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CLIENT: Geoengineers	lneers				INCORPORATED
PROJECT: Gas Works Park-Play	orks Park-Play		INSTRUMENT ID:	OPTIMA ICP 2	START DATE: 1/13/2015
SDG: ZR94			RUNID: IP011371	METHOD: ICP	END DATE: 1/13/2015
CLIENT ID	ARI ID DI	DIL. TIME	%R AG AL AS B BA BI	BA BE CA CD CO CR CU FE HG F	K MG MN MO NA NI PB SB SE SI SN TI TL U V ZN
CRI	CRIF 1	1.00 11063	X	X	
ICSA	ICSAF 1	1.00 11104	X	X	
ICSAB	ICSABF 1	1.00 11150	X	×	
CCV	CCV4 1	1.00 11202	×	X	
CCB	CCB4 1	1.00 11243	×	X	
PBS	ZR94MB1 1	1.00 11284	X	X	
MW-36D-141215	ZR94B 1	1.00 11324			
MW-36D-141215D	ZR94BDUP 1	1.00 11374			
222222	ZS20ADUP 1	1.00 11420			
222222	ZS20B 10	10.00 11471			
222222	ZS20I 10	10.00 11512			
222222	ZS21B 10	10.00 11555			
222222	ZS21I 10	10.00 12001			
CCV	CCV5 1	1.00 12042	×	X	
CCB	CCB5 1	1.00 12083	×	×	
PBS	ZR94MB1 1	1.00 12124			
MW-36D-141215	ZR94B 10	10.00 12164	X	X	
MW-36D-141215D	ZR94BDUP 10	10.00 12210	×	X	
CCV	CCV6 1	1.00 12250	×	×	
CCB	CCB6 1	1.00 12290	X	X	

General Chemistry Analysis Report and Summary QC Forms

ARI Job ID: ZR94



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

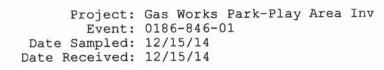
Analyte	Date Batch	Method	Units	RL	Sample
Total Suspended Solids	01/09/15 010915#1	SM2540D	mg/L	10.0	166

RL Analytical reporting limit

U Undetected at reported detection limit

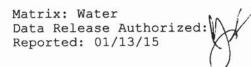


Matrix: Water Data Release Authorized: Reported: 01/13/15



Analyte	Method	Date	Units	Sample	Replicate(s)	RPD/RSD
ARI ID: ZR94A Client	ID: MW-36D-	141215		523		
Total Suspended Solids	SM2540D	01/09/15	mg/L	166	165	0.6%





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%

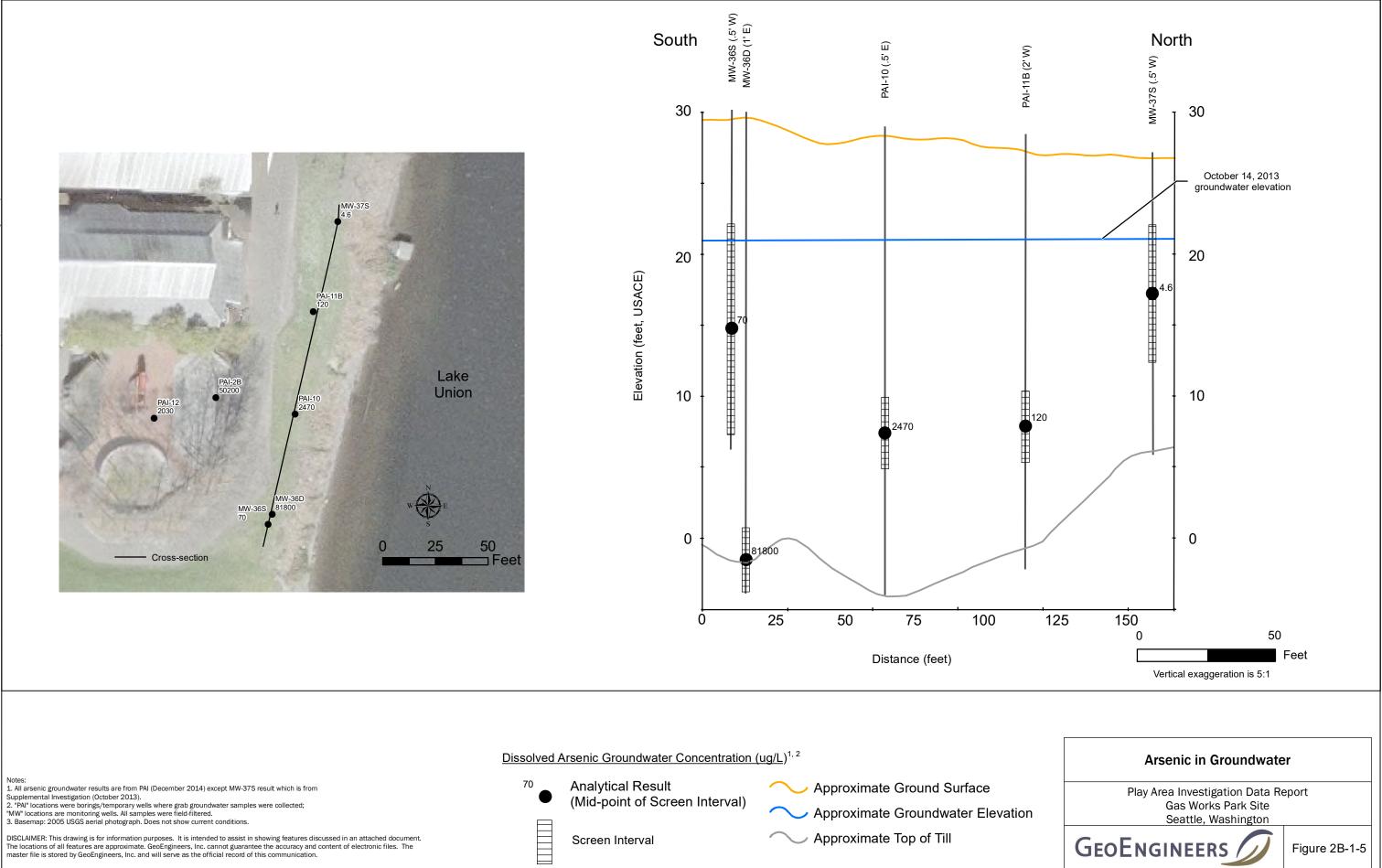


Matrix: Water Data Release Authorized: Reported: 01/13/15

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

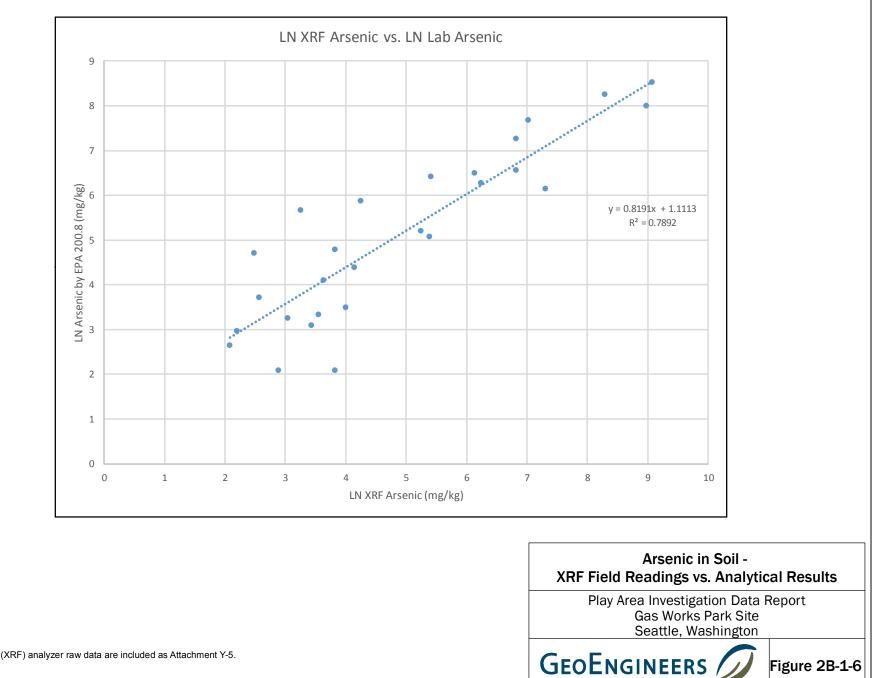


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Figure 2B-1-5

ATTACHMENT 2B-1-5 XRF Soil Arsenic Data





Notes:

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

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

APPENDIX 2B-2 Former Thylox Process Area Geochemical Evaluation



TECHNICAL MEMORANDUM

From:Dimitri Vlassopoulos, Masa KanematsuProject:Gas Work	s Park
Cc: Mike Riley (Anchor QEA)	
Re: Former Thylox Process Area Geochemical Evaluation	

INTRODUCTION

This memorandum documents the results of a geochemical evaluation of elevated arsenic concentrations in monitoring well MW-36D during recent investigations at Gas Works Park in Seattle. Gas Works Park is located on the site of a former manufactured gas plant (MGP) and MW-36D is located in the eastern portion of the site, in an area where hydrogen sulfide (H₂S) removal from the manufactured gas stream was carried out using the Thylox process (Figure 1). The Thylox process was an efficient process for hydrogen sulfide (H₂S) removal based on a concentrated sodium thioarsenate solution. The H₂S captured in the Thylox process was recovered as elemental sulfur during regeneration of the Thylox solution by aeration in a slurry-settling tank. The detection of elevated arsenic in soil and groundwater in this part of the site likely reflects past releases of Thylox solutions, probably from leaks and accidental spills at the tower vessel, piping, slurry-settling tank, Kelly filter, and/or during loading and unloading of trucks.

Field explorations were conducted by GeoEngineers in December 2014 to determine the nature and extent of arsenic impacts in soil and groundwater and to characterize subsurface geochemical conditions as they affect arsenic fate and transport. Figure 1 shows the locations of the former Thylox process areas in the eastern portion of the site, and soil and groundwater sampling locations. The field program included advancing soil borings at selected locations and using X-ray fluorescence (XRF) to screen for arsenic concentrations and select discrete intervals for sampling for laboratory analysis. Selected soil samples were also submitted for sequential extraction analysis to characterize the binding forms of arsenic in the solid phase and additional geochemical parameters influencing soil-water partitioning of arsenic. In addition, groundwater samples, including grab samples from selected boreholes and existing monitoring wells, were collected and analyzed for major ion chemistry, redox indicators, and arsenic speciation.

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 crosssections 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 μ g/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).

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

				Loca	tion		
Parameter	Units	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
рН		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

Table 1. Groundwater Geochemistry

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.

		Location							
Arsenic Species	Units	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		

Table 2. Arsenic Speciation in Groundwater

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_{x-4}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.

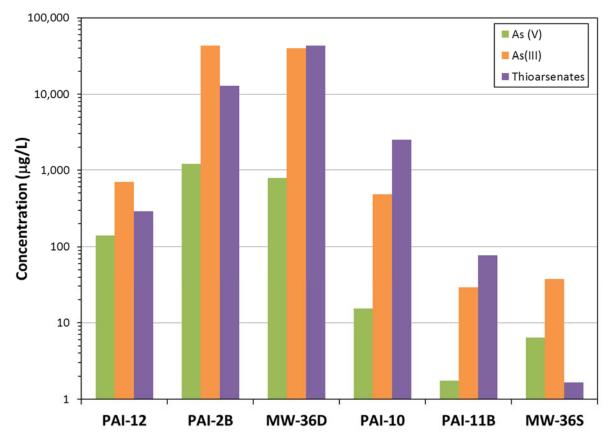


Figure 7. Arsenic speciation in groundwater samples. Thioarsenates represent the concentration sum of four unidentified arsenic peaks as discussed in the text.

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).

	Depth	Observed		Arsenic C	Concentratio	on in Fractio	on ¹ (mg/kg)	
Location	Interval (ft bgs)	Geology	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

Table 3. Sequential Extraction Results for Arsenic in Soil

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

l	Depth	Observed		Iron Co	ncentratior	n in Fraction	1 ¹ (mg/kg)	
Location	Interval (ft bgs)	Geology	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 3for explanation.

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

Table 5. Sulfur Speciation in Soil

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.

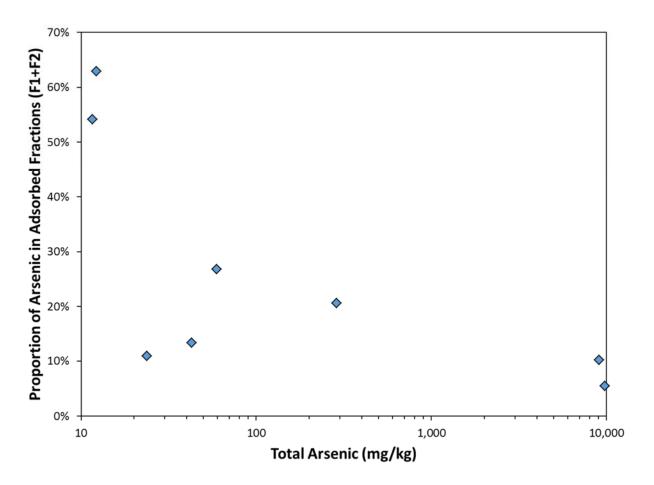


Figure 8. Relationship between total arsenic concentration in soil and percentage extracted in adsorbed fractions (F1 + F2).

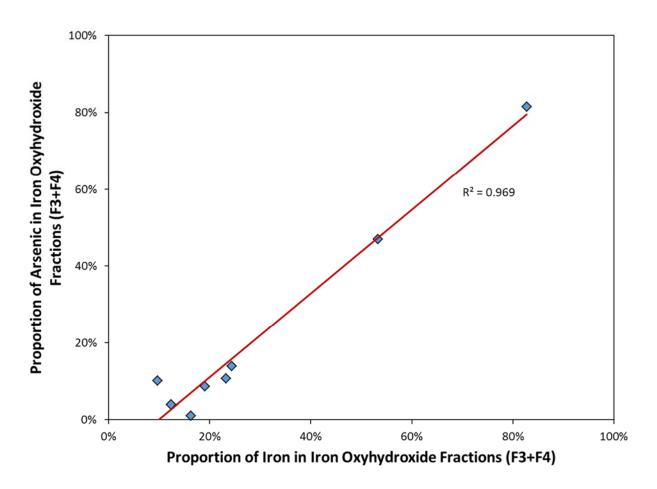


Figure 9. Relationship between the proportions of arsenic and iron extracted in the iron oxyhydroxide fractions (F3 + F4).

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 [As₂S₃] 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.

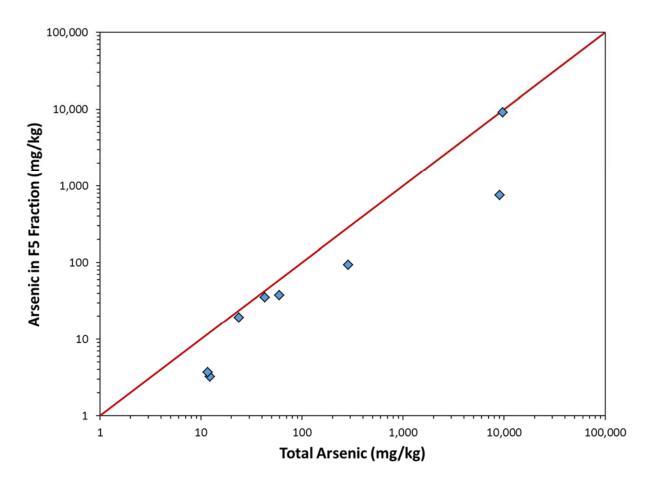


Figure 10. Relationship between arsenic in the residual fraction (F5) and total arsenic concentrations.

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

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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.

	Location							
Solid Phase	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		

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

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.

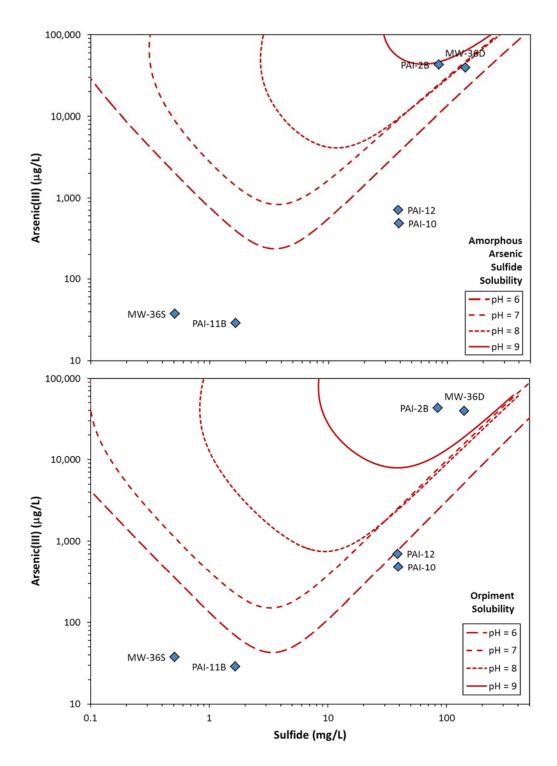


Figure 11. Calculated solubility of solid phase arsenic sulfides as a function of dissolved sulfide concentration and pH. Top: amorphous As₂S₃; bottom: orpiment (crystalline As₂S₃).

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.

		Soil	Groundwater			
Location	Geology	Arsenic ¹ (mg/kg)	Arsenic (µg/L)	рН	K _D (L/kg)	
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	

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

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 Qvr/Qva (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.



- 1. Reference: Richard Haag Associates, 1974: former Thylox process structures. Seattle Parks and Recreation: 2014 Play Area Improvement footprint.
- 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.
- GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc.

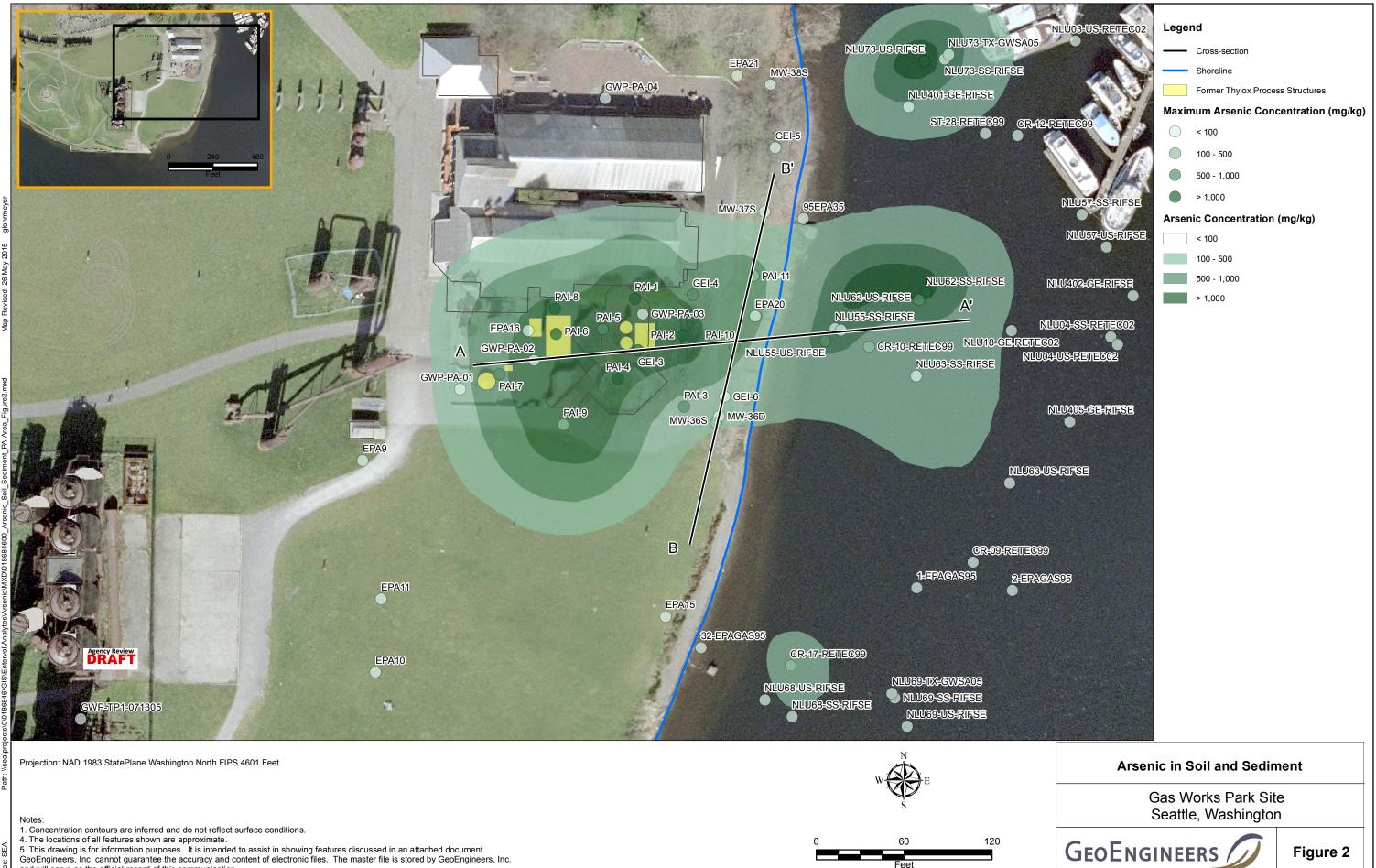
and will serve as the official record of this communication.

40 Feet

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

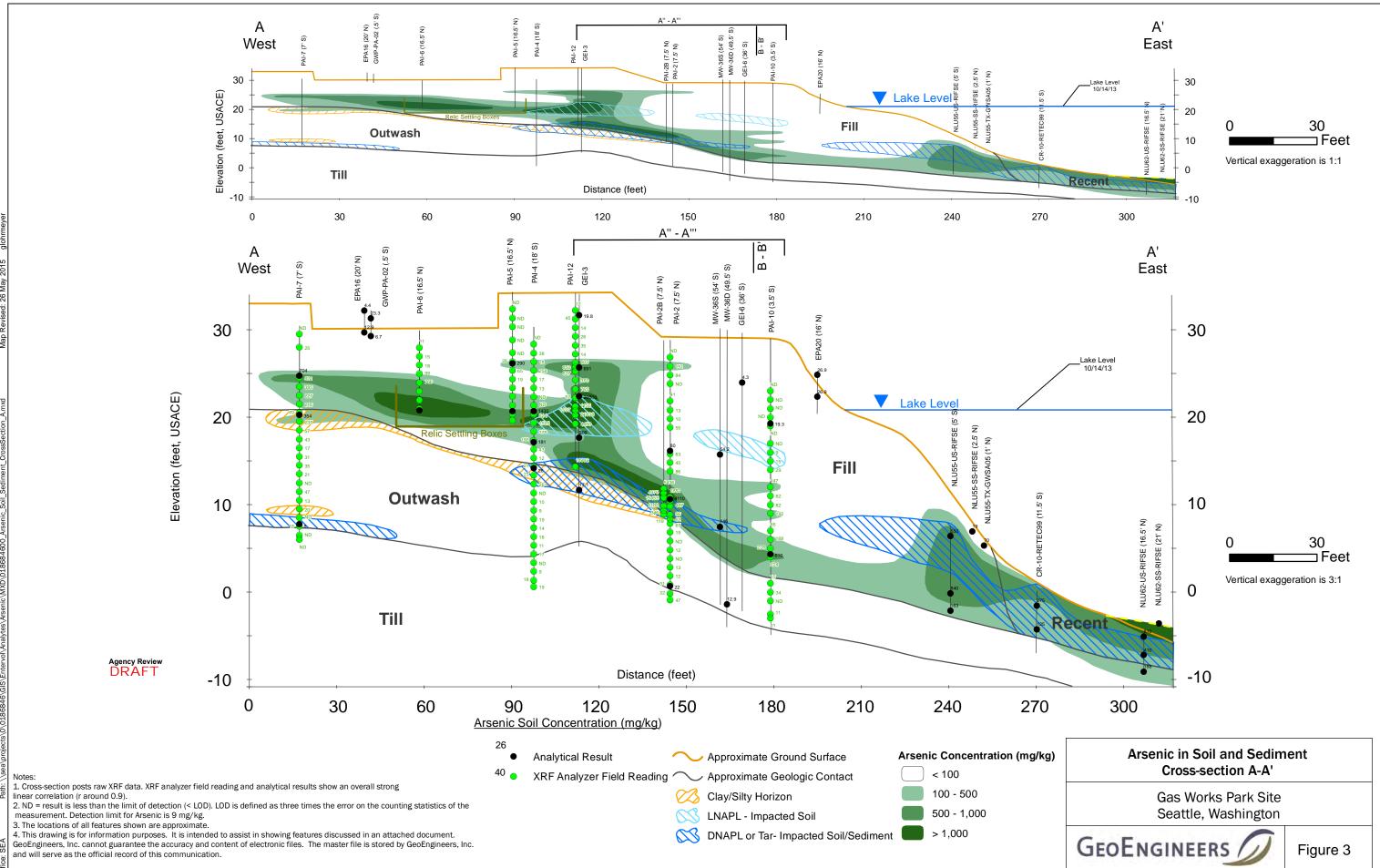
GEOENGINEERS /

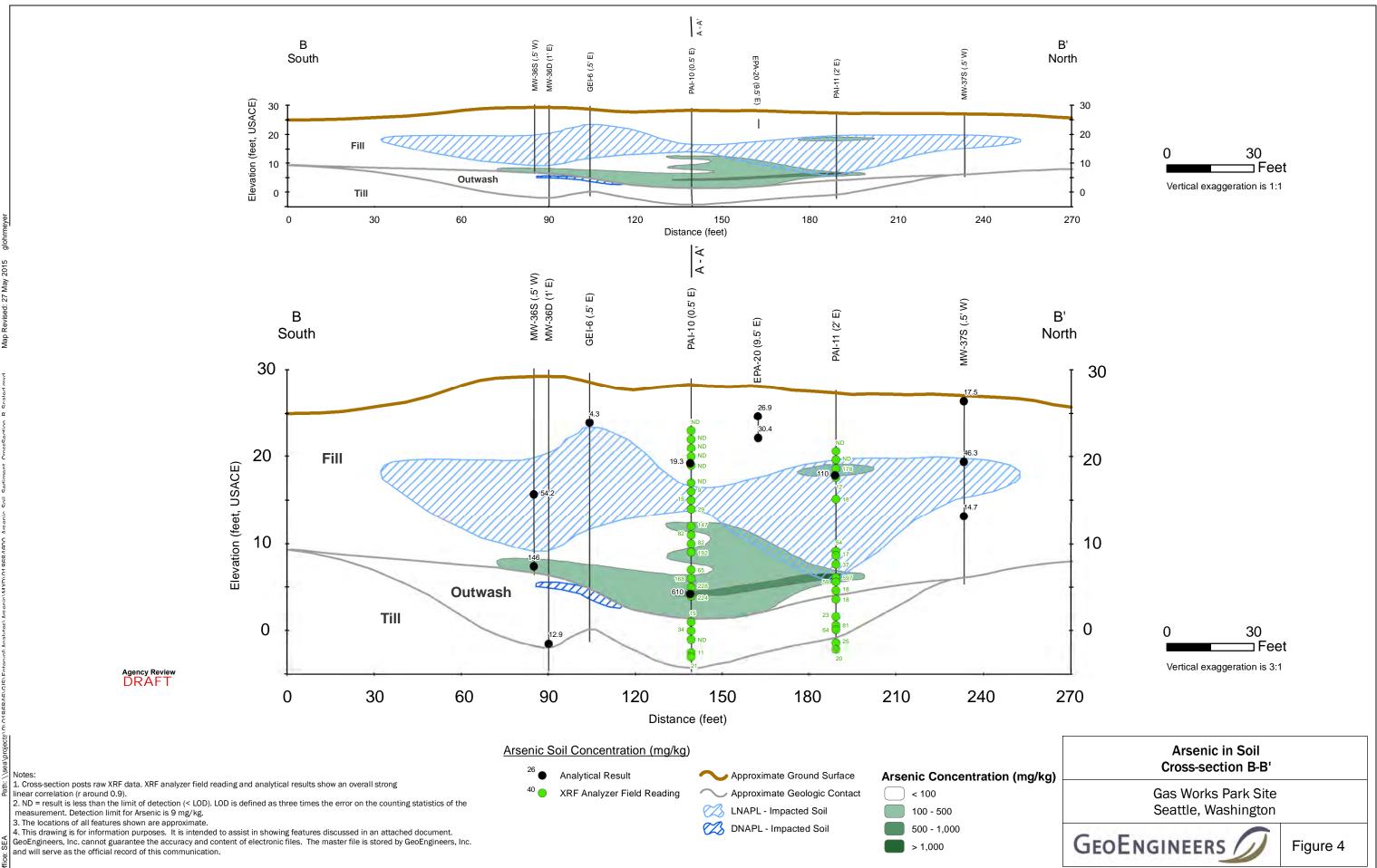
Figure 1

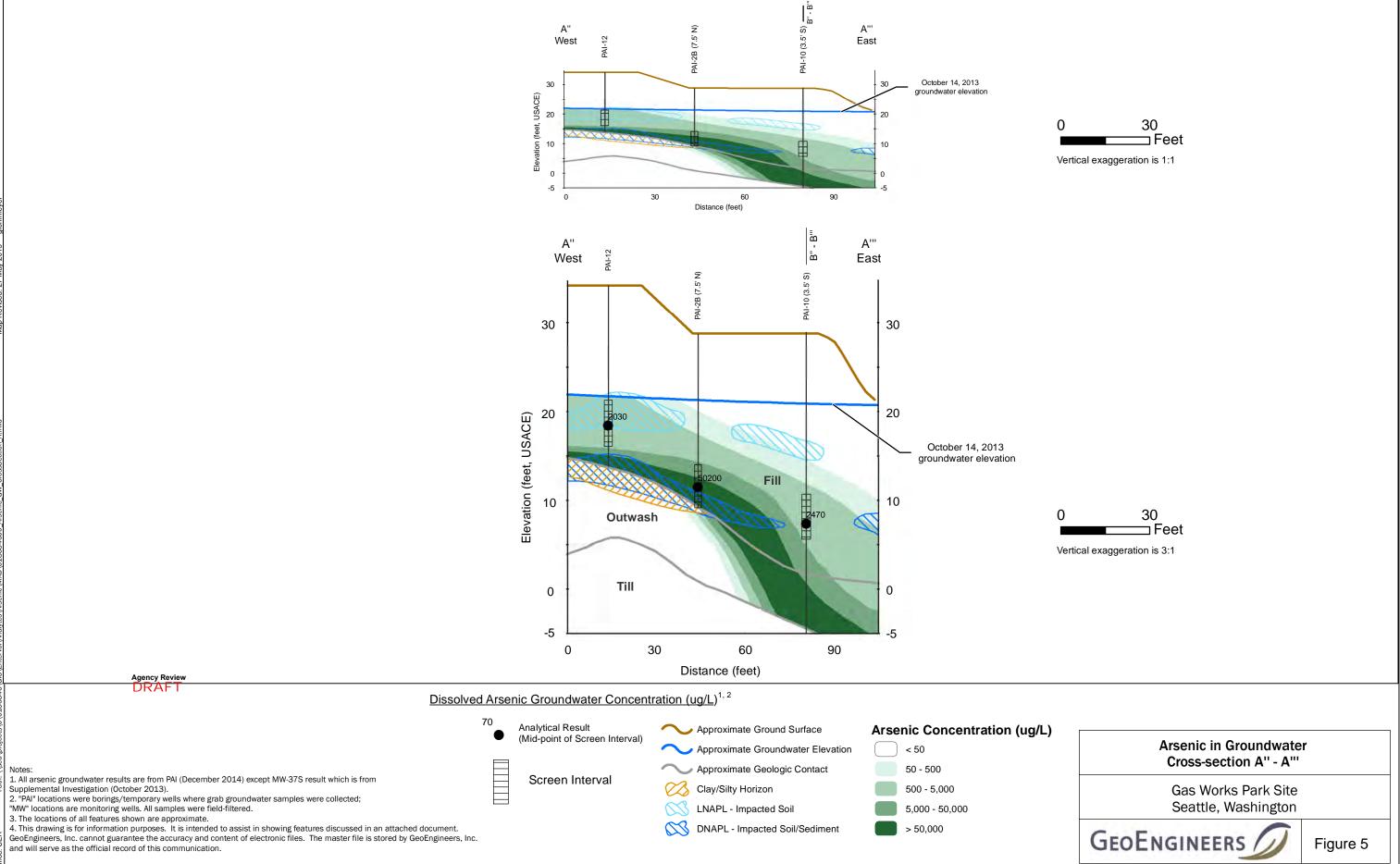


- GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc.

and will serve as the official record of this communication.

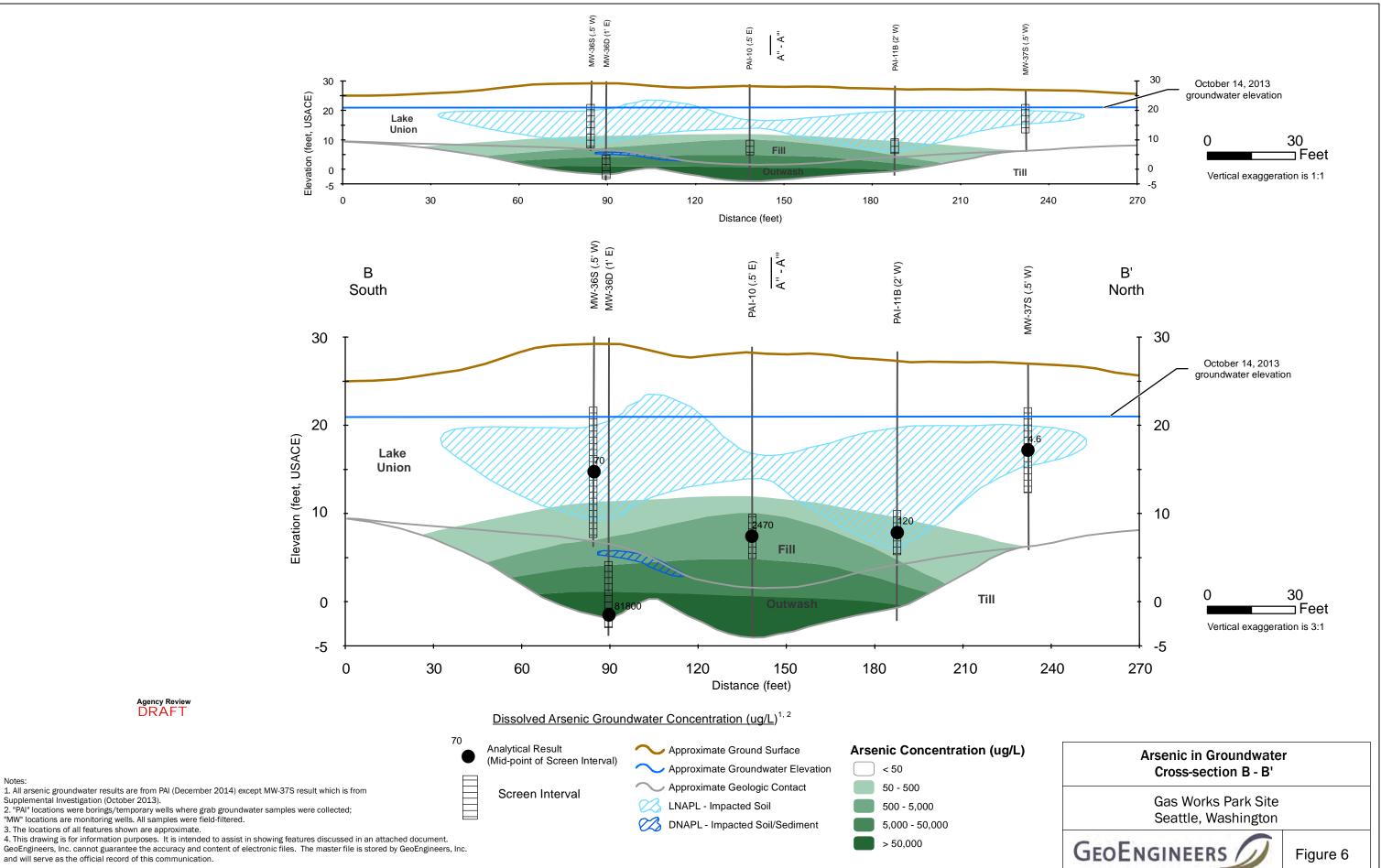












APPENDIX 2B-3 Supplemental Investigation Data Report 2016 Play Area Investigation

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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 of 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 Ecologyapproved 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

 $^{^{\}rm 2}$ 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 (μ g/L) to 50,200 μ g/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 μ g/L to 81,800 μ g/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 μ g/L.

The arsenic concentrations in groundwater are below the maximum of 81,800 μ g/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 μ g/L (PAI-14D) and highest in fill is 10,500 μ g/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 Diamict or Till, however, in each case most of the screen was in outwash thereby included in the outwash average.



		Fill	Out	twash
Location	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.
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 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.

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.



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.

Table 2B-3-1

Soil Analytical and Test Results Gas Works Park Site Seattle, Washington

				Conv	Conventional Grain Size																
					Chemical		76200-	50800-	38100-	25400-				2000-850 µm							
		Sample			Oxygen	76200 µm	50800 µm	38100 µm	25400 µm	19000 µm	19050-9525	9525- 4750	4750- 2000µm	(Mediµm	850-425 μm	425-250 μm	250-106 µm	106-62.5 µm	72.5-45 μm	45-34 μm	<34 µm (Silt
		Elevation (feet	Observed	Total Solids	Demand	(Gravel)	(Gravel)	(Gravel)	(Gravel)	(Gravel)	μm (Gravel)	µm (Gravel)	(Coarse Sand)	Sand)	(Mediµm Sand)	(Fine Sand)	(Fine Sand)	(Fine Sand)	(Silt)	(Silt)	& Clay)
Exploration	Sample ID	USACE)	Geology	%	mg/kg		•	1		1		-		%	0	•	1	•	1	•	
	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-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

							Observed		Field-Meas	sured Water	Quality Par	ameters ³			Groundw	ater Analytical	Results ⁴	
Exploration ¹	Sample ID	Ground Surface	Screen Start	Screen End	Groundwater ²	Tubing Intake	Geology in Screen Interval	pН	Specific Conductance	Turbidity	Dissolved Oxygen	ReDox Potential	Total Dissolved Solids	Filtered/	Arsenic	Iron	Sulfide	Chemical Oxygen Demand
			El	evation (feet USACE)				µS∕cm	NTU	mg/L	millivolts	g/L	Unfiltered	µg∕L	µg∕L	mg/L	mg/L
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			Filtered	586	2,880	3.00	63.4
	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-190913	29.76	18.76	14.76	19.66	16.76	Fill	8.29	1,058	835.0	1.38		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	114
PAI-20S	PAI-20S-190912	29.92	16.92	14.92	16.32	15.42	Fill		n	neasurable N	IAPL in well ^e	6		Unfiltered	NA	NA	280 .	NA
PAI-20AS	PAI-20S-190913	30.12	20.12	15.12	16.72	15.42	Fill		n	neasurable N	IAPL in well ⁶	6		Filtered	4,460	1,770	32.0	193
PAI-20D	PAI-20D-190912	29.88	9.88	4.88	13.78	4.88	Qva			slow rec	harge ⁷			Filtered	841	3,940	9.20	143
PAI-21	concrete refusal	34.17									dry ⁵		-				1	
PAI-21BS	PAI-21BS-161017	34.24	20.24	17.74	18.29	17.74	Fill		n	neasurable N	IAPL in well ⁶	6		Filtered	25.9 ⁸	41.4 ⁸	2.00 L	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		slov	v 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					ana	lytical duplicate	e of PAI-23	3D-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		slov	v 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					ana	lytical duplicate	e of PAI-20	6S-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-160928	25.91	16.41	13.41	20.29	13.71	Fill	6.34	473		1.16	-122.2	0.310	Filtered	29.6	9,480	1.00	70.4
	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-160929	30.30	24.30	19.30	22.29	20.30	Fill	6.98						Filtered	544	3,870	0.210	28.0
PAI-29	shallow Till refusal	33.64		l			1		1		dry ⁵	8			1	1		
PAI-30S	PAI-30S-160929	33.75	28.75	24.75	25.85	24.80	Fill			slow rec	-			Filtered	140	8,150	0.0500	26.7
	PAI-31-S-161018	30.00	15.00	13.50	17.60	14.00	Fill	9.08	1,036	543.9	-	-336.1	0.670	Filtered	733	576	3.58	143
	PAI-31-D-161018	29.87	2.87	0.37	6.97	0.87	Qva/Qpgt	7.77	11.5	717.8			0.740	Filtered	225	2,690	0.0500	26.7
	PAI-32-D-161018	29.72	8.72	3.72	11.08	4.22	Qvr/Qpgt	7.47	873		0.96			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		0.410	Filtered	3,890	15,600	1.76	78.3
	PAI-33-M-161019	34.07	19.07	14.07	19.05	15.07	Fill	8.82	1,240	136.4	0.19		0.810	Filtered	3,870	2,010	20.9	179
	PAI-33-D-161019	34.01	9.01	4.01	18.07	5.01	Qvr/Qva	7.91	984	228.8	0.22		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 ³/₄-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 ³/₄-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 cloggedg 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.

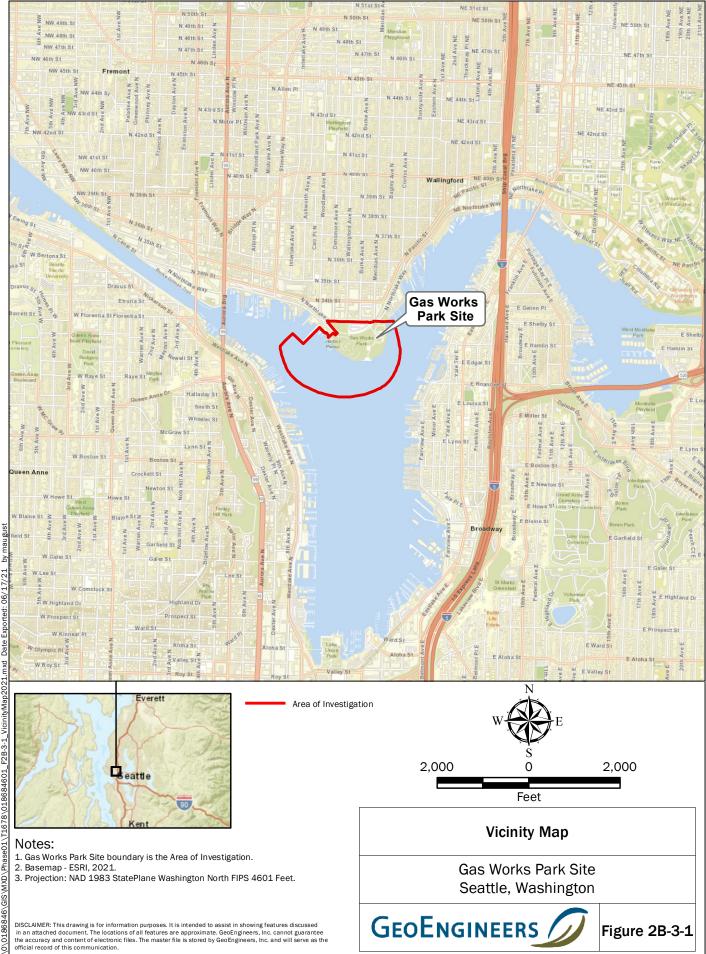
-- = no reading
g/L = grams per liter
J = result estimated
mg/kg = milligrams per kilogram
mg/L = milligrams per liter
NA = not analyzed
NAPL = non-aqueous phase liquid
NTU = nephelometric turbidity units

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

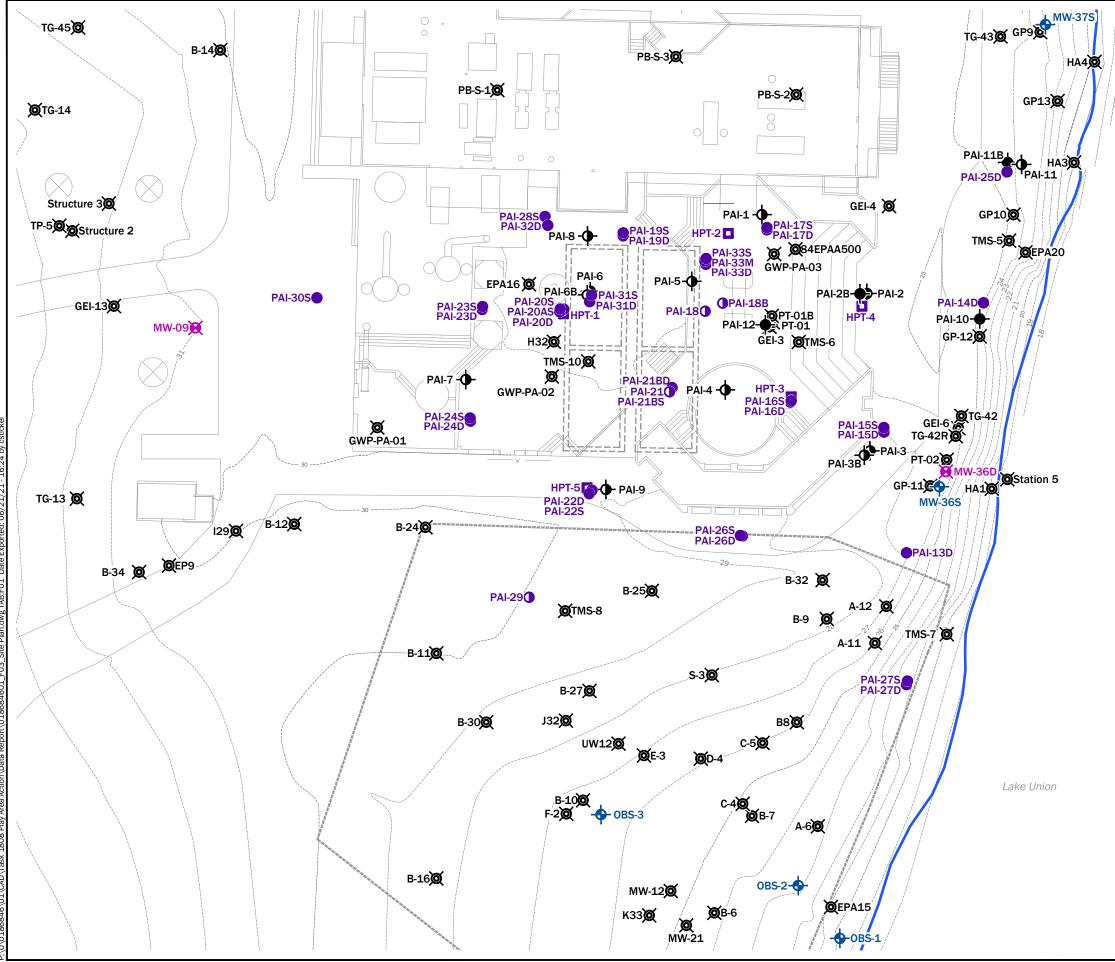
Analytical and Testing Methods:

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









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Legend

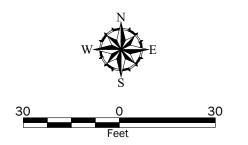


Data Source Notes:

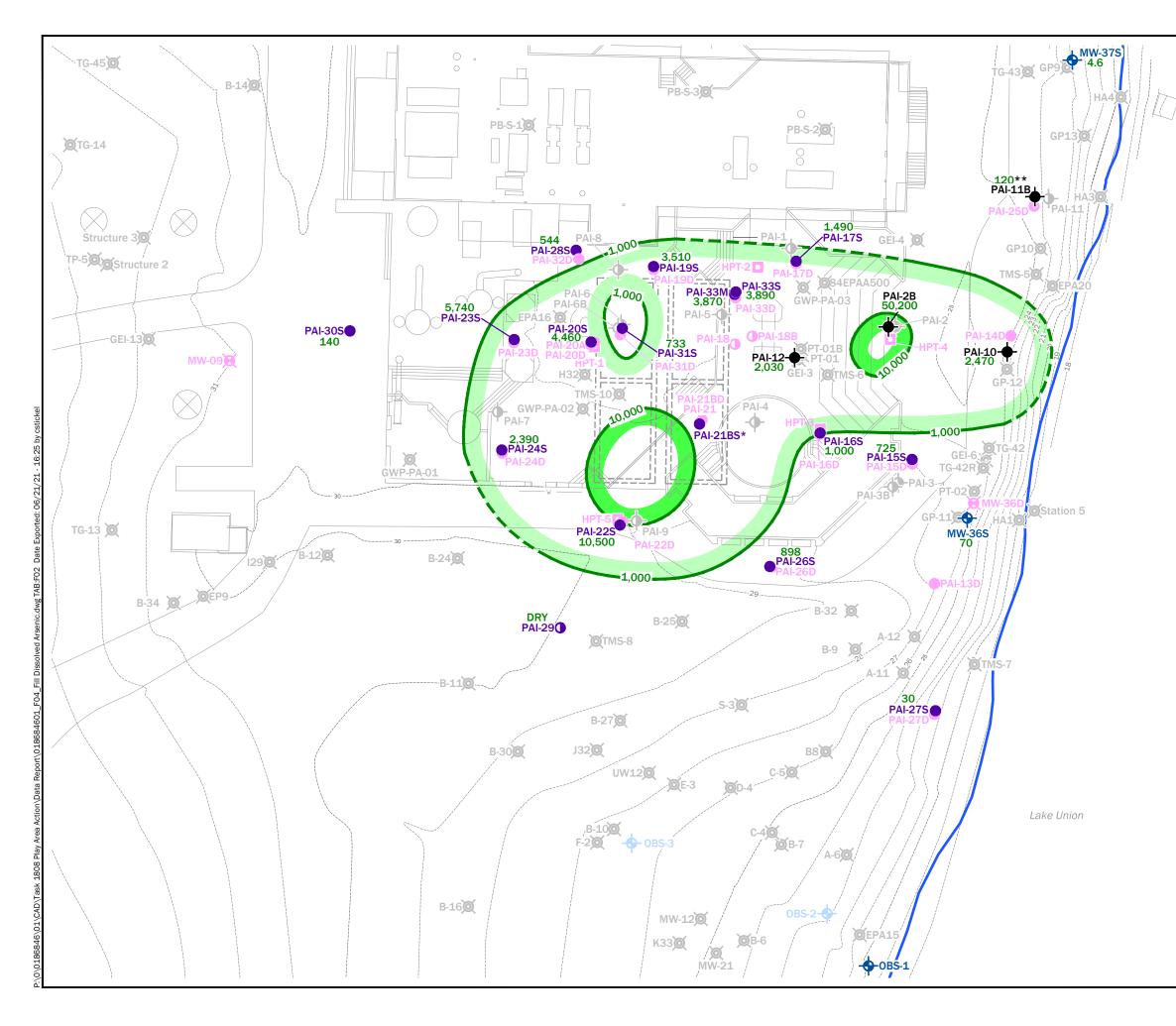
1. Existing conditions survey by Seattle Parks and Recreation, November 2002

2. Earthwork & Demolition plan by Department of Parks and Recreation, July 1974

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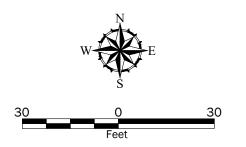
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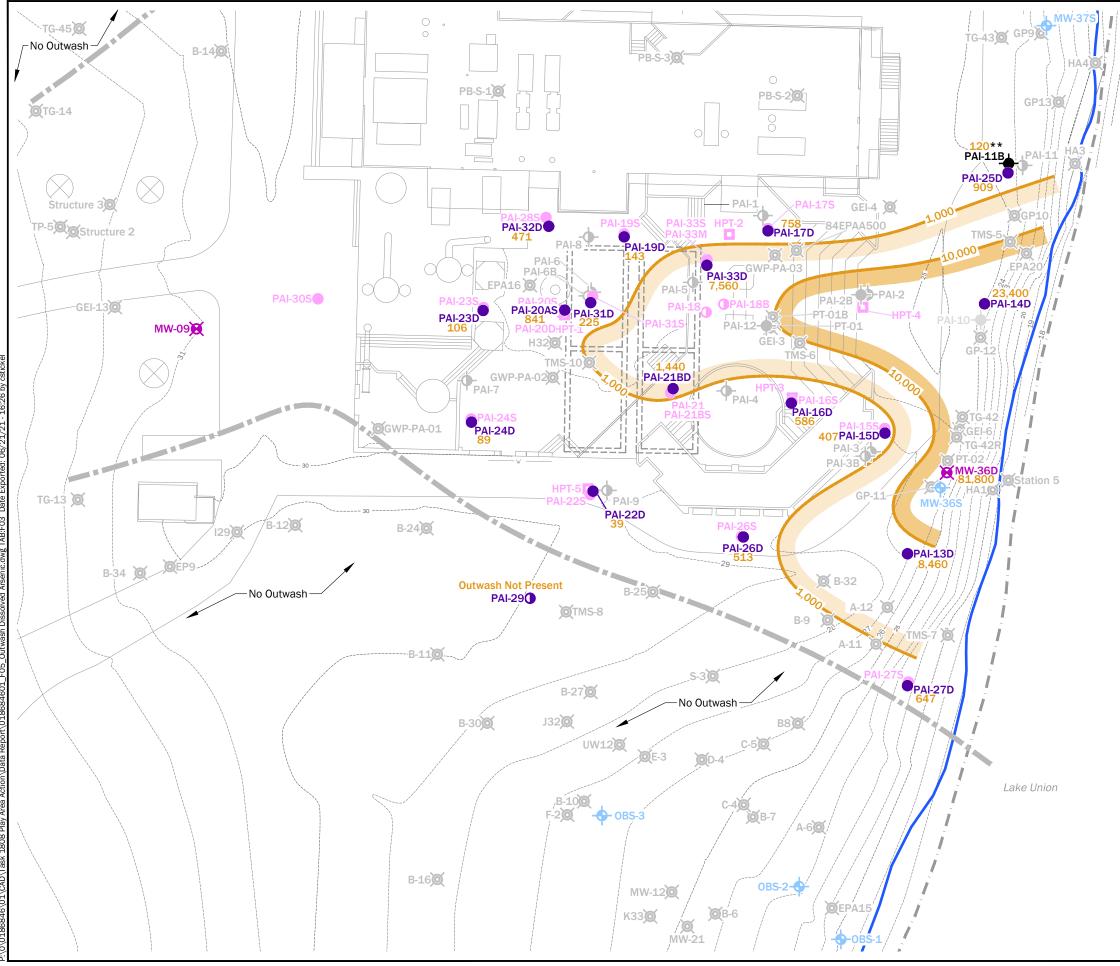
Data Source Notes:

- 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.

