFU	Colony-Forming Unit
DEC	Department of Environmental Conservation
DEQ	Department of Environmental Quality
DHS	Department of Health Services
DOE	Department of Ecology
DOH	Department of Health
EPA	U. S. Environmental Protection Agency
ELAP	Environmental Laboratory Accreditation Program
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
LOD	Limit of Detection
LOQ	Limit of Quantitation
LUFT	Leaking Underground Fuel Tank
M	Modified
MCL	Maximum Contaminant Level is the highest permissible concentration of a substance allowed in drinking water as established by the USEPA.
MDL	Method Detection Limit
MPN	Most Probable Number
MRL	Method Reporting Limit
NA	Not Applicable
NC	Not Calculated
NCASI	National Council of the Paper Industry for Air and Stream Improvement
ND	Not Detected
NIOSH	National Institute for Occupational Safety and Health
PQL	Practical Quantitation Limit
RCRA	Resource Conservation and Recovery Act
SIM	Selected Ion Monitoring
TPH	Total Petroleum Hydrocarbons
tr	Trace level is the concentration of an analyte that is less than the PQL but greater than or equal to the MDL.

Inorganic Data Qualifiers

- * The result is an outlier. See case narrative.
- # The control limit criteria is not applicable. See case narrative.
- B The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards.
- E The result is an estimate amount because the value exceeded the instrument calibration range.
- J The result is an estimated value.
- U The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
DOD-QSM 4.2 definition : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
- i The MRL/MDL or LOQ/LOD is elevated due to a matrix interference.
- X See case narrative.
- Q See case narrative. One or more quality control criteria was outside the limits.
- H The holding time for this test is immediately following sample collection. The samples were analyzed as soon as possible after receipt by the laboratory.

Metals Data Qualifiers

- # The control limit criteria is not applicable. See case narrative.
- J The result is an estimated value.
- E The percent difference for the serial dilution was greater than 10%, indicating a possible matrix interference in the sample.
- M The duplicate injection precision was not met.
- N The Matrix Spike sample recovery is not within control limits. See case narrative.
- S The reported value was determined by the Method of Standard Additions (MSA).
- U The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
DOD-QSM 4.2 definition : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
- W The post-digestion spike for furnace AA analysis is out of control limits, while sample absorbance is less than 50% of spike absorbance.
 - i The MRL/MDL or LOQ/LOD is elevated due to a matrix interference.
- X See case narrative.
- + The correlation coefficient for the MSA is less than 0.995.
- Q See case narrative. One or more quality control criteria was outside the limits.

Organic Data Qualifiers

- * The result is an outlier. See case narrative.
- # The control limit criteria is not applicable. See case narrative.
- A A tentatively identified compound, a suspected aldol-condensation product.
- B The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards.
- C The analyte was qualitatively confirmed using GC/MS techniques, pattern recognition, or by comparing to historical data.
- D The reported result is from a dilution.
- E The result is an estimated value.
- J The result is an estimated value.
- N The result is presumptive. The analyte was tentatively identified, but a confirmation analysis was not performed.
- P The GC or HPLC confirmation criteria was exceeded. The relative percent difference is greater than 40% between the two analytical results.
- U The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
DOD-QSM 4.2 definition : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
 - i The MRL/MDL or LOQ/LOD is elevated due to a chromatographic interference.
- X See case narrative.
- Q See case narrative. One or more quality control criteria was outside the limits.

Additional Petroleum Hydrocarbon Specific Qualifiers

- F The chromatographic fingerprint of the sample matches the elution pattern of the calibration standard.
- L The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of lighter molecular weight constituents than the calibration standard.
- H The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of heavier molecular weight constituents than the calibration standard.
- O The chromatographic fingerprint of the sample resembles an oil, but does not match the calibration standard.
- Y The chromatographic fingerprint of the sample resembles a petroleum product eluting in approximately the correct carbon range, but the elution pattern does not match the calibration standard.
- Z The chromatographic fingerprint does not resemble a petroleum product.

**ALS Group USA Corp. dba ALS Environmental (ALS) - Kelso
State Certifications, Accreditations, and Licenses**

Agency	Web Site	Number
Alaska DEC UST	http://dec.alaska.gov/applications/eh/ehllabreports/USTLabs.aspx	UST-040
Arizona DHS	http://www.azdhs.gov/lab/license/env.htm	AZ0339
Arkansas - DEQ	http://www.adeq.state.ar.us/techsvs/labcert.htm	88-0637
California DHS (ELAP)	http://www.cdph.ca.gov/certlic/labs/Pages/ELAP.aspx	2795
DOD ELAP	http://www.denix.osd.mil/edqw/Accreditation/AccreditedLabs.cfm	L14-51
Florida DOH	http://www.doh.state.fl.us/lab/EnvLabCert/WaterCert.htm	E87412
Hawaii DOH	Not available	-
ISO 17025	http://www.pjllabs.com/	L16-57
Louisiana DEQ	http://www.deq.louisiana.gov/portal/DIVISIONS/PublicParticipationandPermitSupport/LouisianaLaboratoryAccreditationProgram.aspx	03016
Maine DHS	Not available	WA01276
Minnesota DOH	http://www.health.state.mn.us/accreditation	053-999-457
Montana DPHHS	http://www.dphhs.mt.gov/publichealth/	CERT0047
Nevada DEP	http://ndep.nv.gov/bsdw/labservice.htm	WA01276
New Jersey DEP	http://www.nj.gov/dep/oqa/	WA005
North Carolina DWQ	http://www.dwqlab.org/	605
Oklahoma DEQ	http://www.deq.state.ok.us/CSDnew/labcert.htm	9801
Oregon – DEQ (NELAP)	http://public.health.oregon.gov/LaboratoryServices/EnvironmentalLaboratoryAccreditation/Pages/index.aspx	WA100010
South Carolina DHEC	http://www.scdhec.gov/environment/envserv/	61002
Texas CEQ	http://www.tceq.texas.gov/field/qa/env_lab_accreditation.html	T104704427
Washington DOE	http://www.ecy.wa.gov/programs/eap/labs/lab-accreditation.html	C544
Wyoming (EPA Region 8)	http://www.epa.gov/region8/water/dwhome/wyomingdi.html	-
Kelso Laboratory Website	www.alsglobal.com	NA

Analyses were performed according to our laboratory's NELAP-approved quality assurance program. A complete listing of specific NELAP-certified analytes, can be found in the certification section at www.ALSGlobal.com or at the accreditation bodies web site.

Please refer to the certification and/or accreditation body's web site if samples are submitted for compliance purposes. The states highlighted above, require the analysis be listed on the state certification if used for compliance purposes and if the method/analyte is offered by that state.



Chain of Custody

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360)577-7222 Fax (360)636-1068
www.alsglobal.com



CHAIN OF CUSTODY RECORD

Omega COCID 287 PAGE: 1 OF: 1

ADDRESS

Fremont Analytical, Inc.
 3600 Fremont Ave. N.
 Seattle, WA 98103
 TEL: 206-352-3790
 FAX: 206-352-7178

Website: www.fremontanalytical.com

K1611836

SUB CONTRACTOR: ALS		COMPANY: ALS Environmental		SPECIAL INSTRUCTIONS / COMMENTS: <i>Please email results to mridgenry@fremontanalytical.com curre@fremontanalytical.com low level RLs for COC please - RUSH</i>			
ADDRESS: 1317 South 13th Avenue							
CITY, STATE, ZIP: Kelso, WA 98626							
PHONE: (360) 577-7222		FAX: EMAIL:					
ACCOUNT #:				ANALYTICAL PARAMETERS			
ITEM	SAMPLE ID	Client Sample ID	Bottle Type	MATRIX	DATE COLLECTED	NUMBER OF CONTAINERS	COMMENTS Methanol Preserved Weights HOT Sample Notation Additional Sample Description, etc.
1	1609139-002B	PAI-20-20-25	CLEAR JARS 4	Soil	9/12/2016 4:30:00 PM	1	

Relinquished By: <i>[Signature]</i>	Date: 10/3/16	Time: 9:40	Received By: <i>[Signature]</i>	Date: 10/4/16	Time: 1030	REPORT TRANSMITTAL DESIRED: <input type="checkbox"/> HARDCOPY (extra cost) <input type="checkbox"/> FAX <input type="checkbox"/> EMAIL <input type="checkbox"/> ONLINE	
Relinquished By:	Date:	Time:	Received By:	Date:	Time:		
Relinquished By:	Date:	Time:	Received By:	Date:	Time:		
TAT: Standard <input type="checkbox"/> RUSH Next BD <input type="checkbox"/> 2nd BD <input type="checkbox"/> 3rd BD <input checked="" type="checkbox"/>						FOR LAB USE ONLY	
Temp of samples _____ °C Attempt to Cool? _____						Comments: _____	
Note: RUSH requests will incur surcharges!							



PC Amst

Cooler Receipt and Preservation Form

Client Fremont Analytical Service Request K16 HP36

Received: 10/4/16 Opened: 10/4/16 By: CG Unloaded: 10/4/16 By: CG

- 1. Samples were received via? Mail Fed Ex UPS DHL PDX Courier Hand Delivered
- 2. Samples were received in: (circle) cooler Box Envelope Other _____ NA
- 3. Were custody seals on coolers? NA Y N If yes, how many and where? _____
If present, were custody seals intact? Y N If present, were they signed and dated? Y N

Raw Cooler Temp	Corrected Cooler Temp	Raw Temp Blank	Corrected Temp Blank	Corr. Factor	Thermometer ID	Cooler/COC ID	Tracking Number	NA	Filed
-0.5	-0.6			-0.1	366	287 (NA)	1Z X61 92X 03 3204 3311		

- 4. Packing material: Inserts Baggies Bubble Wrap Gel Packs Wet Ice Dry Ice Sleeves _____
- 5. Were custody papers properly filled out (ink, signed, etc.)? NA Y N
- 6. Did all bottles arrive in good condition (unbroken)? Indicate in the table below. NA Y N
- 7. Were all sample labels complete (i.e analysis, preservation, etc.)? NA Y N
- 8. Did all sample labels and tags agree with custody papers? Indicate major discrepancies in the table on page 2. NA Y N
- 9. Were appropriate bottles/containers and volumes received for the tests indicated? NA Y N
- 10. Were the pH-preserved bottles (see SMO GEN SOP) received at the appropriate pH? Indicate in the table below. (NA) Y N
- 11. Were VOA vials received without headspace? Indicate in the table below. (NA) Y N
- 12. Was C12/Res negative? (NA) Y N

Sample ID on Bottle	Sample ID on COC	Identified by:

Sample ID	Bottle Count	Out of	Head-	Broke	pH	Reagent	Volume	Reagent Lot	Initials	Time
	Bottle Type	Temp	space				added	Number		

Notes, Discrepancies, & Resolutions: _____

RUSH

Page _____ of _____



Total Solids

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360)577-7222 Fax (360)636-1068
www.alsglobal.com

ALS Group USA, Corp.
dba ALS Environmental

Analytical Report

Client: Fremont Analytical
Project: COD
Sample Matrix: Soil
Analysis Method: 160.3 Modified
Prep Method: None

Service Request: K1611836
Date Collected: 09/12/16
Date Received: 10/4/16
Units: Percent
Basis: As Received

Solids, Total

Sample Name	Lab Code	Result	MRL	MDL	Dil.	Date Analyzed	Q
1609139-002B	K1611836-001	91.3	-	-	1	10/04/16 12:26	

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client: Fremont Analytical
Project: COD
Sample Matrix: Soil
Analysis Method: 160.3 Modified
Prep Method: None

Service Request: K1611836
Date Collected: NA
Date Received: NA

Units: Percent
Basis: As Received

Replicate Sample Summary
Inorganic Parameters

Sample Name:	Lab Code:	MRL	Sample Result	Duplicate Result	Average	RPD	RPD Limit	Date Analyzed
Batch QC	K1611378-001DUP	-	78.0	77.9	78.0	<1	20	10/04/16
Batch QC	K1611446-006DUP	-	96.1	96.0	96.1	<1	20	10/04/16

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.



General Chemistry

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
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www.alsglobal.com

ALS Group USA, Corp.
dba ALS Environmental

Analytical Report

Client: Fremont Analytical
Project: COD
Sample Matrix: Soil
Analysis Method: SM 5220 C Modified
Prep Method: ALS SOP

Service Request: K1611836
Date Collected: 09/12/16
Date Received: 10/4/16
Units: mg/Kg
Basis: Dry

Chemical Oxygen Demand (COD)

Sample Name	Lab Code	Result	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
1609139-002B	K1611836-001	5970	810	-	1	10/07/16 16:00	10/7/16	
Method Blank	K1611836-MB	ND U	200	-	1	10/07/16 16:00	NA	

ALS Group USA, Corp.

dba ALS Environmental

QA/QC Report

Client: Fremont Analytical
Project: COD
Sample Matrix: Soil

Service Request: K1611836
Date Collected: 09/12/16
Date Received: 10/04/16
Date Analyzed: 10/07/16

Replicate Sample Summary
General Chemistry Parameters

Sample Name: 1609139-002B
Lab Code: K1611836-001

Units: mg/Kg
Basis: Dry

<u>Analyte Name</u>	<u>Analysis Method</u>	<u>MRL</u>	<u>MDL</u>	<u>Sample Result</u>	<u>Duplicate Sample K1611836-001DUP Result</u>	<u>Average</u>	<u>RPD</u>	<u>RPD Limit</u>
Chemical Oxygen Demand (COD)	SM 5220 C Modified	610	-	5970	3720	4850	47 *	20

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client: Fremont Analytical
Project: COD
Sample Matrix: Soil

Service Request: K1611836
Date Collected: 09/12/16
Date Received: 10/04/16
Date Analyzed: 10/7/16
Date Extracted: 10/7/16

Matrix Spike Summary
Chemical Oxygen Demand (COD)

Sample Name: 1609139-002B
Lab Code: K1611836-001
Analysis Method: SM 5220 C Modified
Prep Method: ALS SOP

Units: mg/Kg
Basis: Dry

Matrix Spike
K1611836-001MS

<u>Analyte Name</u>	<u>Sample Result</u>	<u>Result</u>	<u>Spike Amount</u>	<u>% Rec</u>	<u>% Rec Limits</u>
Chemical Oxygen Demand (COD)	5970	64500	52400	112	75-125

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client: Fremont Analytical
Project: COD
Sample Matrix: Soil

Service Request: K1611836
Date Analyzed: 10/07/16
Date Extracted: NA

Lab Control Sample Summary
Chemical Oxygen Demand (COD)

Analysis Method: SM 5220 C Modified
Prep Method: None

Units: mg/Kg
Basis: Dry
Analysis Lot: 517791

Sample Name	Lab Code	Result	Spike Amount	% Rec	% Rec Limits
Lab Control Sample	K1611836-LCS	4540	4840	94	85-115

Work Order: 1609139
CLIENT: GeoEngineers
Project: Gas Works Park Site

QC SUMMARY REPORT
Dissolved Metals by EPA Method 200.8

Sample ID MB-14768FB	SampType: MBLK	Units: µg/L			Prep Date: 9/13/2016	RunNo: 31701					
Client ID: MBLKW	Batch ID: 14788				Analysis Date: 9/13/2016	SeqNo: 598765					
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Arsenic	ND	0.500									
Iron	ND	100									

Sample ID MB-14788	SampType: MBLK	Units: µg/L			Prep Date: 9/13/2016	RunNo: 31701					
Client ID: MBLKW	Batch ID: 14788				Analysis Date: 9/13/2016	SeqNo: 598768					
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Arsenic	ND	0.500									
Iron	ND	50.0									

Sample ID LCS-14788	SampType: LCS	Units: µg/L			Prep Date: 9/13/2016	RunNo: 31701					
Client ID: LCSW	Batch ID: 14788				Analysis Date: 9/13/2016	SeqNo: 598769					
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Arsenic	101	0.500	100.0	0	101	85	115				
Iron	996	50.0	1,000	0	99.6	50	150				

Sample ID 1609098-001CDUP	SampType: DUP	Units: µg/L			Prep Date: 9/13/2016	RunNo: 31701					
Client ID: BATCH	Batch ID: 14788				Analysis Date: 9/13/2016	SeqNo: 598771					
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Arsenic	1.49	0.500						1.626	8.50	30	
Iron	ND	50.0						0		30	

Sample ID 1609098-001CMS	SampType: MS	Units: µg/L			Prep Date: 9/13/2016	RunNo: 31701					
Client ID: BATCH	Batch ID: 14788				Analysis Date: 9/13/2016	SeqNo: 598772					
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Arsenic	512	0.500	500.0	1.626	102	70	130				
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Work Order: 1609139
CLIENT: GeoEngineers
Project: Gas Works Park Site

QC SUMMARY REPORT
Dissolved Metals by EPA Method 200.8

Sample ID 1609098-001CMS	SampType: MS		Units: µg/L	Prep Date: 9/13/2016	RunNo: 31701						
Client ID: BATCH	Batch ID: 14788			Analysis Date: 9/13/2016	SeqNo: 598772						
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Iron	4,900	50.0	5,000	0	98.0	50	150				
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Sample ID 1609098-001CMSD	SampType: MSD		Units: µg/L	Prep Date: 9/13/2016	RunNo: 31701						
Client ID: BATCH	Batch ID: 14788			Analysis Date: 9/13/2016	SeqNo: 598773						
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Arsenic	526	0.500	500.0	1.626	105	70	130	512.4	2.70	30
Iron	5,260	50.0	5,000	0	105	50	150	4,901	6.97	30

Work Order: 1609139
CLIENT: GeoEngineers
Project: Gas Works Park Site

QC SUMMARY REPORT
Sulfide by SM 4500-S2-F

Sample ID MB-R31715	SampType: MBLK	Units: mg/L	Prep Date: 9/13/2016	RunNo: 31715							
Client ID: MBLKW	Batch ID: R31715	Analysis Date: 9/13/2016	SeqNo: 598997								
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Sulfide ND 0.500

Sample ID LCS-R31715	SampType: LCS	Units: mg/L	Prep Date: 9/13/2016	RunNo: 31715							
Client ID: LCSW	Batch ID: R31715	Analysis Date: 9/13/2016	SeqNo: 598998								
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Sulfide 1.80 0.500 2.000 0 90.0 65 135

Sample ID 1609139-001BDUP	SampType: DUP	Units: mg/L	Prep Date: 9/13/2016	RunNo: 31715							
Client ID: PAI-20D-160912	Batch ID: R31715	Analysis Date: 9/13/2016	SeqNo: 599000								
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Sulfide 9.60 0.500 9.200 4.26 30

Sample ID 1609139-001BMS	SampType: MS	Units: mg/L	Prep Date: 9/13/2016	RunNo: 31715							
Client ID: PAI-20D-160912	Batch ID: R31715	Analysis Date: 9/13/2016	SeqNo: 599001								
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Sulfide 11.0 0.500 2.000 9.200 90.0 65 135

Sample ID 1609139-001BMSD	SampType: MSD	Units: mg/L	Prep Date: 9/13/2016	RunNo: 31715							
Client ID: PAI-20D-160912	Batch ID: R31715	Analysis Date: 9/13/2016	SeqNo: 599002								
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Sulfide 10.8 0.500 2.000 9.200 80.0 65 135 11.00 1.83 30

Client Name: **GEI**
 Logged by: **Chelsea Ward**

Work Order Number: **1609139**
 Date Received: **9/13/2016 9:50:00 AM**

Chain of Custody

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

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
 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:	<input type="text"/>	Date:	<input type="text"/>
By Whom:	<input type="text"/>	Via:	<input type="checkbox"/> eMail <input type="checkbox"/> Phone <input type="checkbox"/> Fax <input type="checkbox"/> In Person
Regarding:	<input type="text"/>		
Client Instructions:	<input type="text"/>		

19. Additional remarks:

Item Information

Item #	Temp °C
Cooler	5.8
Sample	1.1
Temp Blank	2.6

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



GeoEngineers

Sandra Smith
600 Stewart Street, Suite 1700
Seattle, WA 98101

RE: Gas Works Park Site
Work Order Number: 1609151

October 06, 2016

Attention Sandra Smith:

Fremont Analytical, Inc. received 6 sample(s) on 9/13/2016 for the analyses presented in the following report.

Chemical Oxygen Demand by SM 5220D
Dissolved Metals by EPA Method 200.8
Grain Size by ASTM D422
Sulfide by SM 4500-S2-F

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



CLIENT: GeoEngineers
Project: Gas Works Park Site
Work Order: 1609151

Work Order Sample Summary

Lab Sample ID	Client Sample ID	Date/Time Collected	Date/Time Received
1609151-001	PAI-19-22.5-24.5	09/13/2016 11:20 AM	09/13/2016 4:01 PM
1609151-002	PAI-19-24.5-25	09/13/2016 11:25 AM	09/13/2016 4:01 PM
1609151-003	PAI-19-11-12	09/13/2016 12:00 PM	09/13/2016 4:01 PM
1609151-004	PAI-19-D-160913	09/13/2016 11:51 AM	09/13/2016 4:01 PM
1609151-005	PAI-19-S-160913	09/13/2016 1:08 PM	09/13/2016 4:01 PM
1609151-006	PAI-20-S-160913	09/13/2016 3:30 PM	09/13/2016 4:01 PM

CLIENT: GeoEngineers
Project: Gas Works Park Site

I. SAMPLE RECEIPT:

Samples receipt information is recorded on the attached Sample Receipt Checklist.

II. GENERAL REPORTING COMMENTS:

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

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

III. ANALYSES AND EXCEPTIONS:

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

Qualifiers:

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



Client: GeoEngineers

Collection Date: 9/13/2016 11:51:00 AM

Project: Gas Works Park Site

Lab ID: 1609151-004

Matrix: Groundwater

Client Sample ID: PAI-19-D-160913

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
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Dissolved Metals by EPA Method 200.8

Batch ID: 14806 Analyst: TN

Arsenic	143	0.500		µg/L	1	9/14/2016 11:21:49 AM
Iron	11,700	50.0		µg/L	1	9/14/2016 11:21:49 AM

Chemical Oxygen Demand by SM 5220D

Batch ID: R31756 Analyst: MW

Chemical Oxygen Demand	114	100	D	mg/L	10	9/15/2016 2:17:18 PM
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Sulfide by SM 4500-S2-F

Batch ID: R31715 Analyst: KT

Sulfide	ND	0.119	MDL	mg/L	1	9/13/2016 4:30:00 PM
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NOTES:

MDL - Sample reported to Method Detection Limit (MDL)



Client: GeoEngineers

Collection Date: 9/13/2016 1:08:00 PM

Project: Gas Works Park Site

Lab ID: 1609151-005

Matrix: Groundwater

Client Sample ID: PAI-19-S-160913

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
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Dissolved Metals by EPA Method 200.8

Batch ID: 14806 Analyst: TN

Arsenic	3,510	0.500		µg/L	1	9/14/2016 11:43:06 AM
Iron	2,130	50.0		µg/L	1	9/14/2016 11:43:06 AM

Chemical Oxygen Demand by SM 5220D

Batch ID: R31756 Analyst: MW

Chemical Oxygen Demand	325	100	D	mg/L	10	9/15/2016 2:17:18 PM
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Sulfide by SM 4500-S2-F

Batch ID: R31715 Analyst: KT

Sulfide	27.6	0.119	MDL	mg/L	1	9/13/2016 4:35:00 PM
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NOTES:

Possible high bias detection due to matrix interference.
MDL - Sample reported to Method Detection Limit (MDL)



Client: GeoEngineers

Collection Date: 9/13/2016 3:30:00 PM

Project: Gas Works Park Site

Lab ID: 1609151-006

Matrix: Groundwater

Client Sample ID: PAI-20-S-160913

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
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Dissolved Metals by EPA Method 200.8

Batch ID: 14806 Analyst: TN

Arsenic	4,460	0.500		µg/L	1	9/14/2016 11:46:41 AM
Iron	1,770	50.0		µg/L	1	9/14/2016 11:46:41 AM

Chemical Oxygen Demand by SM 5220D

Batch ID: R31756 Analyst: MW

Chemical Oxygen Demand	193	100	D	mg/L	10	9/15/2016 2:17:18 PM
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Sulfide by SM 4500-S2-F

Batch ID: R31736 Analyst: KT

Sulfide	32.0	5.00	MDL	mg/L	1	9/14/2016 3:36:00 PM
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NOTES:

Possible high bias detection due to matrix interference.
MDL - Sample reported to Method Detection Limit (MDL)

Grain Size by ASTM D422

Project: Gas Works Park Site
Client: GeoEngineers
Lab Project #: 1609151

Percent Finer (Passing) than the Indicated Size

UOM = Percent

Grain Size Classification	Gravel						Coarse Sand	Medium Sand			Fine Sand			Silt		
	Sieve Size	3"	2"	1 1/2"	1"	3/4"	3/8"	#4	#10	#20	#40	#60	#140	#230	#325	#450
Particle Size (Microns)	76200	50800	38100	25400	19050	9525	4750	2000	850	425	250	106	75	45	34	
PAI-19-22.5-24.5	100%	100%	100%	100%	79.2%	62.7%	56.4%	51.3%	47.7%	43.0%	35.2%	18.6%	12.7%	5.53%	1.31%	
PAI-19-11-12	100%	100%	100%	100%	94.3%	79.5%	69.5%	58.3%	47.8%	32.7%	19.2%	7.51%	5.15%	3.07%	1.47%	

Grain Size by ASTM D422

Project: Gas Works Park Site
Client: GeoEngineers
Lab Project #: 1609151

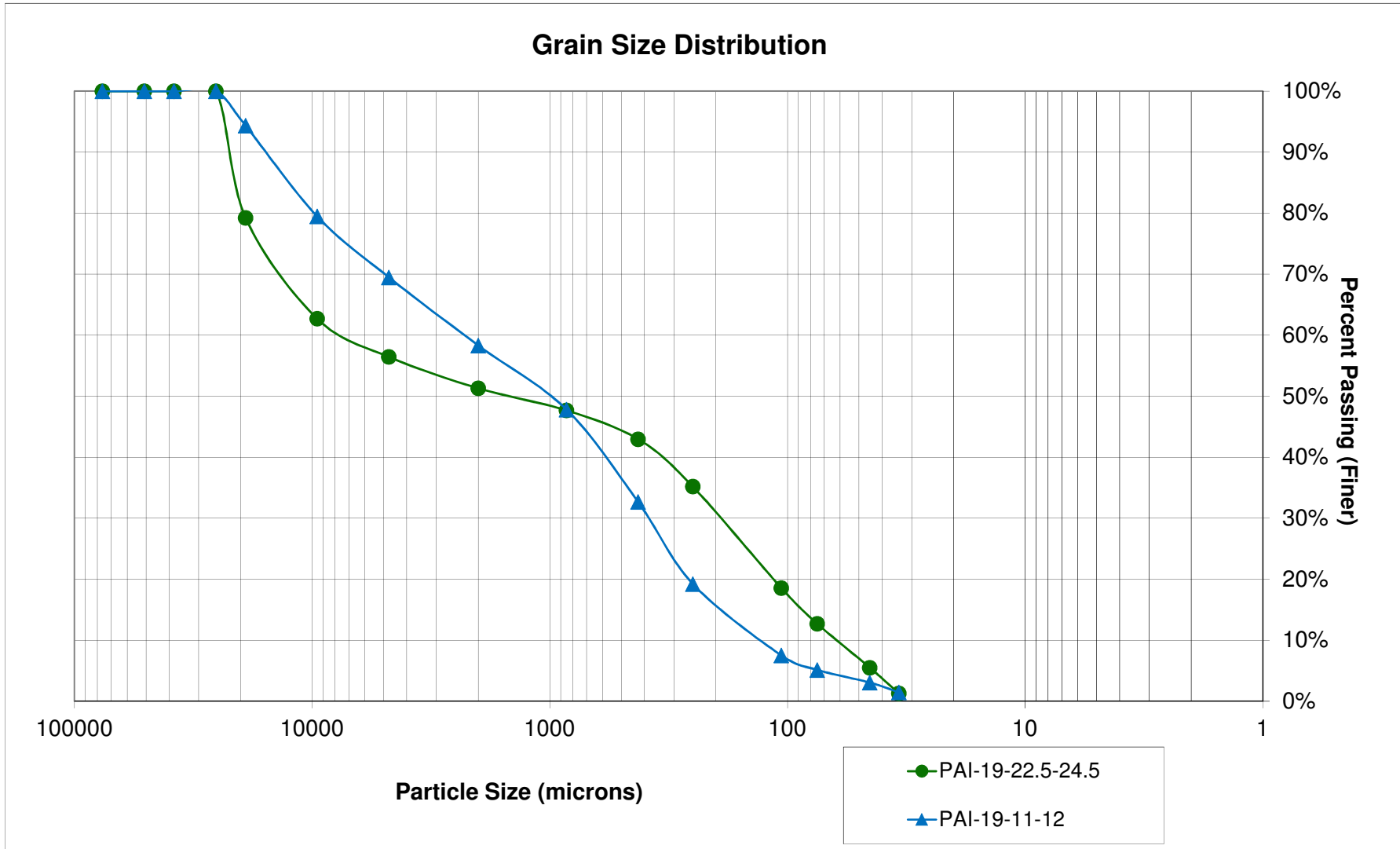
Percent Retained in Each Size Fraction

UOM = Percent

Grain Size Classification	<i>Gravel</i>							<i>Coarse Sand</i>	<i>Medium Sand</i>		<i>Fine Sand</i>			<i>Silt</i>		
	>76200	76200-50800	50800-38100	38100-25400	25400-19000	19050-9525	9525-4750	4750-2000	2000-850	850-425	425-250	250-106	106-62.5	72.5-45	45-34	<34
PAI-19-22.5-24.5	0.00%	0.00%	0.00%	0.00%	20.7%	16.5%	6.26%	5.13%	3.62%	4.70%	7.77%	16.6%	5.82%	7.19%	4.21%	1.30%
PAI-19-11-12	0.00%	0.00%	0.00%	0.00%	5.65%	14.8%	10.0%	11.1%	10.49%	15.1%	13.4%	11.7%	2.36%	2.07%	1.60%	1.46%

Grain Size by ASTM D422

Project: Gas Works Park Site
 Client: GeoEngineers
 Lab Project #: 1609151





ALS Environmental
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October 06, 2016

Analytical Report for Service Request No: 1610999

Mr. Michael Ridgeway
Fremont Analytical
3600 Fremont Avenue, North
Seattle, WA 98103

RE: COD

Dear Mr. Ridgeway,

Enclosed are the results of the sample(s) submitted to our laboratory September 16, 2016. For your reference, these analyses have been assigned our service request number **K1610999**.

Analyses were performed according to our laboratory's EPA-approved quality assurance program. The test results meet requirements of the current EPA standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of EPA-accredited analytes, refer to the certifications section at www.alsglobal.com. All results are intended to be considered in their entirety, and ALS Group USA, Corp. dba ALS Environmental (ALS) is not responsible for use of less than the complete report. Results apply only to the items submitted to the laboratory for analysis and individual items (samples) analyzed, as listed in the report.

Please contact me if you have any questions. My extension is 3375. You may also contact me via email at Janet.Malloch@alsglobal.com.

Respectfully submitted,

ALS Group USA, Corp. dba ALS Environmental

Janet Malloch
Project Manager



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Acronyms

ASTM	American Society for Testing and Materials
A2LA	American Association for Laboratory Accreditation
CARB	California Air Resources Board
CAS Number	Chemical Abstract Service registry Number
CFC	Chlorofluorocarbon
CFU	Colony-Forming Unit
DEC	Department of Environmental Conservation
DEQ	Department of Environmental Quality
DHS	Department of Health Services
DOE	Department of Ecology
DOH	Department of Health
EPA	U. S. Environmental Protection Agency
ELAP	Environmental Laboratory Accreditation Program
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
LOD	Limit of Detection
LOQ	Limit of Quantitation
LUFT	Leaking Underground Fuel Tank
M	Modified
MCL	Maximum Contaminant Level is the highest permissible concentration of a substance allowed in drinking water as established by the USEPA.
MDL	Method Detection Limit
MPN	Most Probable Number
MRL	Method Reporting Limit
NA	Not Applicable
NC	Not Calculated
NCASI	National Council of the Paper Industry for Air and Stream Improvement
ND	Not Detected
NIOSH	National Institute for Occupational Safety and Health
PQL	Practical Quantitation Limit
RCRA	Resource Conservation and Recovery Act
SIM	Selected Ion Monitoring
TPH	Total Petroleum Hydrocarbons
tr	Trace level is the concentration of an analyte that is less than the PQL but greater than or equal to the MDL.

Inorganic Data Qualifiers

- * The result is an outlier. See case narrative.
- # The control limit criteria is not applicable. See case narrative.
- B The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards.
- E The result is an estimate amount because the value exceeded the instrument calibration range.
- J The result is an estimated value.
- U The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
DOD-QSM 4.2 definition : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
- i The MRL/MDL or LOQ/LOD is elevated due to a matrix interference.
- X See case narrative.
- Q See case narrative. One or more quality control criteria was outside the limits.
- H The holding time for this test is immediately following sample collection. The samples were analyzed as soon as possible after receipt by the laboratory.

Metals Data Qualifiers

- # The control limit criteria is not applicable. See case narrative.
- J The result is an estimated value.
- E The percent difference for the serial dilution was greater than 10%, indicating a possible matrix interference in the sample.
- M The duplicate injection precision was not met.
- N The Matrix Spike sample recovery is not within control limits. See case narrative.
- S The reported value was determined by the Method of Standard Additions (MSA).
- U The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
DOD-QSM 4.2 definition : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
- W The post-digestion spike for furnace AA analysis is out of control limits, while sample absorbance is less than 50% of spike absorbance.
 - i The MRL/MDL or LOQ/LOD is elevated due to a matrix interference.
- X See case narrative.
- + The correlation coefficient for the MSA is less than 0.995.
- Q See case narrative. One or more quality control criteria was outside the limits.

Organic Data Qualifiers

- * The result is an outlier. See case narrative.
- # The control limit criteria is not applicable. See case narrative.
- A A tentatively identified compound, a suspected aldol-condensation product.
- B The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards.
- C The analyte was qualitatively confirmed using GC/MS techniques, pattern recognition, or by comparing to historical data.
- D The reported result is from a dilution.
- E The result is an estimated value.
- J The result is an estimated value.
- N The result is presumptive. The analyte was tentatively identified, but a confirmation analysis was not performed.
- P The GC or HPLC confirmation criteria was exceeded. The relative percent difference is greater than 40% between the two analytical results.
- U The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
DOD-QSM 4.2 definition : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
- i The MRL/MDL or LOQ/LOD is elevated due to a chromatographic interference.
- X See case narrative.
- Q See case narrative. One or more quality control criteria was outside the limits.

Additional Petroleum Hydrocarbon Specific Qualifiers

- F The chromatographic fingerprint of the sample matches the elution pattern of the calibration standard.
- L The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of lighter molecular weight constituents than the calibration standard.
- H The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of heavier molecular weight constituents than the calibration standard.
- O The chromatographic fingerprint of the sample resembles an oil, but does not match the calibration standard.
- Y The chromatographic fingerprint of the sample resembles a petroleum product eluting in approximately the correct carbon range, but the elution pattern does not match the calibration standard.
- Z The chromatographic fingerprint does not resemble a petroleum product.

**ALS Group USA Corp. dba ALS Environmental (ALS) - Kelso
State Certifications, Accreditations, and Licenses**

Agency	Web Site	Number
Alaska DEC UST	http://dec.alaska.gov/applications/eh/ehllabreports/USTLabs.aspx	UST-040
Arizona DHS	http://www.azdhs.gov/lab/license/env.htm	AZ0339
Arkansas - DEQ	http://www.adeq.state.ar.us/techsvs/labcert.htm	88-0637
California DHS (ELAP)	http://www.cdph.ca.gov/certlic/labs/Pages/ELAP.aspx	2795
DOD ELAP	http://www.denix.osd.mil/edqw/Accreditation/AccreditedLabs.cfm	L14-51
Florida DOH	http://www.doh.state.fl.us/lab/EnvLabCert/WaterCert.htm	E87412
Hawaii DOH	Not available	-
ISO 17025	http://www.pjllabs.com/	L16-57
Louisiana DEQ	http://www.deq.louisiana.gov/portal/DIVISIONS/PublicParticipationandPermitSupport/LouisianaLaboratoryAccreditationProgram.aspx	03016
Maine DHS	Not available	WA01276
Minnesota DOH	http://www.health.state.mn.us/accreditation	053-999-457
Montana DPHHS	http://www.dphhs.mt.gov/publichealth/	CERT0047
Nevada DEP	http://ndep.nv.gov/bsdw/labservice.htm	WA01276
New Jersey DEP	http://www.nj.gov/dep/oqa/	WA005
North Carolina DWQ	http://www.dwqlab.org/	605
Oklahoma DEQ	http://www.deq.state.ok.us/CSDnew/labcert.htm	9801
Oregon – DEQ (NELAP)	http://public.health.oregon.gov/LaboratoryServices/EnvironmentalLaboratoryAccreditation/Pages/index.aspx	WA100010
South Carolina DHEC	http://www.scdhec.gov/environment/envserv/	61002
Texas CEQ	http://www.tceq.texas.gov/field/qa/env_lab_accreditation.html	T104704427
Washington DOE	http://www.ecy.wa.gov/programs/eap/labs/lab-accreditation.html	C544
Wyoming (EPA Region 8)	http://www.epa.gov/region8/water/dwhome/wyomingdi.html	-
Kelso Laboratory Website	www.alsglobal.com	NA

Analyses were performed according to our laboratory's NELAP-approved quality assurance program. A complete listing of specific NELAP-certified analytes, can be found in the certification section at www.ALSGlobal.com or at the accreditation bodies web site.

Please refer to the certification and/or accreditation body's web site if samples are submitted for compliance purposes. The states highlighted above, require the analysis be listed on the state certification if used for compliance purposes and if the method/analyte is offered by that state.



Chain of Custody

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CHAIN OF CUSTODY RECORD

Omega COCID 265 PAGE: 1 OF: 1

ADDRESS

Fremont Analytical, Inc.
3600 Fremont Ave. N.
Seattle, WA 98103
TEL: 206-352-3790
FAX: 206-352-7178

Website: www.fremontanalytical.com

11610999

SUB CONTRACTOR: ALS		COMPANY: ALS Environmental		SPECIAL INSTRUCTIONS / COMMENTS:			
ADDRESS: 1317 South 13th Avenue				Chemical Oxygen Demand by SM 5220. Please email results to Michael Ridgeway and Chelsea Ward - mridgeway@fremontanalytical.com; cward@fremontanalytical.com.			
CITY, STATE, ZIP: Kelso, WA 98626				<i>Low Level COD Rls if possible</i>			
PHONE: (360) 577-7222	FAX:	EMAIL:					
ACCOUNT #:							

ITEM #	SAMPLE ID	CLIENT SAMPLE ID	BOTTLE TYPE	MATRIX	DATE COLLECTED	NUMBER OF CONTAINERS	COMMENTS: Methanol Preserved Weights HOT Sample Notation, Additional Sample Description.
1	1609151-001A TEST_SUB	PAI-19-22.5-24.5	CLEAR JARS 4 O	Soil	9/13/2016 11:20:00 AM	1	Chemical Oxygen Demand by SM 5220
2	1609151-002A TEST_SUB	PAI-19-24.5-25	CLEAR JARS 4 O	Soil	9/13/2016 11:25:00 AM	1	Chemical Oxygen Demand by SM 5220
3	1609151-003A TEST_SUB	PAI-19-11-12	CLEAR JARS 4 O	Soil	9/13/2016 12:00:00 PM	1	Chemical Oxygen Demand by SM 5220

Relinquished By: <i>[Signature]</i>	Date: 9/15/16	Time: 8:00	Received By: <i>[Signature]</i>	Date: 9-16-16	Time: 9:30	REPORT TRANSMITTAL DESIRED:	
Relinquished By:	Date:	Time:	Received By:	Date:	Time:	<input type="checkbox"/> HARDCOPY (extra cost)	<input type="checkbox"/> FAX <input checked="" type="checkbox"/> EMAIL <input type="checkbox"/> ONLINE
Relinquished By:	Date:	Time:	Received By:	Date:	Time:	FOR LAB USE ONLY	
TAT: Standard <input checked="" type="checkbox"/> RUSH Next BD <input type="checkbox"/> 2nd BD <input type="checkbox"/> 3rd BD <input type="checkbox"/>						Temp of samples _____ °C Attempt to Cool? _____	
Note: RUSH requests will incur surcharges!						Comments: _____	



PC Janet

Cooler Receipt and Preservation Form

Client Fremont Analytical Service Request K16 10999
 Received: 9-16-16 Opened: 9-16-16 By: SW Unloaded: 9-16-16 By: SW

1. Samples were received via? **USPS** Fed Ex UPS **DHL** **PDX** **Courier** **Hand Delivered**
 2. Samples were received in: (circle) Cooler **Box** **Envelope** **Other** NA
 3. Were custody seals on coolers? **NA** Y **N** If yes, how many and where? 1 Front
 If present, were custody seals intact? Y **N** If present, were they signed and dated? Y **N**

Raw Cooler Temp	Corrected Cooler Temp	Raw Temp Blank	Corrected Temp Blank	Corr. Factor	Thermometer ID	Cooler/COC ID	Tracking Number	NA	Filed
1.2	1.2	2.4	2.4	0	360	263	1ZXB192X039861		
1.6	1.7	3.0	3.1	+0.1	356	264	1ZXB192X3194493		
						265			
						266			
						267			
						270			

4. Packing material: **Inserts** Baggies Bubble Wrap Gel Packs **Wet Ice** **Dry Ice** **Sleeves**
 5. Were custody papers properly filled out (ink, signed, etc.)? **NA** Y **N**
 6. Were samples received in good condition (temperature, unbroken)? *Indicate in the table below.* **NA** Y **N**
 If applicable, tissue samples were received: **Frozen** **Partially Thawed** **Thawed**
 7. Were all sample labels complete (i.e. analysis, preservation, etc.)? **NA** Y **N**
 8. Did all sample labels and tags agree with custody papers? *Indicate major discrepancies in the table on page 2.* **NA** Y **N**
 9. Were appropriate bottles/containers and volumes received for the tests indicated? **NA** Y **N**
 10. Were the pH-preserved bottles (*see SMO GEN SOP*) received at the appropriate pH? *Indicate in the table below* **NA** Y **N**
 11. Were VOA vials received without headspace? *Indicate in the table below.* **NA** Y **N**
 12. Was C12/Res negative? **NA** Y **N**

Sample ID on Bottle	Sample ID on COC	Identified by:

Sample ID	Bottle Count	Bottle Type	Out of Temp	Head-space	Broke	pH	Reagent	Volume added	Reagent Lot Number	Initials	Time

Notes, Discrepancies, & Resolutions: _____



Total Solids

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ALS Group USA, Corp.
dba ALS Environmental

Analytical Report

Client: Fremont Analytical
Project: COD
Sample Matrix: Soil
Analysis Method: 160.3 Modified
Prep Method: None

Service Request: K1610999
Date Collected: 09/13/16
Date Received: 09/16/16
Units: Percent
Basis: As Received

Solids, Total

Sample Name	Lab Code	Result	MRL	MDL	Dil.	Date Analyzed	Q
PAI-19-22.5-24.5/1609151-001A	K1610999-001	91.0	-	-	1	09/19/16 17:22	
PAI-19-24.5-25/1609151-002A	K1610999-002	90.0	-	-	1	09/19/16 17:22	
PAI-19-11-12/1609151-003A	K1610999-003	81.8	-	-	1	09/19/16 17:22	

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client: Fremont Analytical
Project: COD
Sample Matrix: Paper
Analysis Method: 160.3 Modified
Prep Method: None

Service Request: K1610999
Date Collected: NA
Date Received: NA

Units: Percent
Basis: As Received

Replicate Sample Summary
Inorganic Parameters

Sample Name:	Lab Code:	MRL	Sample Result	Duplicate Result	Average	RPD	RPD Limit	Date Analyzed
Batch QC	K1610975-001DUP	-	95.5	96.0	95.8	<1	20	09/19/16
Batch QC	K1610996-002DUP	-	88.8	88.7	88.8	<1	20	09/19/16

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.



General Chemistry

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ALS Group USA, Corp.
dba ALS Environmental

Analytical Report

Client: Fremont Analytical
Project: COD
Sample Matrix: Soil
Analysis Method: SM 5220 C Modified
Prep Method: ALS SOP

Service Request: K1610999
Date Collected: 09/13/16
Date Received: 09/16/16
Units: mg/Kg
Basis: Dry

Chemical Oxygen Demand (COD)

Sample Name	Lab Code	Result	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
PAI-19-22.5-24.5/1609151-001A	K1610999-001	2630	110	-	1	09/29/16	9/28/16	
PAI-19-24.5-25/1609151-002A	K1610999-002	3070	100	-	1	09/29/16	9/28/16	
PAI-19-11-12/1609151-003A	K1610999-003	51300	630	-	1	10/04/16	10/4/16	
Method Blank	K1610999-MB1	ND U	10	-	1	09/29/16	NA	
Method Blank	K1610999-MB2	ND U	200	-	1	10/04/16	NA	

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client: Fremont Analytical
Project: COD
Sample Matrix: Soil
Analysis Method: SM 5220 C Modified
Prep Method: ALS SOP

Service Request: K1610999
Date Collected: 09/13/16
Date Received: 09/16/16

Units: mg/Kg
Basis: Dry

Replicate Sample Summary
Chemical Oxygen Demand (COD)

Sample Name:	Lab Code:	MRL	MDL	Sample Result	Duplicate Result	Average	RPD	RPD Limit	Date Analyzed
Batch QC	K1610996-001DUP	130	-	2980	3200	3090	7	20	09/29/16
PAI-19-11-12/1609151-003A	K1610999-003DUP	1100	-	51300	51400	51300	<1	20	10/04/16

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client: Fremont Analytical
Project: COD
Sample Matrix: Soil

Service Request: K1610999
Date Collected: N/A
Date Received: N/A
Date Analyzed: 09/29/16
Date Extracted: 09/28/16

Matrix Spike Summary
Chemical Oxygen Demand (COD)

Sample Name: Batch QC
Lab Code: K1610996-001
Analysis Method: SM 5220 C Modified
Prep Method: ALS SOP

Units: mg/Kg
Basis: Dry

Matrix Spike
K1610996-001MS

<u>Analyte Name</u>	<u>Sample Result</u>	<u>Result</u>	<u>Spike Amount</u>	<u>% Rec</u>	<u>% Rec Limits</u>
Chemical Oxygen Demand (COD)	2980	11300	6830	121	75-125

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client: Fremont Analytical
Project: COD
Sample Matrix: Soil

Service Request: K1610999
Date Collected: 09/13/16
Date Received: 09/16/16
Date Analyzed: 10/4/16
Date Extracted: 10/4/16

Matrix Spike Summary
Chemical Oxygen Demand (COD)

Sample Name: PAI-19-11-12/1609151-003A
Lab Code: K1610999-003
Analysis Method: SM 5220 C Modified
Prep Method: ALS SOP

Units: mg/Kg
Basis: Dry

Matrix Spike
K1610999-003MS

<u>Analyte Name</u>	<u>Sample Result</u>	<u>Result</u>	<u>Spike Amount</u>	<u>% Rec</u>	<u>% Rec Limits</u>
Chemical Oxygen Demand (COD)	51300	79700	34100	83	75-125

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client: Fremont Analytical
Project: COD
Sample Matrix: Soil

Service Request: K1610999
Date Analyzed: 09/29/16
Date Extracted: NA

Lab Control Sample Summary
Chemical Oxygen Demand (COD)

Analysis Method: SM 5220 C Modified
Prep Method: None

Units: mg/Kg
Basis: Dry
Analysis Lot: 516546

Sample Name	Lab Code	Result	Spike Amount	% Rec	% Rec Limits
Lab Control Sample	K1610999-LCS1	231	242	96	85-115

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client: Fremont Analytical
Project: COD
Sample Matrix: Soil

Service Request: K1610999
Date Analyzed: 10/04/16
Date Extracted: NA

Lab Control Sample Summary
Chemical Oxygen Demand (COD)

Analysis Method: SM 5220 C Modified
Prep Method: None

Units: mg/Kg
Basis: Dry
Analysis Lot: 517196

Sample Name	Lab Code	Result	Spike Amount	% Rec	% Rec Limits
Lab Control Sample	K1610999-LCS2	4570	4840	94	85-115

Work Order: 1609151
CLIENT: GeoEngineers
Project: Gas Works Park Site

QC SUMMARY REPORT
Dissolved Metals by EPA Method 200.8

Sample ID MB-14806	SampType: MBLK	Units: µg/L				Prep Date: 9/14/2016	RunNo: 31727				
Client ID: MBLKW	Batch ID: 14806					Analysis Date: 9/14/2016	SeqNo: 599222				
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Arsenic	ND	0.500									
Iron	ND	50.0									

Sample ID LCS-14806	SampType: LCS	Units: µg/L				Prep Date: 9/14/2016	RunNo: 31727				
Client ID: LCSW	Batch ID: 14806					Analysis Date: 9/14/2016	SeqNo: 599223				
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Arsenic	97.2	0.500	100.0	0	97.2	85	115				
Iron	997	50.0	1,000	0	99.7	50	150				

Sample ID 1609151-004ADUP	SampType: DUP	Units: µg/L				Prep Date: 9/14/2016	RunNo: 31727				
Client ID: PAI-19-D-160913	Batch ID: 14806					Analysis Date: 9/14/2016	SeqNo: 599225				
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Arsenic	148	0.500						143.3	2.98	30	
Iron	11,900	50.0						11,660	1.90	30	

Sample ID 1609151-004AMS	SampType: MS	Units: µg/L				Prep Date: 9/14/2016	RunNo: 31727				
Client ID: PAI-19-D-160913	Batch ID: 14806					Analysis Date: 9/14/2016	SeqNo: 599228				
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Arsenic	645	0.500	500.0	143.3	100	70	130				
Iron	16,300	50.0	5,000	11,660	93.7	50	150				

Sample ID 1609151-004AMSD	SampType: MSD	Units: µg/L				Prep Date: 9/14/2016	RunNo: 31727				
Client ID: PAI-19-D-160913	Batch ID: 14806					Analysis Date: 9/14/2016	SeqNo: 599229				
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Arsenic	654	0.500	500.0	143.3	102	70	130	645.0	1.38	30	
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Work Order: 1609151
CLIENT: GeoEngineers
Project: Gas Works Park Site

QC SUMMARY REPORT

Dissolved Metals by EPA Method 200.8

Sample ID	1609151-004AMSD	SampType:	MSD	Units:	µg/L	Prep Date:	9/14/2016	RunNo:	31727		
Client ID:	PAI-19-D-160913	Batch ID:	14806			Analysis Date:	9/14/2016	SeqNo:	599229		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Iron	16,300	50.0	5,000	11,660	92.9	50	150	16,340	0.255	30	

Work Order: 1609151
CLIENT: GeoEngineers
Project: Gas Works Park Site

QC SUMMARY REPORT
Sulfide by SM 4500-S2-F

Sample ID MB-R31736	SampType: MBLK	Units: mg/L	Prep Date: 9/14/2016	RunNo: 31736							
Client ID: MBLKW	Batch ID: R31736	Analysis Date: 9/14/2016	SeqNo: 599396								
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Sulfide ND 0.500

Sample ID LCS-R31736	SampType: LCS	Units: mg/L	Prep Date: 9/14/2016	RunNo: 31736							
Client ID: LCSW	Batch ID: R31736	Analysis Date: 9/14/2016	SeqNo: 599397								
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Sulfide 2.00 0.500 2.000 0 100 65 135

Sample ID 1609151-006BDUP	SampType: DUP	Units: mg/L	Prep Date: 9/14/2016	RunNo: 31736							
Client ID: PAI-20-S-160913	Batch ID: R31736	Analysis Date: 9/14/2016	SeqNo: 599399								
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Sulfide 34.0 5.00 32.00 6.06 30

Sample ID 1609151-006BMS	SampType: MS	Units: mg/L	Prep Date: 9/14/2016	RunNo: 31736							
Client ID: PAI-20-S-160913	Batch ID: R31736	Analysis Date: 9/14/2016	SeqNo: 599400								
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Sulfide 78.0 5.00 40.00 32.00 115 65 135

Sample ID 1609151-006BMSD	SampType: MSD	Units: mg/L	Prep Date: 9/14/2016	RunNo: 31736							
Client ID: PAI-20-S-160913	Batch ID: R31736	Analysis Date: 9/14/2016	SeqNo: 599401								
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Sulfide 76.0 5.00 40.00 32.00 110 65 135 78.00 2.60 30

Work Order: 1609151
CLIENT: GeoEngineers
Project: Gas Works Park Site

QC SUMMARY REPORT
Sulfide by SM 4500-S2-F

Sample ID MB-R31715	SampType: MBLK	Units: mg/L	Prep Date: 9/13/2016	RunNo: 31715							
Client ID: MBLKW	Batch ID: R31715		Analysis Date: 9/13/2016	SeqNo: 598997							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Sulfide ND 0.500

Sample ID LCS-R31715	SampType: LCS	Units: mg/L	Prep Date: 9/13/2016	RunNo: 31715							
Client ID: LCSW	Batch ID: R31715		Analysis Date: 9/13/2016	SeqNo: 598998							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Sulfide 1.80 0.500 2.000 0 90.0 65 135

Sample ID 1609139-001BDUP	SampType: DUP	Units: mg/L	Prep Date: 9/13/2016	RunNo: 31715							
Client ID: BATCH	Batch ID: R31715		Analysis Date: 9/13/2016	SeqNo: 599000							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Sulfide 9.60 0.500 9.200 4.26 30

Sample ID 1609139-001BMS	SampType: MS	Units: mg/L	Prep Date: 9/13/2016	RunNo: 31715							
Client ID: BATCH	Batch ID: R31715		Analysis Date: 9/13/2016	SeqNo: 599001							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Sulfide 11.0 0.500 2.000 9.200 90.0 65 135

Sample ID 1609139-001BMSD	SampType: MSD	Units: mg/L	Prep Date: 9/13/2016	RunNo: 31715							
Client ID: BATCH	Batch ID: R31715		Analysis Date: 9/13/2016	SeqNo: 599002							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Sulfide 10.8 0.500 2.000 9.200 80.0 65 135 11.00 1.83 30

Client Name: GEI	Work Order Number: 1609151
Logged by: Erica Silva	Date Received: 9/13/2016 4:01:00 PM

Chain of Custody

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

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
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:	<input type="text"/>	Date:	<input type="text"/>
By Whom:	<input type="text"/>	Via:	<input type="checkbox"/> eMail <input type="checkbox"/> Phone <input type="checkbox"/> Fax <input type="checkbox"/> In Person
Regarding:	<input type="text"/>		
Client Instructions:	<input type="text"/>		

19. Additional remarks:

Item Information

Item #	Temp °C
Cooler	7.8
Sample	4.9

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



Fremont
Analytical

Chain of Custody Record and Laboratory Services Agreement

3600 Fremont Ave N.
Seattle, WA 98103

Tel: 206-352-3790
Fax: 206-352-7178

Date: 9/13/2016

Laboratory Project No (Internal):

1609151

Page: 1 of 1

Client: Geoengineers
Address: 600 Stewart Street, Suite 1700
Seattle, WA 98103
City, State, zip: Seattle, WA 98103
Telephone: 253.722.2418

Project Name: Gas Works Park Site
Project No: 0186-846-01 Task 1803
Location: Seattle
Report To (PM): Sandra Smith / Claudia De La Via
PM Email: sbsmith@geoengineers.com

cdelaivia@geoengineers.com

*Matrix Codes: A = Air, AQ = Aqueous, B = Bulk, O = Other, P = Product, S = Soil, SD = Sediment, SL = Solid, W = Water, DW = Drinking Water, GW = Ground Water, SW = Storm Water, WW = Waste Water

Sample Name	Sample Date	Sample Time	Sample Type (Matrix)*	Arsenic (EPA 200.8) field filtered	Iron (EPA 200.8) field filtered	Sulfide (4500-S2-F) field filtered	COD (SM5220) field filtered	COD (SM5220)	Grain Size (ASTM D422)	SVOCs (EPA 8270 / 625)	PAHs (EPA 8270 - SIM)	PCBs (EPA 8082 / 608)	Metals** (EPA 6020 / 200.8)	Total (T) / Dissolved (D)	Comments
1 PAL- 19-22.5-24.5	9/13	1120	S		X										
2 PAL- 19-24.5-25		1125	S		X										
3 PAL- 19-11-12		1200	S		X										
4 PAL- 19-D-160913	9/13	1151	GW	X	X										Field Filtered
5 PAL- 19-S-160913		1308	GW	X	X										
6 PAL- 20-S-160913		1530	GW	X	X										
7 PAL-															
8 PAL-															
9 PAL-															
10 PAL-															

**Metals Analysis (Circle): MTCA-5 RCHA-8 Priority Pollutants TAL Individual: Ag Al As B Ba Be Ca Cd Co Cr Cu Fe Hg K Mg Mn Mo Na Ni Pb Sb Se Sr Sn Tl U V Zn

**Anions (Circle): Nitrate Nitrite Chloride Sulfate Bromide O-Phosphate Fluoride Nitrate+Nitrite Turn-around times for samples received after 4:00pm will begin on the following business day.

Sample Disposal: Return to Client Disposal by Lab (samples will be held for 30 days unless otherwise noted. A fee may be assessed if samples are retained after 30 days.)

I represent that I am authorized to enter into this Agreement with Fremont Analytical on behalf of the Client named above, that I have verified Client's agreement to each of the terms on the front and backside of this Agreement.

Relinquished Date/Time: 9/13/16 15:52 Received Date/Time: 9/13/16 15:52
Relinquished Date/Time: 9/13/16 16:01 Received Date/Time: 9/13/16 16:01



GeoEngineers

Sandra Smith
600 Stewart Street, Suite 1700
Seattle, WA 98101

RE: Gas Works Park Site
Work Order Number: 1609167

October 13, 2016

Attention Sandra Smith:

Fremont Analytical, Inc. received 7 sample(s) on 9/14/2016 for the analyses presented in the following report.

Chemical Oxygen Demand by SM 5220D
Dissolved Metals by EPA Method 200.8
Grain Size by ASTM D422
Sulfide by SM 4500-S2-F

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

CLIENT: GeoEngineers
Project: Gas Works Park Site
Work Order: 1609167

Work Order Sample Summary

Lab Sample ID	Client Sample ID	Date/Time Collected	Date/Time Received
1609167-001	PAI-14-20-21.8	09/14/2016 10:10 AM	09/14/2016 3:26 PM
1609167-002	PAI-14-22-22.5	09/14/2016 10:15 AM	09/14/2016 3:26 PM
1609167-003	PAI-14-28-33	09/14/2016 10:50 AM	09/14/2016 3:26 PM
1609167-004	PAI-14-D-160914	09/14/2016 11:09 AM	09/14/2016 3:26 PM
1609167-005	PAI-13-8.2-8.4	09/14/2016 11:50 AM	09/14/2016 3:26 PM
1609167-006	PAI-13-28-33	09/14/2016 1:45 PM	09/14/2016 3:26 PM
1609167-007	PAI-13-D-160914	09/14/2016 2:50 PM	09/14/2016 3:26 PM

CLIENT: GeoEngineers
Project: Gas Works Park Site

I. SAMPLE RECEIPT:

Samples receipt information is recorded on the attached Sample Receipt Checklist.

II. GENERAL REPORTING COMMENTS:

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

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

III. ANALYSES AND EXCEPTIONS:

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



Qualifiers:

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



Client: GeoEngineers

Collection Date: 9/14/2016 11:09:00 AM

Project: Gas Works Park Site

Lab ID: 1609167-004

Matrix: Groundwater

Client Sample ID: PAI-14-D-160914

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
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Dissolved Metals by EPA Method 200.8

Batch ID: 14826 Analyst: TN

Arsenic	23,400	2.50	D	µg/L	5	9/15/2016 11:18:25 AM
Iron	1,020	250	D	µg/L	5	9/15/2016 11:18:25 AM

Chemical Oxygen Demand by SM 5220D

Batch ID: R31756 Analyst: MW

Chemical Oxygen Demand	266	100	D	mg/L	10	9/15/2016 2:17:18 PM
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Sulfide by SM 4500-S2-F

Batch ID: R31736 Analyst: KT

Sulfide	33.2	0.119	MDL	mg/L	1	9/14/2016 3:50:00 PM
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NOTES:

MDL - Sample reported to Method Detection Limit (MDL)



Client: GeoEngineers

Collection Date: 9/14/2016 2:50:00 PM

Project: Gas Works Park Site

Lab ID: 1609167-007

Matrix: Groundwater

Client Sample ID: PAI-13-D-160914

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
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Dissolved Metals by EPA Method 200.8

Batch ID: 14826 Analyst: TN

Arsenic	8,460	2.50	D	µg/L	5	9/15/2016 11:21:59 AM
Iron	2,090	250	D	µg/L	5	9/15/2016 11:21:59 AM

Chemical Oxygen Demand by SM 5220D

Batch ID: R31756 Analyst: MW

Chemical Oxygen Demand	372	100	D	mg/L	10	9/15/2016 2:17:18 PM
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Sulfide by SM 4500-S2-F

Batch ID: R31736 Analyst: KT

Sulfide	68.8	0.119	MDL	mg/L	1	9/14/2016 3:53:00 PM
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NOTES:

MDL - Sample reported to Method Detection Limit (MDL)

Grain Size by ASTM D422

Project: Gas Works Park Site
Client: GeoEngineers
Lab Project #: 1609167

Percent Finer (Passing) than the Indicated Size

UOM = Percent

Grain Size Classification	Gravel						Coarse Sand	Medium Sand			Fine Sand			Silt		
	Sieve Size	3"	2"	1 1/2"	1"	3/4"	3/8"	#4	#10	#20	#40	#60	#140	#230	#325	#450
Particle Size (Microns)	76200	50800	38100	25400	19050	9525	4750	2000	850	425	250	106	75	45	34	
PAI-14-28-33	100%	100%	100%	100%	89.7%	75.8%	68.1%	61.3%	56.8%	50.4%	39.5%	20.0%	13.8%	6.55%	0.794%	
PAI-13-28-33	100%	100%	100%	100%	94.1%	83.4%	77.2%	70.9%	65.9%	58.1%	45.2%	21.3%	13.5%	5.45%	1.54%	



3600 Fremont Ave. N.
 Seattle, WA 98103
 Tel: 206-352-3790
 Fax: 206-352-7178
 Email: info@fremontanalytical.com

Grain Size by ASTM D422

Project: Gas Works Park Site
 Client: GeoEngineers
 Lab Project #: 1609167

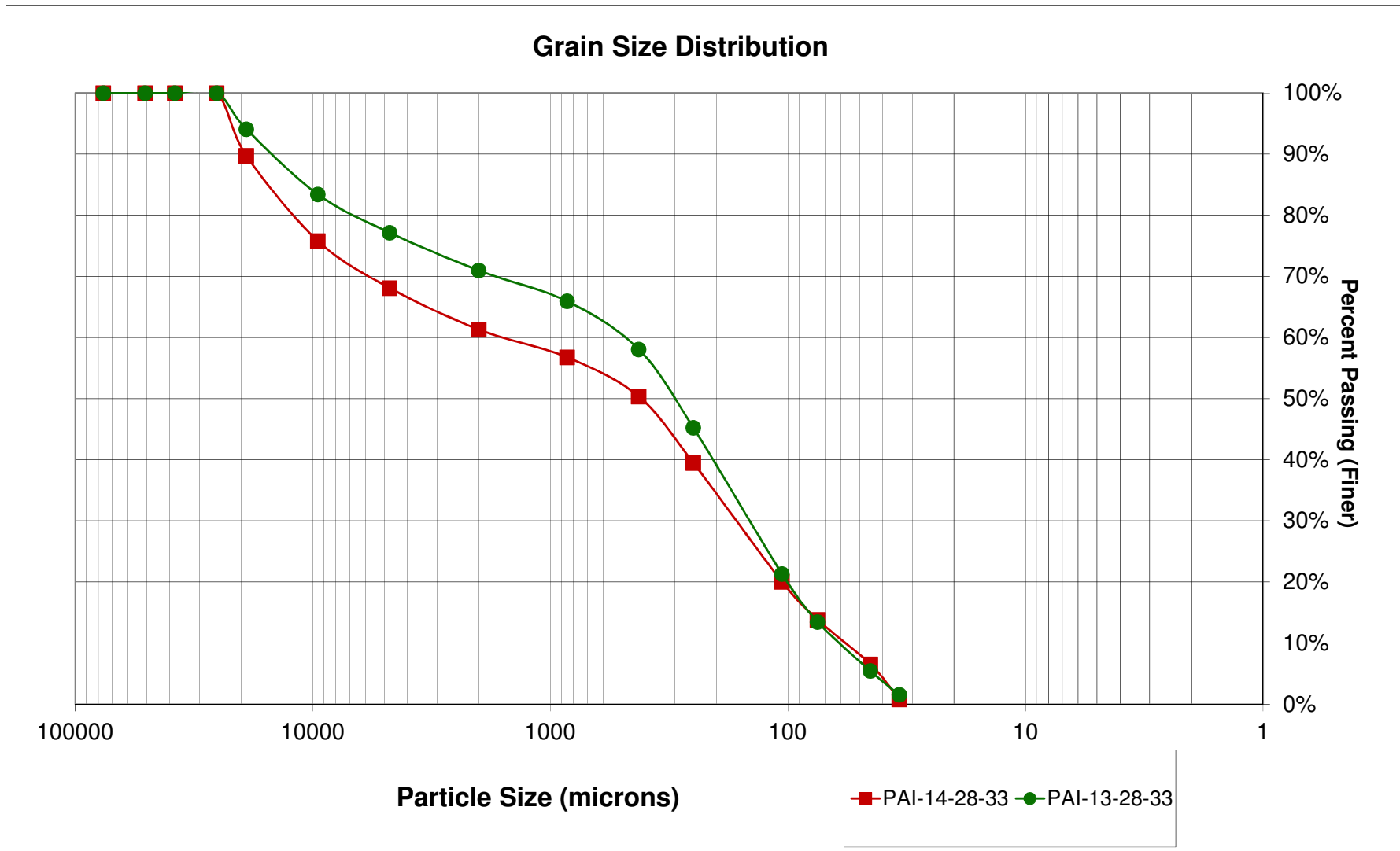
Percent Retained in Each Size Fraction

UOM = Percent

Grain Size Classification	Gravel							Coarse Sand	Medium Sand		Fine Sand			Silt		
	>76200	76200-50800	50800-38100	38100-25400	25400-19000	19050-9525	9525-4750	4750-2000	2000-850	850-425	425-250	250-106	106-62.5	72.5-45	45-34	<34
PAI-14-28-33	0.00%	0.00%	0.00%	0.00%	10.2%	13.9%	7.66%	6.79%	4.52%	6.39%	10.9%	19.4%	6.21%	7.25%	5.74%	0.792%
PAI-13-28-33	0.00%	0.00%	0.00%	0.00%	5.90%	10.6%	6.21%	6.17%	5.00%	7.83%	12.8%	23.8%	7.81%	7.97%	3.88%	1.53%

Grain Size by ASTM D422

Project: Gas Works Park Site
 Client: GeoEngineers
 Lab Project #: 1609167



Grain Size by ASTM D422

Project: Gas Works Park Site
 Client: GeoEngineers
 Lab Project #: 1609197

Percent Finer (Passing) than the Indicated Size

UOM = Percent

Grain Size Classification	Gravel						Coarse Sand	Medium Sand		Fine Sand			Silt		
	Sieve Size	3"	2"	1 1/2"	1"	3/4"	3/8"	#4	#10	#20	#40	#60	#140	#230	#325
Particle Size (Microns)	76200	50800	38100	25400	19050	9525	4750	2000	850	425	250	106	75	45	34
PAI-14-20-21.8	100%	100%	100%	100%	96.4%	63.6%	42.5%	23.4%	13.9%	9.57%	7.07%	3.65%	2.50%	1.21%	0.698%

Grain Size by ASTM D422

Project: Gas Works Park Site
Client: GeoEngineers
Lab Project #: 1609197

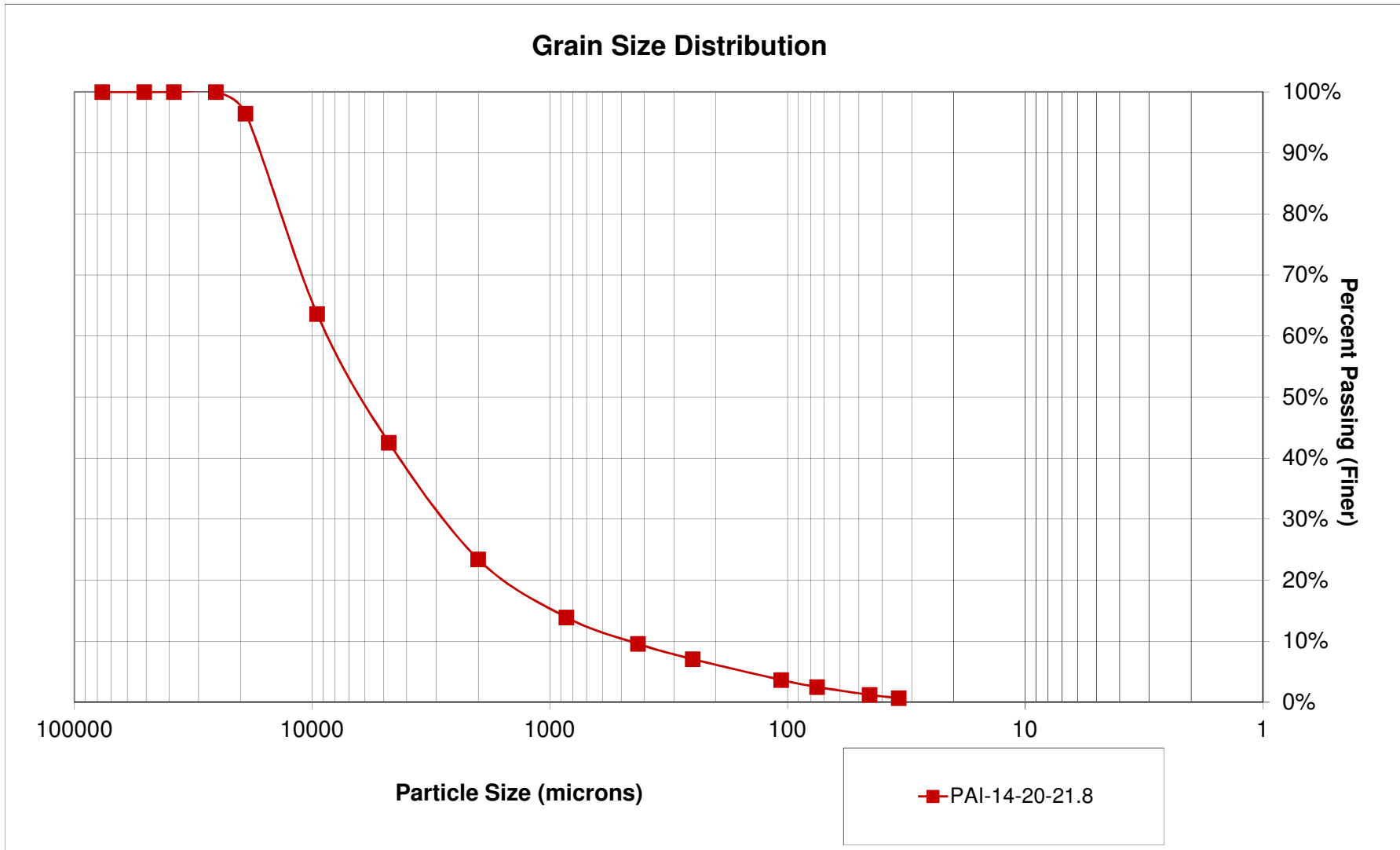
Percent Retained in Each Size Fraction

UOM = Percent

Grain Size Classification	Gravel							Coarse Sand	Medium Sand		Fine Sand			Silt		
	>76200	76200-50800	50800-38100	38100-25400	25400-19000	19050-9525	9525-4750	4750-2000	2000-850	850-425	425-250	250-106	106-62.5	72.5-45	45-34	<34
PAI-14-20-21.8	0.00%	0.00%	0.00%	0.00%	3.51%	32.4%	20.8%	18.9%	9.38%	4.28%	2.47%	3.37%	1.13%	1.27%	0.508%	0.688%

Grain Size by ASTM D422

Project: Gas Works Park Site
 Client: GeoEngineers
 Lab Project #: 1609197





ALS Environmental
ALS Group USA, Corp
1317 South 13th Avenue
Seattle, WA 98626
T: 1 360 577 7222
F: 1 360 636 1068
www.alsglobal.com

October 03, 2016

Analytical Report for Service Request No: 1610996

Mr. Michael Ridgeway
Fremont Analytical
3600 Fremont Avenue, North
Seattle, WA 98103

RE: COD

Dear Mr. Ridgeway,

Enclosed are the results of the sample(s) submitted to our laboratory September 16, 2016. For your reference, these analyses have been assigned our service request number **K1610996**.

Analyses were performed according to our laboratory's ISO 17025 AP-approved quality assurance program. The test results meet requirements of the current ISO 17025 AP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of ISO 17025 AP-accredited analytes, refer to the certifications section at www.alsglobal.com. All results are intended to be considered in their entirety, and ALS Group USA, Corp. dba ALS Environmental (ALS) is not responsible for use of less than the complete report. Results apply only to the items submitted to the laboratory for analysis and individual items (samples) analyzed, as listed in the report.

Please contact me if you have any questions. My extension is 3375. You may also contact me via email at janet.Malloch@alsglobal.com.

Respectfully submitted,

ALS Group USA, Corp. dba ALS Environmental

Janet Malloch
Project Manager



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General Chemistry

Acronyms

ASTM	American Society for Testing and Materials
A2LA	American Association for Laboratory Accreditation
CARB	California Air Resources Board
CAS Number	Chemical Abstract Service registry Number
CFC	Chlorofluorocarbon
CFU	Colony-Forming Unit
DEC	Department of Environmental Conservation
DEQ	Department of Environmental Quality
DHS	Department of Health Services
DOE	Department of Ecology
DOH	Department of Health
EPA	U. S. Environmental Protection Agency
ELAP	Environmental Laboratory Accreditation Program
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
LOD	Limit of Detection
LOQ	Limit of Quantitation
LUFT	Leaking Underground Fuel Tank
M	Modified
MCL	Maximum Contaminant Level is the highest permissible concentration of a substance allowed in drinking water as established by the USEPA.
MDL	Method Detection Limit
MPN	Most Probable Number
MRL	Method Reporting Limit
NA	Not Applicable
NC	Not Calculated
NCASI	National Council of the Paper Industry for Air and Stream Improvement
ND	Not Detected
NIOSH	National Institute for Occupational Safety and Health
PQL	Practical Quantitation Limit
RCRA	Resource Conservation and Recovery Act
SIM	Selected Ion Monitoring
TPH	Total Petroleum Hydrocarbons
tr	Trace level is the concentration of an analyte that is less than the PQL but greater than or equal to the MDL.

Inorganic Data Qualifiers

- * The result is an outlier. See case narrative.
- # The control limit criteria is not applicable. See case narrative.
- B The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards.
- E The result is an estimate amount because the value exceeded the instrument calibration range.
- J The result is an estimated value.
- U The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
DOD-QSM 4.2 definition : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
- i The MRL/MDL or LOQ/LOD is elevated due to a matrix interference.
- X See case narrative.
- Q See case narrative. One or more quality control criteria was outside the limits.
- H The holding time for this test is immediately following sample collection. The samples were analyzed as soon as possible after receipt by the laboratory.

Metals Data Qualifiers

- # The control limit criteria is not applicable. See case narrative.
- J The result is an estimated value.
- E The percent difference for the serial dilution was greater than 10%, indicating a possible matrix interference in the sample.
- M The duplicate injection precision was not met.
- N The Matrix Spike sample recovery is not within control limits. See case narrative.
- S The reported value was determined by the Method of Standard Additions (MSA).
- U The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
DOD-QSM 4.2 definition : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
- W The post-digestion spike for furnace AA analysis is out of control limits, while sample absorbance is less than 50% of spike absorbance.
 - i The MRL/MDL or LOQ/LOD is elevated due to a matrix interference.
- X See case narrative.
- + The correlation coefficient for the MSA is less than 0.995.
- Q See case narrative. One or more quality control criteria was outside the limits.

Organic Data Qualifiers

- * The result is an outlier. See case narrative.
- # The control limit criteria is not applicable. See case narrative.
- A A tentatively identified compound, a suspected aldol-condensation product.
- B The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards.
- C The analyte was qualitatively confirmed using GC/MS techniques, pattern recognition, or by comparing to historical data.
- D The reported result is from a dilution.
- E The result is an estimated value.
- J The result is an estimated value.
- N The result is presumptive. The analyte was tentatively identified, but a confirmation analysis was not performed.
- P The GC or HPLC confirmation criteria was exceeded. The relative percent difference is greater than 40% between the two analytical results.
- U The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
DOD-QSM 4.2 definition : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
- i The MRL/MDL or LOQ/LOD is elevated due to a chromatographic interference.
- X See case narrative.
- Q See case narrative. One or more quality control criteria was outside the limits.

Additional Petroleum Hydrocarbon Specific Qualifiers

- F The chromatographic fingerprint of the sample matches the elution pattern of the calibration standard.
- L The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of lighter molecular weight constituents than the calibration standard.
- H The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of heavier molecular weight constituents than the calibration standard.
- O The chromatographic fingerprint of the sample resembles an oil, but does not match the calibration standard.
- Y The chromatographic fingerprint of the sample resembles a petroleum product eluting in approximately the correct carbon range, but the elution pattern does not match the calibration standard.
- Z The chromatographic fingerprint does not resemble a petroleum product.

**ALS Group USA Corp. dba ALS Environmental (ALS) - Kelso
State Certifications, Accreditations, and Licenses**

Agency	Web Site	Number
Alaska DEC UST	http://dec.alaska.gov/applications/eh/ehllabreports/USTLabs.aspx	UST-040
Arizona DHS	http://www.azdhs.gov/lab/license/env.htm	AZ0339
Arkansas - DEQ	http://www.adeq.state.ar.us/techsvs/labcert.htm	88-0637
California DHS (ELAP)	http://www.cdph.ca.gov/certlic/labs/Pages/ELAP.aspx	2795
DOD ELAP	http://www.denix.osd.mil/edqw/Accreditation/AccreditedLabs.cfm	L14-51
Florida DOH	http://www.doh.state.fl.us/lab/EnvLabCert/WaterCert.htm	E87412
Hawaii DOH	Not available	-
ISO 17025	http://www.pjllabs.com/	L16-57
Louisiana DEQ	http://www.deq.louisiana.gov/portal/DIVISIONS/PublicParticipationandPermitSupport/LouisianaLaboratoryAccreditationProgram.aspx	03016
Maine DHS	Not available	WA01276
Minnesota DOH	http://www.health.state.mn.us/accreditation	053-999-457
Montana DPHHS	http://www.dphhs.mt.gov/publichealth/	CERT0047
Nevada DEP	http://ndep.nv.gov/bsdw/labservice.htm	WA01276
New Jersey DEP	http://www.nj.gov/dep/oqa/	WA005
North Carolina DWQ	http://www.dwqlab.org/	605
Oklahoma DEQ	http://www.deq.state.ok.us/CSDnew/labcert.htm	9801
Oregon – DEQ (NELAP)	http://public.health.oregon.gov/LaboratoryServices/EnvironmentalLaboratoryAccreditation/Pages/index.aspx	WA100010
South Carolina DHEC	http://www.scdhec.gov/environment/envserv/	61002
Texas CEQ	http://www.tceq.texas.gov/field/qa/env_lab_accreditation.html	T104704427
Washington DOE	http://www.ecy.wa.gov/programs/eap/labs/lab-accreditation.html	C544
Wyoming (EPA Region 8)	http://www.epa.gov/region8/water/dwhome/wyomingdi.html	-
Kelso Laboratory Website	www.alsglobal.com	NA

Analyses were performed according to our laboratory's NELAP-approved quality assurance program. A complete listing of specific NELAP-certified analytes, can be found in the certification section at www.ALSGlobal.com or at the accreditation bodies web site.

Please refer to the certification and/or accreditation body's web site if samples are submitted for compliance purposes. The states highlighted above, require the analysis be listed on the state certification if used for compliance purposes and if the method/analyte is offered by that state.



Chain of Custody

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360)577-7222 Fax (360)636-1068
www.alsglobal.com



CHAIN OF CUSTODY RECORD

Omega COCID 266 PAGE: 1 OF: 1

ADDRESS
 Fremont Analytical, Inc.
 3600 Fremont Ave. N.
 Seattle, WA 98103
 TEL: 206-352-3790
 FAX: 206-352-7178
 Website: www.fremontanalytical.com

61610996

SUB CONTRACTOR: ALS COMPANY: ALS Environmental		SPECIAL INSTRUCTIONS / COMMENTS: Please email results to Michael Ridgeway and Chelsea Ward - mridgeway@fremontanalytical.com; cward@fremontanalytical.com. <i>Low Level RLS if possible.</i>
ADDRESS: 1317 South 13th Avenue		
CITY, STATE, ZIP: Kelso, WA 98626		
PHONE: (360) 577-7222 FAX: EMAIL:		
ACCOUNT #:		

ITEM #	SAMPLE ID	CLIENT SAMPLE ID	BOTTLE TYPE	MATRIX	DATE COLLECTED	NUMBER OF CONTAINERS	COMMENTS: Methanol Preserved Weights HOT Sample Notation, Additional Sample Description.
1	1609167-003A	PAI-14-28-33	CLEAR JARS 4 O	Soil	9/14/2016 10:50:00 AM	1	Chemical Oxygen Demand by SM 5220
	TEST_SUB						
2	1609167-006A	PAI-13-28-33	CLEAR JARS 4 O	Soil	9/14/2016 1:45:00 PM	1	Chemical Oxygen Demand by SM 5220
	TEST_SUB						

Relinquished By: <i>[Signature]</i>	Date: 9/15/16	Time: 8:00	Received By: <i>[Signature]</i>	Date: 9/16/16	Time: 9:30	REPORT TRANSMITTAL DESIRED: <input type="checkbox"/> HARDCOPY (extra cost) <input type="checkbox"/> FAX <input checked="" type="checkbox"/> EMAIL <input type="checkbox"/> ONLINE FOR LAB USE ONLY Temp of samples _____ °C Attempt to Cool? _____ Comments: _____
Relinquished By:	Date:	Time:	Received By:	Date:	Time:	
Relinquished By:	Date:	Time:	Received By:	Date:	Time:	
TAT: Standard <input checked="" type="checkbox"/> RUSH Next BD <input type="checkbox"/> 2nd BD <input type="checkbox"/> 3rd BD <input type="checkbox"/>						
Note: RUSH requests will incur surcharges!						



PC Janet

Cooler Receipt and Preservation Form

Client Fremont Analytical Service Request K16 10996
 Received: 9-16-16 Opened: 9-16-16 By: SW Unloaded: 9-16-16 By: SW

1. Samples were received via? USPS Fed Ex UPS DHL PDX Courier Hand Delivered
 2. Samples were received in: (circle) Cooler Box Envelope Other NA
 3. Were custody seals on coolers? NA Y N If yes, how many and where? 1 Front
 If present, were custody seals intact? Y N If present, were they signed and dated? Y N

Raw Cooler Temp	Corrected Cooler Temp	Raw Temp Blank	Corrected Temp Blank	Corr. Factor	Thermometer ID	Cooler/COC ID	Tracking Number	NA	Filed
1.2	1.2	2.4	2.4	0	360	263	1ZXB192X039861		
1.6	1.7	3.0	3.1	+0.1	356	264	1ZXB192X3194493		
						265			
						266			
						267			
						270			

4. Packing material: Inserts Baggies Bubble Wrap Gel Packs Wet Ice Dry Ice Sleeves
 5. Were custody papers properly filled out (ink, signed, etc.)? NA Y N
 6. Were samples received in good condition (temperature, unbroken)? Indicate in the table below. NA Y N
 If applicable, tissue samples were received: Frozen Partially Thawed Thawed
 7. Were all sample labels complete (i.e analysis, preservation, etc.)? NA Y N
 8. Did all sample labels and tags agree with custody papers? Indicate major discrepancies in the table on page 2. NA Y N
 9. Were appropriate bottles/containers and volumes received for the tests indicated? NA Y N
 10. Were the pH-preserved bottles (*see SMO GEN SOP*) received at the appropriate pH? Indicate in the table below NA Y N
 11. Were VOA vials received without headspace? Indicate in the table below. NA Y N
 12. Was C12/Res negative? NA Y N

Sample ID on Bottle	Sample ID on COC	Identified by:

Sample ID	Bottle Count	Bottle Type	Out of Temp	Head-space	Broke	pH	Reagent	Volume added	Reagent Lot Number	Initials	Time

Notes, Discrepancies, & Resolutions: _____



Total Solids

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360)577-7222 Fax (360)636-1068
www.alsglobal.com

ALS Group USA, Corp.
dba ALS Environmental

Analytical Report

Client: Fremont Analytical
Project: COD
Sample Matrix: Soil
Analysis Method: 160.3 Modified
Prep Method: None

Service Request: K1610996
Date Collected: 09/14/16
Date Received: 09/16/16
Units: Percent
Basis: As Received

Solids, Total

Sample Name	Lab Code	Result	MRL	MDL	Dil.	Date Analyzed	Q
PAI-14-28-33/1609167-003A	K1610996-001	89.0	-	-	1	09/19/16 17:22	
PAI-13-28-33/1609167-006A	K1610996-002	88.8	-	-	1	09/19/16 17:22	

ALS Group USA, Corp.

dba ALS Environmental

QA/QC Report

Client: Fremont Analytical
Project: COD
Sample Matrix: Paper
Analysis Method: 160.3 Modified
Prep Method: None

Service Request: K1610996
Date Collected: 09/14/16
Date Received: 09/16/16

Units: Percent
Basis: As Received

Replicate Sample Summary

Inorganic Parameters

Sample Name:	Lab Code:	MRL	Sample Result	Duplicate Result	Average	RPD	RPD Limit	Date Analyzed
Batch QC	K1610975-001DUP	-	95.5	96.0	95.8	<1	20	09/19/16
PAI-13-28-33/1609167-006A	K1610996-002DUP	-	88.8	88.7	88.8	<1	20	09/19/16

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.



General Chemistry

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1317 South 13th Avenue, Kelso, WA 98626
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www.alsglobal.com

ALS Group USA, Corp.
dba ALS Environmental

Analytical Report

Client: Fremont Analytical
Project: COD
Sample Matrix: Soil
Analysis Method: SM 5220 C Modified
Prep Method: ALS SOP

Service Request: K1610996
Date Collected: 09/14/16
Date Received: 09/16/16
Units: mg/Kg
Basis: Dry

Chemical Oxygen Demand (COD)

Sample Name	Lab Code	Result	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
PAI-14-28-33/1609167-003A	K1610996-001	2980	130	-	1	09/29/16	9/28/16	
PAI-13-28-33/1609167-006A	K1610996-002	2260	150	-	1	09/29/16	9/28/16	
Method Blank	K1610996-MB	ND U	10	-	1	09/29/16	NA	

ALS Group USA, Corp.

dba ALS Environmental

QA/QC Report

Client: Fremont Analytical
Project: COD
Sample Matrix: Soil

Service Request: K1610996
Date Collected: 09/14/16
Date Received: 09/16/16
Date Analyzed: 09/29/16

Replicate Sample Summary
General Chemistry Parameters

Sample Name: PAI-14-28-33/1609167-003A
Lab Code: K1610996-001

Units: mg/Kg
Basis: Dry

<u>Analyte Name</u>	<u>Analysis Method</u>	<u>MRL</u>	<u>MDL</u>	<u>Sample Result</u>	<u>Duplicate Sample K1610996-001DUP Result</u>	<u>Average</u>	<u>RPD</u>	<u>RPD Limit</u>
Chemical Oxygen Demand (COD)	SM 5220 C Modified	130	-	2980	3200	3090	7	20

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client: Fremont Analytical
Project: COD
Sample Matrix: Soil

Service Request: K1610996
Date Collected: 09/14/16
Date Received: 09/16/16
Date Analyzed: 09/29/16
Date Extracted: 09/28/16

Matrix Spike Summary
Chemical Oxygen Demand (COD)

Sample Name: PAI-14-28-33/1609167-003A
Lab Code: K1610996-001
Analysis Method: SM 5220 C Modified
Prep Method: ALS SOP

Units: mg/Kg
Basis: Dry

Matrix Spike
K1610996-001MS

<u>Analyte Name</u>	<u>Sample Result</u>	<u>Result</u>	<u>Spike Amount</u>	<u>% Rec</u>	<u>% Rec Limits</u>
Chemical Oxygen Demand (COD)	2980	11300	6830	121	75-125

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client: Fremont Analytical
Project: COD
Sample Matrix: Soil

Service Request: K1610996
Date Analyzed: 09/29/16
Date Extracted: NA

Lab Control Sample Summary
Chemical Oxygen Demand (COD)

Analysis Method: SM 5220 C Modified
Prep Method: None

Units: mg/Kg
Basis: Dry
Analysis Lot: 516546

Sample Name	Lab Code	Result	Spike Amount	% Rec	% Rec Limits
Lab Control Sample	K1610996-LCS	231	242	96	85-115



ALS Environmental
ALS Group USA, Corp
1317 South 13th Avenue
Bellevue, WA 98006
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www.alsglobal.com

October 11, 2016

Analytical Report for Service Request No: 1611732

Mr. Michael Ridgeway
Fremont Analytical
3600 Fremont Avenue, North
Seattle, WA 98103

RE: COD

Dear Mr. Ridgeway,

Enclosed are the results of the sample(s) submitted to our laboratory September 30, 2016. For your reference, these analyses have been assigned our service request number **K1611732**.

Analyses were performed according to our laboratory's ISO 17025-AP-approved quality assurance program. The test results meet requirements of the current ISO 17025-AP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of ISO 17025-AP-accredited analytes, refer to the certifications section at www.alsglobal.com. All results are intended to be considered in their entirety, and ALS Group USA, Corp. dba ALS Environmental (ALS) is not responsible for use of less than the complete report. Results apply only to the items submitted to the laboratory for analysis and individual items (samples) analyzed, as listed in the report.

Please contact me if you have any questions. My extension is 3375. You may also contact me via email at Janet.Malloch@alsglobal.com.

Respectfully submitted,

ALS Group USA, Corp. dba ALS Environmental

Janet Malloch
Project Manager



A S Environmental
A S roup SA, orp
1317 South 13th Avenue
elso, WA 98626
T : 1 360 577 7222
F : 1 360 636 1068
www.alsglobal.com

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Acronyms

ASTM	American Society for Testing and Materials
A2LA	American Association for Laboratory Accreditation
CARB	California Air Resources Board
CAS Number	Chemical Abstract Service registry Number
CFC	Chlorofluorocarbon
CFU	Colony-Forming Unit
DEC	Department of Environmental Conservation
DEQ	Department of Environmental Quality
DHS	Department of Health Services
DOE	Department of Ecology
DOH	Department of Health
EPA	U. S. Environmental Protection Agency
ELAP	Environmental Laboratory Accreditation Program
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
LOD	Limit of Detection
LOQ	Limit of Quantitation
LUFT	Leaking Underground Fuel Tank
M	Modified
MCL	Maximum Contaminant Level is the highest permissible concentration of a substance allowed in drinking water as established by the USEPA.
MDL	Method Detection Limit
MPN	Most Probable Number
MRL	Method Reporting Limit
NA	Not Applicable
NC	Not Calculated
NCASI	National Council of the Paper Industry for Air and Stream Improvement
ND	Not Detected
NIOSH	National Institute for Occupational Safety and Health
PQL	Practical Quantitation Limit
RCRA	Resource Conservation and Recovery Act
SIM	Selected Ion Monitoring
TPH	Total Petroleum Hydrocarbons
tr	Trace level is the concentration of an analyte that is less than the PQL but greater than or equal to the MDL.

Inorganic Data Qualifiers

- * The result is an outlier. See case narrative.
- # The control limit criteria is not applicable. See case narrative.
- B The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards.
- E The result is an estimate amount because the value exceeded the instrument calibration range.
- J The result is an estimated value.
- U The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
DOD-QSM 4.2 definition : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
- i The MRL/MDL or LOQ/LOD is elevated due to a matrix interference.
- X See case narrative.
- Q See case narrative. One or more quality control criteria was outside the limits.
- H The holding time for this test is immediately following sample collection. The samples were analyzed as soon as possible after receipt by the laboratory.

Metals Data Qualifiers

- # The control limit criteria is not applicable. See case narrative.
- J The result is an estimated value.
- E The percent difference for the serial dilution was greater than 10%, indicating a possible matrix interference in the sample.
- M The duplicate injection precision was not met.
- N The Matrix Spike sample recovery is not within control limits. See case narrative.
- S The reported value was determined by the Method of Standard Additions (MSA).
- U The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
DOD-QSM 4.2 definition : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
- W The post-digestion spike for furnace AA analysis is out of control limits, while sample absorbance is less than 50% of spike absorbance.
 - i The MRL/MDL or LOQ/LOD is elevated due to a matrix interference.
- X See case narrative.
- + The correlation coefficient for the MSA is less than 0.995.
- Q See case narrative. One or more quality control criteria was outside the limits.

Organic Data Qualifiers

- * The result is an outlier. See case narrative.
- # The control limit criteria is not applicable. See case narrative.
- A A tentatively identified compound, a suspected aldol-condensation product.
- B The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards.
- C The analyte was qualitatively confirmed using GC/MS techniques, pattern recognition, or by comparing to historical data.
- D The reported result is from a dilution.
- E The result is an estimated value.
- J The result is an estimated value.
- N The result is presumptive. The analyte was tentatively identified, but a confirmation analysis was not performed.
- P The GC or HPLC confirmation criteria was exceeded. The relative percent difference is greater than 40% between the two analytical results.
- U The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
DOD-QSM 4.2 definition : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
 - i The MRL/MDL or LOQ/LOD is elevated due to a chromatographic interference.
- X See case narrative.
- Q See case narrative. One or more quality control criteria was outside the limits.

Additional Petroleum Hydrocarbon Specific Qualifiers

- F The chromatographic fingerprint of the sample matches the elution pattern of the calibration standard.
- L The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of lighter molecular weight constituents than the calibration standard.
- H The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of heavier molecular weight constituents than the calibration standard.
- O The chromatographic fingerprint of the sample resembles an oil, but does not match the calibration standard.
- Y The chromatographic fingerprint of the sample resembles a petroleum product eluting in approximately the correct carbon range, but the elution pattern does not match the calibration standard.
- Z The chromatographic fingerprint does not resemble a petroleum product.

**ALS Group USA Corp. dba ALS Environmental (ALS) - Kelso
State Certifications, Accreditations, and Licenses**

Agency	Web Site	Number
Alaska DEC UST	http://dec.alaska.gov/applications/eh/ehllabreports/USTLabs.aspx	UST-040
Arizona DHS	http://www.azdhs.gov/lab/license/env.htm	AZ0339
Arkansas - DEQ	http://www.adeq.state.ar.us/techsvs/labcert.htm	88-0637
California DHS (ELAP)	http://www.cdph.ca.gov/certlic/labs/Pages/ELAP.aspx	2795
DOD ELAP	http://www.denix.osd.mil/edqw/Accreditation/AccreditedLabs.cfm	L14-51
Florida DOH	http://www.doh.state.fl.us/lab/EnvLabCert/WaterCert.htm	E87412
Hawaii DOH	Not available	-
ISO 17025	http://www.pjllabs.com/	L16-57
Louisiana DEQ	http://www.deq.louisiana.gov/portal/DIVISIONS/PublicParticipationandPermitSupport/LouisianaLaboratoryAccreditationProgram.aspx	03016
Maine DHS	Not available	WA01276
Minnesota DOH	http://www.health.state.mn.us/accreditation	053-999-457
Montana DPHHS	http://www.dphhs.mt.gov/publichealth/	CERT0047
Nevada DEP	http://ndep.nv.gov/bsdw/labservice.htm	WA01276
New Jersey DEP	http://www.nj.gov/dep/oqa/	WA005
North Carolina DWQ	http://www.dwqlab.org/	605
Oklahoma DEQ	http://www.deq.state.ok.us/CSDnew/labcert.htm	9801
Oregon – DEQ (NELAP)	http://public.health.oregon.gov/LaboratoryServices/EnvironmentalLaboratoryAccreditation/Pages/index.aspx	WA100010
South Carolina DHEC	http://www.scdhec.gov/environment/envserv/	61002
Texas CEQ	http://www.tceq.texas.gov/field/qa/env_lab_accreditation.html	T104704427
Washington DOE	http://www.ecy.wa.gov/programs/eap/labs/lab-accreditation.html	C544
Wyoming (EPA Region 8)	http://www.epa.gov/region8/water/dwhome/wyomingdi.html	-
Kelso Laboratory Website	www.alsglobal.com	NA

Analyses were performed according to our laboratory's NELAP-approved quality assurance program. A complete listing of specific NELAP-certified analytes, can be found in the certification section at www.ALSGlobal.com or at the accreditation bodies web site.

Please refer to the certification and/or accreditation body's web site if samples are submitted for compliance purposes. The states highlighted above, require the analysis be listed on the state certification if used for compliance purposes and if the method/analyte is offered by that state.



Case Narrative

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360)577-7222 Fax (360)636-1068
www.alsglobal.com

ALS ENVIRONMENTAL

Client: Fremont Analytical
Project: NA
Sample Matrix: Soil

Service Request No.: K1611732
Date Received: 09/30/16

Case Narrative

All analyses were performed consistent with the quality assurance program of ALS Environmental. This report contains analytical results for samples designated for Tier II data deliverables. When appropriate to the method, method blank results have been reported with each analytical test. Additional quality control analyses reported herein include: Laboratory Duplicate (DUP), Matrix Spike (MS), and Matrix/Duplicate Matrix Spike (MS/DMS).

Sample Receipt

One soil sample was received for analysis at ALS Environmental on 09/30/16. The sample was received in good condition and consistent with the accompanying chain of custody form. The sample was stored in a refrigerator at 4°C upon receipt at the laboratory.

General Chemistry Parameters

Chemical Oxygen Demand by Standard Method 5220 C Modified:

The Relative Percent Difference (RPD) for the replicate analysis in sample Batch QC was outside the normal ALS control limits. The variability in the results was attributed to the heterogeneous character of the sample. Standard mixing techniques were used, but were not sufficient for complete homogenization of this sample.

No other anomalies associated with the analysis of this sample were observed.

Approved by _____

Janet Malloch



Chain of Custody

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360)577-7222 Fax (360)636-1068
www.alsglobal.com



CHAIN OF CUSTODY RECORD

Omega COCID 279

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OF: 1

ADDRESS

Fremont Analytical, Inc.
3600 Fremont Ave. N.
Seattle, WA 98103
TEL: 206-352-3790
FAX: 206-352-7178

Website: www.fremontanalytical.com

K161732

SUB CONTRACTOR: ALS		COMPANY: ALS Environmental		SPECIAL INSTRUCTIONS / COMMENTS: Please email results to Michael Ridgeway and Chelsea Ward - mridgeway@fremontanalytical.com; cward@fremontanalytical.com			
ADDRESS: 1317 South 13th Avenue							
CITY, STATE, ZIP: Kelso, WA 98626							
PHONE: (360) 577-7222		FAX: _____					
ACCOUNT #:							

ITEM #	SAMPLE ID	CLIENT SAMPLE ID	BOTTLE TYPE	MATRIX	DATE COLLECTED	NUMBER OF CONTAINERS	COMMENTS: Methanol Preserved Weights HOT Sample Notation, Additional Sample Description.
1	1609167-002A TEST_SUB	PAI-14-22-22.5	CLEAR JARS 4 O	Soil	9/14/2016 10:15:00 AM	1	Chemical Oxygen Demand by SM 5220, <i>Low Level RL</i>

SS 9/27/16

Relinquished By: <i>Waga J</i>	Date: <i>9/29/16</i>	Time: <i>11:25</i>	Received By: <i>Chung</i>	Date: <i>9-30-16</i>	Time: <i>9:40</i>	REPORT TRANSMITTAL DESIRED:	
Relinquished By:	Date:	Time:	Received By:	Date:	Time:	<input type="checkbox"/> HARDCOPY (extra cost)	<input type="checkbox"/> FAX
Relinquished By:	Date:	Time:	Received By:	Date:	Time:	<input checked="" type="checkbox"/> EMAIL	<input type="checkbox"/> ONLINE
TAT: Standard <input checked="" type="checkbox"/> RUSH <input type="checkbox"/> Next BD <input type="checkbox"/> 2nd BD <input type="checkbox"/> 3rd BD <input type="checkbox"/>						FOR LAB USE ONLY	
Note: RUSH requests will incur surcharges!						Temp of samples _____ °C Attempt to Cool? _____	
						Comments: _____	



PC font

Cooler Receipt and Preservation Form

Client Fremont analytical Service Request K16 11752
Received: 9-30-16 Opened: 9-30-16 By: eg Unloaded: 9-30-16 By: CS

- 1. Samples were received via? USPS FedEx UPS DHL PDX Courier Hand Delivered
- 2. Samples were received in: (circle) Cooler Box CS Envelope Other _____ NA
- 3. Were custody seals on coolers? NA Y N If yes, how many and where? _____
If present, were custody seals intact? Y N If present, were they signed and dated? Y N

Raw Cooler Temp	Corrected Cooler Temp	Raw Temp Blank	Corrected Temp Blank	Corr. Factor	Thermometer ID	Cooler/COC ID NA	Tracking Number NA	Filed
-0.5	-0.5	2.7	2.7	0	298		1Z X61 92X03 3202 6849	

- 4. Packing material: Inserts Baggies Bubble Wrap Gel Packs Wet Ice Dry Ice Sleeves _____
- 5. Were custody papers properly filled out (ink, signed, etc.)? NA Y N
- 6. Were samples received in good condition (temperature, unbroken)? *Indicate in the table below.* NA Y N
If applicable, tissue samples were received: Frozen Partially Thawed Thawed
- 7. Were all sample labels complete (i.e analysis, preservation, etc.)? NA Y N
- 8. Did all sample labels and tags agree with custody papers? *Indicate major discrepancies in the table on page 2.* NA Y N
- 9. Were appropriate bottles/containers and volumes received for the tests indicated? NA Y N
- 10. Were the pH-preserved bottles (*see SMO GEN SOP*) received at the appropriate pH? *Indicate in the table below* NA Y N
- 11. Were VOA vials received without headspace? *Indicate in the table below.* NA Y N
- 12. Was C12/Res negative? NA Y N

Sample ID on Bottle	Sample ID on COC	Identified by:

Sample ID	Bottle Count	Bottle Type	Out of Temp	Head-space	Broke	pH	Reagent	Volume added	Reagent Lot Number	Initials	Time

Notes, Discrepancies, & Resolutions: _____



Total Solids

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
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www.alsglobal.com

ALS Group USA, Corp.
dba ALS Environmental

Analytical Report

Client: Fremont Analytical
Project: COD
Sample Matrix: Soil
Analysis Method: 160.3 Modified
Prep Method: None

Service Request: K1611732
Date Collected: 09/14/16
Date Received: 09/30/16
Units: Percent
Basis: As Received

Solids, Total

Sample Name	Lab Code	Result	MRL	MDL	Dil.	Date Analyzed	Q
1609167-002A	K1611732-001	79.4	-	-	1	10/05/16 16:53	

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client: Fremont Analytical
Project: COD
Sample Matrix: Soil
Analysis Method: 160.3 Modified
Prep Method: None

Service Request: K1611732
Date Collected: NA
Date Received: NA

Units: Percent
Basis: As Received

Replicate Sample Summary
Inorganic Parameters

Sample Name:	Lab Code:	MRL	Sample Result	Duplicate Result	Average	RPD	RPD Limit	Date Analyzed
Batch QC	K1611731-001DUP	-	89.0	89.3	89.2	<1	20	10/05/16
Batch QC	K1611749-005DUP	-	97.4	97.3	97.4	<1	20	10/05/16

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.



General Chemistry

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360)577-7222 Fax (360)636-1068
www.alsglobal.com

ALS Group USA, Corp.
dba ALS Environmental

Analytical Report

Client: Fremont Analytical
Project: COD
Sample Matrix: Soil
Analysis Method: SM 5220 C Modified
Prep Method: ALS SOP

Service Request: K1611732
Date Collected: 09/14/16
Date Received: 09/30/16
Units: mg/Kg
Basis: Dry

Chemical Oxygen Demand (COD)

Sample Name	Lab Code	Result	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
1609167-002A	K1611732-001	39300	700	-	1	10/07/16 16:00	10/7/16	
Method Blank	K1611732-MB	ND U	200	-	1	10/07/16 16:00	NA	

ALS Group USA, Corp.

dba ALS Environmental

QA/QC Report

Client: Fremont Analytical
Project: COD
Sample Matrix: Soil

Service Request: K1611732
Date Collected: NA
Date Received: NA
Date Analyzed: 10/07/16

Replicate Sample Summary
General Chemistry Parameters

Sample Name: Batch QC
Lab Code: K1611836-001

Units: mg/Kg
Basis: Dry

<u>Analyte Name</u>	<u>Analysis Method</u>	<u>MRL</u>	<u>MDL</u>	<u>Sample Result</u>	<u>Duplicate Sample K1611836-001DUP Result</u>	<u>Average</u>	<u>RPD</u>	<u>RPD Limit</u>
Chemical Oxygen Demand (COD)	SM 5220 C Modified	610	-	5970	3720	4850	47 *	20

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client: Fremont Analytical
Project: COD
Sample Matrix: Soil

Service Request: K1611732
Date Collected: N/A
Date Received: N/A
Date Analyzed: 10/7/16
Date Extracted: 10/7/16

Matrix Spike Summary
Chemical Oxygen Demand (COD)

Sample Name: Batch QC
Lab Code: K1611836-001
Analysis Method: SM 5220 C Modified
Prep Method: ALS SOP

Units: mg/Kg
Basis: Dry

Matrix Spike
K1611836-001MS

<u>Analyte Name</u>	<u>Sample Result</u>	<u>Result</u>	<u>Spike Amount</u>	<u>% Rec</u>	<u>% Rec Limits</u>
Chemical Oxygen Demand (COD)	5970	64500	52400	112	75-125

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client: Fremont Analytical
Project: COD
Sample Matrix: Soil

Service Request: K1611732
Date Analyzed: 10/07/16
Date Extracted: NA

Lab Control Sample Summary
Chemical Oxygen Demand (COD)

Analysis Method: SM 5220 C Modified
Prep Method: None

Units: mg/Kg
Basis: Dry
Analysis Lot: 517791

Sample Name	Lab Code	Result	Spike Amount	% Rec	% Rec Limits
Lab Control Sample	K1611732-LCS	4540	4840	94	85-115

Work Order: 1609167
CLIENT: GeoEngineers
Project: Gas Works Park Site

QC SUMMARY REPORT
Dissolved Metals by EPA Method 200.8

Sample ID MB-14826	SampType: MBLK	Units: µg/L				Prep Date: 9/15/2016	RunNo: 31753				
Client ID: MBLKW	Batch ID: 14826					Analysis Date: 9/15/2016	SeqNo: 599718				
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Arsenic	ND	0.500									
Iron	ND	50.0									

Sample ID LCS-14826	SampType: LCS	Units: µg/L				Prep Date: 9/15/2016	RunNo: 31753				
Client ID: LCSW	Batch ID: 14826					Analysis Date: 9/15/2016	SeqNo: 599719				
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Arsenic	106	0.500	100.0	0	106	85	115				
Iron	1,090	50.0	1,000	0	109	50	150				

Sample ID 1609165-001BDUP	SampType: DUP	Units: µg/L				Prep Date: 9/15/2016	RunNo: 31753				
Client ID: BATCH	Batch ID: 14826					Analysis Date: 9/15/2016	SeqNo: 599721				
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Arsenic	23.9	0.500						25.79	7.46	30	
Iron	ND	50.0						0		30	

Sample ID 1609165-001BMS	SampType: MS	Units: µg/L				Prep Date: 9/15/2016	RunNo: 31753				
Client ID: BATCH	Batch ID: 14826					Analysis Date: 9/15/2016	SeqNo: 599724				
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Arsenic	560	0.500	500.0	25.79	107	70	130				
Iron	5,170	50.0	5,000	33.63	103	50	150				

Sample ID 1609165-001BMSD	SampType: MSD	Units: µg/L				Prep Date: 9/15/2016	RunNo: 31753				
Client ID: BATCH	Batch ID: 14826					Analysis Date: 9/15/2016	SeqNo: 599725				
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Arsenic	550	0.500	500.0	25.79	105	70	130	560.4	1.83	30	
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Work Order: 1609167
CLIENT: GeoEngineers
Project: Gas Works Park Site

QC SUMMARY REPORT

Dissolved Metals by EPA Method 200.8

Sample ID 1609165-001BMSD	SampType: MSD	Units: µg/L			Prep Date: 9/15/2016	RunNo: 31753					
Client ID: BATCH	Batch ID: 14826				Analysis Date: 9/15/2016	SeqNo: 599725					
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Iron	5,040	50.0	5,000	33.63	100	50	150	5,175	2.69	30	

Work Order: 1609167
CLIENT: GeoEngineers
Project: Gas Works Park Site

QC SUMMARY REPORT
Sulfide by SM 4500-S2-F

Sample ID MB-R31736	SampType: MBLK	Units: mg/L	Prep Date: 9/14/2016	RunNo: 31736							
Client ID: MBLKW	Batch ID: R31736	Analysis Date: 9/14/2016	SeqNo: 599396								
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Sulfide ND 0.500

Sample ID LCS-R31736	SampType: LCS	Units: mg/L	Prep Date: 9/14/2016	RunNo: 31736							
Client ID: LCSW	Batch ID: R31736	Analysis Date: 9/14/2016	SeqNo: 599397								
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Sulfide 2.00 0.500 2.000 0 100 65 135

Sample ID 1609151-006BDUP	SampType: DUP	Units: mg/L	Prep Date: 9/14/2016	RunNo: 31736							
Client ID: BATCH	Batch ID: R31736	Analysis Date: 9/14/2016	SeqNo: 599399								
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Sulfide 34.0 5.00 32.00 6.06 30

Sample ID 1609151-006BMS	SampType: MS	Units: mg/L	Prep Date: 9/14/2016	RunNo: 31736							
Client ID: BATCH	Batch ID: R31736	Analysis Date: 9/14/2016	SeqNo: 599400								
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Sulfide 78.0 5.00 40.00 32.00 115 65 135

Sample ID 1609151-006BMSD	SampType: MSD	Units: mg/L	Prep Date: 9/14/2016	RunNo: 31736							
Client ID: BATCH	Batch ID: R31736	Analysis Date: 9/14/2016	SeqNo: 599401								
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Sulfide 76.0 5.00 40.00 32.00 110 65 135 78.00 2.60 30

Client Name: **GEI**
 Logged by: **Erica Silva**

Work Order Number: **1609167**
 Date Received: **9/14/2016 3:26:00 PM**

Chain of Custody

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

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
 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:	<input type="text"/>	Date:	<input type="text"/>
By Whom:	<input type="text"/>	Via:	<input type="checkbox"/> eMail <input type="checkbox"/> Phone <input type="checkbox"/> Fax <input type="checkbox"/> In Person
Regarding:	<input type="text"/>		
Client Instructions:	<input type="text"/>		

19. Additional remarks:

Item Information

Item #	Temp °C
Cooler	4.0
Sample	4.2

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



3600 Fremont Ave N.
Seattle, WA 98103

Tel: 206-352-3790
Fax: 206-352-7178

Chain of Custody Record and Laboratory Services Agreement

Date: 9/14/2016

Laboratory Project No (Internal):

1009167

Client: Geoenvironmental

Project Name: Gas Works Park Site

Project No: 0186-846-01 Task 1803

Collected by: GRL/CVD

Address: 600 Stewart Street, Suite 1700
Seattle, WA 98103

Location: Seattle

City, State, Zip: Seattle, WA 98103

Report To (PM): Sandra Smith / Claudia De la Via

PM Email: sbsmith@geoenvironmental.com

Telephone: 253.722.2418

Fax: 253.722.2418

PM Email: cdelavia@geoenvironmental.com

*Matrix Codes: A = Air, AQ = Aqueous, B = Bulk, O = Other, P = Product, S = Soil, SD = Sediment, SL = Solid, W = Water, DW = Drinking Water, GW = Ground Water, SW = Storm Water, WW = Waste Water

Sample Name	Sample Date	Sample Time	Sample Type (Matrix)*	Analytes											Comments		
				Arsenic (EPA 200.8) field filtered	Iron (EPA 200.8) field filtered	Sulfide (4500-S2-F) field filtered	COD (SM5220D) field filtered	COD (SM5220)	Grain Size (ASTM D422)	SVOCs (EPA 8270 / 625)	PAHs (EPA 8270 - SIM)	PCBs (EPA 8082 / 608)	Metals** (EPA 6020 / 200.8)	Total (T) Dissolved (D)			
1 PAI-14-20-21.8	9/14	1010	S														Bottles for COD + Grain
2 PAI-14-22-22.5		1015	S														Bottles for COD
3 PAI-14-28-33		1050	S														FID FILTERED
4 PAI-14-D-K60914	9/4	1109	GW														Bottle for COD
5 PAI-13-8.2-8.4		1150	S														
6 PAI-13-28-33		1345	S														
7 PAI-13-D-160914	9/14	1450 (GAL)	X	X	X	X	X	X	X	X	X	X	X	X	X	X	Field Filtered
8 PAI-																	
9 PAI-																	
10 PAI-																	

**Metals Analysis (Circle): MTCA-5 RCRA-8 Priority Pollutants TAL Individual: Ag Al As B Ba Be Ca Cd Co Cr Cu Fe Hg K Mg Mn Mo Na Ni Pb Sb Se Sr Sn Tl U V Zn

***Anions (Circle): Nitrate Nitrite Chloride Sulfate Bromide O-Phosphate Fluoride Nitrate+Nitrite

Sample Disposal: Return to Client Disposal by Lab (Samples will be held for 30 days unless otherwise noted. A fee may be assessed if samples are retained after 30 days.)

Turn-around times for samples received after 4:00pm will begin on the following business day.

I represent that I am authorized to enter into this Agreement with Fremont Analytical on behalf of the Client named above, that I have verified Client's agreement to each of the terms on the front and backside of this Agreement.

Relinquished: [Signature] Date/Time: 9/14/16 1520

Relinquished: [Signature] Date/Time: 9/14/16 1524

Received: [Signature] Date/Time: 9/14/16 1520

Received: [Signature] Date/Time: 9/14/16 1526



3600 Fremont Ave N.
Seattle, WA 98103
Tel: 206-352-3790
Fax: 206-352-7178

Client: Geoenvironmental
Address: 600 Stewart Street, Suite 1700
Seattle, WA 98103
City, State, Zip: Seattle, WA 98103
Telephone: 253-722-2418

Project Name: Gas Works Park Site
Project No: 0186-846-01 Task 1803
Location: Seattle
Report To (PM): Sandra Smith / Claudia De La Via
PM Email: sbsmith@geoenvironmental.com
cdelevia@geoenvironmental.com

Chain of Custody Record and Laboratory Services Agreement

Date: 9/14/2016

Laboratory Project No (Internal): 1009151

Page: _____ of: _____

Collected by: GRI/CVD

*Matrix Codes: A = Air, AQ = Aqueous, B = Bulk, O = Other, P = Product, S = Soil, SD = Sediment, SL = Solid, W = Water, DW = Drinking Water, GW = Ground Water, SW = Storm Water, WW = Waste Water

Sample Name	Sample Date	Sample Time	Sample Type (Matrix)*	Arsenic (EPA 200.8) field filtered	Iron (EPA 200.8) field filtered	Sulfide (4500-S2-F) field filtered	COD (SM5220D) field filtered	COD (SM5220)	Grain Size (ASTM D422)	SVOCs (EPA 8270 / 625)	PAHs (EPA 8270 / 625)	PCBs (EPA 8082 / 608)	Metals** (EPA 6020 / 200.8)	Total (T) Dissolved (D)	Comments
1 PAL-14-20-21.8	9/14	1010	S												Bottled for COD & Grain Add analysis
2 PAL-14-22-22.5		1015	S												Bottled for COD — 9/14/16 perf. S.
3 PAL-14-28-33		1050	S												ACID FILTERED
4 PAL-14-D-K00914	9/14	1109	GW												Bottle for COD
5 PAL-13-8.2-8.4		1150	S												no analysis for now 9/14/16
6 PAL-13-28-33		1345	S												
7 PAL-13-D-160914	9/14	1450 (SL)	X	X	X	X	X	X							Field Filtered
8 PAL-															
9 PAL-															
10 PAL-															

**Metals Analysis (Circle): MTCA-5 RCRA-8 Priority Pollutants TAL Individual: Ag Al As B Ba Be Ca Cd Co Cr Cu Fe Hg K Mg Mn Mo Na Ni Pb Sb Se Sr Sn Tl Tl U V Zn

***Anions (Circle): Nitrate Nitrite Chloride Sulfate Bromide O-Phosphate Fluoride Nitrate-Nitrite Turn-around times for samples received after 4:00pm will begin on the following business day.

Sample Disposal: Return to Client Disposal by Lab (Samples will be held for 30 days unless otherwise noted. A fee may be assessed if samples are retained after 30 days.)

I represent that I am authorized to enter into this Agreement with Fremont Analytical on behalf of the Client named above, that I have verified Client's agreement to each of the terms on the front and backside of this Agreement.

Relinquished: _____ Date/Time: 9/14/16 1520
 Received: _____ Date/Time: 9/14/16 1520
 Relinquished: _____ Date/Time: 9/14/16 1526
 Received: _____ Date/Time: 9/14/16 1526



GeoEngineers

Sandra Smith
600 Stewart Street, Suite 1700
Seattle, WA 98101

RE: Gas Works Park Site
Work Order Number: 1609188

October 06, 2016

Attention Sandra Smith:

Fremont Analytical, Inc. received 6 sample(s) on 9/15/2016 for the analyses presented in the following report.