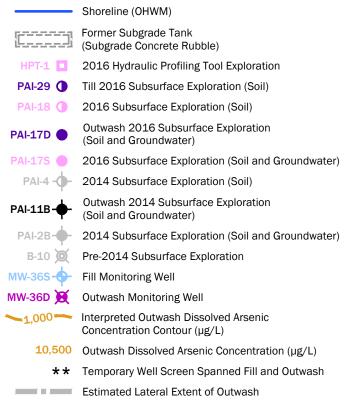
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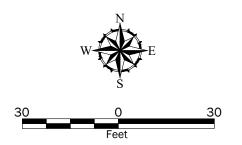
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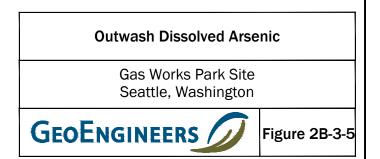


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- 3. Earthwork & Demolition plan by Department of Parks and Recreation, July 1974.

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

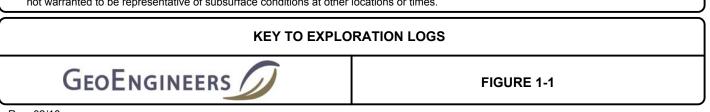




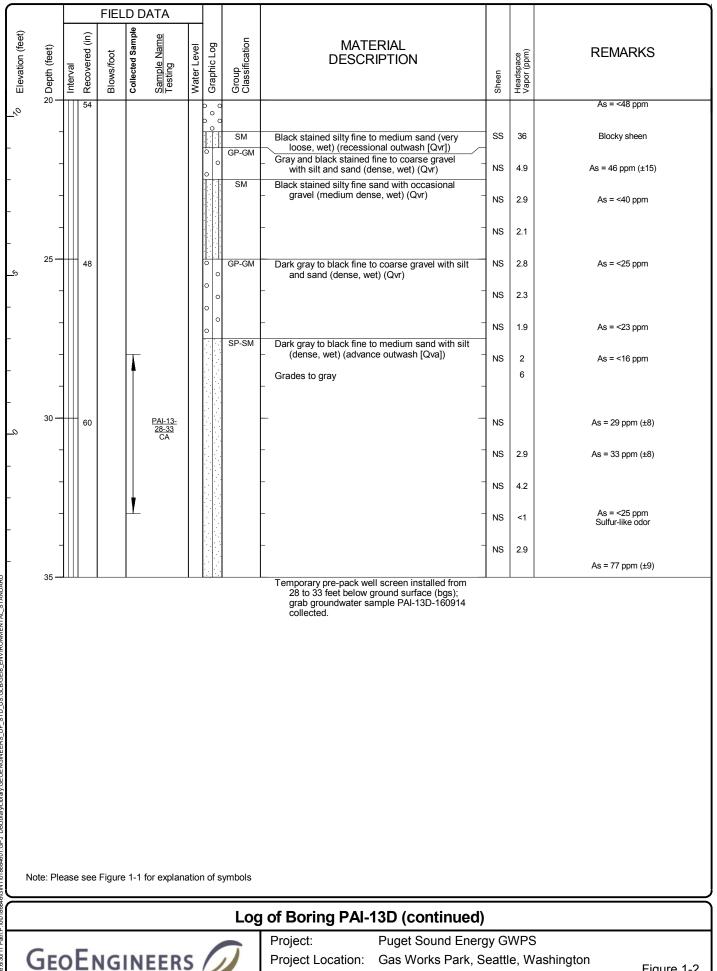
ATTACHMENT 2B-3-1 Boring Logs

	50	IL CLASSIF		N CH	ARI	ADDII		MATERIAL SYMBOLS
М		IONS	SYMB GRAPH		TYPICAL DESCRIPTIONS	_	BOLS LETTER	TYPICAL DESCRIPTIONS
	GRAVEL	CLEAN GRAVELS		GW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES		AC	Asphalt Concrete
	AND GRAVELLY SOILS	(LITTLE OR NO FINES)		GP	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES		сс	Cement Concrete
COARSE GRAINED SOILS	MORE THAN 50% OF COARSE FRACTION	GRAVELS WITH FINES		GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES		CR	Crushed Rock/ Quarry Spalls
	RETAINED ON NO. 4 SIEVE	(APPRECIABLE AMOUNT OF FINES)		GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES		тѕ	Topsoil/ Forest Duff/Sod
MORE THAN 50%	SAND	CLEAN SANDS	• • • • • • • • • • • • • • • • • • •	SW	WELL-GRADED SANDS, GRAVELLY SANDS		Groupd	Iwater Contact
RETAINED ON NO. 200 SIEVE	AND SANDY SOILS	(LITTLE OR NO FINES)		SP	POORLY-GRADED SANDS, GRAVELLY SAND	▼	Measure	d groundwater level in
	MORE THAN 50% OF COARSE FRACTION	SANDS WITH FINES		SM	SILTY SANDS, SAND - SILT MIXTURES	<u> </u>	•	on, well, or piezometer d free product in well or
	PASSING NO. 4 SIEVE	(APPRECIABLE AMOUNT OF FINES)		SC	CLAYEY SANDS, SAND - CLAY MIXTURES	<u> </u>	piezome	ter
				ML	INORGANIC SILTS, ROCK FLOUR, CLAYEY SILTS WITH SLIGHT PLASTICITY		<u>Graphi</u>	<u>c Log Contact</u>
FINE	SILTS AND	LIQUID LIMIT LESS THAN 50		CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS			contact between soil strata
GRAINED SOILS	CLAYS			OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY	/	Approxir strata	nate contact between soil
MORE THAN 50% PASSING NO. 200 SIEVE				мн	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS SILTY SOILS		<u>Materia</u>	I Description Contact
SIEVE	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50		СН	INORGANIC CLAYS OF HIGH PLASTICITY		Contact	between geologic units
	CLATS		huh	он	ORGANIC CLAYS AND SILTS OF MEDIUM TO HIGH PLASTICITY		Contact geologic	between soil of the same unit
Н	GHLY ORGANIC	SOILS		PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS		Laborat	ory / Field Tests
of blo dista and c A "P'	2.4 Sta She Pis Dire Bul Con count is reco pws required nce noted). indicates sa	mpler Symb -inch I.D. split ndard Penetra elby tube ton ect-Push k or grab ntinuous Corir orded for drive to advance sa See exploratio	barrel tion Test g m sample mpler 12 n log for l	(SPT) rs as th inches namme	e number (or r weight	%FG ALACPS DSACCS MDC PIPPM STXCS NSS	Consolid Direct shi Hydrome Moisture Organic o Permeab Plasticity Pocket po Parts per Sieve ana Triaxial c Unconfin Vane she Sheen (No Visibl Slight Sh	limits analysis ry compaction test ation test ear ter analysis content content and dry density content lity or hydraulic conductiv index enetrometer million dysis ompression ed compression ar <u>Classification</u> e Sheen een
drill r	ig.	es sampler pus	•	•		SS MS HS NT	Moderate Heavy Sh Not Teste	Sheen leen

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.



Notes: Image: Provide and	Drilled 9/1	<u>Start</u> 4/2016	<u>En</u> 9/14/	<u>d</u> /2016	Total Depth	(ft)	35		Logged By GRL Checked By SBS	Driller Cascade D	rilling			Drilling Method Continuous
Exerting (X) 1270773.34 Dealer MADB3 (feel) Data Matterial Control (X) 239066.13 Dealer MADB3 (feel) Data Matterial Control (X) 239066.13 Dealer MADB3 (feel) Difference Month NADB3 (feel) Difference Matterial Control (X) 12.80 17.71 Note: Hand-augered from 0.0 2 feet bps. The second secon	Surface Elev Vertical Dat	/ation (ft) um				.s)				N/A				Geoprobe 7730 DT
Image: Second	Northing (Y)			1270 239	0773.34 066.13	,						Date M	easure	Depth to <u>Water (ft)</u> <u>Elevation (ft)</u>
No. Description Description SM Brown sity fine to coarse sand with occasional gravel and frace roots (loose, molst) (fill) Description XMF Readings "As = X ppm" 38 38 NS 1 As = 38 ppm (s8) NS 1 38 M Light brown silt with sand and organic matter (soft to medium sift, molst) (fill) NS 1 As = 38 ppm (s8) 48 M Light brown silt with sand and organic matter (soft to medium sift, molst) (fill) NS 1 As = <51 ppm			FIEL	.D DA	TA						I			
SM Brown sity fine to coarse sand with occasional gravel and tace roots (loce, moist) (fill) $\frac{1}{2}$ $\frac{1}{2}$		Interval Recovered (in)	Blows/foot	Collected Sample	<u>Sample Name</u> Testing	Water Level						Sheen	Headspace Vapor (ppm)	
As = <22 ppm; blocky sheen As = <23 ppm; blocky, patch-like sheel SP Black fused agglomerate with asphaltic SP Black fused agglomerate with asphaltic SP Black fused agglomerate with asphaltic SS 189.9 As = <23 ppm; blocky, patch-like sheel SS 189.9 As = <23 ppm; blocky, patch-like sheel SP Crades coarser with depth SP Crades coarser with depth SP Crades coarser with depth SP SP SP SP SP SP SP SP SP SP		48						ML P-SM OOT GP AC GP	gravel and trace	sand and organic ma stiff, moist) (fill) im sand with silt and f (loose, moist) (fill) brown and orange silf asional fused agglom- vel (medium stiff, mo coarse agglomerate w .) (fill) erial (medium stiff, m n to coarse agglomerate aterial (loose, wet) (fi e fused agglomerate	fill) atter trace t erate ist) vith oist) ate ill) (fill)	NS NS NS NS SS MS NS NS NS NS SS SS NS	<1 1.1 <1 3.9 2.8 448 477.3 2.7	As = 36 ppm (±8) As = <51 ppm As = <27 ppm Naphthalene-like odor As = <14 ppm Groundwater encountered at 7.7 feet during drilling As = <12 ppm Patch-like sheen As = <12 ppm As = <19 ppm As = <24 ppm As = <15 ppm (SP)
As = <28 ppm agglomerate (medium sand- to fine gravel-sized) (fill) Grades coarser with depth Grades coarser with depth Black fused agglomerate (fill) S 21.8 NS 21.8 NS 13.3 NS 22.3 As = 72 ppm (±13)		48				Ţ		SP	 sand- to fine gra Black fused agglom material (fill) 	vel-sized) (fill) erate with asphaltic		(AC) SS SS	437.9	As = <22 ppm; blocky sheen As = <17 ppm
	- - - - -							GP	agglomerate (m gravel-sized) (fil Grades coarser wit	edium sand- to fine)) depth	11um	NS	13.3	
Note: Please see Figure 1-1 for explanation of symbols	Note: Ple	ease see	Figure	e 1-1 foi	r explana	ation	of symb	ols						
Log of Boring PAI-13D									Log of Bor	ing PAI-13D				
GEOENCINEERS Project: Puget Sound Energy GWPS Project Location: Gas Works Park, Seattle, Washington	GF	οFr	NG	INF	ER	S	\bigcap	ī	Project:	Puget Soun				

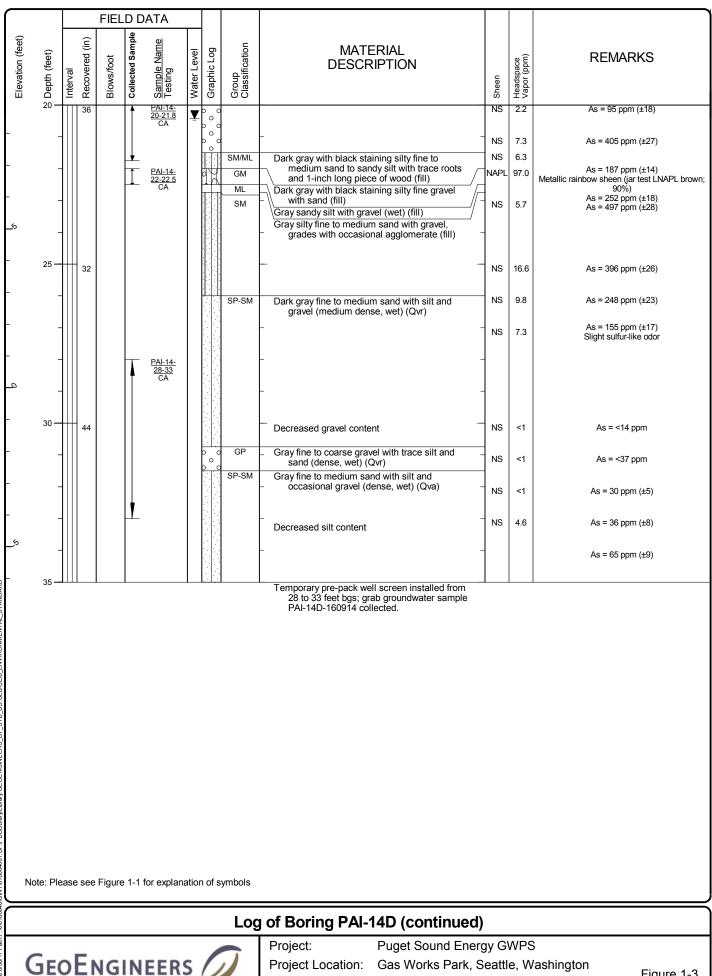


Project Location: Project Number:

0186-846-01

Figure 1-2 Sheet 2 of 2

Drille		<u>Start</u> 4/2016		<u>nd</u> 1/2016	Total Depth	n (ft)	35	5	Logged By GRL Checked By SBS	Driller Cascade Dr	rilling			Drilling Method Continuous
Surfac Vertic	ce Elev al Datu	ation (f	t)		28.89 CE (Lock	(s)			ammer ata	N/A		Drilling Equipr		Geoprobe 7730 DT
Eastir Northi Notes	ing (Ý)	d-auger	ed fror	239	70797.4 9144.24 ? feet bgs					State Plane,North NAD83 (feet)		<u>Groun</u> Date M 9/14/2	easure	Depth to
(feet)	et)	(in)		Sample		vel	-og	ation		ATERIAL			e (c	REMARKS
Elevation (feet)	⊖ Depth (feet) I	Interval Recovered (in)	Blows/foot	Collected Sample	<u>Sample Name</u> Testing	Water Level	Graphic Log	Group ⊠ Classification		CRIPTION	sional	Sheen	Headspace Vapor (ppm)	XRF Readings "As = X ppm"
_	-							Givi		roots (loose, moist) (f		NS	5.1	
-	_	36						SM		edium sand with occas ntains ash (loose, mois		NS NS	<1	As = <45 ppm
- ⁶ 2	5 —	36						ASH SP SP-SM	(medium sand-	c ash (fill) used vesicular agglom to fine gravel-sized) (fi fine to medium sand v	ill)	NS NS	<1 <1	As = <28 ppm As = <30 ppm
-	_							SP GP GP	silt and soot (fill Black with orange fi (medium sand- 2-inch layer of oran		ierate	NS	<1	As = 75 ppm (±11) As = <12 ppm
_	_									ar agglomerate: coarse wel-sized (loose, mois 5 feet		NS MS	1.5 78.9	As = <11 ppm Groundwater encountered at 7.5 feet during drilling Sheen is metallic
- <u>^</u> 2	- 10	40						GP	sand- to coarse	ar agglomerate (coarso gravel-sized), occasio een, white with trace a , wet) (fill)	nally	NS		Green and white particles in sheen pan As = 36 ppm (±9)
-	-								-			SS	49.5 7.8	Slight hydrocarbon-like odor As = 21 ppm (±5) As = <19 ppm
- _%	-								2-inch layer of finer - fine gravel-sized	material (medium san I)	nd- to	SS	4.7	As = <13 ppm
-	15 — - _	12							2-inch layer of dark with trace silt	gray fine to medium sa	and ⁻	NS NS	2.7 1.3	As = 63 ppm (±7) As = 69 ppm (±10)
 No														
									Log of Bor	ing PAI-14D				
C	GEOENGINEERS Project: Puget Sound Energy GWPS Project Location: Gas Works Park, Seattle, Washington Project Number: 0186-846-01													



Project Location:

Project Number:

Gas Works Park, Seattle, Washington

0186-846-01

Figure 1-3 Sheet 2 of 2

Drill	ed 9/2	<u>Star</u> 27/20		<u>En</u> 9/27/	<u>d</u> /2016	Total Depth	(ft)	34	Ļ	Logged By GRL Checked By ZAS	Driller Cascade Drillin	g			Drilling Method Continuous
	ace Ele cal Dat		n (ft)			30.44 E (Lock	s)			ammer ata	N/A		rilling quipn		Geoprobe 7730 DT
North	ing (X) hing (Y es: Har		igere	d from	239	0766.29 103.83 feet bgs					State Plane,North NAD83 (feet)	<u>D</u> a		dwate easure 016	 Depth to
\succeq				FIEL	D DA	TA									
Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot		Sample Name Testing	Water Level	Graphic Log	Group Classification		ATERIAL CRIPTION		Sheen	Headspace Vapor (ppm)	REMARKS
~ -	-0	-	50						AC SP-SM	1.5-inches asphalt of Brown fine to coars occasional grave	e sand with silt and el (loose, moist) (fill)				XRF Readings "As = X ppm"
-	-	-							CC SP-SM SP	Degraded concrete Brown fine to coars occasional grave	(medium dense, moist) (fi	II) /	NS NS	<1 <1	As = 27 ppm (±8) As = 72 ppm (±11)
-		-								 vesicular agglon sand-sized) with 	herate (fine to coarse trace light colored platy ate (loose, moist) (fill)	_	NS	<1	As = 30 ppm (±7)
<u>^</u> ?	5 —		36							Becomes dark brow	n to dark gray		NS NS NS	<1 <1	As = <18 ppm As = <25 ppm
-	-	-								-		_	NS	1.3	As = <26 ppm As = 21 ppm (±5)
		-	30						GP	agglomerate (fir	light weight vesicular e to coarse sand- to fine t zed) with sand (loose, wel	- o (;) - -	NS HS MS SS NS	<1 <1 <1 <1	Groundwater encountered at 9.9 feet during drilling As = 23 ppm (±6) As = 176 ppm (±9) As = 48 ppm (±10); sheen has color As = 51 ppm (±9); sheen has no color As = 23 ppm (±6) As = <22 ppm
- <u>~</u>	15 -	-	36		•	<u>PAI-15- 15-17.4</u> CA <u>PAI-15</u> 7.4-17.6				- With wood, become	s medium dense		NS NS SS JAPL	<1 <1 10 50.3	As = 103 ppm (±8) As = 105 ppm (±10) As = 110 ppm (±11) As = 453 ppm (±17); platy sheen, jar test dark brown NAPL covered 80% of water surface in ja some color As = 278 ppm (±10)
	20 –					CA	Ţ		GP		gravel with sand (medium		IAPL	20.1	As = 35 ppm (±7)
	Note: Please see Figure 1-1 for explanation of symbols														
$\left[\right]$										Log of Bor	ing PAI-15D				
(Ge	ol	EN	IG	INE	ER	S	Ó]	Project: Project Locatio Project Number					

			FIE	-	ATA							
Elevation (feet)	Depth (feet)	Interval Recovered (in)	Blows/foot	Collected Sample	<u>Sample Name</u> Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
	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	NS	12	As = <20 ppm
-	-								 occasional gravel (medium dense to dense, wet) (Qvr) 	NS	20.1	As = 17 ppm (±5)
-	-								-	-	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
<u>ئ</u>	25 —	60								NS	<1	As = 30 ppm (±6)
-	_								-	NS	14.5	As = <15 ppm
-	-								-	-		As = 20 ppm (±6)
-	-								-	- NS	9.1	As = <17 ppm
-	-								Grades siltier	NS	19	As = <14 ppm
_0	30 —	48						SP-SM	Gray fine to medium sand with silt (dense, wet) (Qva)	NS	20.1	As = <15 ppm
-	-				PAI-15- 30-32.5 CA			GP	Gray fine to coarse gravel with trace silt and sand (dense, wet) (Qva)	-	6.4	As = <64 ppm
_	-				<u>DUP-1</u> <u>30-32.5</u> CA			SP-SM	 Gray fine to medium sand with silt (dense, wet) (Qva) 	NS NS	6.1 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 Temporary pre-pack well screen installed from 30.6 to 33.1 feet bgs; grab groundwater			As = 79 ppm (±9) As = 90 ppm (±10)
									sample PAI-15D-160927 collected.			
No	te: Ple	ase see	e Figur	e 1-1 1	for explan	atior	n of s	symbols				

Log of Boring PAI-15D (continued)



ate:6/30/17 Path:

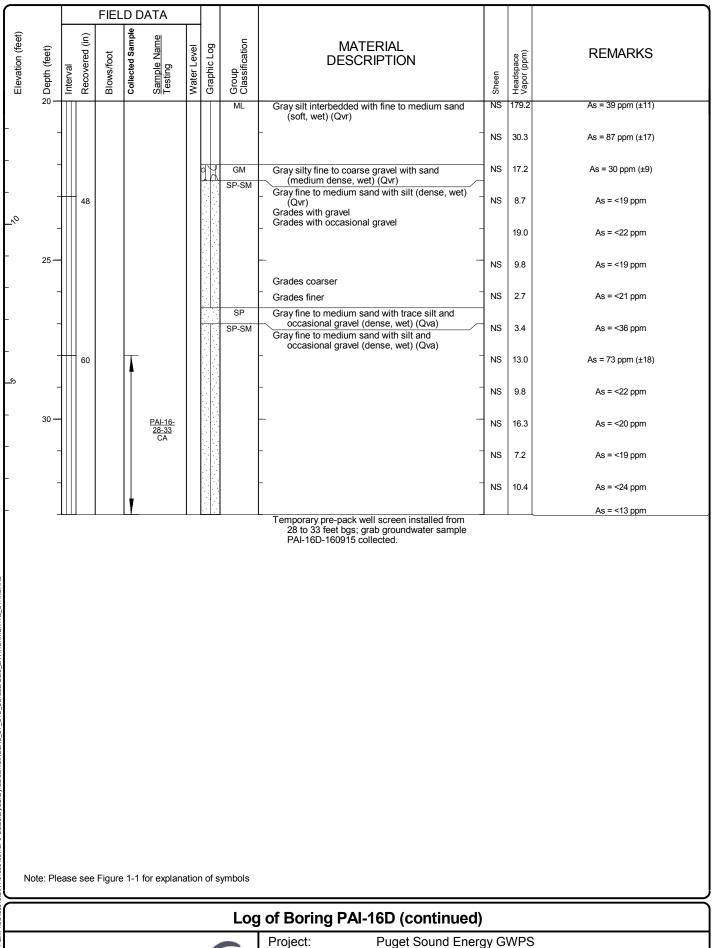
Puget Sound Energy GWPS Gas Works Park, Seattle, Washington 0186-846-01

Figure 1-4 Sheet 2 of 2

Drille	d 9/2	<u>Start</u> 7/2016	<u>E</u> 9/2	<u>nd</u> 7/2016	Total Depth	n (ft)	20		Logged By GRL Checked By ZAS Driller Cascade Drilling			Drilling Method Continuous
Surfac Vertic	ce Elev al Dati	ation (1 um	t)	USA	30.11 CE (Loci	ks)			ammer N/A	Drillin Equip	g ment	Geoprobe 7730 DT
	ng (Y)	d-auge	ed fror	23	70766.25 9105.28 2 feet bgs			S	ystem WA State Plane,North atum NAD83 (feet)		ndwate Measure 2016	Depth to
					-				1	0,211	2010	0.00 20.20
				LD D.								
¹³ ∂ Elevation (feet)	Depth (feet)	Interval Recovered (in)	Blows/foot	Collected Sample	<u>Sample Name</u> Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
<u></u>	0 —								See adjacent boring PAI-15D for soil descriptions	_		
	-								-	_		
	-								_	_		
1 ⁵⁰	- 5 —								-			
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	-								_	_		
Nc	20 — ote: Ple	ase se	e Figur	re 1-1 f	or explan	ation	n of syr	nbols	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			
C	ΞE(οE	NG	IN	EER	S	0	1	Project:Puget Sound EndProject Location:Gas Works Park,Project Number:0186-846-01			

Drillee		<u>Start</u> 5/2016	<u>En</u> 9/15	<u>d</u> /2016	Total Depth	(ft)	3	3	Logged By GRL Checked By SBS	Driller Cascade Drilling			Drilling Method
Surfac Vertica		ation (ft) Im			33.87 CE (Lock	s)			ammer ata	N/A	Drillin Equip		Geoprobe 7730 DT
Eastin Northi Notes	ng (Y)	d-augere	ed from	23	70737.01 39113.2 1½ feet bç	js.				State Plane,North NAD83 (feet)	<u>Grour</u> <u>Date M</u> 9/15/2	leasure	 Depth to
			FIEL	.D D/	ATA								
Elevation (feet)	Depth (feet)	Interval Recovered (in)	Blows/foot	Collected Sample	<u>Sample Name</u> Testing	Water Level	Graphic Log	Group Classification		ATERIAL CRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
	0 —							BRICK SP	1.5 inch brick paved Brown fine to coars	surface e sand (loose, moist) (fill)	NS	<1	XRF Readings "As = X ppm"
-	-							01		al gravel, medium dense	[–] NS	<1	
-	-	32							-		- NS	<1	As = <25 ppm
-	-							GP	Gray and brown find	e to coarse gravel with trace	NS	<1	As = <26 ppm
<u>_%</u>	_							SM	moist) (fill)	ace roots (medium dense, silty fine to coarse sand with	NS	<1 <1	As = <30 ppm
-	5 —	60						SP	(fill)	atter (medium dense, moist) e sand with trace silt and	/NS	<1	As = <69 ppm
-	-							SM	Becomes light brow Brown silty fine to c	· · /	NS	<1	As = <43 ppm
-	-							ML		d e sand and occasional	NS	<1	As = <64 ppm
-	-							GM GP SOOT	pockets of soot	oarse gravel with trace and trace brick dust (fill)	NS	<1	As = <41 ppm As = <76 ppm
<u>^</u> ^	-							SP	Black soot with trac	with trace brick dust (fill) e black fused agglomerate olor towards bottom	/ NS	<1	As = <22 ppm
-	10 —	30							Black fused vesiculation fine gravel-size soot (loose, motion of the second sec	ar agglomerate (fine sand- zed), light weight with trace st) (fill)	NS	2.1	As = <25 ppm
-	-			_					orange)	ored (black, tan, white,	[–] NS	1.1	As = <17 ppm
-	_			Î					Grades to black		[–] NS	<1	As = 101 ppm (±11)
-	_	40			<u>PAI-16-</u> 11.5-15.8 CA				Grades to more fine	9	- HS	2.7	As = 148 ppm (±13) Slight hydrocarbon-like odor from 13 to 15 fe Groundwater encountered at 13 feet during drilling
	-							GP		erate (fine gravel-sized, se sand- and coarse ose, wet) (fill)	NAPL	5.9	As = 974 ppm (±29) Coated with NAPL
-	15 —								_		NAPL	132.6	
-	_							ML	coated black fus	a sand and olive green sed agglomerate with trace weathered wood) (very soft,	- HS	629.8 172.5 16.2	$As = 1,372 \text{ ppm } (\pm 65)$
_	-	60						MH	Gray silt with trace wet) (Qvr)	fibrous organic matter (soft,	NS	152.3	As = 216ppm (±53)
ئې	-					Ţ			-		[−] NS	118.6	As = 49ppm (±12)
- No	20 - III I I I I I I I I I I I I I I I I												
	Log of Boring PAI-16D												
0	ΞEO	DEN	١G	IN	EERS	5		7	Project: Project Locatio Project Numbe				

Figure 1-6 Sheet 1 of 2



Project Location:

Project Number:

ENVIRONMENTAL 3684601.GPJ DBLIbrary/Library:GEOENGINEERS_DF_STD_US.GLB/GEI8 ate:6/30/17 Pat

GEOENGINEERS

Figure 1-6 Sheet 2 of 2

Gas Works Park, Seattle, Washington

0186-846-01

Drilleo	d 9/1	<u>Start</u> 5/2016	<u>E</u> 9/1	<u>nd</u> 5/2016	Total Depth	n (ft)	18	8	Logged By GRL Checked By SBS	Driller Cascade Drilling	g			Drilling Method Continuous
Surfac Vertica	e Eleval Dat	/ation (i um	ft)	USA	33.79 CE (Lock	(S)			Hammer Data	N/A		rilling quipr		Geoprobe 7730 DT
Eastin Northi	g (X) ng (Y)				0737.28 9113.61	3		5	System WA State Plane,North Datum NAD83 (feet)				dwate easure	Depth to
Notes	: Han	d-auge	red fro	m 0 to ′	1½ feet b	gs.						/15/2		13.75 20.04
			FIE	LD D/	ATA									
Elevation (feet)	Depth (feet)	Interval Recovered (in)	Blows/foot	Collected Sample	<u>Sample Name</u> Testing	Water Level	Graphic Log	Group Classification	M. DES	ATERIAL CRIPTION		c	Headspace Vapor (ppm)	REMARKS
Elev	o Dept	Interval Recover	Blow	Colle	<u>Sam</u> Testi	Wate	Grap	Grou				Sheen	Head	
	-								See adjacent boring descriptions.) PAI-16D for soil	_			
	-								-		_			
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<u></u>	-								-		_			
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	-										_			
	-								T					
									l emporary pre-pac 16 to 18 feet bg PAI-16S-19091	k well screen installed from s; grab groundwater sample 5 collected.	n le			
No	te: Ple	ase se	e Figu	re 1-1 fo	or explana	atior	n of sy	/mbols						
_									Log of Boi	ing PAI-16S				
Ċ	ΞE(эE	NG	IN	EER	S		7	Project: Project Locatio Project Numbe	Puget Sound E n: Gas Works Par	-			

Drill	ed 9/	<u>Start</u> 15/2016	<u>Er</u> 9/15	<u>id</u> /2016	Total Depth	n (ft)	3	5	Logged By GRL Checked By SBS	Driller Cascade Drilling				Drilling Method Continuous
	ace Ele cal Da	vation (ft tum			33.96 CE (Lock	(S)			ammer ata	N/A		ling Jipm	ient	Geoprobe 7730 DT
Nort	ing (X) hing (Y es: Ha) nd-augere	ed from	239	0729.73 9167.06 foot bgs				System WA State Plane,North Datum NAD83 (feet)				lwate asure 016	 Depth to
			FIEL	.D DA	٩ΤΑ									
Elevation (feet)	Depth (feet)	Interval Recovered (in)	Blows/foot	Collected Sample	<u>Sample Name</u> Testing	Water Level	Graphic Log	Group Classification	M/ DES	ATERIAL CRIPTION	ā	Sheen	Headspace Vapor (ppm)	REMARKS
	0 -						_	BRICK SP-SM	1.5 inch brick paved	l surface		IS	<1	XRF Readings "As = X ppm"
		48							_ occasional grav (fill) Grades to orange	el (medium dense, moist)		s	<1 <1	As = <28 ppm As = <15 ppm
								ML	(medium stiff, m			IS	<1	As = <25 ppm
-								SM		nedium sand with el, glass-like fragments, trace ash, trace wood		IS	<1	As = <23 ppm
<u>_</u> @								CC SOOT	(loose, moist) (f Concrete Black soot with silty	fine to medium sand and		IS	<1	As = <30 ppm
-	5 -	50						GP ML	trace wood (me	dium dense, moist) (fill)	A		<1	As = <28 ppm
-		$\left\{ \left \right \right\}$						SM SM	(fine gravel-size) Gray silt with trace (fill)	d) (fill) wood (medium stiff, moist)	s	s	<1 <1	As = 84 ppm (±14)
-									Dark gray silty fine s moist) (fill)	sand with soot (loose,	/ .	IS	<1	As = <15 ppm
-								SOOT		edium sand with occasional biece of clear glass (loose,	/	s	17.3	As = 427 ppm (±22)
<u>_{v</u>								SP	Black soot with fine agglomerate (lo Black with orange fi	ose, moist) (fill) used vesicular, glassy		is ss	3.7 1.8	As = 641 ppm (±35) As = 934 ppm (±36) As = 3,779 ppm (±106)
	10 -	21						ML		edium sand- to fine the occasional gravel (loose,		IS	8.1	As = 39 ppm (±10); sheen popping, no color
DARD								SP	Dark gray sandy silf Multi-colored fused medium sand- to	(fill) vesicular agglomerate: o fine gravel-sized eous (loose, moist) (fill)	۱	15 15	3.4 2	As = 3,960 ppm (±144) As = 2,512 ppm (±78)
		55						ML		trace organic matter (fill)			2.4	As = <24 ppm
IRONMENT.								SP	_ sand- to coarse (fill)	used agglomerate (medium gravel-sized) (loose, moist)	_		1.2	As = 1,599 ppm (±46) Groundwater encountered at 13.3 feet during
3/GEI8_ENV				1		T		GP	Black fused agglom – (fill)	erate with occasional gravel	-		68.2	drilling As = 480 ppm (±27)
- US.GLE	15 -				<u>PAI-17-</u> 14-15.8				-		_		67.3	As = 2,049 ppm (±69)
- DF 				1	CA <u>PAI-17-</u> 15.8-16.1			GM/ML	Olive green agglom and NAPL (fill)	erate, silt and black soot	/N/	APL 4	44.6 490.1	Strong naphthalene-like odor As = 6,678 ppm (±218) Strong hydrocarbon-like odor
6GINTO18884601 GPJ DBUbray/Lbray/GE OENOINEERS, DF STD_US GLB/GEB_ENVIRONMENTAL_STA		0		-	CA			SM ML SP-SM	Gray silty fine to me Gray silt with trace matter (Qvr)	edium sand with soot (fill) black decaying organic to medium sand (loose, wet)			63.9	Jar test: LNAPL brown blebs; stains sides of jar As = 710 ppm (±42) As = 199 ppm (±13)
DBLibrary/Li									_		_			
601.GPJ	20 -													
NT7018684		ease see	Figure	e 1-1 fc	or explana	atior	n of s	ymbols						
									Log of Bor	ing PAI-17D				
ate:6/30/17 Path:P:\00018684	Project: Puget Sound Energy GWPS													
GEOENGINEERS Project Location: Gas Works Park, Seattle, Was Project Number: 0186-846-01											/ashington Figure 1-8 Sheet 1 of 2			

Blows/fo Blows/fo Interval Interval Interval Recover Recover Recover Interval Recover	REMARKS
20 SS 12.2 As = 117 ppm (±21); blocky sheen with black staining
GP Dark gray me gravel with sand (medium dense,	s = 75 ppm (±10)
sand with occasional gravel to slity fine to medium	s = 59 ppm (±8)
	s = 29 ppm (±8)
NS 17.8	00
SM Dark gray to black silty fine to medium sand with occasional gravel (medium dense, wet)	s = 32 ppm (±10)
	s = 74 ppm (±8)
NS 1.1 A	s = 17 ppm (±5)
- Weth (Qvr)	
	s = 16 ppm (±5)
(Qva)	As = <19 ppm
dense, moist) (pre-Fraser till [Qpgt])	As = <19 ppm As = <15 ppm
- ³⁰ + 48 NS 1.4 As	= 133 ppm (±37)
NS 3.6 As	s = 59 ppm (±13)
NS 1.4 As	s = 37 ppm (±10)
	s = 42 ppm (±8)
- 35 Temporary pre-pack well screen installed from	s = 38 ppm (±5)
24 to 29 feet bgs; grab groundwater sample PAI-17D-190615 collected. 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: Puget Sound Energy GWPS Project: Cas Works Park, Seattle, Washington Project: Oas Works Park, Seattle, Washington Project: Oas Works Park, Seattle, Washington	
Log of Boring PAI-17D (continued)	
Project: Puget Sound Energy GWPS	
GEOENGINEERS Project Location: Gas Works Park, Seattle, Washington Project Number: 0186-846-01	Figure 1-8 Sheet 2 of 2

Drilled 9/*	<u>Start</u> 5/201	6 9	<u>End</u> 9/15/2	<u>l</u> 2016	Total Depth	(ft)	18	3	Logged By GRL Checked By SBS	Driller Cascade Drilling			Drilling Method	l Continuous	
Surface Ele Vertical Dat	vation um	(ft)	ι	3 JSAC	4.16 E (Lock	s)			lammer Data	N/A	Drilli Equi	ng pment	:	Geoprobe 77	'30 DT
Easting (X) Northing (Y) Notes: Har		ered	from	239	0729.71 167.75 foot bgs			5	System WA State Plane,North Datum NAD83 (feet)			undwa Measu 5/2016	red	Depth to <u>Water (ft)</u> 13.80	Elevation (ft) 20.36
<u> </u>		F) DA	ТΔ										
Elevation (feet)	Interval	(III)			Sample Name Testing	Water Level	Graphic Log	Group Classification			Sheen	Headspace		REMAR	RKS
						Ţ			See adjacent boring descriptions	well screen installed from grab groundwater sample					
Note: Pl	ease s	ee Fi	gure	1-1 foi	r explana	atior	n of sy	mbols							
									Log of Bori	ng PAI-17S					
Ge	οE	N	GI	NE	ERS	S		1	Project: Project Locatior Project Number					gton	Figure 1-9 Sheet 1 of 1

	ce Elev al Dati		n (ft)		USA	33.89 CE (Loci	,			Ham Data			Drilling Equipr	ment	Geoprobe 7730 DT
Eastir Northi Notes	ng (Y) Refu	ısal sal v	at 15 vas e	feet ncou	23 below	70710.42 9141.61 ground si at 5 feet	urfac	e on oncre	conci ete.	System WA State Plane,North Datum NAD83 (feet) rete. Another boring (PAI-18B) attempted nearby, but				dwate easure	Depth to
				FIEI	_D D	ATA									
Elevation (feet)	b Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	<u>Sample Name</u> Testing	Water Level	Graphic Log	Group	Classification	MATERIAL DESCRIPTION		Sheen	Headspace Vapor (ppm)	REMARKS
	0 —		48						BRIC		1.5-inch brick paved surface Brown fine to coarse sand (loose, moist) ((fill)	=		XRF Readings "As = X ppm"
	-								SP		Brown to light brown fine to coarse sand w trace silt and gravel (loose, moist) (fill) Grades to dark brown	vith	- NS	<1	As = <38 ppm
	-								SN	1_	Dark brown silty fine to coarse sand with g trace brick debris (loose, moist) (fill)		NS	<1	As = 31 ppm (±9)
<u></u>	-									-	Fine gravel-sized angular briquette-like pie Trace very fine roots	eces	NS	<1	As = 64 ppm (±9)
	5 —		54						SN SP	>	Black sooty silty fine sand (loose, moist) (f Brown fine to coarse sand with occasional gravel and trace silt (loose, moist) (fill) Dark gray fine to medium sand with trace s))	NS	<1	As = 30 ppm (±9)
	-								SP-S	5М	occasional gravel and trace organic ma (very fine roots) (loose, moist) (fill) Brown to light brown fine sand with silt and trace organic matter (very fine roots) (fill) Grades to no roots	atter /	NS	<1	As = <25 ppm
<u>1</u> 2	_								5P	, -	Grades with occasional gravel Trace decaying wood Grades to light brown		NS	<1	As = 85 ppm (±16)
	- 10		36							_	Dark gray fine to coarse sand with occasic gravel, black vesicular fused lightweigh heavier agglomerate, occasionally glas metallic (loose, moist) (fill)	ht and	NS	<1	As = 13 ppm (±3)
									SP-S	SM	Brown to dark brown fine to coarse sand w silt (loose, moist) (fill)	with	NS	<1	As = <58 ppm
	-								SN		Black silty fine to coarse sand with orange fused non-vesicular agglomerate (loss		NS	<1	$As = 79 \text{ ppm } (\pm 11)$
	-								SOC	-	Moist) (fill) Black soot with occasional gravel, trace metallic fused agglomerate (medium s	/	NS NS	<1 <1	As = 541 ppm (±27) As = 941 ppm (±42) As = 1,217 ppm (±32); sheen with brown ar black blebs
	-		10						ML	-	moist) (fill) Grades with fine sand	/ſ	NAPL	250.1	Strong naphthalene-like odor from 12.5 to 13 As = 410 ppm (±19)
<u>1</u> 0	- 15 —								ML	-	Dark gray sandy silt (fill) 1-inch layer of dark gray with minor green Dark gray to black NAPL coated sandy silt decaying wood debris and one piece or plywood (fill) Light and dark gray mottled silt with occas	t with of	SS -	74.1	Slight hydrocarbon-like odor As = 393 ppm (±24) As = 434 ppm (±47)
											gravel (medium stiff, moist) (fill)	/			

Project:



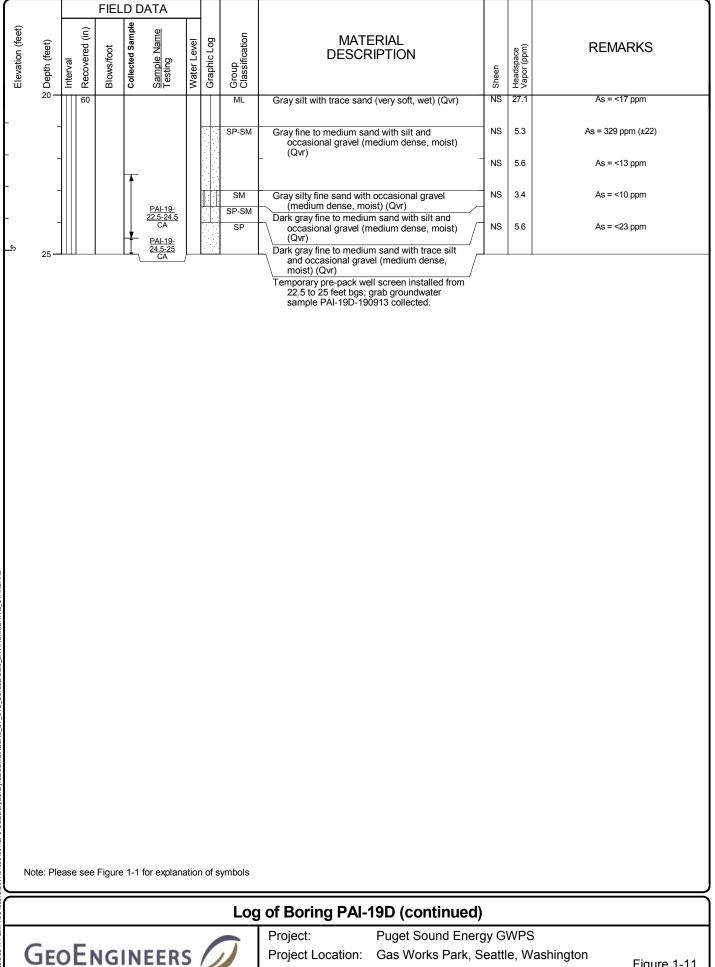
ate:6/30/17 Path:P

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

Figure 1-10 Sheet 1 of 1

Drille	d 9/1	<u>Start</u> 3/2016	<u>Er</u> 9/13	<u>nd</u> 3/2016	Total Depth		25		Logged By GRL Checked By SBS	Driller Cascade Drilling			Drilling Method Continuous
	ce Elev al Datu	ation (ft im)		29.88 CE (Loci	ks)			ammer ata	N/A	Drillir Equip	ng oment	Geoprobe 7730 DT
	ng (Ý)	d-augere	ed fror	127 239	2 feet bgs	9			vstem WA State Plane,North atum NAD83 (feet)			ndwate Measure 2016	Depth to
\geq			FIEI	_D D/	ATA								
Elevation (feet)	o Depth (feet) I	Interval Recovered (in)	Blows/foot	Collected Sample	Sample Name Testing	Water Level	Graphic Log	Group		ATERIAL CRIPTION	Sheen	Headspace Vapor (ppm)	
- - - - - - - - -	5 5 -	30						SP SP SM	moist) (fill) Brown fine to coars gravel, trace silt (fine roots) (loos Dark gray silty fine t occasional grav (loose to mediun		- NS - NS - SS - SS - SS - SS - SS - SS	25.6 67.8 14.8 21.8	As = 870 ppm (±60) As = 1,131 ppm (±54) Moderate hydrocarbon-like odor from 7 to 9 fee
- et -	- 10 — -	48			PAI-19- 11-12 CA			ML P-SM ML	 occasional grave 	t) (fill) coarse sand with silt and al (loose, wet) (fill) occasional gravel (medium	SS MS	64.8	As = 80 ppm (±17) Groundwater encountered at 10.1 feet during drilling As = 428 ppm (±40) Moderate hydrocarbon-like odor from 11 to 15 feet
-	_							SM	Dark gray silty fine t	o medium sand with el (medium dense, wet) (fill)	HS HS		S As = 54 ppm (±8)
_% -	15 —	60				Ţ		SP		n sand with occasional and trace ash (loose, wet)	NS NS NS	8.9	As = 98 ppm (±10)
-	-						s	P-SM	Gray fine to coarse	sand with silt and gravel to dense, moist) (Qvr)	NS	9.0	As = 71 ppm (±16)
-	-								-		- NS	8.1	As = 28 ppm (±8)
	20 —								-		- NS NS		
No	te: Ple	ase see	Figur	e 1-1 fo	or explan	atio	n of sym	bols					
									Log of Bor	ing PAI-19D			
C	GEOENGINEERS Project: Puget Sound Energy GWPS Project Location: Gas Works Park, Seattle, Washington Project Number: 0186-846-01												

Project: Puget Sound Energy GWPS

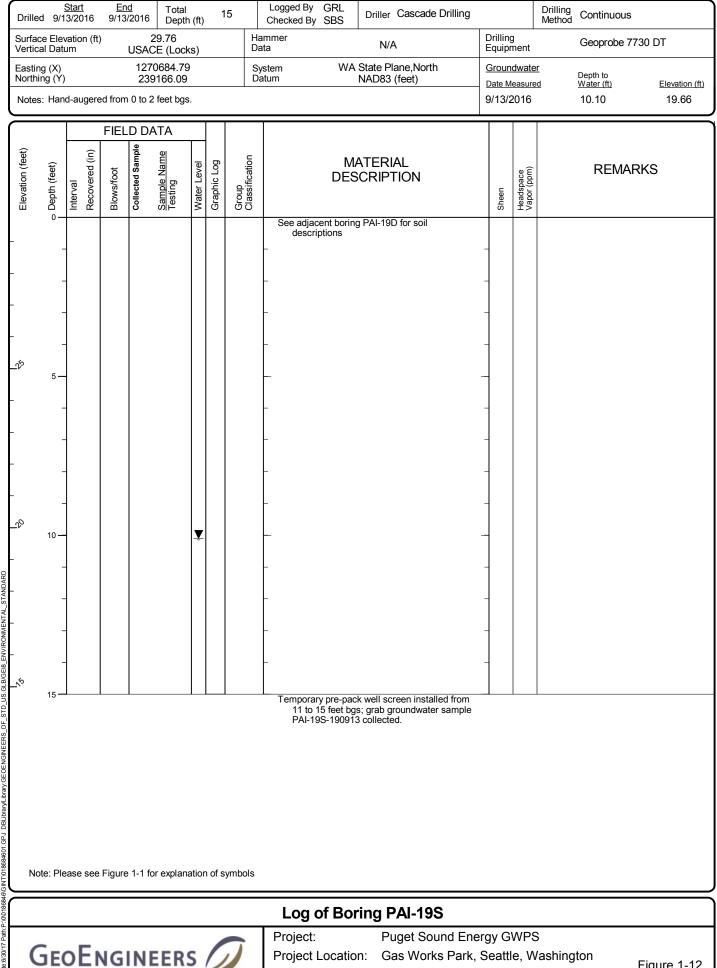


Project Number:

0186-846-01

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Figure 1-11 Sheet 2 of 2



Project Number:

0186-846-01

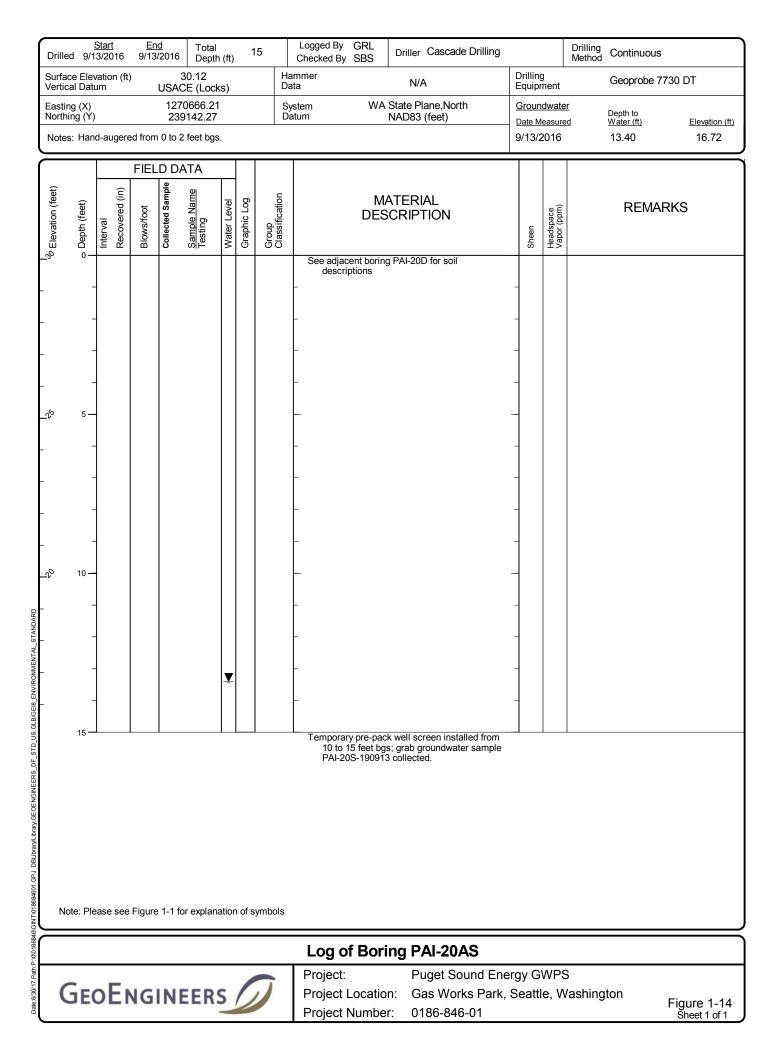
DF_STD_US.GLB/GEI8 GEOENGINEERS DBLibrarv/Librarv Ъ. ate:6/30/17 Pa

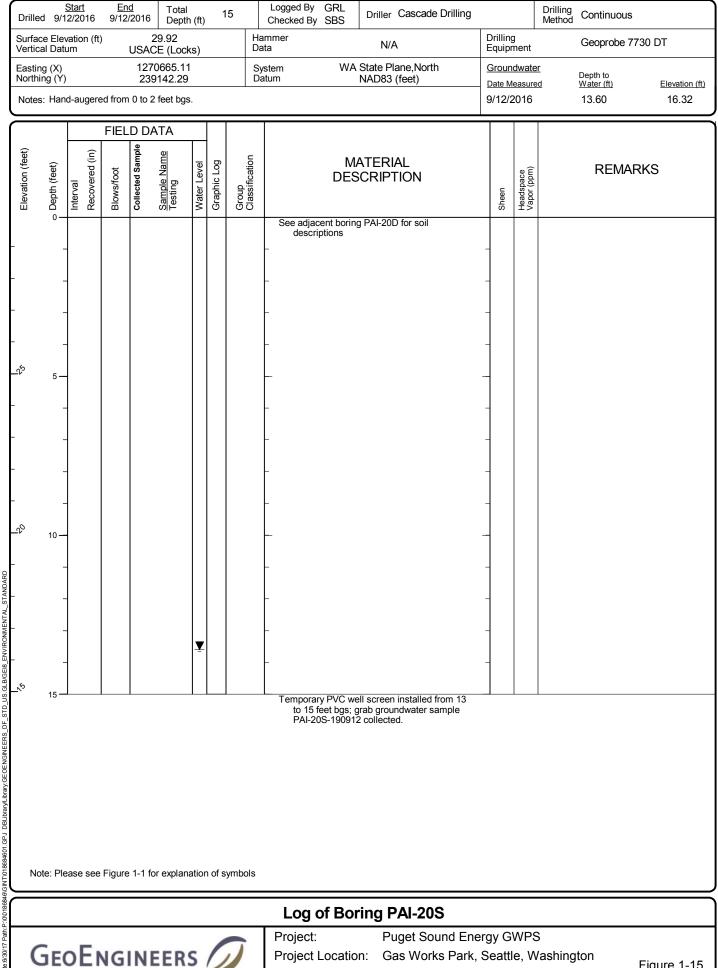
Figure 1-12 Sheet 1 of 1

Drille		<u>Start</u> 2/2016		<u>End</u> 12/2016	Total Depth	ו (ft)	25		Logged By GRL Checked By SBS	Driller Cascade Drilling			Drilling Method Continuous
Surfac Vertic	ce Elev al Dati	ation (um	ft)		29.88 CE (Locł	(S)			ammer ata	N/A	Drillin Equip		Geoprobe 7730 DT
	ng (Ý)	d-auge	red fro	127 239	70664.98 9141.46 2 feet bgs	3			System WA State Plane,North Datum NAD83 (feet)			ndwate leasure 2016	Depth to
				ELD D/	٨٣٨								
Elevation (feet)	⊃ Depth (feet) 	Interval Recovered (in)		ample	Sample Name Testing	Water Level		Glassification		ATERIAL CRIPTION	Sheen	Headspace Vapor (ppm)	
	-	34	L					SP WD SM	2-inch plywood Dark gray silty fine	sand with trace silt (loose,	NS NS SS NS	7.0	XRF Readings "As = X ppm" Sheen 1% coverage Slight hydrocarbon-like odor As = <30 ppm
<u></u>	5—	40)						-		NS NS	8.4 2.0	As = <22 ppm As = <24 ppm
<u>-</u> P		48					0	GP SM	trace silt (mediu Dark gray silty fine	arse gravel with sand and m dense, moist) (fill)	NS NS NS HS	40.1 388.8 65.0	As = 183 ppm (±16) Jar test: dark brown NAPL covered 5% of wa surface
	-	40					1.1.1	SP	(fill) Gray fine to coarse	sand with occasional gravel edium dense, moist) (fill)	NS	25.2 818.5	Moderate hydrocarbon-like odor As = 54 ppm (±7) As = <26 ppm Slight hydrocarbon-like odor from 11 to 14 fe As = 59 ppm (±10)
_^%	- - 15 —	60)		PAI-20- 13.5-15 CA			ML SM	Dark gray silt with 4 wood fragments Dark gray silty fine (medium dense	-inch and 6-inch long planar (medium stiff, wet) (fill) o coarse sand with gravel	MS MS NS NS	98.8 735.6 92.6 189.8	Groundwater encountered at 13.4 feet durin drilling As = <34 ppm As = <23 ppm Jar test: dark brown NAPL covered 10% of wa surface Moderate hydrocarbon-like odor
	-					Ţ	S	P-SM		edium sand with silt and el (medium dense to dense,	- NS	202.2	As = <28 ppm As = <32 ppm Slight hydrocarbon-like odor from 16 to 20 fe As = <15 ppm
	_								-		- _{NS}	142.3	
<u>10</u>	- 20 —								-		⁻ NS	90.2 50.4	As = <39 ppm As = 54 ppm (±8)
No	ote: Ple	ase se	e Figu	ire 1-1 f	or explan	atior	n of sym	bols					
									Log of Bor	ing PAI-20D			
C	ΞEO	οE	NG	SIN	EER	S	0	Ī	Project: Project Locatio Project Numbe				