Chemical Oxygen Demand by SM 5220D
Dissolved Metals by EPA Method 200.8
Grain Size by ASTM D422
Sulfide by SM 4500-S2-F

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

CLIENT: GeoEngineers
Project: Gas Works Park Site
Work Order: 1609188

Work Order Sample Summary

Lab Sample ID	Client Sample ID	Date/Time Collected	Date/Time Received
1609188-001	PAI-16-D-160915	09/15/2016 11:44 AM	09/15/2016 4:17 PM
1609188-002	PAI-16-11.5-15.8	09/15/2016 10:00 AM	09/15/2016 4:17 PM
1609188-003	PAI-16-15.8-16	09/15/2016 10:05 AM	09/15/2016 4:17 PM
1609188-004	PAI-16-28-33	09/15/2016 11:25 AM	09/15/2016 4:17 PM
1609188-005	PAI-16-S-160915	09/15/2016 12:49 PM	09/15/2016 4:17 PM
1609188-006	PAI-17-S-160915	09/15/2016 4:03 PM	09/15/2016 4:17 PM

CLIENT: GeoEngineers
Project: Gas Works Park Site

I. SAMPLE RECEIPT:

Samples receipt information is recorded on the attached Sample Receipt Checklist.

II. GENERAL REPORTING COMMENTS:

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

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

III. ANALYSES AND EXCEPTIONS:

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

Qualifiers:

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



Client: GeoEngineers

Collection Date: 9/15/2016 11:44:00 AM

Project: Gas Works Park Site

Lab ID: 1609188-001

Matrix: Groundwater

Client Sample ID: PAI-16-D-160915

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
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Dissolved Metals by EPA Method 200.8

Batch ID: 14843 Analyst: TN

Arsenic	586	5.00	D	µg/L	10	9/16/2016 1:10:03 PM
Iron	2,880	500	D	µg/L	10	9/16/2016 1:10:03 PM

Chemical Oxygen Demand by SM 5220D

Batch ID: R31908 Analyst: MW

Chemical Oxygen Demand	63.4	50.0	D	mg/L	5	9/22/2016 12:36:42 PM
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Sulfide by SM 4500-S2-F

Batch ID: R31783 Analyst: KT

Sulfide	3.00	0.119	MDL	mg/L	1	9/16/2016 12:06:00 PM
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NOTES:

MDL - Sample reported to Method Detection Limit (MDL)



Client: GeoEngineers

Collection Date: 9/15/2016 12:49:00 PM

Project: Gas Works Park Site

Lab ID: 1609188-005

Matrix: Groundwater

Client Sample ID: PAI-16-S-160915

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
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Dissolved Metals by EPA Method 200.8

Batch ID: 14843 Analyst: TN

Arsenic	1,000	5.00	D	µg/L	10	9/16/2016 1:13:35 PM
Iron	2,500	500	D	µg/L	10	9/16/2016 1:13:35 PM

Chemical Oxygen Demand by SM 5220D

Batch ID: R31908 Analyst: MW

Chemical Oxygen Demand	192	50.0	D	mg/L	5	9/22/2016 12:36:42 PM
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Sulfide by SM 4500-S2-F

Batch ID: R31783 Analyst: KT

Sulfide	60.4	0.119	MDL	mg/L	1	9/16/2016 12:18:00 PM
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NOTES:

MDL - Sample reported to Method Detection Limit (MDL)



Client: GeoEngineers

Collection Date: 9/15/2016 4:03:00 PM

Project: Gas Works Park Site

Lab ID: 1609188-006

Matrix: Groundwater

Client Sample ID: PAI-17-S-160915

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
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Dissolved Metals by EPA Method 200.8

Batch ID: 14843 Analyst: TN

Arsenic	1,490	5.00	D	µg/L	10	9/16/2016 1:17:07 PM
Iron	10,600	500	D	µg/L	10	9/16/2016 1:17:07 PM

Chemical Oxygen Demand by SM 5220D

Batch ID: R31908 Analyst: MW

Chemical Oxygen Demand	76.6	50.0	D	mg/L	5	9/22/2016 12:36:42 PM
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Sulfide by SM 4500-S2-F

Batch ID: R31783 Analyst: KT

Sulfide	13.0	0.119	MDL	mg/L	1	9/16/2016 12:21:00 PM
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NOTES:

MDL - Sample reported to Method Detection Limit (MDL)

Grain Size by ASTM D422

Project: Gas Works Park Site
Client: GeoEngineers
Lab Project #: 1609188

Percent Finer (Passing) than the Indicated Size

UOM = Percent

Grain Size Classification	Gravel						Coarse Sand	Medium Sand		Fine Sand			Silt		
	Sieve Size	3"	2"	1 1/2"	1"	3/4"	3/8"	#4	#10	#20	#40	#60	#140	#230	#325
Particle Size (Microns)	76200	50800	38100	25400	19050	9525	4750	2000	850	425	250	106	75	45	34
PAI-16-11.5-15.8	100%	100%	100%	100%	77.7%	51.4%	36.0%	23.4%	15.1%	8.88%	4.02%	0.185%	0.0369%	0.0133%	0.00591%
PAI-16-28-33	100%	100%	100%	100%	95.5%	85.2%	79.0%	74.3%	70.0%	63.3%	51.2%	25.4%	15.0%	4.37%	0.691%

Grain Size by ASTM D422

Project: Gas Works Park Site
 Client: GeoEngineers
 Lab Project #: 1609188

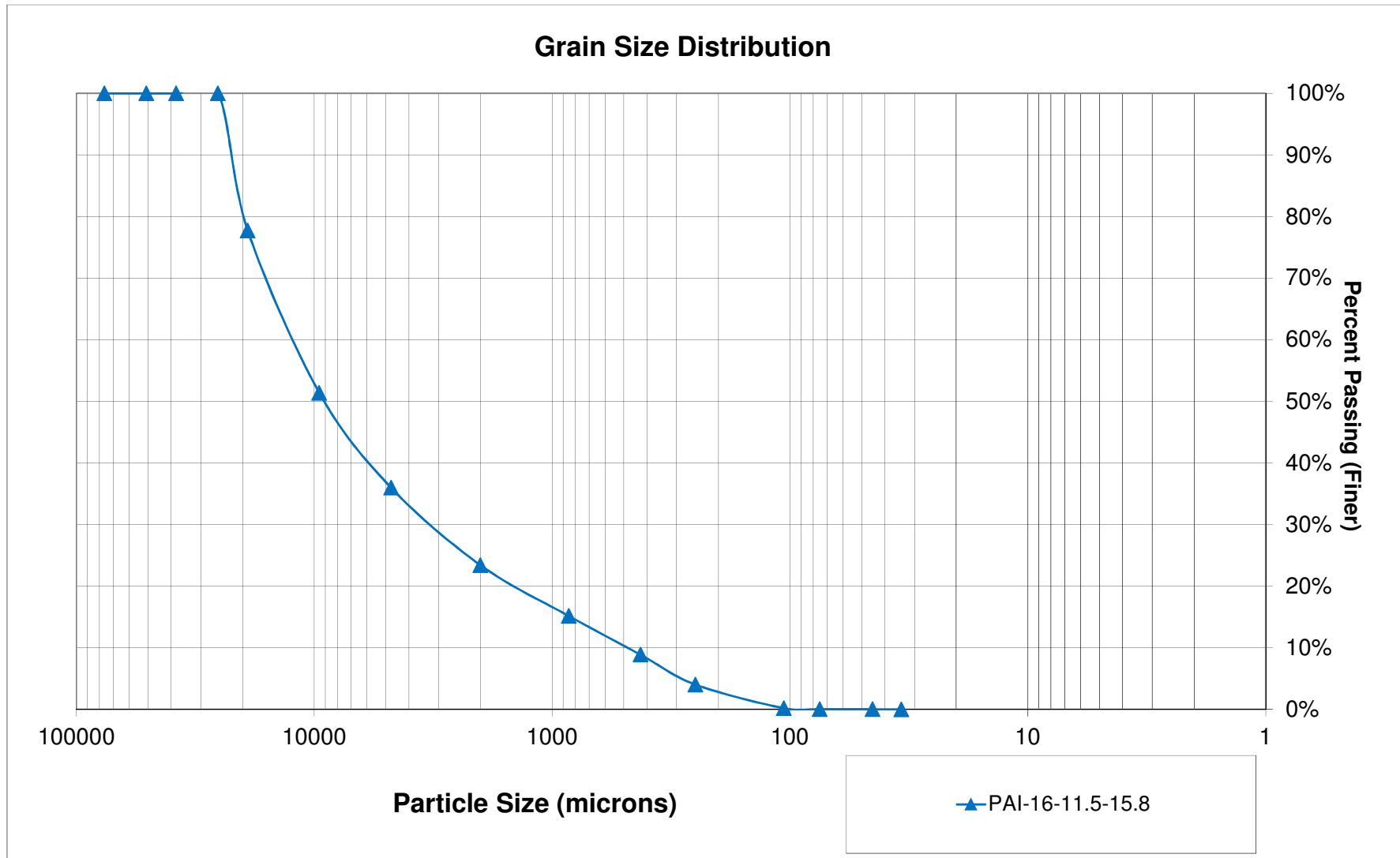
Percent Retained in Each Size Fraction

UOM = Percent

Grain Size Classification	<i>Gravel</i>							<i>Coarse Sand</i>	<i>Medium Sand</i>		<i>Fine Sand</i>			<i>Silt</i>		
	>76200	76200-50800	50800-38100	38100-25400	25400-19000	19050-9525	9525-4750	4750-2000	2000-850	850-425	425-250	250-106	106-62.5	72.5-45	45-34	<34
PAI-16-11.5-15.8	0.00%	0.00%	0.00%	0.00%	22.2%	26.2%	15.3%	12.52%	8.21%	6.24%	4.83%	3.82%	0.147%	0.0235%	0.00735%	0.00588%
PAI-16-28-33	0.00%	0.00%	0.00%	0.00%	4.46%	10.3%	6.15%	4.75%	4.24%	6.73%	12.0%	25.7%	10.5%	10.6%	3.67%	0.690%

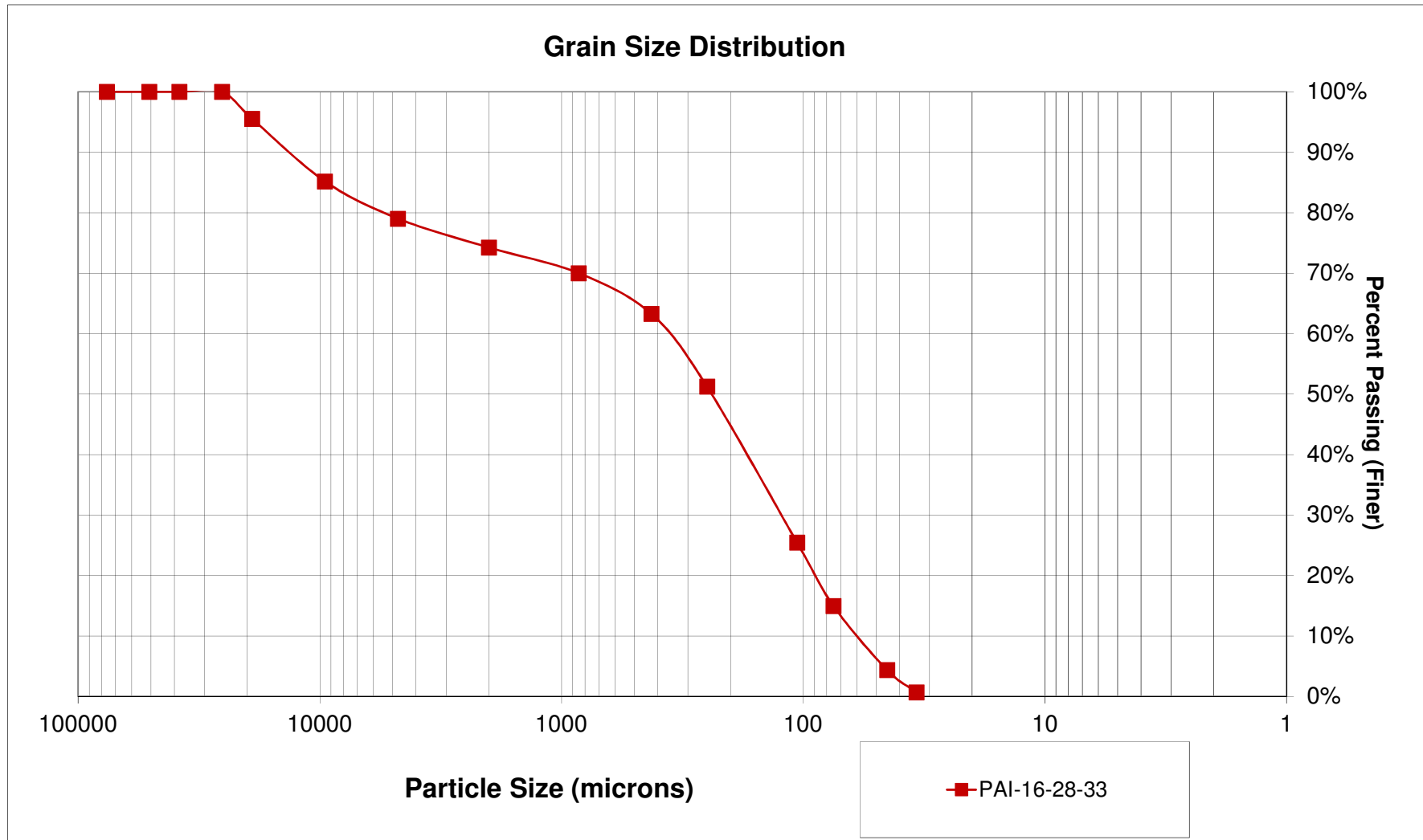
Grain Size by ASTM D422

Project: Gas Works Park Site
 Client: GeoEngineers
 Lab Project #: 1609188



Grain Size by ASTM D422

Project: Gas Works Park Site
 Client: GeoEngineers
 Lab Project #: 1609188





ALS Environmental
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October 06, 2016

Analytical Report for Service Request No: 1611157

Mr. Michael Ridgeway
Fremont Analytical
3600 Fremont Avenue, North
Seattle, WA 98103

RE: COD / 1609188

Dear Mr. Ridgeway,

Enclosed are the results of the sample(s) submitted to our laboratory September 20, 2016. For your reference, these analyses have been assigned our service request number **K1611157**.

Analyses were performed according to our laboratory's EPA-approved quality assurance program. The test results meet requirements of the current EPA standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of EPA-accredited analytes, refer to the certifications section at www.alsglobal.com. All results are intended to be considered in their entirety, and ALS Group USA, Corp. dba ALS Environmental (ALS) is not responsible for use of less than the complete report. Results apply only to the items submitted to the laboratory for analysis and individual items (samples) analyzed, as listed in the report.

Please contact me if you have any questions. My extension is 3375. You may also contact me via email at janet.Malloch@alsglobal.com.

Respectfully submitted,

ALS Group USA, Corp. dba ALS Environmental

Janet Malloch
Project Manager



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Acronyms

ASTM	American Society for Testing and Materials
A2LA	American Association for Laboratory Accreditation
CARB	California Air Resources Board
CAS Number	Chemical Abstract Service registry Number
CFC	Chlorofluorocarbon
CFU	Colony-Forming Unit
DEC	Department of Environmental Conservation
DEQ	Department of Environmental Quality
DHS	Department of Health Services
DOE	Department of Ecology
DOH	Department of Health
EPA	U. S. Environmental Protection Agency
ELAP	Environmental Laboratory Accreditation Program
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
LOD	Limit of Detection
LOQ	Limit of Quantitation
LUFT	Leaking Underground Fuel Tank
M	Modified
MCL	Maximum Contaminant Level is the highest permissible concentration of a substance allowed in drinking water as established by the USEPA.
MDL	Method Detection Limit
MPN	Most Probable Number
MRL	Method Reporting Limit
NA	Not Applicable
NC	Not Calculated
NCASI	National Council of the Paper Industry for Air and Stream Improvement
ND	Not Detected
NIOSH	National Institute for Occupational Safety and Health
PQL	Practical Quantitation Limit
RCRA	Resource Conservation and Recovery Act
SIM	Selected Ion Monitoring
TPH	Total Petroleum Hydrocarbons
tr	Trace level is the concentration of an analyte that is less than the PQL but greater than or equal to the MDL.

Inorganic Data Qualifiers

- * The result is an outlier. See case narrative.
- # The control limit criteria is not applicable. See case narrative.
- B The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards.
- E The result is an estimate amount because the value exceeded the instrument calibration range.
- J The result is an estimated value.
- U The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
DOD-QSM 4.2 definition : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
- i The MRL/MDL or LOQ/LOD is elevated due to a matrix interference.
- X See case narrative.
- Q See case narrative. One or more quality control criteria was outside the limits.
- H The holding time for this test is immediately following sample collection. The samples were analyzed as soon as possible after receipt by the laboratory.

Metals Data Qualifiers

- # The control limit criteria is not applicable. See case narrative.
- J The result is an estimated value.
- E The percent difference for the serial dilution was greater than 10%, indicating a possible matrix interference in the sample.
- M The duplicate injection precision was not met.
- N The Matrix Spike sample recovery is not within control limits. See case narrative.
- S The reported value was determined by the Method of Standard Additions (MSA).
- U The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
DOD-QSM 4.2 definition : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
- W The post-digestion spike for furnace AA analysis is out of control limits, while sample absorbance is less than 50% of spike absorbance.
 - i The MRL/MDL or LOQ/LOD is elevated due to a matrix interference.
- X See case narrative.
- + The correlation coefficient for the MSA is less than 0.995.
- Q See case narrative. One or more quality control criteria was outside the limits.

Organic Data Qualifiers

- * The result is an outlier. See case narrative.
- # The control limit criteria is not applicable. See case narrative.
- A A tentatively identified compound, a suspected aldol-condensation product.
- B The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards.
- C The analyte was qualitatively confirmed using GC/MS techniques, pattern recognition, or by comparing to historical data.
- D The reported result is from a dilution.
- E The result is an estimated value.
- J The result is an estimated value.
- N The result is presumptive. The analyte was tentatively identified, but a confirmation analysis was not performed.
- P The GC or HPLC confirmation criteria was exceeded. The relative percent difference is greater than 40% between the two analytical results.
- U The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
DOD-QSM 4.2 definition : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
 - i The MRL/MDL or LOQ/LOD is elevated due to a chromatographic interference.
- X See case narrative.
- Q See case narrative. One or more quality control criteria was outside the limits.

Additional Petroleum Hydrocarbon Specific Qualifiers

- F The chromatographic fingerprint of the sample matches the elution pattern of the calibration standard.
- L The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of lighter molecular weight constituents than the calibration standard.
- H The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of heavier molecular weight constituents than the calibration standard.
- O The chromatographic fingerprint of the sample resembles an oil, but does not match the calibration standard.
- Y The chromatographic fingerprint of the sample resembles a petroleum product eluting in approximately the correct carbon range, but the elution pattern does not match the calibration standard.
- Z The chromatographic fingerprint does not resemble a petroleum product.

**ALS Group USA Corp. dba ALS Environmental (ALS) - Kelso
State Certifications, Accreditations, and Licenses**

Agency	Web Site	Number
Alaska DEC UST	http://dec.alaska.gov/applications/eh/ehllabreports/USTLabs.aspx	UST-040
Arizona DHS	http://www.azdhs.gov/lab/license/env.htm	AZ0339
Arkansas - DEQ	http://www.adeq.state.ar.us/techsvs/labcert.htm	88-0637
California DHS (ELAP)	http://www.cdph.ca.gov/certlic/labs/Pages/ELAP.aspx	2795
DOD ELAP	http://www.denix.osd.mil/edqw/Accreditation/AccreditedLabs.cfm	L14-51
Florida DOH	http://www.doh.state.fl.us/lab/EnvLabCert/WaterCert.htm	E87412
Hawaii DOH	Not available	-
ISO 17025	http://www.pjllabs.com/	L16-57
Louisiana DEQ	http://www.deq.louisiana.gov/portal/DIVISIONS/PublicParticipationandPermitSupport/LouisianaLaboratoryAccreditationProgram.aspx	03016
Maine DHS	Not available	WA01276
Minnesota DOH	http://www.health.state.mn.us/accreditation	053-999-457
Montana DPHHS	http://www.dphhs.mt.gov/publichealth/	CERT0047
Nevada DEP	http://ndep.nv.gov/bsdw/labservice.htm	WA01276
New Jersey DEP	http://www.nj.gov/dep/oqa/	WA005
North Carolina DWQ	http://www.dwqlab.org/	605
Oklahoma DEQ	http://www.deq.state.ok.us/CSDnew/labcert.htm	9801
Oregon – DEQ (NELAP)	http://public.health.oregon.gov/LaboratoryServices/EnvironmentalLaboratoryAccreditation/Pages/index.aspx	WA100010
South Carolina DHEC	http://www.scdhec.gov/environment/envserv/	61002
Texas CEQ	http://www.tceq.texas.gov/field/qa/env_lab_accreditation.html	T104704427
Washington DOE	http://www.ecy.wa.gov/programs/eap/labs/lab-accreditation.html	C544
Wyoming (EPA Region 8)	http://www.epa.gov/region8/water/dwhome/wyomingdi.html	-
Kelso Laboratory Website	www.alsglobal.com	NA

Analyses were performed according to our laboratory's NELAP-approved quality assurance program. A complete listing of specific NELAP-certified analytes, can be found in the certification section at www.ALSGlobal.com or at the accreditation bodies web site.

Please refer to the certification and/or accreditation body's web site if samples are submitted for compliance purposes. The states highlighted above, require the analysis be listed on the state certification if used for compliance purposes and if the method/analyte is offered by that state.



Chain of Custody

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CHAIN OF CUSTODY RECORD

Omega COCID 271 PAGE: 1 OF: 1

ADDRESS

Fremont Analytical, Inc.
 3600 Fremont Ave. N.
 Seattle, WA 98103
 TEL: 206-352-3790
 FAX: 206-352-7178

Website: www.fremontanalytical.com

K161157

SUB CONTRACTOR: ALS		COMPANY: ALS Environmental		SPECIAL INSTRUCTIONS / COMMENTS: Please email results to Michael Ridgeway and Chelsea Ward - mridgeway@fremontanalytical.com; cward@fremontanalytical.com <i>Low level RL if possible</i>			
ADDRESS: 1317 South 13th Avenue							
CITY, STATE, ZIP: Kelso, WA 98626							
PHONE: (360) 577-7222		FAX: EMAIL:					
ACCOUNT #:							

ITEM #	SAMPLE ID	CLIENT SAMPLE ID	BOTTLE TYPE	MATRIX	DATE COLLECTED	NUMBER OF CONTAINERS	COMMENTS: Methanol Preserved Weights HOT Sample Notation, Additional Sample Description.
1	1609188-002A	PAI-16-11.5-15.8	CLEAR JARS 4 O	Soil	9/15/2016 10:00:00 AM	1	Chemical Oxygen Demand by SM5220, Low Level RL
	TEST_SUB						
2	1609188-004A	PAI-16-28-33	CLEAR JARS 4 O	Soil	9/15/2016 11:25:00 AM	1	Chemical Oxygen Demand by SM5220, Low Level RL
	TEST_SUB						

Relinquished By: <i>[Signature]</i>	Date: 9/19/16	Time: 14:25	Received By: <i>[Signature]</i>	Date: 9/20/16	Time: 10:20	REPORT TRANSMITTAL DESIRED: <input type="checkbox"/> HARDCOPY (extra cost) <input type="checkbox"/> FAX <input checked="" type="checkbox"/> EMAIL <input type="checkbox"/> ONLINE	
Relinquished By:	Date:	Time:	Received By:	Date:	Time:	FOR LAB USE ONLY Temp of samples _____ °C Attempt to Cool? _____ Comments: _____	
Relinquished By:	Date:	Time:	Received By:	Date:	Time:		
TAT: Standard <input checked="" type="checkbox"/> RUSH Next BD <input type="checkbox"/> 2nd BD <input type="checkbox"/> 3rd BD <input type="checkbox"/>							
Note: RUSH requests will incur surcharges!							



Cooler Receipt and Preservation Form

Client Fremont Service Request K16 11157
 Received: 9/20/16 Opened: 9/20/16 By: [Signature] Unloaded: 9/20/16 By: [Signature]

- Samples were received via? USPS Fed Ex UPS DHL PDX Courier Hand Delivered
- Samples were received in: (circle) Cooler Box Envelope Other NA
- Were custody seals on coolers? NA Y N If yes, how many and where? one front
 If present, were custody seals intact? Y N If present, were they signed and dated? Y N

Raw Cooler Temp	Corrected Cooler Temp	Raw Temp Blank	Corrected Temp Blank	Corr. Factor	Thermometer ID	Cooler/COC ID	Tracking Number	NA	Filed
2.9	2.9	5.5	5.5	4	370	271	1E86192X0331995472		

- Packing material: Inserts Baggies Bubble Wrap Gel Packs Wet Ice Dry Ice Sleeves
- Were custody papers properly filled out (ink, signed, etc.)? NA Y N
- Were samples received in good condition (temperature, unbroken)? *Indicate in the table below.* NA Y N
 If applicable, tissue samples were received: Frozen Partially Thawed Thawed
- Were all sample labels complete (i.e analysis, preservation, etc.)? NA Y N
- Did all sample labels and tags agree with custody papers? *Indicate major discrepancies in the table on page 2.* NA Y N
- Were appropriate bottles/containers and volumes received for the tests indicated? NA Y N
- Were the pH-preserved bottles (*see SMO GEN SOP*) received at the appropriate pH? *Indicate in the table below* NA Y N
- Were VOA vials received without headspace? *Indicate in the table below.* NA Y N
- Was C12/Res negative? NA Y N

Sample ID on Bottle	Sample ID on COC	Identified by:

Sample ID	Bottle Count	Bottle Type	Out of Temp	Head-space	Broke	pH	Reagent	Volume added	Reagent Lot Number	Initials	Time

Notes, Discrepancies, & Resolutions: _____



Total Solids

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ALS Group USA, Corp.
dba ALS Environmental

Analytical Report

Client: Fremont Analytical
Project: COD/1609188
Sample Matrix: Soil
Analysis Method: 160.3 Modified
Prep Method: None

Service Request: K1611157
Date Collected: 09/15/16
Date Received: 09/20/16
Units: Percent
Basis: As Received

Solids, Total

Sample Name	Lab Code	Result	MRL	MDL	Dil.	Date Analyzed	Q
PAI-16-11.5-15.8	K1611157-001	63.7	-	-	1	09/21/16 14:47	
PAI-16-28-33	K1611157-002	90.5	-	-	1	09/21/16 14:47	

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client: Fremont Analytical
Project: COD/1609188
Sample Matrix: Sediment
Analysis Method: 160.3 Modified
Prep Method: None

Service Request: K1611157
Date Collected: NA
Date Received: NA

Units: Percent
Basis: As Received

Replicate Sample Summary
Inorganic Parameters

Sample Name:	Lab Code:	MRL	Sample Result	Duplicate Result	Average	RPD	RPD Limit	Date Analyzed
Batch QC	K1611154-001DUP	-	37.7	39.0	38.4	3	20	09/21/16
Batch QC	K1611174-001DUP	-	86.3	86.9	86.6	<1	20	09/21/16

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.



General Chemistry

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ALS Group USA, Corp.
dba ALS Environmental

Analytical Report

Client: Fremont Analytical
Project: COD/1609188
Sample Matrix: Soil
Analysis Method: SM 5220 C Modified
Prep Method: ALS SOP

Service Request: K1611157
Date Collected: 09/15/16
Date Received: 09/20/16
Units: mg/Kg
Basis: Dry

Chemical Oxygen Demand (COD)

Sample Name	Lab Code	Result	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
PAI-16-11.5-15.8	K1611157-001	220000	1500	-	1	10/04/16 15:00	10/4/16	
PAI-16-28-33	K1611157-002	2340	130	-	1	09/29/16 14:15	9/28/16	
Method Blank	K1611157-MB1	ND U	10	-	1	09/29/16 14:15	NA	
Method Blank	K1611157-MB2	ND U	200	-	1	10/04/16 15:00	NA	

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client: Fremont Analytical
Project: COD/1609188
Sample Matrix: Soil
Analysis Method: SM 5220 C Modified
Prep Method: ALS SOP

Service Request: K1611157
Date Collected: NA
Date Received: NA

Units: mg/Kg
Basis: Dry

Replicate Sample Summary
Chemical Oxygen Demand (COD)

Sample Name:	Lab Code:	MRL	MDL	Sample Result	Duplicate Result	Average	RPD	RPD Limit	Date Analyzed
Batch QC	K1610996-001DUP	130	-	2980	3200	3090	7	20	09/29/16
Batch QC	K1610999-003DUP	1100	-	51300	51400	51300	<1	20	10/04/16

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client: Fremont Analytical
Project: COD/1609188
Sample Matrix: Soil

Service Request: K1611157
Date Collected: N/A
Date Received: N/A
Date Analyzed: 09/29/16
Date Extracted: 09/28/16

Matrix Spike Summary
Chemical Oxygen Demand (COD)

Sample Name: Batch QC
Lab Code: K1610996-001
Analysis Method: SM 5220 C Modified
Prep Method: ALS SOP

Units: mg/Kg
Basis: Dry

Matrix Spike
K1610996-001MS

<u>Analyte Name</u>	<u>Sample Result</u>	<u>Result</u>	<u>Spike Amount</u>	<u>% Rec</u>	<u>% Rec Limits</u>
Chemical Oxygen Demand (COD)	2980	11300	6830	121	75-125

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client: Fremont Analytical
Project: COD/1609188
Sample Matrix: Soil

Service Request: K1611157
Date Collected: N/A
Date Received: N/A
Date Analyzed: 10/4/16
Date Extracted: 10/4/16

Matrix Spike Summary
Chemical Oxygen Demand (COD)

Sample Name: Batch QC
Lab Code: K1610999-003
Analysis Method: SM 5220 C Modified
Prep Method: ALS SOP

Units: mg/Kg
Basis: Dry

Matrix Spike
K1610999-003MS

<u>Analyte Name</u>	<u>Sample Result</u>	<u>Result</u>	<u>Spike Amount</u>	<u>% Rec</u>	<u>% Rec Limits</u>
Chemical Oxygen Demand (COD)	51300	79700	34100	83	75-125

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client: Fremont Analytical
Project: COD/1609188
Sample Matrix: Soil

Service Request: K1611157
Date Analyzed: 09/29/16
Date Extracted: NA

Lab Control Sample Summary
Chemical Oxygen Demand (COD)

Analysis Method: SM 5220 C Modified
Prep Method: None

Units: mg/Kg
Basis: Dry
Analysis Lot: 516546

Sample Name	Lab Code	Result	Spike Amount	% Rec	% Rec Limits
Lab Control Sample	K1611157-LCS1	231	242	96	85-115

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client: Fremont Analytical
Project: COD/1609188
Sample Matrix: Soil

Service Request: K1611157
Date Analyzed: 10/04/16
Date Extracted: NA

Lab Control Sample Summary
Chemical Oxygen Demand (COD)

Analysis Method: SM 5220 C Modified
Prep Method: None

Units: mg/Kg
Basis: Dry
Analysis Lot: 517196

Sample Name	Lab Code	Result	Spike Amount	% Rec	% Rec Limits
Lab Control Sample	K1611157-LCS2	4570	4840	94	85-115

Work Order: 1609188
CLIENT: GeoEngineers
Project: Gas Works Park Site

QC SUMMARY REPORT
Dissolved Metals by EPA Method 200.8

Sample ID MB-14843	SampType: MBLK	Units: µg/L				Prep Date: 9/16/2016	RunNo: 31790				
Client ID: MBLKW	Batch ID: 14843					Analysis Date: 9/16/2016	SeqNo: 600479				
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Arsenic	ND	0.500									
Iron	ND	50.0									

Sample ID LCS-14843	SampType: LCS	Units: µg/L				Prep Date: 9/16/2016	RunNo: 31790				
Client ID: LCSW	Batch ID: 14843					Analysis Date: 9/16/2016	SeqNo: 600480				
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Arsenic	101	0.500	100.0	0	101	85	115				
Iron	958	50.0	1,000	0	95.8	50	150				

Sample ID 1609147-001CDUP	SampType: DUP	Units: µg/L				Prep Date: 9/16/2016	RunNo: 31790				
Client ID: BATCH	Batch ID: 14843					Analysis Date: 9/16/2016	SeqNo: 600487				
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Arsenic	5.03	0.500						4.720	6.26	30	
Iron	2,870	50.0						3,043	5.91	30	

Sample ID 1609147-001CMS	SampType: MS	Units: µg/L				Prep Date: 9/16/2016	RunNo: 31790				
Client ID: BATCH	Batch ID: 14843					Analysis Date: 9/16/2016	SeqNo: 600488				
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Arsenic	592	0.500	500.0	4.720	117	70	130				
Iron	8,050	50.0	5,000	3,043	100	50	150				

Sample ID 1609147-001CMSD	SampType: MSD	Units: µg/L				Prep Date: 9/16/2016	RunNo: 31790				
Client ID: BATCH	Batch ID: 14843					Analysis Date: 9/16/2016	SeqNo: 600489				
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Arsenic	587	0.500	500.0	4.720	116	70	130	591.9	0.856	30	
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Work Order: 1609188
CLIENT: GeoEngineers
Project: Gas Works Park Site

QC SUMMARY REPORT
Dissolved Metals by EPA Method 200.8

Sample ID 1609147-001CMSD	SampType: MSD	Units: µg/L			Prep Date: 9/16/2016	RunNo: 31790					
Client ID: BATCH	Batch ID: 14843				Analysis Date: 9/16/2016	SeqNo: 600489					
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Iron	8,050	50.0	5,000	3,043	100	50	150	8,055	0.0495	30	

Work Order: 1609188
CLIENT: GeoEngineers
Project: Gas Works Park Site

QC SUMMARY REPORT
Sulfide by SM 4500-S2-F

Sample ID MB-R31783	SampType: MBLK	Units: mg/L	Prep Date: 9/16/2016	RunNo: 31783							
Client ID: MBLKW	Batch ID: R31783	Analysis Date: 9/16/2016	SeqNo: 600320								
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Sulfide ND 0.500

Sample ID LCS-R31783	SampType: LCS	Units: mg/L	Prep Date: 9/16/2016	RunNo: 31783							
Client ID: LCSW	Batch ID: R31783	Analysis Date: 9/16/2016	SeqNo: 600321								
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Sulfide 1.80 0.500 2.000 0 90.0 65 135

Sample ID 1609188-001BDUP	SampType: DUP	Units: mg/L	Prep Date: 9/16/2016	RunNo: 31783							
Client ID: PAI-16-D-160915	Batch ID: R31783	Analysis Date: 9/16/2016	SeqNo: 600323								
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Sulfide 3.20 0.500 3.000 6.45 30

Sample ID 1609188-001BMS	SampType: MS	Units: mg/L	Prep Date: 9/16/2016	RunNo: 31783							
Client ID: PAI-16-D-160915	Batch ID: R31783	Analysis Date: 9/16/2016	SeqNo: 600324								
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Sulfide 5.20 0.500 2.000 3.000 110 65 135

Sample ID 1609188-001BMSD	SampType: MSD	Units: mg/L	Prep Date: 9/16/2016	RunNo: 31783							
Client ID: PAI-16-D-160915	Batch ID: R31783	Analysis Date: 9/16/2016	SeqNo: 600325								
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Sulfide 5.00 0.500 2.000 3.000 100 65 135 5.200 3.92 30

Client Name: **GEI**
 Logged by: **Erica Silva**

 Work Order Number: **1609188**
 Date Received: **9/15/2016 4:17:00 PM**
Chain of Custody

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

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
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:	<input type="text"/>	Date:	<input type="text"/>
By Whom:	<input type="text"/>	Via:	<input type="checkbox"/> eMail <input type="checkbox"/> Phone <input type="checkbox"/> Fax <input type="checkbox"/> In Person
Regarding:	<input type="text"/>		
Client Instructions:	<input type="text"/>		

19. Additional remarks:

Item Information

Item #	Temp °C
Cooler	4.3
Sample	8.7
Temp Blank	7.6

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



Fremont
Analytical

3600 Fremont Ave N.
Seattle, WA 98103
Tel: 206-352-3790
Fax: 206-352-7178

Client: Geoengineers
Address: 600 Stewart Street, Suite 1700
Seattle, WA 98103
City, State, Zip:
Telephone: 253-722-2418 Fax:

Chain of Custody Record and Laboratory Services Agreement

Date: 9/15/2016

Laboratory Project No (Internal):

1609188

Page: 1 of 1

Project Name: Gas Works Park Site
Project No: 0186-946-01 Task 1803
Location: Seattle
Report To (PM): Sandra Smith / Claudia De La Via
PM Email: sbsmith@geoengineers.com cdelavia@geoengineers.com

*Matrix Codes: A = Air, AQ = Aqueous, B = Bulk, O = Other, P = Product, S = Soil, SD = Sediment, SL = Solid, W = Water, DW = Drinking Water, GW = Ground Water, SW = Storm Water, WW = Waste Water

Sample Name	Sample Date	Sample Time	Sample Type (Matrix)*	Analytes													Comments									
				Arsenic (EPA 200.8) field filtered	Iron (EPA 200.8) field filtered	Sulfide (4500-S2-F) field filtered	COD (SM5220D) field filtered	COD (SM5220)	Grain Size (ASTM D422)	SVOCs (EPA 8270 / 625)	PAHs (EPA 8270 - SIM)	PCBs (EPA 8082 / 608)	Metals** (EPA 6020 / 200.8)	Total (T) Dissolved (D)												
1 PAL-16-D-160915	9/15	1144	GW	X	X	X																			Field Filtered	
2 PAL-16-11.5-15.8		1000	S					X	X																Boyle for COD	
3 PAL-16-15.8-16		1005	S							X	X														FIELD FILTERED	
4 PAL-16-28-33		1125	S																							
5 PAL-16-S-160915		1249	GW	X	X	X																			FIELD FILTERED	
6 PAL-17-5-160915		1603	GW	X	X	X																			Field Filtered	
7 PAL-																										
8 PAL-																										
9 PAL-																										
10 PAL-																										

**Metals Analysis (Circle): MTCA-5 RCRA-8 Priority Pollutants TAL Individual: Ag Al As B Ba Be Ca Cd Co Cr Cu Fe Hg K Mg Mn Mo Na Ni Pb Sb Se Sr Sn Tl U V Zn

***Anions (Circle): Nitrate Nitrite Chloride Sulfate Bromide O-Phosphate Fluoride Nitrate+Nitrite

Sample Disposal: Return to Client Disposal by Lab (Samples will be held for 30 days unless otherwise noted. A fee may be assessed if samples are retained after 30 days.)

I represent that I am authorized to enter into this Agreement with Fremont Analytical on behalf of the Client named above, that I have verified Client's agreement to each of the terms on the front and backside of this Agreement.

Relinquished Date/Time 9/15/16 1607 Received Date/Time 9/15/16 1607
Relinquished Date/Time 9/15/16 1607 Received Date/Time 9/15/16 1617



GeoEngineers

Sandra Smith
600 Stewart Street, Suite 1700
Seattle, WA 98101

RE: Gas Works Park Site
Work Order Number: 1609191

October 06, 2016

Attention Sandra Smith:

Fremont Analytical, Inc. received 4 sample(s) on 9/15/2016 for the analyses presented in the following report.

Chemical Oxygen Demand by SM 5220D
Dissolved Metals by EPA Method 200.8
Grain Size by ASTM D422
Sulfide by SM 4500-S2-F

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

CLIENT: GeoEngineers
Project: Gas Works Park Site
Work Order: 1609191

Work Order Sample Summary

Lab Sample ID	Client Sample ID	Date/Time Collected	Date/Time Received
1609191-001	PAI-17-D-160915	09/15/2016 4:51 PM	09/15/2016 6:23 PM
1609191-002	PAI-17-14-15.8	09/15/2016 3:50 PM	09/15/2016 6:23 PM
1609191-003	PAI-17-15.8-16.1	09/15/2016 3:55 PM	09/15/2016 6:23 PM
1609191-004	PAI-17-26.5-29	09/15/2016 4:25 PM	09/15/2016 6:23 PM

CLIENT: GeoEngineers
Project: Gas Works Park Site

I. SAMPLE RECEIPT:

Samples receipt information is recorded on the attached Sample Receipt Checklist.

II. GENERAL REPORTING COMMENTS:

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

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

III. ANALYSES AND EXCEPTIONS:

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

Qualifiers:

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



Client: GeoEngineers

Collection Date: 9/15/2016 4:51:00 PM

Project: Gas Works Park Site

Lab ID: 1609191-001

Matrix: Groundwater

Client Sample ID: PAI-17-D-160915

Analyses	Result	MDL	Qual	Units	DF	Date Analyzed
----------	--------	-----	------	-------	----	---------------

Dissolved Metals by EPA Method 200.8

Batch ID: 14843 Analyst: TN

Arsenic	758	0.720	D	µg/L	10	9/16/2016 1:20:41 PM
Iron	24,000	56.1	D	µg/L	10	9/16/2016 1:20:41 PM

Chemical Oxygen Demand by SM 5220D

Batch ID: R31908 Analyst: MW

Chemical Oxygen Demand	99.8	19.0	D	mg/L	5	9/22/2016 12:36:42 PM
------------------------	------	------	---	------	---	-----------------------

Sulfide by SM 4500-S2-F

Batch ID: R31783 Analyst: KT

Sulfide	3.20	0.119	MDL	mg/L	1	9/16/2016 12:24:00 PM
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NOTES:

MDL - Sample reported to Method Detection Limit (MDL)

Grain Size by ASTM D422

Project: Gas Works Park Site
Client: GeoEngineers
Lab Project #: 1609191

Percent Finer (Passing) than the Indicated Size

UOM = Percent

Grain Size Classification	Gravel						Coarse Sand	Medium Sand			Fine Sand			Silt		
	3"	2"	1 1/2"	1"	3/4"	3/8"	#4	#10	#20	#40	#60	#140	#230	#325	#450	
Sieve Size	3"	2"	1 1/2"	1"	3/4"	3/8"	#4	#10	#20	#40	#60	#140	#230	#325	#450	
Particle Size (Microns)	76200	50800	38100	25400	19050	9525	4750	2000	850	425	250	106	75	45	34	
PAI-17-26.5-29	100%	100%	100%	100%	89.5%	82.0%	77.2%	72.5%	66.4%	59.8%	47.8%	22.8%	13.1%	3.02%	0.532%	
PAI-17-14-15.8	100%	100%	100%	100%	93.2%	64.7%	48.0%	32.8%	22.7%	15.5%	10.4%	4.49%	2.82%	1.25%	0.449%	

Grain Size by ASTM D422

Project: Gas Works Park Site
Client: GeoEngineers
Lab Project #: 1609191

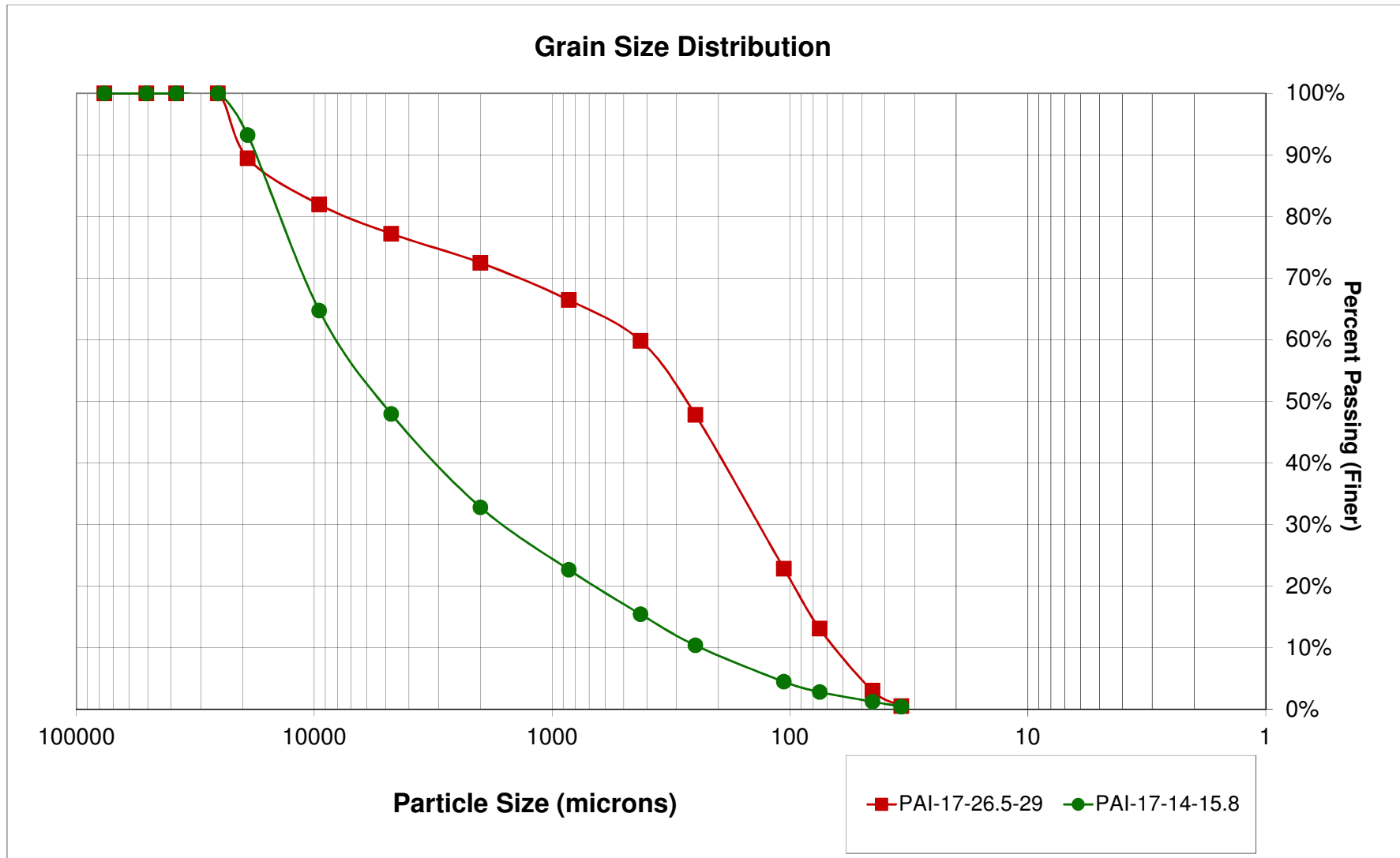
Percent Retained in Each Size Fraction

UOM = Percent

Grain Size Classification	<i>Gravel</i>							<i>Coarse Sand</i>	<i>Medium Sand</i>		<i>Fine Sand</i>			<i>Silt</i>		
	>76200	76200-50800	50800-38100	38100-25400	25400-19000	19050-9525	9525-4750	4750-2000	2000-850	850-425	425-250	250-106	106-62.5	72.5-45	45-34	<34
PAI-17-26.5-29	0.00%	0.00%	0.00%	0.00%	10.5%	7.48%	4.74%	4.71%	6.05%	6.60%	12.0%	24.9%	9.71%	10.1%	2.48%	0.531%
PAI-17-14-15.8	0.00%	0.00%	0.00%	0.00%	7.04%	29.7%	17.5%	15.8%	10.6%	7.53%	5.26%	6.16%	1.73%	1.64%	0.836%	0.468%

Grain Size by ASTM D422

Project: Gas Works Park Site
 Client: GeoEngineers
 Lab Project #: 1609191





ALS Environmental
ALS Group USA, Corp
1317 South 13th Avenue
Bellevue, WA 98006
T: 1 360 577 7222
F: 1 360 636 1068
www.alsglobal.com

October 06, 2016

Analytical Report for Service Request No: 1611153

Mr. Michael Ridgeway
Fremont Analytical
3600 Fremont Avenue, North
Seattle, WA 98103

RE: COD / 1609191

Dear Mr. Ridgeway,

Enclosed are the results of the sample(s) submitted to our laboratory September 20, 2016. For your reference, these analyses have been assigned our service request number **K1611153**.

Analyses were performed according to our laboratory's EPA-approved quality assurance program. The test results meet requirements of the current EPA standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of EPA-accredited analytes, refer to the certifications section at www.alsglobal.com. All results are intended to be considered in their entirety, and ALS Group USA, Corp. dba ALS Environmental (ALS) is not responsible for use of less than the complete report. Results apply only to the items submitted to the laboratory for analysis and individual items (samples) analyzed, as listed in the report.

Please contact me if you have any questions. My extension is 3375. You may also contact me via email at janet.Malloch@alsglobal.com.

Respectfully submitted,

ALS Group USA, Corp. dba ALS Environmental

Janet Malloch
Project Manager



A S Environmental
A S roup SA, orp
1317 South 13th Avenue
elso, WA 98626
T : 1 360 577 7222
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Acronyms

ASTM	American Society for Testing and Materials
A2LA	American Association for Laboratory Accreditation
CARB	California Air Resources Board
CAS Number	Chemical Abstract Service registry Number
CFC	Chlorofluorocarbon
CFU	Colony-Forming Unit
DEC	Department of Environmental Conservation
DEQ	Department of Environmental Quality
DHS	Department of Health Services
DOE	Department of Ecology
DOH	Department of Health
EPA	U. S. Environmental Protection Agency
ELAP	Environmental Laboratory Accreditation Program
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
LOD	Limit of Detection
LOQ	Limit of Quantitation
LUFT	Leaking Underground Fuel Tank
M	Modified
MCL	Maximum Contaminant Level is the highest permissible concentration of a substance allowed in drinking water as established by the USEPA.
MDL	Method Detection Limit
MPN	Most Probable Number
MRL	Method Reporting Limit
NA	Not Applicable
NC	Not Calculated
NCASI	National Council of the Paper Industry for Air and Stream Improvement
ND	Not Detected
NIOSH	National Institute for Occupational Safety and Health
PQL	Practical Quantitation Limit
RCRA	Resource Conservation and Recovery Act
SIM	Selected Ion Monitoring
TPH	Total Petroleum Hydrocarbons
tr	Trace level is the concentration of an analyte that is less than the PQL but greater than or equal to the MDL.

Inorganic Data Qualifiers

- * The result is an outlier. See case narrative.
- # The control limit criteria is not applicable. See case narrative.
- B The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards.
- E The result is an estimate amount because the value exceeded the instrument calibration range.
- J The result is an estimated value.
- U The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
DOD-QSM 4.2 definition : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
- i The MRL/MDL or LOQ/LOD is elevated due to a matrix interference.
- X See case narrative.
- Q See case narrative. One or more quality control criteria was outside the limits.
- H The holding time for this test is immediately following sample collection. The samples were analyzed as soon as possible after receipt by the laboratory.

Metals Data Qualifiers

- # The control limit criteria is not applicable. See case narrative.
- J The result is an estimated value.
- E The percent difference for the serial dilution was greater than 10%, indicating a possible matrix interference in the sample.
- M The duplicate injection precision was not met.
- N The Matrix Spike sample recovery is not within control limits. See case narrative.
- S The reported value was determined by the Method of Standard Additions (MSA).
- U The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
DOD-QSM 4.2 definition : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
- W The post-digestion spike for furnace AA analysis is out of control limits, while sample absorbance is less than 50% of spike absorbance.
 - i The MRL/MDL or LOQ/LOD is elevated due to a matrix interference.
- X See case narrative.
- + The correlation coefficient for the MSA is less than 0.995.
- Q See case narrative. One or more quality control criteria was outside the limits.

Organic Data Qualifiers

- * The result is an outlier. See case narrative.
- # The control limit criteria is not applicable. See case narrative.
- A A tentatively identified compound, a suspected aldol-condensation product.
- B The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards.
- C The analyte was qualitatively confirmed using GC/MS techniques, pattern recognition, or by comparing to historical data.
- D The reported result is from a dilution.
- E The result is an estimated value.
- J The result is an estimated value.
- N The result is presumptive. The analyte was tentatively identified, but a confirmation analysis was not performed.
- P The GC or HPLC confirmation criteria was exceeded. The relative percent difference is greater than 40% between the two analytical results.
- U The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
DOD-QSM 4.2 definition : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
- i The MRL/MDL or LOQ/LOD is elevated due to a chromatographic interference.
- X See case narrative.
- Q See case narrative. One or more quality control criteria was outside the limits.

Additional Petroleum Hydrocarbon Specific Qualifiers

- F The chromatographic fingerprint of the sample matches the elution pattern of the calibration standard.
- L The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of lighter molecular weight constituents than the calibration standard.
- H The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of heavier molecular weight constituents than the calibration standard.
- O The chromatographic fingerprint of the sample resembles an oil, but does not match the calibration standard.
- Y The chromatographic fingerprint of the sample resembles a petroleum product eluting in approximately the correct carbon range, but the elution pattern does not match the calibration standard.
- Z The chromatographic fingerprint does not resemble a petroleum product.

**ALS Group USA Corp. dba ALS Environmental (ALS) - Kelso
State Certifications, Accreditations, and Licenses**

Agency	Web Site	Number
Alaska DEC UST	http://dec.alaska.gov/applications/eh/ehllabreports/USTLabs.aspx	UST-040
Arizona DHS	http://www.azdhs.gov/lab/license/env.htm	AZ0339
Arkansas - DEQ	http://www.adeq.state.ar.us/techsvs/labcert.htm	88-0637
California DHS (ELAP)	http://www.cdph.ca.gov/certlic/labs/Pages/ELAP.aspx	2795
DOD ELAP	http://www.denix.osd.mil/edqw/Accreditation/AccreditedLabs.cfm	L14-51
Florida DOH	http://www.doh.state.fl.us/lab/EnvLabCert/WaterCert.htm	E87412
Hawaii DOH	Not available	-
ISO 17025	http://www.pjllabs.com/	L16-57
Louisiana DEQ	http://www.deq.louisiana.gov/portal/DIVISIONS/PublicParticipationandPermitSupport/LouisianaLaboratoryAccreditationProgram.aspx	03016
Maine DHS	Not available	WA01276
Minnesota DOH	http://www.health.state.mn.us/accreditation	053-999-457
Montana DPHHS	http://www.dphhs.mt.gov/publichealth/	CERT0047
Nevada DEP	http://ndep.nv.gov/bsdw/labservice.htm	WA01276
New Jersey DEP	http://www.nj.gov/dep/oqa/	WA005
North Carolina DWQ	http://www.dwqlab.org/	605
Oklahoma DEQ	http://www.deq.state.ok.us/CSDnew/labcert.htm	9801
Oregon – DEQ (NELAP)	http://public.health.oregon.gov/LaboratoryServices/EnvironmentalLaboratoryAccreditation/Pages/index.aspx	WA100010
South Carolina DHEC	http://www.scdhec.gov/environment/envserv/	61002
Texas CEQ	http://www.tceq.texas.gov/field/qa/env_lab_accreditation.html	T104704427
Washington DOE	http://www.ecy.wa.gov/programs/eap/labs/lab-accreditation.html	C544
Wyoming (EPA Region 8)	http://www.epa.gov/region8/water/dwhome/wyomingdi.html	-
Kelso Laboratory Website	www.alsglobal.com	NA

Analyses were performed according to our laboratory's NELAP-approved quality assurance program. A complete listing of specific NELAP-certified analytes, can be found in the certification section at www.ALSGlobal.com or at the accreditation bodies web site.

Please refer to the certification and/or accreditation body's web site if samples are submitted for compliance purposes. The states highlighted above, require the analysis be listed on the state certification if used for compliance purposes and if the method/analyte is offered by that state.



Chain of Custody

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360)577-7222 Fax (360)636-1068
www.alsglobal.com



CHAIN OF CUSTODY RECORD

Omega COCID 273

PAGE: 1 OF: 1

ADDRESS

Fremont Analytical, Inc.
 3600 Fremont Ave. N.
 Seattle, WA 98103
 TEL: 206-352-3790
 FAX: 206-352-7178

Website: www.fremontanalytical.com

K1611153

SUB CONTRACTOR: ALS COMPANY: ALS Environmental		SPECIAL INSTRUCTIONS / COMMENTS: Please email results to Michael Ridgeway and Chelsea Ward - mridgeway@fremontanalytical.com; cward@fremontanalytical.com <i>Low level RL if possible</i>
ADDRESS: 1317 South 13th Avenue		
CITY, STATE, ZIP: Kelso, WA 98626		
PHONE: (360) 577-7222 FAX: EMAIL:		
ACCOUNT #:		

ITEM #	SAMPLE ID	CLIENT SAMPLE ID	BOTTLE TYPE	MATRIX	DATE COLLECTED	NUMBER OF CONTAINERS	COMMENTS: Methanol Preserved Weights HOT Sample Notation, Additional Sample Description.
1	1609191-002A	PAI-17-14-15.8	CLEAR JARS 4 O	Soil	9/15/2016 3:50:00 PM	1	Chemical Oxygen Demand by SM5220, Low Level RL
	TEST_SUB						
2	1609191-004A	PAI-17-26.5-29	CLEAR JARS 4 O	Soil	9/15/2016 4:25:00 PM	1	Chemical Oxygen Demand by SM5220, Low Level RL
	TEST_SUB						

Relinquished By: <i>[Signature]</i>	Date: 9/16/16	Time: 14:25	Received By: <i>[Signature]</i>	Date: 9/20/16	Time: 10:20	REPORT TRANSMITTAL DESIRED: <input type="checkbox"/> HARD COPY (extra cost) <input type="checkbox"/> FAX <input checked="" type="checkbox"/> EMAIL <input type="checkbox"/> ONLINE	
Relinquished By:	Date:	Time:	Received By:	Date:	Time:	FOR LAB USE ONLY	
Relinquished By:	Date:	Time:	Received By:	Date:	Time:	Temp of samples _____ °C	Attempt to Cool? _____
TAT: Standard <input checked="" type="checkbox"/> RUSH Next BD <input type="checkbox"/> 2nd BD <input type="checkbox"/> 3rd BD <input type="checkbox"/>						Comments: _____	
Note: RUSH requests will incur surcharges!							



Cooler Receipt and Preservation Form

Client Fremont Service Request K16 11/53
 Received: 9/20/16 Opened: 9/20/16 By: [Signature] Unloaded: 9/20/16 By: [Signature]

1. Samples were received via? USPS Fed Ex UPS DHL PDX Courier Hand Delivered
2. Samples were received in: (circle) Cooler Box Envelope Other _____ NA
3. Were custody seals on coolers? NA Y N If yes, how many and where? one front NA
 If present, were custody seals intact? Y N If present, were they signed and dated? Y N

Raw Cooler Temp	Corrected Cooler Temp	Raw Temp Blank	Corrected Temp Blank	Corr. Factor	Thermometer ID	Cooler/COC ID NA	Tracking Number NA	Filed
2.5	2.5	5.5	5.5	0	370	273	1E X61 92K 03 319554	72

4. Packing material: Inserts Baggies Bubble Wrap Gel Packs Wet Ice Dry Ice Sleeves _____
5. Were custody papers properly filled out (ink, signed, etc.)? NA Y N
6. Were samples received in good condition (temperature, unbroken)? Indicate in the table below. NA Y N
 If applicable, tissue samples were received: Frozen Partially Thawed Thawed
7. Were all sample labels complete (i.e analysis, preservation, etc.)? NA Y N
8. Did all sample labels and tags agree with custody papers? Indicate major discrepancies in the table on page 2. NA Y N
9. Were appropriate bottles/containers and volumes received for the tests indicated? NA Y N
10. Were the pH-preserved bottles (see SMO GEN SOP) received at the appropriate pH? Indicate in the table below NA Y N
11. Were VOA vials received without headspace? Indicate in the table below. NA Y N
12. Was C12/Res negative? NA Y N

Sample ID on Bottle	Sample ID on COC	Identified by:

Sample ID	Bottle Count	Bottle Type	Out of Temp	Head-space	Broke	pH	Reagent	Volume added	Reagent Lot Number	Initials	Time

Notes, Discrepancies, & Resolutions: _____



Total Solids

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360)577-7222 Fax (360)636-1068
www.alsglobal.com

ALS Group USA, Corp.
dba ALS Environmental

Analytical Report

Client: Fremont Analytical
Project: COD/1609191
Sample Matrix: Soil
Analysis Method: 160.3 Modified
Prep Method: None

Service Request: K1611153
Date Collected: 09/15/16
Date Received: 09/20/16
Units: Percent
Basis: As Received

Solids, Total

Sample Name	Lab Code	Result	MRL	MDL	Dil.	Date Analyzed	Q
PAI-17-14-15.8	K1611153-001	60.0	-	-	1	09/21/16 14:47	
PAI-17-26.5-29	K1611153-002	90.3	-	-	1	09/21/16 14:47	

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client: Fremont Analytical
Project: COD/1609191
Sample Matrix: Sediment
Analysis Method: 160.3 Modified
Prep Method: None

Service Request: K1611153
Date Collected: NA
Date Received: NA

Units: Percent
Basis: As Received

Replicate Sample Summary
Inorganic Parameters

Sample Name:	Lab Code:	MRL	Sample Result	Duplicate Result	Average	RPD	RPD Limit	Date Analyzed
Batch QC	K1611154-001DUP	-	37.7	39.0	38.4	3	20	09/21/16
Batch QC	K1611174-001DUP	-	86.3	86.9	86.6	<1	20	09/21/16

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.