Gas Works Park, Seattle, Washington Figure 1-13 Sheet 1 of 2

FIELD DATA													
Elevation (feet)	S Depth (feet)	Interval Recovered (in)	Blows/foot	Collected Sample	<u>Sample Name</u> Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	ueed. Deed	Headspace	Vapor (ppm)	REMARKS
الالالالالالالالالالالالالالالالالالال	41deO 20		Blows		PAI-20- 20-25 CA	Water		SP-SM SP-SM	Dark gray fine to medium sand with silt and occasional gravel (dense, wet) (Qva) - - - - - - - - - - - - - - - - - - -		6 3. 6 5.	3 2 1	As = <25 ppm As = 17 ppm (±4) As = 38 ppm (±7) As = <13 ppm
	e: Plea	ase see	Figure	ə 1-1 1	for explana	ation	of sy		of Boring PAI-20D (continu Project: Puget Sound E		3.00	25	
G	ΞEC	Β	١G	IN	EER	S /			Project Location: Gas Works Par Project Number: 0186-846-01				shington Figure 1-13 Sheet 2 of 2





0186-846-01

Figure 1-15 Sheet 1 of 1

GEOENGINEERS DBLibrarv/Librarv GР

Drilled	9/16			6/2016	Total Depth	n (ft)	16		Logged By GRL Checked By SBS	riller Cascade Drilling	Drillin		Drilling Method Continuous
Surface Vertical I					34.17 CE (Lock	(S)			ata	N/A	Equip		Geoprobe 7730 DT
Easting (Northing Notes: F	j (Y)	al at 10) feet l	23	0699.24 9116.44 ground st		e on co	D	atum NA	ate Plane,North D83 (feet)		ndwate leasure	Depth to
			FIEL	D D	ATA								
		Interval Recovered (in)	Blows/foot	Collected Sample	<u>Sample Name</u> Testing	Water Level	Graphic Log	Group Classification		ERIAL RIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
	0	46					<u> </u>	RICK	1.5-inch brick paved su	Irface and with trace silt (loose,	/ NS	<1	XRF Readings "As = X ppm" As = <23 ppm
~	-							SP GP	moist) (fill)	rse gravel with sand and	- NS	<1	As = <26 ppm
<u>8</u> 0	5 —	60						SP	Light brown fine to coa gravel (loose, mois	rse sand with occasional t) (fill)	_		
	_							SM	 brick fragments; ag 6.4 feet (medium d 	c matter (fine roots) and glomerate grades out at ense, moist) (fill)	NS	<1	As = 17 ppm (±6)
	_							SM GP	Trace black glassy ma Gray to black silty fine decomposing wood		NS	<1	As = <29 ppm As = 144 ppm (±14)
<u>150</u>	-							SM		ith sand (loose, moist)	/ [–] NS	<1	As = 161 ppm (±13)
1	10	28							Black silty sooty fine to soot, occasional m occasionally vesicu	medium sand to sandy etallic agglomerate, lar and glassy (loose,	NS NS	<1 8.9	As = 39 ppm (±11) As = 75 ppm (±22)
	_								moist) (fill) Grades with trace woo Dark gray soot, grades White mortar-like mate	orange at 10.25 feet	- NS NS NS SS	<1 1.8 <1 17.4	As = 37 ppm (\pm 7) As = 270 ppm (\pm 21) Strong naphthalene-like odor As = <20 ppm
		36						SP GP	Grades with black agg White mortar-like mate	omerate at 11.2 feet	/ NS	4.5 5.6	As = 210 ppm (±17) As = <24 ppm
								01	sand- to coarse gra	ivel-sized (loose, moist)	NS	5.5	As = 23 ppm (±7)
6	-							ML	and trace silt (loose		_ NS	41.6	As = 168 ppm (±18)
1	15 —							GP	Grades with trace brick		/ MS / MS	483.6 48.1	As = 502 ppm (±31); metallic sheen that dissipates As = 270 ppm (±20)
									(fill) Gray fine to coarse gra moist) (fill)	vel with sand (loose,		18.6	As = 116 ppm (±13)
									<u> (III)</u>	/	/		, γ ττο pprii (± το)

Log of Boring PAI-21



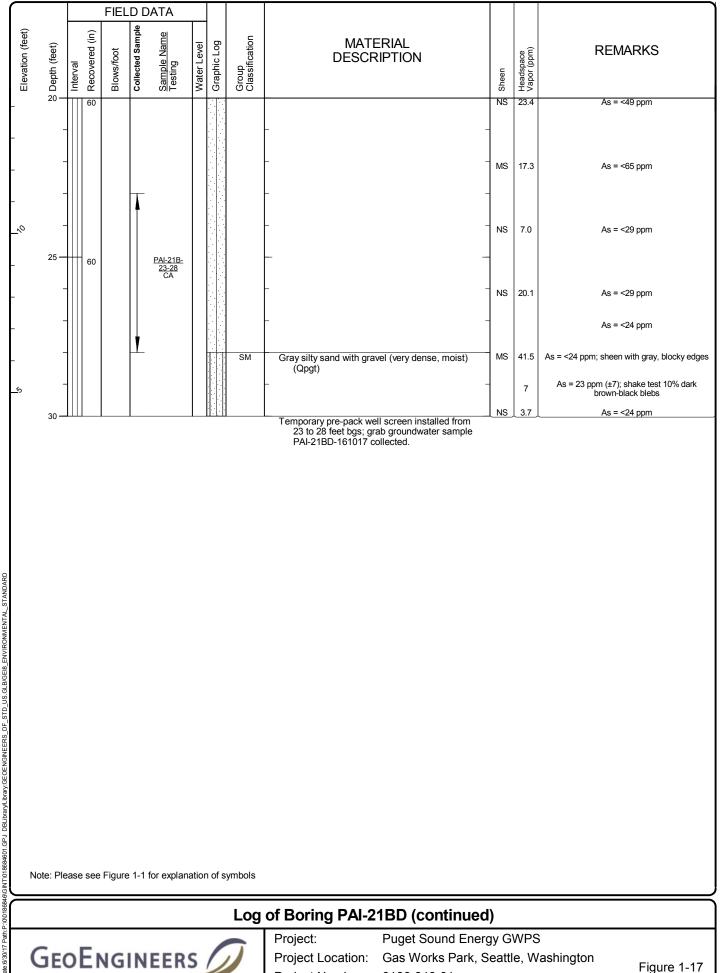
Date:6/30/17 Path:

Project: Project Location: Project Number:

Puget Sound Energy GWPS Gas Works Park, Seattle, Washington 0186-846-01

Figure 1-16 Sheet 1 of 1

Drille		<u>Start</u> 7/2016			Total Depth	(ft)	30		Logged By MWB Checked By ZAS	Dril	ler Cascade Drilling			Drilling Method
Surface Vertic	ce Elev al Datu	ration (ft im)	34. USACE		s)			ammer ata		N/A	Drillin Equip		Sonic DB320
	ing (Ý)	d-augere	ed fror	127070 23911 m 0 to 2 fee	17.73						e Plane,North 83 (feet)	<u>Groun</u> Date M 10/17	easure	Depth to <u>Water (ft)</u> <u>Elevation (ft)</u>
			FIE	LD DAT	A									
Elevation (feet)	Depth (feet)	Interval Recovered (in)	Blows/foot	Collected Sample Sample Name	Testing	Water Level	Graphic Log	Group Classification	M/ DES		RIAL IPTION	Sheen	Headspace Vapor (ppm)	REMARKS
-	0— - -	60						BRICK SP	1.5-inch brick paved Light brown fine sau up to 3 inches (I	and wit	h gravel and cobbles		<1	XRF Readings "As = X ppm" As = <38 ppm
	-							SP	Brown sand with gr. - inches (loose, n			- - NS	<1	As = <45 ppm
-	5—	60						SP	Brown fine to mediu cobbles up to 5 Light brown fine to	inche	es (loose, wet) (fill)		<1 <1	As = <43 ppm As = <17 ppm
	-							SP-SM	Gray to black sand material and as	fill) with s	silt, gravel, wood	NS	<1	As = <28 ppm
<u>~</u> 2°	10 -	60						ASH SP	Ash with brick fragn Black-brown fine sa to 4 inches and	and wi	ith gravel, cobbles up	SS	10.0 123.9	As = 317 ppm (±23); slight blocky sheen, bu odor As = <94 ppm
	-					Ţ		SOOT	Black ash and soot	()	el (loose, moist) (fill)	- NS - NS	235.6 210.1	
<u>-</u> 2°	- 15 —	60						WD CC	Black fibrous wood gravel (fill) Light gray fine sand concrete (loose	d with , mois	hes long with silt and gravel and ash - st) (fill)	NS NS	268.4 201.3	
	-				I <u>-21B-</u> <u>8-16.5</u> CA			SP SP-SM	wet) (fill) Gray fine to medium	m san	nd with gravel (loose, d with silt, gravel and es (loose, moist) (Qvr)	_ HS _ SS	245.2 104.6	As = <73 ppm; heavy sheen/rainbow; shake f 10% orange blebs As = <20 ppm; slightly blocky sheen
<u>_</u> {S	-								-			- NS - NS	135.5 110.3	
No	20 — ote: Ple	⊔∐ ase see	Figur	e 1-1 for e	explana	tior	n of syr	nbols	L					
									Log of Bori	ing	PAI-21BD			
0	ĜΕ	οEr	١G	INE	ERS	5	C	1	Project: Project Locatio Project Numbe	on:	Puget Sound Ene Gas Works Park, 0186-846-01			

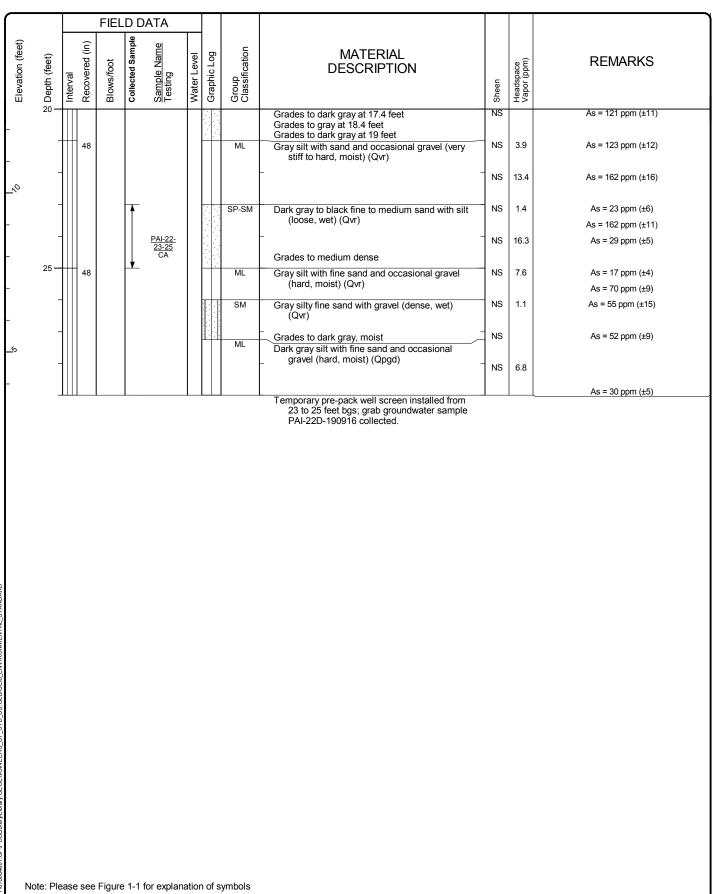


0186-846-01

Figure 1-17 Sheet 2 of 2

Drille	ed 10/	<u>Start</u> 17/2016	<u>E</u> 5 10/1	<u>nd</u> 17/2016	5 Total Depth	า (ft)	16	.5	Logged By MWB Checked By ZAS	Driller Cascade Drilling			Drilling Method Continuou	IS
Surfa Vertic	ce Elev al Dat	/ation (1 um	ť)		34.24 CE (Locł	ks)			ammer ata	N/A	Drillir Equip	ig iment	Sonic [DB320
	ing (Y)			23	70699.26 9116.46			S D		State Plane,North NAD83 (feet)	Date M	ndwate	Depth to <u>Water (ft)</u>	Elevation (ft)
Note	s: Han	d-auge	red froi	m 0 to	2 feet bgs	S.					10/1	7/2016	6 15.95	18.29
			FIE											
Elevation (feet)	Depth (feet)	Interval Recovered (in)	Blows/foot	Collected Sample	<u>Sample Name</u> Testing	Water Level	Graphic Log	Group Classification		ATERIAL CRIPTION	Sheen	Headspace Vapor (ppm)	REM	ARKS
	0 —								See adjacent boring descriptions.	PAI-21BD for soil				
	-								-		-			
	-								_		_			
	-								-		_			
_														
<u>~</u>	-								-		_			
	5 —								_		_			
	-								_		_			
	-								-		-			
	-								_		_			
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<u>n</u> 2	-								-		_			
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	-					Ţ			-		_			
		•					I		Temporary PVC we to 16.5 feet bgs; PAI-21BS-1610	Il screen installed from 14 grab groundwater sample				
									PAI-2 185-1010					
N	te. Di	269.00	o Fiour	• <u> </u>	or evolor	atio	of or	mbolo						
		ase se	e rigui	e 1-11	or explan	a(101	I UT S	INDOIS						
									Log of Bori	ng PAI-21BS				
(ĴΕ	эE	NG	IN	EER	S		7	Project: Project Locatio					Figure 1-18
						-			Project Numbe	r: 0186-846-01				Sheet 1 of 1

Drilled 9/1	<u>Start</u> 16/2016	<u>En</u> 9/16/	<u>d</u> /2016	Total Depth	(ft)	29		Logged By GRL Checked By SBS	Driller Cascade Drilling				Drilling Method Continuous
Surface Ele Vertical Dat				2.64 E (Lock	s)			ammer ata	N/A		rilling quipn		Geoprobe 7730 DT
Easting (X) Northing (Y) Notes: Har		ed from	2390)675.04 085.68 feet bgs					State Plane,North NAD83 (feet)			<u>dwate</u> easure 2016	Depth to
Elevation (feet)	milerval (in)	Blows/foot	Collected Sample	Sample Name Testing		0	Monthead Classification	DES	e gravel with silt and sand	_	S S Sheen	1 1 Headspace Vapor (ppm)	REMARKS XRF Readings "As = X ppm" As = <24 ppm As = <30 ppm As = <18 ppm
	54 54 60 60 60 60	Figure	+	PAI-22- 12-13 CA			ML SP-SM SP SP-SM ML GM SM SM SM ML SM ML SM SM ML SP-SM	(medium stiff, m Grades with trace s Gray and tan silty fir occasional graw (fill) Tan silt (stiff, moist) Tan fine to medium occasional graw (fill) Black fine to medium brick debris on t Gray fine to medium dense, moist) (fi Grades brown mottl Grades gray with lig Gray-brown silty finu occasional graw (fill) Gray with brown and grawel (medium Gray with brown and gravel (medium Gray with brown and gravel (medium Gray with brown and gravel (medium Gray with dark brow to medium sand (fill) Dark gray to black s sand (medium d Gray to brown fine t sand, 1 inch piet wet) (fill) Gray silt (medium s Black stained fine to	and (e to coarse sand with e (medium dense, moist) (fill) sand with silt and e (medium dense, moist) n sand with silt and e (medium dense, moist) n sand with silt (medium l) a sand with silt (medium l) b orange mottling sandy silt gravel (medium stiff to stiff,) d orange mottling silty dense, moist) (fill) arse sand with gravel and m dense, moist) (fill) a rand ight green silty fine (medium dense, moist) ilty sooty fine to medium ense, moist) (fill) o coarse gravel with silt and se of brick (medium dense, ht green dium stiff, wet) (Qvr) iff, wet) (Qvr) medium sand with silt and el (medium dense, wet) 8.5 feet		29 29 29 29 29 29 29 29 29 29 29 29 29 2	5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	As = 81 ppm (±15) As = <28 ppm As = <14 ppm As = 307 ppm (±18); fine yellow powder on surface duing sheen test As = 986 ppm (±47) As = 1,272 ppm (±39) As = 618 ppm (±18) As = 852 ppm (±27); gray, blocky sheen As = 518 ppm (±17) As = 309 ppm (±16) As = 381 ppm (±24) As = 741 ppm (±47) Groundwater encountered at 12 feet during drilling As = 226 ppm (±11) As = 758 ppm (±32) As = 62 ppm (±6) As = 477 ppm (±38) Slight burnt plastic odor As = 172 ppm (±11) As = 131 ppm (±15)
								Log of Bor	ing PAI-22D				
Ge	οEι	NG	INE	ER	S	0	1	Project: Project Location Project Number	Puget Sound En	-	-		

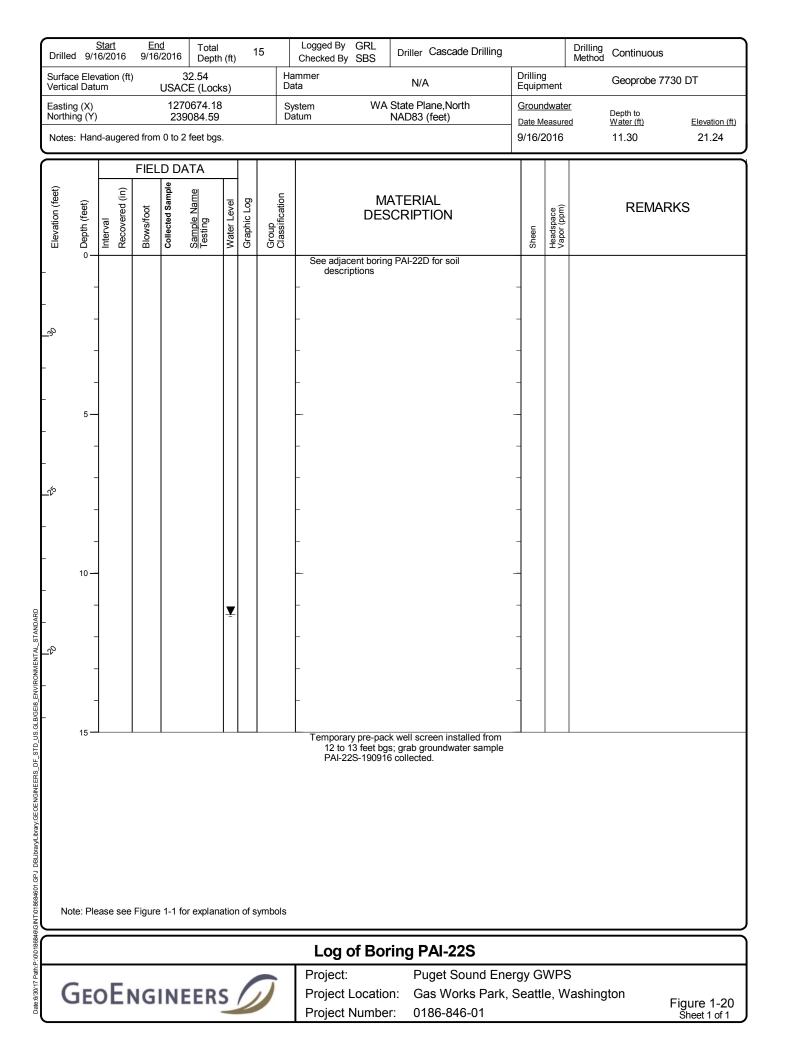


Log of Boring PAI-22D (continued)



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

Figure 1-19 Sheet 2 of 2



Drilled 9/2	<u>Start</u> 6/2016	<u>En</u> 9/26	<u>d</u> /2016	Total Depth	(ft)	29	9	Logged By GRL Checked By ZAS	Driller Cascade Drilling			Drilling Method Continuous
Surface Elev Vertical Datu				30.17 E (Lock	s)			ammer ata	N/A	Drilli Equi	ng oment	Geoprobe 7730 DT
Easting (X) Northing (Y) Notes: Han			1270 239	0640.71 0142.16	-				State Plane,North NAD83 (feet)	Date	indwate Measur /2016	Depth to
		FIFI	.D DA									
³ ∂ Elevation (feet) ⊖ Depth (feet)	Interval Recovered (in)	Blows/foot	Collected Sample	Sample Name Testing	Water Level	Graphic Log	Group Classification	DES	ATERIAL CRIPTION	Sheen	Headspace Vapor (ppm)	
	25						SP-SM SM	Dark brown fine to r occasional grav moist to wet) (fil Dark brown silty fine	nedium sand with silt, el and trace wood (loose,)) e to medium sand with el and trace wood (loose,	- NS - NS - NS - NS	5 <1	XRF Readings "As = X ppm" As = <28 ppm As = <26 ppm As = <24 ppm
 10 10	8		↓	PAI-23- 8-8.7 CA PAI-23- 9.2-9.8 CA	Ţ		SP-SM ML SP-SM GP-GM	Gray fine to mediun occasional grav Dark brown silt with (fill) Gray fine to mediun (fill) Gray silt (stiff, mois Grades to medium matter	el (loose, wet) (fill) sand (medium stiff, moist) n sand with silt (loose, wet)		5 1.9 5 34.8 6 40.1 5 65 7 <1	As = <31 ppm Groundwater encountered at 8.4 feet during drilling Sheen is blocky As = 194 ppm (±14); sheen has color As = 84 ppm (±11) As = 40 ppm (±8) As = <28 ppm 3 Jar test: NAPL at surface is almost 1 mm thick
 _ ~ - _ ~ -							SP-SM	Gray-brown fine to	wet) (Qvr) nedium sand with silt and el (medium dense, moist to	/	5 76.2 5 <1	covers surface As = 53 ppm (±11) As = <19 ppm As = 23 ppm (±6) As = 60 ppm (±11) As = 104 ppm (±10)
	48						SM ML GP-GM	occasional grav (Qvr) Dark gray sandy silt (soft, wet) (Qvr) Dark gray fine to co sand (medium c	o medium sand with el (medium dense, wet) with occasional gravel arse gravel with silt and ense, wet) (Qvr)		24.3	As = 132 ppm (±8) As = 58 ppm (±8)
 20 — Note: Ple	ase see	Figure	 • 1-1 fo	r explana	atior		SP-SM	Dark gray fine to me (medium dense		NS	5 <1	As = 181 ppm (±13)
								Log of Bor	ing PAI-23D			
Geo	Note: Please see Figure 1-1 for explanation of symbols Log of Boring PAI-23D GeoEngineers Project: Puget Sound Energy GWPS Project Location: Gas Works Park, Seattle, Washington Figure 1-21 Project Number: 0186-846-01 Sheet 1 of 2											

\bigcap			FIEL	D D	ATA							
²⁰ Elevation (feet)	Depth (feet)	Interval Recovered (in)	Blows/foot	Collected Sample	<u>Sample Name</u> Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
	20 —	60						ML			30.4	As = 85 ppm (±9)
								IVIL	Gray sandy silt with gravel (very stiff, moist) (Qvr)	NS	6.1	
-	-							SP-SM	Gray fine to medium sand with silt and occasional gravel (dense, moist) (Qvr)			As = <22 ppm
									Grades to wet	NS	4.7	
-	_								Grades to moist to wet			As = 109 ppm (±11)
-	-							SM	Gray sitty fine to medium sand with occasional gravel (dense, wet) (Qvr)	NS	<1	
-	-									NS	<1	As = <18 ppm
<u>_</u> %	25 —	48						SP-SM	Gray fine to medium sand with silt and occasional gravel (medium dense, wet) (Qvr)	NS	4.7	As = <18 ppm
-	-			≜				SP-SM	Gray fine to medium sand with silt and			As = 102 ppm (±10)
									occasional gravel (dense, wet) (Qva)			As = 92 ppm (±11)
-	-				<u>PAI-23-</u> <u>26-28</u> CA					NS	<1	As = 161 ppm (±14)
	-			Ľ₹.								
								ML	Gray sandy silt with occasional gravel (hard, moist) (Qpgd)	NS	<1	As = <28 ppm
	-			I					Temporary pre-pack well screen installed from			As = <17 ppm
									25.8 to 27.8 feet bgs; grab groundwater			

23.0 to 27.8 teet bgs; grab groundwater samples PAI-23D-160926 and D-160926 collected.

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

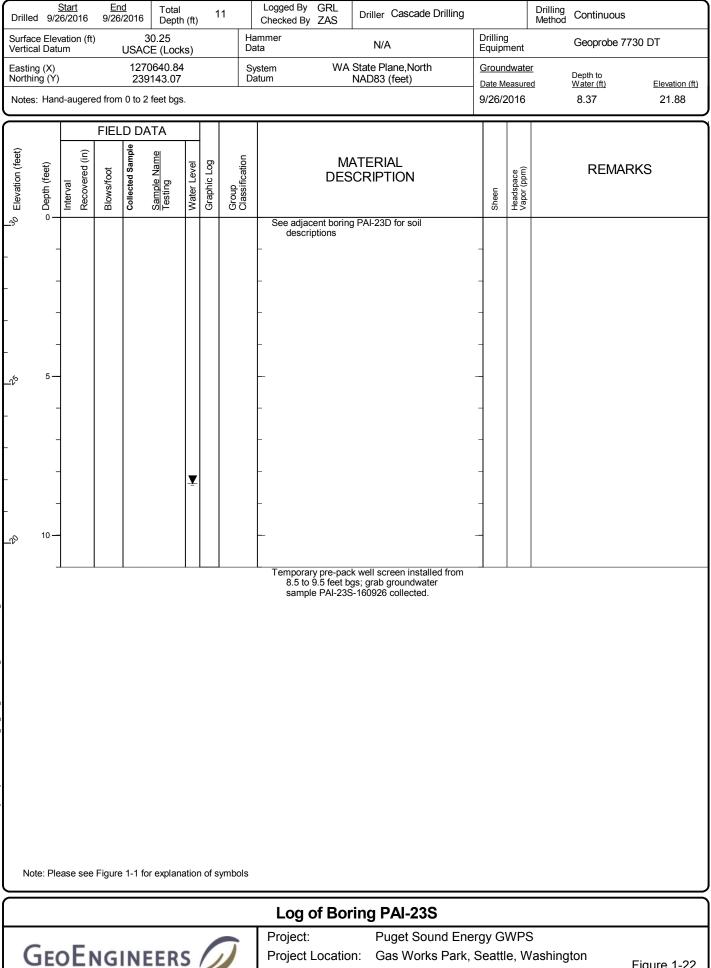
Log of Boring PAI-23D (continued)



Project: Puge Project Location: Gas Project Number: 0186

Puget Sound Energy GWPS Gas Works Park, Seattle, Washington 0186-846-01

Figure 1-21 Sheet 2 of 2



Project Location:

Project Number:

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Figure 1-22 Sheet 1 of 1

Gas Works Park, Seattle, Washington

0186-846-01

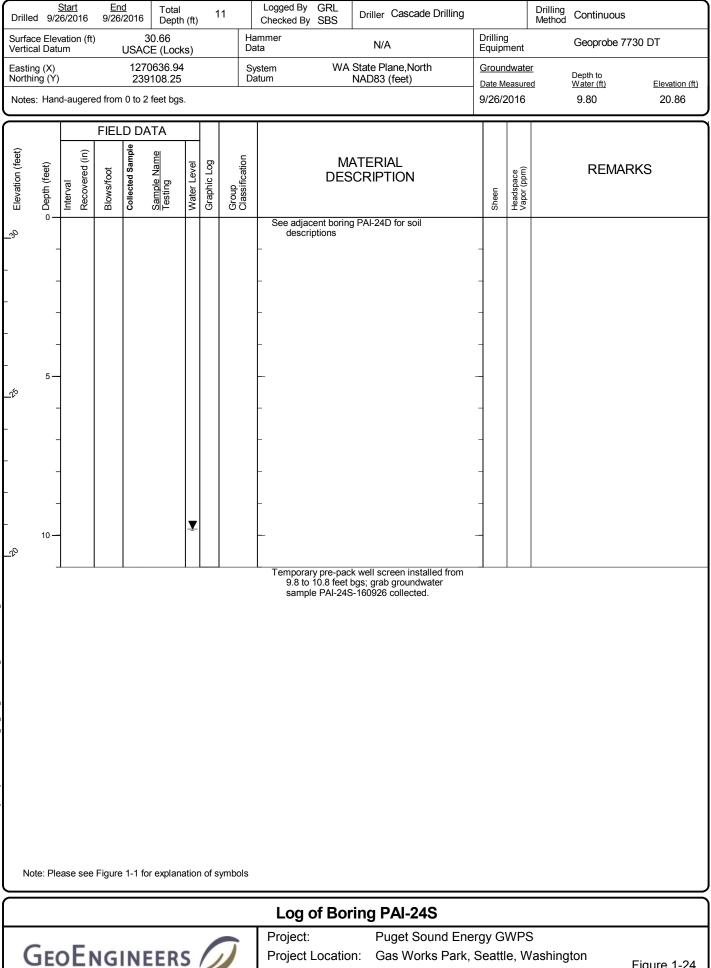
Drilled 9/2	<u>Start</u> 6/2016	<u>End</u> 9/26/20		Total Depth (1	ft)	24	Logged By GRL Checked By ZAS	Driller Cascade Drilling			Drilling Method
Surface Elev Vertical Date			30.5 SACE (I)		lammer Data	N/A	Drillin Equip		Geoprobe 7730 DT
Easting (X) Northing (Y) Notes: Han			127063 239107 to 2 feet	7.26				State Plane,North NAD83 (feet)	<u>Groun</u> Date M 9/26/2	leasure	Depth to
⊖ Elevation (feet) □ Depth (feet)	linterval ⊗ Recovered (in)	Blows/foot DT3IA			vvater Level Graphic Log	Group Classification	DES	ATERIAL CRIPTION m sand with trace silt	Sheen	Headspace Vapor (ppm)	REMARKS XRF Readings "As = X ppm" No recovery from 0 to 2 feet
	42					ML CC ML SP-SM ML WD CC ML	moist) (fill) Light gray degraded moist) (fill) Brown with orange stiff, moist) (fill) Brown fine to mediu occasional graw Dark gray to black (upper 2 inches) and occasional (fill) Decaying, wood (m Light gray degraded moist) (fill)	concrete (medium dense,		 <1 	As = 42 ppm (±11) As = 35 ppm (±9) As = 4,086 ppm (±108) As = 64 ppm (±8) As = 370 ppm (±18) As = 2,527 ppm (±18) As = 440 ppm (±15) As = 34 ppm (±10) As = 370 ppm (±19)
- 10 	40		<u>PAI-2</u> 10-1 CA	11		SP ML SP-SW	Brown fine to coars gravel and trace (fill) Gray silt with sand a moist) (Qvr) Dark gray to black fi and occasional moist to wet) (Q	e sand with occasional silt (medium dense, moist) and occasional gravel (stiff, ne to medium sand with silt gravel (medium dense, vr) ne to medium sand with m dense, wet) (Qvr)		<1 <1 <1 2.9 <1 <1	Groundwater encountered at 9.8 feet during drilling As = 51 ppm (±8) As = 72 ppm (±8) As = 46 ppm (±10) As = <26 ppm As = 27 ppm (±8) As = <22 ppm
15	42		4 6				- - Grades with occasi	onal gravel	- NS - NS - NS - NS	<1 <1 <1 <1	As = <19 ppm As = 34 ppm (±10) As = <30 ppm As = <28 ppm As = <18 ppm
Note: Ple	ease see	Figure 1-	-1 for exp	planati	on of :	symbols					
							Log of Bor	ing PAI-24D			
Geo	oEr	IGII	NEE	RS		J	Project: Project Locatio Project Number				

\square	FIEI	D DATA						
Elevation (feet)	8 Depth (feet) Interval Recovered (in) Blows/foot	Collected Sample Sample Name Testing	Water Level Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
% 		PAI-24- 21.3-22.3 CA		SP ML SM ML	Gray fine to medium sand with trace silt (dense, wet) (Qva) Grades to dark gray Gray sandy silt with occasional gravel (dense, moist) (Qva) Gray silty fine to medium sand (Qva) Gray silt with trace sand and occasional gravel (hard, moist) (Qpgd)	NAPL NS NS NS	<pre>-266.8 <1 <1</pre>	As = 24 ppm (± 7) Jar test: thin brown NAPL at top covers 80% As = 43 ppm (± 14) As = <18 ppm As = <25 ppm As = <16 ppm As = <21 ppm As = < 16 ppm
					Temporary pre-pack well screen installed from 21.5 to 22.5 feet bgs; grab groundwater sample PAI-24D-160926 collected.			As = < 16 ppm
	ote: Please see Figur	e 1-1 for explan	ation of a	symbols				
	ne. Fiedse see Figun				of Boring PAI-24D (continued)			
12. June 1				LOG			\ <u>\</u> /DC	2
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0186-846-01

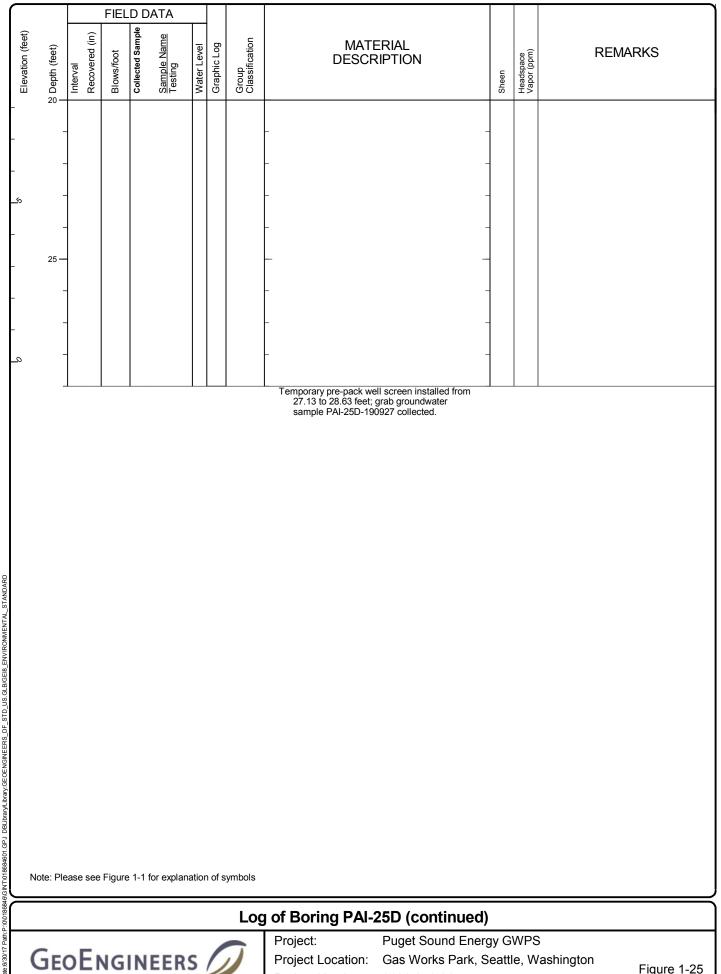
Figure 1-23 Sheet 2 of 2



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Gas Works Park, Seattle, Washington Project Location: Figure 1-24 Project Number: 0186-846-01 Sheet 1 of 1

Drilleo	d 9/2	<u>Start</u> 7/2016	6	<u>End</u> 9/27/	<u>d</u> ′2016	Total Depth	n (ft)	2	9	Logged Checke	By RNM By ZAS	Dril	ller Cascade	Drilling			Drilling Method Cont	inuous	
Surfac Vertica	e Elev al Datu	vation (um	(ft)		USAC	28.23 CE (Lock	(S)			Hammer Data			N/A		Drilling Equipr	g ment	Geop	probe 7730	DT
Easting Northin	ng (Y)		rod	from	239	0804.73 9185.15 ? feet bgs				System Datum	WA	A State NAD	e Plane,North 983 (feet)		Groun	leasure	ed Depth	<u>(ft)</u>	Elevation (ft)
Notes	: Han	u-auge													9/27/2	2016	14.69	9	13.54
<u> </u>				FIEL	D DA I≞		1												
Elevation (feet)		Interval Recovered (in)		Blows/foot	Collected Sample	<u>Sample Name</u> Testing	Water Level	Graphic Log	Group Classification		N DES	IATE SCR	RIAL IPTION		Sheen	Headspace Vapor (ppm)	R	EMARKS	3
-	0 —									See a	idjacent borir	ng PAI-	-11 for soil des	criptions					
-	-									_					-				
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<u>^</u> 2	-									-					-				
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\geq										Lo	a of Bo	rino	j PAI-25 [)					
Ċ	δEC	эE	N	GI	N	EER	S		7	Proje Proje		on:	Puget Sou	und Ene s Park, S			S /ashington	Fig	ure 1-25

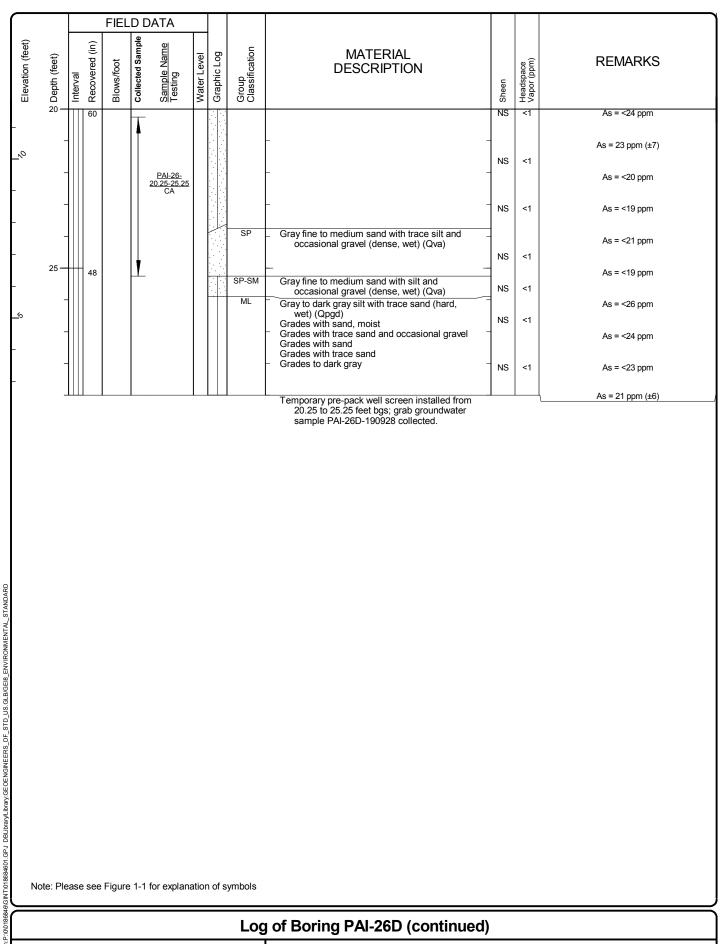


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Figure 1-25 Sheet 2 of 2

Drille		<u>Start</u> 7/2016	<u>Er</u> 9/27	<u>nd</u> 7/2016	Total Depth	(ft)	29		Logged By GRL Checked By ZAS	Driller Cascade Drilling			Drilling Method Continuous
Surfac Vertic		ation (ft um)		31.57 CE (Lock	s)			ammer ata	N/A	Drilli Equi	ng pmeni	Geoprobe 7730 DT
	ng (Ý)	d-augere	ed fron	239	0722.02 0071.36 ½ feet be					State Plane,North NAD83 (feet)	Date	indwa Measu 7/2016	Depth to red Water (ft) Elevation (ft
			FIEI	D DA	٩ΤΑ								
Elevation (feet)	Depth (feet)	Interval Recovered (in)	Blows/foot	Collected Sample	<u>Sample Name</u> Testing	Water Level	Graphic Log Groun	Classification		ATERIAL CRIPTION	Sheen	Headspace	REMARKS
<u></u>	0 —	32					SF	AC P-SM SM ML	trace organic ma Gray silty fine to co	concrete e sand with silt, gravel and atter (loose, moist) (fill) arse sand with gravel and eles (medium dense, moist)			
	-							SP	Geogrid at 1.5 feet Gray sandy silt with (medium stiff, m Grades to gray and	brown			
	-							SF VIL VIL SM	moist) (fill) Gray silt (medium s Brown silt with orga	nic matter (decaying wood)		6 <1 6 <1	As = 31 ppm (±10)
	5 —	30							Gray silty fine sand (fill) Dark gray sandy silty	with gravel (loose, moist)) /		
<u>1</u> 2	-							JF	Black with occasior fused agglomera gravel-sized) (fil	al light gray and orange ate (fine sand- to coarse	_		As = 16 ppm (±4)
	- 10 —	46					o d─_	Л/ML GP	(loose/soft, mois	o coarse sand to sandy silt	- NS - SS - MS	\$ <1	As = <25 ppm 7 As = 382 ppm (±22)
<u>1</u> 0	-				<u>PAI-26-</u> <u>11.6-12.3</u> CA	-	v P	GP VD SP	Dark gray fine grave (loose, wet) (fill) Grades to olive Brown organic matt	el with trace silt and sand		6 4.4 <1	As = 295 ppm (±12) As = 349 ppm (±24) As = 883 ppm (±21) As = 203 ppm (±11)
	- 15 —						SF	P-SM	Grades coarser Gray fine to medium gravel and trace dense, wet) (Qv	loose, wet) (Qvr) n sand with silt, occasional organic matter (medium r)	/NS		As = 147 ppm (±9)
<u>^</u> 2	-	49						SP	Gray and black fine	v without organic matter to coarse sand with trace nal gravel (dense, wet) (Qvr	NS NS		
••	_							P-SM	 Dark gray fine to me occasional grav 1-cm layer dark gra 	edium sand with silt and el (dense, wet) (Qvr) y sandy silt with occasional stiff, moist) (Qvr)	/	5 <1	As = <28 ppm
	-						SF	P-SM	Gray fine to coarse (medium dense Dark gray fine to me	sand with occasional gravel	/_= /NS	5 <1	As = <16 ppm As = <23 ppm
No	20 — ote: Ple	ase see	Figure	e 1-1 fc	or explana	ation	of symb	ools		,			
									Loa of Bor	ing PAI-26D			
C	GE	οEr	١G	INI	EER	S	Ο	i	Project: Project Locatio Project Numbe	Puget Sound En n: Gas Works Park			



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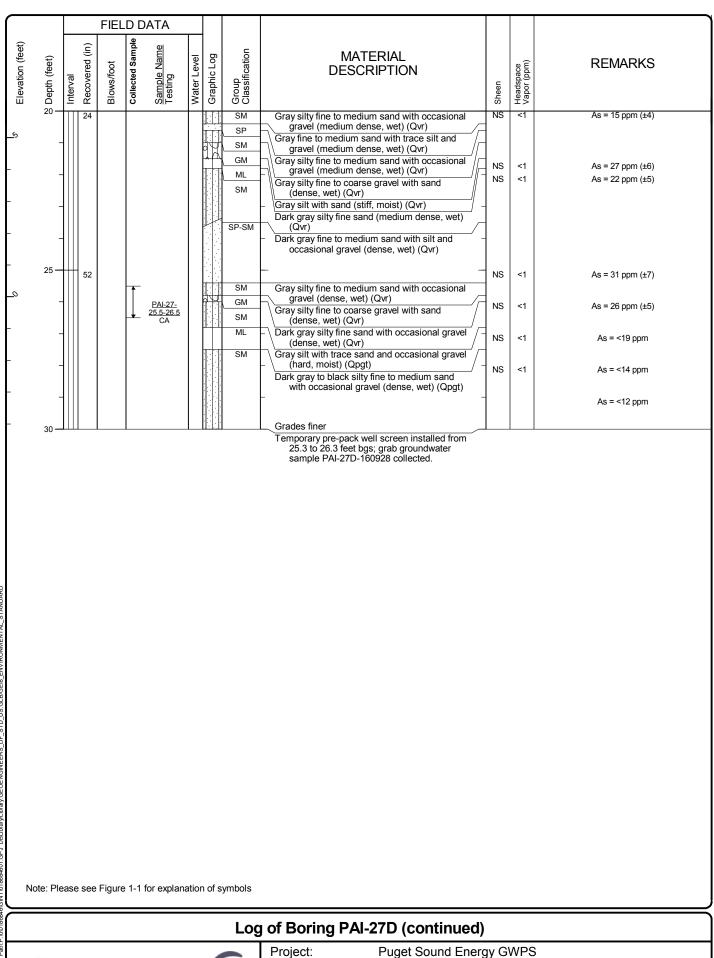
Project: Puget Project Location: Gas W Project Number: 0186-8

Puget Sound Energy GWPS Gas Works Park, Seattle, Washington 0186-846-01

Figure 1-26 Sheet 2 of 2

Drilleo	d 9/2	<u>Start</u> 7/2016	<u>Er</u> 9/27	<u>nd</u> 7/2016	Total Depth	ı (ft)	12	.5	Logged By GRL Checked By ZAS	Driller Caso	ade Drilling			Drilling Method Continuous
Surfac Vertica	e Elev al Dati	/ation (ft um)	3 USAC	31.55 E (Lock	s)			ammer ata	N/A		Drillir Equip	ig ment	Geoprobe 7730 DT
Easting Northin	ng (Y)		ed from	239	0721.42 071.53 ½ feet be			S D	ystem WA vatum	State Plane,N NAD83 (feet)	lorth	Date I	ndwate Measure 2016	Depth to
Notes	. Han					<u>j</u> s.						9/2//	2010	11.42 20.13
Elevation (feet)	o Depth (feet)	Interval Recovered (in)	Blows/foot	Collected Sample	Sample Name Testing	Water Level	Graphic Log	Group Classification	M. DES	ATERIAL CRIPTION	I	Sheen	Headspace Vapor (ppm)	REMARKS
	0					Ţ			See adjacent boring descriptions					
Not	te: Pl¢	ease see	Figure	e 1-1 fo	rexplana	atior	n of sy	mbols	11.4 to 12.4 fee samples PAI-26 PAI-26D-16092	S-190928 and	duplicate			
\equiv									Log of Boi	ing PAI-	26S			
Ċ	ΞE	οEi	١G	INE	ER	S		7	Project: Project Locatio Project Numbe	Puget n: Gas W	Sound Ene 'orks Park,			S Vashington Figure 1-27 Sheet 1 of 1

Drille		<u>Start</u> 8/2016		<u>nd</u> 3/2016	Total Depth	n (ft)	30)	Logged By GRL Checked By ZAS	Driller Cascade Drilling			Drilling Method Continuous					
Surfac Vertic	ce Elev al Dati	ation (ft) Im)		25.84 CE (Lock	(s)			lammer Data	N/A	Drill Equi	ng pment	Geoprobe 7730 DT					
	ng (Ý)	d-augere	ed fror	23	70773.32 9024.91 5 feet bgs					State Plane,North NAD83 (feet)	Date	undwat Measu 8/2016	Depth to red Water (ft) Elevation (ft)					
			FIE	LD D/	ATA													
Elevation (feet)	⇔ Depth (feet) 	Interval Recovered (in)	Blows/foot	Collected Sample	<u>Sample Name</u> Testing	Water Level	Graphic Log	Group Classification	M/ DES	ATERIAL CRIPTION	Sheen	Headspace Vanor (nom)	REMARKS					
<u>_%</u>	-							SP-SM	gravel and trace (loose, moist) (f	e sand with silt, occasional organic matter (roots) ill) d (loose, moist) (fill)								
-	-							SM	Grades with trace s Gray silty fine sand (medium dense	with occasional gravel		6 <1						
-	- 5 —								-		- N							
<u>~</u> }	-	47						GM SM GP	(medium dense Black sooty silty fus	ed agglomerate (fine to ed) (loose, moist) (fill)	N: N: N: N:	6 <1	As = 59 ppm (±15) 2 As = <21 ppm Groundwater encountered at 6.2 feet durin drilling					
	-					Ţ			Black fused vesicul	ar agglomerate (fine to zed with sand-sized) with se, wet) (fill)								
	- 10	40							_		_ _N ;	40. ⁻						
<u>_<</u> 6	_				PAI-27-				- 1-inch layer tan fuse	ed agglomerate	_ M	6 1	As = 268 ppm (±20)					
	-			•	<u>PAI-27-</u> <u>10-12.5</u> CA		0 0 0 0 0 0	SM	agglomerate – Gray silty fine to me	ht colored platy fused	- S: 							
	-								gravel (medium	dense, wet) (Qvr)	_							
<u>~</u> 0	15 —	36						SP-SM		n sand with silt and el (medium dense, wet)	- N:							
	-								Alternates gray and	dark gray	- N	5 <1	As = 16 ppm (±4)					
	-								-									
Nc	20 — ote: Ple	 ase see	Figur	 e 1-1 fe	or explan	 atior	n of sy	mbols										
_									Log of Bor	ing PAI-27D								
C	ĴΕ	οEr	١G	IN	EER	S		7	Project: Project Locatio Project Numbe	Puget Sound En n: Gas Works Park								



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Gas Works Park, Seattle, Washington Project Location: Project Number: 0186-846-01

Figure 1-28 Sheet 2 of 2

Drille	ed 9/2	<u>Start</u> 8/20	16	<u>En</u> 9/28/	<u>d</u> /2016	Total Depth	(ft)	12.5	5	Logged By GRL Checked By ZAS	Dril	ller Cascade Drilling			Drilling Method Continuous
Surfa Vertic	ce Elev cal Dati	vatior um	n (ft)			5.91 E (Lock	s)			ammer ata		N/A	Drillin Equip	g ment	Geoprobe 7730 DT
North	ng (X) ing (Y)				1270 239)773.62 026.05				ystem WA atum	NAD	e Plane,North 983 (feet)	<u>Grour</u> Date N	leasure	Depth to <u>ed</u> <u>Water (ft)</u> <u>Elevation (ft)</u>
Note	s: Han	d-au	-			feet bgs.				1			9/28/2	2016	5.62 20.29
Elevation (feet)	o Depth (feet) I	Interval	Recovered (in)	Blows/foot	Collected Sample O	Sample Name Testing	Water Level	Graphic Log	Group Classification	DES	SCR	RIAL IPTION	Sheen	Headspace Vapor (ppm)	REMARKS
	0 - 5 - - - - - - - - - - - - - - - - -						Ţ			9.5 to 12.5 feet	ck well	I screen installed from grab groundwater			
	Sample PAI-27S-160928 collected. Note: Please see Figure 1-1 for explanation of symbols Log of Boring PAI-27S														
(3-	م ۵				ERS		1	7	Project: Project Locatio		Puget Sound Ene			
	J [(- 1	D		CK:				Project Numbe	Eldure 1-29				

Drilled		<u>Start</u> 9/2016	3 9	<u>End</u>)/29/2	016	Total Depth	ı (ft)	13	3.5		gged By G ecked By Z		Driller Cascade	Drilling			Drilling Method Continuous
Surface Vertical			(ft)	U		30.3 E (Lock	(S)			Hamm Data	er		N/A		Drilling Equipr		Geoprobe 7730 DT
Easting Northing Notes:	g (Ý)	l-auge	ered f		127(239	0660.37 171.22 feet bgs	,			Systen Datum			State Plane,North NAD83 (feet)	ו 	<u>Ground</u> Date M 9/29/2	easure	Depth to
\geq			F	IFI F) DA	ΤΔ											
_	o Depth (feet) I	Interval Recovered (in)			Collected Sample	Sample Name Testing	Water Level	Graphic Log	Group			DES			Sheen	Headspace Vapor (ppm)	REMARKS
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	5	22	в				Ţ		SP SM ML GM		moist) (fill) Brown silty fine to coarse sand with occasional gravel (medium dense, moist) (fill) Grades with gravel Grades with wood, becomes loose and wet Gray-brown silt with trace sand and trace wood (soft, moist) (fill) Black silty fine to coarse gravel with sand and black fused vesicular agglomerate (fine gravel-sized) (loose, wet) (fill) Gray silty fine to medium sand (medium dense, wet) (fill)				NS NS NS NS NS NS NS HS KS MS	137.6 42.8 5.5 4.9 <1 16.1 5.8 1.1 19.5	XRF Readings "As = X ppm" Groundwater encountered at 4.5 feet during drilling As = 113 ppm (±18) As = 3,926 ppm (±102) As = 402 ppm (±32); sheen has brief popping and color; both dissipate in 10 seconds or less
	S 10 12 PAL28- 10 12 30 PAL28- 10-11 CA ML/GM SM SM SM ML SM ML											stiff/me a gravel r) ty fine t al grave e to coa dense, ense e sand silt with Qvr) pre-pack	and sand to silty g edium dense, wet) and sand (medium o medium sand wi d (loose, wet) (Qvr) rse gravel with sa wet) (Qvr) (dense, wet) (Qvr) occasional gravel s well screen instal grab groundwater	(fill) n stiff, th ) nd (hard, led from	- NAPL NS - NS - NS	60.7	As = 819 ppm (±52) As = <79 ppm Liner damaged, likely due to dense gravel
Note	6 to 11 feet bgs; grab groundwater sample PAI-28S-160929 collected. Note: Please see Figure 1-1 for explanation of symbols Log of Boring PAI-28S																
G												Project: Puget Sound Energy GWPS Project Location: Gas Works Park, Seattle, Washington Project Number: 0186-846-01					

Date:8/30/17 Path:P:/00/18846/GINT/018684601.GPJ DBLibrary/Library/GEOENGINEERS_DF_STD_US.GLB/GEI8_ENVIRONMENTAL_STANDARD

/ertical Dat	vation (i um	t)	USA	33.64 .CE (Loci	ks)			ammer ata N/A	Drillin Equip		Geoprobe 7730 DT
Easting (X) Northing (Y) Notes: Har		red fro	23	70655.38 9052.22 3½ feet b				ystem WA State Plane,North atum NAD83 (feet)		idwater leasured	Depth to
<u>^</u>			LD D I≞								
Elevation (feet) Depth (feet)	Interval Recovered (in)	Blows/foot	Collected Sample	<u>Sample Name</u> Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
- 0							SP-SM	Brown fine to medium sand with silt and trace organic matter (fine roots) (loose, moist) (fill) Brown fine to coarse sand with trace silt (loose, moist) (fill) Liner encountered at 1.6 feet	NS NS NS NS	<1 <1 <1 <1	XRF Readings "As = X ppm"
	18						SM	- Gray silty fine to coarse sand (medium dense, moist) (fill)	NS NS	<1 <1	As = 40 ppm (±8)
5 —	50					<u>il i de</u>	ML	<ul> <li>Gray sandy silt with gravel and organic matter (medium stiff, moist) (fill)</li> </ul>	NS	<1	As = 78 ppm (±10)
							SM SOOT	Gray silty fine to coarse sand with gravel (medium dense, moist) (fill)	NS	<1	As = <32 ppm As = 169 ppm (±12)
- - 5	-		Ţ	<u>PAI-29-</u> 7.9-8.4 CA			ML SM SM	Black soot with trace silt, sand and organic matter (medium stiff, moist) (fill) Brick fragment encountered at 6.4 feet Gray sandy silt with gravel (stiff, moist) (fill) Gray silty fine sand with occasional gravel (dense, moist) (fill)		<1 <1	As = <20 ppm As = <21 ppm
							ML	Trace brick dust at 7.2 feet Brown silty fine sand with occasional gravel and trace organic matter (medium dense, moist)	- NS		As = <15 ppm
10 —	40						ML	(fill) Gray silt with sand, organic matter at top, darker laminae likely decaying organic	NS		As = <16 ppm
-	1						SM	matter (hard, moist) (Qpgd)     Gray with orange mottling sandy silt with     occasional gravel (hard, moist) (Qpgd)			As = <23 ppm As = <26 ppm
-							ML	- Grades to no mottling Gray with orange mottling silty fine sand (Qpgd) Grades to no mottling			As = <17 ppm
-								<ul> <li>Gray sandy silt with occasional gravel (hard, moist) (Qpgd)</li> </ul>	[–] NS		As = <23 ppm

# 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

Surfac	ce Elev al Datu	ation	n (ft)			33.75	(n)			Hammer Data	N/A	Drilling Equipr		Geoprobe 7730 DT
Eastir		1111				CE (Lock 0589.08	,				State Plane, North	Groun		r
Northi	ng (Y)					9145.81					NAD83 (feet)	Date M		<ul> <li>Depth to</li> </ul>
Notes	8:											9/29/2	2016	7.90 25.85
				FIFI	D D	ΔΤΔ								
ţ)							П							
Elevation (feet)	eet)		Recovered (in)	ъ	Collected Sample	<u>Sample Name</u> Testing	svel	Log	Group Classification	MA			e Ê	REMARKS
/atio	Depth (feet)	Interval	over	Blows/foot	ected	ting	Water Level	Graphic Log	up ssific	DES	CRIPTION	ue	Headspace Vapor (ppm)	
Шe	o Dep	Inte	Rec	Blo	Coll	<u>Sar</u> Tes	Wai	Gra	C C C G			Sheen	Hea	
	0-		43						SM	Brown silty fine to c (medium dense,	parse sand with gravel moist) (fill)	NS NS	<1	XRF Readings "As = X ppm"
	-								WD SM	Brown organic matt pieces) (fill)	er (decaying small wood		<1	As = 79 ppm (±7)
									SIVI	Black silty sooty fine	e to coarse sand with trace ate (medium dense) (fill)			
	-											[–] NS	<1	As = <29 ppm
										Black silty fused age	glomerate (fine to coarse sand, soot and occasional	NS	<1	Groundwater encountered at 2.8 feet duri drilling
										gravel (loose, we				As = 32 ppm (±8)
	-									-		-		
	5 —		30								-	_		
			30							Grades to very loos	8			
	-									-		-		
												NS		
	_				+	<u>PAI-30-</u> <u>8-9</u> CA	Ţ			-		NS	1.6	As = <35 ppm
స						CA			ML	_ \With gravel		_		
									WIL .		trace organic matter	SS	4.9	As = 81 ppm (±11)
	10 —		52						ML	One piece of wood		∕⊂ _{ss}	10.8	As = 31 ppm (±7)
										moist) (fill)	th trace organic matter		8.6	As = 54 ppm (±11)
	-								ML	\Grades to dark brow	vn /	∕ ss	9.6	As = <18 ppm
	_								CM	(Qvr)	ional gravel (stiff, moist)	,≓ ss	29.9	As = <16 ppm
									SM		with occasional gravel	,		
	_									<ul> <li>(dense, moist) ( Grades to dark gray</li> </ul>		SS		
0	_											_ _{MS}	66.8	As = <21 ppm
												1010	00.0	Λ3 21 μριτι
	15 —		48					<u>ktok</u>	ML	Gray silt (medium s	tiff, moist) (Qvr)	SS	83.4	As = <19 ppm
	-										off wat			$A_{2} = 61 \text{ ppm} (+12)$
										Grades sandy and s		SS		As = 61 ppm (±12)
	-								SM	(Qvr)	dium sand (very loose, wet)	NAPL	185.6	As = <20 ppm; sheen has color Jar test: thin NAPL covers surface, small br and occasional black blebs cover 20%
	_									Grades to loose Grades to medium		_		
રુ									SM	Gray silty fine to me (Qva)	dium sand (dense, wet)			As = <19 ppm
-	_						1	<u>[:].]</u>		Grades with gravel a Grades to gray with	and very dense light purple to mauve color 🧳	_ <b>_</b>	8.2	As = <16 ppm
										Temporary pre-pacl	well screen installed from grab groundwater			
Nia		200		Figure	115	or ovoloo	ation	ofor	nholo	sample PAI-308	S-160929 collected.			
INC	ne. PIE	ases	seel	igure	: 1-1-1	or explan	auon	UI SY	IDUIS					

#### Log of Boring PAI-30S



Date:6/30/17 Path:P:\0/0

 Project:
 Puget Sound Energy GWPS

 Project Location:
 Gas Works Park, Seattle, Washington

 Project Number:
 0186-846-01

Stilled 10/1	<u>Start</u> 8/201	61	<u>End</u> 0/18/		Total Depth	n (ft)	3	1	Logged By MWB Checked By ZAS	Driller Cascade Drilling			Drilling Method Continuous
Surface Elev Vertical Datu		(ft)	ι		9.87 E (Lock	s)			ammer ata	N/A	Drillii Equij	ng oment	Sonic DB320
Easting (X) Northing (Y)	4		£	239	)674.32 )144.6					State Plane,North NAD83 (feet)	Date	ndwate Measur	Depth to <u>ed</u> <u>Water (ft)</u> <u>Elevation (ft)</u>
Notes: Hand	a-auge	erea	from	0 to 2	teet bgs	i.			-		10/1	8/201	6 22.90 6.97
-				DA C									
	Interval Recovered (in)		Blows/foot	Collected Sample	<u>Sample Name</u> Testing	Water Level	Graphic Log	Group Classification		ATERIAL CRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
0 —	60							SP-SM	Brown-tan sand wit moist) (fill)	n silt and gravel (loose,			XRF Readings "As = X ppm"
									-		⁻ NS	<1	As = <25 ppm
								SP ML	moist) (fill)	sand with gravel (loose,	NS	<1	
									wood debris (sti	bunded gravel and trace f, moist) (fill)	- NS	<1	As = <40 ppm
									-		- NS	1.1	As = <32 ppm
5	60	0							_		NS	3.4	
								AC SP	Black semi-solid as	phaltic material (loose,			A
								SP	Gray fine sand with Black fine sand coa		_/ _ ss 		
_									(fill)	el (medium dense, moist)	NS	97.2	As = <42 ppm
-								SP	Black sand with soc	t, occasional gravel and	SS	42.2	As = 151 ppm (±29)
									<ul> <li>fibrous wood (lo</li> </ul>	ose, moist) (fill)	31.7	As = 231 ppm (±40); rainbow sheen hydrocarbon-like odor	
_1 ⁰ 10	60	D						GP ML	moist) (fill) Black-gray silt with	nd coated in soot (loose, gravel, occasional sand and	NS	125.3	As = 128 ppm (±19)
								CC	soot (stiff, moist Light gray crushed debris (loose, m	concrete rubble with metal	NS	68.1	As = 391 ppm (±39)
									_		- NS	14.1	As = <31 ppm
									_		- NS	29.2	
									_		- NS		
	60	D	-	Ť			$\bigotimes$	SP-SM	Black fine sand with cobbles (loose,	silt, gravel and large wet) (fill)	NS	16.2	As = <34 ppm Groundwater encountered at 15 feet during drilling
					<u>PAI-31-</u> 1 <u>5-16.5</u> CA				-		_ MS	13.8	
								SP-SM		dium sand with silt and dense, moist) (Qvr)	[_] NS	27.2	As = <44 ppm As = <40 ppm
									_		_ NS	10.7	As = <25 ppm
									-		_ NS	6.0	As = <31 ppm
_^							집	SP-SM	Gray fine to mediun	a sand with silt and			
Note: Ple	ase se	e Fi	gure	1-1 foi	r explana	atior	n of s	mbols					
									Log of Bor	ing PAI-31D			
~	-								Project:	Puget Sound Er			
Geo	DE	Ν	GI	NE	ER	S			Project Locatio Project Numbe		, Seat	tle, V	Vashington Figure 1-33 Sheet 1 of 2

$\bigcap$			FIEL	D D	ATA							
Elevation (feet)		Interval Recovered (in)	Blows/foot	Collected Sample	<u>Sample Name</u> Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
	20 —	60							occasional gravel (very dense, moist) (Qva)	NS	6.1	As = <19 ppm
-	-									NS		
$\mathbf{F}$	_									NS	2.4	As = <21 ppm
-	_					Ţ		SP-SM	Gray fine sand with silt and occasional gravel – (loose, wet) (Qva)	NS	2.8	As = <25 ppm
$\left  \right $	-							SP-SM	Dark gray fine to medium sand with silt and – gravel (loose, moist) (Qva)	NS	4.3	As = <20 ppm
<u>%</u>	25 —	60						SP-SM	Gray fine to medium sand with silt and gravel — (medium dense, moist) (Qva) –	NS	3.4	As = <29 ppm
F	-							SP-SM	Gray fine sand with silt, occasional gravel and – large cobbles (loose, moist) (Qva)	NS	1.1	As = <20 ppm
F	-							SP-SM	Gray fine to medium sand with silt and – occasional gravel (medium dense, moist) – (Qva)	NS	1.0	As = <35 ppm
-	_				<u>PAI-31-</u> 27-29.5			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
ŀ	-				<u>27-29.5</u> CA					NS	<1	As = <16 ppm As = <24 ppm
_0	30 —	12						SP-SM	Light gray fine sand with silt and gravel (very — dense, moist) (Qpgt) –	NS	<1	As = <26 ppm
-	_								Temporary pre-pack well screen installed from	NS	\ \ <1 /	As = <26 ppm
									27 to 29.5 feet bgs; grab groundwater sample PAI-31D-161018 collected.			

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

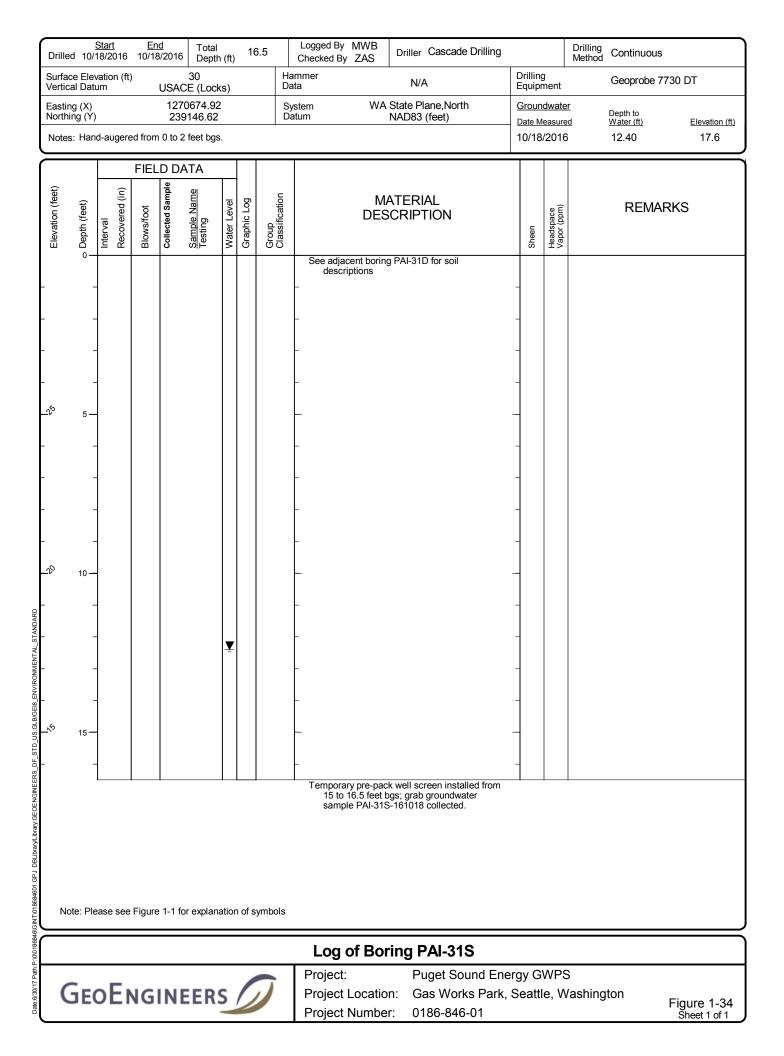
#### Log of Boring PAI-31D (continued)



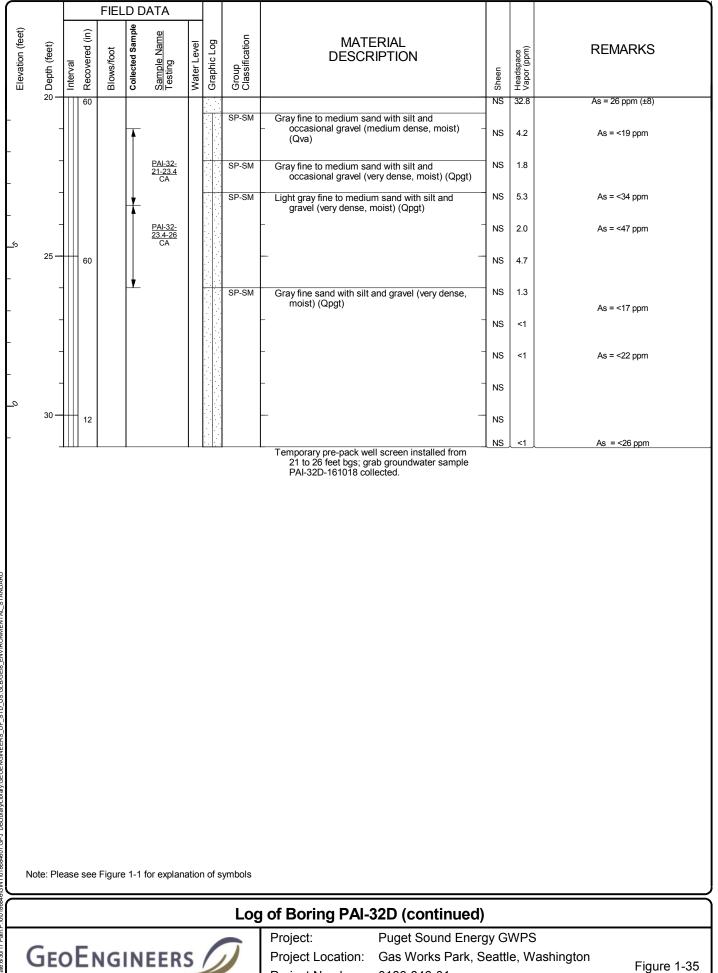
Project: Project Number:

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

Figure 1-33 Sheet 2 of 2



Drille	d 10/1	<u>Start</u> 8/201	6	<u>En</u> 10/18		Total Depth	n (ft)	3	81	Logged By MWB Checked By ZAS	Driller Ca	ascade Drilling			Drilling Method
Surfac Vertic	ce Elev al Datu	ation ( Im	(ft)			29.72 CE (Lock	(S)			ammer ata	N/A		Drilling Equipr		Sonic DB320
	ing (Y)	d-auge	erec	d from	239	0661.22 9168.47 2 feet bgs			S D		State Plane NAD83 (fee		<u>Groun</u> Date M 10/18	easure	Depth to <u>Water (ft)</u> <u>Elevation (ft)</u>
$\geq$				FIFI	.D D/	ΔΤΔ									
Elevation (feet)	<ul> <li>Depth (feet)</li> </ul>	Interval Becovered (in)		Blows/foot	Collected Sample	Sample Name Testing	Water Level	Graphic Log	Group Classification	DES	ATERIAL SCRIPTIC	N	Sheen	Headspace Vapor (ppm)	
_	0	6	0						SP	Brown fine to coars moist) (fill)	e sand with	trace silt (loose,			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 NS NS	<1 <1	As = <20 ppm
ή ^ρ	_									-			[–] NS	4.5	As = 34 ppm (±11)
	5 —	6	0						SP	Black fine sand with gravel coated in soot and					As = 62 ppm (±15)
-	-								Ъг	Black fine sand with gravel coated in soot and - cobbles up to 3 inches in diameter (loose, moist) (fill)				11.4	As = 355 ppm (±24)
_	_								GP	Black gravel with sa debris (loose, w	Black gravel with sand coated in soot and wood debris (loose, wet) (fill)				As = 908 ppm (±29) Groundwater encountered at 7 feet during drill
	-							0	SP-SM	Black to dark gray fine sand with silt, gravel, large cobbles and wood debris (medium				31.6	As = 531 ppm (±30)
	-									dense, moist) (f	,		ss	230.7	As = 595 ppm (±24) Hydrocarbon-like odor
	10 —	6	0						SP-SM	- (loose, wet) (fill)	)		ss	172.9	As = 333 ppm (±18)
-	-								SP-SM	Gray fine sand with (loose, wet) (fill)		asional gravel	- NS	76.3	As = 111 ppm (±13)
-	-								SP SP-SM	Gray sand with silt	-	/	NS	1.3	As = 402 ppm (±15)
-	_									moist) (Qvr)			NS	3.6	As = 294 ppm (±13)
	-								SP-SM	Dark gray fine to me – and large cobble diameter (loose	es up to 6 ind	ches in	- NS	<1	
	15 —	6	0							-			NS	8.9	As = 237 ppm (±25)
-	-									_			NS	9.6	
_	_									-			- NS	11.7	
_	-						Ţ		SP	Gray fine to medium trace gravel (loc			NS	6.2	As = <20 ppm
_^0	_									_	trace gravel (loose, moist) (Qva)			2.5	
_	20 — ote: Ple	⊥∐ ase se	 ee F	igure	 e 1-1 fo	or explan	 atior	l n of s	l ymbols	L			]	I	1
$\geq$										Log of Bor	ring PA	I-32D			
C	ΞEO	οE	N	IG	INI	EER	S		J	Project: Project Locatio Project Numbe	Puge n: Gas	et Sound Ene	nergy GWPS k, Seattle, Washington Figure 1-35 Sheet 1 of 2		

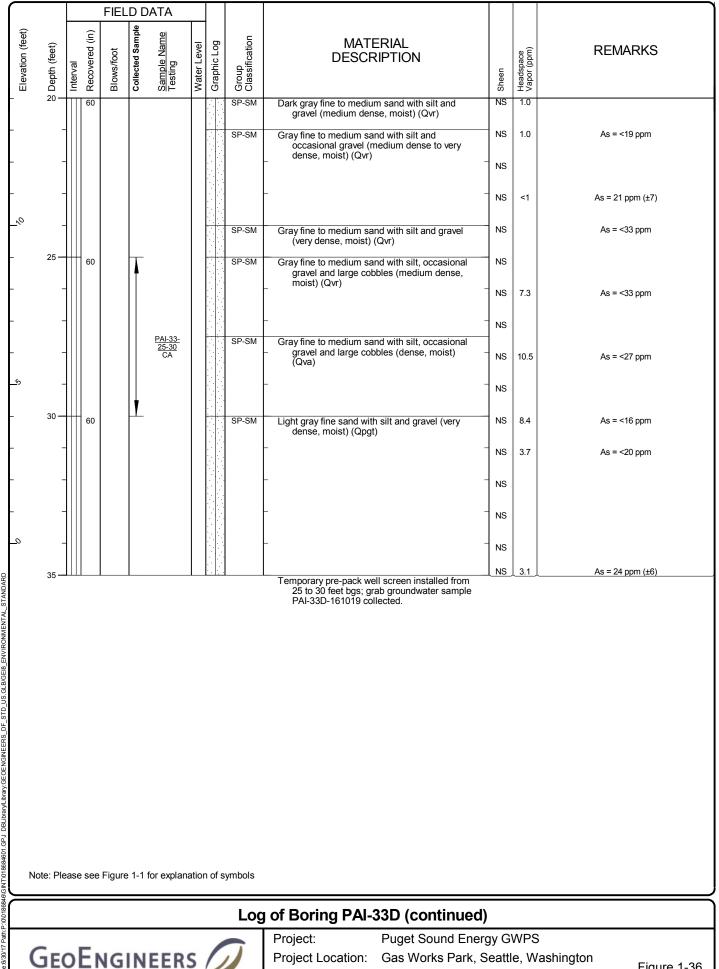


0186-846-01

Sheet 2 of 2

Drille	d 10/1	<u>Start</u> 9/2016	<u>E</u> 10/1	<u>nd</u> 9/2016	Fotal Depth	n (ft)	3	5	Logged By MWB Checked By ZAS	Driller Cascade Drilling			Drilling Method
Surfac Vertica		ration (ft Im	)		34.01 CE (Lock	(S)			ammer ata	N/A	Drilling Equipr	g nent	Sonic DB320
Eastin Northi Notes	ng (Ý)	d-auger	ed fror	23	70710.62 9156.29 2 feet bgs					State Plane,North NAD83 (feet)	<u>Groun</u> Date M 10/19	easure	Depth to <u>ed</u> <u>Water (ft)</u> <u>Elevation (ft</u> )
Elevation (feet)	Depth (feet)	Interval Recovered (in)	Blows/foot	Collected Sample	ATA Sample Name Testing	Water Level	Graphic Log	Group Classification		ATERIAL CRIPTION		Headspace Vapor (ppm)	REMARKS
Eleva	o Deptl I	8 Recove	Blow	Collec	<u>Sam</u> Testi	Wate	ll Grap	BRICK			Sheen	L> Heads	XRF Readings "As = X ppm"
-	-							SP SP-SM	moist) (fill) Brown fine sand wit moist) (fill)	e sand with gravel (loose, h silt and gravel (loose,	NS	<1	
-	-							SP-SM	<ul> <li>Black fine sand with soot (loose, moi</li> </ul>	silt and gravel coated in st) (fill)	NS	<1	As = <32 ppm As = 71 ppm (±13)
	-							SP-SM		ange mottling fine to th silt, gravel and metal	NS	<1	As = 49 ppm (±14)
-	5 —	60						SP-SM	Black fine sand with	silt, gravel and wood	NS NS	<1	As = <37 ppm
	_							SP	debris (fill) Gray fine sand with	gravel and cobbles (fill)	NS	<1	As = <31 ppm As = <37 ppm
- 	-							SP-SM SP SP-SM	soot (fill)	silt and gravel coated in sand with gravel (loose,	NS	<1 7.5	As = 268 ppm (±21) As = 899 ppm (±31)
	10 —	60						SP	Black fine sand with soot (fill) Gray-green fine sar	silt and gravel coated in / d with gravel and trace c agglomerate (medium	NS	<1	Groundwater encountered at 9.8 feet durin drilling As = 6,252 ppm (±114)
	_			<b></b>				SP-SM	_ dense, moist) (fi (1/2-inch pocket of ye feet)	silt (loose, wet) (fill)	NS	1.4	As = 1,700 ppm (±51)
-	-				<u>PAI-33-</u> <u>11.5-12.5</u> CA			GP		l with sand (loose, wet) (fill)	NS NS	<1	As = 7,614 ppm (±190)
<u>_1</u> 0	-				<u>PAI-33-</u> 12.5-15 CA				_		- NS	3.9	As = 7,392 ppm (±197)
	15 —	60				Ţ		SP-SM ML	(fill)	d with silt coated in NAPL sand (loose, wet) (fill)	NAPL HS	37.2 24.8	Shake test 90% coverage; 1 cm of brown LN As = 170 ppm (±13); rainbow sheen
	_							SP	Gray silt with trace sand (loose, wet) (fill) Black stained fine to coarse sand with trace silt and gravel, coated in NAPL (fill)			300.7	As = 80 ppm (±10); shake test 20% coverage cm of black LNAPL Strong hydrocarbon-like odor
_\%	-							CC	Gray concrete rubb	e (fill)	MS	<1	As = 892 ppm (±38); blocky rainbow sheet
No	20 — te: Ple	ase see	Figur	e 1-1 f	or explan	atior	of s	ymbols			NS	<1	As = <25 ppm
									Log of Bor	ing PAI-33D			
C	δEC	οEι	١G	IN	EER	S		J	Project: Project Location Project Number				

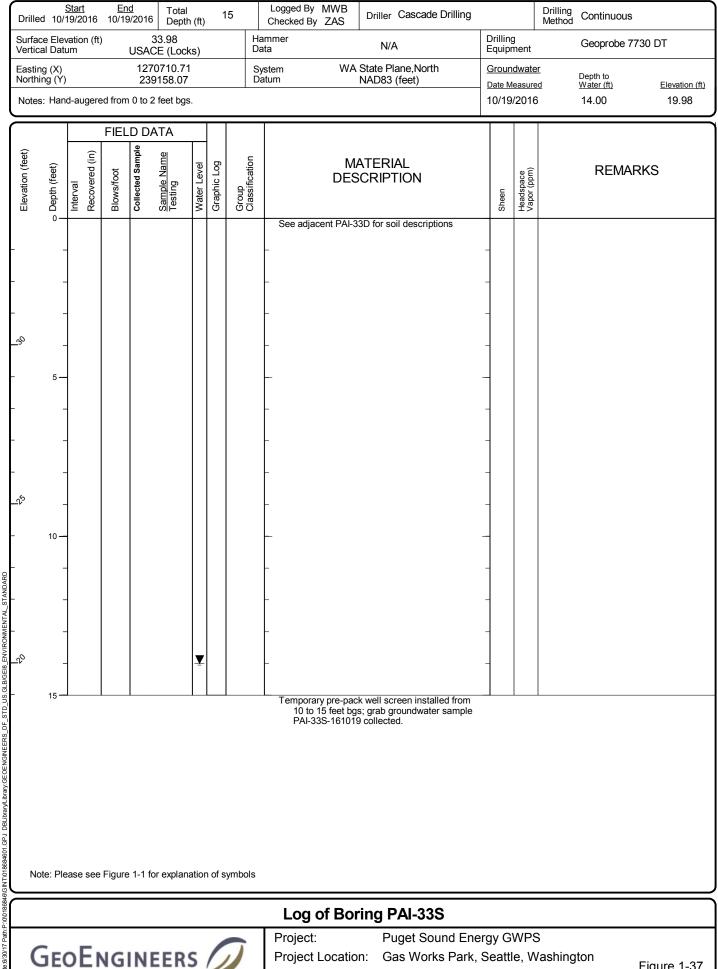
# Log of Boring PAI-33D



0186-846-01

**FNVIRONMENTAL** STD US.GLB/GEI8 3684601.GPJ DBLibrary/Library:GEOENGINEERS

Figure 1-36 Sheet 2 of 2



0186-846-01

_DF_STD_US.GLB/GEI8 GEOENGINEERS DBLibrarv/Librarv Ъ. ate:6/30/17 Pa

Figure 1-37 Sheet 1 of 1

ſ	Drille	d 10/	<u>Start</u> 19/201	<u>E</u> 6 10/1	<u>nd</u> 9/2016	Total Depth	ו (ft)	2	0		Logged By MWB Checked By ZAS	Driller Cascad	e Drilling			Drilling Method	Continuous	
ŝ	Surfac /ertic	ce Elev al Dati	/ation ( um	ft)		4.07 E (Lock	(S)			Ha Da	mmer ta	N/A		Drillin Equip	g ment		Geoprobe 7	730 DT
1	Northi	ng (X) ing (Y) s: Han		red from	23	0710.33 9157.3 feet bgs				Sy Da	stem WA tum	State Plane,Nor NAD83 (feet)	th	Groun	leasure	ed	Depth to <u>Water (ft)</u> 15.02	Elevation (ft) 19.05
	Notes	. Han								_					1		10.02	
	Elevation (feet)	o Depth (feet) I	Interval Recovered (in)		Collected Sample	Testing Testing	Water Level	Graphic Log	Group Classification	Ulassification	DES			Sheen	Headspace Vapor (ppm)		REMAI	RKS
aryLbray.Geoensineers_DF_STD_US.GLB/GE08_EW/IRONMENTAL_STANDARD	\$ \$	0				r explan	¥				See adjacent boring descriptions	s well screen insta						
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**ATTACHMENT 2B-3-2** Gas Works Park Liner Repair (Layfield)



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

To: GeoEngineers, Inc.

Attn: Sandra B Smith

Re: Gas Works Park

Email: sbsmith@geoengineers.com

Pages (1)

Subcontract agreement #0186-846-01 Layfield 093016

Ph: 253-722-2418

#### 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



Backfilled and sod replaced Patch #1



Backfilled and sod replaced patch #2

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

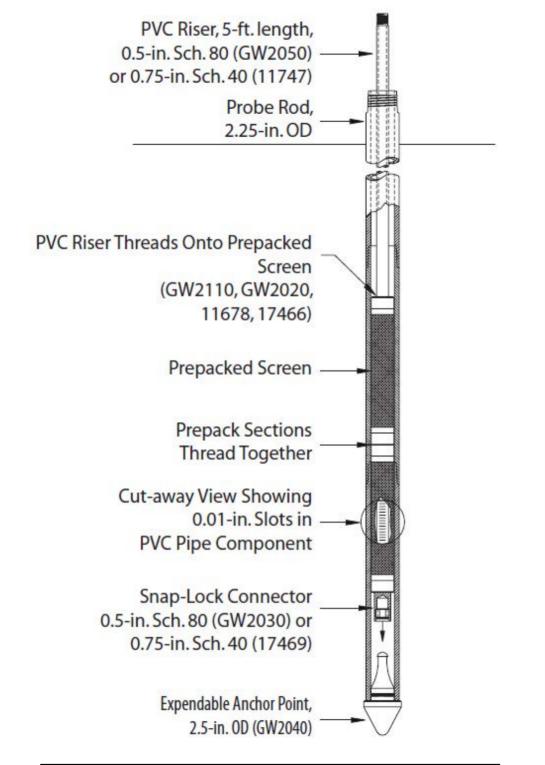
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# Layfield Pre-Weld / Destructive Sample Information

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# 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

# DRILLING | TECHNICAL SERVICES

#### Prepared for:

GeoEngineers, Inc. Chris L. Bailey, PE 600 Stewart Street, Suite 1700 Seattle, Washington 98101 Tel. / 206.239.3246 E-Mail / cbailey@geoengineers.com

#### Prepared by:

Cascade Technical Services Daniel Caputo 13050 W 43rd Drive, Suite 100 Golden, Colorado 80403 Tel. / 303.423.2547 E-Mail /DCaputo@cascade-env.com



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Project Narrative	2
Project Site Map and HPT Locations	3
Hydraulic Profiling Tool Data Summary Table	4
Hydraulic Profiling Tool Data Plots	5
Reference Material	.11
Cascade Personnel	.11
Equipment	.11
HPT System Overview	.11
HPT Data Collection	. 11
HPT Reference Testing and Dissipation Tests	. 12

### **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.

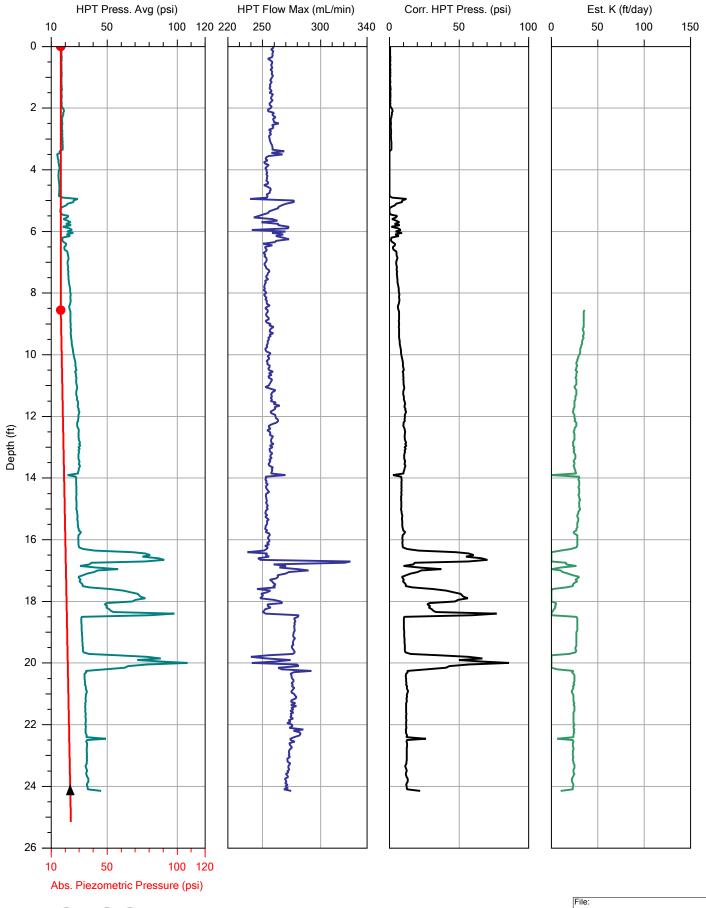
			Pre Boring HPT P	ressure Tests (psi)	Successful		
HPT Location	Total Depth (ft)	Top w Q=0	Bottom w Q=0	Pressure ∆ w Q=0	Pass/Fail*	Dissipation Test(s) Depths (ft)	Comments/Deviations
							Boring advance to refusal. Electrical
HPT-1a	24.15	17.255	17.032	0.223	PASS	13.85, 24.20	conductivity not functional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

*Pass/Fail criteria is 0.22 psi ± 10%.



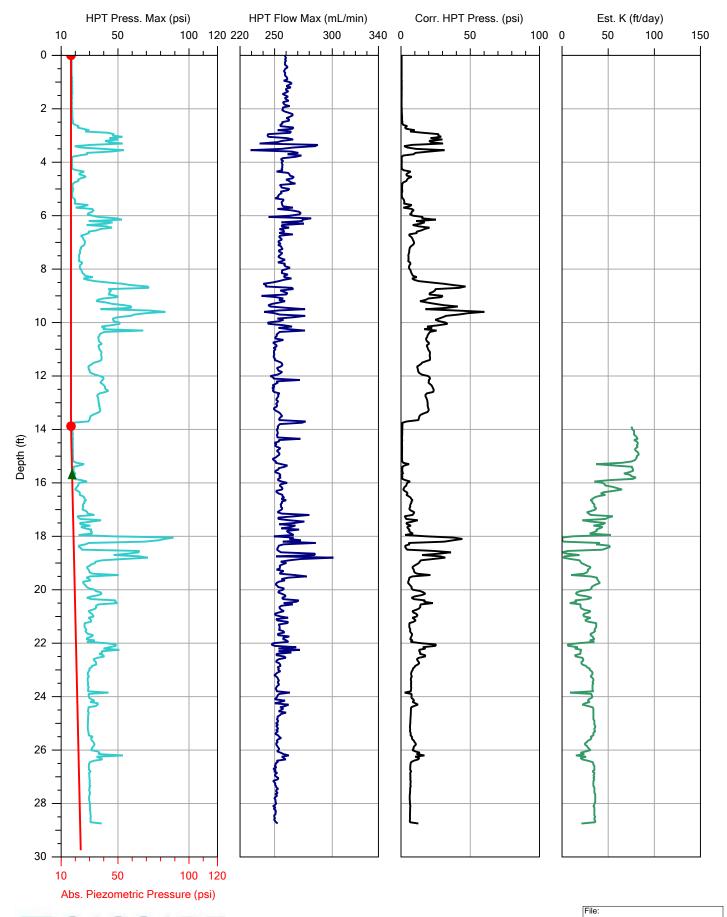
Hydraulic Profiling Tool Data Plots



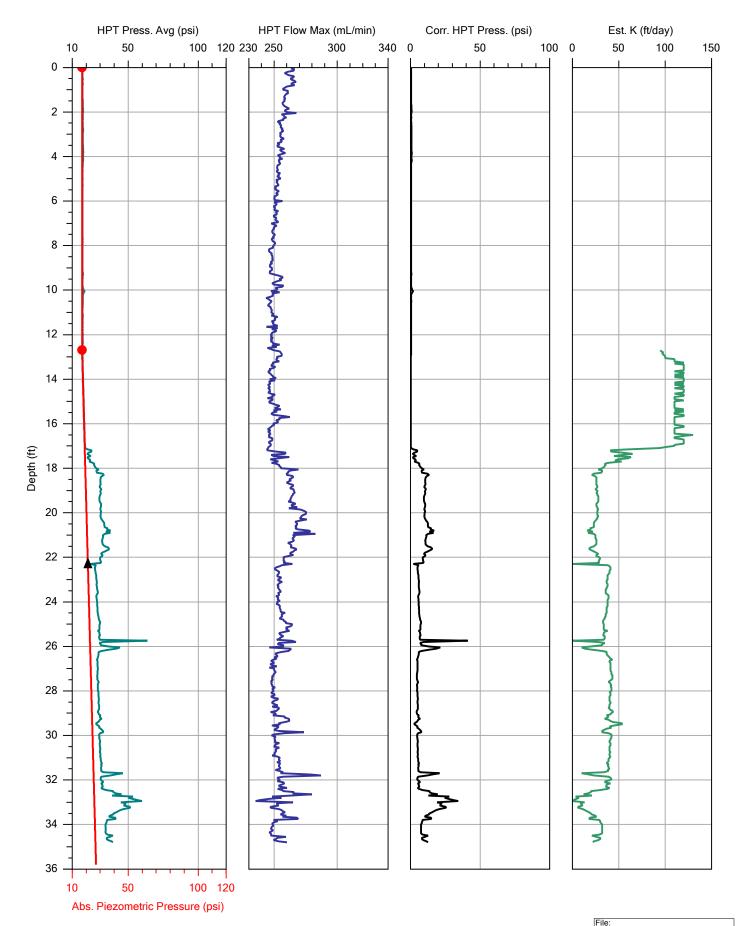


CASCADE

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Cascade	ZH	10/7/2016
Project ID:	Client:	Location:
302169067	GeoEngineers	

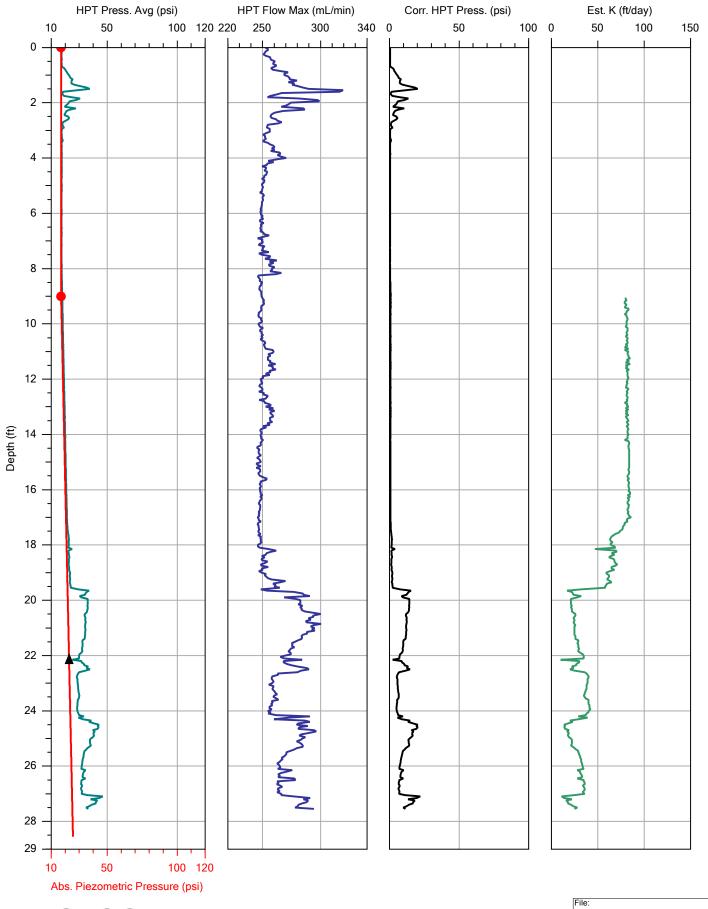


		HPT-2.MHP
Company:	Operator:	Date:
Cascade	ZH	10/7/2016
Project ID:	Client:	Location:
302169067	GeoEngineers	

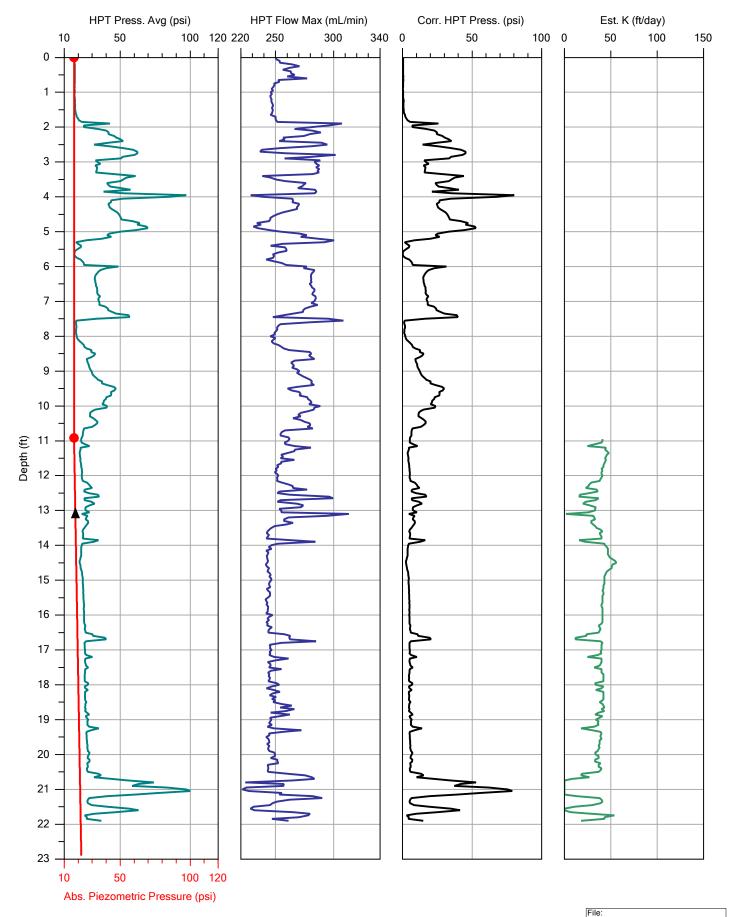


CASCADE

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Cascade	ZH	10/7/2016
Project ID:	Client:	Location:
302169067	GeoEngineers	



		HPT-4.MHP
Company:	Operator:	Date:
Cascade	ZH	10/7/2016
Project ID:	Client:	Location:
302169067	GeoEngineers	



CASCADE

		HPT-5.MHP
Company:	Operator:	Date:
Cascade	ZH	10/7/2016
Project ID:	Client:	Location:
302169067	GeoEngineers	

## **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.
- <u>Pressure</u> 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



www.geoengineers.com

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

Plaza 600 Building, 600 Stewart Street, Suite 1700, Seattle, WA 98101, Telephone: 206.728.2674, Fax: 206.728.2732

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 Rinsate 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.

Sample ID	Analyte	Qualifier	Reason
PAI-14-22-22.5	PAI-14-22-22.5 Chemical Oxygen Demand		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)

SUMMARY OF DATA QUALIFIERS FOR 2016 PLAY AREA SOIL SAMPLING

#### 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.



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www.geoengineers.com

**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 crosscontamination 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.

Sample ID	Analyte	Qualifier	Reason
PAI-20S-160912	Sulfide	J	Holding Time Outlier
PAI-19-S-160913	Sulfide	1	Compound Identification (i.e., ion ratio, retention
TAP13-3-100313	Sunde	J	time, relative abundance, etc.)
PAI-20-S-160913	Sulfide	1	Compound Identification (i.e., ion ratio, retention
171200100010	Guinde	,	time, relative abundance, etc.)
PAI-20D-160912	Sulfide	1	Compound Identification (i.e., ion ratio, retention
171 200 100012	Guinde	,	time, relative abundance, etc.)
PAI-13-D-160914	Sulfide	1	Compound Identification (i.e., ion ratio, retention
171 10 0 100014	Guinde	,	time, relative abundance, etc.)
PAI-14-D-160914	Sulfide		Compound Identification (i.e., ion ratio, retention
171140100014	Guinde	,	time, relative abundance, etc.)
PAI-16-S-160915	Sulfide		Compound Identification (i.e., ion ratio, retention
171 10 0 100010	Guindo	, 	time, relative abundance, etc.)
PAI-16-D-160915	Sulfide		Compound Identification (i.e., ion ratio, retention
17111010100010	Guinde	,	time, relative abundance, etc.)
PAI-17-S-160915	Sulfide		Compound Identification (i.e., ion ratio, retention
1 41-11-0-100010	Sunde	5	time, relative abundance, etc.)
PAI-17-D-160915	Sulfide	1	Compound Identification (i.e., ion ratio, retention
1711110100010	Gamac	5	time, relative abundance, etc.)
PAI-22-S-160916	Sulfide		Compound Identification (i.e., ion ratio, retention
171122 0 100010	Guinde	,	time, relative abundance, etc.)
PAI-22-D-160916	Sulfide		Compound Identification (i.e., ion ratio, retention
17122 0 100010	Guinde	,	time, relative abundance, etc.)

SUMMARY OF DATA QUALIFIERS FOR 2016 PLAY AREA GROUNDWATER SAMPLING

#### 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.



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

**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,

And c. Redy

Mike Ridgeway Laboratory Director

DoD/ELAP Certification #L2371, ISO/IEC 17025:2005 ORELAP Certification: WA 100009-007 (NELAP Recognized)



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



**Case Narrative** 

WO#: **1609134** Date: **10/6/2016** 

CLIENT:GeoEngineersProject: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 & Acronyms**



WO#: **1609134** Date Reported: **10/6/2016** 

### Qualifiers:

- * Flagged value is not within established control limits
- B Analyte detected in the associated Method Blank
- D Dilution was required
- E Value above quantitation range
- H Holding times for preparation or analysis exceeded
- I Analyte with an internal standard that does not meet established acceptance criteria
- J Analyte detected below Reporting Limit
- N Tentatively Identified Compound (TIC)
- Q Analyte with an initial or continuing calibration that does not meet established acceptance criteria
- (<20%RSD, <20% Drift or minimum RRF)
- S Spike recovery outside accepted recovery limits
- ND Not detected at the Reporting Limit
- R High relative percent difference observed

Acronyms:

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



# **Analytical Report**

 Work Order:
 1609134

 Date Reported:
 10/6/2016

Client: GeoEngineers				Collectio	n Date: 9	9/12/2016 2:40:00 PM					
Project: Gas Works Park Site Lab ID: 1609134-001	609134-001 Matrix: Groundwater										
Client Sample ID: PAI-20S-160912 Analyses	Result	RL	Qual	Units	DF	Date Analyzed					
Sulfide by SM 4500-S2-F				Batc	h ID: R3	1948 Analyst: KT					
Sulfide	280	11.9	н	mg/L	1	9/23/2016 2:30:00 PM					
NOTES:	_00	11.0			•	0,20,20 10 2.00.00 F M					

MDL - Sample reported to Method Detection Limit (MDL)



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

UOM = Percent

### Percent Finer (Passing) than the Indicated Size

Grain Size Classification		Gravel						Mediur	n Sand	F	ine San	d		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-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%



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

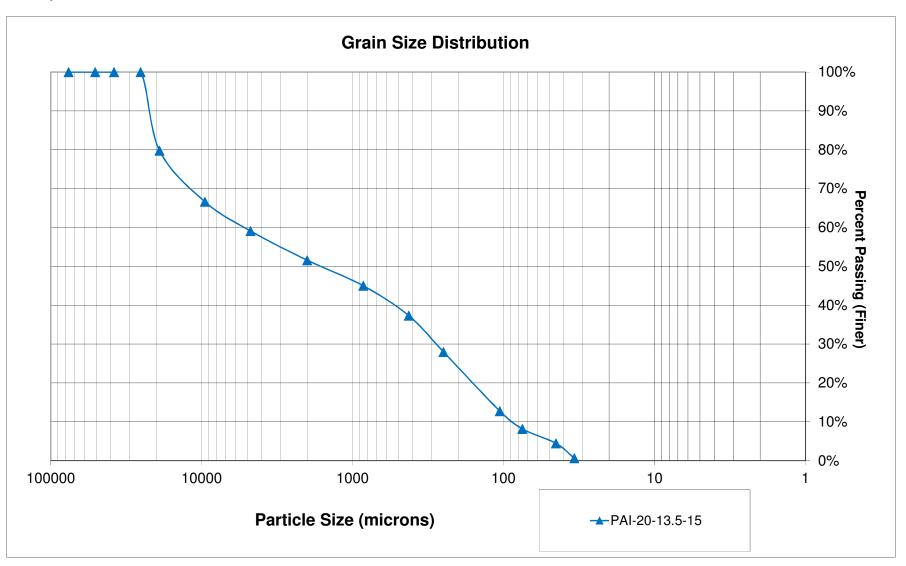
### Percent Retained in Each Size Fraction

UOM = Percent

Grain Size Classification		Gravel						Coarse Sand	Medium	Sand	F	ine San	d	Silt		
Sieve Size (Microns)	>76200	76200- 50800	50800- 38100		25400- 19000		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%



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





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

Analytical Report for Service Request No: 1610998

October 03, 2016

helsea Ward Fremont Analytical 3600 Fremont Avenue, orth Seattle, WA 98103

### RE: COD

ear 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 re uest number **K1610998**.

Analyses were performed according to our laboratory's E AP-approved uality assurance program. The test results meet re uirements of the current E AP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of E AP-accredited analytes, refer to the certifications section at www.alsglobal.com. All results are intended to be considered in their entirety, and A S roup SA orp. dba A S Environmental (A S) 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) analy ed, as listed in the report.

Please contact me if you have any uestions. My extension is 3375. ou may also contact me via email at anet.Malloch@alsglobal.com.