General Chemistry

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ALS Group USA, Corp.
dba ALS Environmental

Analytical Report

Client: Fremont Analytical
Project: COD/1609191
Sample Matrix: Soil
Analysis Method: SM 5220 C Modified
Prep Method: ALS SOP

Service Request: K1611153
Date Collected: 09/15/16
Date Received: 09/20/16
Units: mg/Kg
Basis: Dry

Chemical Oxygen Demand (COD)

Sample Name	Lab Code	Result	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
PAI-17-14-15.8	K1611153-001	180000	1400	-	1	10/04/16 15:00	10/4/16	
PAI-17-26.5-29	K1611153-002	2560	120	-	1	09/29/16 14:15	9/28/16	
Method Blank	K1611153-MB1	ND U	10	-	1	09/29/16 14:15	NA	
Method Blank	K1611153-MB2	ND U	200	-	1	10/04/16 15:00	NA	

ALS Group USA, Corp.

dba ALS Environmental

QA/QC Report

Client: Fremont Analytical
Project: COD/1609191
Sample Matrix: Soil
Analysis Method: SM 5220 C Modified
Prep Method: ALS SOP

Service Request:K1611153
Date Collected:NA
Date Received:NA

Units:mg/Kg
Basis:Dry

Replicate Sample Summary
Chemical Oxygen Demand (COD)

Sample Name:	Lab Code:	MRL	MDL	Sample Result	Duplicate Result	Average	RPD	RPD Limit	Date Analyzed
Batch QC	K1610996-001DUP	130	-	2980	3200	3090	7	20	09/29/16
Batch QC	K1610999-003DUP	1100	-	51300	51400	51300	<1	20	10/04/16

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client: Fremont Analytical
Project: COD/1609191
Sample Matrix: Soil

Service Request: K1611153
Date Collected: N/A
Date Received: N/A
Date Analyzed: 09/29/16
Date Extracted: 09/28/16

Matrix Spike Summary
Chemical Oxygen Demand (COD)

Sample Name: Batch QC
Lab Code: K1610996-001
Analysis Method: SM 5220 C Modified
Prep Method: ALS SOP

Units: mg/Kg
Basis: Dry

Matrix Spike
K1610996-001MS

<u>Analyte Name</u>	<u>Sample Result</u>	<u>Result</u>	<u>Spike Amount</u>	<u>% Rec</u>	<u>% Rec Limits</u>
Chemical Oxygen Demand (COD)	2980	11300	6830	121	75-125

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

ALS Group USA, Corp.
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QA/QC Report

Client: Fremont Analytical
Project: COD/1609191
Sample Matrix: Soil

Service Request: K1611153
Date Collected: N/A
Date Received: N/A
Date Analyzed: 10/4/16
Date Extracted: 10/4/16

Matrix Spike Summary
Chemical Oxygen Demand (COD)

Sample Name: Batch QC
Lab Code: K1610999-003
Analysis Method: SM 5220 C Modified
Prep Method: ALS SOP

Units: mg/Kg
Basis: Dry

Matrix Spike
K1610999-003MS

<u>Analyte Name</u>	<u>Sample Result</u>	<u>Result</u>	<u>Spike Amount</u>	<u>% Rec</u>	<u>% Rec Limits</u>
Chemical Oxygen Demand (COD)	51300	79700	34100	83	75-125

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

ALS Group USA, Corp.
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QA/QC Report

Client: Fremont Analytical
Project: COD/1609191
Sample Matrix: Soil

Service Request: K1611153
Date Analyzed: 09/29/16
Date Extracted: NA

Lab Control Sample Summary
Chemical Oxygen Demand (COD)

Analysis Method: SM 5220 C Modified
Prep Method: None

Units: mg/Kg
Basis: Dry
Analysis Lot: 516546

Sample Name	Lab Code	Result	Spike Amount	% Rec	% Rec Limits
Lab Control Sample	K1611153-LCS1	231	242	96	85-115

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client: Fremont Analytical
Project: COD/1609191
Sample Matrix: Soil

Service Request: K1611153
Date Analyzed: 10/04/16
Date Extracted: NA

Lab Control Sample Summary
Chemical Oxygen Demand (COD)

Analysis Method: SM 5220 C Modified
Prep Method: None

Units: mg/Kg
Basis: Dry
Analysis Lot: 517196

Sample Name	Lab Code	Result	Spike Amount	% Rec	% Rec Limits
Lab Control Sample	K1611153-LCS2	4570	4840	94	85-115



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October 11, 2016

Analytical Report for Service Request No: 1611729

Mr. Michael Ridgeway
Fremont Analytical
3600 Fremont Avenue, North
Seattle, WA 98103

RE: COD

Dear Mr. Ridgeway,

Enclosed are the results of the sample(s) submitted to our laboratory September 30, 2016. For your reference, these analyses have been assigned our service request number **K1611729**.

Analyses were performed according to our laboratory's EPA-approved quality assurance program. The test results meet requirements of the current EPA standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of EPA-accredited analytes, refer to the certifications section at www.alsglobal.com. All results are intended to be considered in their entirety, and ALS Group USA, Corp. dba ALS Environmental (ALS) is not responsible for use of less than the complete report. Results apply only to the items submitted to the laboratory for analysis and individual items (samples) analyzed, as listed in the report.

Please contact me if you have any questions. My extension is 3375. You may also contact me via email at janet.Malloch@alsglobal.com.

Respectfully submitted,

ALS Group USA, Corp. dba ALS Environmental

Janet Malloch
Project Manager



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Acronyms

ASTM	American Society for Testing and Materials
A2LA	American Association for Laboratory Accreditation
CARB	California Air Resources Board
CAS Number	Chemical Abstract Service registry Number
CFC	Chlorofluorocarbon
CFU	Colony-Forming Unit
DEC	Department of Environmental Conservation
DEQ	Department of Environmental Quality
DHS	Department of Health Services
DOE	Department of Ecology
DOH	Department of Health
EPA	U. S. Environmental Protection Agency
ELAP	Environmental Laboratory Accreditation Program
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
LOD	Limit of Detection
LOQ	Limit of Quantitation
LUFT	Leaking Underground Fuel Tank
M	Modified
MCL	Maximum Contaminant Level is the highest permissible concentration of a substance allowed in drinking water as established by the USEPA.
MDL	Method Detection Limit
MPN	Most Probable Number
MRL	Method Reporting Limit
NA	Not Applicable
NC	Not Calculated
NCASI	National Council of the Paper Industry for Air and Stream Improvement
ND	Not Detected
NIOSH	National Institute for Occupational Safety and Health
PQL	Practical Quantitation Limit
RCRA	Resource Conservation and Recovery Act
SIM	Selected Ion Monitoring
TPH	Total Petroleum Hydrocarbons
tr	Trace level is the concentration of an analyte that is less than the PQL but greater than or equal to the MDL.

Inorganic Data Qualifiers

- * The result is an outlier. See case narrative.
- # The control limit criteria is not applicable. See case narrative.
- B The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards.
- E The result is an estimate amount because the value exceeded the instrument calibration range.
- J The result is an estimated value.
- U The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
DOD-QSM 4.2 definition : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
- i The MRL/MDL or LOQ/LOD is elevated due to a matrix interference.
- X See case narrative.
- Q See case narrative. One or more quality control criteria was outside the limits.
- H The holding time for this test is immediately following sample collection. The samples were analyzed as soon as possible after receipt by the laboratory.

Metals Data Qualifiers

- # The control limit criteria is not applicable. See case narrative.
- J The result is an estimated value.
- E The percent difference for the serial dilution was greater than 10%, indicating a possible matrix interference in the sample.
- M The duplicate injection precision was not met.
- N The Matrix Spike sample recovery is not within control limits. See case narrative.
- S The reported value was determined by the Method of Standard Additions (MSA).
- U The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
DOD-QSM 4.2 definition : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
- W The post-digestion spike for furnace AA analysis is out of control limits, while sample absorbance is less than 50% of spike absorbance.
 - i The MRL/MDL or LOQ/LOD is elevated due to a matrix interference.
- X See case narrative.
- + The correlation coefficient for the MSA is less than 0.995.
- Q See case narrative. One or more quality control criteria was outside the limits.

Organic Data Qualifiers

- * The result is an outlier. See case narrative.
- # The control limit criteria is not applicable. See case narrative.
- A A tentatively identified compound, a suspected aldol-condensation product.
- B The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards.
- C The analyte was qualitatively confirmed using GC/MS techniques, pattern recognition, or by comparing to historical data.
- D The reported result is from a dilution.
- E The result is an estimated value.
- J The result is an estimated value.
- N The result is presumptive. The analyte was tentatively identified, but a confirmation analysis was not performed.
- P The GC or HPLC confirmation criteria was exceeded. The relative percent difference is greater than 40% between the two analytical results.
- U The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
DOD-QSM 4.2 definition : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
 - i The MRL/MDL or LOQ/LOD is elevated due to a chromatographic interference.
- X See case narrative.
- Q See case narrative. One or more quality control criteria was outside the limits.

Additional Petroleum Hydrocarbon Specific Qualifiers

- F The chromatographic fingerprint of the sample matches the elution pattern of the calibration standard.
- L The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of lighter molecular weight constituents than the calibration standard.
- H The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of heavier molecular weight constituents than the calibration standard.
- O The chromatographic fingerprint of the sample resembles an oil, but does not match the calibration standard.
- Y The chromatographic fingerprint of the sample resembles a petroleum product eluting in approximately the correct carbon range, but the elution pattern does not match the calibration standard.
- Z The chromatographic fingerprint does not resemble a petroleum product.

**ALS Group USA Corp. dba ALS Environmental (ALS) - Kelso
State Certifications, Accreditations, and Licenses**

Agency	Web Site	Number
Alaska DEC UST	http://dec.alaska.gov/applications/eh/ehllabreports/USTLabs.aspx	UST-040
Arizona DHS	http://www.azdhs.gov/lab/license/env.htm	AZ0339
Arkansas - DEQ	http://www.adeq.state.ar.us/techsvs/labcert.htm	88-0637
California DHS (ELAP)	http://www.cdph.ca.gov/certlic/labs/Pages/ELAP.aspx	2795
DOD ELAP	http://www.denix.osd.mil/edqw/Accreditation/AccreditedLabs.cfm	L14-51
Florida DOH	http://www.doh.state.fl.us/lab/EnvLabCert/WaterCert.htm	E87412
Hawaii DOH	Not available	-
ISO 17025	http://www.pjllabs.com/	L16-57
Louisiana DEQ	http://www.deq.louisiana.gov/portal/DIVISIONS/PublicParticipationandPermitSupport/LouisianaLaboratoryAccreditationProgram.aspx	03016
Maine DHS	Not available	WA01276
Minnesota DOH	http://www.health.state.mn.us/accreditation	053-999-457
Montana DPHHS	http://www.dphhs.mt.gov/publichealth/	CERT0047
Nevada DEP	http://ndep.nv.gov/bsdw/labservice.htm	WA01276
New Jersey DEP	http://www.nj.gov/dep/oqa/	WA005
North Carolina DWQ	http://www.dwqlab.org/	605
Oklahoma DEQ	http://www.deq.state.ok.us/CSDnew/labcert.htm	9801
Oregon – DEQ (NELAP)	http://public.health.oregon.gov/LaboratoryServices/EnvironmentalLaboratoryAccreditation/Pages/index.aspx	WA100010
South Carolina DHEC	http://www.scdhec.gov/environment/envserv/	61002
Texas CEQ	http://www.tceq.texas.gov/field/qa/env_lab_accreditation.html	T104704427
Washington DOE	http://www.ecy.wa.gov/programs/eap/labs/lab-accreditation.html	C544
Wyoming (EPA Region 8)	http://www.epa.gov/region8/water/dwhome/wyomingdi.html	-
Kelso Laboratory Website	www.alsglobal.com	NA

Analyses were performed according to our laboratory's NELAP-approved quality assurance program. A complete listing of specific NELAP-certified analytes, can be found in the certification section at www.ALSGlobal.com or at the accreditation bodies web site.

Please refer to the certification and/or accreditation body's web site if samples are submitted for compliance purposes. The states highlighted above, require the analysis be listed on the state certification if used for compliance purposes and if the method/analyte is offered by that state.



Case Narrative

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ALS ENVIRONMENTAL

Client: Fremont Analytical
Project: NA
Sample Matrix: Soil

Service Request No.: K1611729
Date Received: 09/30/16

Case Narrative

All analyses were performed consistent with the quality assurance program of ALS Environmental. This report contains analytical results for samples designated for Tier II data deliverables. When appropriate to the method, method blank results have been reported with each analytical test. Additional quality control analyses reported herein include: Laboratory Duplicate (DUP), Matrix Spike (MS), and Matrix/Duplicate Matrix Spike (MS/DMS).

Sample Receipt

One soil sample was received for analysis at ALS Environmental on 09/30/16. The sample was received in good condition and consistent with the accompanying chain of custody form. The sample was stored in a refrigerator at 4°C upon receipt at the laboratory.

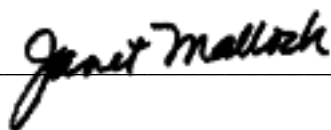
General Chemistry Parameters

Chemical Oxygen Demand by Standard Method 5220 C Modified:

The Relative Percent Difference (RPD) for the replicate analysis in sample Batch QC was outside the normal ALS control limits. The variability in the results was attributed to the heterogeneous character of the sample. Standard mixing techniques were used, but were not sufficient for complete homogenization of this sample.

No other anomalies associated with the analysis of this sample were observed.

Approved by _____





Chain of Custody

ALS Environmental—Kelso Laboratory
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CHAIN OF CUSTODY RECORD

Omega COCID 280

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ADDRESS

Fremont Analytical, Inc.
3600 Fremont Ave. N.
Seattle, WA 98103
TEL: 206-352-3790
FAX: 206-352-7178

Website: www.fremontanalytical.com

Kilbittag

SUB CONTRACTOR: ALS		COMPANY: ALS Environmental		SPECIAL INSTRUCTIONS / COMMENTS: Please email results to Michael Ridgeway and Chelsea Ward - mridgeway@fremontanalytical.com; cward@fremontanalytical.com					
ADDRESS: 1317 South 13th Avenue									
CITY, STATE, ZIP: Kelso, WA 98626									
PHONE: (360) 577-7222		FAX: _____						EMAIL: _____	
ACCOUNT #:									
ITEM #	SAMPLE ID	CLIENT SAMPLE ID	BOTTLE TYPE	MATRIX	DATE COLLECTED	NUMBER OF CONTAINERS	COMMENTS: Methanol Preserved Weights HOT Sample Notation, Additional Sample Description.		
1	1609191-003A TEST_SUB	PAI-17-15.8-16.1	CLEAR JARS 4 O	Soil	9/15/2016 3:55:00 PM	1	Chemical Oxygen Demand by SM5220, Low Level RL		

Relinquished By: <i>Wojcik</i>	Date: 9/29/16	Time: 11:25	Received By: <i>Linburg</i>	Date: 9-30-16	Time: 9:40	REPORT TRANSMITTAL DESIRED:			
Relinquished By:	Date:	Time:	Received By:	Date:	Time:	<input type="checkbox"/> HARDCOPY (extra cost)	<input type="checkbox"/> FAX	<input checked="" type="checkbox"/> EMAIL	<input type="checkbox"/> ONLINE
Relinquished By:	Date:	Time:	Received By:	Date:	Time:	FOR LAB USE ONLY			
TAT: Standard <input checked="" type="checkbox"/> RUSH						Temp of samples _____ °C Attempt to Cool? _____			
Next BD <input type="checkbox"/> 2nd BD <input type="checkbox"/> 3rd BD <input type="checkbox"/>						Comments: _____			
Note: RUSH requests will incur surcharges!									



PC Janet

Cooler Receipt and Preservation Form

Client Fremont analytical Service Request K16 11729
 Received: 9-30-16 Opened: 9-30-16 By: es Unloaded: 9-30-16 By: CS

1. Samples were received via? USPS FedEx UPS DHL PDX Courier Hand Delivered
 2. Samples were received in: (circle) Cooler Box CS Envelope Other _____ NA
 3. Were custody seals on coolers? NA Y N If yes, how many and where? _____
 If present, were custody seals intact? Y N If present, were they signed and dated? Y N

Raw Cooler Temp	Corrected Cooler Temp	Raw Temp Blank	Corrected Temp Blank	Corr. Factor	Thermometer ID	Cooler/COC ID NA	Tracking Number NA	Filed
-0.5	-0.5	2.7	2.7	0	298		1Z X61 92X03 3202 6849	

4. Packing material: Inserts Baggies Bubble Wrap Gel Packs Wet Ice Dry Ice Sleeves _____
 5. Were custody papers properly filled out (ink, signed, etc.)? NA Y N
 6. Were samples received in good condition (temperature, unbroken)? *Indicate in the table below.* NA Y N
 If applicable, tissue samples were received: Frozen Partially Thawed Thawed
 7. Were all sample labels complete (i.e analysis, preservation, etc.)? NA Y N
 8. Did all sample labels and tags agree with custody papers? *Indicate major discrepancies in the table on page 2.* NA Y N
 9. Were appropriate bottles/containers and volumes received for the tests indicated? NA Y N
 10. Were the pH-preserved bottles (*see SMO GEN SOP*) received at the appropriate pH? *Indicate in the table below* NA Y N
 11. Were VOA vials received without headspace? *Indicate in the table below.* NA Y N
 12. Was C12/Res negative? NA Y N

Sample ID on Bottle	Sample ID on COC	Identified by:

Sample ID	Bottle Count Bottle Type	Out of Temp	Head- space	Broke	pH	Reagent	Volume added	Reagent Lot Number	Initials	Time

Notes, Discrepancies, & Resolutions: _____



Total Solids

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ALS Group USA, Corp.
dba ALS Environmental

Analytical Report

Client: Fremont Analytical
Project: COD
Sample Matrix: Soil
Analysis Method: 160.3 Modified
Prep Method: None

Service Request: K1611729
Date Collected: 09/15/16
Date Received: 09/30/16
Units: Percent
Basis: As Received

Solids, Total

Sample Name	Lab Code	Result	MRL	MDL	Dil.	Date Analyzed	Q
1609191-003A	K1611729-001	57.8	-	-	1	10/05/16 16:53	

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client: Fremont Analytical
Project: COD
Sample Matrix: Soil
Analysis Method: 160.3 Modified
Prep Method: None

Service Request: K1611729
Date Collected: NA
Date Received: NA

Units: Percent
Basis: As Received

Replicate Sample Summary
Inorganic Parameters

Sample Name:	Lab Code:	MRL	Sample Result	Duplicate Result	Average	RPD	RPD Limit	Date Analyzed
Batch QC	K1611731-001DUP	-	89.0	89.3	89.2	<1	20	10/05/16
Batch QC	K1611749-005DUP	-	97.4	97.3	97.4	<1	20	10/05/16

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.



General Chemistry

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ALS Group USA, Corp.
dba ALS Environmental

Analytical Report

Client: Fremont Analytical
Project: COD
Sample Matrix: Soil
Analysis Method: SM 5220 C Modified
Prep Method: ALS SOP

Service Request: K1611729
Date Collected: 09/15/16
Date Received: 09/30/16
Units: mg/Kg
Basis: Dry

Chemical Oxygen Demand (COD)

Sample Name	Lab Code	Result	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
1609191-003A	K1611729-001	204000	1600	-	1	10/07/16 16:00	10/7/16	
Method Blank	K1611729-MB	ND U	200	-	1	10/07/16 16:00	NA	

ALS Group USA, Corp.

dba ALS Environmental

QA/QC Report

Client: Fremont Analytical
Project: COD
Sample Matrix: Soil

Service Request: K1611729
Date Collected: NA
Date Received: NA
Date Analyzed: 10/07/16

Replicate Sample Summary
General Chemistry Parameters

Sample Name: Batch QC
Lab Code: K1611836-001

Units: mg/Kg
Basis: Dry

<u>Analyte Name</u>	<u>Analysis Method</u>	<u>MRL</u>	<u>MDL</u>	<u>Sample Result</u>	<u>Duplicate Sample K1611836-001DUP Result</u>	<u>Average</u>	<u>RPD</u>	<u>RPD Limit</u>
Chemical Oxygen Demand (COD)	SM 5220 C Modified	610	-	5970	3720	4850	47 *	20

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client: Fremont Analytical
Project: COD
Sample Matrix: Soil

Service Request: K1611729
Date Collected: N/A
Date Received: N/A
Date Analyzed: 10/7/16
Date Extracted: 10/7/16

Matrix Spike Summary
Chemical Oxygen Demand (COD)

Sample Name: Batch QC
Lab Code: K1611836-001
Analysis Method: SM 5220 C Modified
Prep Method: ALS SOP

Units: mg/Kg
Basis: Dry

Matrix Spike
K1611836-001MS

<u>Analyte Name</u>	<u>Sample Result</u>	<u>Result</u>	<u>Spike Amount</u>	<u>% Rec</u>	<u>% Rec Limits</u>
Chemical Oxygen Demand (COD)	5970	64500	52400	112	75-125

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client: Fremont Analytical
Project: COD
Sample Matrix: Soil

Service Request: K1611729
Date Analyzed: 10/07/16
Date Extracted: NA

Lab Control Sample Summary
Chemical Oxygen Demand (COD)

Analysis Method: SM 5220 C Modified
Prep Method: None

Units: mg/Kg
Basis: Dry
Analysis Lot: 517791

Sample Name	Lab Code	Result	Spike Amount	% Rec	% Rec Limits
Lab Control Sample	K1611729-LCS	4540	4840	94	85-115

Work Order: 1609191
CLIENT: GeoEngineers
Project: Gas Works Park Site

QC SUMMARY REPORT
Dissolved Metals by EPA Method 200.8

Sample ID MB-14843	SampType: MBLK	Units: µg/L				Prep Date: 9/16/2016	RunNo: 31790				
Client ID: MBLKW	Batch ID: 14843					Analysis Date: 9/16/2016	SeqNo: 600479				
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Arsenic	ND	0.500									
Iron	ND	50.0									

Sample ID LCS-14843	SampType: LCS	Units: µg/L				Prep Date: 9/16/2016	RunNo: 31790				
Client ID: LCSW	Batch ID: 14843					Analysis Date: 9/16/2016	SeqNo: 600480				
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Arsenic	101	0.500	100.0	0	101	85	115				
Iron	958	50.0	1,000	0	95.8	50	150				

Sample ID 1609147-001CDUP	SampType: DUP	Units: µg/L				Prep Date: 9/16/2016	RunNo: 31790				
Client ID: BATCH	Batch ID: 14843					Analysis Date: 9/16/2016	SeqNo: 600487				
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Arsenic	5.03	0.500						4.720	6.26	30	
Iron	2,870	50.0						3,043	5.91	30	

Sample ID 1609147-001CMS	SampType: MS	Units: µg/L				Prep Date: 9/16/2016	RunNo: 31790				
Client ID: BATCH	Batch ID: 14843					Analysis Date: 9/16/2016	SeqNo: 600488				
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Arsenic	592	0.500	500.0	4.720	117	70	130				
Iron	8,050	50.0	5,000	3,043	100	50	150				

Sample ID 1609147-001CMSD	SampType: MSD	Units: µg/L				Prep Date: 9/16/2016	RunNo: 31790				
Client ID: BATCH	Batch ID: 14843					Analysis Date: 9/16/2016	SeqNo: 600489				
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Arsenic	587	0.500	500.0	4.720	116	70	130	591.9	0.856	30	
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Work Order: 1609191
CLIENT: GeoEngineers
Project: Gas Works Park Site

QC SUMMARY REPORT
Dissolved Metals by EPA Method 200.8

Sample ID 1609147-001CMSD	SampType: MSD	Units: µg/L			Prep Date: 9/16/2016	RunNo: 31790					
Client ID: BATCH	Batch ID: 14843				Analysis Date: 9/16/2016	SeqNo: 600489					
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Iron	8,050	50.0	5,000	3,043	100	50	150	8,055	0.0495	30	

Work Order: 1609191
CLIENT: GeoEngineers
Project: Gas Works Park Site

QC SUMMARY REPORT
Sulfide by SM 4500-S2-F

Sample ID MB-R31783	SampType: MBLK	Units: mg/L	Prep Date: 9/16/2016	RunNo: 31783							
Client ID: MBLKW	Batch ID: R31783		Analysis Date: 9/16/2016	SeqNo: 600320							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Sulfide ND 0.500

Sample ID LCS-R31783	SampType: LCS	Units: mg/L	Prep Date: 9/16/2016	RunNo: 31783							
Client ID: LCSW	Batch ID: R31783		Analysis Date: 9/16/2016	SeqNo: 600321							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Sulfide 1.80 0.500 2.000 0 90.0 65 135

Sample ID 1609188-001BDUP	SampType: DUP	Units: mg/L	Prep Date: 9/16/2016	RunNo: 31783							
Client ID: BATCH	Batch ID: R31783		Analysis Date: 9/16/2016	SeqNo: 600323							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Sulfide 3.20 0.500 3.000 6.45 30

Sample ID 1609188-001BMS	SampType: MS	Units: mg/L	Prep Date: 9/16/2016	RunNo: 31783							
Client ID: BATCH	Batch ID: R31783		Analysis Date: 9/16/2016	SeqNo: 600324							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Sulfide 5.20 0.500 2.000 3.000 110 65 135

Sample ID 1609188-001BMSD	SampType: MSD	Units: mg/L	Prep Date: 9/16/2016	RunNo: 31783							
Client ID: BATCH	Batch ID: R31783		Analysis Date: 9/16/2016	SeqNo: 600325							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Sulfide 5.00 0.500 2.000 3.000 100 65 135 5.200 3.92 30

Client Name: **GEI**
 Logged by: **Erica Silva**

Work Order Number: **1609191**
 Date Received: **9/15/2016 6:23:00 PM**

Chain of Custody

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

Log In

3. Coolers are present? Yes No NA
 4. Shipping container/cooler in good condition? Yes No
 5. Custody Seals present on shipping container/cooler?
 (Refer to comments for Custody Seals not intact) Yes No Not 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
 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

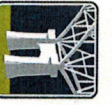
Person Notified:	<input type="text" value="Sandy Smith"/>	Date:	<input type="text" value="9/16/2016"/>
By Whom:	<input type="text" value="Erica Silva"/>	Via:	<input checked="" type="checkbox"/> eMail <input type="checkbox"/> Phone <input type="checkbox"/> Fax <input type="checkbox"/> In Person
Regarding:	<input type="text" value="Sample name discrepancy"/>		
Client Instructions:	<input type="text" value="COC is correct"/>		

19. Additional remarks:

Item Information

Item #	Temp °C
Cooler	3.2
Sample	3.6
Temp Blank	4.4

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



Fremont
Analytical

3600 Fremont Ave N.
Seattle, WA 98103

Tel: 206-352-3790
Fax: 206-352-7178

Chain of Custody Record and Laboratory Services Agreement

Date: 9/15/2016

Laboratory Project No (Internal):

1609191

Page: 1 of: 1

Client: GeoEngineers
Address: 600 Stewart Street, Suite 1700
City, State, Zip: Seattle, WA 98103
Telephone: 253.722.2418

Project Name: Gas Works Park Site
Project No: 0186-846-01 Task 1803
Location: Seattle
Report To (PM): Sandra Smith / Claudia De La Via
PM Email: sbsmith@geoengineers.com

Collected by: GRL/CVD
Sandra Smith / Claudia De La Via
ocdelavia@geoengineers.com

*Matrix Codes: A = Air, AQ = Aqueous, B = Bulk, O = Other, P = Product, S = Soil, SD = Sediment, SL = Solid, W = Water, DW = Drinking Water, GW = Ground Water, SW = Storm Water, WW = Waste Water

Sample Name	Sample Date	Sample Time	Sample Type (Matrix)*	Analytes										Comments				
				Arsenic (EPA 200.8) field filtered	Iron (EPA 200.8) field filtered	Sulfide (4500-52-F) field filtered	COD (SM5220D) field filtered	COD (SM5220)	Grain Size (ASTM D422)	SVOCs (EPA 8270 / 625)	PAHs (EPA 8270 - SIM)	PCBs (EPA 8082 / 608)	Metals** (EPA 6020 / 200.8)		Total (T) Dissolved (D)			
1 PAL-17-D-160915	9/15	1651	GW	X	X	X											Field Filtered	
2 PAL-17-14-15.8		1550	S				X	X										Bottle for COD
3 PAL-17-15.8-16.1		1555	S				X	X										
4 PAL-17-26.5-29		1625	S				X	X										
5 PAL-																		
6 PAL-																		
7 PAL-																		
8 PAL-																		
9 PAL-																		
10 PAL-																		

**Metals Analysis (Circle): MTCA-5 RCRA-8 Priority Pollutants TAL Individual: Ag Al As B Ba Be Ca Cd Co Cr Cu Fe Hg K Mg Mn Mo Na Ni Pb Sb Se Sr Sn Tl U V Zn

**Anions (Circle): Nitrate Nitrite Chloride Sulfate Bromide O-Phosphate Fluoride Nitrate+Nitrite

Sample Disposal: Return to Client Disposal by Lab (Samples will be held for 30 days unless otherwise noted. A fee may be assessed if samples are retained after 30 days.)

I represent that I am authorized to enter into this Agreement with Fremont Analytical on behalf of the Client named above, that I have verified Client's agreement to each of the terms on the front and backside of this Agreement.

Relinquished [Signature] Date/Time 9/15/16 18:22 Received [Signature] Date/Time 9/15/16 18:22

Relinquished [Signature] Date/Time 9/15/16 18:22 Received [Signature] Date/Time 9/15/16 18:22

TAT → SameDay^ NextDay^ 2 Day 3 Day STD

Please coordinate with the lab in advance



Fremont
Analytical

3600 Fremont Ave N.
Seattle, WA 98103

Tel: 206-352-3790
Fax: 206-352-7178

Client: GeoEngineers
Address: 600 Stewart Street, Suite 1700
City, State, Zip: Seattle, WA 98103
Telephone: 253.722.2418

Project Name: Gas Works Park Site
Project No: 0186-946-01 Task 1803
Location: Seattle
Report To (PM): Sandra Smith / Claudia De La Via
PM Email: sbsmith@geoengineers.com

Date: 9/15/2015

Laboratory Project No (internal):

1609191

Page: 1 of: 1

Chain of Custody Record and Laboratory Services Agreement

*Matrix Codes: A = Air, AQ = Aqueous, B = Bulk, O = Other, P = Product, S = Soil, SD = Sediment, SL = Solid, W = Water, DW = Drinking Water, GW = Ground Water, SW = Storm Water, WW = Waste Water

Sample Name	Sample Date	Sample Time	Sample Type (Matrix)*	Analytes											Comments			
				Arsenic (EPA 200.8) field filtered	Iron (EPA 200.8) field filtered	Sulfide (AS50-S2-F) field filtered	COD (SM5220) field filtered	COD (SM5220)	Grain Size (ASTM D422)	SVOCs (EPA 8270 / 625)	PAHs (EPA 8270 / 625)	PCBs (EPA 8082 / 608)	Metals** (EPA 6020 / 200.8)	Total (T) / Dissolved (D)				
1 PAL-17-D-160915	9/15	1651	GW	X	X	X	X											Field Filtered
2 PAL-17-14-15.8		1550	S					X	X									
3 PAL-17-15.8-16.1		1555	S					X	X									
4 PAL-17-26.5-29		1625	S					X	X									Bottle for COD Add analysis 9/27/16 per S.S.
5 PAL-																		
6 PAL-																		
7 PAL-																		
8 PAL-																		
9 PAL-																		
10 PAL-																		

**Metals Analysis (Circle): MTCA-5 RCA-8 Priority Pollutants TAL Individual: Ag Al As B Ba Be Ca Cd Co Cr Cu Fe Hg K Mg Mn Mo Na Ni Pb Sb Se Sr Sn Tl U V Zn

***Anions (Circle): Nitrate Nitrite Chloride Sulfate Bromide O-Phosphate Fluoride Nitrate-Nitrite Turn-around times for samples received after 4:00pm will begin on the following business day.

Sample Disposal: Return to Client Disposal by Lab (Samples will be held for 30 days unless otherwise noted. A fee may be assessed if samples are retained after 30 days.)

I represent that I am authorized to enter into this Agreement with Fremont Analytical on behalf of the Client named above, that I have verified Client's agreement to each of the terms on the front and backside of this Agreement.

Relinquished [Signature] Date/Time 9/15/16 19:22 Received [Signature] Date/Time 9/15/16 6:23
 Relinquished [Signature] Date/Time 9/15/16 19:22 Received [Signature] Date/Time 9/15/16 6:23
 Relinquished [Signature] Date/Time 9/15/16 19:22 Received [Signature] Date/Time 9/15/16 6:23

Special Remarks:
 1. Groundwater arsenic and sulfide samples on ASAP TAT.
 2. Groundwater iron and COD plus soil COD and grain size samples on standard TAT.
 3. Groundwater and soil RIS per the WO
 4. COD = Chemical oxygen demand
 5. Run for dissolved metals

TAT -> SameDay^ NextDay^ 2 Day 3 Day STD
 ^Please coordinate with the lab in advance



GeoEngineers

Sandra Smith
600 Stewart Street, Suite 1700
Seattle, WA 98101

RE: Gas Works Park Site
Work Order Number: 1609211

October 06, 2016

Attention Sandra Smith:

Fremont Analytical, Inc. received 8 sample(s) on 9/16/2016 for the analyses presented in the following report.

Chemical Oxygen Demand by SM 5220D
Dissolved Metals by EPA Method 200.8
Grain Size by ASTM D422
Sulfide by SM 4500-S2-F

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

CLIENT: GeoEngineers
Project: Gas Works Park Site
Work Order: 1609211

Work Order Sample Summary

Lab Sample ID	Client Sample ID	Date/Time Collected	Date/Time Received
1609211-001	PAI-22-12-13	09/16/2016 10:00 AM	09/16/2016 3:50 PM
1609211-002	PAI-22-13.4-13.6	09/16/2016 10:05 AM	09/16/2016 3:50 PM
1609211-003	PAI-22-23-25	09/16/2016 10:10 AM	09/16/2016 3:50 PM
1609211-004	PAI-22-S-160916	09/16/2016 11:47 AM	09/16/2016 3:50 PM
1609211-005	PAI-22-D-160916	09/16/2016 10:50 AM	09/16/2016 3:50 PM
1609211-006	PAI-18-13.2-13.4	09/16/2016 2:45 PM	09/16/2016 3:50 PM
1609211-007	RINSE-160916	09/16/2016 3:00 PM	09/16/2016 3:50 PM
1609211-008	PAI-21-14.4-15	09/16/2016 3:20 PM	09/16/2016 3:50 PM

CLIENT: GeoEngineers
Project: Gas Works Park Site

I. SAMPLE RECEIPT:

Samples receipt information is recorded on the attached Sample Receipt Checklist.

II. GENERAL REPORTING COMMENTS:

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

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

III. ANALYSES AND EXCEPTIONS:

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

Qualifiers:

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



Client: GeoEngineers

Collection Date: 9/16/2016 11:47:00 AM

Project: Gas Works Park Site

Lab ID: 1609211-004

Matrix: Groundwater

Client Sample ID: PAI-22-S-160916

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
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Dissolved Metals by EPA Method 200.8

Batch ID: 14857 Analyst: TN

Arsenic	10,500	5.00	D	µg/L	10	9/19/2016 12:01:33 PM
Iron	6,150	500	D	µg/L	10	9/19/2016 12:01:33 PM

Chemical Oxygen Demand by SM 5220D

Batch ID: R31908 Analyst: MW

Chemical Oxygen Demand	10.7	10.0		mg/L	1	9/22/2016 12:36:42 PM
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Sulfide by SM 4500-S2-F

Batch ID: R31833 Analyst: KT

Sulfide	4.80	0.119	MDL	mg/L	1	9/19/2016 3:55:00 PM
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NOTES:

MDL - Sample reported to Method Detection Limit (MDL)



Client: GeoEngineers

Collection Date: 9/16/2016 10:50:00 AM

Project: Gas Works Park Site

Lab ID: 1609211-005

Matrix: Groundwater

Client Sample ID: PAI-22-D-160916

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
----------	--------	----	------	-------	----	---------------

Dissolved Metals by EPA Method 200.8

Batch ID: 14857 Analyst: TN

Arsenic	39.3	0.500		µg/L	1	9/19/2016 12:22:28 PM
Iron	5,940	50.0		µg/L	1	9/19/2016 12:22:28 PM

Chemical Oxygen Demand by SM 5220D

Batch ID: R31908 Analyst: MW

Chemical Oxygen Demand	28.6	10.0		mg/L	1	9/22/2016 12:36:42 PM
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Sulfide by SM 4500-S2-F

Batch ID: R31833 Analyst: KT

Sulfide	0.600	0.119	MDL	mg/L	1	9/19/2016 4:00:00 PM
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NOTES:

MDL - Sample reported to Method Detection Limit (MDL)

Grain Size by ASTM D422

Project: Gas Works Park Site
Client: GeoEngineers
Lab Project #: 1609211

Percent Finer (Passing) than the Indicated Size

UOM = Percent

Grain Size Classification	Gravel						Coarse Sand	Medium Sand		Fine Sand			Silt		
	Sieve Size	3"	2"	1 1/2"	1"	3/4"	3/8"	#4	#10	#20	#40	#60	#140	#230	#325
Particle Size (Microns)	76200	50800	38100	25400	19050	9525	4750	2000	850	425	250	106	75	45	34
PAI-22-12-13	100%	100%	100%	100%	89.6%	68.3%	58.4%	47.2%	38.9%	29.8%	19.8%	8.33%	5.71%	3.14%	2.11%
PAI-22-23-25	100%	100%	100%	100%	98.4%	98.4%	98.0%	97.0%	95.8%	94.8%	87.7%	36.9%	21.4%	6.49%	2.73%



3600 Fremont Ave. N.
 Seattle, WA 98103
 Tel: 206-352-3790
 Fax: 206-352-7178
 Email: info@fremontanalytical.com

Grain Size by ASTM D422

Project: Gas Works Park Site
 Client: GeoEngineers
 Lab Project #: 1609211

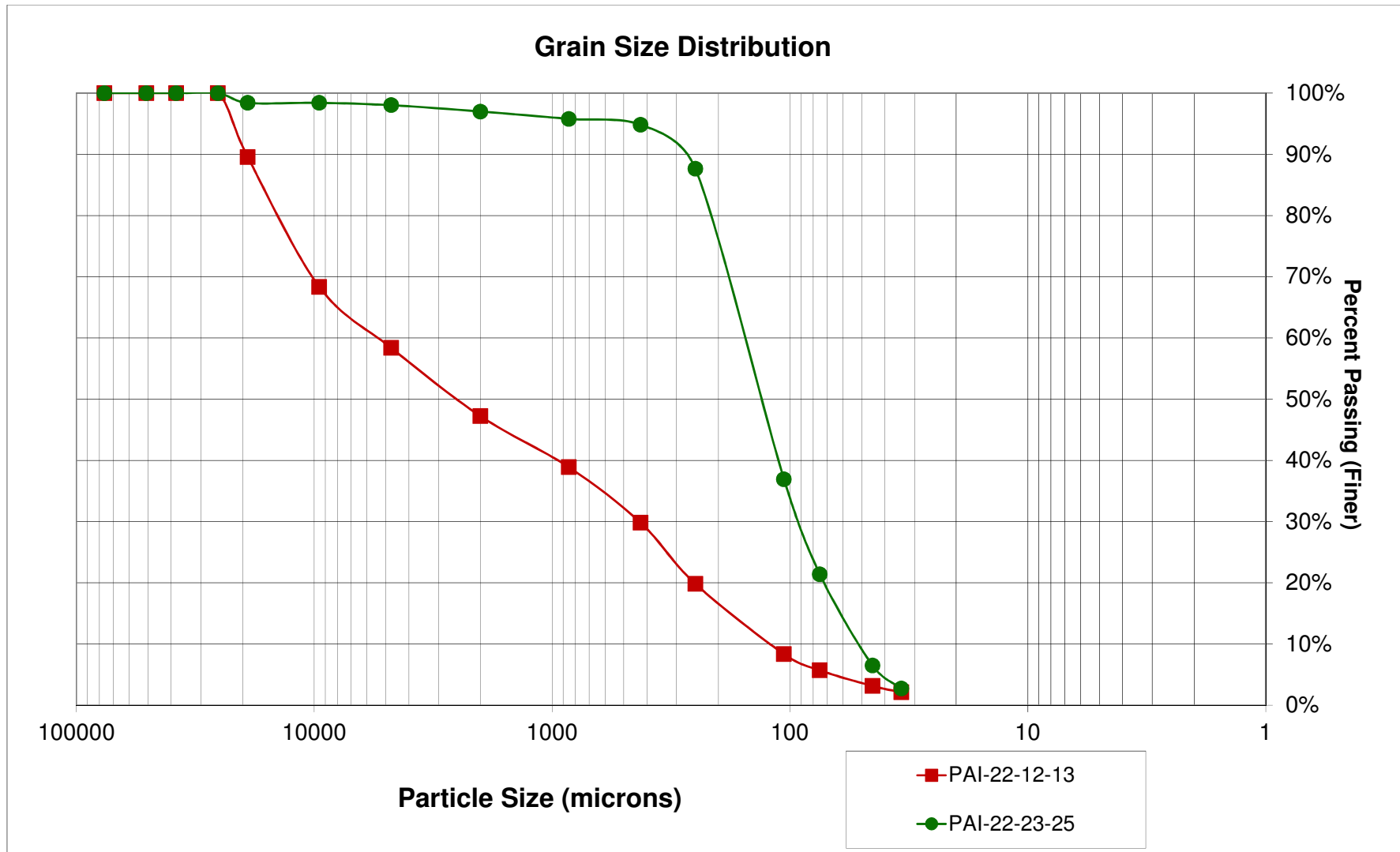
Percent Retained in Each Size Fraction

UOM = Percent

Grain Size Classification	Gravel							Coarse Sand	Medium Sand		Fine Sand			Silt		
	>76200	76200-50800	50800-38100	38100-25400	25400-19000	19050-9525	9525-4750	4750-2000	2000-850	850-425	425-250	250-106	106-62.5	72.5-45	45-34	<34
PAI-22-12-13	0.00%	0.00%	0.00%	0.00%	10.4%	21.2%	10.0%	11.1%	8.33%	9.05%	10.0%	11.5%	2.63%	2.56%	1.03%	2.11%
PAI-22-23-25	0.00%	0.00%	0.00%	0.00%	1.58%	0.00%	0.384%	1.03%	1.19%	0.972%	7.11%	50.5%	15.4%	14.8%	3.74%	2.72%

Grain Size by ASTM D422

Project: Gas Works Park Site
 Client: GeoEngineers
 Lab Project #: 1609211





ALS Environmental
ALS Group USA, Corp
1317 South 13th Avenue
Bellevue, WA 98006
T: 1 360 577 7222
F: 1 360 636 1068
www.alsglobal.com

October 03, 2016

Analytical Report for Service Request No: 1611155

Mr. Michael Ridgeway
Fremont Analytical
3600 Fremont Avenue, North
Seattle, WA 98103

RE: COD / 1609211

Dear Mr. Ridgeway,

Enclosed are the results of the sample(s) submitted to our laboratory September 20, 2016. For your reference, these analyses have been assigned our service request number **K1611155**.

Analyses were performed according to our laboratory's EPA-approved quality assurance program. The test results meet requirements of the current EPA standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of EPA-accredited analytes, refer to the certifications section at www.alsglobal.com. All results are intended to be considered in their entirety, and ALS Group USA, Corp. dba ALS Environmental (ALS) is not responsible for use of less than the complete report. Results apply only to the items submitted to the laboratory for analysis and individual items (samples) analyzed, as listed in the report.

Please contact me if you have any questions. My extension is 3375. You may also contact me via email at janet.Malloch@alsglobal.com.

Respectfully submitted,

ALS Group USA, Corp. dba ALS Environmental

Janet Malloch
Project Manager



A S Environmental
A S roup SA, orp
1317 South 13th Avenue
elso, WA 98626
T : 1 360 577 7222
F : 1 360 636 1068
www.alsglobal.com

Table of Contents

Acronyms
Qualifiers
State Certifications, Accreditations, And Licenses
Chain of Custody
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General Chemistry

Acronyms

ASTM	American Society for Testing and Materials
A2LA	American Association for Laboratory Accreditation
CARB	California Air Resources Board
CAS Number	Chemical Abstract Service registry Number
CFC	Chlorofluorocarbon
CFU	Colony-Forming Unit
DEC	Department of Environmental Conservation
DEQ	Department of Environmental Quality
DHS	Department of Health Services
DOE	Department of Ecology
DOH	Department of Health
EPA	U. S. Environmental Protection Agency
ELAP	Environmental Laboratory Accreditation Program
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
LOD	Limit of Detection
LOQ	Limit of Quantitation
LUFT	Leaking Underground Fuel Tank
M	Modified
MCL	Maximum Contaminant Level is the highest permissible concentration of a substance allowed in drinking water as established by the USEPA.
MDL	Method Detection Limit
MPN	Most Probable Number
MRL	Method Reporting Limit
NA	Not Applicable
NC	Not Calculated
NCASI	National Council of the Paper Industry for Air and Stream Improvement
ND	Not Detected
NIOSH	National Institute for Occupational Safety and Health
PQL	Practical Quantitation Limit
RCRA	Resource Conservation and Recovery Act
SIM	Selected Ion Monitoring
TPH	Total Petroleum Hydrocarbons
tr	Trace level is the concentration of an analyte that is less than the PQL but greater than or equal to the MDL.

Inorganic Data Qualifiers

- * The result is an outlier. See case narrative.
- # The control limit criteria is not applicable. See case narrative.
- B The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards.
- E The result is an estimate amount because the value exceeded the instrument calibration range.
- J The result is an estimated value.
- U The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
DOD-QSM 4.2 definition : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
- i The MRL/MDL or LOQ/LOD is elevated due to a matrix interference.
- X See case narrative.
- Q See case narrative. One or more quality control criteria was outside the limits.
- H The holding time for this test is immediately following sample collection. The samples were analyzed as soon as possible after receipt by the laboratory.

Metals Data Qualifiers

- # The control limit criteria is not applicable. See case narrative.
- J The result is an estimated value.
- E The percent difference for the serial dilution was greater than 10%, indicating a possible matrix interference in the sample.
- M The duplicate injection precision was not met.
- N The Matrix Spike sample recovery is not within control limits. See case narrative.
- S The reported value was determined by the Method of Standard Additions (MSA).
- U The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
DOD-QSM 4.2 definition : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
- W The post-digestion spike for furnace AA analysis is out of control limits, while sample absorbance is less than 50% of spike absorbance.
 - i The MRL/MDL or LOQ/LOD is elevated due to a matrix interference.
- X See case narrative.
- + The correlation coefficient for the MSA is less than 0.995.
- Q See case narrative. One or more quality control criteria was outside the limits.

Organic Data Qualifiers

- * The result is an outlier. See case narrative.
- # The control limit criteria is not applicable. See case narrative.
- A A tentatively identified compound, a suspected aldol-condensation product.
- B The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards.
- C The analyte was qualitatively confirmed using GC/MS techniques, pattern recognition, or by comparing to historical data.
- D The reported result is from a dilution.
- E The result is an estimated value.
- J The result is an estimated value.
- N The result is presumptive. The analyte was tentatively identified, but a confirmation analysis was not performed.
- P The GC or HPLC confirmation criteria was exceeded. The relative percent difference is greater than 40% between the two analytical results.
- U The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
DOD-QSM 4.2 definition : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
 - i The MRL/MDL or LOQ/LOD is elevated due to a chromatographic interference.
- X See case narrative.
- Q See case narrative. One or more quality control criteria was outside the limits.

Additional Petroleum Hydrocarbon Specific Qualifiers

- F The chromatographic fingerprint of the sample matches the elution pattern of the calibration standard.
- L The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of lighter molecular weight constituents than the calibration standard.
- H The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of heavier molecular weight constituents than the calibration standard.
- O The chromatographic fingerprint of the sample resembles an oil, but does not match the calibration standard.
- Y The chromatographic fingerprint of the sample resembles a petroleum product eluting in approximately the correct carbon range, but the elution pattern does not match the calibration standard.
- Z The chromatographic fingerprint does not resemble a petroleum product.

**ALS Group USA Corp. dba ALS Environmental (ALS) - Kelso
State Certifications, Accreditations, and Licenses**

Agency	Web Site	Number
Alaska DEC UST	http://dec.alaska.gov/applications/eh/ehllabreports/USTLabs.aspx	UST-040
Arizona DHS	http://www.azdhs.gov/lab/license/env.htm	AZ0339
Arkansas - DEQ	http://www.adeq.state.ar.us/techsvs/labcert.htm	88-0637
California DHS (ELAP)	http://www.cdph.ca.gov/certlic/labs/Pages/ELAP.aspx	2795
DOD ELAP	http://www.denix.osd.mil/edqw/Accreditation/AccreditedLabs.cfm	L14-51
Florida DOH	http://www.doh.state.fl.us/lab/EnvLabCert/WaterCert.htm	E87412
Hawaii DOH	Not available	-
ISO 17025	http://www.pjllabs.com/	L16-57
Louisiana DEQ	http://www.deq.louisiana.gov/portal/DIVISIONS/PublicParticipationandPermitSupport/LouisianaLaboratoryAccreditationProgram.aspx	03016
Maine DHS	Not available	WA01276
Minnesota DOH	http://www.health.state.mn.us/accreditation	053-999-457
Montana DPHHS	http://www.dphhs.mt.gov/publichealth/	CERT0047
Nevada DEP	http://ndep.nv.gov/bsdw/labservice.htm	WA01276
New Jersey DEP	http://www.nj.gov/dep/oqa/	WA005
North Carolina DWQ	http://www.dwqlab.org/	605
Oklahoma DEQ	http://www.deq.state.ok.us/CSDnew/labcert.htm	9801
Oregon – DEQ (NELAP)	http://public.health.oregon.gov/LaboratoryServices/EnvironmentalLaboratoryAccreditation/Pages/index.aspx	WA100010
South Carolina DHEC	http://www.scdhec.gov/environment/envserv/	61002
Texas CEQ	http://www.tceq.texas.gov/field/qa/env_lab_accreditation.html	T104704427
Washington DOE	http://www.ecy.wa.gov/programs/eap/labs/lab-accreditation.html	C544
Wyoming (EPA Region 8)	http://www.epa.gov/region8/water/dwhome/wyomingdi.html	-
Kelso Laboratory Website	www.alsglobal.com	NA

Analyses were performed according to our laboratory's NELAP-approved quality assurance program. A complete listing of specific NELAP-certified analytes, can be found in the certification section at www.ALSGlobal.com or at the accreditation bodies web site.

Please refer to the certification and/or accreditation body's web site if samples are submitted for compliance purposes. The states highlighted above, require the analysis be listed on the state certification if used for compliance purposes and if the method/analyte is offered by that state.



Chain of Custody

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360)577-7222 Fax (360)636-1068
www.alsglobal.com



CHAIN OF CUSTODY RECORD

Omega COCID 275

PAGE: 1

OF: 1

ADDRESS

Fremont Analytical, Inc.
 3600 Fremont Ave. N.
 Seattle, WA 98103
 TEL: 206-352-3790
 FAX: 206-352-7178

Website: www.fremontanalytical.com

K161155

SUB CONTRACTOR: ALS		COMPANY: ALS Environmental		SPECIAL INSTRUCTIONS / COMMENTS: Please email results to Michael Ridgeway and Chelsea Ward - mridgeway@fremontanalytical.com; cward@fremontanalytical.com <i>Low level RL if possible</i>			
ADDRESS: 1317 South 13th Avenue							
CITY, STATE, ZIP: Kelso, WA 98626							
PHONE: (360) 577-7222		FAX: _____ EMAIL: _____					
ACCOUNT #:							

ITEM #	SAMPLE ID	CLIENT SAMPLE ID	BOTTLE TYPE	MATRIX	DATE COLLECTED	NUMBER OF CONTAINERS	COMMENTS: Methanol Preserved Weights HOT Sample Notation, Additional Sample Description.
1	1609211-001A	PAI-22-12-13	CLEAR JARS 4 O	Soil	9/16/2016 10:00:00 AM	1	Chemical Oxygen Demand by SM5220, Low Level RL
	TEST_SUB						
2	1609211-003A	PAI-22-23-25	CLEAR JARS 4 O	Soil	9/16/2016 10:10:00 AM	1	Chemical Oxygen Demand by SM5220, Low Level RL
	TEST_SUB						

Relinquished By: <i>[Signature]</i>	Date: 9/19/16	Time: 14:25	Received By: <i>[Signature]</i>	Date: 9/20/16	Time: 10:20	REPORT TRANSMITTAL DESIRED:	
Relinquished By:	Date:	Time:	Received By:	Date:	Time:	<input type="checkbox"/> HARDCOPY (extra cost)	<input type="checkbox"/> FAX
Relinquished By:	Date:	Time:	Received By:	Date:	Time:	<input checked="" type="checkbox"/> EMAIL	<input type="checkbox"/> ONLINE
TAT: Standard <input checked="" type="checkbox"/> RUSH						FOR LAB USE ONLY	
Next BD <input type="checkbox"/> 2nd BD <input type="checkbox"/> 3rd BD <input type="checkbox"/>						Temp of samples _____ °C Attempt to Cool? _____	
Note: RUSH requests will incur surcharges!						Comments: _____	



Cooler Receipt and Preservation Form

Client Fremont Service Request K16 11155
 Received: 9/20/16 Opened: 9/20/16 By: [Signature] Unloaded: 9/20/16 By: [Signature]

- Samples were received via? USPS Fed Ex UPS DHL PDX Courier Hand Delivered
- Samples were received in: (circle) Cooler Box Envelope Other NA
- Were custody seals on coolers? NA Y N If yes, how many and where? one, front
 If present, were custody seals intact? Y N If present, were they signed and dated? Y N

Raw Cooler Temp	Corrected Cooler Temp	Raw Temp Blank	Corrected Temp Blank	Corr. Factor	Thermometer ID	Cooler/COC ID	Tracking Number	NA	Filed
2.5	2.7	5.5	5.5	0	370	275	1EKL0192K0331955472		

- Packing material: Inserts Baggies Bubble Wrap Gel Packs Wet Ice Dry Ice Sleeves
- Were custody papers properly filled out (ink, signed, etc.)? NA Y N
- Were samples received in good condition (temperature, unbroken)? *Indicate in the table below.* NA Y N
 If applicable, tissue samples were received: Frozen Partially Thawed Thawed
- Were all sample labels complete (i.e analysis, preservation, etc.)? NA Y N
- Did all sample labels and tags agree with custody papers? *Indicate major discrepancies in the table on page 2.* NA Y N
- Were appropriate bottles/containers and volumes received for the tests indicated? NA Y N
- Were the pH-preserved bottles (*see SMO GEN SOP*) received at the appropriate pH? *Indicate in the table below* NA Y N
- Were VOA vials received without headspace? *Indicate in the table below.* NA Y N
- Was C12/Res negative? NA Y N

Sample ID on Bottle	Sample ID on COC	Identified by:

Sample ID	Bottle Count	Bottle Type	Out of Temp	Head-space	Broke	pH	Reagent	Volume added	Reagent Lot Number	Initials	Time

Notes, Discrepancies, & Resolutions: _____



Total Solids

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ALS Group USA, Corp.
dba ALS Environmental

Analytical Report

Client: Fremont Analytical
Project: COD/1609211
Sample Matrix: Soil
Analysis Method: 160.3 Modified
Prep Method: None

Service Request: K1611155
Date Collected: 09/16/16
Date Received: 09/20/16
Units: Percent
Basis: As Received

Solids, Total

Sample Name	Lab Code	Result	MRL	MDL	Dil.	Date Analyzed	Q
PAI-22-12-13	K1611155-001	88.8	-	-	1	09/26/16 16:37	
PAI-22-23-25	K1611155-002	83.1	-	-	1	09/26/16 16:37	

ALS Group USA, Corp.

dba ALS Environmental

QA/QC Report

Client: Fremont Analytical
Project: COD/1609211
Sample Matrix: Soil

Service Request: K1611155
Date Collected: 09/16/16
Date Received: 09/20/16
Date Analyzed: 09/26/16

Replicate Sample Summary
Inorganic Parameters

Sample Name: PAI-22-23-25
Lab Code: K1611155-002

Units: Percent
Basis: As Received

<u>Analyte Name</u>	<u>Analysis Method</u>	<u>MRL</u>	<u>Sample Result</u>	<u>Duplicate Sample K1611155-002DUP Result</u>	<u>Average</u>	<u>RPD</u>	<u>RPD Limit</u>
Solids, Total	160.3 Modified	-	83.1	83.3	83.2	<1	20

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.