Respectfully submitted,

ALS Group USA, Corp. dba ALS Environmental

Janet mallich

anet Malloch Pro ect 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 Total Solids General Chemistry

R TSO TO S R TPART ER

### 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 MCL	Modified 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

- ${f F}$  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.pjlabs.com/	L16-57
Louisiana DEQ	http://www.deq.louisiana.gov/portal/DIVISIONS/PublicParticipationandPer mitSupport/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/EnvironmentalLaborator yAccreditation/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/anlayte 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

RIGHT SOLUTIONS | RIGHT PARTNER

	Fremon Analytica	L	CHAIN OF	CUSTODY R	ECORD	Omega Ci	OCID 263	PAGE: 1 1	or: 1	ADDRESS Fremont Analytical, Inc. 3600 Fremont Ave. N. Seattle, WA 98103 TEL: 206-352-3790 FAX: 206-352-7178 Website: www.fremontanalytical.com
SUB CONTR.	ATOR: ALS	COMPANY:	ALS Environ	mental		STRUCTIONS /		~		
ADDRESS:	1317 South 13th A	venue			Chemical Ema	Oxygen Den こ人 vesu	nand by SM 522	20. Ridaewa	an af	enortanglefical.com
CITY, STATE,	^{ZIP:} Kelso, WA 98626						ü	var Q	trang	montanalyfical.com
PHONE: (36 ACCOUNT #:	50) 577-7222 FAX:	EMAI	L:				000		b passi	
ITEM #	SAMPLE ID	CLIENT SAMPLE ID	BOTTLE TYPE	MATRIX	DATE COLL	ECTED	NUMBER OF CONTAINERS			S: Methanol Preserved Weights ation, Additional Sample Description.
	1609134-002A	PAI-20-13.5-15	CLEAR JARS 4 O	Soil	9/12/2016 2	2:30:00 PM	1			
	TEST_SUB									

Refinquished By:	Date: 9/15/110 Date:	Time: 3:00 Time:	Received By:	Date: 976766 Date:	Time: 9-3C	REPORT TRANSMITTAL DESIRED:
Relinquished By:	Date:	Time:	Received By:	Date:	Time:	FOR LAB USE ONLY Temp of samples °C Attempt to Cool ?
TAT:	Standard	RUSH	Next BD 2nd BD 1		3D 🗌	Comments:
				Boo	<del>o 7 of 16</del>	Page 15 of 28

AL	\$										Р	c lar	ret
·	2	. Λ	s 1 × 1	Cooler l	Receip	ot and	Pres	ervat	ion Form		_	<del></del>	<u> </u>
	TEMON	t Ana	lytical				Se	rvice	Request K1	6_1094	<u>18</u>	<b>A</b> i	
Received:	9-16-1	6	Opened:	916-16	,	_ By:_		su)	Unloade	d: <u>91</u>	<u>ь 16 </u> Ву:_	seu)	
I. Sample	es were recei	ved via?	USPS	Fed Ex	UP	$\sim$	DHL	PI	DX Couri	er Hand	l Delivered		
2. Sample	es were rece	ived in: (cin	rcle)	Cooler	Box	E	nvelop	e	Other			NA	
3. Were <u>c</u>	custody seals	on coolers	s?	NA	$\supset$ N		If yes	s, how	many and wh	nere?	Front		<u></u>
If pres	ent, were cu	stody seals	intact?	<u>(Y</u>	N (		lf	preser	nt, were they s	signed and d	lated?	Y	N
Rew Cooler Temp	Corrected. Gooler Temp	Raw Temp Blank	Corrected Temp Blank	Corr. Factor	Then	mørnete ID	r C	ooler/			Fracking Numbe	r NA	Filed
1.2	1.2	24	2.4	Ð	3	60		26	3 j	ZX6195	11039861		
1.6	1.7	3.0	3.1	-10.1	3	56		244		ZX6 9a	<u>1X 3194 449</u>	3	<u> </u> ]
<u> </u>			 		<u> </u>	<u> </u>		265	1			<u></u>	╉
·	+							261 271	<del>,</del>				+
L		L		5		1	<u> </u>			~			)
	ng material:	~		······································			<u>ks</u> n	et ice	Dry Ice	Sleeves			
	custody par		-		-		\0 T	<b>I</b> • .			NA		N
6. Were	samples rec	-		on (tempera issue sampl	-		•	dicate <b>Froze</b>	in the table b <b>Partiall</b>	elow. <b>y Thawed</b>	NA Thawed	Y	N
7. Were	all sample la	-	-	-				1 / 046	ar i airean	y Indired	NA	$(\gamma)$	N
8. Did a	II sample lat	els and tag	s agree wit	h custody p	apers?	Indica	te majo	or disc	repancies in t	the table on	page 2. NA		N
9. Were	e appropriate	e bottles/co	ntainers and	d volumes i	received	d for the	e tests i	indicat	ted?		NA	N TY	N
10. Wer	e the pH-pre	eserved bot	tles (see SM	O GEN SOF	) receiv	ved at th	ne appr	opriat	e pH? Indica	te in the tab	le below N	Y	N
	re VOA vial							-	•			X Y	N
	s C12/Res no											~	N
[													
	Sample ID	on Bottle			Samp	le ID on	coc			-	Identified by:		
			- <u></u>						······				
						<u> </u>	. <u></u>						
	······································	· · · · · · · · · · · · · · · · · · ·	Bot	tie Count	Out of	Head-		·······	<u> </u>	Volume	Reagent Lot		
	Sample	ID		ttle Type		space	Broke	pH	Reagent	added	Number	Initials	Time
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\					1		1	1		<u>\</u>	<u> </u>		

### 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

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		Analytical Report	
Client:	Fremont Analytical	Service Request:	K1610998
Project:	COD	Date Collected:	09/12/16
Sample Matrix:	Soil	Date Received:	09/16/16
Analysis Method:	160.3 Modified	Units:	Percent
Prep Method:	None	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	

QA/QC Report

Client:	Fremont Analytical	Service Request:K1610998
Project	COD	Date Collected:NA
Sample Matrix:	Paper	Date Received:NA
Analysis Method:	160.3 Modified	Units:Percent
Prep Method:	None	Basis: As Received
	Replicate Sam	ple Summary

### eplicate Sample Summar 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 Phone (360)577-7222 Fax (360)636-1068 www.alsglobal.com

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		Analytical Report	
Client:	Fremont Analytical	Service Request	K1610998
Project:	COD	Date Collected	09/12/16
Sample Matrix:	Soil	Date Received	: 09/16/16
Analysis Method: Prep Method:	SM 5220 C Modified ALS SOP	Units Basis	: mg/Kg : 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	

QA/QC Report

Client: Project Sample Matrix:	Fremont Analyt COD Soil	ical				Date	e Request: Collected: Received:	NA	
Sample Matrix.	5011						Analyzed:		
		Replic	ate Samp	le Summ	ary				
		General	Chemist	ry Param	eters				
Sample Name:	Batch QC						Units:	mg/Kg	
Lab Code:	K1610996-001						Basis:	Dry	
					Sample	Duplicate Sample K1610996- 001DUP			RPD
Analyte Name		Analysis Method	MRL	MDL	Result	Result	Average	RPD	Limit
Chemical Oxygen Deman	nd (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.

QA/QC Report

Client: Project: Sample Matrix:	Fremont Analytical COD Soil			Service Reque Date Collecter Date Received Date Analyzer	1: N/ l: N/ 1: 09	'A /29/16
		Matrix S	pike Summary	Date Extracte	<b>a:</b> 09	/28/16
			gen Demand (CO	OD)		
Sample Name:	Batch QC			Unit	s: mg	g/Kg
Lab Code:	K1610996-001			Basi	s: Di	у
Analysis Method:	SM 5220 C Modified					
Prep Method:	ALS SOP					
		Matrix Spik	e			
		K1610996-001	MS			
Analyte Name		Sample Result	Result	Spike Amount	% Rec	% Rec Limits
Chemical Oxygen De	emand (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.

QA/QC Report

Client: Project: Sample Matrix:	Fremont Analytical COD Soil		Service Request: Date Analyzed: Date Extracted:	K161099 09/29/16 NA	-
		ntrol Sample Summary Oxygen Demand (COE			
Analysis Method: Prep Method:	SM 5220 C Modified None		Units: Basis:	mg/Kg Dry	
			Analysis Lot: Spike	516546	% Rec
Sample Name Lab Control Sample	Lab Code K1610998-LCS	<b>Result</b> 231		<b>Rec</b> 96	Limits 85-115



Work Order: CLIENT:	1609134 GeoEngineer Gas Works F								QC S	SUMMA Sulfide k		
Project: Sample ID MB-R3		SampType: MB	LK		Units: mg/L		Prep Date	e: 9/23/20	)16	RunNo: 31	·	
Client ID: MBLK	w	Batch ID: R3	1948				Analysis Date	e: 9/23/20	016	SeqNo: 60	3839	
Analyte		Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfide		ND	0.500									
Sample ID LCS-R	31948	SampType: LC	6		Units: mg/L		Prep Date	e: 9/23/20	)16	RunNo: <b>31</b>	948	
Client ID: LCSW		Batch ID: R3	1948				Analysis Date	e: 9/23/20	)16	SeqNo: 60	3840	
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 160913	34-001BDUP	SampType: <b>DU</b>	P		Units: mg/L		Prep Date	e: 9/23/20	)16	RunNo: <b>31</b>	948	
Client ID: PAI-20	S-160912	Batch ID: R3	1948				Analysis Date	e: 9/23/20	016	SeqNo: 60	3842	
Analyte		Result	RL RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfide		240	50.0						280.0	15.4	30	Н
Sample ID 160913	34-001BMS	SampType: <b>MS</b>			Units: mg/L		Prep Date	e: 9/23/20	016	RunNo: <b>31</b>	948	
Client ID: PAI-20	S-160912	Batch ID: R3	1948				Analysis Date	e: 9/23/20	)16	SeqNo: 60	3843	
Analyte		Result	RL 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				Н
Sample ID 160913	34-001BMSD	SampType: <b>MS</b>	D		Units: <b>mg/L</b>		Prep Date	e: 9/23/20	)16	RunNo: 31	948	
Client ID: PAI-20	S-160912	Batch ID: R3	1948				Analysis Date	e: 9/23/20	016	SeqNo: 60	3844	
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	Н



## Sample Log-In Check List

С	lient Name:	GEI		Work Order Nu	mber: 1609134		
Lo	ogged by:	Erica Silva	a	Date Received:	9/12/2016	6 4:23:00 PM	
<u>Cha</u>	nin of Cust	ody					
1.	Is Chain of C	ustody com	plete?	Yes 🖌	No 🗌	Not Present	
2.	How was the	sample deli	vered?	<u>Courier</u>			
<u>Log</u>	<u>In</u>						
-	Coolers are p	present?		Yes 🗹	No		
			r in good condition?	Yes 🔽	No 🗌	_	
5.			n shipping container/cooler? Custody Seals not intact)	Yes	No	Not Required 🗹	
6.	Was an atten	npt made to	cool the samples?	Yes 🖌	No 🗌		
7.	Were all item	is received a	at a temperature of >0°C to 10.0°C [*]	Yes 🖌	No 🗌		
8.	Sample(s) in	proper cont	ainer(s)?	Yes 🖌	No 🗌		
9.	Sufficient sar	nple volume	o for indicated test(s)?	Yes 🖌	No 🗌		
10.	Are samples	properly pre	eserved?	Yes 🖌	No 🗌		
11.	Was preserva	ative added	to bottles?	Yes	No 🗹	NA 🗌	
12.	Is there head	space in the	e VOA vials?	Yes	No 🗌	NA 🗸	
13.	Did all sample	es containe	rs arrive in good condition(unbroken)?	Yes 🗹	No 🗌		
14.	Does paperw	ork match b	oottle labels?	Yes 🖌	No 🗌		
15.	Are matrices	correctly ide	entified on Chain of Custody?	Yes 🖌	No 🗌		
			were requested?	Yes 🗹	No 🗌		
17.	Were all hold	ling times at	ble to be met?	Yes	No 🗹		
<u>Spe</u>	cial Handli	ing (if ap	<u>plicable)</u>				
-			discrepancies with this order?	Yes 🖌	No 🗌		
	Person	Notified:	Sandy Smith Date		9/12/2016		
	By Who	m:	Chelsea Ward Via:	🗌 eMail 🖌 F	Phone 🗌 Fax	In Person	
	Regardi	ng:					
	Client In	structions:	Water volume not field filtered as origin	nally intended, ana	llvze for Total Me	etals	
19.	Additional rer	marks:					1

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

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at	Return to Client assessed if samples are retained after 30 days.)		te Nitrite Chloride Sulfate Bromide O-Phosphate Fluoride Nitrate+Nitrite	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	9 PAI-	8 PAI-	7 PAI-	6 PAI		3 PAI-	2 PAL- 70-13, 5-15 9/12 1430 5 XX	160912 9/12 1440 GWXXXXX	Sample         Sample<	A = Air, AQ = Aqueous, B = Bulk, O = Other, P = Product, S = Soil, SD = Sediment, SL = Soild, W = Water, OW = Drinking Water,	253,722.2418 Fax: PM Email: <u>sbsmitt</u>	.e, Zip: Seattle, WA 98103 Report To (PM):	Address: 600 Stewart Street, Suite 1700 Location: Seattle	GeoEngineers Project No:	3600 Fremont Ave N. Tel: 206-352-3790 Seattle, WA 98103 Fax: 206-352-7178 Project Name: Gas Wo	Analytical Date:	Chain of Custody R	
Hg K Mg Mn Mo Na Ni Pb Sb Se Sr Sn TI TI U V Zn         Hg K Mg Mn Mo Na Ni Pb Sb Se Sr Sn TI TI U V Zn         Turn-around times for samples         Special Remarks:         received after 4:00pm will begin         1. Groundwater arsenic and sulfide samples on ASAP TAT.         on the following business day.         2. Groundwater iron and COD plus soll COD and grain size sample         3. Groundwater and soll RLs per the WO         4. COD = Chemical oxygen demand         5. Run for dissolved metals	Ni Pb begin lay.	Ĕ	Pb Sb Se Sr Sn Tl Tl U V									Sample not field titled		GW = Ground Water, SW = Storm water, WW - Waste Water	1@ geoenglineers.com gueravia where where we were wreter	ā		0186-846-01 Task 1803 Collected by: GRL/CVD	Gas Works Park Site	9/ 12/2016 Laboratory Project No (internal): 1609134	ecord and Laboratory Services Agreement	

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COC 1 1 - A E 16 - 1 of 0



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

**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,

Mohal c. Rady

Mike Ridgeway Laboratory Director

DoD/ELAP Certification #L2371, ISO/IEC 17025:2005 ORELAP Certification: WA 100009-007 (NELAP Recognized)



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



Case Narrative

Date: 10/13/2016

CLIENT:GeoEngineersProject: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 & Acronyms**



WO#: 1609139 Date Reported: 10/13/2016

### Qualifiers:

- * Flagged value is not within established control limits
- B Analyte detected in the associated Method Blank
- D Dilution was required
- E Value above quantitation range
- H Holding times for preparation or analysis exceeded
- I Analyte with an internal standard that does not meet established acceptance criteria
- J Analyte detected below Reporting Limit
- N Tentatively Identified Compound (TIC)
- Q Analyte with an initial or continuing calibration that does not meet established acceptance criteria
- (<20%RSD, <20% Drift or minimum RRF)
- S Spike recovery outside accepted recovery limits
- ND Not detected at the Reporting Limit
- R High relative percent difference observed

Acronyms:

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



# **Analytical Report**

Work Order: **1609139** Date Reported: **10/13/2016** 

Client: GeoEngineers			Collection Date: 9/12/2016 5:0											
Project:Gas Works Park SiteLab ID:1609139-001			Matrix: Groundwater											
Client Sample ID: PAI-20D-160912														
Analyses	Result	RL	Qual	Units	DF	Date Analyzed								
Dissolved Metals by EPA Meth	<u>od 200.8</u>			Batc	h ID: 1	4788	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	<u>SM 5220D</u>			Batc	h ID: F	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				Batc	h ID: F	R31715	Analyst: KT							
Sulfide	9.20	0.119	MDL	mg/L	1	9/13/2016 4:10:00 PM								

NOTES:

Possible high bias detection due to matrix interference.

MDL - Sample reported to Method Detection Limit (MDL)



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

UOM = Percent

### Percent Finer (Passing) than the Indicated Size

Grain Size Classification	Gravel							Mediur	n 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-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%



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

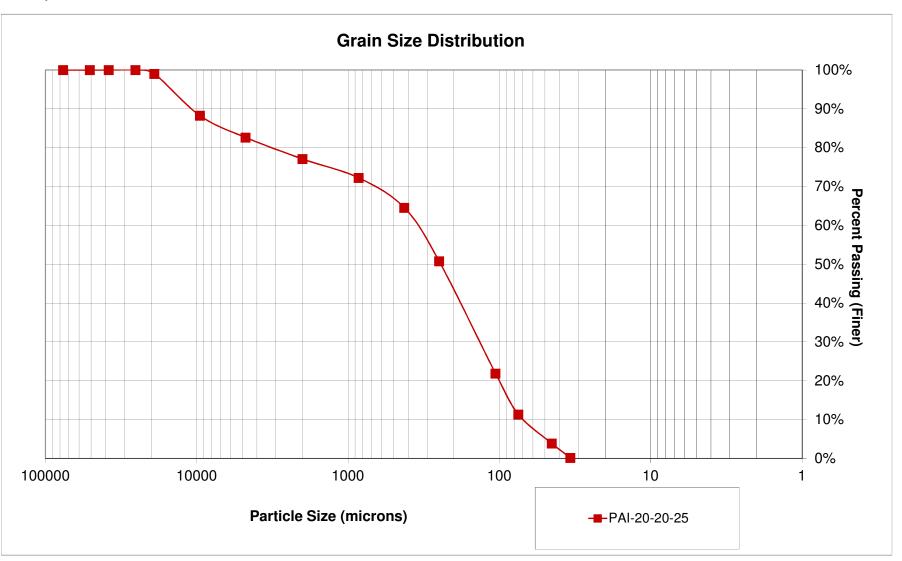
### Percent Retained in Each Size Fraction

UOM = Percent

Grain Size Classification	Gravel						Coarse Sand	Medium Sand Fine Sand			d	Silt				
Sieve Size (Microns)	>76200	76200- 50800	50800- 38100		25400- 19000		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%



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



Page 8 of 30



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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

October 11, 2016

Analytical Report for Service Request No: 1611836

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

### RE: COD

ear 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 re uest number **K1611836**.

Analyses were performed according to our laboratory's E AP-approved uality assurance program. The test results meet re uirements of the current E AP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of E AP-accredited analytes, refer to the certifications section at www.alsglobal.com. All results are intended to be considered in their entirety, and A S roup SA orp. dba A S Environmental (A S) 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) analy ed, as listed in the report.

Please contact me if you have any uestions. My extension is 3375. ou may also contact me via email at anet.Malloch@alsglobal.com.

Respectfully submitted,

ALS Group USA, Corp. dba ALS Environmental

Janet mallach

anet Malloch Pro ect 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 Total Solids

**General Chemistry** 

R TSO TO S R TPART ER

### 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 MCL	Modified 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 tr	Total Petroleum Hydrocarbons 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

- ${f F}$  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.pjlabs.com/	L16-57
Louisiana DEQ	http://www.deq.louisiana.gov/portal/DIVISIONS/PublicParticipationandPer mitSupport/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/EnvironmentalLaborator yAccreditation/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/anlayte 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

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**CHAIN OF CUSTODY RECORD** 

OF: 1

K1611836

# Fremont

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

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Website: www.fremontanalytical.com

SUB C	ONTRATOR: ALS		COMPANY:	ALS Envir	onmental		SPECIAL INSTRUCTIONS/COMMENTS: Please email results to maidance a clorent analyticality
ADDRI	ess: 1317 S	South 13th Avenu	le				curre Openantar alghical in
CITY, S	Kelso,	, WA 98626					Please email results to midgeway Offernant analytical and cueve Offernant an alytical and law level RLS for COD please - RUSH
PHONE	(360) 577-72	22 FAX:	EMAIL:				ANALYTICAL PARAMETERS
ACCOL ITEM	INT #: 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	<b>√</b>

Relinquished By:	Date: 10/3//// Date:	Time:	Received By:	Date: 10/4/16 Date:	Time: 1030 Time:	REPORT TRANSMITTAL DESIRED:
Relinquished By:	Date:	Time:	Received By:	Date:	Time:	FOR LAB USE ONLY
TAT: Stand	.(]	RUSH	Next BD [] 2nd BD []	3rd BI	×¥´	Temp of samples     °C     Attempt to Cool ?       Comments:
			Note: RUSH requests will incur sur			Page 15 of 3



Packing material:       Inserts Baggies       Bubble Wrap       Gel Packs       Wet Ice Dry Ice Sleeves         Were custody papers properly filled out (ink, signed, etc.)?       NA       NA       NA         Did all bottles arrive in good condition (unbroken)?       Indicate in the table below.       NA       NA         Were all sample labels complete (i.e analysis, preservation, etc.)?       NA       NA       NA       NA         Did all sample labels and tags agree with custody papers?       Indicate major discrepancies in the table on page 2.       NA       NA       NA         Were appropriate bottles/containers and volumes received for the tests indicated?       NA       NA       NA       NA         Were VOA vials received without headspace?       Indicate in the table below.       NA       NA       NA       NA	ALS	
Samples were received via?       Mail       Fed Ex       Image: Samples were received in: (circle)       Mail       Fed Ex       Image: Samples were received in: (circle)       Mail       Fed Ex       Image: Samples were received in: (circle)       Mail       Fed Ex       Image: Samples were received in: (circle)       Mail       Fed Ex       Image: Sample sa	Cooler Receipt and Preservation Form	1 m
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Samples were received via?       Mail       Fed Ex       Image: Samples were received in: (circle)       Mail       Fed Ex       Image: Samples were received in: (circle)       Mail       Fed Ex       Image: Samples were received in: (circle)       Mail       Fed Ex       Image: Samples were received in: (circle)       Mail       Fed Ex       Image: Sample sa	eceived: 10/4/16 Opened: 10/4/16 By: CC7 Unloaded: 10/4/16 By: CC	ר
Samples were received in: (circle)       Gate       Bax       Envelope       Other		
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         New cooler Temp Temp Temp Temp Temp Temp Temp Temp		1
If present, were custody seals intact?       Y       N       If present, were they signed and dated?       Y       N         New model coorder temp       Rev corrected       Corrected       Corrected       Tracking Number       NA       File         0.5       -0.6       -0.1       3.66       17.2 × 6.1       92.× 0.3       32.04       33.11         0.5       -0.6       -0.1       3.66       17.2 × 6.1       92.× 0.3       32.04       33.11         Packing material:       Inserts       Baggies       Bubble Wrup       Gel Packs       Wet Ice       Dry Ice       Steeves		
Description       Temp Blank       Temp Blank </td <td></td> <td>N</td>		N
0.5       -0.6       -0.1       1Z X 6 1       Y1ZX 03       3204       3311         Packing material:       Inserts       Baggies       Bubble Wrap       Gel Packs       Wet Ice       Dry Ice       Sleeves         Were custody papers properly filled out (ink, signed, etc.)?       NA       Y       NA	Raw Corrected Raw Corrected Corr. Thermometer Cooler/COC ID Tracking Number	
Packing material:       Inserts       Baggies       Eubble Wrap       Gel Packs       Wet Ice       Dry Ice       Sleeves         Were custody papers properly filled out (ink, signed, etc.)?       NA       Y       NA       N         Did all bottles arrive in good condition (unbroken)?       Indicate in the table below.       NA       Y       N         Were all sample labels complete (i.e analysis, preservation, etc.)?       NA       N       N       N         Did all sample labels and tags agree with custody papers?       Indicate major discrepancies in the table on page 2.       NA       N       N         Were appropriate bottles/containers and volumes received for the tests indicated?       NA       Y       N         Were VOA vials received bottles (see SMO GEN SOP) received at the appropriate pH? Indicate in the table below       Y       N         Were VOA vials received without headspace?       Indicate in the table below.       Y       N         Was C12/Res negative?       Y       N         Sample ID on Bottle       Sample ID on COC       Identified by:         Identified by:       Identified by:       Identified by:	ooler Temp Cooler Temp Blank Temp Blank Factor ID (NA)	
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Were all sample labels complete (i.e analysis, preservation, etc.)?       NA       NA <td></td> <td>5</td>		5
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       Y       N         Were VOA vials received without headspace? Indicate in the table below.       Y       N         Was C12/Res negative?       Y       N         Sample ID on Bottle       Sample ID on COC       Identified by:         Bottle Count       Out of Head-       Volume       Reagent Lot		14
Were appropriate bottles/containers and volumes received for the tests indicated?       NA		-
Were the pH-preserved bottles (see SMO GEN SOP) received at the appropriate pH? Indicate in the table below       Y       N         Were VOA vials received without headspace? Indicate in the table below.       Y       N         Was C12/Res negative?       X       N         Sample ID on Bottle       Sample ID on COC       Identified by:         Bottle Count       Out of Head-       Volume       Reagent Lot		- <b>1</b> -
Were VOA vials received without headspace? Indicate in the table below.       Image: Constraint of table below.       Image: Constraintof table below.       Image: Constrai		A*
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	Sample ID on Bottle Sample ID on COC Identified by:	
Sample ID     Bottle Type     Temp space     Broke     pri     Reagent     added     Multiper     Imitals     Time		<b>*</b> 1
	Sample ID Bottle Type Temp space broke pri Reagent added Number Imbais	
		·

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

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		Analytical Repor	t				
Client:	Fremont Analytical			Service	<b>Request:</b>	K1611836	
Project:	COD			Date (	Collected:	09/12/16	
Sample Matrix:	Soil			Date 1	Received:	10/4/16	
Analysis Method:	160.3 Modified				Units:	Percent	
Prep Method:	None				<b>Basis:</b>	As Received	
		Solids, Total					
Sample Name	Lab Code	Result	MRL	MDL	Dil.	Date Analyzed	Q

	2				2.11		×
1609139-002B	K1611836-001	91.3	-	-	1	10/04/16 12:26	

QA/QC Report

Client:	Fremont Analytical	Service Request:K1611836
Project	COD	Date Collected:NA
Sample Matrix:	Soil	Date Received:NA
Analysis Method:	160.3 Modified	Units:Percent
Prep Method:	None	Basis: As Received
	Replicate Sampl	e Summarv

### 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 Phone (360)577-7222 Fax (360)636-1068 www.alsglobal.com

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Analytical Report **Client:** Service Request: K1611836 Fremont Analytical Date Collected: 09/12/16 **Project:** COD **Sample Matrix:** Soil **Date Received:** 10/4/16 **Analysis Method:** SM 5220 C Modified Units: mg/Kg **Prep Method:** ALS SOP 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	

QA/QC Report

Client:	Fremont Analy	tical				Service	e Request:	K1611836	
Project	COD					Date	Collected:	09/12/16	
Sample Matrix:	Soil					Date	<b>Received:</b>	10/04/16	
						Date	Analyzed:	10/07/16	
		Replic	ate Samp	ole Summ	ary				
		General	Chemist	ry Param	eters				
Sample Name:	1609139-002B	1					Units:	mg/Kg	
Lab Code:	K1611836-001						<b>Basis:</b>	Dry	
						Duplicate Sample K1611836-			
					Sample	001DUP			RPD
Analyte Name		Analysis Method	MRL	MDL	Result	Result	Average	RPD	Limit
Chemical Oxygen Demar	nd (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.

QA/QC Report

Client: Project: Sample Matrix:	Fremont Analytical COD Soil			Service Requ Date Collecte Date Receive Date Analyze Date Extract	ed: d: ed:	K1611836 09/12/16 10/04/16 10/7/16 10/7/16
		Matrix S	oike Summary	Datt Extract	cu.	10/ // 10
			gen Demand (C	O <b>D</b> )		
Sample Name:	1609139-002B			Uni	its:	mg/Kg
Lab Code:	K1611836-001			Bas	sis:	Dry
Analysis Method:	SM 5220 C Modified					
Prep Method:	ALS SOP					
		Matrix Spik	e			
		K1611836-001	MS			
Analyte Name		Sample Result	Result	Spike Amount	% R	
Chemical Oxygen De	emand (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.

QA/QC Report

Client: Project:	Fremont Analytical COD		Service Request: Date Analyzed:	K161183 10/07/16	
Sample Matrix:	Soil		Date Extracted:	NA	
		trol Sample Summary Oxygen Demand (COD	))		
Analysis Method:	SM 5220 C Modified		Units:	mg/Kg	
Prep Method:	None		Basis:	Dry	
			Analysis Lot:	517791	
Sample Name	Lab Code	Result	Spike Amount %	Rec	% Rec Limits
Lab Control Sample	K1611836-LCS	4540		94	85-115



Work Order: CLIENT:	1609139 GeoEngineer	rs							<u>Oh a</u>				
Project:	Gas Works F	Park Site							Cne	mical Oxyg	gen Demai	na by Siv	52201
Sample ID MB-R3	1756	SampType	MBLK			Units: <b>mg/L</b>		Prep Date	9/15/20	16	RunNo: 31	756	
Client ID: MBLK	w	Batch ID:	R31756					Analysis Date	: <b>9/15/20</b>	16	SeqNo: 599	9820	
Analyte		F	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-R	31756	SampType	LCS			Units: <b>mg/L</b>		Prep Date	9/15/20	16	RunNo: 31	756	
Client ID: LCSW		Batch ID:	R31756					Analysis Date	9/15/20	16	SeqNo: 599	9821	
Analyte		F	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chemical Oxygen [	Demand		80.2	10.0	75.00	0	107	80	120				
Sample ID 160911	12-001ADUP	SampType	DUP			Units: mg/L		Prep Date	9/15/20	16	RunNo: 31	756	
Client ID: BATCH	4	Batch ID:	R31756					Analysis Date	9/15/20	16	SeqNo: 599	9823	
Analyte		F	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chemical Oxygen	Demand		ND	10.0						0		30	
Sample ID 160911	12-001AMS	SampType	MS			Units: mg/L		Prep Date	9/15/20	16	RunNo: 31	756	
Client ID: BATCH	4	Batch ID:	R31756					Analysis Date	9/15/20	16	SeqNo: 599	9824	
Analyte		F	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chemical Oxygen [	Demand		80.9	10.0	75.00	6.062	99.7	70	130				
Sample ID 160911	12-001AMSD	SampType	MSD			Units: <b>mg/L</b>		Prep Date	9/15/20	16	RunNo: 31	756	
Client ID: BATCH	4	Batch ID:	R31756					Analysis Date	: <b>9/15/20</b>	16	SeqNo: 59	9825	
Analyte		F	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chemical Oxygen	Demand		81.5	10.0	75.00	6.062	101	70	130	80.87	0.815	30	

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Work Order: 160913								QC S	SUMMAI	RY REF	POR
	gineers						Die	solved Me	tals by EF	DA Motho	4 200
Project: Gas W	orks Park Site						015			Aimetho	u 200
Sample ID MB-14768FB	SampType: <b>MBLK</b>			Units: µg/L		Prep Date	: <b>9/13/201</b>	6	RunNo: 31	701	
Client ID: MBLKW	Batch ID: 14788					Analysis Date	: <b>9/13/201</b>	6	SeqNo: 59	8765	
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit I	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic Iron	ND ND	0.500 100									
Sample ID MB-14788	SampType: <b>MBLK</b>			Units: µg/L		Prep Date	9/13/201	6	RunNo: 31	701	
Client ID: MBLKW	Batch ID: 14788					Analysis Date	: <b>9/13/201</b>	6	SeqNo: 59	8768	
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit I	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic Iron	ND ND	0.500 50.0									
Sample ID LCS-14788	SampType: LCS			Units: µg/L		Prep Date	e 9/13/201	6	RunNo: 31	701	
Client ID: LCSW	Batch ID: 14788					Analysis Date	: <b>9/13/201</b>	6	SeqNo: 59	8769	
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit I	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic Iron	101 996	0.500 50.0	100.0 1,000	0 0	101 99.6	85 50	115 150				
Sample ID <b>1609098-001CD</b>	UP SampType: DUP			Units: µg/L		Prep Date	9/13/201	6	RunNo: 31	701	
Client ID: BATCH	Batch ID: 14788					Analysis Date	e: 9/13/201	6	SeqNo: 59	8771	
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit I	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic Iron	1.49 ND	0.500 50.0						1.626 0	8.50	30 30	
Sample ID 1609098-001CM	S SampType: MS			Units: µg/L		Prep Date	e 9/13/201	6	RunNo: 31	701	
Client ID: BATCH	Batch ID: 14788					Analysis Date	: <b>9/13/201</b>	6	SeqNo: <b>59</b>	8772	
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit I	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	512	0.500	500.0	1.626	102	70	130				



Work Order: CLIENT: Project:	1609139 GeoEnginee Gas Works							Di	QC S ssolved Me	SUMMAF		-
Sample ID <b>1609</b> Client ID: <b>BAT</b>		SampType: <b>MS</b> Batch ID: <b>14788</b>			Units: µg/L			ite: 9/13/20		RunNo: 317	-	
Analyte	СП	Result	RL	SPK value	SPK Ref Val	%REC	Analysis Da LowLimit		RPD Ref Val	SeqNo: <b>598</b> %RPD	RPDLimit	Qual
Iron		4,900	50.0	5,000	0	98.0	50	150				
Sample ID 1609	098-001CMSD	SampType: <b>MSD</b>			Units: µg/L		Prep Da	ite: 9/13/20	016	RunNo: 317	701	
Client ID: BAT	СН	Batch ID: 14788					Analysis Da	ite: 9/13/20	016	SeqNo: 598	3773	
Analyte		Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic Iron		526 5,260	0.500 50.0	500.0 5,000	1.626 0	105 105	70 50	130 150	512.4 4,901	2.70 6.97	30 30	



Work Order: CLIENT:	1609139 GeoEnginee								QC S	SUMMAI Sulfide b		-
Project:	Gas Works	Park Site								Sunden	y 3141 430	JU-32-F
Sample ID MB-R3	81715	SampType: MBLK			Units: <b>mg/L</b>		Prep Date:	9/13/20	16	RunNo: 317	715	
Client ID: MBLK	w	Batch ID: R31715					Analysis Date:	9/13/20	16	SeqNo: 598	3997	
Analyte		Result	RL	SPK value	SPK Ref Val	%REC	LowLimit H	lighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfide		ND	0.500									
Sample ID LCS-R	31715	SampType: LCS			Units: <b>mg/L</b>		Prep Date:	9/13/20	16	RunNo: 31	715	
Client ID: LCSW		Batch ID: R31715					Analysis Date:	9/13/20	16	SeqNo: 598	3998	
Analyte		Result	RL	SPK value	SPK Ref Val	%REC	LowLimit H	lighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfide		1.80	0.500	2.000	0	90.0	65	135				
Sample ID 16091	39-001BDUP	SampType: <b>DUP</b>			Units: mg/L		Prep Date:	9/13/20	16	RunNo: 31	715	
Client ID: PAI-20	D-160912	Batch ID: R31715					Analysis Date:	9/13/20	16	SeqNo: 599	9000	
Analyte		Result	RL	SPK value	SPK Ref Val	%REC	LowLimit H	lighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfide		9.60	0.500						9.200	4.26	30	
Sample ID 16091	39-001BMS	SampType: <b>MS</b>			Units: <b>mg/L</b>		Prep Date:	9/13/20	16	RunNo: 31	715	
Client ID: PAI-20	D-160912	Batch ID: R31715					Analysis Date:	9/13/20	16	SeqNo: 599	9001	
Analyte		Result	RL	SPK value	SPK Ref Val	%REC	LowLimit H	lighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfide		11.0	0.500	2.000	9.200	90.0	65	135				
Sample ID 16091	39-001BMSD	SampType: <b>MSD</b>			Units: <b>mg/L</b>		Prep Date:	9/13/20	16	RunNo: 31	715	
Client ID: PAI-20	D-160912	Batch ID: R31715					Analysis Date:	9/13/20	16	SeqNo: 59	9002	
Analyte		Result	RL	SPK value	SPK Ref Val	%REC	LowLimit H	lighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfide		10.8	0.500	2.000	9.200	80.0	65	135	11.00	1.83	30	



## Sample Log-In Check List

C	lient Name:	GEI	Work Order N	umber: 1609139	
L	ogged by:	Chelsea Ward	Date Receive	d: <b>9/13/2016</b>	6 9:50:00 AM
<u>Cha</u>	ain of Custo	ody			
1.	Is Chain of C	ustody complete?	Yes 🖌	No 🗌	Not Present
2.	How was the	sample delivered?	<u>Courier</u>		
Loc	ı In				
-	Coolers are p	resent?	Yes 🖌	No 🗌	
4.	Shipping cont	tainer/cooler in good condition?	Yes ✔	No 🗌	
		s present on shipping container/cooler?	Yes		Not Required 🗹
0.		iments for Custody Seals not intact)			1
6.	Was an atten	npt made to cool the samples?	Yes 🖌	No 🗌	NA 🗌
7.	Were all item	s received at a temperature of >0°C to 10.0°C*	Yes 🖌	No 🗌	
8.	Sample(s) in	proper container(s)?	Yes 🖌	No 🗌	
9.	Sufficient san	nple volume for indicated test(s)?	Yes 🖌	No 🗌	
10	Are samples	properly preserved?	Yes 🖌	No 🗌	
11.	Was preserva	ative added to bottles?	Yes	No 🗹	NA 🗌
12	Is there head	space in the VOA vials?	Yes	No 🗌	NA 🗸
13	Did all sample	es containers arrive in good condition(unbroken)?	Yes 🖌	No 🗌	
14.	Does paperw	ork match bottle labels?	Yes 🖌	No 🗌	
15.	Are matrices	correctly identified on Chain of Custody?	Yes 🖌	No 🗌	
		at analyses were requested?	Yes 🖌	No 🗌	
17.	Were all hold	ing times able to be met?	Yes 🖌	No 🗌	
<u>Spe</u>	ecial Handli	ing (if applicable)			
18	Was client no	tified of all discrepancies with this order?	Yes	No 🗌	NA 🔽
	Person	Notified: Date			
	By Who	m: Via:	eMail	Phone 🗌 Fax	In Person
	Regardi	ng:			
	Client In	structions:			

### 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

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COC 1.1 - 4.5.16 - 1	alytical.com	www.fremontanalytical.com	or	Distribution: White - Lab, Yellow - File, Pink - Originator	Distribution: White - Lab,
		AV IL DO			
APlease coordinate with the lab in advance	r 9113110 9:50	C C C C C C C C C C C C C C C C C C C	lue ofisto	$a_{n}() q_{n}$	× / × / ()
TAT → SameDay [^] NextDay [^] 2 Day 3 Day STD	Date/Time	Received	0712	Date/Time	Palinquiched
	9/12/110 9:40 mm	× 0 0 0 1	11 naun	Date/Time	Relinquished x
<ol> <li>Groundwater and soil RLs per the WO</li> <li>COD = Chemical oxygen demand</li> <li>Louis for discoluted motols</li> </ol>	Date/Time	An	Agreement with Fremor ackside of this Agreemen	I represent that I am authorized to enter into this Agreement with Fremont agreement to each of the terms on the front and backside of this Agreement.	I represent that I am au agreement to each of the
standard TAT.	on the following business day.	ained after 30 days.)	assessed if samples are retained after 30 days.	Return to Client	Sample Disposal:
		O-Phosphate Fluoride be held for 30 days unless otherwise not	de Sulfate Bromide	Nitrate Nitrite Chloride	***Anions (Circle): Nit
Pb Sb Se Sr Sn Ti Ti U V Zn	Co Cr Cu Fe Hg K Mg Mn Mo Na Ni Pb	Individual: Ag Al As B Ba Be Ca Cd (	Priority Pollutants TAL	: MTCA-5 RCRA-8	**Metals Analysis (Circle):
				10	10 PAI-
					9 ?AI-
					8 PAI-
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		XX	1630 S	25 q/12	2 PAI- 20 - 20 -
Field Filtered			mg 0071	09/17 9/12	1 PAI- 200-1600
Comments	- 1	( 5 2 2 2 R	*	Date	Sample Name
	S [E 3 4 5 10 5 5 1 4 5 6 7 6 7 6 7 6 7 6 7 6 7 6 7 6 7 6 7 6	14 (134,303) (164 (116 64 14 (134,303) (164 (116 64 (154,303) (164 (116 64 (164 (116 (116 64 (164 (116 (116 (116 (116 (116 (116 (116	Sample	Gammb	
SW = Storm Water, WW = Waste Water	Water,	N = Water,	P = Product, S = Soil,	= Aqueous, B = Bulk, O = Other,	*Matrix Codes: A = Air, AQ = Aqueous,
cdelavia@geoengineers.com	sbsmith@geoengineers.com	PM Email:	Fax:	253.722.2418	Telephone:
	Sandra Smith / Claudia De La Via	Report To (PM):		Seattle, WA 98103	City, State, Zip:
	Seattle	Location:	1700	600 Stewart Street, Suite 1700	Address:
Collected by: GRL/CVD	0186-846-01 Task 1803	Project No:		GeoEngineers	Client:
	Gas Works Park Site	Project Name:	3	Fax: 206-352-7178	Seattle, WA 98103
Page:of:				Tel: 206-352-3790	2600 Eremont Ave N
Laboratory Project No (internal): 1009139	Date: 9/ 2/2016			Analytical	
Chain of Custody Record and Laboratory Services Agreement	tody Record and Lal	Chain of Cus		omont	



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

**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,

Mohal c. Rady

Mike Ridgeway Laboratory Director

DoD/ELAP Certification #L2371, ISO/IEC 17025:2005 ORELAP Certification: WA 100009-007 (NELAP Recognized)



CLIENT:GeoEngineersProject:Gas Works Park SiteWork 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						



Case Narrative

Date: 10/6/2016

CLIENT:GeoEngineersProject: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 & Acronyms**



WO#: **1609151** Date Reported: **10/6/2016** 

### Qualifiers:

- * Flagged value is not within established control limits
- B Analyte detected in the associated Method Blank
- D Dilution was required
- E Value above quantitation range
- H Holding times for preparation or analysis exceeded
- I Analyte with an internal standard that does not meet established acceptance criteria
- J Analyte detected below Reporting Limit
- N Tentatively Identified Compound (TIC)
- Q Analyte with an initial or continuing calibration that does not meet established acceptance criteria
- (<20%RSD, <20% Drift or minimum RRF)
- S Spike recovery outside accepted recovery limits
- ND Not detected at the Reporting Limit
- R High relative percent difference observed

Acronyms:

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



# **Analytical Report**

 Work Order:
 1609151

 Date Reported:
 10/6/2016

Client: GeoEngineers		Collection Date: 9/13/2016 11:51:00								
Project: Gas Works Park Site										
Lab ID: 1609151-004		Matrix: Groundwater								
Client Sample ID: PAI-19-D-16091	3									
Analyses	Result	RL	Qual	Units	DF	Date Analyzed				
Dissolved Metals by EPA Method	<u>1 200.8</u>			Batc	h ID: 14	806 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	<u>I 5220D</u>			Batc	h ID: R3	1756 Analyst: MW				
Chemical Oxygen Demand	114	100	D	mg/L	10	9/15/2016 2:17:18 PM				
Sulfide by SM 4500-S2-F				Batc	h ID: R3	1715 Analyst: KT				
Sulfide	ND	0.119	MDL	mg/L	1	9/13/2016 4:30:00 PM				
NOTES:										

MDL - Sample reported to Method Detection Limit (MDL)



# **Analytical Report**

 Work Order:
 1609151

 Date Reported:
 10/6/2016

Client: GeoEngineers		Collection Date: 9/13/2016 1:08:00 PM							
Project:Gas Works Park SiteLab ID:1609151-005		Matrix: Groundwater							
Client Sample ID: PAI-19-S-160	913								
Analyses	Result	RL	Qual	Units	DF	Date Analyzed			
Dissolved Metals by EPA Meth	nod 200.8			Batc	h ID: 14	806 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	<u>SM 5220D</u>			Batc	h ID: R3	1756 Analyst: MW			
Chemical Oxygen Demand	325	100	D	mg/L	10	9/15/2016 2:17:18 PM			
Sulfide by SM 4500-S2-F				Batc	h ID: R3	1715 Analyst: KT			
Sulfide NOTES:	27.6	0.119	MDL	mg/L	1	9/13/2016 4:35:00 PM			

NOTES:

Possible high bias detection due to matrix interference.

MDL - Sample reported to Method Detection Limit (MDL)



# **Analytical Report**

Work Order: 1609151 Date Reported: 10/6/2016

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-16091	3								
Analyses	Result	RL	Qual	Units	DF	Date Analyzed			
Dissolved Metals by EPA Method	d 200.8			Batc	h ID: 14	806 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 SI	<u>M 5220D</u>			Batc	h ID: R3	1756 Analyst: MW			
Chemical Oxygen Demand	193	100	D	mg/L	10	9/15/2016 2:17:18 PM			
Sulfide by SM 4500-S2-F				Batc	h ID: R3	1736 Analyst: KT			
Sulfide <b>NOTES</b> :	32.0	5.00	MDL	mg/L	1	9/14/2016 3:36:00 PM			

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

UOM = Percent

### Percent Finer (Passing) than the Indicated Size

Grain Size Classification	Gravel					Coarse Sand	Mediur	n 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

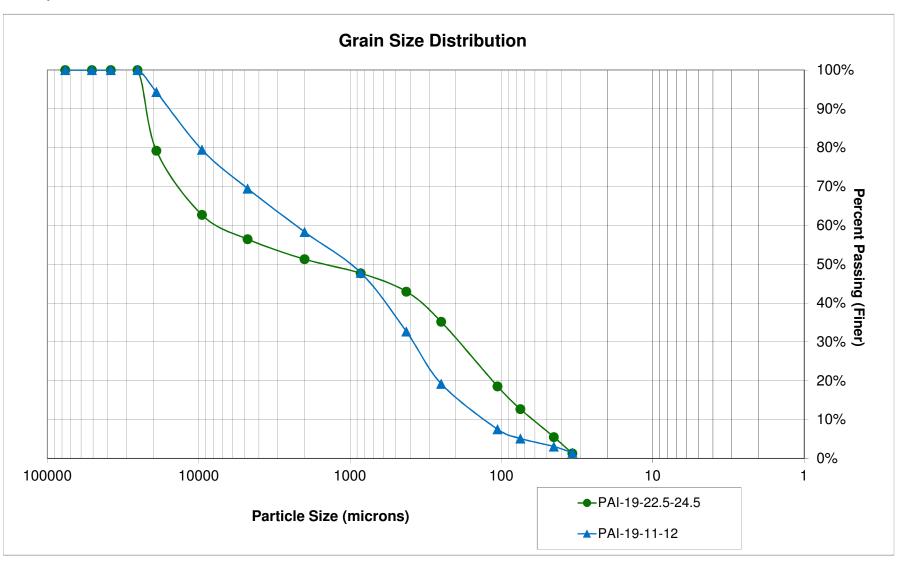
UOM = Percent

Grain Size Classification	Gravel					Coarse Sand	Medium Sand Fine Sand			d	Silt					
Sieve Size (Microns)	>76200	76200- 50800		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



Page 10 of 35



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

Analytical Report for Service Request No: 1610999

October 06, 2016

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

## RE: COD

ear 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 re uest number **K1610999**.

Analyses were performed according to our laboratory's E AP-approved uality assurance program. The test results meet re uirements of the current E AP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of E AP-accredited analytes, refer to the certifications section at www.alsglobal.com. All results are intended to be considered in their entirety, and A S roup SA orp. dba A S Environmental (A S) 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) analy ed, as listed in the report.

Please contact me if you have any uestions. My extension is 3375. ou may also contact me via email at anet.Malloch@alsglobal.com.

Respectfully submitted,

ALS Group USA, Corp. dba ALS Environmental

Junit mallach

anet Malloch Pro ect 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 Total Solids General Chemistry

R TSO TO S R TPART ER

### 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 MCL	Modified 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 tr	Total Petroleum Hydrocarbons 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.pjlabs.com/	L16-57
Louisiana DEQ	http://www.deq.louisiana.gov/portal/DIVISIONS/PublicParticipationandPer mitSupport/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/EnvironmentalLaborator yAccreditation/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/anlayte 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

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	Fremon		CHAIN OF	CUSTODY RI	ECORD Omega C	OCID 265	$\begin{array}{c c} PAGE; & OF; \\ 1 & 1 \end{array}$	ADDRESS Fremont Analytical, Inc. 3600 Fremont Ave. N. Seattle, WA 98103 TEL: 206-352-3790 FAX: 206-352-7178 Website: www.fremontanalytical.com		
SUB CONTR	ATOR: ALS	COMPANY:	ALS Enviro	nmental	SPECIAL INSTRUCTIONS					
ADDRESS:	ADDRESS: 1317 South 13th Avenue						ward@fremontanalytical.com.	ael Ridgeway and Chelsea Ward -		
CITY, STATE	CITY, STATE, ZIP: Kelso, WA 98626					Low Level COD RLs if possible				
PHONE: (3	50) 577-7222 FAX:	EMA	IL:	·······		ىمىسەرتەرنىشىكىغۇن	ξ.			
ACCOUNT #										
ITEM #	SAMPLE ID	CLIENT SAMPLE ID	BOTTLE TYPE	MATRIX	DATE COLLECTED	NUMBER OF CONTAINERS		Methanol Preserved Weights on, Additional Sample Description.		
1	1609151-001A	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		
1	TEST_SUB									
2	1609151-002A	PAI-19-24.5-25	CLEAR JARS 4 O	Soil	9/13/2016 11:25:00 AM	1	Chemical Oxygen Demand	by SM 5220		
	TEST_SUB									
3	1609151-003A	PAI-19-11-12	CLEAR JARS 4 O	Soil	9/13/2016 12:00:00 PM	1	Chemical Oxygen Demand	by SM 5220		
5	TEST_SUB									

Relinquished By Relinquished By:	Date: G115110 Date:	Time: <u>8:00</u> Time:	Received By:	Date: 9-16-16 Date:	Times 93	REPORT TRANSMITTAL DESIRED:				
Relinquished By:	Date:	Time:	Received By:	Date:	Time:	FOR LAB USE ONLY				
TAT: Stand	ard D	RUSH	Next BD 2nd BD []	3rd Bl	> []	Temp of samples°C Attempt to Cool ? Comments:				
Note: RUSH requests will incur surcharges!						Page 17 of 3				
	Page 7 of 18									

ALS					P	clane	Ł
	1: 1 Cooler	Receipt and P	reservation Fo	rm	<b>N</b>	J	
lient Fremont Anal	yttica 1		_Service Request	KI6_1099	9	-1	-
<b>A</b>	pened: 916-16	• By:	See Unl	oaded: <u>916</u>	<u>16</u> By:	Der)	-
. Samples were received via?	USPS Fed Ex(	UPS D	OHL PDX (	Courier Hand	Delivered		
. Samples were received in: (circ	cle) Cooler	Box Env	elope Other_			NA	
Were custody seals on coolers?	NA Y	D n I	f yes, how many ar	nd where? 1	Front		
If present, were custody seals i	ntact?	$\supset$ N	If present, were	hey signed and da	ited?	Y I	N
Raw Corrected Raw Cooler Temp Blank	Corrected Corr. Temp Blank Factor	Thermometer	Cooler/COC ID N		racking Number		Filed
12 12 24	2.4 0	360	263	and the second	1039861		
1.6 1.7 3.0	3.1 70.1	356	244	12,461 92	<u>X 3194 449</u>	3	
		<u> </u> +	204		·····		
			267 270		,,,,,		
4. Packing material: Inserts	Raggies Bubble W	Tran Gel Packs	L	ce Sleeves		-,,,,,,,,,,,,,_	
5. Were custody papers properly			> mentee big i		NA	$\overline{(\mathbf{Y})}$	N
<ol> <li>Were samples received in good</li> </ol>			Indicate in the ta	hle helow.	NA	()	N
lf apj	plicable, tissue sampl	es were received		rtially Thawed	Thawed		
7. Were all sample labels comple					NA	$\underline{\alpha}$	Ν
8. Did all sample labels and tags		-	5	es in the table on p	<b>Q</b>		N
9. Were appropriate bottles/con					NA		N
10. Were the pH-preserved bottl				ndicate in the tabl	~	$\prec$	N
11. Were VOA vials received w	ithout headspace? In	idicate in the tab	le below.				N
12. Was C12/Res negative?	·····	······				Y	N
Sample ID on Bottle		Sample ID on C	oc		dentified by:		
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				<u>.                                    </u>			
	Bottle Count	Out of Head-		Volume	Reagent Lot		
Sample ID	Bottle Type	Temp space B	roke pH Rea	gent added	Number	Initials T	ime
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### Notes, Discrepancies, & Resolutions:



# **Total Solids**

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Analytical Report

Client:Fremont AnalyticalProject:CODSample Matrix:SoilAnalysis Method:160.3 ModifiedPrep 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	

QA/QC Report

Client:	Fremont Analytical	Service Request:K1610999					
Project	COD	Date Collected:NA					
Sample Matrix:	Paper	Date Received:NA					
Analysis Method:	160.3 Modified	Units:Percent					
Prep Method:	None	Basis: As Received					
	Replicate Sa	mple 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.



# **General Chemistry**

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

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Analytical Report **Client:** Service Request: K1610999 Fremont Analytical Date Collected: 09/13/16 **Project:** COD **Sample Matrix:** Soil **Date Received:** 09/16/16 **Analysis Method:** SM 5220 C Modified Units: mg/Kg **Prep Method:** ALS SOP 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	

QA/QC Report

Client:	Fremont Analytical	Service Request:K1610999
Project	COD	Date Collected:09/13/16
Sample Matrix:	Soil	<b>Date Received:</b> 09/16/16
Analysis Method: Prep Method:	SM 5220 C Modified ALS SOP	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.

QA/QC Report

Client: Project: Sample Matrix:	Fremont Analytical COD Soil			Service Reque Date Collecter Date Received Date Analyzer	1: N/ l: N/ 1: 09	/A //29/16
		Matrix S	pike Summary	Date Extracte	<b>a:</b> 09	/28/16
			gen Demand (CO	OD)		
Sample Name:	Batch QC			Unit	s: m	g/Kg
Lab Code:	K1610996-001			Basi	s: Di	y
Analysis Method:	SM 5220 C Modified					
Prep Method:	ALS SOP					
		Matrix Spik	e			
		K1610996-001	MS			
Analyte Name		Sample Result	Result	Spike Amount	% Rec	% Rec Limits
Chemical Oxygen De	emand (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.

QA/QC Report

Client: Project: Sample Matrix:	Fremont Analytical COD Soil			Service Reque Date Collecte Date Received Date Analyze	d: 1: d:	K1610999 09/13/16 09/16/16 10/4/16		
			pike Summary	Date Extracte	ed:	10/4/16		
Chemical Oxygen Demand (COD)								
Sample Name:	PAI-19-11-12/1609151-	-003A		Uni	ts:	mg/Kg		
Lab Code:	K1610999-003			Basi	is:	Dry		
Analysis Method:	SM 5220 C Modified							
Prep Method:	ALS SOP							
		Matrix Spik	xe					
		K1610999-003	SMS					
Analyte Name		Sample Result	Result	Spike Amount	% Re			
Chemical Oxygen De	mand (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.

QA/QC Report

Client: Project: Sample Matrix:	Fremont Analytical COD Soil		Service Requ Date Analyze Date Extracto	ed: 09/29	0999 0/16					
	Lab Control Sample Summary Chemical Oxygen Demand (COD)									
Analysis Method: Prep Method:	SM 5220 C Modified None		Units: Basis: Analysis Lot:	mg/K Dry 5165	-					
Sample Name Lab Control Sample	Lab Code K1610999-LCS1	Result 231	Spike Amount 242	% <b>Rec</b> 96	% Rec Limits 85-115					

QA/QC Report

Client: Project: Sample Matrix:	Fremont Analytical COD Soil		Service Requ Date Analyze Date Extract	ed: 10/	610999 04/16
		trol Sample Summar Oxygen Demand (CO			
Analysis Method: Prep Method:	SM 5220 C Modified None		Units: Basis: Analysis Lot	Dry	/Kg y 7196
Sample Name Lab Control Sample	Lab Code K1610999-LCS2	<b>Result</b> 4570	Spike Amount 4840	% Rec 94	% Rec Limits 85-115



Work Order: 1609 CLIENT: Geo	151 Engineers							QCS	SUMMAR	RY REF	PORT
	Works Park Site						Chemic	al Oxyg	gen Demar	nd by SM	5220
Sample ID MB-R31756	SampType: MBLK			Units: <b>mg/L</b>		Prep Date:	9/15/2016		RunNo: 317	756	
Client ID: MBLKW	Batch ID: R31756					Analysis Date:	9/15/2016		SeqNo: 599	9820	
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit H	lighLimit RPE	0 Ref Val	%RPD	RPDLimit	Qual
Chemical Oxygen Deman	d ND	10.0									
Sample ID LCS-R31756	SampType: LCS			Units: <b>mg/L</b>		Prep Date:	9/15/2016		RunNo: 317	756	
Client ID: LCSW	Batch ID: R31756					Analysis Date:	9/15/2016		SeqNo: 599	9821	
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit H	lighLimit RPD	) Ref Val	%RPD	RPDLimit	Qual
Chemical Oxygen Deman	80.2	10.0	75.00	0	107	80	120				
Sample ID 1609112-001	ADUP SampType: DUP			Units: mg/L		Prep Date:	9/15/2016		RunNo: 317	756	
Client ID: BATCH	Batch ID: R31756					Analysis Date:	9/15/2016		SeqNo: 599	9823	
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit H	lighLimit RPD	) Ref Val	%RPD	RPDLimit	Qual
Chemical Oxygen Deman	d ND	10.0						0		30	
Sample ID 1609112-001	MS SampType: MS			Units: mg/L		Prep Date:	9/15/2016		RunNo: 317	756	
Client ID: BATCH	Batch ID: R31756					Analysis Date:	9/15/2016		SeqNo: 599	9824	
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit H	lighLimit RPD	) Ref Val	%RPD	RPDLimit	Qual
Chemical Oxygen Deman	80.9	10.0	75.00	6.062	99.7	70	130				
Sample ID 1609112-001	MSD SampType: MSD			Units: <b>mg/L</b>		Prep Date:	9/15/2016		RunNo: 317	756	
Client ID: BATCH	Batch ID: R31756					Analysis Date:	9/15/2016		SeqNo: 599	9825	
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit H	lighLimit RPD	) Ref Val	%RPD	RPDLimit	Qual
Chemical Oxygen Deman	81.5	10.0	75.00	6.062	101	70	130	80.87	0.815	30	

Fremont
Analytical

Work Order:1609151CLIENT:GeoEngirProject:Gas Work	neers ks Park Site						Di	QC Ssolved Me	SUMMAI etals by EF		-
Sample ID MB-14806	SampType: <b>MBLK</b>			Units: µg/L		Prep Dat	te: 9/14/20	016	RunNo: 31	727	
Client ID: MBLKW	Batch ID: 14806					Analysis Dat	te: 9/14/20	016	SeqNo: 59	9222	
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic Iron	ND ND	0.500 50.0									
Sample ID LCS-14806	SampType: LCS			Units: µg/L		Prep Dat	te: 9/14/20	016	RunNo: 31	727	
Client ID: LCSW	Batch ID: 14806					Analysis Dat	te: 9/14/20	016	SeqNo: 59	9223	
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: <b>DUP</b>			Units: µg/L		Prep Dat	te: 9/14/20	016	RunNo: 31	727	
Client ID: PAI-19-D-160913	Batch ID: 14806					Analysis Dat	te: 9/14/20	016	SeqNo: 59	9225	
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: <b>MS</b>			Units: µg/L		Prep Dat	te: <b>9/14/2</b>	016	RunNo: 31	727	
Client ID: PAI-19-D-160913	Batch ID: 14806					Analysis Dat	te: 9/14/20	016	SeqNo: 59	9228	
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: <b>MSD</b>			Units: µg/L		Prep Dat	te: 9/14/20	016	RunNo: 31	727	
Client ID: PAI-19-D-160913	Batch ID: 14806					Analysis Dat	te: <b>9/14/2</b>	016	SeqNo: <b>59</b>	9229	
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	
<b></b>										Pag	e 30 of



Work Order:	1609151								QC S	SUMMA	RY REF	PORT
CLIENT:	GeoEnginee	ers						<b>D</b> :				-
Project:	Gas Works	Park Site						DI	ssolved Me	tais by EP	'A Metho	a 200.8
Sample ID 16091	51-004AMSD	SampType: <b>MSD</b>			Units: µg/L		Prep Dat	te: <b>9/14/20</b>	)16	RunNo: 317	727	
Client ID: PAI-19	-D-160913	Batch ID: 14806					Analysis Dat	te: <b>9/14/20</b>	)16	SeqNo: 599	9229	
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								QC S	SUMMAI	RY REF	PORT
CLIENT:	GeoEnginee									Sulfide b	W SM 450	10-SJ-E
Project:	Gas Works I	Park Site								Sunden	y 3141 430	J0-32-1
Sample ID MB-R3	1736	SampType: MBLK			Units: mg/L		Prep Date:	9/14/20	16	RunNo: 317	736	
Client ID: MBLK	w	Batch ID: R31736					Analysis Date:	9/14/20	16	SeqNo: 59	9396	
Analyte		Result	RL	SPK value	SPK Ref Val	%REC	LowLimit H	lighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfide		ND	0.500									
Sample ID LCS-R	31736	SampType: LCS			Units: mg/L		Prep Date:	9/14/20	16	RunNo: 31	736	
Client ID: LCSW		Batch ID: R31736					Analysis Date:	9/14/20	16	SeqNo: 599	9397	
Analyte		Result	RL	SPK value	SPK Ref Val	%REC	LowLimit H	lighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfide		2.00	0.500	2.000	0	100	65	135				
Sample ID 16091	51-006BDUP	SampType: <b>DUP</b>			Units: mg/L		Prep Date:	9/14/20	16	RunNo: 31	736	
Client ID: PAI-20	-S-160913	Batch ID: R31736					Analysis Date:	9/14/20	16	SeqNo: 59	9399	
Analyte		Result	RL	SPK value	SPK Ref Val	%REC	LowLimit H	lighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfide		34.0	5.00						32.00	6.06	30	
Sample ID 16091	51-006BMS	SampType: <b>MS</b>			Units: mg/L		Prep Date:	9/14/20	16	RunNo: 317	736	
Client ID: PAI-20	-S-160913	Batch ID: R31736					Analysis Date:	9/14/20	16	SeqNo: 59	9400	
Analyte		Result	RL	SPK value	SPK Ref Val	%REC	LowLimit H	lighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfide		78.0	5.00	40.00	32.00	115	65	135				
Sample ID 16091	51-006BMSD	SampType: <b>MSD</b>			Units: <b>mg/L</b>		Prep Date:	9/14/20	16	RunNo: 31	736	
Client ID: PAI-20	-S-160913	Batch ID: R31736					Analysis Date:	9/14/20	16	SeqNo: 59	9401	
Analyte		Result	RL	SPK value	SPK Ref Val	%REC	LowLimit H	lighLimit	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: CLIENT:	1609151 GeoEnginee								QC S	SUMMAI Sulfide b		
Project:	Gas Works										·	
Sample ID MB-R		SampType: MBLK			Units: <b>mg/L</b>		Prep Date:			RunNo: 317	-	
Client ID: MBLK	Ŵ	Batch ID: R31715					Analysis Date:	9/13/20	16	SeqNo: 598	3997	
Analyte		Result	RL	SPK value	SPK Ref Val	%REC	LowLimit H	lighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfide		ND	0.500									
Sample ID LCS-F	31715	SampType: LCS			Units: <b>mg/L</b>		Prep Date:	9/13/20	16	RunNo: 31	715	
Client ID: LCSW	1	Batch ID: R31715					Analysis Date:	9/13/20	16	SeqNo: 598	3998	
Analyte		Result	RL	SPK value	SPK Ref Val	%REC	LowLimit H	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfide		1.80	0.500	2.000	0	90.0	65	135				
Sample ID 16091	39-001BDUP	SampType: <b>DUP</b>			Units: mg/L		Prep Date:	9/13/20	16	RunNo: 31	715	
Client ID: BATC	н	Batch ID: R31715					Analysis Date:	9/13/20	16	SeqNo: 59	9000	
Analyte		Result	RL	SPK value	SPK Ref Val	%REC	LowLimit H	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfide		9.60	0.500						9.200	4.26	30	
Sample ID 16091	39-001BMS	SampType: <b>MS</b>			Units: mg/L		Prep Date:	9/13/20	16	RunNo: 31	715	
Client ID: BATC	н	Batch ID: R31715					Analysis Date:	9/13/20	16	SeqNo: 59	9001	
Analyte		Result	RL	SPK value	SPK Ref Val	%REC	LowLimit H	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfide		11.0	0.500	2.000	9.200	90.0	65	135				
Sample ID 16091	39-001BMSD	SampType: <b>MSD</b>			Units: <b>mg/L</b>		Prep Date:	9/13/20	16	RunNo: 31	715	
Client ID: BATC	н	Batch ID: R31715					Analysis Date:	9/13/20	16	SeqNo: 59	9002	
Analyte		Result	RL	SPK value	SPK Ref Val	%REC	LowLimit H	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	



# Sample Log-In Check List

С	lient Name:	GEI	Work Order N	lumber: 1609151	l	
Lo	ogged by:	Erica Silva	Date Receive	d: <b>9/13/201</b>	16 4:01:00 PM	
<u>Cha</u>	nin of Custe	ody				
1.	Is Chain of C	ustody complete?	Yes 🖌	No 🗌	Not Present	
2.	How was the	sample delivered?	<u>Courier</u>			
<u>Log</u>	<u>. In</u>					
-	Coolers are p	present?	Yes 🗹	No 🗌	NA	
4.	Shipping con	tainer/cooler in good condition?	Yes 🖌	No 🗌		
5.		s present on shipping container/cooler? ments for Custody Seals not intact)	Yes	No 🗌	Not Required	✓
6.	Was an atten	npt made to cool the samples?	Yes 🖌	No 🗌	NA [	
7.	Were all item	s 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 sar	nple volume for indicated test(s)?	Yes 🖌	No 🗌		
10.	Are samples	properly preserved?	Yes 🖌	No 🗌		
11.	Was preserva	ative added to bottles?	Yes 🗌	No 🗹	NA [	
12.	Is there head	space in the VOA vials?	Yes 🗌	No 🗌	NA	✓
13.	Did all sample	es containers arrive in good condition(unbroken)?	Yes 🗹	No 🗌		
14.	Does paperw	ork match bottle labels?	Yes 🖌	No 🗌		
15.	Are matrices	correctly identified on Chain of Custody?	Yes 🖌	No 🗌		
16.	Is it clear what	at analyses were requested?	Yes 🖌	No 🗌		
17.	Were all hold	ing times able to be met?	Yes 🖌	No 🗌		
<u>Spe</u>	cial Handli	ing (if applicable)				
18.	Was client no	tified of all discrepancies with this order?	Yes 🗌	No 🗌	NA	✓
	Person	Notified: Date				
	By Who	m: Via:	eMail	] Phone 🗌 Fax	In Person	
	Regardi	ng:				
	Client In	structions:				]
19.	-	structions:				

### 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

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Freemon         Annu/Vitcol         Annu/Vitcol         GeoEngineers         Goo Stewart Street, suite 1700         Sample       Sample         Sci.722.2418       Fax:         A = Air, AQ = Aqueous, B = Bulk, O = Other, P = Product, S = Soil, SD         Date       Time       Matrix)*         P2.52-724.5       Q1/3       I/20       Sample         Date       Time       Matrix)*       A         A = Air, AQ = Aqueous, B = Bulk, O = Other, P = Product, S = Soil, SD       Sample       Sample       Sample         Date       Time       Matrix)*       A       A         A = Air, AQ = Aqueous, B = Bulk, O = Other, P = Product, S = Soil, SD       Sample       Sample       Sample         Date       Date       Time       Matrix)*       A         A = Air, AQ = Aqueous, B = Bulk, O = Other, P = Product, S = Soil, SD       Sample       Sample       Sample         Date       Quark       Sample       Sample       Sample       Sample         Colored S       Quark       Quark       Sample       Sample       Sample       Sample         Sis(Circle):       MTCA-5       RCRA-8       Priority Polutants       TA         Bis (Circle):       Ni	APlease coordinate with the lab in advance	INNI ALCI		E	¢			
Chain of Custody Rep         Date:	→ SameDay^ NextDay^ 2 Day	(1/2 112A)		X	110:01		$\left( \right)$	1
Chain of Custody Report of Project Name:	5. Run for dissolved metals	10.2	R MB	Repeated	1552	Time		x Relinquished
Freemont       Image: A model of the second of	<ol> <li>Groundwater and soil RLs per the WO</li> <li>COD = Chemical oxygen demand</li> </ol>		n behalf of the Client named al	rement.	greement with I kside of this Agr	front and back	terms on the	agreement to each of the Relinguished
Effective       Chain of Custody Report         Anew.       Tel: 206-322-3720       Project Name:       Oas Works         GeoEngineer       Foi:       Project Name:       Oase-404-000         Goo Stewart Street, Suite 1700       Foi:       Project Name:       Oase-404-000         Somtle, WN 9803       Foi:       Project Name:       Oase-404-00         Somtle, WN 9803       Foi:       Sanda Smith       Project Name:       Oase-404-00         Somtle, WN 9803       Foi:       Foi:       Sanda Smith       Sanda Smith         Somale       Sample       Sample       Sanda Smith       Maran, Water, DV = Dinking Water, OW       Ownare, OW         Arr, AC=Aqueous, B = Bulk, O = Other, P = Product, S = Soll, SD = Sodiment, S1 = Solid, W = Water, OW       Ownare, OW       Ownare, OW         Arr, AC=Aqueous, B = Bulk, O = Other, P = Product, SI = Solid, W = Water, OW       Ownare, OW       Ownare, OW       Ownare, OW         Arr, AC = Aqueous, B = Dulk, O = Other, P = Pr	<ol> <li>Groundwater in actine and COD plus soil COD and grain size samples on -standard TAT</li> </ol>	day.	0 days unless otherwise noted. A fee ays.)	s are retained after 30 d	assessed if sample	lient	Return to C	Sample Disposal:
American       Chain of Custody Report         Tel: 206-352-3730       Project Name:	Special Remarks:	Turn-around times for samples	phate Fluoride Nitrate+	Bromide O-Phos	Sulfate	Chloride		***Anions (Circle): Nitra
Annu Price     Sumple     Fax:     Sumple     Sumple<	Sb Se Sr Sn Ti Ti U V	Cr Cu Fe Hg K Mg Mn Mo Na Ni	Al As B Ba Be Ca Cd	1	riority Pollutants	÷.,	1.1	**Metals Analysis (Circle):
Image: Normality interview       Sample       Fax: 100       Sample								10 PAI-
Annuprice       Sample       Sample <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>PAI-</td>								PAI-
American       Sample       Sample <thsample< th="">       Sample       Sample</thsample<>								PAI-
Image: Sample Color								PAI-
Image: Sample	J.			W XX X	F	¥	-	PAI-20-5-16 (
Attraction       Date:       g         Attraction       Date:       g         M.       Tel: 206-352-7178       Project Name:       Gas Worksp         GeoEngineers       Frail       Project Name:       Gas Worksp         GoO Stewart Street, Suite 1700       Location:       Sanda Snitt         Seattle, WA 98103       Fax:       Project No::       Sanda Snitt         Z53.772.2418       Fax:       Product, S = Soll, SD = Sediment, SI = Solid, W = Water, DW = Drinking Water, GW         AQ= Aqueous, B = Bulk, O = Other, P = Product, S = Soll, SD = Sediment, SI = Solid, W = Water, DW = Drinking Water, GW       Drive water, GW         AQ= Aqueous, B = Bulk, O = Other, P = Product, S = Soll, SD = Sediment, SI = Solid, W = Water, DW = Drinking Water, GW       Drive water, GW         AQ= Aqueous, B = Bulk, O = Other, P = Product, S = Soll, SD = Sediment, SI = Solid, W = Water, GW       Drinking Water, GW         AQ= Aqueous, B = Bulk, O = Other, P = Product, S = Soll, SD = Sediment, SI = Solid, W = Water, GW       Drinking Water, GW         AQ= Aqueous, B = Bulk, O = Other, P = Product, S = Soll, SD = Sediment, SI = Solid, W = Water, GW       Drinking Water, GW         AQ= Aqueous, B = Bulk, O = Other, P = Product, S = Soll, SD = Sediment, SI = Solid, SD = Sedim = Solid, SD = Sediment, SI = Solid, SD = Sed				NXXX	-		-	PAI-19-5-160
Amount     Image: Sample     Sa	したす			WXX w		1.3	5160	4 PAI- 17-0-16
Analytical       Image: Second Street Suite 1700       Second Street			XX		1	*		PAI-19-11-12
Arrouveries       Chain of Custody Repaires         N.       Tel: 206-352-7178         GeoEngineers       Froject Name:         Goo Stewart Street, Suite 1700       Location:         Seattle, WA 98103       Fax:         Aqueous, B = Bulk, O = Other, P = Product, S = Solil, SD = Sediment, SL = Solid, W = Water, DW = Drinking Water, GW         Aq= Aqueous, B = Bulk, O = Other, P = Product, S = Solil, SD = Sediment, SL = Solid, W = Water, DW = Drinking Water, GW         Sample       Sample         Trap       Sample         Sample       Sample         Trap       Sample         Sample       Sample         Sample       Sample         Trap       Sample         Sample       Sample         Trap       Sample         Sample       Sample         Sample       Sample         Sample       Sample         Sample       Sample         Sample					1125 5			N
Array frage       Array frage       Chain of Custody Report of Custody					1/20 5		24.5	PAI- 10-22.5-
Amalynican       Imalynican       Imalynican         Amalynican       Imalynican       Imalynican         Amalynican       Imalynican       Imalynican       Imalynican         M.       Tel: 206-352-3790       Imalynican       Imalynica	Comments	4488-849-4699-1699-1699-1699-1699-1699-1699-16	Statistics of the statistics o	N-Senic Lin		Sample		Sample Name
Analytical       Date:       9/         Analytical       Image: Section of Custody Regimers         N.       Tel: 206-352-7178       Froject Name:       9/         GeoEngineers       Project Name:       Gas Works P         600 Stewart Street, Suite 1700       Location:       Seattle         Seattle, WA 98103       Fax:       Project To (PM):       Seandra Smith @a         253.722.2418       Fax:       PM Email:       sbsmith@a	orm Water, WW = Waste Water	GW = Ground Water,	N = Water,	SD = Sedii				*Matrix Codes: A = Air, AC
Fremmont       Image: Statute       Image: Stat	cdelavia@geoengineers.com	sbsmith@geoengineers.com	PM Email:		μ		253.722.	
Chain of Custody Regeneration         A tradytical         Tel: 206-352-3790         Fax: 206-352-7178         GeoEngineers         Goo Stewart Street, Suite 1700         Chain of Custody Regeneration         Chain of Custody Regeneration         Steveneration		Sandra Smith / Claudia De La Via	Report To (PM):		1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1	VA 98103	Seattle, W	City, State, Zip:
Chain of Custody Regenting         Analytical         Tel: 206-352-3790         Fax: 206-352-7178         GeoEngineers         Project Name:         Gas Works P         Project No:         0186-846-01		Seattle	Location:		1700	art Street, Suite :	600 Stewa	Address:
Chain of Custody Regeneration         Analytical         Tel: 206-352-3790         Fax: 206-352-7178			Project No:			eers	GeoEngin	Client:
Date: 9/	of:	Gas Works Dark Site	Project Name:		8	206-352-3790 206-352-717		3600 Fremont Ave N. Seattle, WA 98103
Chain of Custody Rev	hoals	9/			6	alytica	An	
	aboratory Services Agreement		Chain of Cus			on		



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

**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,

Mohal c. Rady

Mike Ridgeway Laboratory Director

DoD/ELAP Certification #L2371, ISO/IEC 17025:2005 ORELAP Certification: WA 100009-007 (NELAP Recognized)



CLIENT: Project: Work Order:	GeoEngineers Gas Works Park Site 1609167	Work Order S	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



Case Narrative WO#: 1609167

Date: 10/13/2016

CLIENT:GeoEngineersProject: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 & Acronyms**



WO#: 1609167 Date Reported: 10/13/2016

### Qualifiers:

- * Flagged value is not within established control limits
- B Analyte detected in the associated Method Blank
- D Dilution was required
- E Value above quantitation range
- H Holding times for preparation or analysis exceeded
- I Analyte with an internal standard that does not meet established acceptance criteria
- J Analyte detected below Reporting Limit
- N Tentatively Identified Compound (TIC)
- Q Analyte with an initial or continuing calibration that does not meet established acceptance criteria
- (<20%RSD, <20% Drift or minimum RRF)
- S Spike recovery outside accepted recovery limits
- ND Not detected at the Reporting Limit
- R High relative percent difference observed

Acronyms:

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



# **Analytical Report**

Work Order: **1609167** Date Reported: **10/13/2016** 

Client: GeoEngineers				Collectior	n Date: 9	9/14/2016 11:09:00 AM			
Project: Gas Works Park Site Lab ID: 1609167-004 Client Sample ID: PAI-14-D-160	914	Matrix: Groundwater							
Analyses	Result	RL	Qual	Units	DF	Date Analyzed			
Dissolved Metals by EPA Meth	od 200.8			Batc	h ID: 14	826 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	<u>SM 5220D</u>			Batc	h ID: R3	1756 Analyst: MW			
Chemical Oxygen Demand	266	100	D	mg/L	10	9/15/2016 2:17:18 PM			
Sulfide by SM 4500-S2-F				Batc	h ID: R3	1736 Analyst: KT			
Sulfide NOTES:	33.2	0.119	MDL	mg/L	1	9/14/2016 3:50:00 PM			

MDL - Sample reported to Method Detection Limit (MDL)



# **Analytical Report**

Work Order: **1609167** Date Reported: **10/13/2016** 

Client: GeoEngineers				Collectior	n Date: 9	9/14/2016 2:50:00 PM			
Project: Gas Works Park Site Lab ID: 1609167-007 Client Sample ID: PAI-13-D-1609	014	Matrix: Groundwater							
Analyses	Result	RL	Qual	Units	DF	Date Analyzed			
Dissolved Metals by EPA Metho	od 200.8			Batc	h ID: 14	826 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 S	SM 5220D			Batc	h ID: R3	1756 Analyst: MW			
Chemical Oxygen Demand	372	100	D	mg/L	10	9/15/2016 2:17:18 PM			
Sulfide by SM 4500-S2-F				Batc	h ID: R3	1736 Analyst: KT			
Sulfide NOTES:	68.8	0.119	MDL	mg/L	1	9/14/2016 3:53:00 PM			

MDL - Sample reported to Method Detection Limit (MDL)



Project: Gas Works Park Site Client: GeoEngineers Lab Project #: 1609167

UOM = Percent

### Percent Finer (Passing) than the Indicated Size

Grain Size Classification	Gravel							Mediur	n 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%



Project: Gas Works Park Site Client: GeoEngineers Lab Project #: 1609167

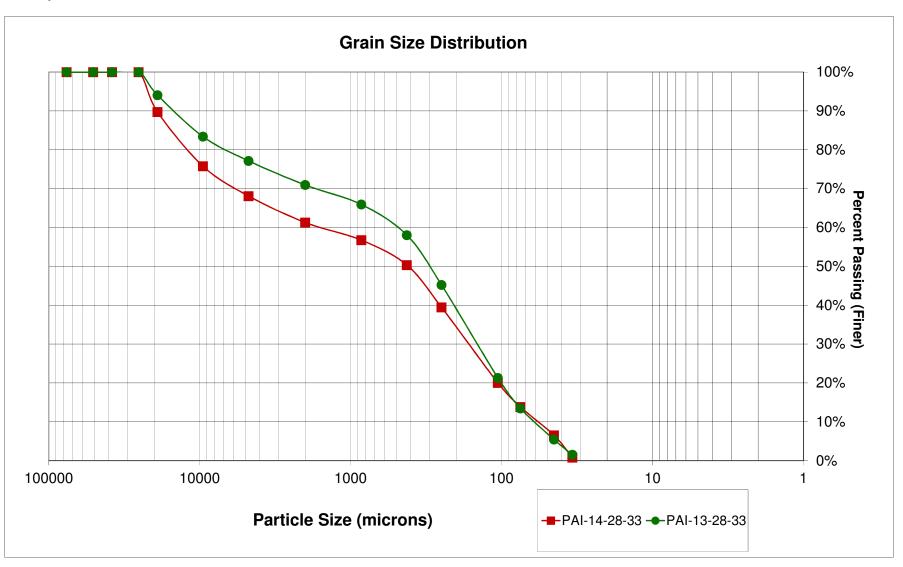
### Percent Retained in Each Size Fraction

UOM = Percent

Grain Size Classification	Gravel						Coarse Sand	Medium Sand Fine Sand				Silt				
Sieve Size (Microns)	>76200	76200- 50800			25400- 19000		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%	4.52 % 5.00%	0.39 <i>%</i> 7.83%	12.8%		7.81%	7.97%	3.88%	1.53%



Project: Gas Works Park Site Client: GeoEngineers Lab Project #: 1609167





Project: Gas Works Park Site Client: GeoEngineers Lab Project #: 1609197

UOM = Percent

### Percent Finer (Passing) than the Indicated Size

Grain Size Coarse Medium Sand Fine Sand Gravel Silt Sand Classification 3" 2" 1 1/2" 1" 3/8" Sieve Size 3/4" #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-14-20-21.8 100% 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%



Project: Gas Works Park Site Client: GeoEngineers Lab Project #: 1609197

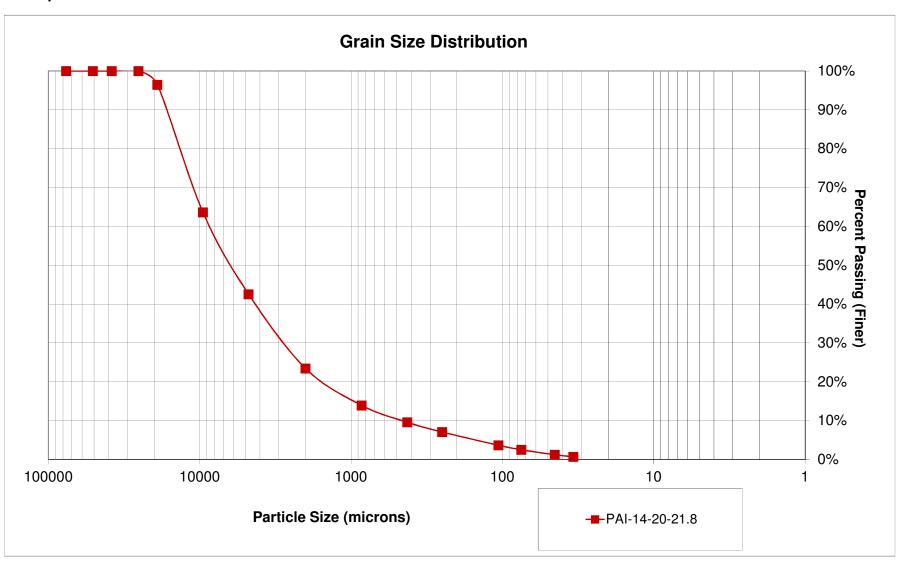
### Percent Retained in Each Size Fraction

UOM = Percent

Grain Size Classification	Gravel							Coarse Sand	Medium Sand Fine Sand			d	Silt			
Sieve Size (Microns)	>76200		50800- 38100			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%



Project: Gas Works Park Site Client: GeoEngineers Lab Project #: 1609197





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

Analytical Report for Service Request No: 1610996

October 03, 2016

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

### RE: COD

ear 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 re uest number **K1610996**.

Analyses were performed according to our laboratory's E AP-approved uality assurance program. The test results meet re uirements of the current E AP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of E AP-accredited analytes, refer to the certifications section at www.alsglobal.com. All results are intended to be considered in their entirety, and A S roup SA orp. dba A S Environmental (A S) 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) analy ed, as listed in the report.

Please contact me if you have any uestions. My extension is 3375. ou may also contact me via email at anet.Malloch@alsglobal.com.

Respectfully submitted,

ALS Group USA, Corp. dba ALS Environmental

Jenet mallich

anet Malloch Pro ect 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 Total Solids

**General Chemistry** 

R TSO TO S R TPART ER

### 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 MCL	Modified 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.pjlabs.com/	L16-57
Louisiana DEQ	http://www.deq.louisiana.gov/portal/DIVISIONS/PublicParticipationandPer mitSupport/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/EnvironmentalLaborator yAccreditation/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/anlayte 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

Ĩ	Fremo		CHAIN OF	CUSTODY RE	CORD Omega C	DCID 266	PAGE: 1	or: 1	ADDRESS Fremont Analytical, Inc. 3600 Fremont Ave. N. Seattle, WA 98103 TEL: 206-352-3790 FAX: 206-352-7178 Website: www.fremontanalytical.com
·····	ATOR: ALS	COMPANY:	ALS Enviror	nmental	SPECIAL INSTRUCTIONS / Please email results to		· · · · · · · · · · · · · · · · · · ·		way@fremontanalytical.com;
ADDRESS:	1317 South 13th	Avenue			cward@fremontanalyt		,		,, <u>(</u>
CITY, STATE PHONE: (30	^{6, ZIP:} Kelso, WA 9862 60) 577-7222	6 EMA	L:		- Low Lev	el RL	s if pos	ssible.	
ACCOUNT #	· · · · · · · · · · · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·							
ITEM #	SAMPLE ID	CLIENT SAMPLE ID	BOTTLE TYPE	MATRIX	DATE COLLECTED	NUMBER OF CONTAINERS			Methanol Preserved Weights on, Additional Sample Description.
	1609167-003A	PAI-14-28-33	CLEAR JARS 4 O	Soil	9/14/2016 10:50:00 AM	1	Chemical Ox	ygen Demano	by SM 5220
L	TEST_SUB							······································	
	1609167-006A	PAI-13-28-33	CLEAR JARS 4 O	Soil	9/14/2016 1:45:00 PM	1	Chemical Ox	ygen Demand	by SM 5220
2	TEST_SUB								

Relinquished By:	Date: <u>91151110</u> Date:	Time: B: US Time:	Received By:	Date: P1010 Date:	Time:	REPORT TRANSMITTAL DESIRED:
Relinquished By:	· Date:	Time:	Received By:	Date;	Time:	FOR LAB USE ONLY
TAT:	Standard D	RUSH	Next BD 2nd BD	3rd B	ם מו	Temp of samples°C Attempt to Cool ? Comments:
			Note: RUSH requests will incu		Page 19 of	
			······································	Pac	ne 7 of 16	

						р	c lan	ot
( <b>)</b>	, Cooler R	leceipt and H	Preservati	ion Form				
lient Fremont Analytic	al	-		Request K16_	109	910	0	
	ed: 976-16	By:	- K.)	Unloaded:		016 By:	X.	
tecerved: <u>716 16</u> Openin	eu: <u>71616</u>	by	<u> </u>			<u>////</u> ////////////////////////////////	<u>vec</u>	
. Samples were received via? USI	PS Fed Ex	UPS I	DHL PD	X Courier	Hana	l Delivered		
2. Samples were received in: (circle)	Cooler	Box En	velope	Other			NA	
8. Were <u>custody seals</u> on coolers?	NA Y	2 м	If yes, how	many and whe	re?	Front		
If present, were custody seals intact	? <u>(Y</u>	) N	If presen	t, were they sig	gned and d	ated?	$(\mathbf{Y})$	N
	ected Corr. Blank Factor	Thermometer ID	Cooler/C	OC ID NA		racking Numbe	r N⁄	Filed
12 12 24 2.	40	360	263			11039861		
1.6 1.7 3.0 3.	1-70.1	356	244		X61 9a	<u>14 3194 449</u>	3	+
·			204					
		······································	267	<b>,</b>				+
4. Packing material: Inserts Bagg	in Bubble W	an Gal Pack	_ <u>_</u>		leeves	······································		
5. Were custody papers properly fille				Diyice Si	<u> </u>	NA	$\overline{(Y)}$	N
<ol> <li>Were custody papers property line</li> <li>Were samples received in good co</li> </ol>	· •	. ,	) Indicate	n the table hol	<i>ow</i>	NA		N
	ble, tissue sample					Thawed	C .	EN
7. Were all sample labels complete (i	e analysis, prese.	rvation, etc.)?		-		NA	$(\mathbf{Y})$	Ν
8. Did all sample labels and tags agree	e with custody p	apers? Indicate	major discr	epancies in the	e table on	page 2. NA	$\nabla$	N
9. Were appropriate bottles/container	rs and volumes re	eceived for the	tests indicate	ed?		NA	$\overline{\mathbf{Y}}$	N
10. Were the pH-preserved bottles (see	ee SMO GEN SOP	) received at the	e appropriate	pH? Indicate	in the tab	le below NA	∑ Y	N
11. Were VOA vials received without	it headspace? Ind	dicate in the tab	ole below.				D Y	N
12. Was C12/Res negative?							y y	N
Sample ID on Bottle		Sample ID on C	00:			Identified by:		
		·····					- <u>, , , , , , , , , , , , , , , , , , , </u>	
	<u>_</u>							
		Out of Head-			Volume	Reagent Lot		
Sample ID	Bottle Type	Temp space B	roke pH	Reagent	added	Number	Initials	Time
		┟╌╼╼┟╼╌╾╁╴		·····	+		┼───┼	
				·	1		╂╼╼╌╂	
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	<u></u>					<u> </u>	11	

#### 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

Analytical Report **Client:** Service Request: K1610996 Fremont Analytical Date Collected: 09/14/16 **Project:** COD Sample Matrix: Soil **Date Received:** 09/16/16 **Analysis Method:** 160.3 Modified Units: Percent **Prep Method:** Basis: As Received None 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	

QA/QC Report

Client:	Fremont Analytical	Service Request:K1610996
Project	COD	<b>Date Collected:</b> 09/14/16
Sample Matrix:	Paper	<b>Date Received:</b> 09/16/16
Analysis Method:	160.3 Modified	Units:Percent
Prep Method:	None	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.



# **General Chemistry**

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

Analytical Report **Client:** Service Request: K1610996 Fremont Analytical Date Collected: 09/14/16 **Project:** COD **Sample Matrix:** Soil **Date Received:** 09/16/16 **Analysis Method:** SM 5220 C Modified Units: mg/Kg **Prep Method:** ALS SOP 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	

QA/QC Report

Client: Project Sample Matrix:	Fremont Analy COD Soil	ytical				Date (	Request: Collected: Received:		
-						Date A	Analyzed:	09/29/16	
		Replic	ate Samp	le Summ	ary				
		General	Chemist	ry Param	eters				
Sample Name:	PAI-14-28-33	/1609167-003A					Units:	mg/Kg	
Lab Code:	K1610996-00	1					Basis:	Dry	
						Duplicate Sample K1610996-			
Analyte Name		Analysis Method	MRL	MDL	Sample Result	001DUP Result	Average	RPD	RPD Limit
Chemical Oxygen Demar	nd (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.

QA/QC Report

Client: Project: Sample Matrix:	Fremont Analytical COD Soil			Service Requ Date Collecte Date Received Date Analyze	d: 1: d:	K1610996 09/14/16 09/16/16 09/29/16
		Matrix S	pike Summary	Date Extracto	ed:	09/28/16
			gen Demand (CO	)D)		
Sample Name:	PAI-14-28-33/1609167-	-003A		Uni	ts:	mg/Kg
Lab Code:	K1610996-001			Bas	is:	Dry
Analysis Method:	SM 5220 C Modified					
Prep Method:	ALS SOP					
		Matrix Spil	ĸe			
		K1610996-001	MS			
Analyte Name		Sample Result	Result	Spike Amount	% Re	ec % Rec Limits
Chemical Oxygen De	mand (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.

QA/QC Report

Client: Project: Sample Matrix:	Fremont Analytical COD Soil		Service Request Date Analyzed: Date Extracted:	09/29/16	
		ntrol Sample Summary Oxygen Demand (COI			
Analysis Method: Prep Method:	SM 5220 C Modified None		Units: Basis:	mg/Kg Dry	
			Analysis Lot:	516546	
Sample Name	Lab Code	Result	Spike Amount %	Rec	% Rec Limits
Lab Control Sample	K1610996-LCS	231	242	96	85-115



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1317 South 13th Avenue elso, WA 98626
T: 1 360 577 7222
F: 1 360 636 1068
www.alsglobal.com

Analytical Report for Service Request No:

October 11, 2016

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

## RE: COD

ear 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 re uest number **K1611732**.

Analyses were performed according to our laboratory's E AP-approved uality assurance program. The test results meet re uirements of the current E AP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of E AP-accredited analytes, refer to the certifications section at www.alsglobal.com. All results are intended to be considered in their entirety, and A S roup SA orp. dba A S Environmental (A S) 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) analy ed, as listed in the report.

Please contact me if you have any uestions. My extension is 3375. ou may also contact me via email at anet.Malloch@alsglobal.com.

Respectfully submitted,

ALS Group USA, Corp. dba ALS Environmental

Janet mallich

anet Malloch Pro ect Manager

1611732



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 Case Narrative Chain of Custody Total Solids

**General Chemistry** 

R TSO TO S R TPART ER

#### 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 MCL	Modified 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 tr	Total Petroleum Hydrocarbons 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.
- $E \qquad \mbox{The result is an estimated value.}$
- 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

- ${f F}$  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.pjlabs.com/	L16-57
Louisiana DEQ	http://www.deq.louisiana.gov/portal/DIVISIONS/PublicParticipationandPer mitSupport/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/EnvironmentalLaborator yAccreditation/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/anlayte 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 AnalyticalProject:NASample Matrix:Soil

Service Request No.:KDate Received:0

K1611732 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  $4^{\circ}$ 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.

Janet mallach 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

Fremont

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OF:

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KI611732

#### ADDRESS

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

SUB CONTRA	ATOR: ALS	COMPANY:	ALS Enviror	nmental				
ADDRESS:	1317 South 13th A	venue				-	way and Chelsea Ward - mridgeway@tremontanalytical.com;	
CITY, STATE,	^{ZIP:} Kelso, WA 98626							
PHONE: (36	50) 577-7222 FAX:	EMAI	L:					
ACCOUNT #:			· · · · · · · · · · · · · · · · · · ·					Í
item #	ALS       ALS Environmental         ALS Environmental       Please email results to Michael Ridgeway and Chelsea Ward - mridgeway@fremontanalytical.com; cward@fremontanalytical.com         ALDRESS:       1317 South 13th Avenue       Please email results to Michael Ridgeway and Chelsea Ward - mridgeway@fremontanalytical.com; cward@fremontanalytical.com         CTY, STATE, ZIP:       Kelso, WA 98626       FAX:       EMAIL:         HONE:       (360) 577-7222       FAX:       EMAIL:         CCOUNT #:       Image: State of the state of t							
	1609167-002A	PAI-14-22-22.5	CLEAR JARS 4 O	Soil	9/14/2016 10:15:00 AM	1	Chemical Oxygen Demand by SM 5220 , Low Level RL	
<b>ـ</b>	TEST_SUB						<del>35</del> 1/21	1/14

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Relinquished By:	Date:	Time:	Received By:	Date:	Time:	FOR LAB USE ONLY
TAT:	Standard 🙀	RUSH	Next BD [] 2nd BD []	3rd Bl	⊥ ₽ □	Temp of samples°C Attempt to Cool?
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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

		Analytical Report					
Client:	Fremont Analytical			Service	<b>Request:</b>	K1611732	
Project:	COD			Date (	Collected:	09/14/16	
Sample Matrix:	Soil			Date 1	Received:	09/30/16	
Analysis Method:	160.3 Modified				Units:	Percent	
Prep Method:	None				<b>Basis:</b>	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

QA/QC Report

Client:	Fremont Analytical	Service Request:K1611732
Project	COD	Date Collected:NA
Sample Matrix:	Soil	Date Received:NA
Analysis Method:	160.3 Modified	Units:Percent
Prep Method:	None	Basis: As Received
	Replicate Sam	le Summary

#### 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.



# **General Chemistry**

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

Analytical Report **Client:** Service Request: K1611732 Fremont Analytical Date Collected: 09/14/16 **Project:** COD **Sample Matrix:** Soil **Date Received:** 09/30/16 **Analysis Method:** SM 5220 C Modified Units: mg/Kg **Prep Method:** ALS SOP 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	

QA/QC Report

Client: Project Sample Matrix:	Fremont Analy COD Soil	tical				Date Date	e Request: Collected: Received:	NA NA	
Date Analyzed: Replicate Sample Summary General Chemistry Parameters					10/07/16				
		General	Chemist	ry Param	eters				
Sample Name:	Batch QC						Units:	mg/Kg	
Lab Code:	K1611836-001						Basis:	Dry	
						Duplicate Sample K1611836-			
		Amalausia Mathad	MDI	MDI	Sample	001DUP		DDD	RPD
Analyte Name	1(000)	Analysis Method	MRL	MDL	Result	Result	Average	RPD	Limit
Chemical Oxygen Demar	id (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.

QA/QC Report

Client: Project: Sample Matrix:	Fremont Analytical COD Soil			Service Requ Date Collecto Date Receive Date Analyzo Date Extract	ed: d: ed:	K16117 N/A N/A 10/7/16 10/7/16	
		•	pike Summary		cui	10,7710	
		Chemical Oxy	gen Demand (C	OD)			
Sample Name:	Batch QC			Un	its:	mg/Kg	
Lab Code:	K1611836-001			Bas	sis:	Dry	
Analysis Method:	SM 5220 C Modified						
Prep Method:	ALS SOP						
		Matrix Spik	e				
		K1611836-001	MS				
Analyte Name		Sample Result	Result	Spike Amount	% R		% Rec Limits
Chemical Oxygen De	emand (COD)	5970	64500	52400	112	2	75-125

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

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

QA/QC Report

Client: Project: Sample Matrix:	Fremont Analytical COD Soil		Service Req Date Analyz Date Extrac	zed:	K1611732 10/07/16 NA
		trol Sample Summary Oxygen Demand (CO			
Analysis Method: Prep Method:	SM 5220 C Modified None		Units: Basis: Analysis Lo	1	ng/Kg Dry 517791
Sample Name Lab Control Sample	Lab Code K1611732-LCS	<b>Result</b> 4540	<b>Spike</b> <u>Amount</u> 4840	% <b>Rec</b> 94	% Rec Limits 85-115



	9167 DEngineers						QC	SUMMA	RY REF	<b>'</b> ORT
	Works Park Site						Chemical Ox	ygen Dema	nd by SN	5220
Sample ID MB-R31756	SampType: <b>MBLK</b>			Units: mg/L		Prep Date	e: 9/15/2016	RunNo: 31	756	
Client ID: MBLKW	Batch ID: R31756					Analysis Date	e: 9/15/2016	SeqNo: 59	9820	
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit RPD Ref Va	I %RPD	RPDLimit	Qual
Chemical Oxygen Demai	nd ND	10.0								
Sample ID LCS-R31756	SampType: LCS			Units: <b>mg/L</b>		Prep Date	e: 9/15/2016	RunNo: 31	756	
Client ID: LCSW	Batch ID: R31756					Analysis Date	e: 9/15/2016	SeqNo: 59	9821	
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit RPD Ref Va	l %RPD	RPDLimit	Qual
Chemical Oxygen Demai	nd 80.2	10.0	75.00	0	107	80	120			
Sample ID <b>1609112-00</b> 1	ADUP SampType: DUP			Units: <b>mg/L</b>		Prep Date	e: 9/15/2016	RunNo: 31	756	
Client ID: BATCH	Batch ID: R31756					Analysis Date	e: 9/15/2016	SeqNo: 59	9823	
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit RPD Ref Va	l %RPD	RPDLimit	Qual
Chemical Oxygen Demai	nd ND	10.0						)	30	
Sample ID 1609112-001	AMS SampType: MS			Units: mg/L		Prep Date	e: 9/15/2016	RunNo: 31	756	
Client ID: BATCH	Batch ID: R31756					Analysis Date	e: 9/15/2016	SeqNo: 59	9824	
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit RPD Ref Va	l %RPD	RPDLimit	Qual
Chemical Oxygen Demai	nd 80.9	10.0	75.00	6.062	99.7	70	130			
Sample ID 1609112-001	AMSD SampType: MSD			Units: <b>mg/L</b>		Prep Date	e: 9/15/2016	RunNo: 31	756	
Client ID: BATCH	Batch ID: R31756					Analysis Date	e: 9/15/2016	SeqNo: 59	9825	
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit RPD Ref Va	l %RPD	RPDLimit	Qual
Chemical Oxygen Demai	nd 81.5	10.0	75.00	6.062	101	70	130 80.8	7 0.815	30	

Fremont
Analytical

Work Order: 1609167 CLIENT: GeoEngine	ere						QC	SUMMARY REP	OR
Project: Gas Works							Dissolved Me	etals by EPA Method	d 200
Sample ID MB-14826	SampType: <b>MBLK</b>			Units: µg/L		Prep Date:	9/15/2016	RunNo: <b>31753</b>	
Client ID: MBLKW	Batch ID: 14826					Analysis Date:	9/15/2016	SeqNo: <b>599718</b>	
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit H	lighLimit 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 H	lighLimit 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: <b>DUP</b>			Units: µg/L		Prep Date:	9/15/2016	RunNo: 31753	
Client ID: BATCH	Batch ID: 14826					Analysis Date:	9/15/2016	SeqNo: <b>599721</b>	
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit H	lighLimit 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: <b>MS</b>			Units: µg/L		Prep Date:	9/15/2016	RunNo: 31753	
Client ID: BATCH	Batch ID: 14826					Analysis Date:	9/15/2016	SeqNo: <b>599724</b>	
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit H	lighLimit 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 H	lighLimit RPD Ref Val	%RPD RPDLimit	Qual
Arsenic	550	0.500	500.0	25.79	105	70	130 560.4	1.83 30	
								Page	48 o



Work Order: CLIENT: Project:	1609167 GeoEngineer Gas Works P							Di	QC S ssolved Me	SUMMAI		-
Sample ID 160916 Client ID: BATCH		SampType: <b>MSD</b> Batch ID: <b>14826</b>			Units: µg/L		Prep Dat Analysis Dat	te: 9/15/20 te: 9/15/20		RunNo: <b>317</b> SeqNo: <b>59</b> 9		
Analyte		Result	RL	SPK value	SPK Ref Val	%REC	,		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: CLIENT:	1609167 GeoEnginee	rs							QC S			
Project:	Gas Works F	Park Site								Sulfide b	oy SM 450	00-S2-F
Sample ID MB-R3 Client ID: MBLK		SampType: <b>MBLK</b> Batch ID: <b>R31736</b>			Units: <b>mg/L</b>		Prep Date: Analysis Date:			RunNo: <b>31</b> SeqNo: <b>59</b>		
Analyte		Result	RL	SPK value	SPK Ref Val	%REC	LowLimit H	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfide		ND	0.500									
Sample ID LCS-R	31736	SampType: LCS			Units: <b>mg/L</b>		Prep Date:	9/14/20	016	RunNo: 31	736	
Client ID: LCSW		Batch ID: R31736					Analysis Date:	9/14/20	16	SeqNo: 59	9397	
Analyte		Result	RL	SPK value	SPK Ref Val	%REC	LowLimit H	lighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfide		2.00	0.500	2.000	0	100	65	135				
Sample ID 160915	51-006BDUP	SampType: <b>DUP</b>			Units: mg/L		Prep Date:	9/14/20	16	RunNo: 31	736	
Client ID: BATCH	1	Batch ID: R31736					Analysis Date:	9/14/20	16	SeqNo: 59	9399	
Analyte		Result	RL	SPK value	SPK Ref Val	%REC	LowLimit H	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfide		34.0	5.00						32.00	6.06	30	
Sample ID 160915	51-006BMS	SampType: <b>MS</b>			Units: mg/L		Prep Date:	9/14/20	16	RunNo: 31	736	
Client ID: BATCH	1	Batch ID: R31736					Analysis Date:	9/14/20	16	SeqNo: <b>59</b>	9400	
Analyte		Result	RL	SPK value	SPK Ref Val	%REC	LowLimit H	lighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfide		78.0	5.00	40.00	32.00	115	65	135				
Sample ID 160915	51-006BMSD	SampType: <b>MSD</b>			Units: <b>mg/L</b>		Prep Date:	9/14/20	016	RunNo: 31	736	
Client ID: BATCH	ł	Batch ID: R31736					Analysis Date:	9/14/20	16	SeqNo: 59	9401	
Analyte		Result	RL	SPK value	SPK Ref Val	%REC	LowLimit H	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfide		76.0	5.00	40.00	32.00	110	65	135	78.00	2.60	30	



## Sample Log-In Check List

С	lient Name:	GEI	Work Order Num	ber: 1609167	
Lo	ogged by:	Erica Silva	Date Received:	9/14/2016	3:26:00 PM
<u>Cha</u>	nin of Custe	ody			
1.	Is Chain of C	ustody complete?	Yes 🖌	No 🗌	Not Present
2.	How was the	sample delivered?	<u>Courier</u>		
<u>Log</u>	<u>In</u>				
-	Coolers are p	present?	Yes 🖌	No 🗌	
4.	Shipping con	tainer/cooler in good condition?	Yes 🖌	No 🗌	
5.		ls present on shipping container/cooler? ments for Custody Seals not intact)	Yes	No 🗌	Not Required 🗹
6.	Was an atten	npt made to cool the samples?	Yes 🖌	No 🗌	
7.	Were all item	s 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 sar	nple volume for indicated test(s)?	Yes 🖌	No 🗌	
10.	Are samples	properly preserved?	Yes 🖌	No 🗌	
11.	Was preserva	ative added to bottles?	Yes	No 🗹	NA 🗌
12.	Is there head	space in the VOA vials?	Yes	No 🗌	NA 🗹
13.	Did all sample	es containers arrive in good condition(unbroken)?	Yes 🗹	No 🗌	
14.	Does paperw	ork match bottle labels?	Yes 🖌	No 🗌	
15.	Are matrices	correctly identified on Chain of Custody?	Yes 🖌	No 🗌	
16.	Is it clear what	at analyses were requested?	Yes 🗸	No 🗌	
17.	Were all hold	ing times able to be met?	Yes 🖌	No 🗌	
<u>Spe</u>	cial Handli	ing (if applicable)			
18.	Was client no	tified of all discrepancies with this order?	Yes	No 🗌	NA 🗹
	Person	Notified: Date			
	By Who	m: Via:	🗌 eMail 🗌 Pl	none 🗌 Fax 🗌	In Person
	Regardi	ng:			
	Client In	istructions:			
19.	Client In Additional rer				

#### 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

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Distribution: White - Lab, Yellow - File, Pink - Originator

A many biclose         Second construction         Geoengineers         Goo Stewart Street, Suite 1700         Zip:       Seattle, WA 98103 $a = Air, AQ = Aqueous, B = Bulk, O = Other, P = Product, S = Soll, SD = Date       Sample       Sample         20 - 2l, B q/lq los Construction       rame       Matrixity       rame         20 - 2l, B q/lq los Construction       rame       Sample       Sample       Sample         20 - 2l, B q/lq los Construction       sample       Sample       Sample       Sample         20 - 2l, B q/lq los Construction       sample       Sample       Sample         20 - 2l, B q/lq los Construction       sample       Sample       Sample         20 - 2l, B q/lq los Construction       sample       Sample       Sample         20 - 2l, B q/lq los Construction       sample       Sample       Sample         20 - 2l, B q/lq q/lq los Construction       sample       Sample       Sample       Sample         20 - 2l, B q/lq q/lq los Cons       sample       Sample  $		NUN IIINIC	X	11/ 10/12/	A II CU	I ( / K
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Ameriprice       page 4/4 page       page 4/4 page <td></td> <td>TATURE (SZO</td> <td></td> <td>e 1570</td> <td>Date/Tim</td> <td>Relinguished</td>		TATURE (SZO		e 1570	Date/Tim	Relinguished
ATTUNETION       Date: $y   / D25$ Date: $y   / D25$ Date: $y   / D25$ N       Tel: 206-332-2178       For: 206-332-2178       Polet Name:       Environment Street, Sale 700       Environment Street 700       <	3. Groundwater and soil RLs per the WO 4. COD = Chemical oxygen demand	l above, that I have verified Client's	t Analytical on behalf of the Client named	o this Agreement with Fremon nd backside of this Agreement	authorized to enter int he terms on the front a	epresent that I am a eement to each of th
$ \begin{array}{ c                                   $			ill be held for 30 days unless otherwise noted. A ained after 30 days.)	Disposal by Lab (Samples w assessed if samples are retained)	Return to Client	1
$\begin{array}{ c c c } \hline \textbf{M} & \textbf{Tel: 206-352-3790} \\ \textbf{N} & \textbf{Tel: 206-352-3790} \\ \textbf{M} & \textbf{M} & \textbf{M} & \textbf{M} \\ \textbf{M} & \textbf{M} \\ \textbf{M} & \textbf{M} & \textbf{M} \\ \textbf{M} & \textbf{M} \\ \textbf{M} & \textbf{M} \\ \textbf{M} & \textbf{M} \\ \textbf{M} & \textbf{M} & \textbf{M} \\ \textbf{M} \\ \textbf{M} & \textbf{M} \\ $		Turn-arc	O-Phosphate Fluoride	nloride Sulfate	te Nitrite	nions (Circle): N
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	Sb Se Sr Sn Ti TI U V	Cr Cu Fe Hg K	Ag Al As B Ba Be Ca Cd	Priority Pollutants	MTCA-5	etals Analysis (Circl
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$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$						
Date: $g / U / 2015$ Laboratory Project Nome:       Laboratory Project Nome:       Sample: $g / U / 2015$ N.       Trice       Project Name:       Gas Works Park Ste       Page:	1th			-	9	3-1-
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$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	1	tor now	X X -no 4nd	1150 5	10	13-8
$ \begin{array}{ c c c c c c } \hline \laboratory Project No (internal) \\ \hline \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \$	FISED FILTENED		-6	GW	0914 91	14-0-16
Array       Date: $9/ V $ /2016       Laboratory Project No:         N.       Tel: 206-352-3790       Project Name:       Gas Works Park Site       Page:			XX		33	14-28-2
$ \begin{array}{ c                                   $	P				22	14-22-
$ \begin{array}{ c                                   $	(0)+			S	1.8	14-20-2
Analytical       Date:	Comments			Sample Time (Matrix)*	So S	
A malytical       Date:	Storm Water, WW = Waste Water			c = coil	2.2410	
A malytical       Date: 9/ 1/4 / 2016         A malytical       Date: 9/ 1/4 / 2016         A malytical       Fax: 206-352-3790         Fax: 206-352-7178       Project Name:         GeoEngineers       Project None:         GeoEngineers       Project No:         600 Stewart Street, Suite 1700       Location:         Scattle WA 08103       Booset To (DM):	cdelavia@geoengineers.com	shsmith@recenciceers.com	Nepoit to (rivi).	E.S.		State, Zip:
A malythcal N. Tel: 206-352-3790 Fax: 206-352-7178 Project Name: Gas Works Park Site GeoEngineers Project No: 0186-846-01 Task 1803 600 Stewart Street, Suite 1700 Location: Seattle			Bosort To (DM/).		Seattle WA 98103	
Amalylical       Date:		Seattle	Location:	Suite 1700	600 Stewart Street,	ress:
Analytical       Date: 9/ /4 /2016         V.       Tel: 206-352-3790         Fax: 206-352-7178       Project Name: Gas Works Park Site	Collected by: GRL/CVD		Project No:		GeoEngineers	1ŧ
Date: 9/ /4/2016		Gas Works Bark Site	Project Name	-3790 -7178	Tel: 206-352 Fax: 206-352	0 Fremont Ave N. ttle, WA 98103
	Laboratory Project No (Internal):	16			Analyti	