General Chemistry

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ALS Group USA, Corp.
dba ALS Environmental

Analytical Report

Client: Fremont Analytical
Project: COD/1609211
Sample Matrix: Soil
Analysis Method: SM 5220 C Modified
Prep Method: ALS SOP

Service Request: K1611155
Date Collected: 09/16/16
Date Received: 09/20/16
Units: mg/Kg
Basis: Dry

Chemical Oxygen Demand (COD)

Sample Name	Lab Code	Result	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
PAI-22-12-13	K1611155-001	9540	120	-	1	09/29/16 14:15	9/28/16	
PAI-22-23-25	K1611155-002	3400	120	-	1	09/29/16 14:15	9/28/16	
Method Blank	K1611155-MB	ND U	10	-	1	09/29/16 14:15	NA	

ALS Group USA, Corp.

dba ALS Environmental

QA/QC Report

Client: Fremont Analytical
Project COD/1609211
Sample Matrix: Soil

Service Request: K1611155
Date Collected: NA
Date Received: NA
Date Analyzed: 09/29/16

Replicate Sample Summary
General Chemistry Parameters

Sample Name: Batch QC
Lab Code: K1610996-001

Units: mg/Kg
Basis: Dry

<u>Analyte Name</u>	<u>Analysis Method</u>	<u>MRL</u>	<u>MDL</u>	<u>Sample Result</u>	<u>Duplicate Sample K1610996-001DUP Result</u>	<u>Average</u>	<u>RPD</u>	<u>RPD Limit</u>
Chemical Oxygen Demand (COD)	SM 5220 C Modified	130	-	2980	3200	3090	7	20

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client: Fremont Analytical
Project: COD/1609211
Sample Matrix: Soil

Service Request: K1611155
Date Collected: N/A
Date Received: N/A
Date Analyzed: 09/29/16
Date Extracted: 09/28/16

Matrix Spike Summary
Chemical Oxygen Demand (COD)

Sample Name: Batch QC
Lab Code: K1610996-001
Analysis Method: SM 5220 C Modified
Prep Method: ALS SOP

Units: mg/Kg
Basis: Dry

Matrix Spike
K1610996-001MS

<u>Analyte Name</u>	<u>Sample Result</u>	<u>Result</u>	<u>Spike Amount</u>	<u>% Rec</u>	<u>% Rec Limits</u>
Chemical Oxygen Demand (COD)	2980	11300	6830	121	75-125

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client: Fremont Analytical
Project: COD/1609211
Sample Matrix: Soil

Service Request: K1611155
Date Analyzed: 09/29/16
Date Extracted: NA

Lab Control Sample Summary
Chemical Oxygen Demand (COD)

Analysis Method: SM 5220 C Modified
Prep Method: None

Units: mg/Kg
Basis: Dry
Analysis Lot: 516546

Sample Name	Lab Code	Result	Spike Amount	% Rec	% Rec Limits
Lab Control Sample	K1611155-LCS	231	242	96	85-115

Work Order: 1609211
CLIENT: GeoEngineers
Project: Gas Works Park Site

QC SUMMARY REPORT
Dissolved Metals by EPA Method 200.8

Sample ID MB-14857	SampType: MBLK	Units: µg/L			Prep Date: 9/19/2016	RunNo: 31821					
Client ID: MBLKW	Batch ID: 14857				Analysis Date: 9/19/2016	SeqNo: 601132					
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Arsenic	ND	0.500									
Iron	ND	50.0									

Sample ID LCS-14857	SampType: LCS	Units: µg/L			Prep Date: 9/19/2016	RunNo: 31821					
Client ID: LCSW	Batch ID: 14857				Analysis Date: 9/19/2016	SeqNo: 601133					
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Arsenic	101	0.500	100.0	0	101	85	115				
Iron	916	50.0	1,000	0	91.6	50	150				

Sample ID 1609211-004ADUP	SampType: DUP	Units: µg/L			Prep Date: 9/19/2016	RunNo: 31821					
Client ID: PAI-22-S-160916	Batch ID: 14857				Analysis Date: 9/19/2016	SeqNo: 601138					
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Arsenic	10,000	5.00						10,490	4.68	30	D
Iron	5,960	500						6,148	3.13	30	D

Sample ID 1609211-004AMS	SampType: MS	Units: µg/L			Prep Date: 9/19/2016	RunNo: 31821					
Client ID: PAI-22-S-160916	Batch ID: 14857				Analysis Date: 9/19/2016	SeqNo: 601139					
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Arsenic	10,700	5.00	500.0	10,490	34.5	70	130				DS
Iron	10,700	500	5,000	6,148	91.7	50	150				D

NOTES:
S - Analyte concentration was too high for accurate spike recovery(ies).



Work Order: 1609211
CLIENT: GeoEngineers
Project: Gas Works Park Site

QC SUMMARY REPORT
Dissolved Metals by EPA Method 200.8

Sample ID	1609211-004AMSD	SampType:	MSD	Units:	µg/L	Prep Date:	9/19/2016	RunNo:	31821		
Client ID:	PAI-22-S-160916	Batch ID:	14857			Analysis Date:	9/19/2016	SeqNo:	601140		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	10,800	5.00	500.0	10,490	53.3	70	130	10,660	0.881	30	DS
Iron	10,300	500	5,000	6,148	83.1	50	150	10,730	4.09	30	D

NOTES:

S - Analyte concentration was too high for accurate spike recovery(ies).

Work Order: 1609211
CLIENT: GeoEngineers
Project: Gas Works Park Site

QC SUMMARY REPORT
Sulfide by SM 4500-S2-F

Sample ID MB-R31833	SampType: MBLK	Units: mg/L	Prep Date: 9/19/2016	RunNo: 31833							
Client ID: MBLKW	Batch ID: R31833		Analysis Date: 9/19/2016	SeqNo: 601382							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfide	ND	0.119									MDL

NOTES:
MDL - Sample reported to Method Detection Limit (MDL)

Sample ID LCS-R31833	SampType: LCS	Units: mg/L	Prep Date: 9/19/2016	RunNo: 31833							
Client ID: LCSW	Batch ID: R31833		Analysis Date: 9/19/2016	SeqNo: 601383							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfide	2.00	0.500	2.000	0	100	65	135				

Sample ID 1609211-005BDUP	SampType: DUP	Units: mg/L	Prep Date: 9/19/2016	RunNo: 31833							
Client ID: PAI-22-D-160916	Batch ID: R31833		Analysis Date: 9/19/2016	SeqNo: 601386							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfide	1.00	0.500						0.6000	50.0	30	

Sample ID 1609211-005BMS	SampType: MS	Units: mg/L	Prep Date: 9/19/2016	RunNo: 31833							
Client ID: PAI-22-D-160916	Batch ID: R31833		Analysis Date: 9/19/2016	SeqNo: 601387							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfide	2.80	0.500	2.000	0.6000	110	65	135				

Sample ID 1609211-005BMSD	SampType: MSD	Units: mg/L	Prep Date: 9/19/2016	RunNo: 31833							
Client ID: PAI-22-D-160916	Batch ID: R31833		Analysis Date: 9/19/2016	SeqNo: 601388							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfide	3.00	0.500	2.000	0.6000	120	65	135	2.800	6.90	30	

Client Name: **GEI**
 Logged by: **Erica Silva**

Work Order Number: **1609211**
 Date Received: **9/16/2016 3:50:00 PM**

Chain of Custody

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

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
 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:	<input type="text" value="Sandy Smith"/>	Date:	<input type="text" value="9/16/2016"/>
By Whom:	<input type="text" value="Erica Silva"/>	Via:	<input checked="" type="checkbox"/> eMail <input type="checkbox"/> Phone <input type="checkbox"/> Fax <input type="checkbox"/> In Person
Regarding:	<input type="text" value="Sampling time of 16:45"/>		
Client Instructions:	<input type="text" value="14:45"/>		

19. Additional remarks:

Item Information

Item #	Temp °C
Cooler	4.1
Sample	7.3
Temp Blank	7.1

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



GeoEngineers

Sandra Smith
600 Stewart Street, Suite 1700
Seattle, WA 98101

RE: Gas Works Park Site
Work Order Number: 1609321

November 07, 2016

Attention Sandra Smith:

Fremont Analytical, Inc. received 6 sample(s) on 9/26/2016 for the analyses presented in the following report.

Dissolved Metals by EPA Method 200.8
Grain Size by ASTM D422

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

CLIENT: GeoEngineers
Project: Gas Works Park Site
Work Order: 1609321

Work Order Sample Summary

Lab Sample ID	Client Sample ID	Date/Time Collected	Date/Time Received
1609321-001	PAI-23-26-28	09/26/2016 10:00 AM	09/26/2016 3:45 PM
1609321-002	PAI-23-9.2-9.8	09/26/2016 10:05 AM	09/26/2016 3:45 PM
1609321-003	PAI-23-8-8.7	09/26/2016 10:10 AM	09/26/2016 3:45 PM
1609321-004	PAI-23-S-160926	09/26/2016 11:56 AM	09/26/2016 3:45 PM
1609321-005	PAI-23-D-160926	09/26/2016 11:08 AM	09/26/2016 3:45 PM
1609321-006	D-160926	09/26/2016 12:00 AM	09/26/2016 3:45 PM

CLIENT: GeoEngineers
Project: Gas Works Park Site

I. SAMPLE RECEIPT:

Samples receipt information is recorded on the attached Sample Receipt Checklist.

II. GENERAL REPORTING COMMENTS:

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

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

III. ANALYSES AND EXCEPTIONS:

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

1609321-001A

TEST_SUB has been Sub Contracted.

1609321-002A

TEST_SUB has been Sub Contracted.

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



Client: GeoEngineers

Collection Date: 9/26/2016 11:56:00 AM

Project: Gas Works Park Site

Lab ID: 1609321-004

Matrix: Groundwater

Client Sample ID: PAI-23-S-160926

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
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Dissolved Metals by EPA Method 200.8

Batch ID: 14957

Analyst: TN

Arsenic	5,740	2.50	D	µg/L	5	9/28/2016 2:07:58 PM
Iron	208	250	DJ	µg/L	5	9/28/2016 2:07:58 PM



Client: GeoEngineers

Collection Date: 9/26/2016 11:08:00 AM

Project: Gas Works Park Site

Lab ID: 1609321-005

Matrix: Groundwater

Client Sample ID: PAI-23-D-160926

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
-----------------	---------------	-----------	-------------	--------------	-----------	----------------------

Dissolved Metals by EPA Method 200.8

Batch ID: 14945

Analyst: MW

Arsenic	106	0.500		µg/L	1	9/27/2016 5:19:17 PM
Iron	23,300	50.0		µg/L	1	9/27/2016 5:19:17 PM



Client: GeoEngineers

Collection Date: 9/26/2016

Project: Gas Works Park Site

Lab ID: 1609321-006

Matrix: Groundwater

Client Sample ID: D-160926

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
-----------------	---------------	-----------	-------------	--------------	-----------	----------------------

Dissolved Metals by EPA Method 200.8

Batch ID: 14945

Analyst: MW

Arsenic	104	0.500		µg/L	1	9/27/2016 5:22:49 PM
Iron	22,900	50.0		µg/L	1	9/27/2016 5:22:49 PM

Grain Size by ASTM D422

Project: Gas Works Park Site
 Client: GeoEngineers
 Lab Project #: 1609321

Percent Finer (Passing) than the Indicated Size

UOM = Percent

Grain Size Classification	Gravel						Coarse Sand	Medium Sand		Fine Sand			Silt		
	3"	2"	1 1/2"	1"	3/4"	3/8"	#4	#10	#20	#40	#60	#140	#230	#325	#450
Particle Size (Microns)	76200	50800	38100	25400	19050	9525	4750	2000	850	425	250	106	75	45	34
PAI-23-26-28	100%	100%	100%	100%	93.6%	90.1%	85.0%	80.1%	76.1%	69.3%	55.1%	24.4%	13.5%	5.32%	0.443%

Grain Size by ASTM D422

Project: Gas Works Park Site
Client: GeoEngineers
Lab Project #: 1609321

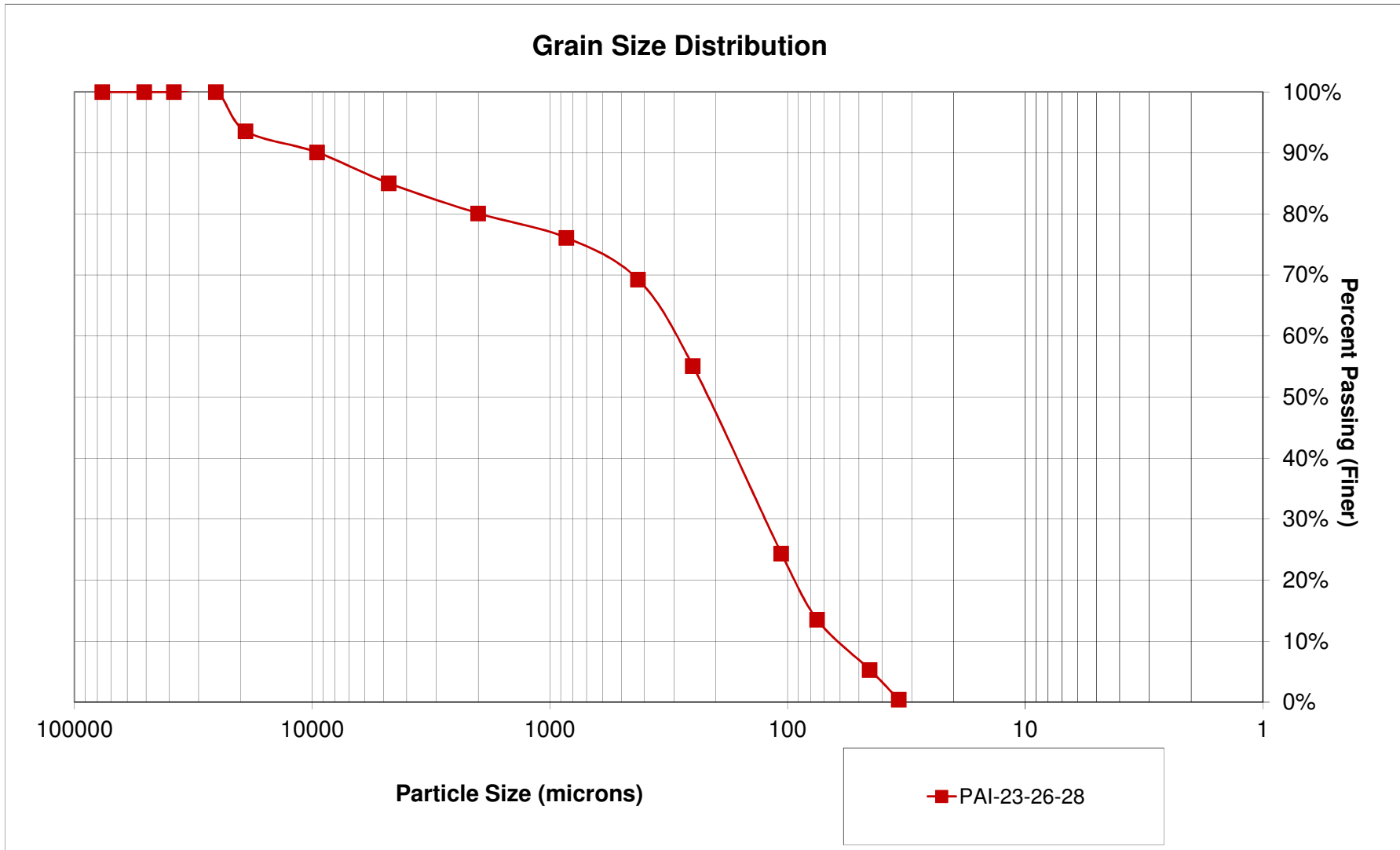
Percent Retained in Each Size Fraction

UOM = Percent

Grain Size Classification	<i>Gravel</i>							<i>Coarse Sand</i>	<i>Medium Sand</i>		<i>Fine Sand</i>			<i>Silt</i>		
	>76200	76200-50800	50800-38100	38100-25400	25400-19000	19050-9525	9525-4750	4750-2000	2000-850	850-425	425-250	250-106	106-62.5	72.5-45	45-34	<34
PAI-23-26-28	0.00%	0.00%	0.00%	0.00%	6.40%	3.47%	5.05%	4.91%	3.99%	6.84%	14.1%	30.7%	10.8%	8.19%	4.86%	0.441%

Grain Size by ASTM D422

Project: Gas Works Park Site
 Client: GeoEngineers
 Lab Project #: 1609321



Grain Size by ASTM D422

Project: Gas Works Park Site
 Client: GeoEngineers
 Lab Project #: 1609321

Percent Finer (Passing) than the Indicated Size

UOM = Percent

Grain Size Classification	Gravel						Coarse Sand	Medium Sand		Fine Sand			Silt		
	Sieve Size	3"	2"	1 1/2"	1"	3/4"	3/8"	#4	#10	#20	#40	#60	#140	#200	#325
Particle Size (Microns)	76200	50800	38100	25400	19050	9525	4750	2000	850	425	250	106	75	45	34
PAI-23-8-8.7	100%	100%	100%	100%	93.6%	69.7%	60.8%	47.8%	38.5%	30.5%	21.1%	9.55%	5.34%	1.46%	0.524%

Grain Size by ASTM D422

Project: Gas Works Park Site
 Client: GeoEngineers
 Lab Project #: 1609321

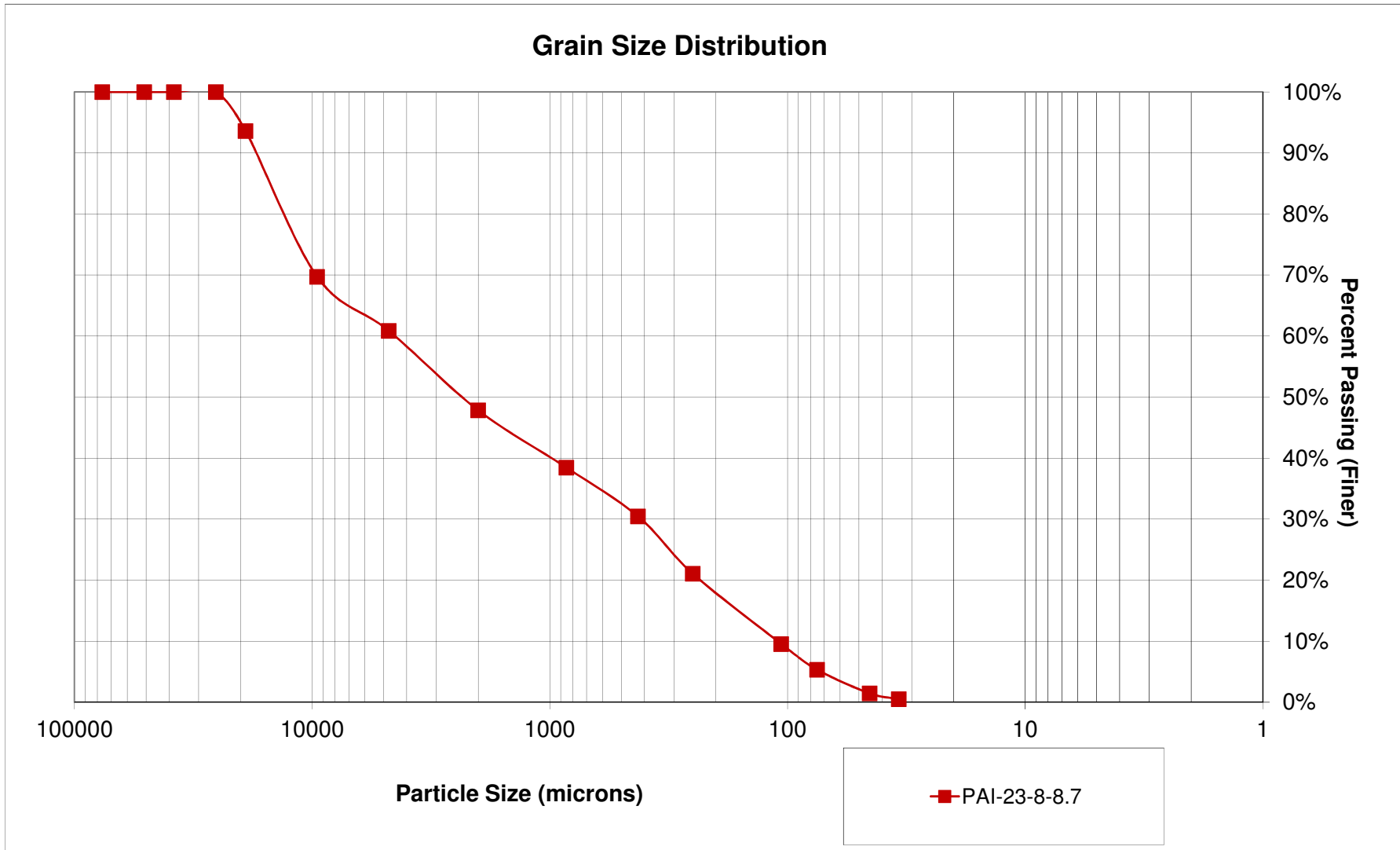
Percent Retained in Each Size Fraction

UOM = Percent

Grain Size Classification	Gravel							Coarse Sand	Medium Sand		Fine Sand			Silt		
	>76200	76200-50800	50800-38100	38100-25400	25400-19000	19050-9525	9525-4750	4750-2000	2000-850	850-425	425-250	250-106	106-75	75-45	45-34	<34
PAI-23-8-8.7	0.00%	0.00%	0.00%	0.00%	6.37%	23.9%	8.87%	13.0%	9.37%	7.99%	9.38%	11.5%	4.20%	3.88%	0.932%	0.524%

Grain Size by ASTM D422

Project: Gas Works Park Site
 Client: GeoEngineers
 Lab Project #: 1609321





ALS Environmental
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October 11, 2016

Analytical Report for Service Request No: 1611731

Mr. Michael Ridgeway
Fremont Analytical
3600 Fremont Avenue, North
Seattle, WA 98103

RE: COD

Dear Mr. Ridgeway,

Enclosed are the results of the sample(s) submitted to our laboratory September 30, 2016. For your reference, these analyses have been assigned our service request number **K1611731**.

Analyses were performed according to our laboratory's EPA-approved quality assurance program. The test results meet requirements of the current EPA standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of EPA-accredited analytes, refer to the certifications section at www.alsglobal.com. All results are intended to be considered in their entirety, and ALS Group USA, Corp. dba ALS Environmental (ALS) is not responsible for use of less than the complete report. Results apply only to the items submitted to the laboratory for analysis and individual items (samples) analyzed, as listed in the report.

Please contact me if you have any questions. My extension is 3375. You may also contact me via email at janet.Malloch@alsglobal.com.

Respectfully submitted,

ALS Group USA, Corp. dba ALS Environmental

Janet Malloch
Project Manager



A S Environmental
A S roup SA, orp
1317 South 13th Avenue
also, WA 98626
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F : 1 360 636 1068
www.alsglobal.com

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Acronyms

ASTM	American Society for Testing and Materials
A2LA	American Association for Laboratory Accreditation
CARB	California Air Resources Board
CAS Number	Chemical Abstract Service registry Number
CFC	Chlorofluorocarbon
CFU	Colony-Forming Unit
DEC	Department of Environmental Conservation
DEQ	Department of Environmental Quality
DHS	Department of Health Services
DOE	Department of Ecology
DOH	Department of Health
EPA	U. S. Environmental Protection Agency
ELAP	Environmental Laboratory Accreditation Program
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
LOD	Limit of Detection
LOQ	Limit of Quantitation
LUFT	Leaking Underground Fuel Tank
M	Modified
MCL	Maximum Contaminant Level is the highest permissible concentration of a substance allowed in drinking water as established by the USEPA.
MDL	Method Detection Limit
MPN	Most Probable Number
MRL	Method Reporting Limit
NA	Not Applicable
NC	Not Calculated
NCASI	National Council of the Paper Industry for Air and Stream Improvement
ND	Not Detected
NIOSH	National Institute for Occupational Safety and Health
PQL	Practical Quantitation Limit
RCRA	Resource Conservation and Recovery Act
SIM	Selected Ion Monitoring
TPH	Total Petroleum Hydrocarbons
tr	Trace level is the concentration of an analyte that is less than the PQL but greater than or equal to the MDL.

Inorganic Data Qualifiers

- * The result is an outlier. See case narrative.
- # The control limit criteria is not applicable. See case narrative.
- B The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards.
- E The result is an estimate amount because the value exceeded the instrument calibration range.
- J The result is an estimated value.
- U The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
DOD-QSM 4.2 definition : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
- i The MRL/MDL or LOQ/LOD is elevated due to a matrix interference.
- X See case narrative.
- Q See case narrative. One or more quality control criteria was outside the limits.
- H The holding time for this test is immediately following sample collection. The samples were analyzed as soon as possible after receipt by the laboratory.

Metals Data Qualifiers

- # The control limit criteria is not applicable. See case narrative.
- J The result is an estimated value.
- E The percent difference for the serial dilution was greater than 10%, indicating a possible matrix interference in the sample.
- M The duplicate injection precision was not met.
- N The Matrix Spike sample recovery is not within control limits. See case narrative.
- S The reported value was determined by the Method of Standard Additions (MSA).
- U The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
DOD-QSM 4.2 definition : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
- W The post-digestion spike for furnace AA analysis is out of control limits, while sample absorbance is less than 50% of spike absorbance.
 - i The MRL/MDL or LOQ/LOD is elevated due to a matrix interference.
- X See case narrative.
- + The correlation coefficient for the MSA is less than 0.995.
- Q See case narrative. One or more quality control criteria was outside the limits.

Organic Data Qualifiers

- * The result is an outlier. See case narrative.
- # The control limit criteria is not applicable. See case narrative.
- A A tentatively identified compound, a suspected aldol-condensation product.
- B The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards.
- C The analyte was qualitatively confirmed using GC/MS techniques, pattern recognition, or by comparing to historical data.
- D The reported result is from a dilution.
- E The result is an estimated value.
- J The result is an estimated value.
- N The result is presumptive. The analyte was tentatively identified, but a confirmation analysis was not performed.
- P The GC or HPLC confirmation criteria was exceeded. The relative percent difference is greater than 40% between the two analytical results.
- U The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
DOD-QSM 4.2 definition : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
 - i The MRL/MDL or LOQ/LOD is elevated due to a chromatographic interference.
- X See case narrative.
- Q See case narrative. One or more quality control criteria was outside the limits.

Additional Petroleum Hydrocarbon Specific Qualifiers

- F The chromatographic fingerprint of the sample matches the elution pattern of the calibration standard.
- L The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of lighter molecular weight constituents than the calibration standard.
- H The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of heavier molecular weight constituents than the calibration standard.
- O The chromatographic fingerprint of the sample resembles an oil, but does not match the calibration standard.
- Y The chromatographic fingerprint of the sample resembles a petroleum product eluting in approximately the correct carbon range, but the elution pattern does not match the calibration standard.
- Z The chromatographic fingerprint does not resemble a petroleum product.

**ALS Group USA Corp. dba ALS Environmental (ALS) - Kelso
State Certifications, Accreditations, and Licenses**

Agency	Web Site	Number
Alaska DEC UST	http://dec.alaska.gov/applications/eh/ehllabreports/USTLabs.aspx	UST-040
Arizona DHS	http://www.azdhs.gov/lab/license/env.htm	AZ0339
Arkansas - DEQ	http://www.adeq.state.ar.us/techsvs/labcert.htm	88-0637
California DHS (ELAP)	http://www.cdph.ca.gov/certlic/labs/Pages/ELAP.aspx	2795
DOD ELAP	http://www.denix.osd.mil/edqw/Accreditation/AccreditedLabs.cfm	L14-51
Florida DOH	http://www.doh.state.fl.us/lab/EnvLabCert/WaterCert.htm	E87412
Hawaii DOH	Not available	-
ISO 17025	http://www.pjllabs.com/	L16-57
Louisiana DEQ	http://www.deq.louisiana.gov/portal/DIVISIONS/PublicParticipationandPermitSupport/LouisianaLaboratoryAccreditationProgram.aspx	03016
Maine DHS	Not available	WA01276
Minnesota DOH	http://www.health.state.mn.us/accreditation	053-999-457
Montana DPHHS	http://www.dphhs.mt.gov/publichealth/	CERT0047
Nevada DEP	http://ndep.nv.gov/bsdw/labservice.htm	WA01276
New Jersey DEP	http://www.nj.gov/dep/oqa/	WA005
North Carolina DWQ	http://www.dwqlab.org/	605
Oklahoma DEQ	http://www.deq.state.ok.us/CSDnew/labcert.htm	9801
Oregon – DEQ (NELAP)	http://public.health.oregon.gov/LaboratoryServices/EnvironmentalLaboratoryAccreditation/Pages/index.aspx	WA100010
South Carolina DHEC	http://www.scdhec.gov/environment/envserv/	61002
Texas CEQ	http://www.tceq.texas.gov/field/qa/env_lab_accreditation.html	T104704427
Washington DOE	http://www.ecy.wa.gov/programs/eap/labs/lab-accreditation.html	C544
Wyoming (EPA Region 8)	http://www.epa.gov/region8/water/dwhome/wyomingdi.html	-
Kelso Laboratory Website	www.alsglobal.com	NA

Analyses were performed according to our laboratory's NELAP-approved quality assurance program. A complete listing of specific NELAP-certified analytes, can be found in the certification section at www.ALSGlobal.com or at the accreditation bodies web site.

Please refer to the certification and/or accreditation body's web site if samples are submitted for compliance purposes. The states highlighted above, require the analysis be listed on the state certification if used for compliance purposes and if the method/analyte is offered by that state.



Case Narrative

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360)577-7222 Fax (360)636-1068
www.alsglobal.com

ALS ENVIRONMENTAL

Client: Fremont Analytical
Project: NA
Sample Matrix: Soil

Service Request No.: K1611731
Date Received: 09/30/16

Case Narrative

All analyses were performed consistent with the quality assurance program of ALS Environmental. This report contains analytical results for samples designated for Tier II data deliverables. When appropriate to the method, method blank results have been reported with each analytical test. Additional quality control analyses reported herein include: Laboratory Duplicate (DUP), Matrix Spike (MS), and Matrix/Duplicate Matrix Spike (MS/DMS).

Sample Receipt

Two soil samples were received for analysis at ALS Environmental on 09/30/16. The samples were received in good condition and consistent with the accompanying chain of custody form. The samples were stored in a refrigerator at 4°C upon receipt at the laboratory.

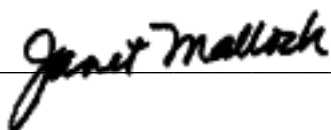
General Chemistry Parameters

Chemical Oxygen Demand by Standard Method 5220 C Modified:

The Relative Percent Difference (RPD) for the replicate analysis in sample Batch QC was outside the normal ALS control limits. The variability in the results was attributed to the heterogeneous character of the sample. Standard mixing techniques were used, but were not sufficient for complete homogenization of this sample.

No other anomalies associated with the analysis of these samples were observed.

Approved by _____





Chain of Custody

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360)577-7222 Fax (360)636-1068
www.alsglobal.com



CHAIN OF CUSTODY RECORD

Omega COCID 277

PAGE: 1

OF: 1

ADDRESS

Fremont Analytical, Inc.
3600 Fremont Ave. N.
Seattle, WA 98103
TEL: 206-352-3790
FAX: 206-352-7178

Website: www.fremontanalytical.com

K1611731

SUB CONTRACTOR: ALS		COMPANY: ALS Environmental		SPECIAL INSTRUCTIONS / COMMENTS: Please email results to Michael Ridgeway and Chelsea Ward - mridgeway@fremontanalytical.com; cward@fremontanalytical.com					
ADDRESS: 1317 South 13th Avenue									
CITY, STATE, ZIP: Kelso, WA 98626									
PHONE: (360) 577-7222		FAX: _____						EMAIL: _____	
ACCOUNT #: _____									

ITEM #	SAMPLE ID	CLIENT SAMPLE ID	BOTTLE TYPE	MATRIX	DATE COLLECTED	NUMBER OF CONTAINERS	COMMENTS: Methanol Preserved Weights HOT Sample Notation, Additional Sample Description.
1	1609321-001A	PAI-23-26-28	CLEAR JARS 4 O	Soil	9/26/2016 10:00:00 AM	1	Chemical Oxygen Demand by SM5220, Low Level RL
	TEST_SUB						
2	1609321-002A	PAI-23-9.2-9.8	CLEAR JARS 4 O	Soil	9/26/2016 10:05:00 AM	1	Chemical Oxygen Demand by SM5220, Low Level RL
	TEST_SUB						

Relinquished By: <i>Wayne J...</i>	Date: 7-24-16	Time: 11:25	Received By: <i>Ann S...</i>	Date: 7-30-16	Time: 9:40	REPORT TRANSMITTAL DESIRED:	
Relinquished By:	Date:	Time:	Received By:	Date:	Time:	<input type="checkbox"/> HARDCOPY (extra cost)	<input type="checkbox"/> FAX
Relinquished By:	Date:	Time:	Received By:	Date:	Time:	<input checked="" type="checkbox"/> EMAIL	<input type="checkbox"/> ONLINE
TAT: Standard <input checked="" type="checkbox"/> RUSH						FOR LAB USE ONLY	
Next BD <input type="checkbox"/> 2nd BD <input type="checkbox"/> 3rd BD <input type="checkbox"/>						Temp of samples _____ °C Attempt to Cool? _____	
Note: RUSH requests will incur surcharges!						Comments: _____	



PC Janet

Cooler Receipt and Preservation Form

Client Fremont analytical Service Request K16 11731
 Received: 9-30-16 Opened: 9-30-16 By: es Unloaded: 9-30-16 By: CS

1. Samples were received via? USPS FedEx UPS DHL PDX Courier Hand Delivered
2. Samples were received in: (circle) Cooler Box CS Envelope Other _____ NA
3. Were custody seals on coolers? NA Y N If yes, how many and where? _____
 If present, were custody seals intact? Y N If present, were they signed and dated? Y N

Raw Cooler Temp	Corrected Cooler Temp	Raw Temp Blank	Corrected Temp Blank	Corr. Factor	Thermometer ID	Cooler/COC ID NA	Tracking Number NA	Filed
-0.5	-0.5	2.7	2.7	0	298		1Z X61 92X03 3202 6849	

4. Packing material: Inserts Baggies Bubble Wrap Gel Packs Wet Ice Dry Ice Sleeves _____
5. Were custody papers properly filled out (ink, signed, etc.)? NA Y N
6. Were samples received in good condition (temperature, unbroken)? *Indicate in the table below.* NA Y N
 If applicable, tissue samples were received: Frozen Partially Thawed Thawed
7. Were all sample labels complete (i.e analysis, preservation, etc.)? NA Y N
8. Did all sample labels and tags agree with custody papers? *Indicate major discrepancies in the table on page 2.* NA Y N
9. Were appropriate bottles/containers and volumes received for the tests indicated? NA Y N
10. Were the pH-preserved bottles (*see SMO GEN SOP*) received at the appropriate pH? *Indicate in the table below* NA Y N
11. Were VOA vials received without headspace? *Indicate in the table below.* NA Y N
12. Was C12/Res negative? NA Y N

Sample ID on Bottle	Sample ID on COC	Identified by:

Sample ID	Bottle Count	Bottle Type	Out of Temp	Head-space	Broke	pH	Reagent	Volume added	Reagent Lot Number	Initials	Time

Notes, Discrepancies, & Resolutions: _____



Total Solids

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Phone (360)577-7222 Fax (360)636-1068
www.alsglobal.com

ALS Group USA, Corp.
dba ALS Environmental

Analytical Report

Client: Fremont Analytical
Project: COD
Sample Matrix: Soil
Analysis Method: 160.3 Modified
Prep Method: None

Service Request: K1611731
Date Collected: 09/26/16
Date Received: 09/30/16
Units: Percent
Basis: As Received

Solids, Total

Sample Name	Lab Code	Result	MRL	MDL	Dil.	Date Analyzed	Q
1609321-001A	K1611731-001	89.0	-	-	1	10/05/16 16:53	
1609321-002A	K1611731-002	83.1	-	-	1	10/05/16 16:53	

ALS Group USA, Corp.

dba ALS Environmental

QA/QC Report

Client: Fremont Analytical
Project: COD
Sample Matrix: Soil
Analysis Method: 160.3 Modified
Prep Method: None

Service Request: K1611731
Date Collected: 09/26/16
Date Received: 09/30/16

Units: Percent
Basis: As Received

Replicate Sample Summary

Inorganic Parameters

Sample Name:	Lab Code:	MRL	Sample Result	Duplicate Result	Average	RPD	RPD Limit	Date Analyzed
1609321-001A	K1611731-001DUP	-	89.0	89.3	89.2	<1	20	10/05/16
Batch QC	K1611749-005DUP	-	97.4	97.3	97.4	<1	20	10/05/16

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.



General Chemistry

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www.alsglobal.com

ALS Group USA, Corp.
dba ALS Environmental

Analytical Report

Client: Fremont Analytical
Project: COD
Sample Matrix: Soil
Analysis Method: SM 5220 C Modified
Prep Method: ALS SOP

Service Request: K1611731
Date Collected: 09/26/16
Date Received: 09/30/16
Units: mg/Kg
Basis: Dry

Chemical Oxygen Demand (COD)

Sample Name	Lab Code	Result	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
1609321-001A	K1611731-001	3580	630	-	1	10/07/16 16:00	10/7/16	
1609321-002A	K1611731-002	16300	960	-	1	10/07/16 16:00	10/7/16	
Method Blank	K1611731-MB	ND U	200	-	1	10/07/16 16:00	NA	

ALS Group USA, Corp.

dba ALS Environmental

QA/QC Report

Client: Fremont Analytical
Project: COD
Sample Matrix: Soil

Service Request: K1611731
Date Collected: NA
Date Received: NA
Date Analyzed: 10/07/16

Replicate Sample Summary
General Chemistry Parameters

Sample Name: Batch QC
Lab Code: K1611836-001

Units: mg/Kg
Basis: Dry

<u>Analyte Name</u>	<u>Analysis Method</u>	<u>MRL</u>	<u>MDL</u>	<u>Sample Result</u>	<u>Duplicate Sample K1611836-001DUP Result</u>	<u>Average</u>	<u>RPD</u>	<u>RPD Limit</u>
Chemical Oxygen Demand (COD)	SM 5220 C Modified	610	-	5970	3720	4850	47 *	20

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client: Fremont Analytical
Project: COD
Sample Matrix: Soil

Service Request: K1611731
Date Collected: N/A
Date Received: N/A
Date Analyzed: 10/7/16
Date Extracted: 10/7/16

Matrix Spike Summary
Chemical Oxygen Demand (COD)

Sample Name: Batch QC
Lab Code: K1611836-001
Analysis Method: SM 5220 C Modified
Prep Method: ALS SOP

Units: mg/Kg
Basis: Dry

Matrix Spike
K1611836-001MS

<u>Analyte Name</u>	<u>Sample Result</u>	<u>Result</u>	<u>Spike Amount</u>	<u>% Rec</u>	<u>% Rec Limits</u>
Chemical Oxygen Demand (COD)	5970	64500	52400	112	75-125

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client: Fremont Analytical
Project: COD
Sample Matrix: Soil

Service Request: K1611731
Date Analyzed: 10/07/16
Date Extracted: NA

Lab Control Sample Summary
Chemical Oxygen Demand (COD)

Analysis Method: SM 5220 C Modified
Prep Method: None

Units: mg/Kg
Basis: Dry
Analysis Lot: 517791

Sample Name	Lab Code	Result	Spike Amount	% Rec	% Rec Limits
Lab Control Sample	K1611731-LCS	4540	4840	94	85-115

Work Order: 1609321
CLIENT: GeoEngineers
Project: Gas Works Park Site

QC SUMMARY REPORT
Dissolved Metals by EPA Method 200.8

Sample ID MB-14957	SampType: MBLK	Units: µg/L				Prep Date: 9/28/2016	RunNo: 32016				
Client ID: MBLKW	Batch ID: 14957					Analysis Date: 9/28/2016	SeqNo: 605291				
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Arsenic	ND	0.500									
Iron	ND	50.0									

Sample ID LCS-14957	SampType: LCS	Units: µg/L				Prep Date: 9/28/2016	RunNo: 32016				
Client ID: LCSW	Batch ID: 14957					Analysis Date: 9/28/2016	SeqNo: 605292				
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Arsenic	101	0.500	100.0	0	101	85	115				
Iron	1,010	50.0	1,000	0	101	50	150				

Sample ID 1609335-005ADUP	SampType: DUP	Units: µg/L				Prep Date: 9/28/2016	RunNo: 32016				
Client ID: BATCH	Batch ID: 14957					Analysis Date: 9/28/2016	SeqNo: 605294				
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Arsenic	889	0.500						908.7	2.16	30	
Iron	6,020	50.0						6,195	2.85	30	

Sample ID 1609335-005AMS	SampType: MS	Units: µg/L				Prep Date: 9/28/2016	RunNo: 32016				
Client ID: BATCH	Batch ID: 14957					Analysis Date: 9/28/2016	SeqNo: 605295				
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Arsenic	1,470	0.500	500.0	908.7	113	70	130				
Iron	11,700	50.0	5,000	6,195	110	50	150				

Sample ID 1609335-005AMSD	SampType: MSD	Units: µg/L				Prep Date: 9/28/2016	RunNo: 32016				
Client ID: BATCH	Batch ID: 14957					Analysis Date: 9/28/2016	SeqNo: 605296				
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Arsenic	1,480	0.500	500.0	908.7	113	70	130	1,471	0.282	30	
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Work Order: 1609321
CLIENT: GeoEngineers
Project: Gas Works Park Site

QC SUMMARY REPORT
Dissolved Metals by EPA Method 200.8

Sample ID	1609335-005AMSD	SampType:	MSD	Units:	µg/L	Prep Date:	9/28/2016	RunNo:	32016		
Client ID:	BATCH	Batch ID:	14957			Analysis Date:	9/28/2016	SeqNo:	605296		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Iron	11,900	50.0	5,000	6,195	114	50	150	11,690	1.78	30	

Work Order: 1609321
CLIENT: GeoEngineers
Project: Gas Works Park Site

QC SUMMARY REPORT
Dissolved Metals by EPA Method 200.8

Sample ID MB-14945	SampType: MBLK	Units: µg/L			Prep Date: 9/27/2016	RunNo: 32007					
Client ID: MBLKW	Batch ID: 14945				Analysis Date: 9/27/2016	SeqNo: 605108					
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Arsenic	ND	0.500									
Iron	ND	50.0									

Sample ID LCS-14945	SampType: LCS	Units: µg/L			Prep Date: 9/27/2016	RunNo: 32007					
Client ID: LCSW	Batch ID: 14945				Analysis Date: 9/27/2016	SeqNo: 605109					
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Arsenic	102	0.500	100.0	0	102	85	115				
Iron	1,020	50.0	1,000	0	102	50	150				

Sample ID 1609324-004ADUP	SampType: DUP	Units: µg/L			Prep Date: 9/27/2016	RunNo: 32007					
Client ID: BATCH	Batch ID: 14945				Analysis Date: 9/27/2016	SeqNo: 605117					
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Arsenic	83.0	0.500						88.52	6.48	30	
Iron	8,770	50.0						9,487	7.85	30	

Sample ID 1609324-004AMS	SampType: MS	Units: µg/L			Prep Date: 9/27/2016	RunNo: 32007					
Client ID: BATCH	Batch ID: 14945				Analysis Date: 9/27/2016	SeqNo: 605118					
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Arsenic	610	0.500	500.0	88.52	104	70	130				
Iron	13,600	50.0	5,000	9,487	81.4	50	150				

Sample ID 1609324-004AMSD	SampType: MSD	Units: µg/L			Prep Date: 9/27/2016	RunNo: 32007					
Client ID: BATCH	Batch ID: 14945				Analysis Date: 9/27/2016	SeqNo: 605119					
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Arsenic	646	0.500	500.0	88.52	112	70	130	609.9	5.75	30	
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Work Order: 1609321
CLIENT: GeoEngineers
Project: Gas Works Park Site

QC SUMMARY REPORT
Dissolved Metals by EPA Method 200.8

Sample ID	1609324-004AMSD	SampType:	MSD	Units:	µg/L	Prep Date:	9/27/2016	RunNo:	32007		
Client ID:	BATCH	Batch ID:	14945			Analysis Date:	9/27/2016	SeqNo:	605119		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Iron	14,600	50.0	5,000	9,487	103	50	150	13,560	7.74	30	

Client Name: **GEI**
 Logged by: **Erica Silva**

Work Order Number: **1609321**
 Date Received: **9/26/2016 3:45:00 PM**

Chain of Custody

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

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

Samples received at appropriate temperature

8. Sample(s) in proper container(s)? Yes No
 9. Sufficient sample volume for indicated test(s)? Yes No
 10. Are samples properly preserved? Yes No
 11. Was preservative added to bottles? Yes No NA
 12. Is there headspace in the VOA vials? Yes No NA
 13. Did all samples containers arrive in good condition(unbroken)? Yes No
 14. Does paperwork match bottle labels? Yes No
 15. Are matrices correctly identified on Chain of Custody? Yes No
 16. Is it clear what analyses were requested? Yes No
 17. Were all holding times able to be met? Yes No

Special Handling (if applicable)

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

Person Notified:	<input type="text" value="Claudia De La Via"/>	Date:	<input type="text" value="9/26/2016"/>
By Whom:	<input type="text" value="Erica Silva"/>	Via:	<input checked="" type="checkbox"/> eMail <input type="checkbox"/> Phone <input type="checkbox"/> Fax <input type="checkbox"/> In Person
Regarding:	<input type="text" value="Volume provided for COD preserved with NaOH + Zn Acetate"/>		
Client Instructions:	<input type="text"/>		

19. Additional remarks:

Item Information

Item #	Temp °C
Cooler	3.8
Sample	4.4
Temp Blank	15.6

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



3600 Fremont Ave N.
Seattle, WA 98103

Tel: 206-352-3790
Fax: 206-352-7178

Chain of Custody Record and Laboratory Services Agreement

Date: 9/26/2016

Laboratory Project No (Internal): 11009321

Page: 1 of 1

Client: GeoEngineers

Address: 600 Stewart Street, Suite 1700

City, State, Zip: Seattle, WA 98103

Telephone: 253.722.2418

Project Name: Gas Works Park Site

Project No: 0186-846-01 Task 1803

Location: Seattle

Report To (PM): Sandra Smith / Claudia De La Via

PM Email: sbsmith@geoengineers.com

cdelaviva@geoengineers.com

*Matrix Codes: A = Air, AQ = Aqueous, B = Bulk, O = Other, P = Product, S = Soil, SD = Sediment, SL = Solid, W = Water, DW = Drinking Water, GW = Ground Water, SW = Storm Water, WW = Waste Water

Sample Name	Sample Date	Sample Time	Sample Type (Matrix)*	Arsenic (EPA 200.8) field filtered	Iron (EPA 200.8) field filtered	Sulfide (4500-S2-F) field filtered	COD (SM5220D) field filtered	COD (SM5220) field filtered	Grain Size (ASTM D422)	SVOCs (EPA 8270 / 625)	PAHs (EPA 8270 - SIM)	PCBs (EPA 8082 / 608)	Metals** (EPA 6020 / 200.8)	Total (T) Dissolved (D)	Comments
1 PAI- 23-26-28	9/26	1000	S					X	X						
2 PAI- 23-9.2-9.8		1005	I					X							Volume for COD only
3 PAI- 23-8-8.7		1010	I					X							for grain only. SP-SM above screen
4 PAI- 23-8-160926		1156	W					X							Field Filtered
5 PAI- 23-D-160926		1108	I					X							
6 PAI- D-160926			I					X							↓
7 PAI-															
8 PAI-															
9 PAI-															
10 PAI-															

**Metals Analysis (Circle): MTC-A-5 RCRA-8 Priority Pollutants TAL Individual: Ag Al As B Ba Be Ca Cd Co Cr Cu Fe Hg K Mg Mn Mo Na Ni Pb Sb Se Sr Sn Tl U V Zn

***Anions (Circle): Nitrate Nitrite Chloride Sulfate Bromide O-Phosphate Fluoride Nitrate-Nitrite Turn-around times for samples received after 4:00pm will begin on the following business day.

Sample Disposal: Return to Client Disposal by Lab (Samples will be held for 30 days unless otherwise noted. A fee may be assessed if samples are retained after 30 days.)

I represent that I am authorized to enter into this Agreement with Fremont Analytical on behalf of the Client named above, that I have verified Client's agreement to each of the terms on the front and backside of this Agreement.

Relinquished	Date/Time	Received	Date/Time
X	9/26/16 15:30	X	9/26/16 15:30
X	9/26/16 15:45	X	9/26/16 15:45



GeoEngineers

Sandra Smith
600 Stewart Street, Suite 1700
Seattle, WA 98101

RE: Gas Works Park Site
Work Order Number: 1609324

October 13, 2016

Attention Sandra Smith:

Fremont Analytical, Inc. received 4 sample(s) on 9/27/2016 for the analyses presented in the following report.

Chemical Oxygen Demand by SM 5220D
Dissolved Metals by EPA Method 200.8
Grain Size by ASTM D422

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: 10/13/2016

CLIENT: GeoEngineers
Project: Gas Works Park Site
Work Order: 1609324

Work Order Sample Summary

Lab Sample ID	Client Sample ID	Date/Time Collected	Date/Time Received
1609324-001	PAI-24-10-11	09/26/2016 3:40 PM	09/27/2016 8:00 AM
1609324-002	PAI-24-21.3-22.3	09/26/2016 3:30 PM	09/27/2016 8:00 AM
1609324-003	PAI-24-S-160926	09/26/2016 5:00 PM	09/27/2016 8:00 AM
1609324-004	PAI-24-D-160926	09/26/2016 4:02 PM	09/27/2016 8:00 AM

CLIENT: GeoEngineers
Project: Gas Works Park Site

I. SAMPLE RECEIPT:

Samples receipt information is recorded on the attached Sample Receipt Checklist.

II. GENERAL REPORTING COMMENTS:

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

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

III. ANALYSES AND EXCEPTIONS:

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

1609324-001B

TEST_SUB has been Sub Contracted.

1609324-002B

TEST_SUB has been Sub Contracted.

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



Client: GeoEngineers

Collection Date: 9/26/2016 5:00:00 PM

Project: Gas Works Park Site

Lab ID: 1609324-003

Matrix: Water

Client Sample ID: PAI-24-S-160926

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
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Dissolved Metals by EPA Method 200.8

Batch ID: 14945

Analyst: MW

Arsenic	2,390	5.00	D	µg/L	10	9/27/2016 4:45:38 PM
Iron	4,630	500	D	µg/L	10	9/27/2016 4:45:38 PM

Chemical Oxygen Demand by SM 5220D

Batch ID: R32068

Analyst: MW

Chemical Oxygen Demand	45.2	20.0	D	mg/L	2	9/30/2016 3:18:15 PM
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Client: GeoEngineers

Collection Date: 9/26/2016 4:02:00 PM

Project: Gas Works Park Site

Lab ID: 1609324-004

Matrix: Water

Client Sample ID: PAI-24-D-160926

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
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Dissolved Metals by EPA Method 200.8

Batch ID: 14945

Analyst: MW

Arsenic	88.5	0.500		µg/L	1	9/27/2016 5:36:32 PM
Iron	9,490	50.0		µg/L	1	9/27/2016 5:36:32 PM

Chemical Oxygen Demand by SM 5220D

Batch ID: R32068

Analyst: MW

Chemical Oxygen Demand	54.5	20.0	D	mg/L	2	9/30/2016 3:18:15 PM
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Grain Size by ASTM D422

Project: Gas Works Park Site
Client: GeoEngineers
Lab Project #: 1609324

Percent Finer (Passing) than the Indicated Size

UOM = Percent

Grain Size Classification	Gravel						Coarse Sand	Medium Sand		Fine Sand			Silt		
	Sieve Size	3"	2"	1 1/2"	1"	3/4"	3/8"	#4	#10	#20	#40	#60	#140	#230	#325
Particle Size (Microns)	76200	50800	38100	25400	19050	9525	4750	2000	850	425	250	106	75	45	34
PAI-24-10-11	100%	100%	100%	100%	100%	99.3%	97.5%	77.0%	42.2%	27.8%	19.6%	10.5%	4.19%	0.854%	0.0693%
PAI-24-21.3-22.3	100%	100%	100%	100%	100%	98.7%	96.6%	91.9%	85.7%	69.9%	45.7%	13.9%	3.96%	0.22%	0.0704%

Grain Size by ASTM D422

Project: Gas Works Park Site
Client: GeoEngineers
Lab Project #: 1609324

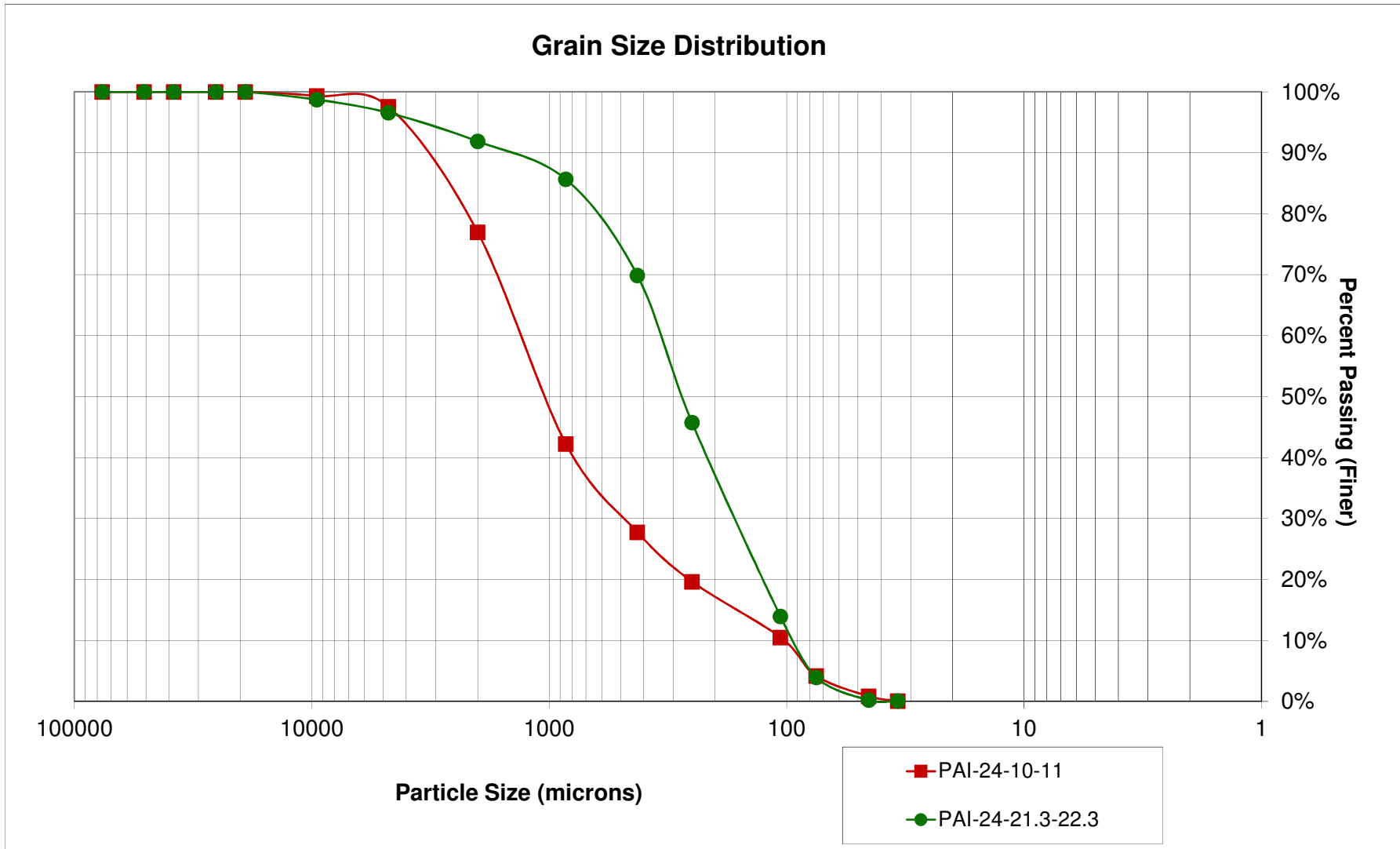
Percent Retained in Each Size Fraction

UOM = Percent

Grain Size Classification	Gravel							Coarse Sand	Medium Sand		Fine Sand			Silt		
	>76200	76200-50800	50800-38100	38100-25400	25400-19000	19050-9525	9525-4750	4750-2000	2000-850	850-425	425-250	250-106	106-62.5	72.5-45	45-34	<34
PAI-24-10-11	0.00%	0.00%	0.00%	0.00%	0.00%	0.685%	1.77%	20.6%	34.8%	14.5%	8.13%	9.14%	6.32%	3.34%	0.785%	0.0693%
PAI-24-21.3-22.3	0.00%	0.00%	0.00%	0.00%	0.00%	1.29%	2.14%	4.66%	6.19%	15.7%	24.0%	31.7%	9.93%	3.72%	0.15%	0.0701%

Grain Size by ASTM D422

Project: Gas Works Park Site
 Client: GeoEngineers
 Lab Project #: 1609324





ALS Environmental
ALS Group USA, Corp
1317 South 13th Avenue
Seattle, WA 98626
T: 1 360 577 7222
F: 1 360 636 1068
www.alsglobal.com

October 11, 2016

Analytical Report for Service Request No: 1611736

Mr. Michael Ridgeway
Fremont Analytical
3600 Fremont Avenue, North
Seattle, WA 98103

RE: COD

Dear Mr. Ridgeway,

Enclosed are the results of the sample(s) submitted to our laboratory September 30, 2016. For your reference, these analyses have been assigned our service request number **K1611736**.

Analyses were performed according to our laboratory's EPA-approved quality assurance program. The test results meet requirements of the current EPA standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of EPA-accredited analytes, refer to the certifications section at www.alsglobal.com. All results are intended to be considered in their entirety, and ALS Group USA, Corp. dba ALS Environmental (ALS) is not responsible for use of less than the complete report. Results apply only to the items submitted to the laboratory for analysis and individual items (samples) analyzed, as listed in the report.

Please contact me if you have any questions. My extension is 3375. You may also contact me via email at Janet.Malloch@alsglobal.com.

Respectfully submitted,

ALS Group USA, Corp. dba ALS Environmental

Janet Malloch
Project Manager



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Acronyms

ASTM	American Society for Testing and Materials
A2LA	American Association for Laboratory Accreditation
CARB	California Air Resources Board
CAS Number	Chemical Abstract Service registry Number
CFC	Chlorofluorocarbon
CFU	Colony-Forming Unit
DEC	Department of Environmental Conservation
DEQ	Department of Environmental Quality
DHS	Department of Health Services
DOE	Department of Ecology
DOH	Department of Health
EPA	U. S. Environmental Protection Agency
ELAP	Environmental Laboratory Accreditation Program
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
LOD	Limit of Detection
LOQ	Limit of Quantitation
LUFT	Leaking Underground Fuel Tank
M	Modified
MCL	Maximum Contaminant Level is the highest permissible concentration of a substance allowed in drinking water as established by the USEPA.
MDL	Method Detection Limit
MPN	Most Probable Number
MRL	Method Reporting Limit
NA	Not Applicable
NC	Not Calculated
NCASI	National Council of the Paper Industry for Air and Stream Improvement
ND	Not Detected
NIOSH	National Institute for Occupational Safety and Health
PQL	Practical Quantitation Limit
RCRA	Resource Conservation and Recovery Act
SIM	Selected Ion Monitoring
TPH	Total Petroleum Hydrocarbons
tr	Trace level is the concentration of an analyte that is less than the PQL but greater than or equal to the MDL.

Inorganic Data Qualifiers

- * The result is an outlier. See case narrative.
- # The control limit criteria is not applicable. See case narrative.
- B The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards.
- E The result is an estimate amount because the value exceeded the instrument calibration range.
- J The result is an estimated value.
- U The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
DOD-QSM 4.2 definition : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
- i The MRL/MDL or LOQ/LOD is elevated due to a matrix interference.
- X See case narrative.
- Q See case narrative. One or more quality control criteria was outside the limits.
- H The holding time for this test is immediately following sample collection. The samples were analyzed as soon as possible after receipt by the laboratory.

Metals Data Qualifiers

- # The control limit criteria is not applicable. See case narrative.
- J The result is an estimated value.
- E The percent difference for the serial dilution was greater than 10%, indicating a possible matrix interference in the sample.
- M The duplicate injection precision was not met.
- N The Matrix Spike sample recovery is not within control limits. See case narrative.
- S The reported value was determined by the Method of Standard Additions (MSA).
- U The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
DOD-QSM 4.2 definition : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
- W The post-digestion spike for furnace AA analysis is out of control limits, while sample absorbance is less than 50% of spike absorbance.
 - i The MRL/MDL or LOQ/LOD is elevated due to a matrix interference.
- X See case narrative.
- + The correlation coefficient for the MSA is less than 0.995.
- Q See case narrative. One or more quality control criteria was outside the limits.