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2	Tel: 206-352-3790	90						Page:of:	
	Fax: 206-352-7178	178			Project Name:	Gas Works Park Site	Park Site		
Client: Geo£	GeoEngineers				* Project No:	0186-846-	0186-846-01 Task 1803	Collected by: GRL/CVD	
8	600 Stewart Street, Suite 1700	te 1700			Location:	Seattle			
e, Zip:	Seattle, WA 98103				Report To (PM):		Sandra Smith / Claudia De La Via		
	253.722.2418	Fax:			PM Email:		sbsmith@geoengineers.com	cdelavia@geoengineers.com	m
A = Air, AQ = A		O = Other, P = Product,	S = Soil,	SD = Sediment, SI	N = Water,	DW = Drinking Water, GV	GW = Ground Water, SW = S	SW = Storm Water, WW = Waste Water	er
			Sample	A STATE STAT	Sol and the sol	1931 935   1931   1935   1935			
Sample Name	Sample Date	e Sample Time	Type (Matrix)*	ASSERIE LOT LE SUN	State S	Me			Comments
M-14-20-21.8	9/14	-			$\bigotimes$	<u> </u>		Bottles for COD	celt Grain Add enalysis
PAL 14-20-025			5		$\otimes$			Bottles for COD	good and and
PAI-14-28-33	4	1050	0		XX				
PAL-14-0-Keo914	1 9/4	1109	5	466	8			FIGID FILTENED	B
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M-13-1-160914	9/14	1 IUSOGIA	Sin	XXXX				tield Fillera	
PAI-									
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10 PAI-								A CANADA AND A CANADA	
**Metals Analysis (Circle): MTCA-5	A-5 RCRA-8	<b>Priority Pollutants</b>	itants TAL	Individual: Ag	g Al As B Ba Be Ca Cd	Co Cr Cu Fe	Hg K Mg Mn Mo Na Ni Pb	Pb Sb Se Sr Sn Ti Ti U V	/ Zn
e): Mitrate	Nitrite Chi	Chloride Sulfate	te Bromide Lab (Samples will	de O-Phosphate vill be held for 30 days	te Fluoride ys unless otherwise not		Turn-around times for samples received after 4:00pm will begin on the following business day.	3	Special Remarks: 1. Groundwater arsenic and sulfide samples on ASAP TAT. 2. Groundwater Iron and COD plus soil COD and grain size samples on
I represent that I am authorized to enter into this Agreement with Fremont Analytical on behalf of the Client named above, that I have veri accommon to each of the forms on the front and backside of this Agreement.	d to enter into the front and	assessed in its Agreement backside of th	with Fremo	assessed if samples are recalled after 50 0495. Agreement with Fremont Analytical on b Aside of this Agreement.	behalf of the Client nam	ned above, that I h	we verified Client's	standard TAT. 3. Groundwater and soil RLs per the WO 4. COD = Chemical oxygen demand	per the WO
Relinguished	Date/Time	1500		Refeived ×	SAN	AlterTime ALAHO	(SO)	5. Run for dissolved metals	
Relinguished X	Date/Time	ili re	))	Releived	UNY.	bate/Time		TAT → SameDay^ NextDay^ 2 Day	Day^ 2 Day 3 Day STD
I NA	1112 11/2	1101	11	X	1	JE VIC.	222	Aplease coordinate with the lab in advance	's in advance



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

**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,

Mohal c. Rady

Mike Ridgeway Laboratory Director

DoD/ELAP Certification #L2371, ISO/IEC 17025:2005 ORELAP Certification: WA 100009-007 (NELAP Recognized)



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



Case Narrative

Date: 10/6/2016

CLIENT:GeoEngineersProject: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 & Acronyms**



WO#: **1609188** Date Reported: **10/6/2016** 

## Qualifiers:

- * Flagged value is not within established control limits
- B Analyte detected in the associated Method Blank
- D Dilution was required
- E Value above quantitation range
- H Holding times for preparation or analysis exceeded
- I Analyte with an internal standard that does not meet established acceptance criteria
- J Analyte detected below Reporting Limit
- N Tentatively Identified Compound (TIC)
- Q Analyte with an initial or continuing calibration that does not meet established acceptance criteria
- (<20%RSD, <20% Drift or minimum RRF)
- S Spike recovery outside accepted recovery limits
- ND Not detected at the Reporting Limit
- R High relative percent difference observed

Acronyms:

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



# **Analytical Report**

 Work Order:
 1609188

 Date Reported:
 10/6/2016

Client: GeoEngineers			(	Collection	n 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-16091	5							
Analyses	Result	RL	Qual	Units	DF	Date Analyzed		
Dissolved Metals by EPA Method	d 200.8			Batc	h ID: 14	843 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 SI	<u>M 5220D</u>			Batc	h ID: R3	1908 Analyst: MW		
Chemical Oxygen Demand	63.4	50.0	D	mg/L	5	9/22/2016 12:36:42 PM		
Sulfide by SM 4500-S2-F				Batc	h ID: R3	1783 Analyst: KT		
Sulfide NOTES:	3.00	0.119	MDL	mg/L	1	9/16/2016 12:06:00 PM		

MDL - Sample reported to Method Detection Limit (MDL)



# **Analytical Report**

 Work Order:
 1609188

 Date Reported:
 10/6/2016

Client: GeoEngineers			(	Collection	n Date:	9/15/2016 12:49:00 PM			
Project:Gas Works Park SiteLab ID:1609188-005		Matrix: Groundwater							
Client Sample ID: PAI-16-S-1609	15								
Analyses	Result	RL	Qual	Units	DF	Date Analyzed			
Dissolved Metals by EPA Metho	od 200.8			Batc	h ID: 14	843 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 S	<u>M 5220D</u>			Batc	h ID: R3	1908 Analyst: MW			
Chemical Oxygen Demand	192	50.0	D	mg/L	5	9/22/2016 12:36:42 PM			
Sulfide by SM 4500-S2-F				Batc	h ID: R3	1783 Analyst: KT			
Sulfide NOTES:	60.4	0.119	MDL	mg/L	1	9/16/2016 12:18:00 PM			

MDL - Sample reported to Method Detection Limit (MDL)



# **Analytical Report**

 Work Order:
 1609188

 Date Reported:
 10/6/2016

Client: GeoEngineers				Collectior	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-16091 Analyses	Result	RL	Qual	Units	DF	Date Analyzed		
Dissolved Metals by EPA Metho	d 200.8			Batc	h ID: 14	843 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 SI	<u>M 5220D</u>			Batc	h ID: R3	1908 Analyst: MW		
Chemical Oxygen Demand	76.6	50.0	D	mg/L	5	9/22/2016 12:36:42 PM		
Sulfide by SM 4500-S2-F				Batc	h ID: R3	1783 Analyst: KT		
Sulfide NOTES:	13.0	0.119	MDL	mg/L	1	9/16/2016 12:21:00 PM		

MDL - Sample reported to Method Detection Limit (MDL)



Project: Gas Works Park Site Client: GeoEngineers Lab Project #: 1609188

UOM = Percent

## Percent Finer (Passing) than the Indicated Size

Grain Size Classification			Gra	ivel			Coarse Sand	Mediur	n Sand	F	ine San	d		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-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%



Project: Gas Works Park Site Client: GeoEngineers Lab Project #: 1609188

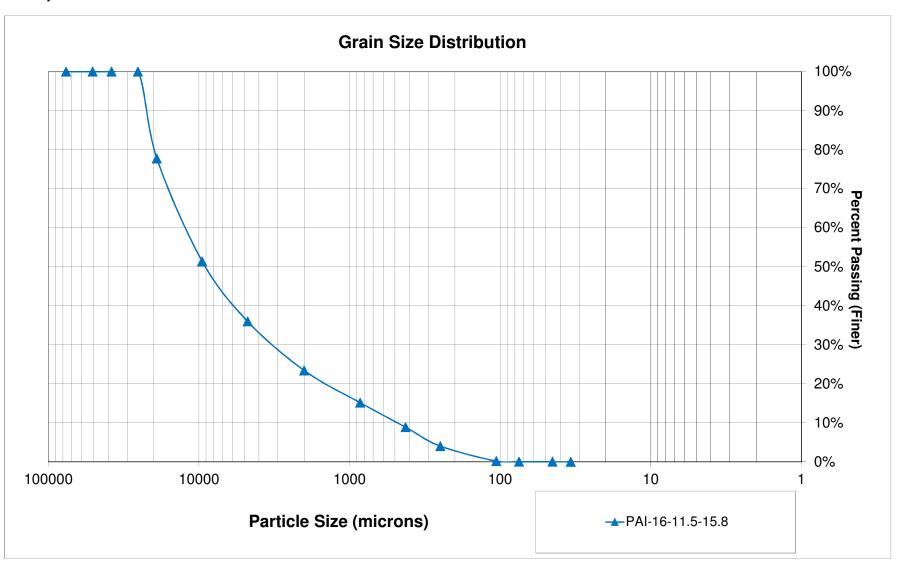
## Percent Retained in Each Size Fraction

UOM = Percent

Grain Size Classification	Gravel				Coarse Sand	Medium Sand Fine Sand			Silt							
Sieve Size (Microns)	>76200		50800- 38100		25400- 19000		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%	4.03%	25.7%	10.5%	10.6%	3.67%	0.690%

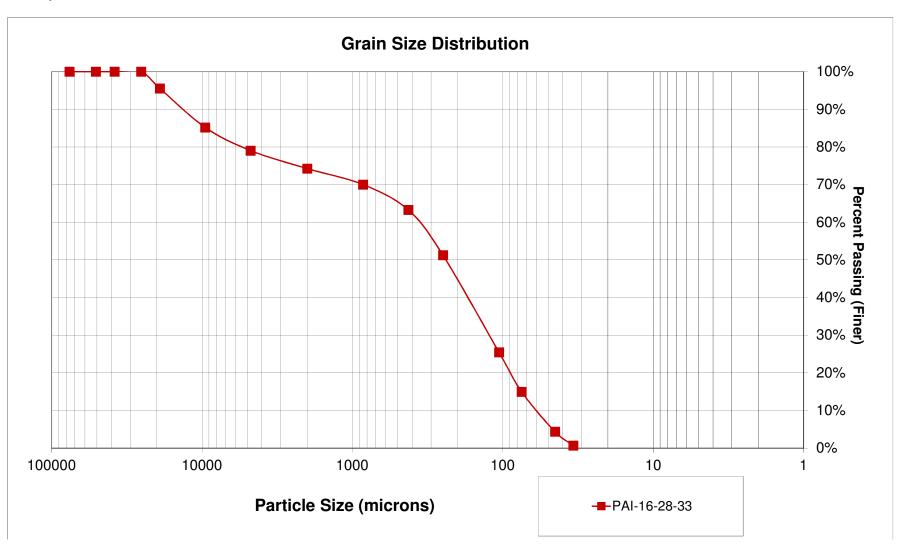


Project: Gas Works Park Site Client: GeoEngineers Lab Project #: 1609188





Project: Gas Works Park Site Client: GeoEngineers Lab Project #: 1609188





A S Environmental
A S roup SA, orp
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Analytical Report for Service Request No: 1611157

October 06, 2016

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

## RE: COD / 1609188

ear 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 re uest number **K1611157**.

Analyses were performed according to our laboratory's E AP-approved uality assurance program. The test results meet re uirements of the current E AP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of E AP-accredited analytes, refer to the certifications section at www.alsglobal.com. All results are intended to be considered in their entirety, and A S roup SA orp. dba A S Environmental (A S) 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) analy ed, as listed in the report.

Please contact me if you have any uestions. My extension is 3375. ou may also contact me via email at anet.Malloch@alsglobal.com.

Respectfully submitted,

ALS Group USA, Corp. dba ALS Environmental

Janet mallich

anet Malloch Pro ect Manager



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Acronyms Qualifiers State Certifications, Accreditations, And Licenses Chain of Custody Total Solids General Chemistry

R TSO TO S R TPART ER

## 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 MCL	Modified 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 tr	Total Petroleum Hydrocarbons 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.pjlabs.com/	L16-57
Louisiana DEQ	http://www.deq.louisiana.gov/portal/DIVISIONS/PublicParticipationandPer mitSupport/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/EnvironmentalLaborator yAccreditation/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/anlayte is offered by that state.



# Chain of Custody

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PAGE: OF: ADDRESS **CHAIN OF CUSTODY RECORD** Omega COCID 271 remo 1 1 Fremont Analytical, Inc. 3600 Fremont Ave. N. enn waren K1611157 Seattle, WA 98103 TEL: 206-352-3790 FAX: 206-352-7178 Website: www.fremontanalytical.com SUB CONTRATOR: ALS SPECIAL INSTRUCTIONS / COMMENTS: COMPANY: **ALS Environmental** Please email results to Michael Ridgeway and Chelsea Ward - mridgeway@fremontanalytical.com; ADDRESS: 1317 South 13th Avenue cward@fremontanalytical.com CITY, STATE, ZIP: Kelso, WA 98626 low level Kl if possible PHONE: EMAIL: FAX: (360) 577-7222 ACCOUNT #: NUMBER OF COMMENTS: Methanol Preserved Weights ПТЕМ # SAMPLE ID CLIENT SAMPLE ID BOTTLE TYPE MATRIX DATE COLLECTED CONTAINERS HOT Sample Notation, Additional Sample Description. Chemical Oxygen Demand by SM5220, Low Level RL 1609188-002A PAI-16-11.5-15.8 CLEAR JARS 4 O Soil 9/15/2016 10:00:00 AM 1

 1
 Incontrol out (m)
 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

 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

 2
 TEST SUB
 TEST SUB
 TEST SUB
 1
 Chemical Oxygen Demand by SM5220, Low Level RL

Relinquished By:	Date: 9/19/16	Time: 14:25	Received By:	Date:	Time 20	REPORT TRANSMITTAL DESIRED:	
Relinquished By:	Date:	Time: Time:	Received By:	Daté: / Date:	Time:	FOR LAB USE ONLY	
TAT: Stand	lard R	RUSH			₽□	Temp of samples  °C   Attempt to Cool ?     Comments:	
Note: RUSH requests will incur surcharges! Page 18 of 35							

ALS							PC Jan	et	
	Cooler Re	ceipt and P	reservatio	on Form					
Client Fremont			Service R	equest <b>K1</b>	6	,11157	) 		
eceived: 9/20/16 Opened: 9/20/16 By: Unloaded: 9/20/16 By:									
1. Samples were received via? USI	PS Fed Ex		- HL PDX	Couri	ier Hand	l Delivered			
. Samples were received in: (circle) Cooler Box Envelope Other NA									
Were custody seals on coolers? NA Q N If yes, how many and where? Our flout									
If present, were custody seals intact	r Q	N	If present,	were they s	signed and d	lated?	Q	N	
Raw Corrected, Raw Corre		Thermometer	Cooler/CO			Fracking Numb		A	
Cooler Temp Cooler Temp Blank Temp	Blank Factor	370	271	<u>NA</u>	EXIOI	92803	31955	A Filed	
					¥			· · ·	
					<u> </u>	<u></u>			
4. Packing material: <i>Inserts Bagg</i>		Gel Packs	Wet Ice	Dry Ice	Sleeves	N	· /J	 N	
<ol> <li>Were custody papers properly filled</li> <li>Were samples received in good cor</li> </ol>	<b>-</b>		Indicata in	the table b	alou	N. N.	$\widetilde{}$	N N	
	le, tissue samples				v <b>Thawed</b>	Thawed		N.	
7. Were all sample labels complete (i.e	e analysis, preserva	tion, etc.)?		-		N	A (Ì	Ν	
8. Did all sample labels and tags agree	e with custody pape	ers? Indicate i	najor discreț	pancies in t	he table on j	<i>page 2.</i> N	A 🕅	Ν	
9. Were appropriate bottles/container	s and volumes rece	ived for the te	sts indicated	?		N	A 🕐	N	
10. Were the pH-preserved bottles (see				H? Indica	te in the tabl	le below 🕅	× Y	Ν	
11. Were VOA vials received without	headspace? Indic	ate in the table	e below.			N N	A) Y	Ν	
12. Was C12/Res negative?	····	·····		·····		(N	<i>y</i> Y	N	
Sample ID on Bottle		ample ID on CO			an Anglas ang ang ang Anglas ang	dentified by:	an a		
	•				<u></u>	dentined by:			
	Bottle Count Ou	t of Head-			Mahima	Decreant Lat	1		
Sample ID		mp space Bro	ke pH	Reagent	Volume added	Reagent Lot Number	Initials	Time	
	······								
					++		+		
					++				
					1 I		1 1		

Notes, Discrepancies, & Resolutions:

7/25/16

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# **Total Solids**

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Analytical Report **Client:** Service Request: K1611157 Fremont Analytical Date Collected: 09/15/16 **Project:** COD/1609188 **Sample Matrix:** Soil **Date Received:** 09/20/16 **Analysis Method:** 160.3 Modified Units: Percent **Prep Method:** Basis: As Received None 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	

QA/QC Report

Client:	Fremont Analytical	Service Request:K1611157
Project	COD/1609188	Date Collected:NA
Sample Matrix:	Sediment	Date Received:NA
Analysis Method:	160.3 Modified	Units:Percent
Prep Method:	None	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

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

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Analytical Report

Client:	Fremont Analytical			Ser
Project:	COD/1609188			Da
Sample Matrix:	Soil			Da
Analysis Method:	SM 5220 C Modified			
Prep Method:	ALS SOP			
			 L (COD)	

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	

QA/QC Report

Client:	Fremont Analytical
Project	COD/1609188
Sample Matrix:	Soil

Analysis Method:SM 5220 C ModifiedPrep 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.

Printed 10/5/2016 11:32:02 AM

Superset Reference:16-0000393323 rev 00 Page 25 of 35

QA/QC Report

Client: Project: Sample Matrix:	Fremont Analytical COD/1609188 Soil			Service Reque Date Collected Date Received Date Analyzed Date Extracte	d: N/A l: N/A d: 09/2	
		Matrix S	pike Summary			
			gen Demand (CO	<b>)D</b> )		
Sample Name:	Batch QC			Unit	s: mg	/Kg
Lab Code:	K1610996-001			Basi	s: Dry	7
Analysis Method:	SM 5220 C Modified					
Prep Method:	ALS SOP					
		Matrix Spik	æ			
		K1610996-001	MS			
Analyte Name		Sample Result	Result	Spike Amount	% Rec	% Rec Limits
Chemical Oxygen De	emand (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.

QA/QC Report

Client: Project: Sample Matrix:	Fremont Analytical COD/1609188 Soil			Service Reque Date Collecte Date Received Date Analyze Date Extracte	d: ] d: ] d: ]	K1611157 N/A N/A 10/4/16 10/4/16
		Matrix S	nika Summary	Date Extract	.u.	10/4/10
		-	pike Summary gen Demand (CO	DD)		
Sample Name:	Batch QC		-	Uni	ts:	mg/Kg
Lab Code:	K1610999-003			Bas	is:	Dry
Analysis Method:	SM 5220 C Modified					
Prep Method:	ALS SOP					
		<b>Matrix Spik</b> K1610999-003				
Analyte Name		Sample Result	Result	Spike Amount	% Rec	c % Rec Limits
Chemical Oxygen De	emand (COD)	51300	79700	34100	83	75-125

Results flagged with an asterisk  $(\ast)$  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.

QA/QC Report

Client: Project: Sample Matrix:	Fremont Analytical COD/1609188 Soil		Service Req Date Analyz Date Extrac	zed:	K161115 09/29/16 NA	
		trol Sample Summary Dxygen Demand (COD)	)			
Analysis Method: Prep Method:	SM 5220 C Modified None		Units: Basis: Analysis Lo	t:	mg/Kg Dry 516546	
Sample Name Lab Control Sample	Lab Code K1611157-LCS1	Result 231	Spike Amount 242	% Rec 96	:	% Rec Limits 85-115

QA/QC Report

Client: Project: Sample Matrix:	Fremont Analytical COD/1609188 Soil		Service Req Date Analyz Date Extrac	zed:	K1611157 10/04/16 NA
		trol Sample Summary Dxygen Demand (COl			
Analysis Method: Prep Method:	SM 5220 C Modified None		Units: Basis: Analysis Lo		mg/Kg Dry 517196
Sample Name Lab Control Sample	Lab Code K1611157-LCS2	<b>Result</b> 4570	Spike Amount 4840	% Rec 94	% Rec Limits 85-115



Work Order: CLIENT:	1609188 GeoEnginee							Che	QC Semical Oxyg	SUMMAI		
Project:	Gas Works											OLLOD
Sample ID MB-R3		SampType: <b>MBLK</b>			Units: <b>mg/L</b>		Prep Date			RunNo: 31		
Client ID: MBLK	N	Batch ID: R31908					Analysis Date	e: <b>9/22/20</b>	016	SeqNo: 60	3040	
Analyte		Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chemical Oxygen E	Demand	ND	10.0									
Sample ID LCS-R	31908	SampType: LCS			Units: <b>mg/L</b>		Prep Date	e: <b>9/22/20</b>	016	RunNo: 31	908	
Client ID: LCSW		Batch ID: R31908					Analysis Date	e: 9/22/20	)16	SeqNo: 60	3041	
Analyte		Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chemical Oxygen	Demand	72.3	10.0	75.00	0	96.3	80	120				
Sample ID 160924	5-001CDUP	SampType: <b>DUP</b>			Units: mg/L		Prep Date	e: <b>9/22/20</b>	016	RunNo: 31	908	
Client ID: BATCH	1	Batch ID: R31908					Analysis Date	e: <b>9/22/20</b>	)16	SeqNo: 60	3043	
Analyte		Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chemical Oxygen E	Demand	20.0	10.0						23.94	18.1	30	
Sample ID 160924	15-001CMS	SampType: <b>MS</b>			Units: mg/L		Prep Date	e: <b>9/22/20</b>	)16	RunNo: 31	908	
Client ID: BATCH	1	Batch ID: R31908					Analysis Date	e: 9/22/20	)16	SeqNo: 60	3044	
Analyte		Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chemical Oxygen E	Demand	92.8	10.0	75.00	23.94	91.8	70	130				
Sample ID 160924	5-001CMSD	SampType: <b>MSD</b>			Units: mg/L		Prep Date	e: <b>9/22/20</b>	016	RunNo: 31	908	
Client ID: BATCH	1	Batch ID: R31908					Analysis Date	e: <b>9/22/20</b>	016	SeqNo: 60	3045	
Analyte		Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chemical Oxygen	Demand	90.1	10.0	75.00	23.94	88.3	70	130	92.78	2.90	30	

Fremont
Analytical

	88 ngineers /orks Park Site						Dis	QC S solved Me	SUMMAI		-
Sample ID MB-14843	SampType: MBLK			Units: µg/L		Prep Date	e: <b>9/16/20</b>	16	RunNo: 317	90	
Client ID: MBLKW	Batch ID: 14843					Analysis Date	e: <b>9/16/20</b>	16	SeqNo: 600	9479	
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic Iron	ND ND	0.500 50.0									
Sample ID LCS-14843	SampType: LCS			Units: µg/L		Prep Date	e: <b>9/16/20</b>	16	RunNo: 317	/90	
Client ID: LCSW	Batch ID: 14843					Analysis Date	e: 9/16/20	16	SeqNo: 600	9480	
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 1609147-001CD	UP SampType: DUP			Units: µg/L		Prep Date	e: 9/16/20	16	RunNo: 317	/90	
Client ID: BATCH	Batch ID: 14843					Analysis Date	e: <b>9/16/20</b>	16	SeqNo: 600	9487	
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 1609147-001CM	SampType: MS			Units: µg/L		Prep Date	e: 9/16/20	16	RunNo: 317	/90	
Client ID: BATCH	Batch ID: 14843					Analysis Date	e: <b>9/16/20</b>	16	SeqNo: 600	9488	
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 1609147-001CM	SD SampType: MSD			Units: µg/L		Prep Date	e: 9/16/20	16	RunNo: 317	/90	
Client ID: BATCH	Batch ID: 14843					Analysis Date	e: <b>9/16/20</b>	16	SeqNo: 600	9489	
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	
<b>.</b>										Pag	a 31 of



Work Order:	1609188								QC S	SUMMA	RY REF	PORT
CLIENT:	GeoEnginee	ers						<b>D</b> :		tala hu ED	A Matha	- 000 0
Project:	Gas Works	Park Site							ssolved Me	tais by EP	'A Metho	a 200.8
Sample ID 16091	47-001CMSD	SampType: <b>MSD</b>			Units: µg/L		Prep Dat	te: 9/16/20	016	RunNo: 317	790	
Client ID: BATCH	4	Batch ID: 14843					Analysis Dat	te: 9/16/20	016	SeqNo: 600	0489	
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: CLIENT:	1609188 GeoEnginee								QC S	SUMMAI Sulfide b		
Project: Sample ID MB-F Client ID: MBLI		SampType: MBLK Batch ID: R31783			Units: <b>mg/L</b>		Prep Date:			RunNo: 31	783	
Analyte		Result	RL	SPK value	SPK Ref Val	%REC	Analysis Date		RPD Ref Val	SeqNo: <b>60</b> %RPD	RPDLimit	Qual
Sulfide		ND	0.500					5				
Sample ID LCS-	R31783	SampType: LCS			Units: <b>mg/L</b>		Prep Date:	9/16/20	16	RunNo: 31	783	
Client ID: LCS	N	Batch ID: R31783					Analysis Date	9/16/20	16	SeqNo: 60	0321	
Analyte		Result	RL	SPK value	SPK Ref Val	%REC	LowLimit H	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfide		1.80	0.500	2.000	0	90.0	65	135				
Sample ID 1609	188-001BDUP	SampType: <b>DUP</b>			Units: mg/L		Prep Date:	9/16/20	16	RunNo: 31	783	
Client ID: PAI-1	l6-D-160915	Batch ID: R31783					Analysis Date	9/16/20	16	SeqNo: 60	0323	
Analyte		Result	RL	SPK value	SPK Ref Val	%REC	LowLimit H	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfide		3.20	0.500						3.000	6.45	30	
Sample ID 1609	188-001BMS	SampType: <b>MS</b>			Units: mg/L		Prep Date	9/16/20	16	RunNo: 31	783	
Client ID: PAI-1	6-D-160915	Batch ID: R31783					Analysis Date	9/16/20	16	SeqNo: 60	0324	
Analyte		Result	RL	SPK value	SPK Ref Val	%REC	LowLimit H	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfide		5.20	0.500	2.000	3.000	110	65	135				
Sample ID 1609	188-001BMSD	SampType: <b>MSD</b>			Units: <b>mg/L</b>		Prep Date	9/16/20	16	RunNo: 31	783	
Client ID: PAI-1	6-D-160915	Batch ID: R31783					Analysis Date	9/16/20	16	SeqNo: 60	0325	
Analyte		Result	RL	SPK value	SPK Ref Val	%REC	LowLimit H	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfide		5.00	0.500	2.000	3.000	100	65	135	5.200	3.92	30	



## Sample Log-In Check List

CI	ient Name:	GEI	Work Ord	ler Number:	1609188		
Lo	gged by:	Erica Silva	Date Rec	eived:	9/15/201	6 4:17:00 PM	
Cha	in of Custo	<u>ody</u>					
1.	Is Chain of C	ustody complete?	Yes [	✓	No 🗌	Not Present	
2.	How was the	sample delivered?	<u>Courie</u>	er			
<u>Log</u>	In						
-	Coolers are p	resent?	Yes	✓	No 🗌	NA	
5.							
4.	Shipping cont	ainer/cooler in good condition?	Yes	✓	No 🗌		
		s present on shipping container/cooler? ments for Custody Seals not intact)	Yes		No 🗌	Not Required	✓
6.	Was an atten	npt made to cool the samples?	Yes	✓	No 🗌	NA	
7.	Were all item	s 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 san	nple volume for indicated test(s)?	Yes	✓	No 🗌		
10.	Are samples	properly preserved?	Yes	✓	No 🗌		
11.	Was preserva	ative added to bottles?	Yes		No 🔽	NA	
12.	Is there head	space in the VOA vials?	Yes [		No 🗌	NA	✓
13.	Did all sample	es containers arrive in good condition(unbroken)?	Yes	✓	No 🗌		
14.	Does paperw	ork match bottle labels?	Yes	✓	No 🗌		
15.	Are matrices	correctly identified on Chain of Custody?	Yes	✓	No 🗌		
16.	Is it clear what	at analyses were requested?	Yes	✓	No 🗌		
17.	Were all hold	ing times able to be met?	Yes	✓	No 🗌		
Spe	cial Handli	ng (if applicable)					
-		tified of all discrepancies with this order?	Yes		No 🗌	NA	✓
	Person I						
	By Who		eMail	Phone	e 🗌 Fax	In Person	
	Regardi	,					
	Client In	structions:					
19.	Additional ren	narks:					

## Item Information

Item #	Temp ⁰C
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

COC 1.1 - 4.5.16 - 1 of 2

# www.fremontanalytical.com

		Date: 9/15 /2016	Laboratory Project No (internal): 1609188
Ś	Tel: 206-352-3790		Page: of: /
Seattle, WA 98103 Fax: 2	Fax: 200-352-7178	Project Name: Gas Works Park Site	
Client: GeoEngineers		Project No: 0186-846-01 Task 1803	Collected by: GRL/CVD
Address: 600 Stewart	600 Stewart Street, Suite 1700	Location: Seattle	
City, State, Zip: Seattle, WA 98103		Report To (PM): Sandra Smith / Claudia De La Via	
Telephone: 253.722.2418	Fax:	PM Email: sbsmith@geoengineers.com	cdelavia@geoengineers.com
*Matrix Codes: A = Air, AQ = Aqueous, B = Bulk,	O = Other, P = Product, S = Soil,	V = Water, DW = Drinking Water,	GW = Ground Water, SW = Storm Water, WW = Waste Water
Sample Name	Sample Sample Type Type Type (Matrix)* \$\$5500 (300 (300 (300 (300 (300 (300 (300	The state of the s	Comments
PAI-16-D-160915	S 1144 GW XXX		Field Filkered
PAI-16-11.5-15.8	X 1000 S		
PAI-16-15.8-16	2 2001		Bothe for Cab
PAI-16-28-33	X 1125 5		
	0		FIELD FILTENSO
PAI-17-5-160915	V 1603 GW XXXX		Field Filtered
PAI-			
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	b Sb Se Sr Sn Ti Ti U V Zn
***Anions (Circle): Nitrate Nitrite Sample Disposal: Return to Client	Chloride Sulfate Bromide O-Phosphate Disposal by Lab (Samples will be held for 30 days unles	Fluoride Nitrate+Nitrite Turn-around times for samples s otherwise noted. A fee may be 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
represent that I am authorized to ent	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	the Client named aboye, that I have verified Client's	- standard TAT. 3. Groundwater and soil RLs per the WO
Relinquished Date		1 date/Time	5. Run for dissolved metals
Relinguished	Date/Time Reseived		TAT → SameDay^ NextDay^ 2 Day 3 Day STD
1 30.0.110	× ()	+ 10 10 10 10 +	



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

**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,

Mohal c. Rady

Mike Ridgeway Laboratory Director

DoD/ELAP Certification #L2371, ISO/IEC 17025:2005 ORELAP Certification: WA 100009-007 (NELAP Recognized)



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



Case Narrative

Date: 10/6/2016

CLIENT:GeoEngineersProject: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 & Acronyms**



WO#: **1609191** Date Reported: **10/6/2016** 

#### Qualifiers:

- * Flagged value is not within established control limits
- B Analyte detected in the associated Method Blank
- D Dilution was required
- E Value above quantitation range
- H Holding times for preparation or analysis exceeded
- I Analyte with an internal standard that does not meet established acceptance criteria
- J Analyte detected below Reporting Limit
- N Tentatively Identified Compound (TIC)
- Q Analyte with an initial or continuing calibration that does not meet established acceptance criteria
- (<20%RSD, <20% Drift or minimum RRF)
- S Spike recovery outside accepted recovery limits
- ND Not detected at the Reporting Limit
- R High relative percent difference observed

Acronyms:

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



## **Analytical Report**

 Work Order:
 1609191

 Date Reported:
 10/6/2016

Client: GeoEngineers			(	Collection	Date:	9/15/2016 4:51:00 PM
Project:Gas Works Park SiteLab ID:1609191-001			l	Matrix: G	roundwa	ater
Client Sample ID: PAI-17-D-16097	15					
Analyses	Result	MDL	Qual	Units	DF	Date Analyzed
Dissolved Metals by EPA Metho	<u>d 200.8</u>			Batc	h ID: 14	843 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 Sl	<u>M 5220D</u>			Batc	h ID: R3	1908 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				Batc	h ID: R3	1783 Analyst: KT
Sulfide NOTES:	3.20	0.119	MDL	mg/L	1	9/16/2016 12:24:00 PM

MDL - Sample reported to Method Detection Limit (MDL)



## Grain Size by ASTM D422

Project: Gas Works Park Site Client: GeoEngineers Lab Project #: 1609191

UOM = Percent

#### Percent Finer (Passing) than the Indicated Size

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-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

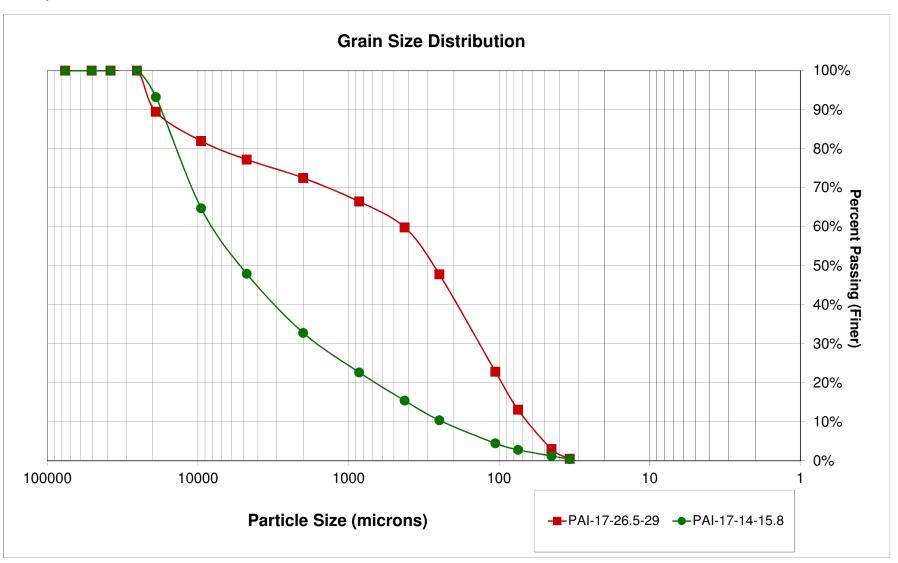
UOM = Percent

Grain Size Classification		Gravel					Coarse Sand	Medium	Medium Sand Fine Sand			Silt				
Sieve Size (Microns)	>76200	76200- 50800	50800- 38100		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





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

Analytical Report for Service Request No: 1611153

October 06, 2016

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

#### RE: COD / 1609191

ear 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 re uest number **K1611153**.

Analyses were performed according to our laboratory's E AP-approved uality assurance program. The test results meet re uirements of the current E AP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of E AP-accredited analytes, refer to the certifications section at www.alsglobal.com. All results are intended to be considered in their entirety, and A S roup SA orp. dba A S Environmental (A S) 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) analy ed, as listed in the report.

Please contact me if you have any uestions. My extension is 3375. ou may also contact me via email at anet.Malloch@alsglobal.com.

Respectfully submitted,

ALS Group USA, Corp. dba ALS Environmental

Janet mallach

anet Malloch Pro ect 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 Total Solids General Chemistry

R TSO TO S R TPART ER

#### 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 MCL	Modified 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 tr	Total Petroleum Hydrocarbons 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

- ${f F}$  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.pjlabs.com/	L16-57
Louisiana DEQ	http://www.deq.louisiana.gov/portal/DIVISIONS/PublicParticipationandPer mitSupport/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/EnvironmentalLaborator yAccreditation/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/anlayte 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

RIGHT SOLUTIONS | RIGHT PARTNER

CHAIN OF CUSTODY RECORD On

Fremont

Omega COCID 273

ADDRESS

K1611153

OF: 1

PAGE:

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

SUB CONTR	ATOR: ALS	COMPANY:	ALS Environ	mental		SPECIAL INSTRUCTIONS / COMMENTS:						
ADDRESS:	1317 South 13th	Avenue			Please email results to Michael Ridgeway and Chelsea Ward - mridgeway@fremontanalytical.com; cward@fremontanalytical.com							
CITY, STATI	^{3, ZIP:} Kelso, WA 9862	26	***************************************		i	a: 0						
HONE: (3	60) 577-7222 FAX:	EMA	(L:		- Low level	KL B	possible					
CCOUNT #	:											
ITEM #	SAMPLE ID	CLIENT SAMPLE ID	BOTTLE TYPE	MATRIX	DATE COLLECTED	NUMBER OF CONTAINERS	COMMENTS: Methanol Preserved Weights HOT Sample Notation, Additional Sample Description.					
	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					
1	TEST_SUB											
	1609191-004A	PAI-17-26.5-29	CLEAR JARS 4 0	Soil	9/15/2016 4:25:00 PM	1	Chemical Oxygen Demand by SM5220, Low Level RL					
2	TEST SUB											

🛄 HARDCOPY (extra cost) 📋 FAX 😥 EMAIL 📋 ONLINE
FOR LAB USE ONLY
Temp of samples  °C   Attempt to Cool ?     Comments:
Page 15 of 5
•



AL	S)								Р	C Jane	et
	_	-	i	Cooler	Receipt and	Preservation For	m				
Client	Fr	enor	vt				K16	11/5	53		
Received:	9/201	6	Opened:	9/20/1	<u>(</u> <i>q</i> By:	Unloa	aded: $\frac{9}{z}$	0/14	By:	f' =	
1. Sample	es were rece	ived via?	USPS	Fed Ex	CUPS ->	C DHL PDX Co	ourier Han	' 1 Deliver	red		
,	es were rece		and the second se	Cooler >	A State of the second s	velope Other			Δ	ŅA	
•	sustody seals		The second second	NA (Y	· · · · · · · · · · · · · · · · · · ·	If yes, how many and	where?	me	tion	<u>t</u>	
If pres	ent, were cu	- stody seals	s intact?	$\mathcal{G}$	> - N	If present, were the		lated?	1	$\bigcirc$	N
Raw	Corrected.	Raw	Corrected	Corr,	Thermometer	Cooler/COC ID		Fracking	Number		
Cooler Temp	Cooler Temp	<u>Temp Blank</u> ろ、う	Temp Blank	Factor	370	NA 273	12 XIal	928	133	NA 19554	Filed
	2.)			L							
		<u></u>		{ 							
										·	
4. Packir	ng material:	Inserts	Baggies	Rubble W	rap ( Gel Packs	Wet Ice Dry Ice	Sleeves				<u> </u>
	custody pap			-	and a second sec				NA	(Y	N
		• •	-		,	Indicate in the table	below.		NA	Ĩ	N
		-	-	-	s were received:	Frozen Partic	ully Thawed	Thawed		-	
	•	•	•		rvation, etc.)?				NA	(Y	Ν
8. Did all	sample labe	els and tag	s agree with	custody pa	pers? Indicate i	najor discrepancies i	n the table on $\mu$	page 2.	NA	Č	Ν
9. Were	appropriate	bottles/cor	tainers and	volumes re	ceived for the te	sts indicated?			NA	Ċ	N
10. Were	the pH-pres	erved bott	les (see SMC	) GEN SOP)	received at the	appropriate pH? India	cate in the tabl	e below	(NA	Y	Ν
11. Were	VOA vials	received w	ithout head	space? Ind	licate in the table	e below.			NÀ	Y	Ν
12. Was	C12/Res neg	ative?							NA	Y	N
· · · · ·			Sec.			en de tradition de la companya de la	s Xa da	iya d			

Sample ID on Bottle	Sample ID on COC	identified by:
	*	

Sample ID	Bottle Count Bottle Type	Out of Temp	Head- space	Broke	рH	Reagent	Volume added	Reagent Lot Number	Initials	Time
								4		

#### Notes, Discrepancies, & Resolutions:_____

7/25/16



# **Total Solids**

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

RIGHT SOLUTIONS | RIGHT PARTNER

Analytical Report **Client:** Service Request: K1611153 Fremont Analytical Date Collected: 09/15/16 **Project:** COD/1609191 **Sample Matrix:** Soil **Date Received:** 09/20/16 **Analysis Method:** 160.3 Modified Units: Percent **Prep Method:** Basis: As Received None 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	

QA/QC Report

Client:	Fremont Analytical	Service Request:K1611153
Project	COD/1609191	Date Collected:NA
Sample Matrix:	Sediment	Date Received:NA
Analysis Method:	160.3 Modified	Units:Percent
Prep Method:	None	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.



# General Chemistry

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

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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	

QA/QC Report

Client:	Fremont Analytical
Project	COD/1609191
Sample Matrix:	Soil

Analysis Method:SM 5220 C ModifiedPrep 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.

QA/QC Report

Client: Project: Sample Matrix:	Fremont Analytical COD/1609191 Soil			Service Reque Date Collected Date Received Date Analyzed Date Extracte	d: N/A l: N/A d: 09/	
		Matrix S	pike Summary			
			gen Demand (CO	<b>)D</b> )		
Sample Name:	Batch QC			Unit	s: mg	/Kg
Lab Code:	K1610996-001			Basi	s: Dry	1
Analysis Method:	SM 5220 C Modified					
Prep Method:	ALS SOP					
		Matrix Spik	e			
		K1610996-001	MS			
Analyte Name		Sample Result	Result	Spike Amount	% Rec	% Rec Limits
Chemical Oxygen De	emand (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.

QA/QC Report

Client: Project: Sample Matrix:	Fremont Analytical COD/1609191 Soil			Service Reque Date Collecte Date Receivee Date Analyze Date Extracte	d: N d: N d: 1	S1611153 J/A J/A 0/4/16 0/4/16
		Matrix S	alleo Cummone	Date Extracto	<b>u</b> . 1	0/4/10
		-	pike Summary gen Demand (CO	<b>)D</b> )		
Sample Name:	Batch QC			Uni	ts: n	ng/Kg
Lab Code:	K1610999-003			Bas	is: I	Dry
Analysis Method:	SM 5220 C Modified					
Prep Method:	ALS SOP					
		Matrix Spik				
		K1610999-003	MS			
Analyte Name		Sample Result	Result	Spike Amount	% Rec	% Rec Limits
Chemical Oxygen De	emand (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.

QA/QC Report

Client: Project: Sample Matrix:	Fremont Analytical COD/1609191 Soil		Service Red Date Analy Date Extra	zed:	K161115 09/29/16 NA	3
		trol Sample Summar Oxygen Demand (CO				
Analysis Method: Prep Method:	SM 5220 C Modified None		Units: Basis: Analysis Lo	ot:	mg/Kg Dry 516546	
Sample Name Lab Control Sample	Lab Code K1611153-LCS1	<b>Result</b> 231	Spike Amount 242	% Rec 96	2	% Rec Limits 85-115

QA/QC Report

Client: Project: Sample Matrix:	Fremont Analytical COD/1609191 Soil		Service Request Date Analyzed: Date Extracted:	10/04/16	-
		trol Sample Summary Dxygen Demand (COI			
Analysis Method: Prep Method:	SM 5220 C Modified None		Units: Basis: Analysis Lot:	mg/Kg Dry 517196	
Sample Name Lab Control Sample	Lab Code K1611153-LCS2	<b>Result</b> 4570		94	% Rec Limits 85-115



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

Analytical Report for Service Request No: 1611729

October 11, 2016

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

#### RE: COD

ear 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 re uest number **K1611729**.

Analyses were performed according to our laboratory's E AP-approved uality assurance program. The test results meet re uirements of the current E AP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of E AP-accredited analytes, refer to the certifications section at www.alsglobal.com. All results are intended to be considered in their entirety, and A S roup SA orp. dba A S Environmental (A S) 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) analy ed, as listed in the report.

Please contact me if you have any uestions. My extension is 3375. ou may also contact me via email at anet.Malloch@alsglobal.com.

Respectfully submitted,

ALS Group USA, Corp. dba ALS Environmental

Janet malloch

anet Malloch Pro ect 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 Case Narrative Chain of Custody Total Solids

**General Chemistry** 

R TSO TO S R TPART ER

#### 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 MCL	Modified 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.pjlabs.com/	L16-57
Louisiana DEQ	http://www.deq.louisiana.gov/portal/DIVISIONS/PublicParticipationandPer mitSupport/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/EnvironmentalLaborator yAccreditation/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/anlayte 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

RIGHT SOLUTIONS | RIGHT PARTNER

#### ALS ENVIRONMENTAL

Client:Fremont AnalyticalProject:NASample Matrix:Soil

Service Request No.: Date Received:

K1611729 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  $4^{\circ}$ 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.