Organic Data Qualifiers

- * The result is an outlier. See case narrative.
- # The control limit criteria is not applicable. See case narrative.
- A A tentatively identified compound, a suspected aldol-condensation product.
- B The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards.
- C The analyte was qualitatively confirmed using GC/MS techniques, pattern recognition, or by comparing to historical data.
- D The reported result is from a dilution.
- E The result is an estimated value.
- J The result is an estimated value.
- N The result is presumptive. The analyte was tentatively identified, but a confirmation analysis was not performed.
- P The GC or HPLC confirmation criteria was exceeded. The relative percent difference is greater than 40% between the two analytical results.
- U The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
DOD-QSM 4.2 definition : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
 - i The MRL/MDL or LOQ/LOD is elevated due to a chromatographic interference.
- X See case narrative.
- Q See case narrative. One or more quality control criteria was outside the limits.

Additional Petroleum Hydrocarbon Specific Qualifiers

- F The chromatographic fingerprint of the sample matches the elution pattern of the calibration standard.
- L The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of lighter molecular weight constituents than the calibration standard.
- H The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of heavier molecular weight constituents than the calibration standard.
- O The chromatographic fingerprint of the sample resembles an oil, but does not match the calibration standard.
- Y The chromatographic fingerprint of the sample resembles a petroleum product eluting in approximately the correct carbon range, but the elution pattern does not match the calibration standard.
- Z The chromatographic fingerprint does not resemble a petroleum product.

**ALS Group USA Corp. dba ALS Environmental (ALS) - Kelso
State Certifications, Accreditations, and Licenses**

Agency	Web Site	Number
Alaska DEC UST	http://dec.alaska.gov/applications/eh/ehllabreports/USTLabs.aspx	UST-040
Arizona DHS	http://www.azdhs.gov/lab/license/env.htm	AZ0339
Arkansas - DEQ	http://www.adeq.state.ar.us/techsvs/labcert.htm	88-0637
California DHS (ELAP)	http://www.cdph.ca.gov/certlic/labs/Pages/ELAP.aspx	2795
DOD ELAP	http://www.denix.osd.mil/edqw/Accreditation/AccreditedLabs.cfm	L14-51
Florida DOH	http://www.doh.state.fl.us/lab/EnvLabCert/WaterCert.htm	E87412
Hawaii DOH	Not available	-
ISO 17025	http://www.pjllabs.com/	L16-57
Louisiana DEQ	http://www.deq.louisiana.gov/portal/DIVISIONS/PublicParticipationandPermitSupport/LouisianaLaboratoryAccreditationProgram.aspx	03016
Maine DHS	Not available	WA01276
Minnesota DOH	http://www.health.state.mn.us/accreditation	053-999-457
Montana DPHHS	http://www.dphhs.mt.gov/publichealth/	CERT0047
Nevada DEP	http://ndep.nv.gov/bsdw/labservice.htm	WA01276
New Jersey DEP	http://www.nj.gov/dep/oqa/	WA005
North Carolina DWQ	http://www.dwqlab.org/	605
Oklahoma DEQ	http://www.deq.state.ok.us/CSDnew/labcert.htm	9801
Oregon – DEQ (NELAP)	http://public.health.oregon.gov/LaboratoryServices/EnvironmentalLaboratoryAccreditation/Pages/index.aspx	WA100010
South Carolina DHEC	http://www.scdhec.gov/environment/envserv/	61002
Texas CEQ	http://www.tceq.texas.gov/field/qa/env_lab_accreditation.html	T104704427
Washington DOE	http://www.ecy.wa.gov/programs/eap/labs/lab-accreditation.html	C544
Wyoming (EPA Region 8)	http://www.epa.gov/region8/water/dwhome/wyomingdi.html	-
Kelso Laboratory Website	www.alsglobal.com	NA

Analyses were performed according to our laboratory's NELAP-approved quality assurance program. A complete listing of specific NELAP-certified analytes, can be found in the certification section at www.ALSGlobal.com or at the accreditation bodies web site.

Please refer to the certification and/or accreditation body's web site if samples are submitted for compliance purposes. The states highlighted above, require the analysis be listed on the state certification if used for compliance purposes and if the method/analyte is offered by that state.



Case Narrative

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360)577-7222 Fax (360)636-1068
www.alsglobal.com

ALS ENVIRONMENTAL

Client: Fremont Analytical
Project: NA
Sample Matrix: Soil

Service Request No.: K1611736
Date Received: 09/30/16

Case Narrative

All analyses were performed consistent with the quality assurance program of ALS Environmental. This report contains analytical results for samples designated for Tier II data deliverables. When appropriate to the method, method blank results have been reported with each analytical test. Additional quality control analyses reported herein include: Laboratory Duplicate (DUP), Matrix Spike (MS), and Matrix/Duplicate Matrix Spike (MS/DMS).

Sample Receipt

Two soil samples were received for analysis at ALS Environmental on 09/30/16. The samples were received in good condition and consistent with the accompanying chain of custody form. The samples were stored in a refrigerator at 4°C upon receipt at the laboratory.

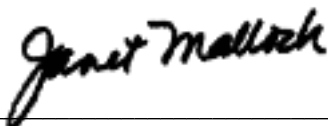
General Chemistry Parameters

Chemical Oxygen Demand by Standard Method 5220 C Modified:

The Relative Percent Difference (RPD) for the replicate analysis in sample Batch QC was outside the normal ALS control limits. The variability in the results was attributed to the heterogeneous character of the sample. Standard mixing techniques were used, but were not sufficient for complete homogenization of this sample.

No other anomalies associated with the analysis of these samples were observed.

Approved by _____





Chain of Custody

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360)577-7222 Fax (360)636-1068
www.alsglobal.com



CHAIN OF CUSTODY RECORD

Omega COCID 278 PAGE: 1 OF: 1

ADDRESS
 Fremont Analytical, Inc.
 3600 Fremont Ave. N.
 Seattle, WA 98103
 TEL: 206-352-3790
 FAX: 206-352-7178
 Website: www.fremontanalytical.com

K/6/11/16

SUB CONTRACTOR: ALS		COMPANY: ALS Environmental		SPECIAL INSTRUCTIONS / COMMENTS:			
ADDRESS: 1317 South 13th Avenue		Chemical Oxygen Demand by SM5220, Low Level RL. Standard TAT, please email results toeward@fremontanalytical.com and mridgeyway@fremontanalytical.com.					
CITY, STATE, ZIP: Kelso, WA 98626							
PHONE: (360) 577-7222	FAX:					EMAIL:	
ACCOUNT #:							

ITEM #	SAMPLE ID	CLIENT SAMPLE ID	BOTTLE TYPE	MATRIX	DATE COLLECTED	NUMBER OF CONTAINERS	COMMENTS: Methanol Preserved Weights HOT Sample Notation, Additional Sample Description.
1	1609324-001B	24-10-11	CLEAR JARS 4 O	Soil	9/26/2016 3:40:00 PM	1	Chemical Oxygen Demand by SM5220, Low Level RL
	TEST_SUB						
2	1609324-002B	24-21.3-22.3	CLEAR JARS 4 O	Soil	9/26/2016 3:30:00 PM	1	Chemical Oxygen Demand by SM5220, Low Level RL
	TEST_SUB						

Relinquished By: <i>[Signature]</i>	Date: 9/29/16	Time: 11:25	Received By: <i>[Signature]</i>	Date: 9-30-16	Time: 9:40	REPORT TRANSMITTAL DESIRED:	
Relinquished By:	Date:	Time:	Received By:	Date:	Time:	<input type="checkbox"/> HARDCOPY (extra cost)	<input type="checkbox"/> FAX
Relinquished By:	Date:	Time:	Received By:	Date:	Time:	<input type="checkbox"/> EMAIL	<input type="checkbox"/> ONLINE
TAT: Standard <input type="checkbox"/> RUSH <input type="checkbox"/> Next BD <input type="checkbox"/> 2nd BD <input type="checkbox"/> 3rd BD <input type="checkbox"/>						FOR LAB USE ONLY	
Note: RUSH requests will incur surcharges!						Temp of samples _____ °C Attempt to Cool? _____	
						Comments: _____	



PC Janit

Cooler Receipt and Preservation Form

Client Fremont analytical Service Request K16 11736
Received: 9-30-16 Opened: 9-30-16 By: es Unloaded: 9-30-16 By: CS

- 1. Samples were received via? USPS FedEx UPS DHL PDX Courier Hand Delivered
- 2. Samples were received in: (circle) Cooler Box CS Envelope Other _____ NA
- 3. Were custody seals on coolers? NA Y N If yes, how many and where? _____
If present, were custody seals intact? Y N If present, were they signed and dated? Y N

Raw Cooler Temp	Corrected Cooler Temp	Raw Temp Blank	Corrected Temp Blank	Corr. Factor	Thermometer ID	Cooler/COC ID NA	Tracking Number NA	Filed
-0.5	-0.5	2.7	2.7	0	298		1Z X61 92X03 3202 6849	

- 4. Packing material: Inserts Baggies Bubble Wrap Gel Packs Wet Ice Dry Ice Sleeves _____
- 5. Were custody papers properly filled out (ink, signed, etc.)? NA Y N
- 6. Were samples received in good condition (temperature, unbroken)? *Indicate in the table below.* NA Y N
If applicable, tissue samples were received: Frozen Partially Thawed Thawed
- 7. Were all sample labels complete (i.e analysis, preservation, etc.)? NA Y N
- 8. Did all sample labels and tags agree with custody papers? *Indicate major discrepancies in the table on page 2.* NA Y N
- 9. Were appropriate bottles/containers and volumes received for the tests indicated? NA Y N
- 10. Were the pH-preserved bottles (*see SMO GEN SOP*) received at the appropriate pH? *Indicate in the table below* NA Y N
- 11. Were VOA vials received without headspace? *Indicate in the table below.* NA Y N
- 12. Was C12/Res negative? NA Y N

Sample ID on Bottle	Sample ID on COC	Identified by:

Sample ID	Bottle Count	Out of	Head-	Broke	pH	Reagent	Volume	Reagent Lot	Initials	Time
	Bottle Type	Temp	space				added	Number		

Notes, Discrepancies, & Resolutions:



Total Solids

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360)577-7222 Fax (360)636-1068
www.alsglobal.com

ALS Group USA, Corp.
dba ALS Environmental

Analytical Report

Client: Fremont Analytical
Project: COD
Sample Matrix: Soil
Analysis Method: 160.3 Modified
Prep Method: None

Service Request: K1611736
Date Collected: 09/26/16
Date Received: 09/30/16
Units: Percent
Basis: As Received

Solids, Total

Sample Name	Lab Code	Result	MRL	MDL	Dil.	Date Analyzed	Q
1609324-001B	K1611736-001	76.7	-	-	1	10/06/16 15:58	
1609324-002B	K1611736-002	84.8	-	-	1	10/06/16 15:58	

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client: Fremont Analytical
Project: COD
Sample Matrix: Sediment
Analysis Method: 160.3 Modified
Prep Method: None

Service Request: K1611736
Date Collected: NA
Date Received: NA

Units: Percent
Basis: As Received

Replicate Sample Summary
Inorganic Parameters

Sample Name:	Lab Code:	MRL	Sample Result	Duplicate Result	Average	RPD	RPD Limit	Date Analyzed
Batch QC	K1611778-001DUP	-	16.7	16.8	16.8	<1	20	10/06/16

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client: Fremont Analytical
Project: COD
Sample Matrix: Sludge, Solid
Analysis Method: 160.3 Modified
Prep Method: None

Service Request: K1611736
Date Collected: NA
Date Received: NA

Units: Percent
Basis: NA

Replicate Sample Summary
Inorganic Parameters

Sample Name:	Lab Code:	MRL	Sample Result	Duplicate Result	Average	RPD	RPD Limit	Date Analyzed
Batch QC	K1611870-001DUP	-	23.6	22.2	22.9	6	20	10/06/16

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.



General Chemistry

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ALS Group USA, Corp.
dba ALS Environmental

Analytical Report

Client: Fremont Analytical
Project: COD
Sample Matrix: Soil
Analysis Method: SM 5220 C Modified
Prep Method: ALS SOP

Service Request: K1611736
Date Collected: 09/26/16
Date Received: 09/30/16
Units: mg/Kg
Basis: Dry

Chemical Oxygen Demand (COD)

Sample Name	Lab Code	Result	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
1609324-001B	K1611736-001	7900	1200	-	1	10/07/16 16:00	10/7/16	
1609324-002B	K1611736-002	6920	550	-	1	10/07/16 16:00	10/7/16	
Method Blank	K1611736-MB	ND U	200	-	1	10/07/16 16:00	NA	

ALS Group USA, Corp.

dba ALS Environmental

QA/QC Report

Client: Fremont Analytical
Project: COD
Sample Matrix: Soil

Service Request: K1611736
Date Collected: NA
Date Received: NA
Date Analyzed: 10/07/16

Replicate Sample Summary
General Chemistry Parameters

Sample Name: Batch QC
Lab Code: K1611836-001

Units: mg/Kg
Basis: Dry

<u>Analyte Name</u>	<u>Analysis Method</u>	<u>MRL</u>	<u>MDL</u>	<u>Sample Result</u>	<u>Duplicate Sample K1611836-001DUP Result</u>	<u>Average</u>	<u>RPD</u>	<u>RPD Limit</u>
Chemical Oxygen Demand (COD)	SM 5220 C Modified	610	-	5970	3720	4850	47 *	20

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client: Fremont Analytical
Project: COD
Sample Matrix: Soil

Service Request: K1611736
Date Collected: N/A
Date Received: N/A
Date Analyzed: 10/7/16
Date Extracted: 10/7/16

Matrix Spike Summary
Chemical Oxygen Demand (COD)

Sample Name: Batch QC
Lab Code: K1611836-001
Analysis Method: SM 5220 C Modified
Prep Method: ALS SOP

Units: mg/Kg
Basis: Dry

Matrix Spike
K1611836-001MS

<u>Analyte Name</u>	<u>Sample Result</u>	<u>Result</u>	<u>Spike Amount</u>	<u>% Rec</u>	<u>% Rec Limits</u>
Chemical Oxygen Demand (COD)	5970	64500	52400	112	75-125

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client: Fremont Analytical
Project: COD
Sample Matrix: Soil

Service Request: K1611736
Date Analyzed: 10/07/16
Date Extracted: NA

Lab Control Sample Summary
Chemical Oxygen Demand (COD)

Analysis Method: SM 5220 C Modified
Prep Method: None

Units: mg/Kg
Basis: Dry
Analysis Lot: 517791

Sample Name	Lab Code	Result	Spike Amount	% Rec	% Rec Limits
Lab Control Sample	K1611736-LCS	4540	4840	94	85-115

Work Order: 1609324
CLIENT: GeoEngineers
Project: Gas Works Park Site

QC SUMMARY REPORT
Dissolved Metals by EPA Method 200.8

Sample ID MB-14945	SampType: MBLK	Units: µg/L			Prep Date: 9/27/2016	RunNo: 32007					
Client ID: MBLKW	Batch ID: 14945				Analysis Date: 9/27/2016	SeqNo: 605108					
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Arsenic	ND	0.500									
Iron	ND	50.0									

Sample ID LCS-14945	SampType: LCS	Units: µg/L			Prep Date: 9/27/2016	RunNo: 32007					
Client ID: LCSW	Batch ID: 14945				Analysis Date: 9/27/2016	SeqNo: 605109					
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Arsenic	102	0.500	100.0	0	102	85	115				
Iron	1,020	50.0	1,000	0	102	50	150				

Sample ID 1609324-004ADUP	SampType: DUP	Units: µg/L			Prep Date: 9/27/2016	RunNo: 32007					
Client ID: PAI-24-D-160926	Batch ID: 14945				Analysis Date: 9/27/2016	SeqNo: 605117					
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Arsenic	83.0	0.500						88.52	6.48	30	
Iron	8,770	50.0						9,487	7.85	30	

Sample ID 1609324-004AMS	SampType: MS	Units: µg/L			Prep Date: 9/27/2016	RunNo: 32007					
Client ID: PAI-24-D-160926	Batch ID: 14945				Analysis Date: 9/27/2016	SeqNo: 605118					
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Arsenic	610	0.500	500.0	88.52	104	70	130				
Iron	13,600	50.0	5,000	9,487	81.4	50	150				

Sample ID 1609324-004AMSD	SampType: MSD	Units: µg/L			Prep Date: 9/27/2016	RunNo: 32007					
Client ID: PAI-24-D-160926	Batch ID: 14945				Analysis Date: 9/27/2016	SeqNo: 605119					
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Arsenic	646	0.500	500.0	88.52	112	70	130	609.9	5.75	30	
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Work Order: 1609324
CLIENT: GeoEngineers
Project: Gas Works Park Site

QC SUMMARY REPORT
Dissolved Metals by EPA Method 200.8

Sample ID	1609324-004AMSD	SampType:	MSD	Units:	µg/L	Prep Date:	9/27/2016	RunNo:	32007		
Client ID:	PAI-24-D-160926	Batch ID:	14945			Analysis Date:	9/27/2016	SeqNo:	605119		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Iron	14,600	50.0	5,000	9,487	103	50	150	13,560	7.74	30	

Client Name: GEI	Work Order Number: 1609324
Logged by: Clare Griggs	Date Received: 9/27/2016 8:00:00 AM

Chain of Custody

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

Log In

3. Coolers are present? Yes No NA
4. Shipping container/cooler in good condition? Yes No
5. Custody Seals present on shipping container/cooler?
(Refer to comments for Custody Seals not intact) Yes No Not 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
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:	<input type="text"/>	Date:	<input type="text"/>
By Whom:	<input type="text"/>	Via:	<input type="checkbox"/> eMail <input type="checkbox"/> Phone <input type="checkbox"/> Fax <input type="checkbox"/> In Person
Regarding:	<input type="text"/>		
Client Instructions:	<input type="text"/>		

19. Additional remarks:

Item Information

Item #	Temp °C
Cooler	3.8
Sample	3.2

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



GeoEngineers

Sandra Smith
600 Stewart Street, Suite 1700
Seattle, WA 98101

RE: Gas Works Park Site
Work Order Number: 1609335

October 27, 2016

Attention Sandra Smith:

Fremont Analytical, Inc. received 7 sample(s) on 9/27/2016 for the analyses presented in the following report.

Chemical Oxygen Demand by SM 5220D
Dissolved Metals by EPA Method 200.8
Grain Size by ASTM D422

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

CC:
Claudia De La Via

CLIENT: GeoEngineers
Project: Gas Works Park Site
Work Order: 1609335

Work Order Sample Summary

Lab Sample ID	Client Sample ID	Date/Time Collected	Date/Time Received
1609335-001	PAI-15-15-17.4	09/27/2016 10:50 AM	09/27/2016 3:09 PM
1609335-002	PAI-15-17.4-17.6	09/27/2016 10:55 AM	09/27/2016 3:09 PM
1609335-003	PAI-15-30-32.5	09/27/2016 11:10 AM	09/27/2016 3:09 PM
1609335-004	Dup-1	09/27/2016 12:00 AM	09/27/2016 3:09 PM
1609335-005	PAI-25-D-160927	09/27/2016 9:07 AM	09/27/2016 3:09 PM
1609335-006	PAI-15-S-160927	09/27/2016 11:00 AM	09/27/2016 3:09 PM
1609335-007	PAI-15-D-160927	09/27/2016 11:54 AM	09/27/2016 3:09 PM

CLIENT: GeoEngineers
Project: Gas Works Park Site

I. SAMPLE RECEIPT:

Samples receipt information is recorded on the attached Sample Receipt Checklist.

II. GENERAL REPORTING COMMENTS:

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

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

III. ANALYSES AND EXCEPTIONS:

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



Qualifiers:

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



Client: GeoEngineers

Collection Date: 9/27/2016 9:07:00 AM

Project: Gas Works Park Site

Lab ID: 1609335-005

Matrix: Water

Client Sample ID: PAI-25-D-160927

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
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Dissolved Metals by EPA Method 200.8

Batch ID: 14957 Analyst: TN

Arsenic	909	0.500		µg/L	1	9/28/2016 11:19:10 AM
Iron	6,190	50.0		µg/L	1	9/28/2016 11:19:10 AM

Chemical Oxygen Demand by SM 5220D

Batch ID: R32068 Analyst: MW

Chemical Oxygen Demand	736	100	D	mg/L	10	9/30/2016 3:18:15 PM
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Client: GeoEngineers

Collection Date: 9/27/2016 11:00:00 AM

Project: Gas Works Park Site

Lab ID: 1609335-006

Matrix: Water

Client Sample ID: PAI-15-S-160927

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
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Dissolved Metals by EPA Method 200.8

Batch ID: 14957

Analyst: TN

Arsenic	725	5.00	D	µg/L	10	9/28/2016 11:33:19 AM
Iron	1,970	500	D	µg/L	10	9/28/2016 11:33:19 AM

Chemical Oxygen Demand by SM 5220D

Batch ID: R32068

Analyst: MW

Chemical Oxygen Demand	67.7	20.0	D	mg/L	2	9/30/2016 3:18:15 PM
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Client: GeoEngineers

Collection Date: 9/27/2016 11:54:00 AM

Project: Gas Works Park Site

Lab ID: 1609335-007

Matrix: Water

Client Sample ID: PAI-15-D-160927

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
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Dissolved Metals by EPA Method 200.8

Batch ID: 14957 Analyst: TN

Arsenic	407	0.500		µg/L	1	9/28/2016 11:36:51 AM
Iron	35,700	50.0		µg/L	1	9/28/2016 11:36:51 AM

Chemical Oxygen Demand by SM 5220D

Batch ID: R32068 Analyst: MW

Chemical Oxygen Demand	187	20.0	D	mg/L	2	9/30/2016 3:18:15 PM
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Grain Size by ASTM D422

Project: Gas Works Park Site
Client: GeoEngineers
Lab Project #: 1609335

Percent Finer (Passing) than the Indicated Size

UOM = Percent

Grain Size Classification	Gravel						Coarse Sand	Medium Sand		Fine Sand			Silt		
	Sieve Size	3"	2"	1 1/2"	1"	3/4"	3/8"	#4	#10	#20	#40	#60	#140	#230	#325
Particle Size (Microns)	76200	50800	38100	25400	19050	9525	4750	2000	850	425	250	106	75	45	34
PAI-15-15-17.4	100%	100%	100%	100%	91.8%	64.0%	46.4%	27.6%	14.1%	2.04%	0.0877%	0.00642%	0.00%	0.00%	0.00%
PAI-15-30-32.5	100%	100%	100%	100%	92.0%	85.1%	77.6%	72.8%	68.1%	60.6%	46.8%	20.1%	12.4%	5.11%	1.84%
Dup-1	100%	100%	100%	100%	87.8%	75.3%	66.0%	59.6%	55.3%	49.0%	37.9%	16.5%	10.5%	4.32%	2.08%

Grain Size by ASTM D422

Project: Gas Works Park Site
Client: GeoEngineers
Lab Project #: 1609335

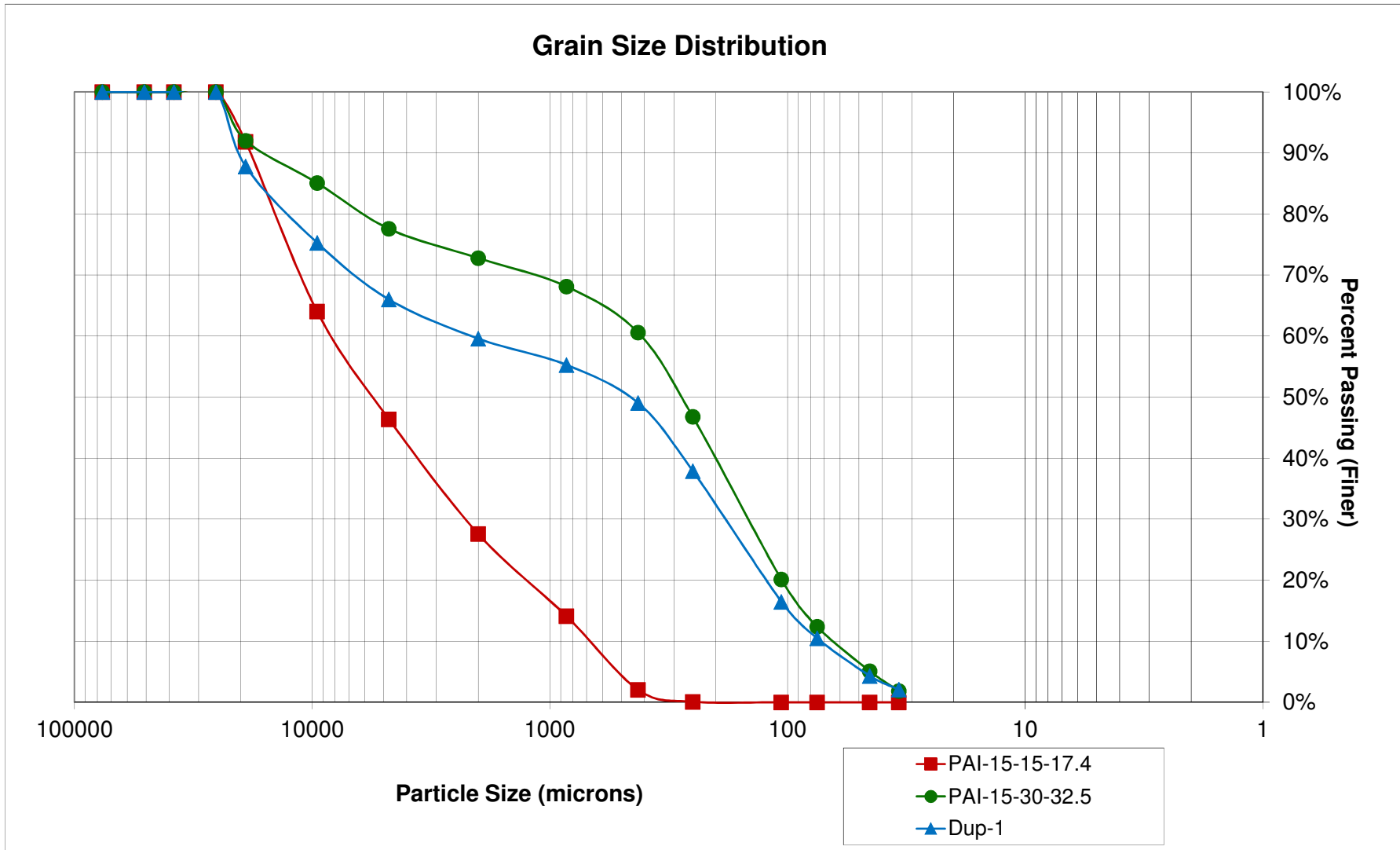
Percent Retained in Each Size Fraction

UOM = Percent

Grain Size Classification	Gravel							Coarse Sand	Medium Sand		Fine Sand			Silt		
	>76200	76200-50800	50800-38100	38100-25400	25400-19000	19050-9525	9525-4750	4750-2000	2000-850	850-425	425-250	250-106	106-62.5	72.5-45	45-34	<34
PAI-15-15-17.4	0.00%	0.00%	0.00%	0.00%	8.09%	27.6%	17.5%	18.6%	13.4%	12.0%	1.94%	0.0805%	0.00636%	0.00%	0.00%	0.00%
PAI-15-30-32.5	0.00%	0.00%	0.00%	0.00%	7.98%	6.91%	7.50%	4.79%	4.66%	7.53%	13.8%	26.6%	7.73%	7.25%	3.26%	1.84%
Dup-1	0.00%	0.00%	0.00%	0.00%	12.2%	12.5%	9.28%	6.40%	4.30%	6.22%	11.1%	21.4%	5.96%	6.16%	2.24%	2.07%

Grain Size by ASTM D422

Project: Gas Works Park Site
 Client: GeoEngineers
 Lab Project #: 1609335





ALS Environmental
ALS Group USA, Corp
1317 South 13th Avenue
Bellevue, WA 98006
T: 1 360 577 7222
F: 1 360 636 1068
www.alsglobal.com

October 11, 2016

Analytical Report for Service Request No: 1611734

Mr. Michael Ridgeway
Fremont Analytical
3600 Fremont Avenue, North
Seattle, WA 98103

RE: COD

Dear Mr. Ridgeway,

Enclosed are the results of the sample(s) submitted to our laboratory September 30, 2016. For your reference, these analyses have been assigned our service request number **K1611734**.

Analyses were performed according to our laboratory's EPA-approved quality assurance program. The test results meet requirements of the current EPA standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of EPA-accredited analytes, refer to the certifications section at www.alsglobal.com. All results are intended to be considered in their entirety, and ALS Group USA, Corp. dba ALS Environmental (ALS) is not responsible for use of less than the complete report. Results apply only to the items submitted to the laboratory for analysis and individual items (samples) analyzed, as listed in the report.

Please contact me if you have any questions. My extension is 3375. You may also contact me via email at Janet.Malloch@alsglobal.com.

Respectfully submitted,

ALS Group USA, Corp. dba ALS Environmental

Janet Malloch
Project Manager



A S Environmental
A S roup SA, orp
1317 South 13th Avenue
also, WA 98626
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www.alsglobal.com

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Acronyms

ASTM	American Society for Testing and Materials
A2LA	American Association for Laboratory Accreditation
CARB	California Air Resources Board
CAS Number	Chemical Abstract Service registry Number
CFC	Chlorofluorocarbon
CFU	Colony-Forming Unit
DEC	Department of Environmental Conservation
DEQ	Department of Environmental Quality
DHS	Department of Health Services
DOE	Department of Ecology
DOH	Department of Health
EPA	U. S. Environmental Protection Agency
ELAP	Environmental Laboratory Accreditation Program
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
LOD	Limit of Detection
LOQ	Limit of Quantitation
LUFT	Leaking Underground Fuel Tank
M	Modified
MCL	Maximum Contaminant Level is the highest permissible concentration of a substance allowed in drinking water as established by the USEPA.
MDL	Method Detection Limit
MPN	Most Probable Number
MRL	Method Reporting Limit
NA	Not Applicable
NC	Not Calculated
NCASI	National Council of the Paper Industry for Air and Stream Improvement
ND	Not Detected
NIOSH	National Institute for Occupational Safety and Health
PQL	Practical Quantitation Limit
RCRA	Resource Conservation and Recovery Act
SIM	Selected Ion Monitoring
TPH	Total Petroleum Hydrocarbons
tr	Trace level is the concentration of an analyte that is less than the PQL but greater than or equal to the MDL.

Inorganic Data Qualifiers

- * The result is an outlier. See case narrative.
- # The control limit criteria is not applicable. See case narrative.
- B The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards.
- E The result is an estimate amount because the value exceeded the instrument calibration range.
- J The result is an estimated value.
- U The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
DOD-QSM 4.2 definition : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
- i The MRL/MDL or LOQ/LOD is elevated due to a matrix interference.
- X See case narrative.
- Q See case narrative. One or more quality control criteria was outside the limits.
- H The holding time for this test is immediately following sample collection. The samples were analyzed as soon as possible after receipt by the laboratory.

Metals Data Qualifiers

- # The control limit criteria is not applicable. See case narrative.
- J The result is an estimated value.
- E The percent difference for the serial dilution was greater than 10%, indicating a possible matrix interference in the sample.
- M The duplicate injection precision was not met.
- N The Matrix Spike sample recovery is not within control limits. See case narrative.
- S The reported value was determined by the Method of Standard Additions (MSA).
- U The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
DOD-QSM 4.2 definition : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
- W The post-digestion spike for furnace AA analysis is out of control limits, while sample absorbance is less than 50% of spike absorbance.
 - i The MRL/MDL or LOQ/LOD is elevated due to a matrix interference.
- X See case narrative.
- + The correlation coefficient for the MSA is less than 0.995.
- Q See case narrative. One or more quality control criteria was outside the limits.

Organic Data Qualifiers

- * The result is an outlier. See case narrative.
- # The control limit criteria is not applicable. See case narrative.
- A A tentatively identified compound, a suspected aldol-condensation product.
- B The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards.
- C The analyte was qualitatively confirmed using GC/MS techniques, pattern recognition, or by comparing to historical data.
- D The reported result is from a dilution.
- E The result is an estimated value.
- J The result is an estimated value.
- N The result is presumptive. The analyte was tentatively identified, but a confirmation analysis was not performed.
- P The GC or HPLC confirmation criteria was exceeded. The relative percent difference is greater than 40% between the two analytical results.
- U The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
DOD-QSM 4.2 definition : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
- i The MRL/MDL or LOQ/LOD is elevated due to a chromatographic interference.
- X See case narrative.
- Q See case narrative. One or more quality control criteria was outside the limits.

Additional Petroleum Hydrocarbon Specific Qualifiers

- F The chromatographic fingerprint of the sample matches the elution pattern of the calibration standard.
- L The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of lighter molecular weight constituents than the calibration standard.
- H The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of heavier molecular weight constituents than the calibration standard.
- O The chromatographic fingerprint of the sample resembles an oil, but does not match the calibration standard.
- Y The chromatographic fingerprint of the sample resembles a petroleum product eluting in approximately the correct carbon range, but the elution pattern does not match the calibration standard.
- Z The chromatographic fingerprint does not resemble a petroleum product.

**ALS Group USA Corp. dba ALS Environmental (ALS) - Kelso
State Certifications, Accreditations, and Licenses**

Agency	Web Site	Number
Alaska DEC UST	http://dec.alaska.gov/applications/eh/ehllabreports/USTLabs.aspx	UST-040
Arizona DHS	http://www.azdhs.gov/lab/license/env.htm	AZ0339
Arkansas - DEQ	http://www.adeq.state.ar.us/techsvs/labcert.htm	88-0637
California DHS (ELAP)	http://www.cdph.ca.gov/certlic/labs/Pages/ELAP.aspx	2795
DOD ELAP	http://www.denix.osd.mil/edqw/Accreditation/AccreditedLabs.cfm	L14-51
Florida DOH	http://www.doh.state.fl.us/lab/EnvLabCert/WaterCert.htm	E87412
Hawaii DOH	Not available	-
ISO 17025	http://www.pjllabs.com/	L16-57
Louisiana DEQ	http://www.deq.louisiana.gov/portal/DIVISIONS/PublicParticipationandPermitSupport/LouisianaLaboratoryAccreditationProgram.aspx	03016
Maine DHS	Not available	WA01276
Minnesota DOH	http://www.health.state.mn.us/accreditation	053-999-457
Montana DPHHS	http://www.dphhs.mt.gov/publichealth/	CERT0047
Nevada DEP	http://ndep.nv.gov/bsdw/labservice.htm	WA01276
New Jersey DEP	http://www.nj.gov/dep/oqa/	WA005
North Carolina DWQ	http://www.dwqlab.org/	605
Oklahoma DEQ	http://www.deq.state.ok.us/CSDnew/labcert.htm	9801
Oregon – DEQ (NELAP)	http://public.health.oregon.gov/LaboratoryServices/EnvironmentalLaboratoryAccreditation/Pages/index.aspx	WA100010
South Carolina DHEC	http://www.scdhec.gov/environment/envserv/	61002
Texas CEQ	http://www.tceq.texas.gov/field/qa/env_lab_accreditation.html	T104704427
Washington DOE	http://www.ecy.wa.gov/programs/eap/labs/lab-accreditation.html	C544
Wyoming (EPA Region 8)	http://www.epa.gov/region8/water/dwhome/wyomingdi.html	-
Kelso Laboratory Website	www.alsglobal.com	NA

Analyses were performed according to our laboratory's NELAP-approved quality assurance program. A complete listing of specific NELAP-certified analytes, can be found in the certification section at www.ALSGlobal.com or at the accreditation bodies web site.

Please refer to the certification and/or accreditation body's web site if samples are submitted for compliance purposes. The states highlighted above, require the analysis be listed on the state certification if used for compliance purposes and if the method/analyte is offered by that state.



Case Narrative

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360)577-7222 Fax (360)636-1068
www.alsglobal.com

ALS ENVIRONMENTAL

Client: Fremont Analytical
Project: NA
Sample Matrix: Soil

Service Request No.: K1611734
Date Received: 09/30/16

Case Narrative

All analyses were performed consistent with the quality assurance program of ALS Environmental. This report contains analytical results for samples designated for Tier II data deliverables. When appropriate to the method, method blank results have been reported with each analytical test. Additional quality control analyses reported herein include: Laboratory Duplicate (DUP), Matrix Spike (MS), and Matrix/Duplicate Matrix Spike (MS/DMS).

Sample Receipt

Three soil samples were received for analysis at ALS Environmental on 09/30/16. The samples were received in good condition and consistent with the accompanying chain of custody form. The samples were stored in a refrigerator at 4°C upon receipt at the laboratory.

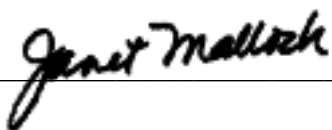
General Chemistry Parameters

Chemical Oxygen Demand by Standard Method 5220 C Modified:

The Relative Percent Difference (RPD) for the replicate analysis in sample Batch QC was outside the normal ALS control limits. The variability in the results was attributed to the heterogeneous character of the sample. Standard mixing techniques were used, but were not sufficient for complete homogenization of this sample.

No other anomalies associated with the analysis of these samples were observed.

Approved by _____





Chain of Custody

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360)577-7222 Fax (360)636-1068
www.alsglobal.com



CHAIN OF CUSTODY RECORD

Omega COCID 281

PAGE: 1

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ADDRESS

Fremont Analytical, Inc.
3600 Fremont Ave. N.
Seattle, WA 98103
TEL: 206-352-3790
FAX: 206-352-7178

Website: www.fremontanalytical.com

K161134

SUB CONTRACTOR: ALS		COMPANY: ALS Environmental		SPECIAL INSTRUCTIONS / COMMENTS:			
ADDRESS: 1317 South 13th Avenue		Chemical Oxygen Demand by SM5220, Low Level RL. Please email results to cward@fremontanalytical.com and mridgeway@fremontanalytical.com					
CITY, STATE, ZIP: Kelso, WA 98626							
PHONE: (360) 577-7222	FAX:					EMAIL:	
ACCOUNT #:							

ITEM #	SAMPLE ID	CLIENT SAMPLE ID	BOTTLE TYPE	MATRIX	DATE COLLECTED	NUMBER OF CONTAINERS	COMMENTS: Methanol Preserved Weights HOT Sample Notation, Additional Sample Description.
1	1609335-001B TEST_SUB	PAI-15-15-17.4	CLEAR JARS 4 O	Soil	9/27/2016 10:50:00 AM	1	Chemical Oxygen Demand by SM5220, Low Level RL
2	1609335-003B TEST_SUB	PAI-15-30-32.5	CLEAR JARS 4 O	Soil	9/27/2016 11:10:00 AM	1	Chemical Oxygen Demand by SM5220, Low Level RL
3	1609335-004B TEST_SUB	Dup-1	CLEAR JARS 4 O	Soil	9/27/2016	1	Chemical Oxygen Demand by SM5220, Low Level RL

Relinquished By: <i>[Signature]</i>	Date: 9/24/16	Time: 11:25	Received By: <i>[Signature]</i>	Date: 9-30-16	Time: 11:46
Relinquished By:	Date:	Time:	Received By:	Date:	Time:
Relinquished By:	Date:	Time:	Received By:	Date:	Time:
TAT: Standard <input type="checkbox"/> RUSH <input type="checkbox"/> Next BD <input type="checkbox"/> 2nd BD <input type="checkbox"/> 3rd BD <input type="checkbox"/>					
Note: RUSH requests will incur surcharges!					

REPORT TRANSMITTAL DESIRED:	
<input type="checkbox"/> HARDCOPY (extra cost)	<input type="checkbox"/> FAX <input type="checkbox"/> EMAIL <input type="checkbox"/> ONLINE
FOR LAB USE ONLY	
Temp of samples _____ °C	Attempt to Cool? _____
Comments: _____	



PC Janet

Cooler Receipt and Preservation Form

Client Fremont analytical Service Request K16 11734
Received: 9-30-16 Opened: 9-30-16 By: es Unloaded: 9-30-16 By: CS

- 1. Samples were received via? USPS FedEx UPS DHL PDX Courier Hand Delivered
- 2. Samples were received in: (circle) Cooler Box CS Envelope Other _____ NA
- 3. Were custody seals on coolers? NA Y N If yes, how many and where? _____
If present, were custody seals intact? Y N If present, were they signed and dated? Y N

Raw Cooler Temp	Corrected Cooler Temp	Raw Temp Blank	Corrected Temp Blank	Corr. Factor	Thermometer ID	Cooler/COC ID NA	Tracking Number NA	Filed
-0.5	-0.5	2.7	2.7	0	298		1Z X61 92X03 3202 6849	

- 4. Packing material: Inserts Baggies Bubble Wrap Gel Packs Wet Ice Dry Ice Sleeves _____
- 5. Were custody papers properly filled out (ink, signed, etc.)? NA Y N
- 6. Were samples received in good condition (temperature, unbroken)? *Indicate in the table below.* NA Y N
If applicable, tissue samples were received: Frozen Partially Thawed Thawed
- 7. Were all sample labels complete (i.e analysis, preservation, etc.)? NA Y N
- 8. Did all sample labels and tags agree with custody papers? *Indicate major discrepancies in the table on page 2.* NA Y N
- 9. Were appropriate bottles/containers and volumes received for the tests indicated? NA Y N
- 10. Were the pH-preserved bottles (*see SMO GEN SOP*) received at the appropriate pH? *Indicate in the table below* NA Y N
- 11. Were VOA vials received without headspace? *Indicate in the table below.* NA Y N
- 12. Was C12/Res negative? NA Y N

Sample ID on Bottle	Sample ID on COC	Identified by:

Sample ID	Bottle Count	Bottle Type	Out of Temp	Head-space	Broke	pH	Reagent	Volume added	Reagent Lot Number	Initials	Time

Notes, Discrepancies, & Resolutions: _____



Total Solids

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360)577-7222 Fax (360)636-1068
www.alsglobal.com

ALS Group USA, Corp.
dba ALS Environmental

Analytical Report

Client: Fremont Analytical
Project: COD
Sample Matrix: Soil
Analysis Method: 160.3 Modified
Prep Method: None

Service Request: K1611734
Date Collected: 09/27/16
Date Received: 09/30/16
Units: Percent
Basis: As Received

Solids, Total

Sample Name	Lab Code	Result	MRL	MDL	Dil.	Date Analyzed	Q
1609335-001B	K1611734-001	61.3	-	-	1	10/05/16 16:53	
1609335-003B	K1611734-002	90.3	-	-	1	10/05/16 16:53	
1609335-004B	K1611734-003	90.6	-	-	1	10/05/16 16:53	

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client: Fremont Analytical
Project: COD
Sample Matrix: Soil
Analysis Method: 160.3 Modified
Prep Method: None

Service Request: K1611734
Date Collected: NA
Date Received: NA

Units: Percent
Basis: As Received

Replicate Sample Summary
Inorganic Parameters

Sample Name:	Lab Code:	MRL	Sample Result	Duplicate Result	Average	RPD	RPD Limit	Date Analyzed
Batch QC	K1611731-001DUP	-	89.0	89.3	89.2	<1	20	10/05/16
Batch QC	K1611749-005DUP	-	97.4	97.3	97.4	<1	20	10/05/16

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.



General Chemistry

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
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www.alsglobal.com

ALS Group USA, Corp.
dba ALS Environmental

Analytical Report

Client: Fremont Analytical
Project: COD
Sample Matrix: Soil
Analysis Method: SM 5220 C Modified
Prep Method: ALS SOP

Service Request: K1611734
Date Collected: 09/27/16
Date Received: 09/30/16
Units: mg/Kg
Basis: Dry

Chemical Oxygen Demand (COD)

Sample Name	Lab Code	Result	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
1609335-001B	K1611734-001	154000	1400	-	1	10/07/16 16:00	10/7/16	
1609335-003B	K1611734-002	2720	450	-	1	10/07/16 16:00	10/7/16	
1609335-004B	K1611734-003	2370	900	-	1	10/07/16 16:00	10/7/16	
Method Blank	K1611734-MB	ND U	200	-	1	10/07/16 16:00	NA	

ALS Group USA, Corp.

dba ALS Environmental

QA/QC Report

Client: Fremont Analytical
Project: COD
Sample Matrix: Soil

Service Request: K1611734
Date Collected: NA
Date Received: NA
Date Analyzed: 10/07/16

Replicate Sample Summary
General Chemistry Parameters

Sample Name: Batch QC
Lab Code: K1611836-001

Units: mg/Kg
Basis: Dry

<u>Analyte Name</u>	<u>Analysis Method</u>	<u>MRL</u>	<u>MDL</u>	<u>Sample Result</u>	<u>Duplicate Sample K1611836-001DUP Result</u>	<u>Average</u>	<u>RPD</u>	<u>RPD Limit</u>
Chemical Oxygen Demand (COD)	SM 5220 C Modified	610	-	5970	3720	4850	47 *	20

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client: Fremont Analytical
Project: COD
Sample Matrix: Soil

Service Request: K1611734
Date Collected: N/A
Date Received: N/A
Date Analyzed: 10/7/16
Date Extracted: 10/7/16

Matrix Spike Summary
Chemical Oxygen Demand (COD)

Sample Name: Batch QC
Lab Code: K1611836-001
Analysis Method: SM 5220 C Modified
Prep Method: ALS SOP

Units: mg/Kg
Basis: Dry

Matrix Spike
K1611836-001MS

<u>Analyte Name</u>	<u>Sample Result</u>	<u>Result</u>	<u>Spike Amount</u>	<u>% Rec</u>	<u>% Rec Limits</u>
Chemical Oxygen Demand (COD)	5970	64500	52400	112	75-125

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client: Fremont Analytical
Project: COD
Sample Matrix: Soil

Service Request: K1611734
Date Analyzed: 10/07/16
Date Extracted: NA

Lab Control Sample Summary
Chemical Oxygen Demand (COD)

Analysis Method: SM 5220 C Modified
Prep Method: None

Units: mg/Kg
Basis: Dry
Analysis Lot: 517791

Sample Name	Lab Code	Result	Spike Amount	% Rec	% Rec Limits
Lab Control Sample	K1611734-LCS	4540	4840	94	85-115



ALS Environmental
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F: 1 360 636 1068
www.alsglobal.com

October 26, 2016

Analytical Report for Service Request No: 1612505

Mr. Michael Ridgeway
Fremont Analytical
3600 Fremont Avenue, North
Seattle, WA 98103

RE: 1609335

Dear Mr. Ridgeway,

Enclosed are the results of the sample(s) submitted to our laboratory October 14, 2016
For your reference, these analyses have been assigned our service request number **K1612505**.

Analyses were performed according to our laboratory's ISO 17025 AP-approved quality assurance program. The test results meet requirements of the current ISO 17025 AP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of ISO 17025 AP-accredited analytes, refer to the certifications section at www.alsglobal.com. All results are intended to be considered in their entirety, and ALS Group USA, Corp. dba ALS Environmental (ALS) is not responsible for use of less than the complete report. Results apply only to the items submitted to the laboratory for analysis and individual items (samples) analyzed, as listed in the report.

Please contact me if you have any questions. My extension is 3375. You may also contact me via email at janet.Malloch@alsglobal.com.

Respectfully submitted,

ALS Group USA, Corp. dba ALS Environmental

Janet Malloch
Project Manager



A S Environmental
A S roup SA, orp
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also, WA 98626
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General Chemistry

Acronyms

ASTM	American Society for Testing and Materials
A2LA	American Association for Laboratory Accreditation
CARB	California Air Resources Board
CAS Number	Chemical Abstract Service registry Number
CFC	Chlorofluorocarbon
CFU	Colony-Forming Unit
DEC	Department of Environmental Conservation
DEQ	Department of Environmental Quality
DHS	Department of Health Services
DOE	Department of Ecology
DOH	Department of Health
EPA	U. S. Environmental Protection Agency
ELAP	Environmental Laboratory Accreditation Program
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
LOD	Limit of Detection
LOQ	Limit of Quantitation
LUFT	Leaking Underground Fuel Tank
M	Modified
MCL	Maximum Contaminant Level is the highest permissible concentration of a substance allowed in drinking water as established by the USEPA.
MDL	Method Detection Limit
MPN	Most Probable Number
MRL	Method Reporting Limit
NA	Not Applicable
NC	Not Calculated
NCASI	National Council of the Paper Industry for Air and Stream Improvement
ND	Not Detected
NIOSH	National Institute for Occupational Safety and Health
PQL	Practical Quantitation Limit
RCRA	Resource Conservation and Recovery Act
SIM	Selected Ion Monitoring
TPH	Total Petroleum Hydrocarbons
tr	Trace level is the concentration of an analyte that is less than the PQL but greater than or equal to the MDL.

Inorganic Data Qualifiers

- * The result is an outlier. See case narrative.
- # The control limit criteria is not applicable. See case narrative.
- B The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards.
- E The result is an estimate amount because the value exceeded the instrument calibration range.
- J The result is an estimated value.
- U The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
DOD-QSM 4.2 definition : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
- i The MRL/MDL or LOQ/LOD is elevated due to a matrix interference.
- X See case narrative.
- Q See case narrative. One or more quality control criteria was outside the limits.
- H The holding time for this test is immediately following sample collection. The samples were analyzed as soon as possible after receipt by the laboratory.

Metals Data Qualifiers

- # The control limit criteria is not applicable. See case narrative.
- J The result is an estimated value.
- E The percent difference for the serial dilution was greater than 10%, indicating a possible matrix interference in the sample.
- M The duplicate injection precision was not met.
- N The Matrix Spike sample recovery is not within control limits. See case narrative.
- S The reported value was determined by the Method of Standard Additions (MSA).
- U The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
DOD-QSM 4.2 definition : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
- W The post-digestion spike for furnace AA analysis is out of control limits, while sample absorbance is less than 50% of spike absorbance.
 - i The MRL/MDL or LOQ/LOD is elevated due to a matrix interference.
- X See case narrative.
- + The correlation coefficient for the MSA is less than 0.995.
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Organic Data Qualifiers

- * The result is an outlier. See case narrative.
- # The control limit criteria is not applicable. See case narrative.
- A A tentatively identified compound, a suspected aldol-condensation product.
- B The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards.
- C The analyte was qualitatively confirmed using GC/MS techniques, pattern recognition, or by comparing to historical data.
- D The reported result is from a dilution.
- E The result is an estimated value.
- J The result is an estimated value.
- N The result is presumptive. The analyte was tentatively identified, but a confirmation analysis was not performed.
- P The GC or HPLC confirmation criteria was exceeded. The relative percent difference is greater than 40% between the two analytical results.
- U The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
DOD-QSM 4.2 definition : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
 - i The MRL/MDL or LOQ/LOD is elevated due to a chromatographic interference.
- X See case narrative.
- Q See case narrative. One or more quality control criteria was outside the limits.

Additional Petroleum Hydrocarbon Specific Qualifiers

- F The chromatographic fingerprint of the sample matches the elution pattern of the calibration standard.
- L The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of lighter molecular weight constituents than the calibration standard.
- H The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of heavier molecular weight constituents than the calibration standard.
- O The chromatographic fingerprint of the sample resembles an oil, but does not match the calibration standard.
- Y The chromatographic fingerprint of the sample resembles a petroleum product eluting in approximately the correct carbon range, but the elution pattern does not match the calibration standard.
- Z The chromatographic fingerprint does not resemble a petroleum product.

**ALS Group USA Corp. dba ALS Environmental (ALS) - Kelso
State Certifications, Accreditations, and Licenses**

Agency	Web Site	Number
Alaska DEC UST	http://dec.alaska.gov/applications/eh/ehllabreports/USTLabs.aspx	UST-040
Arizona DHS	http://www.azdhs.gov/lab/license/env.htm	AZ0339
Arkansas - DEQ	http://www.adeq.state.ar.us/techsvs/labcert.htm	88-0637
California DHS (ELAP)	http://www.cdph.ca.gov/certlic/labs/Pages/ELAP.aspx	2795
DOD ELAP	http://www.denix.osd.mil/edqw/Accreditation/AccreditedLabs.cfm	L14-51
Florida DOH	http://www.doh.state.fl.us/lab/EnvLabCert/WaterCert.htm	E87412
Hawaii DOH	Not available	-
ISO 17025	http://www.pjllabs.com/	L16-57
Louisiana DEQ	http://www.deq.louisiana.gov/portal/DIVISIONS/PublicParticipationandPermitSupport/LouisianaLaboratoryAccreditationProgram.aspx	03016
Maine DHS	Not available	WA01276
Minnesota DOH	http://www.health.state.mn.us/accreditation	053-999-457
Montana DPHHS	http://www.dphhs.mt.gov/publichealth/	CERT0047
Nevada DEP	http://ndep.nv.gov/bsdw/labservice.htm	WA01276
New Jersey DEP	http://www.nj.gov/dep/oqa/	WA005
North Carolina DWQ	http://www.dwqlab.org/	605
Oklahoma DEQ	http://www.deq.state.ok.us/CSDnew/labcert.htm	9801
Oregon – DEQ (NELAP)	http://public.health.oregon.gov/LaboratoryServices/EnvironmentalLaboratoryAccreditation/Pages/index.aspx	WA100010
South Carolina DHEC	http://www.scdhec.gov/environment/envserv/	61002
Texas CEQ	http://www.tceq.texas.gov/field/qa/env_lab_accreditation.html	T104704427
Washington DOE	http://www.ecy.wa.gov/programs/eap/labs/lab-accreditation.html	C544
Wyoming (EPA Region 8)	http://www.epa.gov/region8/water/dwhome/wyomingdi.html	-
Kelso Laboratory Website	www.alsglobal.com	NA

Analyses were performed according to our laboratory's NELAP-approved quality assurance program. A complete listing of specific NELAP-certified analytes, can be found in the certification section at www.ALSGlobal.com or at the accreditation bodies web site.

Please refer to the certification and/or accreditation body's web site if samples are submitted for compliance purposes. The states highlighted above, require the analysis be listed on the state certification if used for compliance purposes and if the method/analyte is offered by that state.



Chain of Custody

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360)577-7222 Fax (360)636-1068
www.alsglobal.com



CHAIN OF CUSTODY RECORD

Omega COCID 290 PAGE: 1 OF: 1

ADDRESS

Fremont Analytical, Inc.
 3600 Fremont Ave. N.
 Seattle, WA 98103
 TEL: 206-352-3790
 FAX: 206-352-7178
 Website: www.fremontanalytical.com

11612505

SUB CONTRACTOR: ALS		COMPANY: ALS Environmental		SPECIAL INSTRUCTIONS / COMMENTS: <i>Please email results to mridgeway@fremontanalytical.com and cward@fremontanalytical.com</i>			
ADDRESS: 1317 South 13th Avenue							
CITY, STATE, ZIP: Kelso, WA 98626							
PHONE: (360) 577-7222	FAX:	EMAIL:					
ACCOUNT #:				ANALYTICAL PARAMETERS			
ITEM	SAMPLE ID	Client Sample ID	Bottle Type	MATRIX	DATE COLLECTED	NUMBER OF CONTAINERS	COMMENTS Methanol Preserved Weights HOT Sample Notation Additional Sample Description, etc.
1	1609335-002A	PAI-15-17.4-17.6	CLEAR JARS 4	Soil	9/27/2016 10:55:00 AM	1	Chemical Oxygen Demand by SM5220, Low Level RL

Relinquished By: <i>[Signature]</i>	Date: 10/13/16	Time: 13:35	Received By: <i>[Signature]</i>	Date: 10/14/16	Time: 1000	REPORT TRANSMITTAL DESIRED: <input type="checkbox"/> HARDCOPY (extra cost) <input type="checkbox"/> FAX <input type="checkbox"/> EMAIL <input type="checkbox"/> ONLINE
Relinquished By:	Date:	Time:	Received By:	Date:	Time:	
TAT: Standard <input checked="" type="checkbox"/> RUSH Next BD <input type="checkbox"/> 2nd BD <input type="checkbox"/> 3rd BD <input type="checkbox"/>						FOR LAB USE ONLY
Temp of samples _____ °C Attempt to Cool ? _____						Comments: _____
Note: RUSH requests will incur surcharges!						



PC Janet

Cooler Receipt and Preservation Form

Client Fremont Service Request K16 12505
 Received: 10/14/16 Opened: 10/14/16 By: [Signature] Unloaded: 10/14/16 By: [Signature]

1. Samples were received via? USPS Fed Ex UPS DHL PDX Courier Hand Delivered
 2. Samples were received in: (circle) Cooler Box Envelope Other NA
 3. Were custody seals on coolers? NA Y N If yes, how many and where? _____
 If present, were custody seals intact? Y N If present, were they signed and dated? Y N

Raw Cooler Temp	Corrected Cooler Temp	Raw Temp Blank	Corrected Temp Blank	Corr. Factor	Thermometer ID	Cooler/COC ID	Tracking Number	NA	Filed
2.8	2.7	-	-	-0.1	375	290	12X6192X 03 9900 0330		

4. Packing material: Inserts Baggies Bubble Wrap Gel Packs Wet Ice Dry Ice Sleeves _____
 5. Were custody papers properly filled out (ink, signed, etc.)? NA Y N
 6. Were samples received in good condition (temperature, unbroken)? Indicate in the table below. NA Y N
 If applicable, tissue samples were received: Frozen Partially Thawed Thawed
 7. Were all sample labels complete (i.e analysis, preservation, etc.)? NA Y N
 8. Did all sample labels and tags agree with custody papers? Indicate major discrepancies in the table on page 2. NA Y N
 9. Were appropriate bottles/containers and volumes received for the tests indicated? NA Y N
 10. Were the pH-preserved bottles (see SMO GEN SOP) received at the appropriate pH? Indicate in the table below NA Y N
 11. Were VOA vials received without headspace? Indicate in the table below. NA Y N
 12. Was C12/Res negative? NA Y N

Sample ID on Bottle	Sample ID on COC	Identified by:

Sample ID	Bottle Count	Out of	Head-space	Broke	pH	Reagent	Volume added	Reagent Lot Number	Initials	Time

Notes, Discrepancies, & Resolutions: _____



Total Solids

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
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ALS Group USA, Corp.
dba ALS Environmental

Analytical Report

Client: Fremont Analytical
Project: 1609335
Sample Matrix: Soil
Analysis Method: 160.3 Modified
Prep Method: None

Service Request: K1612505
Date Collected: 09/27/16
Date Received: 10/14/16
Units: Percent
Basis: As Received

Solids, Total

Sample Name	Lab Code	Result	MRL	MDL	Dil.	Date Analyzed	Q
1609335-002A	K1612505-001	50.1	-	-	1	10/24/16 11:27	

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client: Fremont Analytical
Project: 1609335
Sample Matrix: Soil
Analysis Method: 160.3 Modified
Prep Method: None

Service Request: K1612505
Date Collected: NA
Date Received: NA

Units: Percent
Basis: As Received

Replicate Sample Summary
Inorganic Parameters

Sample Name:	Lab Code:	MRL	MDL	Sample Result	Duplicate Result	Average	RPD	RPD Limit	Date Analyzed
Batch QC	K1612284-003DUP	-	-	97.2	97.2	97.2	<1	20	10/24/16
Batch QC	K1612549-003DUP	-	-	80.2	80.3	80.3	<1	20	10/24/16

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.



General Chemistry

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360)577-7222 Fax (360)636-1068
www.alsglobal.com

ALS Group USA, Corp.
dba ALS Environmental

Analytical Report

Client: Fremont Analytical
Project: 1609335
Sample Matrix: Soil
Analysis Method: SM 5220 C Modified
Prep Method: ALS SOP

Service Request: K1612505
Date Collected: 09/27/16
Date Received: 10/14/16
Units: mg/Kg
Basis: Dry

Chemical Oxygen Demand (COD)

Sample Name	Lab Code	Result	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
1609335-002A	K1612505-001	37300	400	-	1	10/24/16 13:00	10/20/16	
Method Blank	K1612505-MB1	ND U	200	-	1	10/24/16 13:00	10/20/16	
Method Blank	K1612505-MB2	ND U	200	-	1	10/24/16 13:00	10/20/16	

ALS Group USA, Corp.

dba ALS Environmental

QA/QC Report

Client: Fremont Analytical
Project 1609335
Sample Matrix: Soil

Service Request: K1612505
Date Collected: NA
Date Received: NA
Date Analyzed: 10/24/16

Replicate Sample Summary
General Chemistry Parameters

Sample Name: Batch QC
Lab Code: KQ1613642-07

Units: mg/Kg
Basis: Wet

<u>Analyte Name</u>	<u>Analysis Method</u>	<u>MRL</u>	<u>MDL</u>	<u>Sample Result</u>	<u>Duplicate Sample KQ1613642-07DUP Result</u>	<u>Average</u>	<u>RPD</u>	<u>RPD Limit</u>
Chemical Oxygen Demand (COD)	SM 5220 C Modified	10	-	59	67	62.8	13	20

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client: Fremont Analytical
Project: 1609335
Sample Matrix: Soil

Service Request: K1612505
Date Collected: N/A
Date Received: N/A
Date Analyzed: 10/24/16
Date Extracted: 10/20/16

Matrix Spike Summary
Chemical Oxygen Demand (COD)

Sample Name: Batch QC
Lab Code: KQ1613642-07
Analysis Method: SM 5220 C Modified
Prep Method: ALS SOP

Units: mg/Kg
Basis: Wet

Matrix Spike
KQ1613642-07MS

<u>Analyte Name</u>	<u>Sample Result</u>	<u>Result</u>	<u>Spike Amount</u>	<u>% Rec</u>	<u>% Rec Limits</u>
Chemical Oxygen Demand (COD)	59	1070	1000	101	75-125

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client: Fremont Analytical
Project: 1609335
Sample Matrix: Soil

Service Request: K1612505
Date Analyzed: 10/24/16
Date Extracted: 10/20/16

Lab Control Sample Summary
Chemical Oxygen Demand (COD)

Analysis Method: SM 5220 C Modified
Prep Method: ALS SOP

Units: mg/Kg
Basis: Dry
Analysis Lot: 520274

Sample Name	Lab Code	Result	Spike Amount	% Rec	% Rec Limits
Lab Control Sample	K1612505-LCS1	4860	4840	100	85-115
Lab Control Sample	K1612505-LCS2	4860	4840	100	85-115

Work Order: 1609335
CLIENT: GeoEngineers
Project: Gas Works Park Site

QC SUMMARY REPORT
Dissolved Metals by EPA Method 200.8

Sample ID MB-14957	SampType: MBLK	Units: µg/L				Prep Date: 9/28/2016	RunNo: 32016				
Client ID: MBLKW	Batch ID: 14957					Analysis Date: 9/28/2016	SeqNo: 605291				
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Arsenic	ND	0.500									
Iron	ND	50.0									

Sample ID LCS-14957	SampType: LCS	Units: µg/L				Prep Date: 9/28/2016	RunNo: 32016				
Client ID: LCSW	Batch ID: 14957					Analysis Date: 9/28/2016	SeqNo: 605292				
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Arsenic	101	0.500	100.0	0	101	85	115				
Iron	1,010	50.0	1,000	0	101	50	150				

Sample ID 1609335-005ADUP	SampType: DUP	Units: µg/L				Prep Date: 9/28/2016	RunNo: 32016				
Client ID: PAI-25-D-160927	Batch ID: 14957					Analysis Date: 9/28/2016	SeqNo: 605294				
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Arsenic	889	0.500						908.7	2.16	30	
Iron	6,020	50.0						6,195	2.85	30	

Sample ID 1609335-005AMS	SampType: MS	Units: µg/L				Prep Date: 9/28/2016	RunNo: 32016				
Client ID: PAI-25-D-160927	Batch ID: 14957					Analysis Date: 9/28/2016	SeqNo: 605295				
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Arsenic	1,470	0.500	500.0	908.7	113	70	130				
Iron	11,700	50.0	5,000	6,195	110	50	150				

Sample ID 1609335-005AMSD	SampType: MSD	Units: µg/L				Prep Date: 9/28/2016	RunNo: 32016				
Client ID: PAI-25-D-160927	Batch ID: 14957					Analysis Date: 9/28/2016	SeqNo: 605296				
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Arsenic	1,480	0.500	500.0	908.7	113	70	130	1,471	0.282	30	
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Work Order: 1609335
CLIENT: GeoEngineers
Project: Gas Works Park Site

QC SUMMARY REPORT

Dissolved Metals by EPA Method 200.8

Sample ID	1609335-005AMSD	SampType:	MSD	Units:	µg/L	Prep Date:	9/28/2016	RunNo:	32016		
Client ID:	PAI-25-D-160927	Batch ID:	14957			Analysis Date:	9/28/2016	SeqNo:	605296		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Iron	11,900	50.0	5,000	6,195	114	50	150	11,690	1.78	30	

Client Name: **GEI**
 Logged by: **Clare Griggs**

Work Order Number: **1609335**
 Date Received: **9/27/2016 3:09:00 PM**

Chain of Custody

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

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
 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:	<input type="text"/>	Date:	<input type="text"/>
By Whom:	<input type="text"/>	Via:	<input type="checkbox"/> eMail <input type="checkbox"/> Phone <input type="checkbox"/> Fax <input type="checkbox"/> In Person
Regarding:	<input type="text"/>		
Client Instructions:	<input type="text"/>		

19. Additional remarks:

Item Information

Item #	Temp °C
Cooler	4.1
Sample	4.8

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



Fremont

Analytical

3600 Fremont Ave N.
Seattle, WA 98103

Tel: 206-352-3790
Fax: 206-352-7178

Chain of Custody Record and Laboratory Services Agreement

Date: 9/21/2016

Laboratory Project No (Internal): 1109835

Page: 1 of: 1

Client: GeoEngineers
Address: 600 Stewart Street, Suite 1700
City, State, Zip: Seattle, WA 98103
Telephone: 253.722.2418

Project Name: Gas Works Park Site
Project No: 0186-846-01 Task 1803
Location: Seattle
Report To (PM): Sandra Smith / Claudia De La Via
PM Email: sbsmith@geoengineers.com

Collected by: GRL/CVD
CDElavia@geoengineers.com

*Matrix Codes: A = Air, AQ = Aqueous, B = Bulk, O = Other, P = Product, S = Soil, SD = Sediment, SL = Solid, W = Water, DW = Drinking Water, GW = Ground Water, SW = Storm Water, WW = Waste Water

Sample Name	Sample Date	Sample Time	Sample Type (Matrix)*	Arsenic (EPA 200.8) field filtered	Iron (EPA 200.8) field filtered	Sulfide (4500-S2-FI) field filtered	COD (SM5220) field filtered	COD (SM5220) field filtered	Grain Size (ASTM D422)	SVOCs (EPA 8270 / 625)	PAHs (EPA 8270 - SIM)	PCBs (EPA 8082 / 608)	Metals** (EPA 6020 / 200.8)	Total (T) Dissolved (D)	Comments
1 PAL- 1S-15-17.4	9/22	1050	S	X	X										
2 PAL- 1S-17.4-17.6		1055		X	X										Collected 4oz Jar (optional COD)
3 PAL- 1S-30-32.5		1110		X	X										⊕ Add Analysis per S. Smith
4 PAL- DUP-1				X	X										⊕ Add Analysis per S. Smith
5 PAL- 2S-D-160923		0807		X	X										
6 PAL- 1S-S-160923		1100		X	X										
7 PAL- 1S-D-160927		1154		X	X										
8 PAL-															
9 PAL-															
10 PAL-															

**Metals Analysis (Circle): MTCA-5 RCRA-8 Priority Pollutants TAL Individual: Ag Al As B Ba Be Ca Cd Co Cr Cu Fe Hg K Mg Mn Mo Na Ni Pb Sb Se Sr Sn Tl U V Zn

***Anions (Circle): Nitrate Nitrite Chloride Sulfate Bromide Iodide Fluoride Nitrate-Nitrite
Sample Disposal: Return to Client Disposal by Lab (Samples will be held for 30 days unless otherwise noted. A fee may be assessed if samples are retained after 30 days.)
Turn-around times for samples received after 4:00pm will begin on the following business day.

I represent that I am authorized to enter into this Agreement with Fremont Analytical on behalf of the Client named above, that I have verified Client's agreement to each of the terms on the front and backside of this Agreement.

Relinquished	Date/Time	Received	Date/Time
<u>9/22/16 259PM</u>	<u>9/22/16 1509</u>	<u>9/22/16 1409</u>	<u>9/22/16 1509</u>
Relinquished	Date/Time	Received	Date/Time
<u>9/22/16 1509</u>	<u>9/22/16 1509</u>	<u>9/22/16 1509</u>	<u>9/22/16 1509</u>

TAT → SameDay Nextday 2 Day 3 Day STD
Please coordinate with the lab in advance



GeoEngineers

Sandra Smith
600 Stewart Street, Suite 1700
Seattle, WA 98101

RE: Gas Works Park Site
Work Order Number: 1609348

October 12, 2016

Attention Sandra Smith:

Fremont Analytical, Inc. received 10 sample(s) on 9/28/2016 for the analyses presented in the following report.

Chemical Oxygen Demand by SM 5220D
Dissolved Metals by EPA Method 200.8
Grain Size by ASTM D422

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

CC:
Claudia De La Via



CLIENT: GeoEngineers
Project: Gas Works Park Site
Work Order: 1609348

Work Order Sample Summary

Lab Sample ID	Client Sample ID	Date/Time Collected	Date/Time Received
1609348-001	PAI-26-11.6-12.3	09/28/2016 10:20 AM	09/28/2016 5:32 PM
1609348-002	PAI-26-12.3-12.4	09/28/2016 10:25 AM	09/28/2016 5:32 PM
1609348-003	PAI-26-20.25-25.25	09/28/2016 10:30 AM	09/28/2016 5:32 PM
1609348-004	PAI-26-D-160928	09/28/2016 11:31 AM	09/28/2016 5:32 PM
1609348-005	PAI-26-S-160928	09/28/2016 10:46 AM	09/28/2016 5:32 PM
1609348-006	D-160928	09/28/2016 12:00 AM	09/28/2016 5:32 PM
1609348-007	PAI-27-S-160928	09/28/2016 4:14 PM	09/28/2016 5:32 PM
1609348-008	PAI-27-D-160928	09/28/2016 4:47 PM	09/28/2016 5:32 PM
1609348-009	PAI-27-25.5-26.5	09/28/2016 3:30 PM	09/28/2016 5:32 PM
1609348-010	PAI-27-10-12.5	09/28/2016 3:25 PM	09/28/2016 5:32 PM

CLIENT: GeoEngineers
Project: Gas Works Park Site

I. SAMPLE RECEIPT:

Samples receipt information is recorded on the attached Sample Receipt Checklist.

II. GENERAL REPORTING COMMENTS:

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

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

III. ANALYSES AND EXCEPTIONS:

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

Qualifiers:

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



CLIENT: GeoEngineers

Project: Gas Works Park Site

Lab ID: 1609348-004

Collection Date: 9/28/2016 11:31:00 AM

Client Sample ID: PAI-26-D-160928

Matrix: Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
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Dissolved Metals by EPA Method 200.8

Batch ID: 14968

Analyst: TN

Arsenic	513	0.500		µg/L	1	9/29/2016 11:08:41 AM
Iron	13,100	50.0		µg/L	1	9/29/2016 11:08:41 AM

Chemical Oxygen Demand by SM 5220D

Batch ID: R32068

Analyst: MW

Chemical Oxygen Demand	24.0	20.0	D	mg/L	2	9/30/2016 3:18:15 PM
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Lab ID: 1609348-005

Collection Date: 9/28/2016 10:46:00 AM

Client Sample ID: PAI-26-S-160928

Matrix: Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
----------	--------	----	------	-------	----	---------------

Dissolved Metals by EPA Method 200.8

Batch ID: 14968

Analyst: TN

Arsenic	898	5.00	D	µg/L	10	9/29/2016 11:19:19 AM
Iron	75,800	500	D	µg/L	10	9/29/2016 11:19:19 AM

Chemical Oxygen Demand by SM 5220D

Batch ID: R32068

Analyst: MW

Chemical Oxygen Demand	49.2	20.0	D	mg/L	2	9/30/2016 3:18:15 PM
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CLIENT: GeoEngineers
Project: Gas Works Park Site

Lab ID: 1609348-006

Collection Date: 9/28/2016

Client Sample ID: D-160928

Matrix: Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
----------	--------	----	------	-------	----	---------------

Dissolved Metals by EPA Method 200.8

Batch ID: 14968

Analyst: TN

Arsenic	904	0.500		µg/L	1	9/29/2016 11:34:17 AM
Iron	72,300	50.0		µg/L	1	9/29/2016 11:34:17 AM

Chemical Oxygen Demand by SM 5220D

Batch ID: R32068

Analyst: MW

Chemical Oxygen Demand	43.9	20.0	D	mg/L	2	9/30/2016 3:18:15 PM
------------------------	------	------	---	------	---	----------------------

Lab ID: 1609348-007

Collection Date: 9/28/2016 4:14:00 PM

Client Sample ID: PAI-27-S-160928

Matrix: Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
----------	--------	----	------	-------	----	---------------

Dissolved Metals by EPA Method 200.8

Batch ID: 14968

Analyst: TN

Arsenic	29.6	0.500		µg/L	1	9/29/2016 11:55:32 AM
Iron	9,480	50.0		µg/L	1	9/29/2016 11:55:32 AM

Chemical Oxygen Demand by SM 5220D

Batch ID: R32068

Analyst: MW

Chemical Oxygen Demand	70.4	20.0	D	mg/L	2	9/30/2016 3:18:15 PM
------------------------	------	------	---	------	---	----------------------



CLIENT: GeoEngineers
Project: Gas Works Park Site

Lab ID: 1609348-008

Collection Date: 9/28/2016 4:47:00 PM

Client Sample ID: PAI-27-D-160928

Matrix: Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
<u>Dissolved Metals by EPA Method 200.8</u>				Batch ID: 14968		Analyst: TN
Arsenic	647	0.500		µg/L	1	9/29/2016 11:41:21 AM
Iron	3,860	50.0		µg/L	1	9/29/2016 11:41:21 AM
<u>Chemical Oxygen Demand by SM 5220D</u>				Batch ID: R32068		Analyst: MW
Chemical Oxygen Demand	133	20.0	D	mg/L	2	9/30/2016 3:18:15 PM

Grain Size by ASTM D422

Project: Gas Works Park Site
 Client: GeoEngineers
 Lab Project #: 1609348

Percent Finer (Passing) than the Indicated Size

UOM = Percent

Grain Size Classification	Gravel						Coarse Sand	Medium Sand		Fine Sand			Silt		
	Sieve Size	3"	2"	1 1/2"	1"	3/4"	3/8"	#4	#10	#20	#40	#60	#140	#230	#325
Particle Size (Microns)	76200	50800	38100	25400	19050	9525	4750	2000	850	425	250	106	75	45	34
PAI-26-11.6-12.3	100%	100%	100%	100%	83.1%	70.1%	57.5%	41.3%	29.4%	20.2%	12.6%	4.40%	2.85%	1.39%	0.700%
PAI-26-20.25-25.25	100%	100%	100%	100%	91.1%	72.1%	68.0%	60.6%	55.0%	48.4%	37.5%	19.4%	12.0%	4.01%	1.28%
PAI-27-25.5-26.5	100%	100%	100%	100%	97.4%	90.8%	82.6%	75.6%	70.0%	60.6%	44.2%	17.4%	10.4%	3.50%	0.963%
PAI-27-10-12.5	100%	100%	100%	100%	89.0%	57.6%	41.6%	23.7%	13.8%	8.52%	5.67%	2.68%	1.83%	0.972%	0.603%

Grain Size by ASTM D422

Project: Gas Works Park Site
Client: GeoEngineers
Lab Project #: 1609348

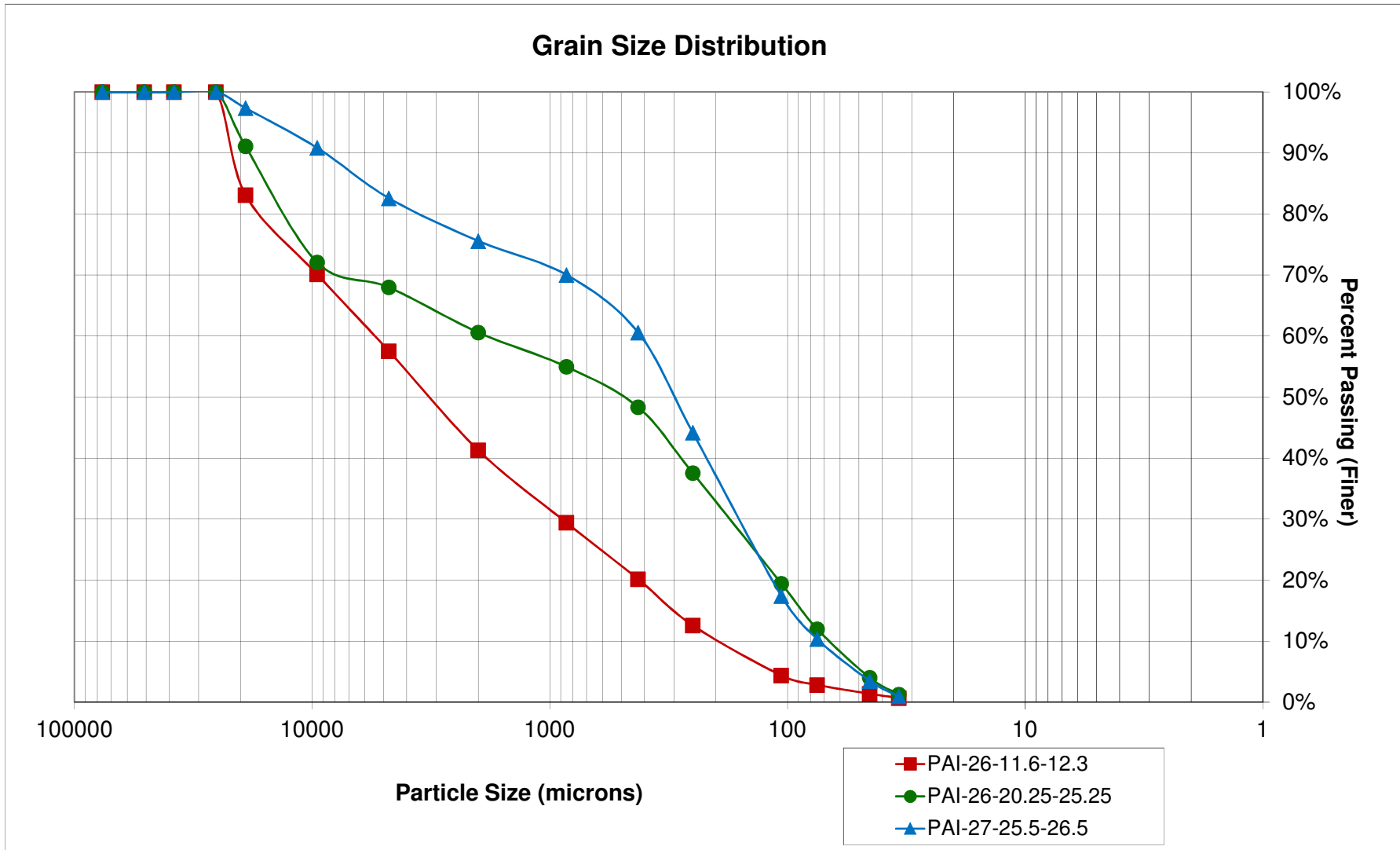
Percent Retained in Each Size Fraction

UOM = Percent

Grain Size Classification	Gravel							Coarse Sand	Medium Sand		Fine Sand			Silt		
	>76200	76200-50800	50800-38100	38100-25400	25400-19000	19050-9525	9525-4750	4750-2000	2000-850	850-425	425-250	250-106	106-62.5	72.5-45	45-34	<34
PAI-26-11.6-12.3	0.00%	0.00%	0.00%	0.00%	16.9%	13.0%	12.6%	16.2%	11.9%	9.24%	7.59%	8.17%	1.55%	1.46%	0.686%	0.699%
PAI-26-20.25-25.25	0.00%	0.00%	0.00%	0.00%	8.91%	19.0%	4.10%	7.38%	5.62%	6.61%	10.8%	18.1%	7.43%	7.98%	2.73%	1.28%
PAI-27-25.5-26.5	0.00%	0.00%	0.00%	0.00%	2.65%	6.51%	8.26%	7.00%	5.57%	9.43%	16.4%	26.8%	7.05%	6.86%	2.54%	0.963%
PAI-27-10-12.5	0.00%	0.00%	0.00%	0.00%	11.0%	31.2%	16.1%	17.8%	9.89%	5.27%	2.84%	2.99%	0.842%	0.857%	0.368%	0.602%

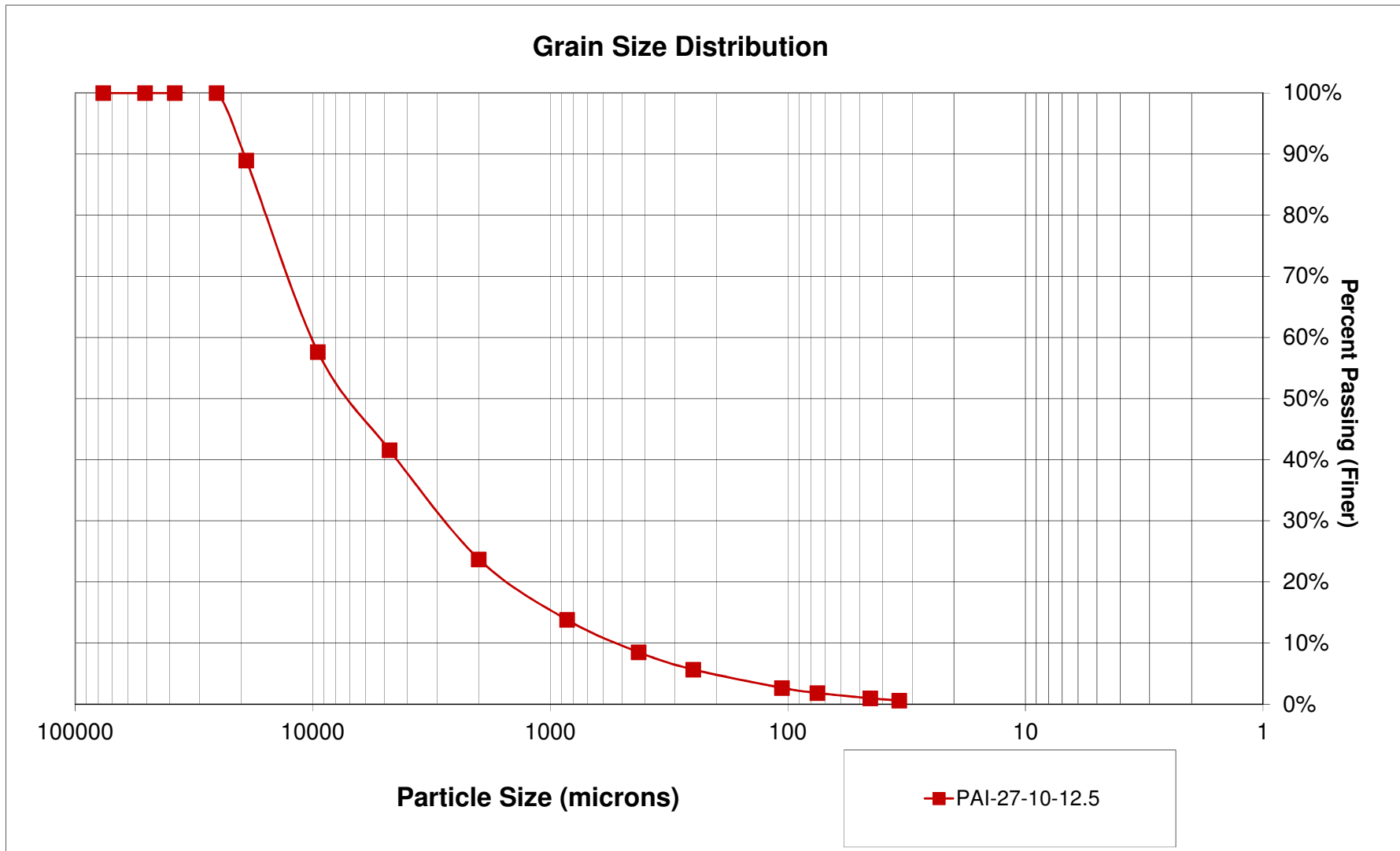
Grain Size by ASTM D422

Project: Gas Works Park Site
 Client: GeoEngineers
 Lab Project #: 1609348



Grain Size by ASTM D422

Project: Gas Works Park Site
 Client: GeoEngineers
 Lab Project #: 1609348





ALS Environmental
ALS Group USA, Corp
1317 South 13th Avenue
Bellevue, WA 98006
T: 1 360 577 7222
F: 1 360 636 1068
www.alsglobal.com

October 11, 2016

Analytical Report for Service Request No: 1611733

Mr. Michael Ridgeway
Fremont Analytical
3600 Fremont Avenue, North
Seattle, WA 98103

RE: COD

Dear Mr. Ridgeway,

Enclosed are the results of the sample(s) submitted to our laboratory September 30, 2016. For your reference, these analyses have been assigned our service request number **K1611733**.

Analyses were performed according to our laboratory's ISO 17025 AP-approved quality assurance program. The test results meet requirements of the current ISO 17025 AP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of ISO 17025 AP-accredited analytes, refer to the certifications section at www.alsglobal.com. All results are intended to be considered in their entirety, and ALS Group USA, Corp. dba ALS Environmental (ALS) is not responsible for use of less than the complete report. Results apply only to the items submitted to the laboratory for analysis and individual items (samples) analyzed, as listed in the report.

Please contact me if you have any questions. My extension is 3375. You may also contact me via email at janet.Malloch@alsglobal.com.

Respectfully submitted,

ALS Group USA, Corp. dba ALS Environmental

Janet Malloch
Project Manager



A S Environmental
A S roup SA, orp
1317 South 13th Avenue
also, WA 98626
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Table of Contents

Acronyms

Qualifiers

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General Chemistry

Acronyms

ASTM	American Society for Testing and Materials
A2LA	American Association for Laboratory Accreditation
CARB	California Air Resources Board
CAS Number	Chemical Abstract Service registry Number
CFC	Chlorofluorocarbon
CFU	Colony-Forming Unit
DEC	Department of Environmental Conservation
DEQ	Department of Environmental Quality
DHS	Department of Health Services
DOE	Department of Ecology
DOH	Department of Health
EPA	U. S. Environmental Protection Agency
ELAP	Environmental Laboratory Accreditation Program
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
LOD	Limit of Detection
LOQ	Limit of Quantitation
LUFT	Leaking Underground Fuel Tank
M	Modified
MCL	Maximum Contaminant Level is the highest permissible concentration of a substance allowed in drinking water as established by the USEPA.
MDL	Method Detection Limit
MPN	Most Probable Number
MRL	Method Reporting Limit
NA	Not Applicable
NC	Not Calculated
NCASI	National Council of the Paper Industry for Air and Stream Improvement
ND	Not Detected
NIOSH	National Institute for Occupational Safety and Health
PQL	Practical Quantitation Limit
RCRA	Resource Conservation and Recovery Act
SIM	Selected Ion Monitoring
TPH	Total Petroleum Hydrocarbons
tr	Trace level is the concentration of an analyte that is less than the PQL but greater than or equal to the MDL.

Inorganic Data Qualifiers

- * The result is an outlier. See case narrative.
- # The control limit criteria is not applicable. See case narrative.
- B The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards.
- E The result is an estimate amount because the value exceeded the instrument calibration range.
- J The result is an estimated value.
- U The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
DOD-QSM 4.2 definition : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
- i The MRL/MDL or LOQ/LOD is elevated due to a matrix interference.
- X See case narrative.
- Q See case narrative. One or more quality control criteria was outside the limits.
- H The holding time for this test is immediately following sample collection. The samples were analyzed as soon as possible after receipt by the laboratory.

Metals Data Qualifiers

- # The control limit criteria is not applicable. See case narrative.
- J The result is an estimated value.
- E The percent difference for the serial dilution was greater than 10%, indicating a possible matrix interference in the sample.
- M The duplicate injection precision was not met.
- N The Matrix Spike sample recovery is not within control limits. See case narrative.
- S The reported value was determined by the Method of Standard Additions (MSA).
- U The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
DOD-QSM 4.2 definition : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
- W The post-digestion spike for furnace AA analysis is out of control limits, while sample absorbance is less than 50% of spike absorbance.
 - i The MRL/MDL or LOQ/LOD is elevated due to a matrix interference.
- X See case narrative.
- + The correlation coefficient for the MSA is less than 0.995.
- Q See case narrative. One or more quality control criteria was outside the limits.

Organic Data Qualifiers

- * The result is an outlier. See case narrative.
- # The control limit criteria is not applicable. See case narrative.
- A A tentatively identified compound, a suspected aldol-condensation product.
- B The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards.
- C The analyte was qualitatively confirmed using GC/MS techniques, pattern recognition, or by comparing to historical data.
- D The reported result is from a dilution.
- E The result is an estimated value.
- J The result is an estimated value.
- N The result is presumptive. The analyte was tentatively identified, but a confirmation analysis was not performed.
- P The GC or HPLC confirmation criteria was exceeded. The relative percent difference is greater than 40% between the two analytical results.
- U The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
DOD-QSM 4.2 definition : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
- i The MRL/MDL or LOQ/LOD is elevated due to a chromatographic interference.
- X See case narrative.
- Q See case narrative. One or more quality control criteria was outside the limits.

Additional Petroleum Hydrocarbon Specific Qualifiers

- F The chromatographic fingerprint of the sample matches the elution pattern of the calibration standard.
- L The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of lighter molecular weight constituents than the calibration standard.
- H The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of heavier molecular weight constituents than the calibration standard.
- O The chromatographic fingerprint of the sample resembles an oil, but does not match the calibration standard.
- Y The chromatographic fingerprint of the sample resembles a petroleum product eluting in approximately the correct carbon range, but the elution pattern does not match the calibration standard.
- Z The chromatographic fingerprint does not resemble a petroleum product.

**ALS Group USA Corp. dba ALS Environmental (ALS) - Kelso
State Certifications, Accreditations, and Licenses**

Agency	Web Site	Number
Alaska DEC UST	http://dec.alaska.gov/applications/eh/ehllabreports/USTLabs.aspx	UST-040
Arizona DHS	http://www.azdhs.gov/lab/license/env.htm	AZ0339
Arkansas - DEQ	http://www.adeq.state.ar.us/techsvs/labcert.htm	88-0637
California DHS (ELAP)	http://www.cdph.ca.gov/certlic/labs/Pages/ELAP.aspx	2795
DOD ELAP	http://www.denix.osd.mil/edqw/Accreditation/AccreditedLabs.cfm	L14-51
Florida DOH	http://www.doh.state.fl.us/lab/EnvLabCert/WaterCert.htm	E87412
Hawaii DOH	Not available	-
ISO 17025	http://www.pjllabs.com/	L16-57
Louisiana DEQ	http://www.deq.louisiana.gov/portal/DIVISIONS/PublicParticipationandPermitSupport/LouisianaLaboratoryAccreditationProgram.aspx	03016
Maine DHS	Not available	WA01276
Minnesota DOH	http://www.health.state.mn.us/accreditation	053-999-457
Montana DPHHS	http://www.dphhs.mt.gov/publichealth/	CERT0047
Nevada DEP	http://ndep.nv.gov/bsdw/labservice.htm	WA01276
New Jersey DEP	http://www.nj.gov/dep/oqa/	WA005
North Carolina DWQ	http://www.dwqlab.org/	605
Oklahoma DEQ	http://www.deq.state.ok.us/CSDnew/labcert.htm	9801
Oregon – DEQ (NELAP)	http://public.health.oregon.gov/LaboratoryServices/EnvironmentalLaboratoryAccreditation/Pages/index.aspx	WA100010
South Carolina DHEC	http://www.scdhec.gov/environment/envserv/	61002
Texas CEQ	http://www.tceq.texas.gov/field/qa/env_lab_accreditation.html	T104704427
Washington DOE	http://www.ecy.wa.gov/programs/eap/labs/lab-accreditation.html	C544
Wyoming (EPA Region 8)	http://www.epa.gov/region8/water/dwhome/wyomingdi.html	-
Kelso Laboratory Website	www.alsglobal.com	NA

Analyses were performed according to our laboratory's NELAP-approved quality assurance program. A complete listing of specific NELAP-certified analytes, can be found in the certification section at www.ALSGlobal.com or at the accreditation bodies web site.

Please refer to the certification and/or accreditation body's web site if samples are submitted for compliance purposes. The states highlighted above, require the analysis be listed on the state certification if used for compliance purposes and if the method/analyte is offered by that state.



Case Narrative

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360)577-7222 Fax (360)636-1068
www.alsglobal.com

ALS ENVIRONMENTAL

Client: Fremont Analytical
Project: NA
Sample Matrix: Soil

Service Request No.: K1611733
Date Received: 09/30/16

Case Narrative

All analyses were performed consistent with the quality assurance program of ALS Environmental. This report contains analytical results for samples designated for Tier II data deliverables. When appropriate to the method, method blank results have been reported with each analytical test. Additional quality control analyses reported herein include: Laboratory Duplicate (DUP), Matrix Spike (MS), and Matrix/Duplicate Matrix Spike (MS/DMS).

Sample Receipt

Four soil samples were received for analysis at ALS Environmental on 09/30/16. The samples were received in good condition and consistent with the accompanying chain of custody form. The samples were stored in a refrigerator at 4°C upon receipt at the laboratory.

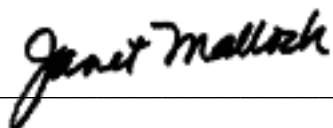
General Chemistry Parameters

Chemical Oxygen Demand by Standard Method 5220 C Modified:

The Relative Percent Difference (RPD) for the replicate analysis in sample Batch QC was outside the normal ALS control limits. The variability in the results was attributed to the heterogeneous character of the sample. Standard mixing techniques were used, but were not sufficient for complete homogenization of this sample.

No other anomalies associated with the analysis of these samples were observed.

Approved by _____





Chain of Custody

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360)577-7222 Fax (360)636-1068
www.alsglobal.com



CHAIN OF CUSTODY RECORD

Omega COCID 285

PAGE: 1 OF: 1

ADDRESS

Fremont Analytical, Inc.
 3600 Fremont Ave. N.
 Seattle, WA 98103
 TEL: 206-352-3790
 FAX: 206-352-7178

Website: www.fremontanalytical.com

K1611733

SUB CONTRACTOR: ALS		COMPANY: ALS Environmental		SPECIAL INSTRUCTIONS / COMMENTS: Please email results to Mike Ridgeway at mridgeway@fremontanalytical.com and Chelsea Ward at cward@fremontanalytical.com.			
ADDRESS: 1317 South 13th Avenue							
CITY, STATE, ZIP: Kelso, WA 98626							
PHONE: (360) 577-7222		FAX: _____					
ACCOUNT #:							

ITEM #	SAMPLE ID	CLIENT SAMPLE ID	BOTTLE TYPE	MATRIX	DATE COLLECTED	NUMBER OF CONTAINERS	COMMENTS: Methanol Preserved Weights HOT Sample Notation, Additional Sample Description.
1	1609348-001B	PAI-26-11.6-12.3	CLEAR JARS 4 O	Soil	9/28/2016 10:20:00 AM	1	Chemical Oxygen Demand by SM5220, Low Level RL
	TEST_SUB						
2	1609348-003B	PAI-26-20.25-25.2	CLEAR JARS 4 O	Soil	9/28/2016 10:30:00 AM	1	Chemical Oxygen Demand by SM5220, Low Level RL
	TEST_SUB						
3	1609348-009B	PAI-27-25.5-26.5	CLEAR JARS 4 O	Soil	9/28/2016 3:30:00 PM	1	Chemical Oxygen Demand by SM5220, Low Level RL
	TEST_SUB						
4	1609348-010B	PAI-27-10-12.5	CLEAR JARS 4 O	Soil	9/28/2016 3:25:00 PM	1	Chemical Oxygen Demand by SM5220, Low Level RL
	TEST_SUB						

Relinquished By: <i>[Signature]</i>	Date: 9/29/16	Time: 1:25	Received By: <i>[Signature]</i>	Date: 9-30-16	Time: 9:40
Relinquished By:	Date:	Time:	Received By:	Date:	Time:
Relinquished By:	Date:	Time:	Received By:	Date:	Time:
TAT: Standard <input checked="" type="checkbox"/> RUSH Next BD <input type="checkbox"/> 2nd BD <input type="checkbox"/> 3rd BD <input type="checkbox"/> Note: RUSH requests will incur surcharges!					

REPORT TRANSMITTAL DESIRED:	
<input type="checkbox"/> HARD COPY (extra cost)	<input type="checkbox"/> FAX <input checked="" type="checkbox"/> EMAIL <input type="checkbox"/> ONLINE
FOR LAB USE ONLY	
Temp of samples _____ °C	Attempt to Cool? _____
Comments: _____	



PC Just

Cooler Receipt and Preservation Form

Client Fremont analytical Service Request K16 11733
Received: 9-30-16 Opened: 9-30-16 By: eg Unloaded: 9-30-16 By: CS

- 1. Samples were received via? USPS FedEx UPS DHL PDX Courier Hand Delivered
- 2. Samples were received in: (circle) Cooler Box CS Envelope Other _____ NA
- 3. Were custody seals on coolers? NA Y N If yes, how many and where? _____
If present, were custody seals intact? Y N If present, were they signed and dated? Y N

Raw Cooler Temp	Corrected Cooler Temp	Raw Temp Blank	Corrected Temp Blank	Corr. Factor	Thermometer ID	Cooler/COC ID NA	Tracking Number NA	Filed
-0.5	-0.5	2.7	2.7	0	298		1Z X61 92X03 3202 6849	

- 4. Packing material: Inserts Baggies Bubble Wrap Gel Packs Wet Ice Dry Ice Sleeves _____
- 5. Were custody papers properly filled out (ink, signed, etc.)? NA Y N
- 6. Were samples received in good condition (temperature, unbroken)? *Indicate in the table below.* NA Y N
If applicable, tissue samples were received: Frozen Partially Thawed Thawed
- 7. Were all sample labels complete (i.e analysis, preservation, etc.)? NA Y N
- 8. Did all sample labels and tags agree with custody papers? *Indicate major discrepancies in the table on page 2.* NA Y N
- 9. Were appropriate bottles/containers and volumes received for the tests indicated? NA Y N
- 10. Were the pH-preserved bottles (*see SMO GEN SOP*) received at the appropriate pH? *Indicate in the table below* NA Y N
- 11. Were VOA vials received without headspace? *Indicate in the table below.* NA Y N
- 12. Was C12/Res negative? NA Y N

Sample ID on Bottle	Sample ID on COC	Identified by:

Sample ID	Bottle Count	Bottle Type	Out of Temp	Head-space	Broke	pH	Reagent	Volume added	Reagent Lot Number	Initials	Time

Notes, Discrepancies, & Resolutions: _____



General Chemistry

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360)577-7222 Fax (360)636-1068
www.alsglobal.com

ALS Group USA, Corp.
dba ALS Environmental

Analytical Report

Client: Fremont Analytical
Project: COD
Sample Matrix: Soil
Analysis Method: SM 5220 C Modified
Prep Method: ALS SOP

Service Request: K1611733
Date Collected: 09/28/16
Date Received: 09/30/16
Units: mg/Kg
Basis: Dry

Chemical Oxygen Demand (COD)

Sample Name	Lab Code	Result	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
1609348-001B	K1611733-001	131000	1800	-	1	10/07/16 16:00	10/7/16	
1609348-003B	K1611733-002	3490	800	-	1	10/07/16 16:00	10/7/16	
1609348-009B	K1611733-003	4600	1000	-	1	10/07/16 16:00	10/7/16	
1609348-010B	K1611733-004	43200	610	-	1	10/07/16 16:00	10/7/16	
Method Blank	K1611733-MB	ND U	200	-	1	10/07/16 16:00	NA	

ALS Group USA, Corp.

dba ALS Environmental

QA/QC Report

Client: Fremont Analytical
Project: COD
Sample Matrix: Soil

Service Request: K1611733
Date Collected: NA
Date Received: NA
Date Analyzed: 10/07/16

Replicate Sample Summary
General Chemistry Parameters

Sample Name: Batch QC
Lab Code: K1611836-001

Units: mg/Kg
Basis: Dry

<u>Analyte Name</u>	<u>Analysis Method</u>	<u>MRL</u>	<u>MDL</u>	<u>Sample Result</u>	<u>Duplicate Sample K1611836-001DUP Result</u>	<u>Average</u>	<u>RPD</u>	<u>RPD Limit</u>
Chemical Oxygen Demand (COD)	SM 5220 C Modified	610	-	5970	3720	4850	47 *	20

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client: Fremont Analytical
Project: COD
Sample Matrix: Soil

Service Request: K1611733
Date Collected: N/A
Date Received: N/A
Date Analyzed: 10/7/16
Date Extracted: 10/7/16

Matrix Spike Summary
Chemical Oxygen Demand (COD)

Sample Name: Batch QC
Lab Code: K1611836-001
Analysis Method: SM 5220 C Modified
Prep Method: ALS SOP

Units: mg/Kg
Basis: Dry

Matrix Spike
K1611836-001MS

<u>Analyte Name</u>	<u>Sample Result</u>	<u>Result</u>	<u>Spike Amount</u>	<u>% Rec</u>	<u>% Rec Limits</u>
Chemical Oxygen Demand (COD)	5970	64500	52400	112	75-125

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client: Fremont Analytical
Project: COD
Sample Matrix: Soil

Service Request: K1611733
Date Analyzed: 10/07/16
Date Extracted: NA

Lab Control Sample Summary
Chemical Oxygen Demand (COD)

Analysis Method: SM 5220 C Modified
Prep Method: None

Units: mg/Kg
Basis: Dry
Analysis Lot: 517791

Sample Name	Lab Code	Result	Spike Amount	% Rec	% Rec Limits
Lab Control Sample	K1611733-LCS	4540	4840	94	85-115

Work Order: 1609348
CLIENT: GeoEngineers
Project: Gas Works Park Site

QC SUMMARY REPORT
Dissolved Metals by EPA Method 200.8

Sample ID MB-14968	SampType: MBLK	Units: µg/L			Prep Date: 9/29/2016	RunNo: 32034					
Client ID: MBLKW	Batch ID: 14968				Analysis Date: 9/29/2016	SeqNo: 605751					
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Arsenic	ND	0.500									
Iron	ND	50.0									

Sample ID LCS-14968	SampType: LCS	Units: µg/L			Prep Date: 9/29/2016	RunNo: 32034					
Client ID: LCSW	Batch ID: 14968				Analysis Date: 9/29/2016	SeqNo: 605752					
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Arsenic	99.3	0.500	100.0	0	99.3	85	115				
Iron	1,010	50.0	1,000	0	101	50	150				

Sample ID 1609348-004ADUP	SampType: DUP	Units: µg/L			Prep Date: 9/29/2016	RunNo: 32034					
Client ID: PAI-26-D-160928	Batch ID: 14968				Analysis Date: 9/29/2016	SeqNo: 605754					
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Arsenic	521	0.500						513.4	1.45	30	
Iron	13,700	50.0						13,130	4.02	30	

Sample ID 1609348-004AMS	SampType: MS	Units: µg/L			Prep Date: 9/29/2016	RunNo: 32034					
Client ID: PAI-26-D-160928	Batch ID: 14968				Analysis Date: 9/29/2016	SeqNo: 605755					
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Arsenic	1,060	0.500	500.0	513.4	109	70	130				
Iron	18,100	50.0	5,000	13,130	99.1	50	150				

Sample ID 1609348-004AMSD	SampType: MSD	Units: µg/L			Prep Date: 9/29/2016	RunNo: 32034					
Client ID: PAI-26-D-160928	Batch ID: 14968				Analysis Date: 9/29/2016	SeqNo: 605759					
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Arsenic	1,080	0.500	500.0	513.4	114	70	130	1,059	2.27	30	
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Work Order: 1609348
CLIENT: GeoEngineers
Project: Gas Works Park Site

QC SUMMARY REPORT
Dissolved Metals by EPA Method 200.8

Sample ID	1609348-004AMSD	SampType:	MSD	Units:	µg/L	Prep Date:	9/29/2016	RunNo:	32034		
Client ID:	PAI-26-D-160928	Batch ID:	14968	Analysis Date:	9/29/2016	SeqNo:	605759				
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Iron	18,800	50.0	5,000	13,130	113	50	150	18,080	3.65	30	

Client Name: **GEI**
 Logged by: **Erica Silva**

Work Order Number: **1609348**
 Date Received: **9/28/2016 5:32:00 PM**

Chain of Custody

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

Log In

3. Coolers are present? Yes No NA
 4. Shipping container/cooler in good condition? Yes No
 5. Custody Seals present on shipping container/cooler?
 (Refer to comments for Custody Seals not intact) Yes No Not 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
 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:	<input type="text"/>	Date:	<input type="text"/>
By Whom:	<input type="text"/>	Via:	<input type="checkbox"/> eMail <input type="checkbox"/> Phone <input type="checkbox"/> Fax <input type="checkbox"/> In Person
Regarding:	<input type="text"/>		
Client Instructions:	<input type="text"/>		

19. Additional remarks:

Item Information

Item #	Temp °C
Cooler	4.3
Sample	1.2
Temp Blank	5.3

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



GeoEngineers

Sandra Smith
600 Stewart Street, Suite 1700
Seattle, WA 98101

RE: Gas Works Park Site
Work Order Number: 1609367

October 27, 2016

Attention Sandra Smith:

Fremont Analytical, Inc. received 8 sample(s) on 9/29/2016 for the analyses presented in the following report.

Chemical Oxygen Demand by SM 5220D
Dissolved Metals by EPA Method 200.8
Grain Size by ASTM D422

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

CC:
Claudia De La Via



CLIENT: GeoEngineers
Project: Gas Works Park Site
Work Order: 1609367

Work Order Sample Summary

Lab Sample ID	Client Sample ID	Date/Time Collected	Date/Time Received
1609367-001	PAI-28-10.0-11.0	09/29/2016 9:25 AM	09/29/2016 5:42 PM
1609367-002	PAI-28-S-160929	09/29/2016 10:21 AM	09/29/2016 5:42 PM
1609367-003	RINSE-160929	09/29/2016 2:30 PM	09/29/2016 5:42 PM
1609367-004	PAI-29-7.9-8.4	09/29/2016 3:00 PM	09/29/2016 5:42 PM
1609367-005	PAI-29-8.4-9.2	09/29/2016 3:05 PM	09/29/2016 5:42 PM
1609367-006	PAI-30-8-9	09/29/2016 4:35 PM	09/29/2016 5:42 PM
1609367-007	PAI-30-16.7-18.2	09/29/2016 4:40 PM	09/29/2016 5:42 PM
1609367-008	PAI-30-S-160929	09/29/2016 4:40 PM	09/29/2016 5:42 PM

CLIENT: GeoEngineers
Project: Gas Works Park Site

I. SAMPLE RECEIPT:

Samples receipt information is recorded on the attached Sample Receipt Checklist.

II. GENERAL REPORTING COMMENTS:

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

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

III. ANALYSES AND EXCEPTIONS:

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

1609367-001B

TEST_SUB has been Sub Contracted.

1609367-004B

TEST_SUB has been Sub Contracted.

1609367-006B

TEST_SUB has been Sub Contracted.



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



Client: GeoEngineers

Collection Date: 9/29/2016 10:21:00 AM

Project: Gas Works Park Site

Lab ID: 1609367-002

Matrix: Water

Client Sample ID: PAI-28-S-160929

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
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Dissolved Metals by EPA Method 200.8

Batch ID: 14980

Analyst: TN

Arsenic	544	0.500		µg/L	1	9/30/2016 11:06:13 AM
Iron	3,870	50.0		µg/L	1	9/30/2016 11:06:13 AM

Chemical Oxygen Demand by SM 5220D

Batch ID: R32169

Analyst: MW

Chemical Oxygen Demand	28.0	20.0	D	mg/L	2	10/6/2016 2:02:37 PM
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Client: GeoEngineers

Collection Date: 9/29/2016 2:30:00 PM

Project: Gas Works Park Site

Lab ID: 1609367-003

Matrix: Water

Client Sample ID: RINSE-160929

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
----------	--------	----	------	-------	----	---------------

Dissolved Metals by EPA Method 200.8

Batch ID: 14980 Analyst: TN

Arsenic	0.589	0.500		µg/L	1	9/30/2016 10:36:13 AM
Iron	ND	50.0		µg/L	1	9/30/2016 10:36:13 AM

Chemical Oxygen Demand by SM 5220D

Batch ID: R32169 Analyst: MW

Chemical Oxygen Demand	ND	10.0		mg/L	1	10/6/2016 2:02:37 PM
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Client: GeoEngineers

Collection Date: 9/29/2016 4:40:00 PM

Project: Gas Works Park Site

Lab ID: 1609367-008

Matrix: Water

Client Sample ID: PAI-30-S-160929

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
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Dissolved Metals by EPA Method 200.8

Batch ID: 14980 Analyst: TN

Arsenic	140	0.500		µg/L	1	9/30/2016 11:09:45 AM
Iron	8,150	50.0		µg/L	1	9/30/2016 11:09:45 AM

Chemical Oxygen Demand by SM 5220D

Batch ID: R32169 Analyst: MW

Chemical Oxygen Demand	26.7	20.0	D	mg/L	2	10/6/2016 2:02:37 PM
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Grain Size by ASTM D422

Project: Gas Works Park Site
Client: GeoEngineers
Lab Project #: 1609367

Percent Finer (Passing) than the Indicated Size

UOM = Percent

Grain Size Classification	Gravel						Coarse Sand	Medium Sand		Fine Sand			Silt		
	Sieve Size	3"	2"	1 1/2"	1"	3/4"	3/8"	#4	#10	#20	#40	#60	#140	#230	#325
Particle Size (Microns)	76200	50800	38100	25400	19050	9525	4750	2000	850	425	250	106	75	45	34
PAI-28-10.0-11.0	100%	100%	100%	100%	86.1%	74.8%	64.2%	51.5%	40.9%	29.1%	16.9%	5.46%	3.21%	1.29%	0.451%
PAI-29-7.9-8.4	100%	100%	100%	100%	90.7%	79.6%	57.3%	38.2%	27.3%	19.7%	13.9%	6.16%	3.85%	1.64%	0.784%
PAI-30-8-9	100%	100%	100%	100%	96.2%	80.9%	72.3%	57.6%	44.5%	32.4%	21.9%	10.5%	6.93%	2.99%	0.834%

Grain Size by ASTM D422

Project: Gas Works Park Site
Client: GeoEngineers
Lab Project #: 1609367

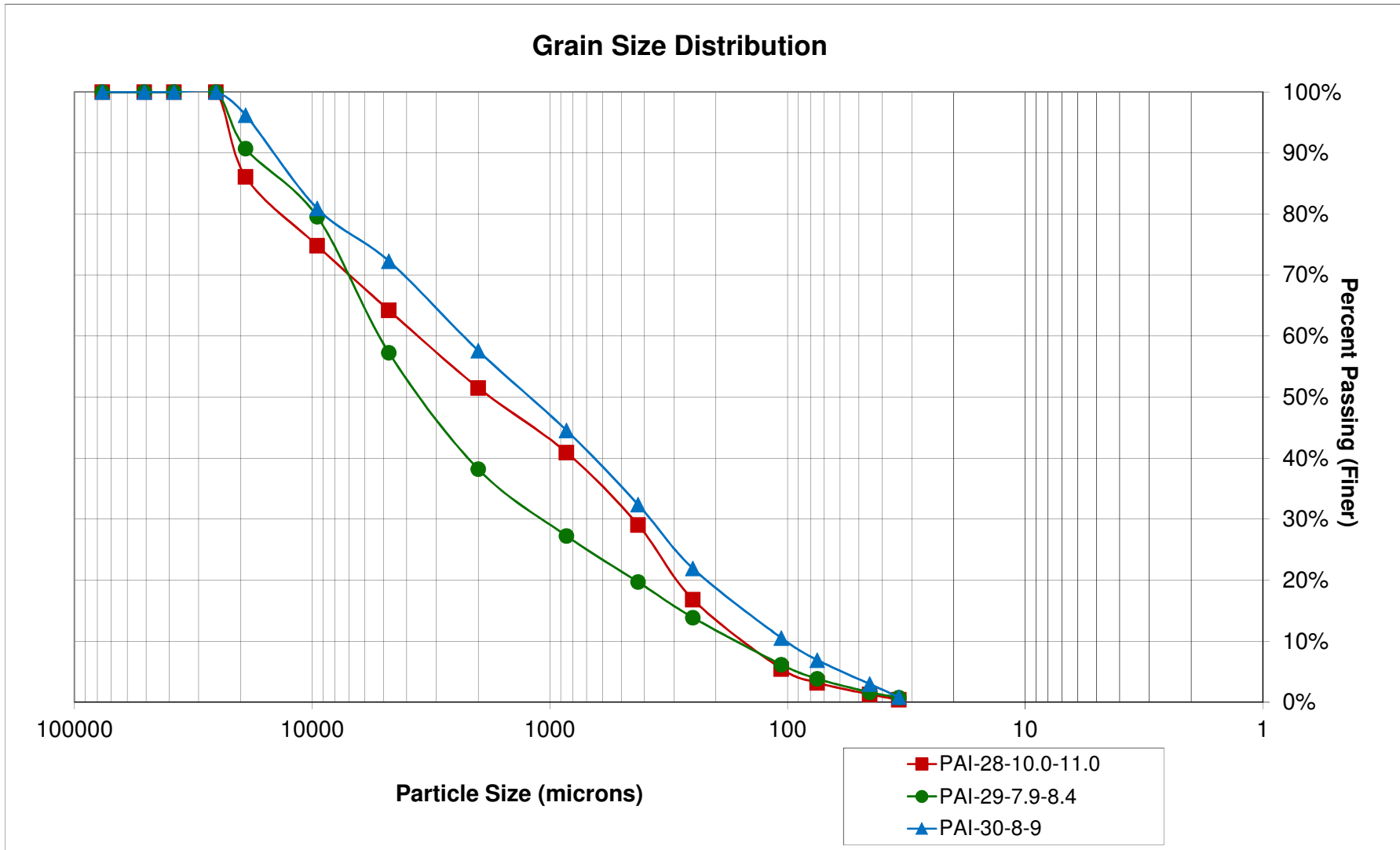
Percent Retained in Each Size Fraction

UOM = Percent

Grain Size Classification	Gravel							Coarse Sand	Medium Sand		Fine Sand			Silt		
	>76200	76200-50800	50800-38100	38100-25400	25400-19000	19050-9525	9525-4750	4750-2000	2000-850	850-425	425-250	250-106	106-62.5	62.5-45	45-34	<34
PAI-28-10.0-11.0	0.00%	0.00%	0.00%	0.00%	13.9%	11.2%	10.6%	12.7%	10.6%	11.9%	12.2%	11.4%	2.25%	1.91%	0.840%	0.450%
PAI-29-7.9-8.4	0.00%	0.00%	0.00%	0.00%	9.28%	11.1%	22.3%	19.1%	10.9%	7.55%	5.82%	7.72%	2.31%	2.21%	0.855%	0.784%
PAI-30-8-9	0.00%	0.00%	0.00%	0.00%	3.80%	15.2%	8.62%	14.6%	13.0%	12.1%	10.4%	11.4%	3.59%	3.92%	2.15%	0.832%

Grain Size by ASTM D422

Project: Gas Works Park Site
 Client: GeoEngineers
 Lab Project #: 1609367





ALS Environmental
ALS Group USA, Corp
1317 South 13th Avenue
Bellevue, WA 98006
T: 1 360 577 7222
F: 1 360 636 1068
www.alsglobal.com

October 26, 2016

Analytical Report for Service Request No: 1612019

Mr. Michael Ridgeway
Fremont Analytical
3600 Fremont Avenue, North
Seattle, WA 98103

RE: 1609367

Dear Mr. Ridgeway,

Enclosed are the results of the sample(s) submitted to our laboratory October 06, 2016
For your reference, these analyses have been assigned our service request number **K1612019**.

Analyses were performed according to our laboratory's EPA-approved quality assurance program. The test results meet requirements of the current EPA standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of EPA-accredited analytes, refer to the certifications section at www.alsglobal.com. All results are intended to be considered in their entirety, and ALS Group USA, Corp. dba ALS Environmental (ALS) is not responsible for use of less than the complete report. Results apply only to the items submitted to the laboratory for analysis and individual items (samples) analyzed, as listed in the report.

Please contact me if you have any questions. My extension is 3375. You may also contact me via email at janet.Malloch@alsglobal.com.

Respectfully submitted,

ALS Group USA, Corp. dba ALS Environmental

Janet Malloch
Project Manager



A S Environmental
A S roup SA, orp
1317 South 13th Avenue
elso, WA 98626
T : 1 360 577 7222
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Table of Contents

Acronyms

Qualifiers

State Certifications, Accreditations, And Licenses

Chain of Custody

Total Solids

General Chemistry

Acronyms

ASTM	American Society for Testing and Materials
A2LA	American Association for Laboratory Accreditation
CARB	California Air Resources Board
CAS Number	Chemical Abstract Service registry Number
CFC	Chlorofluorocarbon
CFU	Colony-Forming Unit
DEC	Department of Environmental Conservation
DEQ	Department of Environmental Quality
DHS	Department of Health Services
DOE	Department of Ecology
DOH	Department of Health
EPA	U. S. Environmental Protection Agency
ELAP	Environmental Laboratory Accreditation Program
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
LOD	Limit of Detection
LOQ	Limit of Quantitation
LUFT	Leaking Underground Fuel Tank
M	Modified
MCL	Maximum Contaminant Level is the highest permissible concentration of a substance allowed in drinking water as established by the USEPA.
MDL	Method Detection Limit
MPN	Most Probable Number
MRL	Method Reporting Limit
NA	Not Applicable
NC	Not Calculated
NCASI	National Council of the Paper Industry for Air and Stream Improvement
ND	Not Detected
NIOSH	National Institute for Occupational Safety and Health
PQL	Practical Quantitation Limit
RCRA	Resource Conservation and Recovery Act
SIM	Selected Ion Monitoring
TPH	Total Petroleum Hydrocarbons
tr	Trace level is the concentration of an analyte that is less than the PQL but greater than or equal to the MDL.

Inorganic Data Qualifiers

- * The result is an outlier. See case narrative.
- # The control limit criteria is not applicable. See case narrative.
- B The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards.
- E The result is an estimate amount because the value exceeded the instrument calibration range.
- J The result is an estimated value.
- U The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
DOD-QSM 4.2 definition : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
- i The MRL/MDL or LOQ/LOD is elevated due to a matrix interference.
- X See case narrative.
- Q See case narrative. One or more quality control criteria was outside the limits.
- H The holding time for this test is immediately following sample collection. The samples were analyzed as soon as possible after receipt by the laboratory.

Metals Data Qualifiers

- # The control limit criteria is not applicable. See case narrative.
- J The result is an estimated value.
- E The percent difference for the serial dilution was greater than 10%, indicating a possible matrix interference in the sample.
- M The duplicate injection precision was not met.
- N The Matrix Spike sample recovery is not within control limits. See case narrative.
- S The reported value was determined by the Method of Standard Additions (MSA).
- U The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
DOD-QSM 4.2 definition : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
- W The post-digestion spike for furnace AA analysis is out of control limits, while sample absorbance is less than 50% of spike absorbance.
 - i The MRL/MDL or LOQ/LOD is elevated due to a matrix interference.
- X See case narrative.
- + The correlation coefficient for the MSA is less than 0.995.
- Q See case narrative. One or more quality control criteria was outside the limits.

Organic Data Qualifiers

- * The result is an outlier. See case narrative.
- # The control limit criteria is not applicable. See case narrative.
- A A tentatively identified compound, a suspected aldol-condensation product.
- B The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards.
- C The analyte was qualitatively confirmed using GC/MS techniques, pattern recognition, or by comparing to historical data.
- D The reported result is from a dilution.
- E The result is an estimated value.
- J The result is an estimated value.
- N The result is presumptive. The analyte was tentatively identified, but a confirmation analysis was not performed.
- P The GC or HPLC confirmation criteria was exceeded. The relative percent difference is greater than 40% between the two analytical results.
- U The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
DOD-QSM 4.2 definition : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
 - i The MRL/MDL or LOQ/LOD is elevated due to a chromatographic interference.
- X See case narrative.
- Q See case narrative. One or more quality control criteria was outside the limits.

Additional Petroleum Hydrocarbon Specific Qualifiers

- F The chromatographic fingerprint of the sample matches the elution pattern of the calibration standard.
- L The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of lighter molecular weight constituents than the calibration standard.
- H The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of heavier molecular weight constituents than the calibration standard.
- O The chromatographic fingerprint of the sample resembles an oil, but does not match the calibration standard.
- Y The chromatographic fingerprint of the sample resembles a petroleum product eluting in approximately the correct carbon range, but the elution pattern does not match the calibration standard.
- Z The chromatographic fingerprint does not resemble a petroleum product.

**ALS Group USA Corp. dba ALS Environmental (ALS) - Kelso
State Certifications, Accreditations, and Licenses**

Agency	Web Site	Number
Alaska DEC UST	http://dec.alaska.gov/applications/eh/ehllabreports/USTLabs.aspx	UST-040
Arizona DHS	http://www.azdhs.gov/lab/license/env.htm	AZ0339
Arkansas - DEQ	http://www.adeq.state.ar.us/techsvs/labcert.htm	88-0637
California DHS (ELAP)	http://www.cdph.ca.gov/certlic/labs/Pages/ELAP.aspx	2795
DOD ELAP	http://www.denix.osd.mil/edqw/Accreditation/AccreditedLabs.cfm	L14-51
Florida DOH	http://www.doh.state.fl.us/lab/EnvLabCert/WaterCert.htm	E87412
Hawaii DOH	Not available	-
ISO 17025	http://www.pjllabs.com/	L16-57
Louisiana DEQ	http://www.deq.louisiana.gov/portal/DIVISIONS/PublicParticipationandPermitSupport/LouisianaLaboratoryAccreditationProgram.aspx	03016
Maine DHS	Not available	WA01276
Minnesota DOH	http://www.health.state.mn.us/accreditation	053-999-457
Montana DPHHS	http://www.dphhs.mt.gov/publichealth/	CERT0047
Nevada DEP	http://ndep.nv.gov/bsdw/labservice.htm	WA01276
New Jersey DEP	http://www.nj.gov/dep/oqa/	WA005
North Carolina DWQ	http://www.dwqlab.org/	605
Oklahoma DEQ	http://www.deq.state.ok.us/CSDnew/labcert.htm	9801
Oregon – DEQ (NELAP)	http://public.health.oregon.gov/LaboratoryServices/EnvironmentalLaboratoryAccreditation/Pages/index.aspx	WA100010
South Carolina DHEC	http://www.scdhec.gov/environment/envserv/	61002
Texas CEQ	http://www.tceq.texas.gov/field/qa/env_lab_accreditation.html	T104704427
Washington DOE	http://www.ecy.wa.gov/programs/eap/labs/lab-accreditation.html	C544
Wyoming (EPA Region 8)	http://www.epa.gov/region8/water/dwhome/wyomingdi.html	-
Kelso Laboratory Website	www.alsglobal.com	NA

Analyses were performed according to our laboratory's NELAP-approved quality assurance program. A complete listing of specific NELAP-certified analytes, can be found in the certification section at www.ALSGlobal.com or at the accreditation bodies web site.

Please refer to the certification and/or accreditation body's web site if samples are submitted for compliance purposes. The states highlighted above, require the analysis be listed on the state certification if used for compliance purposes and if the method/analyte is offered by that state.



Chain of Custody

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360)577-7222 Fax (360)636-1068
www.alsglobal.com



CHAIN OF CUSTODY RECORD

Omega COCID 286

PAGE: 1 OF: 1

ADDRESS

Fremont Analytical, Inc.
3600 Fremont Ave. N.
Seattle, WA 98103
TEL: 206-352-3790
FAX: 206-352-7178

Website: www.fremontanalytical.com

K1612019

SUB CONTRACTOR: ALS	COMPANY: ALS Environmental	SPECIAL INSTRUCTIONS / COMMENTS: Please email results to Mike Ridgeway at mridgeway@fremontanalytical.com and Chelsea Ward at cward@fremontanalytical.com.
ADDRESS: 1317 South 13th Avenue		
CITY, STATE, ZIP: Kelso, WA 98626		
PHONE: (360) 577-7222	FAX: _____ EMAIL: _____	
ACCOUNT #: _____		

ITEM #	SAMPLE ID	CLIENT SAMPLE ID	BOTTLE TYPE	MATRIX	DATE COLLECTED	NUMBER OF CONTAINERS	COMMENTS: Methanol Preserved Weights HOT Sample Notation, Additional Sample Description.
1	1609367-001B	PAI-28-10.0-11.0	CLEAR JARS 4 O	Soil	9/29/2016 9:25:00 AM	1	Chemical Oxygen Demand by SM5220, Low Level RL
	TEST_SUB						
2	1609367-004B	PAI-29-7.9-8.4	CLEAR JARS 4 O	Soil	9/29/2016 3:00:00 PM	1	Chemical Oxygen Demand by SM5220, Low Level RL
	TEST_SUB						
3	1609367-006B	PAI-30-8-9	CLEAR JARS 4 O	Soil	9/29/2016 4:35:00 PM	1	Chemical Oxygen Demand by SM5220, Low Level RL
	TEST_SUB						

Relinquished By: <i>Wojcik</i>	Date: 10/5/16	Time: 16:09	Received By: <i>Cathy Brewer ALS</i>	Date: 10/6/16	Time: 1030
Relinquished By:	Date:	Time:	Received By:	Date:	Time:
Relinquished By:	Date:	Time:	Received By:	Date:	Time:

TAT: Standard RUSH Next BD 2nd BD 3rd BD

Note: RUSH requests will incur surcharges!

REPORT TRANSMITTAL DESIRED:

HARDCOPY (extra cost) FAX EMAIL ONLINE

FOR LAB USE ONLY

Temp of samples _____ °C Attempt to Cool? _____

Comments: _____



PC Janet

Cooler Receipt and Preservation Form

Client Fremont Analytical Service Request K16 12019
 Received: 10/6/16 Opened: 10/6/16 By: CG Unloaded: 10/6/16 By: CG

1. Samples were received via? Mail Fed Ex UPS DHL PDX Courier Hand Delivered
2. Samples were received in: (circle) Cooler Box Envelope Other NA
3. Were custody seals on coolers? NA Y N If yes, how many and where? _____
 If present, were custody seals intact? Y N If present, were they signed and dated? Y N

Raw Cooler Temp	Corrected Cooler Temp	Raw Temp Blank	Corrected Temp Blank	Corr. Factor	Thermometer ID	Cooler/COC ID	Tracking Number		NA	Filed
5.4	6.3			-0.1	325	286	NA	12 X61 92X 03 3205	4292	

4. Packing material: Inserts Baggies Bubble Wrap Gel Packs Wet Ice Dry Ice Sleeves _____
5. Were custody papers properly filled out (ink, signed, etc.)? NA Y N
6. Did all bottles arrive in good condition (unbroken)? *Indicate in the table below.* NA Y N
7. Were all sample labels complete (i.e analysis, preservation, etc.)? NA Y N
8. Did all sample labels and tags agree with custody papers? *Indicate major discrepancies in the table on page 2.* NA Y N
9. Were appropriate bottles/containers and volumes received for the tests indicated? NA Y N
10. Were the pH-preserved bottles (*see SMO GEN SOP*) received at the appropriate pH? *Indicate in the table below* NA Y N
11. Were VOA vials received without headspace? *Indicate in the table below.* NA Y N
12. Was C12/Res negative? NA Y N

Sample ID on Bottle	Sample ID on COC	Identified by:

Sample ID	Bottle Count	Bottle Type	Out of Temp	Head-space	Broke	pH	Reagent	Volume added	Reagent Lot Number	Initials	Time

Notes, Discrepancies, & Resolutions: _____



Total Solids

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360)577-7222 Fax (360)636-1068
www.alsglobal.com

ALS Group USA, Corp.
dba ALS Environmental

Analytical Report

Client: Fremont Analytical
Project: 1609367
Sample Matrix: Soil
Analysis Method: 160.3 Modified
Prep Method: None

Service Request: K1612019
Date Collected: 09/29/16
Date Received: 10/6/16
Units: Percent
Basis: As Received

Solids, Total

Sample Name	Lab Code	Result	MRL	MDL	Dil.	Date Analyzed	Q
1609367-003B PAI-28-10.0-11.0	K1612019-001	84.2	-	-	1	10/13/16 15:05	
1609367-004B PAI-29-7.9-8.4	K1612019-002	82.6	-	-	1	10/13/16 15:05	
1609367-006B PAI-30-8-9	K1612019-003	77.5	-	-	1	10/13/16 15:05	

ALS Group USA, Corp.

dba ALS Environmental

QA/QC Report

Client: Fremont Analytical
Project: 1609367
Sample Matrix: Soil
Analysis Method: 160.3 Modified
Prep Method: None

Service Request: K1612019
Date Collected: 09/29/16
Date Received: 10/06/16

Units: Percent
Basis: As Received

Replicate Sample Summary

Inorganic Parameters

Sample Name:	Lab Code:	MRL	Sample Result	Duplicate Result	Average	RPD	RPD Limit	Date Analyzed
1609367-004B PAI-29-7.9-8.4	K1612019-002DUP	-	82.6	84.8	83.7	3	20	10/13/16
Batch QC	K1612064-001DUP	-	84.3	84.2	84.3	<1	20	10/13/16

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.



General Chemistry

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360)577-7222 Fax (360)636-1068
www.alsglobal.com

ALS Group USA, Corp.
dba ALS Environmental

Analytical Report

Client: Fremont Analytical
Project: 1609367
Sample Matrix: Soil
Analysis Method: SM 5220 C Modified
Prep Method: ALS SOP

Service Request: K1612019
Date Collected: 09/29/16
Date Received: 10/6/16
Units: mg/Kg
Basis: Dry

Chemical Oxygen Demand (COD)

Sample Name	Lab Code	Result	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
1609367-003B PAI-28-10.0-11.0	K1612019-001	3880	240	-	1	10/24/16	10/20/16	
1609367-004B PAI-29-7.9-8.4	K1612019-002	4060	240	-	1	10/24/16	10/20/16	
1609367-006B PAI-30-8-9	K1612019-003	38000	260	-	1	10/24/16	10/20/16	
Method Blank	K1612019-MB1	ND U	200	-	1	10/24/16	10/20/16	
Method Blank	K1612019-MB2	ND U	200	-	1	10/24/16	10/20/16	

ALS Group USA, Corp.

dba ALS Environmental

QA/QC Report

Client: Fremont Analytical
Project 1609367
Sample Matrix: Soil

Service Request: K1612019
Date Collected: NA
Date Received: NA
Date Analyzed: 10/24/16

Replicate Sample Summary
General Chemistry Parameters

Sample Name: Batch QC
Lab Code: KQ1613642-07

Units: mg/Kg
Basis: Wet

<u>Analyte Name</u>	<u>Analysis Method</u>	<u>MRL</u>	<u>MDL</u>	<u>Sample Result</u>	<u>Duplicate Sample KQ1613642-07DUP Result</u>	<u>Average</u>	<u>RPD</u>	<u>RPD Limit</u>
Chemical Oxygen Demand (COD)	SM 5220 C Modified	10	-	59	67	62.8	13	20

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client: Fremont Analytical
Project: 1609367
Sample Matrix: Soil

Service Request: K1612019
Date Collected: N/A
Date Received: N/A
Date Analyzed: 10/24/16
Date Extracted: 10/20/16

Matrix Spike Summary
Chemical Oxygen Demand (COD)

Sample Name: Batch QC
Lab Code: KQ1613642-07
Analysis Method: SM 5220 C Modified
Prep Method: ALS SOP

Units: mg/Kg
Basis: Wet

Matrix Spike
KQ1613642-07MS

<u>Analyte Name</u>	<u>Sample Result</u>	<u>Result</u>	<u>Spike Amount</u>	<u>% Rec</u>	<u>% Rec Limits</u>
Chemical Oxygen Demand (COD)	59	1070	1000	101	75-125

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client: Fremont Analytical
Project: 1609367
Sample Matrix: Soil

Service Request: K1612019
Date Analyzed: 10/24/16
Date Extracted: 10/20/16

Lab Control Sample Summary
Chemical Oxygen Demand (COD)

Analysis Method: SM 5220 C Modified
Prep Method: ALS SOP

Units: mg/Kg
Basis: Dry
Analysis Lot: 520274

Sample Name	Lab Code	Result	Spike Amount	% Rec	% Rec Limits
Lab Control Sample	K1612019-LCS1	4860	4840	100	85-115
Lab Control Sample	K1612019-LCS2	4860	4840	100	85-115

Work Order: 1609367
CLIENT: GeoEngineers
Project: Gas Works Park Site

QC SUMMARY REPORT
Chemical Oxygen Demand by SM 5220D

Sample ID MB-R32169	SampType: MBLK	Units: mg/L	Prep Date: 10/6/2016	RunNo: 32169							
Client ID: MBLKW	Batch ID: R32169		Analysis Date: 10/6/2016	SeqNo: 608337							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chemical Oxygen Demand	ND	10.0									

Sample ID LCS-R32169	SampType: LCS	Units: mg/L	Prep Date: 10/6/2016	RunNo: 32169							
Client ID: LCSW	Batch ID: R32169		Analysis Date: 10/6/2016	SeqNo: 608338							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chemical Oxygen Demand	78.9	10.0	75.00	0	105	80	120				

Sample ID 1609367-002BDUP	SampType: DUP	Units: mg/L	Prep Date: 10/6/2016	RunNo: 32169							
Client ID: PAI-28-S-160929	Batch ID: R32169		Analysis Date: 10/6/2016	SeqNo: 608340							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chemical Oxygen Demand	36.0	20.0						28.01	24.8	30	D

Sample ID 1609367-002BMS	SampType: MS	Units: mg/L	Prep Date: 10/6/2016	RunNo: 32169							
Client ID: PAI-28-S-160929	Batch ID: R32169		Analysis Date: 10/6/2016	SeqNo: 608341							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chemical Oxygen Demand	197	20.0	150.0	28.01	113	70	130				D

Sample ID 1609367-002BMSD	SampType: MSD	Units: mg/L	Prep Date: 10/6/2016	RunNo: 32169							
Client ID: PAI-28-S-160929	Batch ID: R32169		Analysis Date: 10/6/2016	SeqNo: 608342							
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chemical Oxygen Demand	192	20.0	150.0	28.01	109	70	130	197.5	2.72	30	D



Work Order: 1609367
CLIENT: GeoEngineers
Project: Gas Works Park Site

QC SUMMARY REPORT
Dissolved Metals by EPA Method 200.8

Sample ID MB-14980	SampType: MBLK	Units: µg/L				Prep Date: 9/30/2016	RunNo: 32059				
Client ID: MBLKW	Batch ID: 14980					Analysis Date: 9/30/2016	SeqNo: 606207				
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Arsenic	ND	0.500									
Iron	ND	50.0									

Sample ID LCS-14980	SampType: LCS	Units: µg/L				Prep Date: 9/30/2016	RunNo: 32059				
Client ID: LCSW	Batch ID: 14980					Analysis Date: 9/30/2016	SeqNo: 606208				
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Arsenic	102	0.500	100.0	0	102	85	115				
Iron	1,020	50.0	1,000	0	102	50	150				

Sample ID 1609367-003ADUP	SampType: DUP	Units: µg/L				Prep Date: 9/30/2016	RunNo: 32059				
Client ID: RINSE-160929	Batch ID: 14980					Analysis Date: 9/30/2016	SeqNo: 606210				
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Arsenic	ND	0.500						0.5890	130	30	
Iron	ND	50.0						0		30	

Sample ID 1609367-003AMS	SampType: MS	Units: µg/L				Prep Date: 9/30/2016	RunNo: 32059				
Client ID: RINSE-160929	Batch ID: 14980					Analysis Date: 9/30/2016	SeqNo: 606211				
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Arsenic	500	0.500	500.0	0.5890	99.8	70	130				
Iron	5,040	50.0	5,000	24.43	100	50	150				

Sample ID 1609367-003AMSD	SampType: MSD	Units: µg/L				Prep Date: 9/30/2016	RunNo: 32059				
Client ID: RINSE-160929	Batch ID: 14980					Analysis Date: 9/30/2016	SeqNo: 606212				
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Arsenic	508	0.500	500.0	0.5890	102	70	130	499.5	1.73	30	
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Work Order: 1609367
CLIENT: GeoEngineers
Project: Gas Works Park Site

QC SUMMARY REPORT
Dissolved Metals by EPA Method 200.8

Sample ID 1609367-003AMSD	SampType: MSD	Units: µg/L			Prep Date: 9/30/2016	RunNo: 32059					
Client ID: RINSE-160929	Batch ID: 14980				Analysis Date: 9/30/2016	SeqNo: 606212					
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Iron	4,810	50.0	5,000	24.43	95.7	50	150	5,035	4.62	30	

Client Name: **GEI**
 Logged by: **Erica Silva**

Work Order Number: **1609367**
 Date Received: **9/29/2016 5:42:00 PM**

Chain of Custody

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

Log In

3. Coolers are present? Yes No NA
 4. Shipping container/cooler in good condition? Yes No
 5. Custody Seals present on shipping container/cooler?
 (Refer to comments for Custody Seals not intact) Yes No Not 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
 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:	<input type="text"/>	Date:	<input type="text"/>
By Whom:	<input type="text"/>	Via:	<input type="checkbox"/> eMail <input type="checkbox"/> Phone <input type="checkbox"/> Fax <input type="checkbox"/> In Person
Regarding:	<input type="text"/>		
Client Instructions:	<input type="text"/>		

19. Additional remarks:

Item Information

Item #	Temp °C
Cooler	3.8
Sample	2.0

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



Fremont
Analytical

3600 Fremont Ave N.
Seattle, WA 98103

Tel: 206-352-3790
Fax: 206-352-7178

Client: GeoEngineers
Address: 600 Stewart Street, Suite 1700
City, State, Zip: Seattle, WA 98103
Telephone: 253.722.2418

Project Name: Gas Works Park Site
Project No: 0186-846-01 Task 1803
Location: Seattle
Report To (PM): Sandra Smith / Claudia De La Via
PM Email: sbsmith@geoengineers.com

Date: 9/29/2016
Laboratory Project No (Internal): 1609367
Page: 1 of 1
Collected by: GRL/CVD / SAS

Chain of Custody Record and Laboratory Services Agreement

*Matrix Codes: A = Air, AQ = Aqueous, B = Bulk, O = Other, P = Product, S = Soil, SD = Sediment, SL = Solid, W = Water, DW = Drinking Water, GW = Ground Water, SW = Storm Water, WW = Waste Water

Sample Name	Sample Date	Sample Time	Sample Type (Matrix)*	Analytes											Comments											
				Arsenic (EPA 200.8) field filtered	Iron (EPA 200.8) field filtered	Sulfide (4500-S2-F) field filtered	COD (SM5220D) field filtered	COD (SM5220)	Grain Size (ASTM D422)	SVOCs (EPA 8270 / 625)	PAHs (EPA 8270 - SIM)	PCBs (EPA 8082 / 608)	Metals** (EPA 6020 / 200.8)	Total (T) Dissolved (D)												
1 PAL- 28-10.0-11.0- 160929	9/29/16	0925	S					X	X																	
2 PAL- 28-5-160929	9/29	1021	W	X	X																					
3 PAL- RMISE-160929	9/29	1430	W	X	X																					
4 PAL- 29-7.9-8.4	9/29	1500	S					X	X																	
5 PAL- 29-8.4-9.2	9/29	1505	S																							
6 PAL- 30-8-9	9/29	1635	S					X	X																	
7 PAL- 30-16.7-18.2	9/29	1640	S																							
8 PAL- 30-5-160929	9/29	1640	W	X	X			X																		
9 PAL-																										
10 PAL-																										

**Metals Analysis (Circle): MTCA-5 RCRA-8 Priority Pollutants TAL Individual: Ag Al As B Ba Be Ca Cd Co Cr Cu Fe Hg K Mg Mn Mo Na Ni Pb S Se Sr Sn Tl U V Zn

***Anions (Circle): Nitrate Nitrite Chloride Sulfate Bromide O-Phosphate Fluoride Nitrate+Nitrite

Sample Disposal: Return to Client Disposal by Lab (Samples will be held for 30 days unless otherwise noted. A fee may be assessed if samples are retained after 30 days.)

I represent that I am authorized to enter into this Agreement with Fremont Analytical on behalf of the Client named above, that I have verified Client's agreement to each of the terms on the front and backside of this Agreement.

Relinquished: Brian Eubank 9/29/16 17:42 Date/Time
Received: Sandra Smith 9/29/16 17:42 Date/Time

Relinquished: X Date/Time
Received: X Date/Time

TAT → SameDay NextDay 2 Day 3 Day STD
*Please coordinate with the lab in advance



GeoEngineers

Sandra Smith
600 Stewart Street, Suite 1700
Seattle, WA 98101

RE: Gas Works Park Site
Work Order Number: 1610280

November 28, 2016

Attention Sandra Smith:

Fremont Analytical, Inc. received 5 sample(s) on 10/17/2016 for the analyses presented in the following report.

Chemical Oxygen Demand by SM 5220D
Dissolved Metals by EPA Method 200.8
Grain Size by ASTM D422
Total Metals by EPA Method 6020

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

CC:
Claudia De La Via

CLIENT: GeoEngineers
Project: Gas Works Park Site
Work Order: 1610280

Work Order Sample Summary

Lab Sample ID	Client Sample ID	Date/Time Collected	Date/Time Received
1610280-001	PAI-21B-23-28	10/16/2016 12:15 PM	10/17/2016 4:18 PM
1610280-002	PAI-21B-15.8-16.5	10/16/2016 12:25 PM	10/17/2016 4:18 PM
1610280-003	PAI-21B-14-14.7	10/16/2016 12:20 PM	10/17/2016 4:18 PM
1610280-004	PAI-21B-S-161017	10/16/2016 3:30 PM	10/17/2016 4:18 PM
1610280-005	PAI-21B-D-161017	10/16/2016 2:33 PM	10/17/2016 4:18 PM

CLIENT: GeoEngineers
Project: Gas Works Park Site

I. SAMPLE RECEIPT:

Samples receipt information is recorded on the attached Sample Receipt Checklist.

II. GENERAL REPORTING COMMENTS:

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

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

III. ANALYSES AND EXCEPTIONS:

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

1610280-001B

TEST_SUB has been Sub Contracted.

1610280-002B

TEST_SUB has been Sub Contracted.

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



Client: GeoEngineers

Collection Date: 10/16/2016 3:30:00 PM

Project: Gas Works Park Site

Lab ID: 1610280-004

Matrix: Product

Client Sample ID: PAI-21B-S-161017

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
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Total Metals by EPA Method 6020

Batch ID: 15167

Analyst: TN

Arsenic	25.9	0.196		mg/Kg	1	10/19/2016 3:53:52 PM
Iron	41.4	10.8		mg/Kg	1	10/19/2016 3:53:52 PM

Chemical Oxygen Demand by SM 5220D

Batch ID: R32441

Analyst: MW

Chemical Oxygen Demand	12,700	1,000	D	mg/L	100	10/20/2016 1:28:05 PM
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Client: GeoEngineers

Collection Date: 10/16/2016 2:33:00 PM

Project: Gas Works Park Site

Lab ID: 1610280-005

Matrix: Groundwater

Client Sample ID: PAI-21B-D-161017

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
<u>Dissolved Metals by EPA Method 200.8</u>				Batch ID: 15153		Analyst: TN
Arsenic	1,440	0.500		µg/L	1	10/18/2016 12:31:04 PM
Iron	970	50.0		µg/L	1	10/18/2016 12:31:04 PM
<u>Chemical Oxygen Demand by SM 5220D</u>				Batch ID: R32441		Analyst: MW
Chemical Oxygen Demand	ND	10.0		mg/L	1	10/20/2016 1:28:05 PM

Grain Size by ASTM D422

Project: Gas Works Park Site
 Client: GeoEngineers
 Lab Project #: 1610280

Percent Finer (Passing) than the Indicated Size

UOM = Percent

Grain Size Classification	Gravel						Coarse Sand	Medium Sand		Fine Sand			Silt		
	Sieve Size	3"	2"	1 1/2"	1"	3/4"	3/8"	#4	#10	#20	#40	#60	#140	#200	#325
Particle Size (Microns)	76200	50800	38100	25400	19050	9525	4750	2000	850	425	250	106	75	45	34
PAI-21B-23-28	100%	100%	100%	100%	81.1%	75.6%	70.5%	65.0%	60.1%	52.4%	39.7%	16.8%	10.2%	4.57%	0.766%
PAI-21B-15.8-16.5	100%	100%	100%	100%	40.1%	32.5%	27.3%	21.1%	14.3%	8.63%	5.75%	2.90%	1.88%	0.933%	0.0247%

Grain Size by ASTM D422

Project: Gas Works Park Site
Client: GeoEngineers
Lab Project #: 1610280

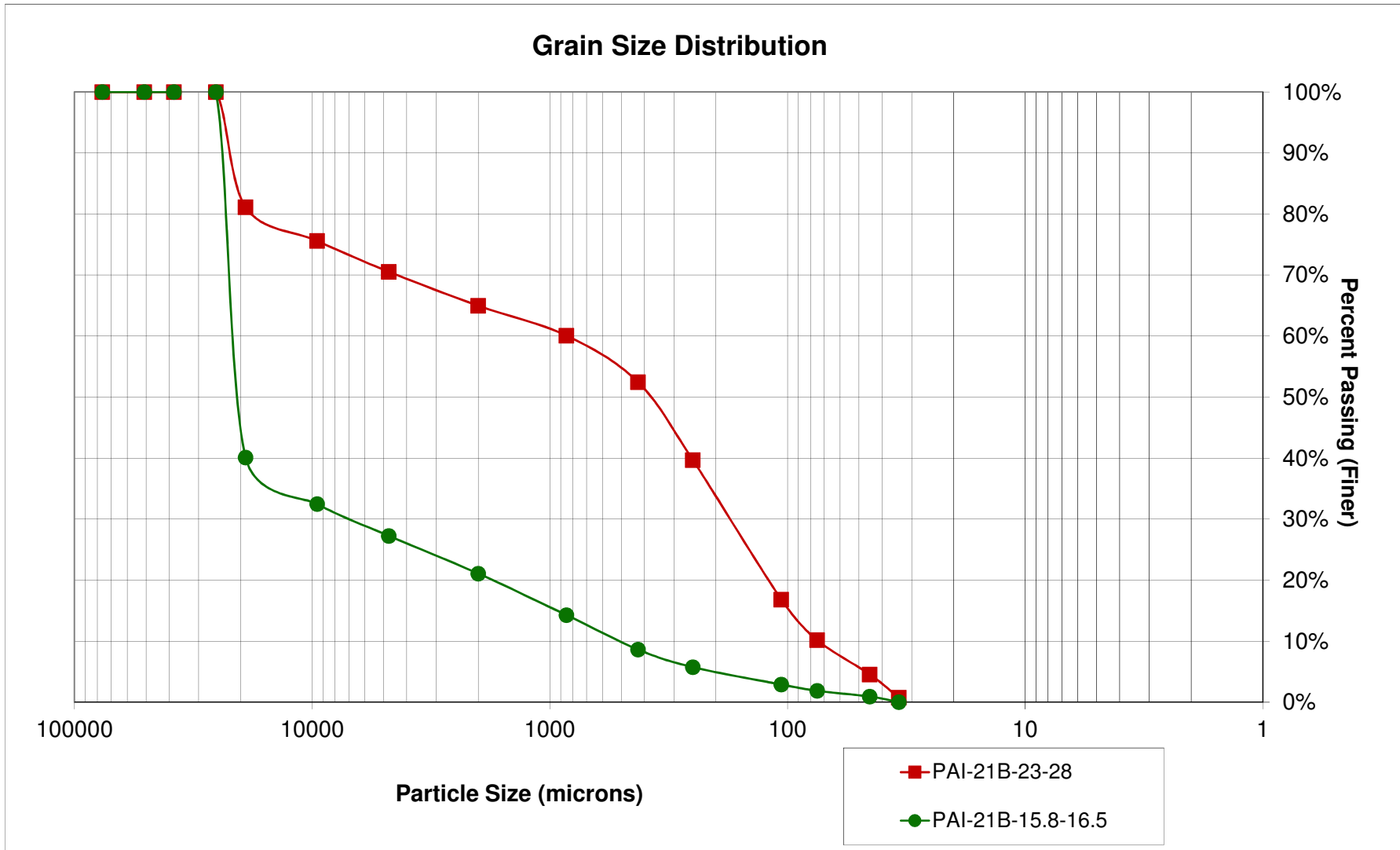
Percent Retained in Each Size Fraction

UOM = Percent

Grain Size Classification	Gravel							Coarse Sand	Medium Sand		Fine Sand			Silt		
	>76200	76200-50800	50800-38100	38100-25400	25400-19000	19050-9525	9525-4750	4750-2000	2000-850	850-425	425-250	250-106	106-75	75-45	45-34	<34
PAI-21B-23-28	0.00%	0.00%	0.00%	0.00%	18.9%	5.53%	5.07%	5.55%	4.90%	7.63%	12.8%	22.9%	6.62%	5.63%	3.80%	0.766%
PAI-21B-15.8-16.5	0.00%	0.00%	0.00%	0.00%	59.9%	7.62%	5.24%	6.17%	6.80%	5.65%	2.88%	2.85%	1.03%	0.945%	0.908%	0.0247%

Grain Size by ASTM D422

Project: Gas Works Park Site
 Client: GeoEngineers
 Lab Project #: 1610280





ALS Environmental
ALS Group USA, Corp
1317 South 13th Avenue
Bellevue, WA 98006
T: 1 360 577 7222
F: 1 360 636 1068
www.alsglobal.com

November 14, 2016

Analytical Report for Service Request No: 1612823

Mr. Michael Ridgeway
Fremont Analytical
3600 Fremont Avenue, North
Seattle, WA 98103

RE: 1610280

Dear Mr. Ridgeway,

Enclosed are the results of the sample(s) submitted to our laboratory October 21, 2016
For your reference, these analyses have been assigned our service request number **K1612823**.

Analyses were performed according to our laboratory's ISO 17025-AP-approved quality assurance program. The test results meet requirements of the current ISO 17025-AP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of ISO 17025-AP-accredited analytes, refer to the certifications section at www.alsglobal.com. All results are intended to be considered in their entirety, and ALS Group USA, Corp. dba ALS Environmental (ALS) is not responsible for use of less than the complete report. Results apply only to the items submitted to the laboratory for analysis and individual items (samples) analyzed, as listed in the report.

Please contact me if you have any questions. My extension is 3375. You may also contact me via email at Janet.Malloch@alsglobal.com.

Respectfully submitted,

ALS Group USA, Corp. dba ALS Environmental

Janet Malloch
Project Manager



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Acronyms

ASTM	American Society for Testing and Materials
A2LA	American Association for Laboratory Accreditation
CARB	California Air Resources Board
CAS Number	Chemical Abstract Service registry Number
CFC	Chlorofluorocarbon
CFU	Colony-Forming Unit
DEC	Department of Environmental Conservation
DEQ	Department of Environmental Quality
DHS	Department of Health Services
DOE	Department of Ecology
DOH	Department of Health
EPA	U. S. Environmental Protection Agency
ELAP	Environmental Laboratory Accreditation Program
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
LOD	Limit of Detection
LOQ	Limit of Quantitation
LUFT	Leaking Underground Fuel Tank
M	Modified
MCL	Maximum Contaminant Level is the highest permissible concentration of a substance allowed in drinking water as established by the USEPA.
MDL	Method Detection Limit
MPN	Most Probable Number
MRL	Method Reporting Limit
NA	Not Applicable
NC	Not Calculated
NCASI	National Council of the Paper Industry for Air and Stream Improvement
ND	Not Detected
NIOSH	National Institute for Occupational Safety and Health
PQL	Practical Quantitation Limit
RCRA	Resource Conservation and Recovery Act
SIM	Selected Ion Monitoring
TPH	Total Petroleum Hydrocarbons
tr	Trace level is the concentration of an analyte that is less than the PQL but greater than or equal to the MDL.

Inorganic Data Qualifiers

- * The result is an outlier. See case narrative.
- # The control limit criteria is not applicable. See case narrative.
- B The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards.
- E The result is an estimate amount because the value exceeded the instrument calibration range.
- J The result is an estimated value.
- U The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
DOD-QSM 4.2 definition : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
- i The MRL/MDL or LOQ/LOD is elevated due to a matrix interference.
- X See case narrative.
- Q See case narrative. One or more quality control criteria was outside the limits.
- H The holding time for this test is immediately following sample collection. The samples were analyzed as soon as possible after receipt by the laboratory.

Metals Data Qualifiers

- # The control limit criteria is not applicable. See case narrative.
- J The result is an estimated value.
- E The percent difference for the serial dilution was greater than 10%, indicating a possible matrix interference in the sample.
- M The duplicate injection precision was not met.
- N The Matrix Spike sample recovery is not within control limits. See case narrative.
- S The reported value was determined by the Method of Standard Additions (MSA).
- U The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
DOD-QSM 4.2 definition : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
- W The post-digestion spike for furnace AA analysis is out of control limits, while sample absorbance is less than 50% of spike absorbance.
 - i The MRL/MDL or LOQ/LOD is elevated due to a matrix interference.
- X See case narrative.
- + The correlation coefficient for the MSA is less than 0.995.
- Q See case narrative. One or more quality control criteria was outside the limits.

Organic Data Qualifiers

- * The result is an outlier. See case narrative.
- # The control limit criteria is not applicable. See case narrative.
- A A tentatively identified compound, a suspected aldol-condensation product.
- B The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards.
- C The analyte was qualitatively confirmed using GC/MS techniques, pattern recognition, or by comparing to historical data.
- D The reported result is from a dilution.
- E The result is an estimated value.
- J The result is an estimated value.
- N The result is presumptive. The analyte was tentatively identified, but a confirmation analysis was not performed.
- P The GC or HPLC confirmation criteria was exceeded. The relative percent difference is greater than 40% between the two analytical results.
- U The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
DOD-QSM 4.2 definition : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
- i The MRL/MDL or LOQ/LOD is elevated due to a chromatographic interference.
- X See case narrative.
- Q See case narrative. One or more quality control criteria was outside the limits.

Additional Petroleum Hydrocarbon Specific Qualifiers

- F The chromatographic fingerprint of the sample matches the elution pattern of the calibration standard.
- L The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of lighter molecular weight constituents than the calibration standard.
- H The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of heavier molecular weight constituents than the calibration standard.
- O The chromatographic fingerprint of the sample resembles an oil, but does not match the calibration standard.
- Y The chromatographic fingerprint of the sample resembles a petroleum product eluting in approximately the correct carbon range, but the elution pattern does not match the calibration standard.
- Z The chromatographic fingerprint does not resemble a petroleum product.

**ALS Group USA Corp. dba ALS Environmental (ALS) - Kelso
State Certifications, Accreditations, and Licenses**

Agency	Web Site	Number
Alaska DEC UST	http://dec.alaska.gov/applications/eh/ehllabreports/USTLabs.aspx	UST-040
Arizona DHS	http://www.azdhs.gov/lab/license/env.htm	AZ0339
Arkansas - DEQ	http://www.adeq.state.ar.us/techsvs/labcert.htm	88-0637
California DHS (ELAP)	http://www.cdph.ca.gov/certlic/labs/Pages/ELAP.aspx	2795
DOD ELAP	http://www.denix.osd.mil/edqw/Accreditation/AccreditedLabs.cfm	L14-51
Florida DOH	http://www.doh.state.fl.us/lab/EnvLabCert/WaterCert.htm	E87412
Hawaii DOH	Not available	-
ISO 17025	http://www.pjllabs.com/	L16-57
Louisiana DEQ	http://www.deq.louisiana.gov/portal/DIVISIONS/PublicParticipationandPermitSupport/LouisianaLaboratoryAccreditationProgram.aspx	03016
Maine DHS	Not available	WA01276
Minnesota DOH	http://www.health.state.mn.us/accreditation	053-999-457
Montana DPHHS	http://www.dphhs.mt.gov/publichealth/	CERT0047
Nevada DEP	http://ndep.nv.gov/bsdw/labservice.htm	WA01276
New Jersey DEP	http://www.nj.gov/dep/oqa/	WA005
North Carolina DWQ	http://www.dwqlab.org/	605
Oklahoma DEQ	http://www.deq.state.ok.us/CSDnew/labcert.htm	9801
Oregon – DEQ (NELAP)	http://public.health.oregon.gov/LaboratoryServices/EnvironmentalLaboratoryAccreditation/Pages/index.aspx	WA100010
South Carolina DHEC	http://www.scdhec.gov/environment/envserv/	61002
Texas CEQ	http://www.tceq.texas.gov/field/qa/env_lab_accreditation.html	T104704427
Washington DOE	http://www.ecy.wa.gov/programs/eap/labs/lab-accreditation.html	C544
Wyoming (EPA Region 8)	http://www.epa.gov/region8/water/dwhome/wyomingdi.html	-
Kelso Laboratory Website	www.alsglobal.com	NA

Analyses were performed according to our laboratory's NELAP-approved quality assurance program. A complete listing of specific NELAP-certified analytes, can be found in the certification section at www.ALSGlobal.com or at the accreditation bodies web site.

Please refer to the certification and/or accreditation body's web site if samples are submitted for compliance purposes. The states highlighted above, require the analysis be listed on the state certification if used for compliance purposes and if the method/analyte is offered by that state.



Chain of Custody

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CHAIN OF CUSTODY RECORD

Omega COCID 292 PAGE: 1 OF: 1

ADDRESS
 Fremont Analytical, Inc.
 3600 Fremont Ave. N.
 Seattle, WA 98103
 TEL: 206-352-3790
 FAX: 206-352-7178
 Website: www.fremontanalytical.com

16102823

SUB CONTRACTOR: ALS	COMPANY: ALS Environmental	SPECIAL INSTRUCTIONS / COMMENTS: Please email results to Mike Ridgeway at mridgeway@fremontanalytical.com and Chelsea Ward at cward@fremontanalytical.com.
ADDRESS: 1317 South 13th Avenue		
CITY, STATE, ZIP: Kelso, WA 98626		
PHONE: (360) 577-7222 FAX: EMAIL:		
ACCOUNT #:		

ITEM #	SAMPLE ID	CLIENT SAMPLE ID	BOTTLE TYPE	MATRIX	DATE COLLECTED	NUMBER OF CONTAINERS	COMMENTS: Methanol Preserved Weights HOT Sample Notation, Additional Sample Description.
1	1610280-001B	PAI-21-23-28	CLEAR JARS 4 O	Soil	10/16/2016 12:15:00 PM	1	Chemical Oxygen Demand by SM5220, Low Level RL
	TEST_SUB						
2	1610280-002B	PAI-21-15.8-16.5	CLEAR JARS 4 O	Soil	10/16/2016 12:25:00 PM	1	Chemical Oxygen Demand by SM5220, Low Level RL
	TEST_SUB						

Relinquished By:	Date: 10/20/16	Time: 1443	Received By:	Date: 10/24/16	Time: 0915	REPORT TRANSMITTAL DESIRED: <input type="checkbox"/> HARD COPY (extra cost) <input type="checkbox"/> FAX <input checked="" type="checkbox"/> EMAIL <input type="checkbox"/> ONLINE
Relinquished By:	Date:	Time:	Received By:	Date:	Time:	
Relinquished By:	Date:	Time:	Received By:	Date:	Time:	FOR LAB USE ONLY
TAT:	Standard <input checked="" type="checkbox"/>	RUSH	Next BD <input type="checkbox"/>	2nd BD <input type="checkbox"/>	3rd BD <input type="checkbox"/>	Temp of samples _____ °C Attempt to Cool? _____
Note: RUSH requests will incur surcharges!						Comments: _____



PC Jaret

Cooler Receipt and Preservation Form

Client: Fremont Service Request K16 12823
 Received: 10/21/16 Opened: 10/21/16 By: [Signature] Unloaded: 10/21/16 By: [Signature]

- Samples were received via? USPS Fed Ex UPS DHL PDX Courier Hand Delivered
- Samples were received in: (circle) Cooler Box Envelope Other NA
- Were custody seals on coolers? NA Y N If yes, how many and where? _____
 If present, were custody seals intact? Y N If present, were they signed and dated? Y N

Raw Cooler Temp	Corrected Cooler Temp	Raw Temp Blank	Corrected Temp Blank	Corr. Factor	Thermometer ID	Cooler/COC ID	Tracking Number	NA	Filed
1.8	1.9	—	—	+1	356	NA	17X6192X033275		1014

- Packing material: Inserts Baggies Bubble Wrap Gel Packs Wet Ice Dry Ice Sleeves
- Were custody papers properly filled out (ink, signed, etc.)? NA Y N
- Were samples received in good condition (temperature, unbroken)? *Indicate in the table below.* NA Y N
 If applicable, tissue samples were received: Frozen Partially Thawed Thawed
- Were all sample labels complete (i.e analysis, preservation, etc.)? NA Y N
- Did all sample labels and tags agree with custody papers? *Indicate major discrepancies in the table on page 2.* NA Y N
- Were appropriate bottles/containers and volumes received for the tests indicated? NA Y N
- Were the pH-preserved bottles (*see SMO GEN SOP*) received at the appropriate pH? *Indicate in the table below* NA Y N
- Were VOA vials received without headspace? *Indicate in the table below.* NA Y N
- Was C12/Res negative? NA Y N

Sample ID on Bottle	Sample ID on COC	Identified by:

Sample ID	Bottle Count Bottle Type	Out of Temp	Head-space	Broke	pH	Reagent	Volume added	Reagent Lot Number	Initials	Time

Notes, Discrepancies, & Resolutions: _____



Total Solids

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ALS Group USA, Corp.
dba ALS Environmental

Analytical Report

Client: Fremont Analytical
Project: 1610280
Sample Matrix: Soil
Analysis Method: 160.3 Modified
Prep Method: None

Service Request: K1612823
Date Collected: 10/16/16
Date Received: 10/21/16
Units: Percent
Basis: As Received

Solids, Total

Sample Name	Lab Code	Result	MRL	MDL	Dil.	Date Analyzed	Q
1610280-001B PAI-21-23-28	K1612823-001	89.2	-	-	1	11/08/16 11:13	
1610280-002B PAI-21-15,8-16.5	K1612823-002	89.2	-	-	1	11/08/16 11:13	

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client: Fremont Analytical
Project: 1610280
Sample Matrix: Sediment
Analysis Method: 160.3 Modified
Prep Method: None

Service Request: K1612823
Date Collected: NA
Date Received: NA

Units: Percent
Basis: As Received

Replicate Sample Summary
Inorganic Parameters

Sample Name:	Lab Code:	MRL	Sample Result	Duplicate Result	Average	RPD	RPD Limit	Date Analyzed
Batch QC	K1612738-002DUP	-	97.0	97.1	97.1	<1	20	11/08/16
Batch QC	K1612870-008DUP	-	66.5	66.0	66.3	<1	20	11/08/16

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.



General Chemistry

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ALS Group USA, Corp.
dba ALS Environmental

Analytical Report

Client: Fremont Analytical
Project: 1610280
Sample Matrix: Soil
Analysis Method: SM 5220 C Modified
Prep Method: ALS SOP

Service Request: K1612823
Date Collected: 10/16/16
Date Received: 10/21/16
Units: mg/Kg
Basis: Dry

Chemical Oxygen Demand (COD)

Sample Name	Lab Code	Result	MRL	MDL	Dil.	Date Analyzed	Date Extracted	Q
1610280-001B PAI-21-23-28	K1612823-001	2110	100	-	1	10/27/16	10/27/16	
1610280-002B PAI-21-15,8-16.5	K1612823-002	59200	530	-	1	10/27/16	10/27/16	
Method Blank	K1612823-MB	ND U	10	-	1	10/27/16	10/27/16	

ALS Group USA, Corp.

dba ALS Environmental

QA/QC Report

Client: Fremont Analytical
Project 1610280
Sample Matrix: Soil

Service Request: K1612823
Date Collected: NA
Date Received: NA
Date Analyzed: 10/27/16

Replicate Sample Summary
General Chemistry Parameters

Sample Name: Batch QC
Lab Code: K1612822-001

Units: mg/Kg
Basis: Dry

<u>Analyte Name</u>	<u>Analysis Method</u>	<u>MRL</u>	<u>MDL</u>	<u>Sample Result</u>	<u>Duplicate Sample K1612822-001DUP Result</u>	<u>Average</u>	<u>RPD</u>	<u>RPD Limit</u>
Chemical Oxygen Demand (COD)	SM 5220 C Modified	170	-	19200	22000	20600	14	20

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client: Fremont Analytical
Project: 1610280
Sample Matrix: Soil

Service Request: K1612823
Date Collected: N/A
Date Received: N/A
Date Analyzed: 10/27/16
Date Extracted: 10/27/16

Matrix Spike Summary
Chemical Oxygen Demand (COD)

Sample Name: Batch QC
Lab Code: K1612822-001
Analysis Method: SM 5220 C Modified
Prep Method: ALS SOP

Units: mg/Kg
Basis: Dry

Matrix Spike
K1612822-001MS

<u>Analyte Name</u>	<u>Sample Result</u>	<u>Result</u>	<u>Spike Amount</u>	<u>% Rec</u>	<u>% Rec Limits</u>
Chemical Oxygen Demand (COD)	19200	31100	10000	119	75-125

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client: Fremont Analytical
Project: 1610280
Sample Matrix: Soil

Service Request: K1612823
Date Analyzed: 10/27/16
Date Extracted: 10/27/16

Lab Control Sample Summary
Chemical Oxygen Demand (COD)

Analysis Method: SM 5220 C Modified
Prep Method: ALS SOP

Units: mg/Kg
Basis: Dry
Analysis Lot: 520929

Sample Name	Lab Code	Result	Spike Amount	% Rec	% Rec Limits
Lab Control Sample	K1612823-LCS	226	242	93	85-115

Work Order: 1610280
CLIENT: GeoEngineers
Project: Gas Works Park Site

QC SUMMARY REPORT
Dissolved Metals by EPA Method 200.8

Sample ID MB-15153	SampType: MBLK	Units: µg/L				Prep Date: 10/18/2016	RunNo: 32379				
Client ID: MBLKW	Batch ID: 15153					Analysis Date: 10/18/2016	SeqNo: 612494				
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Arsenic	ND	0.500									
Iron	ND	50.0									

Sample ID LCS-15153	SampType: LCS	Units: µg/L				Prep Date: 10/18/2016	RunNo: 32379				
Client ID: LCSW	Batch ID: 15153					Analysis Date: 10/18/2016	SeqNo: 612495				
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Arsenic	97.1	0.500	100.0	0	97.1	85	115				
Iron	964	50.0	1,000	0	96.4	50	150				

Sample ID 1610280-005ADUP	SampType: DUP	Units: µg/L				Prep Date: 10/18/2016	RunNo: 32379				
Client ID: PAI-21B-D-161017	Batch ID: 15153					Analysis Date: 10/18/2016	SeqNo: 612497				
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Arsenic	1,440	0.500						1,444	0.0201	30	
Iron	894	50.0						969.8	8.16	30	

Sample ID 1610280-005AMS	SampType: MS	Units: µg/L				Prep Date: 10/18/2016	RunNo: 32379				
Client ID: PAI-21B-D-161017	Batch ID: 15153					Analysis Date: 10/18/2016	SeqNo: 612498				
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Arsenic	1,970	0.500	500.0	1,444	105	70	130				
Iron	5,980	50.0	5,000	969.8	100	50	150				

Sample ID 1610280-005AMSD	SampType: MSD	Units: µg/L				Prep Date: 10/18/2016	RunNo: 32379				
Client ID: PAI-21B-D-161017	Batch ID: 15153					Analysis Date: 10/18/2016	SeqNo: 612499				
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Arsenic	1,850	0.500	500.0	1,444	81.8	70	130	1,967	5.96	30	
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Work Order: 1610280
CLIENT: GeoEngineers
Project: Gas Works Park Site

QC SUMMARY REPORT
Dissolved Metals by EPA Method 200.8

Sample ID	1610280-005AMSD	SampType:	MSD	Units:	µg/L	Prep Date:	10/18/2016	RunNo:	32379		
Client ID:	PAI-21B-D-161017	Batch ID:	15153	Analysis Date:	10/18/2016	SeqNo:	612499				
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Iron	5,560	50.0	5,000	969.8	91.8	50	150	5,980	7.28	30	

Work Order: 1610280
CLIENT: GeoEngineers
Project: Gas Works Park Site

QC SUMMARY REPORT
Total Metals by EPA Method 6020

Sample ID MB-15167	SampType: MBLK	Units: mg/Kg				Prep Date: 10/19/2016	RunNo: 32424				
Client ID: MBLKS	Batch ID: 15167					Analysis Date: 10/19/2016	SeqNo: 613491				
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Arsenic	ND	0.0806									
Iron	ND	4.44									

Sample ID LCS-15167	SampType: LCS	Units: mg/Kg				Prep Date: 10/19/2016	RunNo: 32424				
Client ID: LCSS	Batch ID: 15167					Analysis Date: 10/19/2016	SeqNo: 613492				
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Arsenic	36.0	0.0758	37.88	0	94.9	80	120				
Iron	347	4.17	378.8	0	91.6	80	120				

Sample ID 1610194-001ADUP	SampType: DUP	Units: mg/Kg-dry				Prep Date: 10/19/2016	RunNo: 32424				
Client ID: BATCH	Batch ID: 15167					Analysis Date: 10/19/2016	SeqNo: 613494				
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Arsenic	4.81	0.0854						4.324	10.7	20	
Iron	23,700	4.70						19,150	21.4	20	R

NOTES:

R - High RPD observed. The method is in control as indicated by the LCS.

Sample ID 1610194-001AMS	SampType: MS	Units: mg/Kg-dry				Prep Date: 10/19/2016	RunNo: 32424				
Client ID: BATCH	Batch ID: 15167					Analysis Date: 10/19/2016	SeqNo: 613498				
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Arsenic	51.8	0.0861	43.03	4.324	110	75	125				
Iron	20,000	4.73	430.3	19,150	208	75	125				S

NOTES:

S - Outlying spike recovery(ies) observed. A duplicate analysis was performed with similar results indicating a possible matrix effect.

Work Order: 1610280
CLIENT: GeoEngineers
Project: Gas Works Park Site

QC SUMMARY REPORT
Total Metals by EPA Method 6020

Sample ID 1610194-001AMSD	SampType: MSD	Units: mg/Kg-dry			Prep Date: 10/19/2016	RunNo: 32424					
Client ID: BATCH	Batch ID: 15167				Analysis Date: 10/19/2016	SeqNo: 613499					
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Arsenic	53.0	0.0874	43.72	4.324	111	75	125	51.79	2.25	20	
Iron	21,100	4.81	437.2	19,150	457	75	125	20,050	5.35	20	S

NOTES:

S - Outlying spike recovery(ies) observed. A duplicate analysis was performed with similar results indicating a possible matrix effect.

Sample ID 1610194-001APDS	SampType: PDS	Units: mg/Kg-dry			Prep Date: 10/19/2016	RunNo: 32424					
Client ID: BATCH	Batch ID: 15167				Analysis Date: 10/19/2016	SeqNo: 613500					
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Iron	20,400	4.70	427	19,200	301	80	120				S
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NOTES:

S - Spike recovery indicates a possible matrix effect. The method is in control as indicated by the Laboratory Control Sample (LCS).

Client Name: **GEI**
 Logged by: **Erica Silva**

Work Order Number: **1610280**
 Date Received: **10/17/2016 4:18:00 PM**

Chain of Custody

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

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
 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

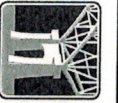
Person Notified:	<input type="text"/>	Date:	<input type="text"/>
By Whom:	<input type="text"/>	Via:	<input type="checkbox"/> eMail <input type="checkbox"/> Phone <input type="checkbox"/> Fax <input type="checkbox"/> In Person
Regarding:	<input type="text"/>		
Client Instructions:	<input type="text"/>		

19. Additional remarks:

Item Information

Item #	Temp °C
Cooler	0.8
Sample	0.9

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



Fremont
Analytical

Chain of Custody Record and Laboratory Services Agreement

3600 Fremont Ave N.
Seattle, WA 98103

Tel: 206-352-3790
Fax: 206-352-7178

Date: 10/17/2016

Laboratory Project No (Internal):

1610280

Client: GeoEngineers

Project Name: Gas Works Park Site

Address: 600 Stewart Street, Suite 1700

Project No: 0186-846-01 Task-1803

Collected by: MWB/CVD

City, State, Zip: Seattle, WA 98103

Location: Seattle

Report To (PM): Sandra Smith / Claudia De La Via

Telephone: 253.722.2418

Report To (PM): Sandra Smith / Claudia De La Via

PM Email: sdelavia@geoengineers.com

Fax: 206-352-7178

PM Email: ssmith@geoengineers.com

oddelavia@geoengineers.com

*Matrix Codes: A = Air, AQ = Aqueous, B = Bulk, O = Other, P = Product, S = Soil, SD = Sediment, SL = Solid, W = Water, DW = Drinking Water, GW = Ground Water, SW = Storm Water, WW = Waste Water

Sample Name	Sample Date	Sample Time	Sample Type (Matrix)*	Analytes										Comments				
				Arsenic (EPA 200.8) field filtered	Iron (EPA 200.8) field filtered	COD (SM5220) field filtered	COD (SM5220)	Grain Size (ASTM D422)	SVOCs (EPA 8270 / 625)	PAHs (EPA 8270 - SIM)	PCBs (EPA 8082 / 608)	Metals** (EPA 6020 / 200.8)	Total (T) Dissolved (D)					
1 PAL- 21-23-28	10/16	1215	S															
2 PAL- 21-15.8-16.5		1225	S															
3 PAL- 21-14-14.7		1220	S															
4 PAL- 21-5-16/10/7		1530	SW	X	X													Hold
5 PAL- 21-D-16/10/7		1433	SW	X	X													
6 PAL-																		
7 PAL-																		
8 PAL-																		
9 PAL-																		
10 PAL-																		

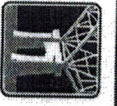
**Metals Analysis (Circle): MTCA-5 RCRA-8 Priority Pollutants TAL Individual: Ag Al As B Ba Be Ca Cd Co Cr Cu Fe Hg K Mg Mn Mo Na Ni Pb Sb Se Sr Sn Ti Tl U V Zn

**Antions (Circle): Nitrate Nitrite Chloride Sulfate Bromide O-Phosphate Fluoride Nitrate+Nitrite Turn-around times for samples received after 4:00pm will begin on the following business day.

Sample Disposal: Return to Client Disposal by Lab (Samples will be held for 30 days unless otherwise noted. A fee may be assessed if samples are retained after 30 days.)

I represent that I am authorized to enter into this Agreement with Fremont Analytical on behalf of the Client named above, that I have verified Client's agreement to each of the terms on the front and backside of this Agreement.

Relinquished	Date/Time	Received	Date/Time
x	10/17/16 1606	x	10/17/16 10070
x	10/17/16 1019	x	10/17/16 1018



Fremont

ANALYTICAL

3600 Fremont Ave N,
Seattle, WA 98103

Tel: 206-352-3790
Fax: 206-352-7178

Chain of Custody Record and Laboratory Services Agreement

Date: 10/17/2016

Laboratory Project No (Internal):

1610280

Page: 1 of 1

Client: Geoengineers
Address: 600 Stewart Street, Suite 1700
City, State, zip: Seattle, WA 98103
Telephone: 253.722.2418

Project Name: Gas Works Park Site
Project No: 0186-946-01 Task 1803
Location: Seattle
Report To (PM): Sandra Smith / Claudia De la Via
PM Email: sbsmith@geoengineers.com

Collected by: MWB/CVD

*Matrix Codes: A = Air, AQ = Aqueous, B = Bulk, O = Other, P = Product, S = Soil, SD = Sediment, SL = Solid, W = Water, DW = Drinking Water, GW = Ground Water, SW = Storm Water, WW = Waste Water

Sample Name	Sample Date	Sample Time	Sample Type (Matrix)*	Analysis										Comments				
				Arsenic (EPA 200.8) field filtered	Iron (EPA 200.9) field filtered	COD (SM5220) field filtered	COD (SM5220)	Grain Size (ASTM D422)	SVOCs (EPA 8270 / 625)	PAHs (EPA 8270 - SIM)	PCBs (EPA 8082 / 608)	Metals** (EPA 6020 / 200.8)	Total (T) / Dissolved (D)					
1 PAL- 21-23-28	10/16	1215	S															
2 PAL- 21-15-8-16.5		1225	S															
3 PAL- 21-14-14.7		1220	S															
4 PAL- 21-5-161017		1530	GW	X	X	X												
5 PAL- 21-0-161017		1433	GW	X	X	X												
6 PAL-																		
7 PAL-																		
8 PAL-																		
9 PAL-																		
10 PAL-																		

Hold per S. Smith 10/16/16 SS

***Anions (Circle): Nitrate Nitrite Chloride Sulfate Bromide O-Phosphate Fluoride Nitrate+Nitrite

***Metals Analysis (Circle): MTC-5 RCRA-8 Priority Pollutants TAL Individual: Ag Al As B Ba Be Ca Cd Co Cr Cu Fe Hg K Mg Mn Mo Na Ni Pb Sb Se Sr Sn Tl U V Zn

Special Remarks:
1. Groundwater arsenic and sulfide samples on ASAP TAT.
2. Groundwater iron and COD plus soil COD and grain size samples on standard TAT.
3. Groundwater and soil RIs per the WO
4. COD = Chemical oxygen demand
5. Run for dissolved metals

I represent that I am authorized to enter into this Agreement with Fremont Analytical on behalf of the Client named above, that I have verified Client's agreement to each of the terms on the front and backside of this Agreement.

Reinquired: 10/17/16 1606 Received 10/17/16 1019

Reinquired: 10/17/16 1606 Received 10/17/16 1018

TAT → SameDay, NextDay, 2 Day, 3 Day, STD

Please coordinate with the lab in advance