Janet mallach 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

RIGHT SOLUTIONS | RIGHT PARTNER

ADDRESS

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

CITE A TNI	OF	<b>CUSTODY</b>	DECODD	0
CHAIN	$\mathbf{Or}$	CUSIODI	NECOND	U U



OF: 1 KILITZA

PAGE:

1

SUB CONTR.	ATOR: ALS	COMPANY:	ALS Environ	imental	SPECIAL INSTRUCTIONS / COMMENTS:					
ADDRESS:	1317 South 13th A	Avenue			Please email results to cward@fremontanalyt		way and Chelsea Ward - mridgeway@fremontanalytical.com;			
CITY, STATE	^{, ZIP:} Kelso, WA 98626	<u></u>	······································		_					
PHONE: (30	50) 577-7222 FAX:	EMAI	L:							
ACCOUNT #:			<b>****</b>	· · · · · · · · · · · · · · · · · · ·	_					
ITEM #	SAMPLE ID	CLIENT SAMPLE ID	BOTTLE TYPE	MATRIX	DATE COLLECTED	NUMBER OF CONTAINERS	COMMENTS: Methanol Preserved Weights HOT Sample Notation, Additional Sample Description.			
	1609191-003A	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			
	TEST_SUB									

Relinquished By	Date/ 1/29/16	Time:	Received By: Lynsnyl	Date: 9-30-4	Time: 1:40	REPORT TRANSMITTAL DESIRED:
Relinquished By	Date:		Received By:	Date:	Time:	HARDCOPY (extra cost)
Reinquished By:	. Date:	Time:	Received By:	Date:	Time:	FOR LAB USE ONLY
TAT:	Standard 🔽	L	Next BD 2nd BD	3rd B	D []	Temp of samples°C Attempt to Cool?
			Note: RUSH requests will incur su	charges!		
				Dac	10.0 of 18	

								Р	Claus	1
_		Cooler	Receipt a	and Prese	rvation Fo	rm		-		<u>e-3,</u>
client Fremont anado	y fical	) 		Ser	vice Request	K16	11.76	29		
Received: <u>9-30-16</u>	Opened:	9-30-	<u>/6</u> 1	By:	Unlo	aded: 9	-30-16	By:	<u>C</u>	
. Samples were received via?	USPS	Fedex	UPS	DHL	PDX Co	ourier H	and Delivere	d		
2. Samples were received in: (cir	rcle)	Çoster	Stox cs	Envelope	Other			<u> </u>	NA	
8. Were <u>custody seals</u> on coolers	5?	NA Y	Y ÔÑ	If yes, l	now many and	where?				
If present, were custody seals	intact?	Y	N	If pr	esent, were the	ey signed an	d dated?		Y	Ν
Raw Corrected, Raw Cooler Temp Cooler Temp Blank	Corrected Temp Blank	Corr. Factor	Thermom ID		ler/COC ID NA	al a la companya da series de la com La companya da series	Tracking N		NA	File
-0.5 -0.5 2.7	2.7	<u> </u>	298			12 X6	1 92×03	3202	6849	ļ
										<u> </u>
							·····	- · .		
Packing material: Inserts	Baggies	Babble W	rap Gel Pa	acks Wet	Ice Dry Ice	Sleeves				
. Were custody papers properly			$\sim$					NA	\$	N
. Were samples received in goo	•			en)? Indica	te in the table	below.		NA	$\bigotimes$	N
	licable, tiss	•								
<ol> <li>Were all sample labels complete</li> </ol>		•	3 11010 10001	vea: rra	ozen Partia	lly Thawed	Thawed		->	
		sis, preser	vation, etc.)	?		-		NA	$\varphi$	N
. Did all sample labels and tags a	agree with	/sis, preser custody pa	vation, etc.)	? ate major di	iscrepancies ir	-		NA	Ŵ	N
<ul> <li>Did all sample labels and tags a</li> <li>Were appropriate bottles/conta</li> </ul>	agree with a ainers and v	/sis, preser custody pa /olumes re	rvation, etc.) pers? <i>Indic</i> ceived for th	? <i>ate major di</i> he tests indic	iscrepancies in cated?	the table of	n page 2.		$\mathcal{O}$	N N
<ul> <li>Did all sample labels and tags a</li> <li>Were appropriate bottles/conta</li> <li>Were the pH-preserved bottle</li> </ul>	agree with ainers and v s ( <i>see SMO</i>	vsis, preser custody pa volumes re GEN SOP)	rvation, etc.) ppers? <i>Indic</i> ceived for th received at	? <i>tate major di</i> the tests indic the appropri	iscrepancies in cated?	the table of	n page 2.	NA	C) C) Y	N N N
<ul> <li>B. Did all sample labels and tags a</li> <li>Were appropriate bottles/conta</li> <li>Were the pH-preserved bottle</li> <li>Were VOA vials received with</li> </ul>	agree with ainers and v s ( <i>see SMO</i>	vsis, preser custody pa volumes re GEN SOP)	rvation, etc.) ppers? <i>Indic</i> ceived for th received at	? <i>tate major di</i> the tests indic the appropri	iscrepancies in cated?	the table of	n page 2.	NA	A A Y Y	N N N N
<ul> <li>Did all sample labels and tags a</li> <li>Were appropriate bottles/conta</li> <li>Were the pH-preserved bottle</li> </ul>	agree with ainers and v s ( <i>see SMO</i>	vsis, preser custody pa volumes re GEN SOP)	rvation, etc.) ppers? <i>Indic</i> ceived for th received at	? <i>tate major di</i> the tests indic the appropri	iscrepancies in cated?	the table of	n page 2.	NA	C) C) Y	N N N
<ul> <li>Did all sample labels and tags a</li> <li>Were appropriate bottles/conta</li> <li>Were the pH-preserved bottle</li> <li>Were VOA vials received wit</li> <li>Was C12/Res negative?</li> </ul>	agree with ainers and v s ( <i>see SMO</i>	vsis, preser custody pa volumes re <i>GEN SOP</i> ) pace? <i>Ind</i>	vation, etc.) ppers? Indic ceived for the received at licate in the t	? ate major di the tests indic the appropri table below.	iscrepancies in cated?	the table of	n page 2. ble below	NA NA R R R	A A Y Y	N N N N
<ul> <li>B. Did all sample labels and tags a</li> <li>Were appropriate bottles/conta</li> <li>Were the pH-preserved bottle</li> <li>Were VOA vials received with</li> </ul>	agree with ainers and v s ( <i>see SMO</i>	vsis, preser custody pa volumes re <i>GEN SOP</i> ) pace? <i>Ind</i>	rvation, etc.) ppers? <i>Indic</i> ceived for th received at	? ate major di the tests indic the appropri table below.	iscrepancies in cated?	the table of	n page 2.	NA NA R R R	A A Y Y	N N N N
<ul> <li>B. Did all sample labels and tags a</li> <li>Were appropriate bottles/conta</li> <li>Were the pH-preserved bottle</li> <li>Were VOA vials received wit</li> <li>Was C12/Res negative?</li> </ul>	agree with ainers and v s ( <i>see SMO</i>	vsis, preser custody pa volumes re <i>GEN SOP</i> ) pace? <i>Ind</i>	vation, etc.) ppers? Indic ceived for the received at licate in the t	? ate major di the tests indic the appropri table below.	iscrepancies in cated?	the table of	n page 2. ble below	NA NA R R R	A A Y Y	N N N N
<ul> <li>B. Did all sample labels and tags a</li> <li>Were appropriate bottles/conta</li> <li>Were the pH-preserved bottle</li> <li>Were VOA vials received wit</li> <li>Was C12/Res negative?</li> </ul>	agree with ainers and v s ( <i>see SMO</i>	vsis, preser custody pa volumes re <i>GEN SOP</i> ) pace? <i>Ind</i>	vation, etc.) ppers? Indic ceived for the received at licate in the t	? ate major di the tests indic the appropri table below.	iscrepancies in cated?	the table of	n page 2. ble below	NA NA R R R R	A A Y Y	N N N N
<ul> <li>B. Did all sample labels and tags a</li> <li>Were appropriate bottles/conta</li> <li>Were the pH-preserved bottle</li> <li>Were VOA vials received wit</li> <li>Was C12/Res negative?</li> </ul>	agree with o ainers and v s ( <i>see SMO</i> thout heads	vsis, preser custody pa volumes re GEN SOP) pace? Ind	vation, etc.) pers? <i>Indic</i> ceived for the received at <i>licate in the t</i>	? ate major di the tests indic the appropri table below.	iscrepancies in cated?	n the table of	n page 2. ble below Identified by:	NA NA A	A A Y Y	N N N N
<ul> <li>Did all sample labels and tags a</li> <li>Were appropriate bottles/conta</li> <li>Were the pH-preserved bottle</li> <li>Were VOA vials received wit</li> <li>Was C12/Res negative?</li> </ul>	agree with ainers and v s ( <i>see SMO</i>	vsis, preser custody pa volumes re <i>GEN SOP</i> ) pace? <i>Ind</i>	vation, etc.) ppers? Indic ceived for the received at licate in the t	? eate major di the tests indic the appropri table below.	iscrepancies in cated?	the table of	n page 2. ble below	NA NA NA	A A Y Y	N N N N N
<ul> <li>Did all sample labels and tags a</li> <li>Were appropriate bottles/conta</li> <li>Were the pH-preserved bottle</li> <li>Were VOA vials received wit</li> <li>Was C12/Res negative?</li> </ul> Sample ID on Bottle	agree with o ainers and v s (see SMO thout heads	vsis, preser custody pa volumes re <i>GEN SOP</i> ) pace? <i>Ind</i>	vation, etc.) upers? Indic ceived for the received at licate in the the Sample ID or	? eate major di the tests indic the appropri table below.	screpancies in sated? ate pH? Indic	n the table of cate in the ta	n page 2. ble below Identified by: Reagent Lc	NA NA NA	CV V Y Y Y	N N N N N
<ul> <li>Did all sample labels and tags a</li> <li>Were appropriate bottles/conta</li> <li>Were the pH-preserved bottle</li> <li>Were VOA vials received wit</li> <li>Was C12/Res negative?</li> </ul>	agree with o ainers and v s (see SMO thout heads	vsis, preser custody pa volumes re <i>GEN SOP</i> ) pace? <i>Ind</i>	vation, etc.) upers? Indic ceived for the received at licate in the the Sample ID or	? eate major di the tests indic the appropri table below.	screpancies in sated? ate pH? Indic	n the table of cate in the ta	n page 2. ble below Identified by: Reagent Lc	NA NA NA	CV V Y Y Y	N N N N N
<ul> <li>B. Did all sample labels and tags a</li> <li>Were appropriate bottles/conta</li> <li>Were the pH-preserved bottle</li> <li>Were VOA vials received wit</li> <li>Was C12/Res negative?</li> </ul>	agree with o ainers and v s (see SMO thout heads	vsis, preser custody pa volumes re <i>GEN SOP</i> ) pace? <i>Ind</i>	vation, etc.) upers? Indic ceived for the received at licate in the the Sample ID or	? eate major di the tests indic the appropri table below.	screpancies in sated? ate pH? Indic	n the table of cate in the ta	n page 2. ble below Identified by: Reagent Lc	NA NA NA	CV V Y Y Y	N N N N N
<ul> <li>B. Did all sample labels and tags a</li> <li>Were appropriate bottles/conta</li> <li>Were the pH-preserved bottle</li> <li>Were VOA vials received wit</li> <li>Was C12/Res negative?</li> </ul>	agree with o ainers and v s (see SMO thout heads	vsis, preser custody pa volumes re <i>GEN SOP</i> ) pace? <i>Ind</i>	vation, etc.) upers? Indic ceived for the received at licate in the the Sample ID or	? eate major di the tests indic the appropri table below.	screpancies in sated? ate pH? Indic	n the table of cate in the ta	n page 2. ble below Identified by: Reagent Lc	NA NA NA	CV V Y Y Y	N N N N N
<ul> <li>B. Did all sample labels and tags a</li> <li>Were appropriate bottles/conta</li> <li>Were the pH-preserved bottle</li> <li>Were VOA vials received wit</li> <li>Was C12/Res negative?</li> </ul>	agree with o ainers and v s (see SMO thout heads	vsis, preser custody pa volumes re <i>GEN SOP</i> ) pace? <i>Ind</i>	vation, etc.) upers? Indic ceived for the received at licate in the the Sample ID or	? eate major di the tests indic the appropri table below.	screpancies in sated? ate pH? Indic	n the table of cate in the ta	n page 2. ble below Identified by: Reagent Lc	NA NA NA	CV V Y Y Y	N N N N N

e



# **Total Solids**

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

RIGHT SOLUTIONS | RIGHT PARTNER

		Analytical Repor	t				
Client:	Fremont Analytical			Service	<b>Request:</b>	K1611729	
Project:	COD			Date (	Collected:	09/15/16	
Sample Matrix:	Soil			Date 1	Received:	09/30/16	
Analysis Method:	160.3 Modified				Units:	Percent	
Prep Method:	None				<b>Basis:</b>	As Received	
		Solids, Total					
Sample Name	Lab Code	Result	MRL	MDL	Dil.	Date Analyzed	Q

~~~ <b>r</b> ~~~						J	x
1609191-003A	K1611729-001	57.8	-	-	1	10/05/16 16:53	

QA/QC Report

Client:	Fremont Analytical	Service Request:K1611729
Project	COD	Date Collected:NA
Sample Matrix:	Soil	Date Received:NA
Analysis Method:	160.3 Modified	Units:Percent
Prep Method:	None	Basis: As Received
	Renlicate Samn	e Summary

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

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Analytical Report **Client:** Service Request: K1611729 Fremont Analytical Date Collected: 09/15/16 **Project:** COD **Sample Matrix:** Soil **Date Received:** 09/30/16 **Analysis Method:** SM 5220 C Modified Units: mg/Kg **Prep Method:** ALS SOP 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	

QA/QC Report

Client: Project Sample Matrix:	Fremont Analy COD Soil	tical				Date	e Request: Collected: Received:	NA	
						Date 2	Analyzed:	10/07/16	
		Replic	ate Samp	ole Summ	ary				
		General	Chemist	ry Param	eters				
Sample Name:	Batch QC						Units:	mg/Kg	
Lab Code:	K1611836-001						Basis:	Dry	
						Duplicate Sample K1611836-			
					Sample	001DUP			RPD
Analyte Name		Analysis Method	MRL	MDL	Result	Result	Average		Limit
Chemical Oxygen Demar	nd (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.

QA/QC Report

Client: Project: Sample Matrix:	Fremont Analytical COD Soil			Service Requ Date Collecte Date Receive Date Analyze Date Extract	ed: d: ed:	K1611729 N/A N/A 10/7/16 10/7/16
		Matrix S	pike Summary	Dute Extract	cu.	10, 1, 10
		Chemical Oxy	gen Demand (C	OD)		
Sample Name:	Batch QC			Uni	its:	mg/Kg
Lab Code:	K1611836-001			Bas	sis:	Dry
Analysis Method:	SM 5220 C Modified					
Prep Method:	ALS SOP					
		Matrix Spik	e			
		K1611836-001	MS			
Analyte Name		Sample Result	Result	Spike Amount	% R	
Chemical Oxygen De	emand (COD)	5970	64500	52400	112	2 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.

QA/QC Report

Client: Project: Sample Matrix:	Fremont Analytical COD Soil		Service Request: Date Analyzed: Date Extracted:	K161172 10/07/16 NA	-
		trol Sample Summary Oxygen Demand (COD)		
Analysis Method: Prep Method:	SM 5220 C Modified None		Units: Basis: Analysis Lot:	mg/Kg Dry 517791	
Sample Name Lab Control Sample	Lab Code K1611729-LCS	Result 4540		Rec	% Rec Limits 85-115



Work Order: CLIENT:	1609191 GeoEnginee	ers									SUMMA		
Project:	Gas Works	Park Site							Che	mical Oxy	gen Demai	nd by SM	5220D
Sample ID MB-R3 1 Client ID: MBLKV		SampType Batch ID:	: MBLK R31908			Units: mg/L		Prep Date Analysis Date	e: 9/22/20 e: 9/22/20		RunNo: 319 SeqNo: 603		
Analyte		F	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chemical Oxygen D	emand		ND	10.0									
Sample ID LCS-R3	1908	SampType	LCS			Units: mg/L		Prep Date	e: 9/22/20	16	RunNo: 319	908	
Client ID: LCSW		Batch ID:	R31908					Analysis Date	e: 9/22/20	16	SeqNo: 603	3041	
Analyte		F	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chemical Oxygen D	emand		72.3	10.0	75.00	0	96.3	80	120				
Sample ID 160924	5-001CDUP	SampType	DUP			Units: mg/L		Prep Date	e: 9/22/20	16	RunNo: 319	908	
Client ID: BATCH		Batch ID:	R31908					Analysis Date	e: 9/22/20	16	SeqNo: 603	3043	
Analyte		F	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chemical Oxygen D	emand		20.0	10.0						23.94	18.1	30	
Sample ID 160924	5-001CMS	SampType	MS			Units: mg/L		Prep Date	e: 9/22/20	16	RunNo: 319	908	
Client ID: BATCH		Batch ID:	R31908					Analysis Date	e: 9/22/20	16	SeqNo: 603	3044	
Analyte		F	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chemical Oxygen D	emand		92.8	10.0	75.00	23.94	91.8	70	130				
Sample ID 160924	5-001CMSD	SampType	MSD			Units: mg/L		Prep Date	e: 9/22/20	16	RunNo: 319	908	
Client ID: BATCH		Batch ID:	R31908					Analysis Date	e: 9/22/20	16	SeqNo: 603	3045	
Analyte		F	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chemical Oxygen D	emand		90.1	10.0	75.00	23.94	88.3	70	130	92.78	2.90	30	

Fremont
Analytical

Client ID: MBLKW Batch ID: 14843 Analysis Date: 9/16/2016 SeqNo: 60047 Analyte Result RL SPK value SPK Value SPK Ref Val %REC LowLimit HighLimit RPD (Value) %RPD (Value)	-	SUMMARY etals by EPA M	•	Dis							: GeoEngine	Work Or CLIENT: Project:
Analyte Result RI SPK value SPK Ref Val %REC LowLimit HighLimit RPD Ref Val %RPD R Arsenic Iron ND 50.0 Vinits: µg/L Prep Date: 9/16/2016 RunNo: 31790 RunNo: 31790 Sample ID LCS* Batch ID: 14843 SeqNo: 60046 Analysis Date: 9/16/2016 RunNo: 31790 SeqNo: 60046 Analyte Result RL SPK value SPK Ref Val %REC LowLimit HighLimit RPD Ref Val %RPD R Analyte Result RL SPK value SPK Ref Val %REC LowLimit HighLimit RPD Ref Val %RPD R Yeron 101 0.500 100.0 0 101 85 105 105 105 106 107		RunNo: 31790	6	9/16/20	Prep Date:		Units: µg/L			SampType: MBLK) MB-14843	Sample ID
Arsenic Iron ND 0.500 50.0 Units: µg/L Prep Date: 9/16/2016 RunNo: 31790 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: 60042 Analyte Result RL SPK value SPK Ref Val %REC LowLimit HighLimit RPD Ref Val %RPD R 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: 31796 Client ID: BATCH Batch ID: 14843 SPK value SPK Ref Val %REC LowLimit HighLimit RPD Ref Val %RPD F Arasenic 5.03 <th>9</th> <th>SeqNo: 600479</th> <th>6</th> <th>9/16/20</th> <th>nalysis Date:</th> <th></th> <th></th> <th></th> <th></th> <th>Batch ID: 14843</th> <th>MBLKW</th> <th>Client ID:</th>	9	SeqNo: 600479	6	9/16/20	nalysis Date:					Batch ID: 14843	MBLKW	Client ID:
Iron ND 50.0 Sample ID LCS-14843 SampType: LCS Units: µg/L Prep Date: 9/16/2016 RunNo: 317.90 Client ID: LCSW Batch ID: 14843 Italian SPK Ref Val %REC LowLimit HighLimit RPD Ref Val %REC Analysis Date: 9/16/2016 SeqNo: 60.048 Analyte Result RL SPK value SPK Ref Val %REC LowLimit HighLimit RPD Ref Val %REC Italian Result %REC ND 101 8.5 11.5 %REC ND %REC Italian Result RD ND 0 101 8.5 11.5 %REC ND %REC Italian ND 17.90 <	PDLimit Qual	%RPD RPI	RPD Ref Val	ighLimit	LowLimit H	%REC	SPK Ref Val	SPK value	RL	Result		Analyte
Client ID: LCSW Batch ID: 14843 Analysis Date: 9/16/2016 SeqNo: 60048 Analyte Result RL SPK value SPK Ref Val %REC LowLimit HighLimit RPD Ref Val %RPD R Arsenic 101 0.500 100.0 0 101 85 115 %RPD R MRPD NRPD NRP												
Analyte Result RL SPK value SPK Ref Val %REC LowLimit HighLimit RPD Ref Val %RPD R Arsenic Iron 101 0.500 100.0 0 101 85 115 500 150		RunNo: 31790	6	9/16/20	Prep Date:		Units: µg/L			SampType: LCS	LCS-14843	Sample ID
Arsenic Iron 101 0.500 100.0 0 101 85 115 Jron 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 RL SPK value SPK Ref Val %REC LowLimit HighLimit RPD Ref Val %RPD F Arsenic 5.03 0.500	0	SeqNo: 600480	6	9/16/20	nalysis Date:					Batch ID: 14843	LCSW	Client ID:
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 RL SPK value SPK Ref Val %REC LowLinit HighLinit RPD Ref Val %RPD R Arsenic 5.03 0.500	PDLimit Qual	%RPD RPI	RPD Ref Val	ighLimit	LowLimit H	%REC	SPK Ref Val	SPK value	RL	Result		Analyte
Sample ID 1609147-001CDUP SampType: DUP Units: µg/L Prep Date: 9/16/2016 RunNo: 31790 Client ID: BATCH Batch ID: 14843 Image: SPK value SPK Ref Val %REC LowLimit HighLimit RPD Ref Val %RPD Result %RPD Result %RPD %RPD Result %RPD %RPD %RPD Result %RPD				115	85	101	0	100.0	0.500	101		Arsenic
Client ID: BATCH Batch ID: 14843 Analysis Date: 9/16/2016 SeqNo: 6004 grammed and sequence				150	50	95.8	0	1,000	50.0	958		Iron
Analyte Result RL SPK value SPK Ref Val %REC LowLinit HighLinit RPD Ref Val %RPD KRPD		RunNo: 31790	6	9/16/20	Prep Date:		Units: µg/L			SampType: DUP	0 1609147-001CDUP	Sample ID
Arsenic 5.03 0.500 4.720 6.26 Iron 2,870 50.0 100 100 100 100 Sample ID 1609147-001CMS SampType: MS Units: µg/L Prep Date: 9/16/2016 RunNo: 31790 Client ID: BATCH Batch ID: 14843 Image: SPK Ref Val %REC LowLinit HighLinit RPD Ref Val %RPD Fe Analyte Result RL SPK Xelue SPK Ref Val %REC LowLinit HighLinit RPD Ref Val %RPD Fe Arsenic 592 0.500 500.0 4.720 117 70 130 Image: NSD Image: NSD Units: µg/L Prep Date: 9/16/2016 RunNo: 31790 Sample ID 1609147-001CMSD SampType: MSD Units: µg/L Prep Date: 9/16/2016 RunNo: 31790	7	SeqNo: 600487	6	9/16/20	nalysis Date:					Batch ID: 14843	BATCH	Client ID:
Iron 2,870 50.0 3,043 5.91 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: 60048 Analyte Result RL SPK value SPK Ref Val %REC LowLimit HighLimit RPD Ref Val %RPD F Arsenic 592 0.500 50.00 4.720 117 70 130 F F Sample ID 1609147-001CMSD SampType: MSD Units: µg/L Prep Date: 9/16/2016 RunNo: 31790	PDLimit Qual	%RPD RPI	RPD Ref Val	ighLimit	LowLimit H	%REC	SPK Ref Val	SPK value	RL	Result		Analyte
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: 60048 Analyte Result RL SPK value SPK Ref Val %REC LowLimit HighLimit RPD Ref Val %RPD R Arsenic 592 0.500 500.0 4.720 117 70 130 %RPD K	30	6.26	4.720						0.500	5.03		Arsenic
Client ID: BATCH Batch ID: 14843 Analysis Date: 9/16/2016 SeqNo: 60048 Analyte Result RL SPK value SPK Ref Val %REC LowLimit HighLimit RPD Ref Val %RPD R Arsenic 592 0.500 500.0 4.720 117 70 130 VIII VIIII VIIII VIIII VIIIII VIIIIIIIII RPD Ref Val MRPD R Sample ID 1609147-001CMSD SampType: MSD Units: µg/L Prep Date: 9/16/2016 RunNo: 31790	30	5.91	3,043						50.0	2,870		Iron
Analyte Result RL SPK value SPK Ref Val %REC LowLimit HighLimit RPD Ref Val %RPD		RunNo: 31790	6	9/16/20	Prep Date:		Units: µg/L			SampType: MS	0 1609147-001CMS	Sample ID
Arsenic Iron 592 8,050 0.500 50.0 500.0 5,000 4.720 3,043 117 100 70 50 130 150 Sample ID 1609147-001CMSD SampType: MSD Units: µg/L Prep Date: 9/16/2016 RunNo: 31790	8	SeqNo: 600488	6	9/16/20	nalysis Date:					Batch ID: 14843	ВАТСН	Client ID:
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	PDLimit Qual	%RPD RPI	RPD Ref Val	ighLimit	LowLimit H	%REC	SPK Ref Val	SPK value	RL	Result		Analyte
Sample ID 1609147-001CMSD SampType: MSD Units: μg/L Prep Date: 9/16/2016 RunNo: 31790				130	70	117	4.720	500.0	0.500	592		Arsenic
				150	50	100	3,043	5,000	50.0	8,050		Iron
Client ID: Batch ID: 14843 Analysis Date: 9/16/2016 SeqNo: 60048		RunNo: 31790	6	9/16/20	Prep Date:		Units: µg/L			SampType: MSD	0 1609147-001CMSD	Sample ID
	9	SeqNo: 600489	6	9/16/20	nalysis Date:					Batch ID: 14843	ВАТСН	Client ID:
Analyte Result RL SPK value SPK Ref Val %REC LowLimit HighLimit RPD Ref Val %RPD F	PDLimit Qual	%RPD RPI	RPD Ref Val	ighLimit	LowLimit H	%REC	SPK Ref Val	SPK value	RL	Result		Analyte
Arsenic 587 0.500 500.0 4.720 116 70 130 591.9 0.856	30	0.856	591.9	130	70	116	4.720	500.0	0.500	587		Arsenic



Work Order: CLIENT: Project:	1609191 GeoEngineer Gas Works P							Dis	QC S ssolved Me	SUMMAF		-
Sample ID 16091 4 Client ID: BATCH		SampType: MSD Batch ID: 14843			Units: µg/L		Prep Dat Analysis Dat	e: 9/16/20 e: 9/16/20		RunNo: 317 SegNo: 600		
Analyte	-	Result	RL	SPK value	SPK Ref Val	%REC	,		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: CLIENT:	1609191 GeoEngineer									QC S	SUMMAI Sulfide b		
Project:	Gas Works P											<u> </u>	
Sample ID MB-R		SampType: N				Units: mg/L		Prep Date			RunNo: 31		
Client ID: MBLK	w	Batch ID:	R31783					Analysis Date			SeqNo: 60)320	
Analyte		Res	sult	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sulfide			ND	0.500									
Sample ID LCS-R	31783	SampType: I	LCS			Units: mg/L		Prep Date	9/16/20	16	RunNo: 31	783	
Client ID: LCSW		Batch ID:	R31783					Analysis Date	9/16/20	16	SeqNo: 60	0321	
Analyte		Res	sult	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 16091	88-001BDUP	SampType:	DUP			Units: mg/L		Prep Date	9/16/20	16	RunNo: 31	783	
Client ID: BATC	н	Batch ID:	R31783					Analysis Date	: 9/16/20	16	SeqNo: 60)323	
Analyte		Res	sult	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 16091	88-001BMS	SampType: I	MS			Units: mg/L		Prep Date	9/16/20	16	RunNo: 31	783	
Client ID: BATC	н	Batch ID:	R31783					Analysis Date	9/16/20	16	SeqNo: 60)324	
Analyte		Res	sult	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 16091	88-001BMSD	SampType:	MSD			Units: mg/L		Prep Date	9/16/20	016	RunNo: 31	783	
Client ID: BATC	н	Batch ID:	R31783					Analysis Date	9/16/20	16	SeqNo: 60	0325	
Analyte		Res	sult	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	



Sample Log-In Check List

CI	ient Name:	GEI		Work O	rder Num	nber: 1609191		
Lc	gged by:	Erica Silva	l	Date Re	ceived:	9/15/2016	6:23:00 PM	
<u>Cha</u>	in of Custe	<u>ody</u>						
1.	Is Chain of C	ustody com	blete?	Yes	✓	No 🗌	Not Present	
2.	How was the	sample deli	vered?	<u>Clier</u>	<u>nt</u>			
<u>Log</u>	In							
-	Coolers are p	present?		Yes	✓	No 🗌	NA	
4	Shipping con	tainer/coolei	in good condition?	Yes	✓	No 🗌		
			shipping container/cooler?	Yes		No 🗌	Not Required	✓
			ustody Seals not intact)				- 1	
6.	Was an atten	npt made to	cool the samples?	Yes	✓	No 🗌	NA	
7.	Were all item	is received a	t a temperature of >0°C to 10.0°C [★]	Yes	✓	No 🗌	NA	
8.	Sample(s) in	proper conta	ainer(s)?	Yes	✓	No 🗌		
9.	Sufficient sar	mple volume	for indicated test(s)?	Yes	✓	No 🗌		
10.	Are samples	properly pre	served?	Yes	✓	No 🗌		
11.	Was preserva	ative added	to bottles?	Yes		No 🗹	NA	
12.	Is there head	lspace in the	VOA vials?	Yes		No 🗌	NA	✓
13.	Did all sample	es container	s arrive in good condition(unbroken)?	Yes	✓	No 🗌		
14.	Does paperw	ork match b	ottle labels?	Yes	✓	No 🗌		
15.	Are matrices	correctly ide	entified on Chain of Custody?	Yes	✓	No 🗌		
16.	Is it clear what	at analyses v	were requested?	Yes	✓	No 🗌		
17.	Were all hold	ling times ab	le to be met?	Yes	✓	No 🗌		
<u>Spe</u>	cial Handli	ing (if ap	<u>olicable)</u>					
-			discrepancies with this order?	Yes	✓	No 🗌	NA	
	Person	Notified:	Sandy Smith Date			9/16/2016		
	By Who	om:	Erica Silva Via:	✓ eMa	il 🗌 Pl	hone 🗌 Fax	In Person	
	Regardi	ing:	Sample name discrepancy					
	Client In	nstructions:	COC is correct					
19.	Regardi	ng: nstructions:	Sample name discrepancy					

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

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	remont	Chain of Custo	dy Record and La	Chain of Custody Record and Laboratory Services Agreement
	Analytical	Date:	e: 9//5/2016	Laboratory Project No (internal): 1609191 5
3600 Fremont Ave N. Seattle, WA 98103	Tel: 206-352-3790 Fax: 206-352-7178			Page:of:
Client:	GeoEngineers	Project Name:	Gas Works Park Site	Palacted by Del Com
Address:	600 Stewart Street, Suite 1700	Location:	Seattle	
City, State, Zip:	Seattle, WA 98103	Report To (PM):	Sandra Smith / Claudia De La Via	
Telephone:	253.722.2418 Fax:	PM Email:	sbsmith@geoengineers.com	cdelavia@geoengineers.com
*Matrix Codes: A = Air, AQ =	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 Sample Type Date Time (Matrix)*	144 (333) (144 (114 (4) (334) (144 (114 (4) (335) (144 (114 (4))))))))))))))))))))))))))	1743 *** (13 + 444 0 (24) + (14) + (Composite
1 PAI-17-D-160915	- 9/15 1651 v			Field Filest
2 PAI-17-14-15,8	2 ossi 1 a	XX		
3 PAI-17-15,8-16.	6.1 1555 S			Bottle for cab
4 PAI-17-26.5-	29 V 1625 S	XX		1.1.1
5 PAI-				
6 PAI-				
7 PAI-				
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	b Sb Se Sr Sn Ti Ti U V Zn
***Anions (Circle): Nitrate	Nitrite Chloride	le O-Phosphate Fluoride Nitrate+Nitrite	e Turn-around times for samples	Special Remarks: 1. Groundwater arsenic and sulfide samples on ASAP TAT.
Sample Disposal:	Return to Client ussposai by tao (samples will be held for 30 day assessed if samples are retained after 30 days.)	urisposai by Lab (samples will be held for 30 days unless otherwise noted. A fee may be assessed if samples are retained after 30 days.)	be on the following business day.	 Groundwater iron and COD plus soil COD and grain size samples on standard TAT.
agreement to each of the ter	a represent that I am authorized to enter into this Agreement with Fremont agreement to each of the terms on the front and backside of this Agreement.	ar 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.	that I have verified Client's	 Groundwater and soil RLs per the WO GOD = Chemical oxygen demand
Relinquished x	9/15/1/2 1802	Received Date/Time	me	5. Run for dissolved metals
Relinquished x	Date/Time	Received Ann Date/Time	a/.	TAT \rightarrow SameDay^ NextDay^ 2 Day 3 Day STD
		, , , , , , , , , , , , , , , , , , , ,	0/ 15/ 10 v. T	^Please coordinate with the lab in advance
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Distribution: White - Lab, Yellow - File, Pink - Originator

Image: State, Zip: Image: State, Zip: GeoEngineers In: Sample In: Sample In: Sample In: A = Alir, AQ = Aqueous, B = Bulk, O = Other In: A = Alir, AQ = Aqueous, B = Bulk, O = Other In: In: Sample In: In: Sample In: In: In: In: In: In: <t< th=""><th>TAT → SameDav^A NextDav^A 2 Dav 3 Dav STD</th><th>me / / 11/22</th><th>KICO Date/Time</th><th>Received</th><th></th><th></th><th>Date/Time</th><th></th><th>Relinquished x</th></t<>	TAT → SameDav ^A NextDav ^A 2 Dav 3 Dav STD	me / / 11/22	KICO Date/Time	Received			Date/Time		Relinquished x
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Difference in two w. Tel: 2005-352-3770 Project Name: Gas Works Parks no:	3. Groundwater and soll RLs per the WO 4. CDD = Chemical oxygen demand	that I have verified Client's	ehalf of the Client named above,	nt Analytical on I nt.	with Freme his Agreeme	is Agreemen backside of t	n the front and	m authorized of the terms o	i represent that I a agreement to each (
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Important parts g/l5/ Tel: 206-352-7178 Froject Name: Gas Works Parks reoEngineers Froject Name: Gas Works Parks roo Stewart Street, Suite 1700 Location: Santha oo Stewart Street, Suite 1700 Location: Santha oo Stewart Street, Suite 1700 Fax: Project No: Other Seattle sattle, WA 98103 Fax: PM Email: Santha Sonth / Cl 33.722.2418 Fax: PM Email: Santha Sonth / Cl 33.722.2418 Fax: Project No: Santha Sonth / Cl sattle, WA 98103 Somple Fax: PM Email: Santha Sonth / Cl 33.722.2418 Fax: Product, S = Soil, SD = Sediment, SL = Soild, W = Water, DW = Drinking Water, GW = Gro Santha Sonth / Cl sample Sample Sample Sample Santha Sontha So									5 PAI-
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Image: Sample Date Date: 9/15/1 Tel: 206-352-7178 Project Name: Gas Works Park 5 Project Name: Gas Works Park 5 Project No: 0186-846-01 Task Ostewart Street, Suite 1700 Fax: Project No: 0186-846-01 Task Ostewart Street, Suite 1700 Fax: Project No: 0186-846-01 Task Ostewart Street, Suite 1700 Sandra Smith / Cl Sandra Smith / Cl 3.772.2418 Fax: Project No: Sandra Smith / Cl 3.772.2418 Fax: Product, S = Soil, SD = Sediment, SL = Soild, W = Water, DW = Drinking Water, GW = Gro Sandra Smith / Cl sus, B = Bulk, O = Other, P = Product, S = Soil, SD = Sediment, SL = Soild, W = Water, DW = Drinking Water, GW = Gro Gas Sample Sample Sample Sample Sample Sample Sample Sample Sample Date Time Marticly Sample <	for cab				N	1555		8-16.1	3 PAI-17-15
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Analyzican Date: 9//5/1 Analyzican Tel: 206-352-3790 Project Name: Gas Works Parks GeoEngineers Froject Name: Gas Works Parks Project No: Gas Works Parks 600 Stewart Street, Suite 1700 Santhe 1700 Location: Santhe 1700 Santhe 1700 253.772.2418 Fax: Project No: Santhe Smith / Cl Santhe Smith / Cl AC = Aqueous, B = Bulk, O = Other, P = Product, S = Soil, SD = SedIment, SL = Soild, W = Water, DW = Drinking Water, GW = Gro PM Email: Sbsmith @geogra AC = Aqueous, B = Bulk, O = Other, P = Product, S = Soil, SD = SedIment, SL = Soild, W = Water, DW = Drinking Water, GW = Gro Santhe Street Stree	Filespi			XXX	-		g/1:	50915	1 PAL-17-D-1
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Amalyrican Date: 9//5/ Amalyrican Date: 9//5/ M. Tel: 206-352-3790 3 Fax: 206-352-7178 GeoEngineers Project Name: Gas Works Parks 600 Stewart Street, Suite 1700 Location: Seattle Seattle, WA 98103 Fax: 253.722.2418 Fax: PM Email: sbsmith@geoen	orm Water, WW = Waste Water	g Water, GW = Ground Water, SW = Sto	N = Water,				B = Bulk,		*Matrix Codes: A = A
Seattle, VIp: Seattle, WA 98103 Seattle, WA 98103 Concerning of the seattle, WA 981	cdelavia@geoengineers.com	sbsmith@geoengineers.com	PM Email:		×	Fa	1.722.2418		Telephone:
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Project Name: Gas Works Park S GeoEngineers Project No: 0186-646-01 Task		Seattle	Location:			uite 1700	Stewart Street, S	600	Address:
Analytican N. Tel: 206-352-3790 Fax: 206-352-7178 Project Name:	Collected by: GRL/CVD	0186-846-01 Task 1803	Project No:				DEngineers	Geo	Client:
Date: 9/151			Project Name			3790 7178	Tel: 206-352- Fax: 206-352-	lve N. 103	3600 Fremont A Seattle, WA 98
	Laboratory Project No (Internal): 1609191	e: 9//5/2016	Dat				Analyti	G	



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

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,

Mohal c. Rady

Mike Ridgeway Laboratory Director

DoD/ELAP Certification #L2371, ISO/IEC 17025:2005 ORELAP Certification: WA 100009-007 (NELAP Recognized)



CLIENT: Project: Work Order:	GeoEngineers Gas Works Park Site 1609211	Work Order S	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



Case Narrative

WO#: **1609211** Date: **10/6/2016**

CLIENT:GeoEngineersProject: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 & Acronyms



WO#: **1609211** Date Reported: **10/6/2016**

Qualifiers:

- * Flagged value is not within established control limits
- B Analyte detected in the associated Method Blank
- D Dilution was required
- E Value above quantitation range
- H Holding times for preparation or analysis exceeded
- I Analyte with an internal standard that does not meet established acceptance criteria
- J Analyte detected below Reporting Limit
- N Tentatively Identified Compound (TIC)
- Q Analyte with an initial or continuing calibration that does not meet established acceptance criteria
- (<20%RSD, <20% Drift or minimum RRF)
- S Spike recovery outside accepted recovery limits
- ND Not detected at the Reporting Limit
- R High relative percent difference observed

Acronyms:

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



Analytical Report

 Work Order:
 1609211

 Date Reported:
 10/6/2016

Client: GeoEngineers			(Collectio	n Date:	9/16/2016 11:47:00 AM
Project: Gas Works Park Site Lab ID: 1609211-004	046		I	Matrix: G	iroundw	ater
Client Sample ID: PAI-22-S-1609 Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Dissolved Metals by EPA Meth	od 200.8			Batc	h ID: 14	857 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	<u>SM 5220D</u>			Batc	h ID: R3	Analyst: MW
Chemical Oxygen Demand	10.7	10.0		mg/L	1	9/22/2016 12:36:42 PM
Sulfide by SM 4500-S2-F				Batc	h ID: R3	Analyst: KT
Sulfide NOTES:	4.80	0.119	MDL	mg/L	1	9/19/2016 3:55:00 PM

MDL - Sample reported to Method Detection Limit (MDL)



Analytical Report

 Work Order:
 1609211

 Date Reported:
 10/6/2016

Client: GeoEngineers				Collectior	n Dat	e: 9/16/2016 10:50:00 AM
Project: Gas Works Park Site Lab ID: 1609211-005 Client Sample ID: PAI-22-D-160916				Matrix: G	round	dwater
Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Dissolved Metals by EPA Method 2	200.8			Batc	h ID:	14857 Analyst: TN
Arsenic Iron	39.3 5,940	0.500 50.0		μg/L μg/L	1 1	9/19/2016 12:22:28 PM 9/19/2016 12:22:28 PM
Chemical Oxygen Demand by SM	<u>5220D</u>			Batc	h ID:	R31908 Analyst: MW
Chemical Oxygen Demand	28.6	10.0		mg/L	1	9/22/2016 12:36:42 PM
Sulfide by SM 4500-S2-F				Batc	h ID:	R31833 Analyst: KT
Sulfide NOTES:	0.600	0.119	MDL	mg/L	1	9/19/2016 4:00:00 PM

MDL - Sample reported to Method Detection Limit (MDL)



Grain Size by ASTM D422

Project: Gas Works Park Site Client: GeoEngineers Lab Project #: 1609211

UOM = Percent

Percent Finer (Passing) than the Indicated Size

Grain Size Classification			Gra	avel			Coarse Sand	Mediur	n Sand	F	ine San	d		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-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%



Grain Size by ASTM D422

Project: Gas Works Park Site Client: GeoEngineers Lab Project #: 1609211

Percent Retained in Each Size Fraction

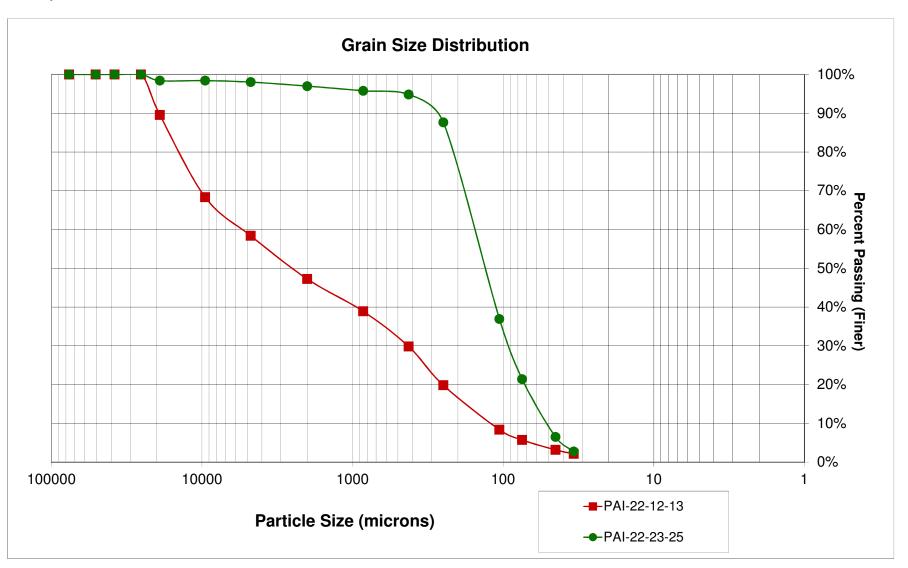
UOM = Percent

Grain Size Classification				Gravel				Coarse Sand	Medium	Sand	F	ine San	d		Silt	
Sieve Size (Microns)	>76200		50800- 38100		25400- 19000		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



www.fremontanalytical.com



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

Analytical Report for Service Request No: 1611155

October 03, 2016

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

RE: COD / 1609211

ear 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 re uest number **K1611155**.

Analyses were performed according to our laboratory's E AP-approved uality assurance program. The test results meet re uirements of the current E AP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of E AP-accredited analytes, refer to the certifications section at www.alsglobal.com. All results are intended to be considered in their entirety, and A S roup SA orp. dba A S Environmental (A S) 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) analy ed, as listed in the report.

Please contact me if you have any uestions. My extension is 3375. ou may also contact me via email at anet.Malloch@alsglobal.com.

Respectfully submitted,

ALS Group USA, Corp. dba ALS Environmental

and mallich

anet Malloch Pro ect Manager



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Table of Contents

Acronyms Qualifiers State Certifications, Accreditations, And Licenses Chain of Custody Total Solids General Chemistry

R TSO TO S R TPART ER

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 MCL	Modified 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.pjlabs.com/	L16-57
Louisiana DEQ	http://www.deq.louisiana.gov/portal/DIVISIONS/PublicParticipationandPer mitSupport/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/EnvironmentalLaborator yAccreditation/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/anlayte is offered by that state.



Chain of Custody

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Fremont Approximate CHAIN OF CUSTODY RECORD

Omega COCID 275 PAGE:

OF:

K1611155

1

1

ADDRESS

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

SUB CONTR	ATOR: ALS	COMPANY;	ALS Enviro	nmental	SPECIAL INSTRUCTIONS /	SPECIAL INSTRUCTIONS / COMMENTS:				
ADDRESS:	1317 South 13th	Avenue				Please email results to Michael Ridgeway and Chelsea Ward - mridgeway@fremontanalytical.com; cward@fremontanalytical.com				
CITY, STATE	^{E, ZIP:} Kelso, WA 9862	6			Las level	- Low level RL ib possible				
PHONE: (3	60) 577-7222 FAX:	EMA	L			٦	56.00			
ACCOUNT #			<u></u>							
ITEM #	SAMPLE ID	CLIENT SAMPLE ID	BOTTLE TYPE	MATRIX	DATE COLLECTED	NUMBER OF CONTAINERS	COMMENTS: Methanol Preserved Weights HOT Sample Notation, Additional Sample Description.			
	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			
1	TEST_SUB									
	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			
2	TEST_SUB			<u>, , , , , , , , , , , , , , , , , , , </u>						

Relinquished By:	Date: Aligiu	Time: 14:25	Received By:	Date	Time: 20	REPORT TRANSMITTAL DESIRED:			
Relinquished By:	Date:	Time:	Received By	Date:	Time:	🗋 HARDCOPY (extra cost) 🗌 FAX 🕅 EMAIL 🗌 ONLINE			
Relinquished By:	Date:	Time:	Received By:	Date:	Time:	FOR LAB USE ONLY			
TAT: Stan	dard 📉	RUSH	Next BD [] 2nd BD []	3rd Bl	>	Temp of samples°C Attempt to Cool ?			
Note: RUSH requests will incur surcharges!									

ALS					PC ·	Janet
·····	/ Cooler	Receipt and I	Preservation For	m	~ ~	
Client Fremo	nt	<i></i>	Service Request	K16 11155		
Received: 9/20/16	Opened: 9 20		Unic	aded: 9/20/14	By:	2
	USPS Fed Ex			ourier Hand Delivered	, 0	
 Samples were received via? Samples were received in: 		· · · · · · · · · · · · · · · · · · ·	OHL PDX C velope Other	ourier Hana Delivered		14
 Samples were received in: Were custody seals on cool 			f yes, how many an	d where? Oul	First	
If present, were custody set		Ž N	-	ney signed and dated?	(RI N
		Thermometer	Cooler/COC ID	Tracking N	lumber	
Raw Corrected Raw Cooler Temp Cooler Temp Big	COLLACIAC		<u>N/</u>		. 1 210	NA Filed
2.) 2.) 2.)	-2.7 4	240	275	12 X6192X6)3 217	19772
				1		
					·	
4. Packing material: Insert	s Baggies Bubble	Wrap Gel Packs	Wet Ice Dry Ice	e Sleeves		
5. Were custody papers prop	erly filled out (ink, sign	ed, etc.)?			NA	N N
6. Were samples received in	• • •				NA	M N
7. Were all sample labels con	applicable, tissue samp nplete (i.e analysis, pres		Frozen Part	ially Thawed Thawed	NA	(N) N
8. Did all sample labels and t	ags agree with custody	papers? Indicate	major discrepancies	in the table on page 2.	NA	M N
9. Were appropriate bottles/	containers and volumes	received for the te	ests indicated?		NA	N N
10. Were the pH-preserved b	ottles (see SMO GEN SO	P) received at the	appropriate pH? Ind	licate in the table below		Y N
11. Were VOA vials received	d without headspace? I	ndicate in the tabl	e below.		NA	Y N
12. Was C12/Res negative?					(NA)	Y N
		ali Arrenda de	Alexandra and the second	llet de la service de la composition de		
Sample ID on Bottle	<u> </u>	Sample ID on CC)C	Identified by	<u>.</u>	
	·····	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,				
Sample ID	Bottle Count Bottle Type	Out of Head- Temp space Bro	oke pH Reage	Volume Reagent I nt added Numbe		ials Time

Notes, Discrepancies, & Resolutions:_



Total Solids

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Analytical Report **Client:** Service Request: K1611155 Fremont Analytical Date Collected: 09/16/16 **Project:** COD/1609211 Sample Matrix: Soil **Date Received:** 09/20/16 **Analysis Method:** 160.3 Modified Units: Percent **Prep Method:** Basis: As Received None 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	

QA/QC Report

Client:	Fremont Analytical				Service Reques	t: K161	1155
Project	COD/1609211				Date Collected	l: 09/16	5/16
Sample Matrix:	Soil				Date Received	l: 09/20)/16
					Date Analyzed	l: 09/26	5/16
		Repli	cate Sample Su	mmary			
		Inc	organic Param	eters			
Sample Name:	PAI-22-23-25				Unit	s: Perc	ent
Lab Code:	K1611155-002				Bas	s: As R	Received
			Sample	Duplicate Sample K1611155- 002DUP			
Analyte Name	Analysis Method	MRL	Result	Result	Average	RPD	RPD Limit
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

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

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Analytical Report **Client:** Service Request: K1611155 Fremont Analytical Date Collected: 09/16/16 **Project:** COD/1609211 **Sample Matrix:** Soil **Date Received:** 09/20/16 **Analysis Method:** SM 5220 C Modified Units: mg/Kg **Prep Method:** ALS SOP 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	

QA/QC Report

Client: Project Sample Matrix:	Fremont Analy COD/1609211 Soil	tical				Date Date	e Request: Collected: Received:	NA NA	
		-	-	le Summ ry Param	•	Date .	Analyzed:	09/29/16	
				- ,					
Sample Name:	Batch QC						Units:	mg/Kg	
Lab Code:	K1610996-001						Basis:	Dry	
						Duplicate Sample K1610996-			
					Sample	001DUP			RPD
Analyte Name		Analysis Method	MRL	MDL	Result	Result	Average	RPD	Limit
Chemical Oxygen Demar	nd (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.

QA/QC Report

Client: Project: Sample Matrix:	Fremont Analytical COD/1609211 Soil			Service Reque Date Collected Date Received Date Analyzed Date Extracte	l: N/. l: N/. l: 09/	
		Matrix S	pike Summary	Date Extracte	u. 07	20/10
			gen Demand (CO	DD)		
Sample Name:	Batch QC			Unit	s: mg	t/Kg
Lab Code:	K1610996-001			Basi	s: Dr	у
Analysis Method:	SM 5220 C Modified					
Prep Method:	ALS SOP					
		Matrix Spik	æ			
		K1610996-001	MS			
Analyte Name		Sample Result	Result	Spike Amount	% Rec	% Rec Limits
Chemical Oxygen De	emand (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.

QA/QC Report

Client: Project: Sample Matrix:	Fremont Analytical COD/1609211 Soil		Service Req Date Analyz Date Extrac	ed:	K161115 09/29/16 NA	5
		ttrol Sample Summary Oxygen Demand (COD))			
Analysis Method: Prep Method:	SM 5220 C Modified None		Units: Basis: Analysis Lo	t:	mg/Kg Dry 516546	
Sample Name Lab Control Sample	Lab Code K1611155-LCS	Result 231	Spike Amount 242	% Rec 96		% Rec Limits 85-115



Work Order: 1609 CLIENT: Geol	211 Engineers						-			
Project: Gas	Works Park Site						Chemical Oxy	gen Demar	ia by Siv	5220
Sample ID MB-R31908	SampType: MBLK			Units: mg/L		Prep Date:	9/22/2016	RunNo: 319	08	
Client ID: MBLKW	Batch ID: R31908					Analysis Date:	9/22/2016	SeqNo: 603	040	
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit H	lighLimit RPD Ref Val	%RPD	RPDLimit	Qual
Chemical Oxygen Demand	ND	10.0								
Sample ID LCS-R31908	SampType: LCS			Units: mg/L		Prep Date:	9/22/2016	RunNo: 319	008	
Client ID: LCSW	Batch ID: R31908					Analysis Date:	9/22/2016	SeqNo: 603	6041	
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit H	lighLimit RPD Ref Val	%RPD	RPDLimit	Qual
Chemical Oxygen Demand	72.3	10.0	75.00	0	96.3	80	120			
Sample ID 1609245-0010	DUP SampType: DUP			Units: mg/L		Prep Date:	9/22/2016	RunNo: 319	008	
Client ID: BATCH	Batch ID: R31908					Analysis Date:	9/22/2016	SeqNo: 603	043	
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit H	lighLimit RPD Ref Val	%RPD	RPDLimit	Qual
Chemical Oxygen Demand	20.0	10.0					23.94	18.1	30	
Sample ID 1609245-001C	MS SampType: MS			Units: mg/L		Prep Date:	9/22/2016	RunNo: 319	008	
Client ID: BATCH	Batch ID: R31908					Analysis Date:	9/22/2016	SeqNo: 603	044	
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit H	lighLimit RPD Ref Val	%RPD	RPDLimit	Qual
Chemical Oxygen Demano	92.8	10.0	75.00	23.94	91.8	70	130			
Sample ID 1609245-0010	MSD SampType: MSD			Units: mg/L		Prep Date:	9/22/2016	RunNo: 319	008	
Client ID: BATCH	Batch ID: R31908					Analysis Date:	9/22/2016	SeqNo: 603	045	
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit H	lighLimit RPD Ref Val	%RPD	RPDLimit	Qual
Chemical Oxygen Demand	90.1	10.0	75.00	23.94	88.3	70	130 92.78	2.90	30	



Work Order:1609211CLIENT:GeoEngiProject:Gas Wo							Di	QC Ssolved Me	SUMMAI etals by EP		
Sample ID MB-14857	SampType: MBLK			Units: µg/L		Prep Da	te: 9/19/2	016	RunNo: 318	321	
Client ID: MBLKW	Batch ID: 14857					Analysis Da	te: 9/19/2	016	SeqNo: 60	1132	
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic Iron	ND ND	0.500 50.0									
Sample ID LCS-14857	SampType: LCS			Units: µg/L		Prep Da	te: 9/19/2	016	RunNo: 31	321	
Client ID: LCSW	Batch ID: 14857					Analysis Da	te: 9/19/2	016	SeqNo: 60	1133	
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 1609211-004ADUF	SampType: DUP			Units: µg/L		Prep Da	te: 9/19/2	016	RunNo: 31	321	
Client ID: PAI-22-S-160916	Batch ID: 14857					Analysis Da	te: 9/19/2	016	SeqNo: 60	1138	
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 Da	te: 9/19/2	016	RunNo: 31	321	
Client ID: PAI-22-S-160916	Batch ID: 14857					Analysis Da	te: 9/19/2	016	SeqNo: 60	1139	
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: CLIENT: Project:	1609211 GeoEngine Gas Works							Di	QC S ssolved Me	SUMMA tals by EP		-
Sample ID 16092	11-004AMSD	SampType: MSD			Units: µg/L		Prep Da	te: 9/19/20	016	RunNo: 318	321	
Client ID: PAI-22	2-S-160916	Batch ID: 14857					Analysis Da	te: 9/19/20)16	SeqNo: 601	140	
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								QC S	SUMMAI	RY REF	ORT
CLIENT:	GeoEngineer								•		oy SM 450	
Project:	Gas Works F	Park Site								Sumuer	Jy 5141 430	JU-52-1
Sample ID MB-	R31833	SampType: MBLK			Units: mg/L		Prep Date	e: 9/19/20)16	RunNo: 31	833	
Client ID: MBL	KW	Batch ID: R31833					Analysis Date	e: 9/19/20)16	SeqNo: 60	1382	
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	e: 9/19/2 ()16	RunNo: 31	833	
Client ID: LCS	w	Batch ID: R31833					Analysis Date	e: 9/19/20	016	SeqNo: 60	1383	
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 1609	211-005BDUP	SampType: DUP			Units: mg/L		Prep Date	e: 9/19/2 (016	RunNo: 31	833	
Client ID: PAI-	22-D-160916	Batch ID: R31833					Analysis Date	e: 9/19/20)16	SeqNo: 60	1386	
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 1609	211-005BMS	SampType: MS			Units: mg/L		Prep Date	e: 9/19/2 (016	RunNo: 31	833	
Client ID: PAI-	22-D-160916	Batch ID: R31833					Analysis Date	e: 9/19/20	016	SeqNo: 60	1387	
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 1609	211-005BMSD	SampType: MSD			Units: mg/L		Prep Date	e: 9/19/2 0	016	RunNo: 31	833	
Client ID: PAI-	22-D-160916	Batch ID: R31833					Analysis Date	e: 9/19/20	016	SeqNo: 60	1388	
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	



Sample Log-In Check List

CI	ient Name:	GEI		Work O	rder Num	ber: 1609211		
Lo	gged by:	Erica Silva		Date Re	ceived:	9/16/2010	6 3:50:00 PM	
<u>Cha</u>	in of Custe	ody						
1.	Is Chain of C	ustody complete	?	Yes	✓	No 🗌	Not Present	
2.	How was the	sample delivere	d?	<u>Cour</u>	<u>ier</u>			
<u>Log</u>	In							
-	Coolers are p	present?		Yes	✓	No 🗌	NA	
4.	Shipping cont	tainer/cooler in g	good condition?	Yes	✓	No 🗌		
5.			pping container/cooler? ody Seals not intact)	Yes		No 🗌	Not Required	✓
6.	Was an atten	npt made to coo	I the samples?	Yes	✓	No 🗌	NA	
7.	Were all item	s received at a	emperature of >0°C to 10.0°C*	Yes	✓	No 🗌	NA	
8.	Sample(s) in	proper containe	r(s)?	Yes	✓	No 🗌		
9.	Sufficient san	nple volume for	indicated test(s)?	Yes	✓	No 🗌		
10.	Are samples	properly preserv	ved?	Yes	✓	No 🗌		
11.	Was preserva	ative added to b	ottles?	Yes		No 🔽	NA	
12.	Is there head	space in the VC	A vials?	Yes		No 🗌	NA	✓
13.	Did all sample	es containers ar	rive in good condition(unbroken)?	Yes	✓	No 🗌		
14.	Does paperw	ork match bottle	labels?	Yes	✓	No 🗌		
15.	Are matrices	correctly identifi	ed on Chain of Custody?	Yes		No 🗌		
16.	Is it clear what	at analyses were	e requested?	Yes	✓	No 🗌		
17.	Were all hold	ing times able to	be met?	Yes	✓	No 🗌		
<u>Spe</u>	cial Handli	ing (if applic	able)					
-			repancies with this order?	Yes	✓	No 🗌	NA	
	Person	Notified: Sa	ndv Smith Date	e 📃		9/16/2016		
	By Who	m: Eri	ca Silva Via:	✓ eMa	il 🗌 Pł	hone 🗌 Fax	In Person	
	Regardi	ng: Sa	mpling time of 16:45					
	Client In	structions: 14	45					
19.	Additional rer	narks:						

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

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www.fremontanalytical.com

Distribution: White - Lab, Yellow - File, Pink - Originator

Liesse coordiningte with the Jap in godauce		1111	0					Г
ADJone poordinate with the lab in advance	12 150	M Glin	1×1) Jau	2/10/10			×
TAT \rightarrow SameDav ^A NextDav ^A 2 Dav 3 Dav STD			Received		Tim	Date	Relinquished	2
5. Run for dissolved metals		Al rullu	x	iculo	Pare/ lime	19	x	×
3. Groundwater and soil RLs per the WO 4. COD = Chemical oxygen demand	, that I have verified Client's	on behalt of the Client named	ement.	kside of this Agr	ront and bac	ie terms on the f	a represent that I am authorized to enter into this Agreement with remont agreement to each of the terms on the front and backside of this Agreement.	0 00 -
 Groundwater iron and COD plus soil COD and grain size samples on standard TAT. 	be on the following business day.	usposal by Lab (Samples will be held for 30 days unless otherwise noted. A fee may be assessed if samples are retained after 30 days.)	Disposal by Lab (Samples will be held for 30 data assessed if samples are retained after 30 days.)	Disposal by Lab (Sai assessed if samples		Return to Client	Sample Disposal:	- IV
Special Remarks: 1. Groundwater arcenic and culfide camples on ACAD TAT	e Turn-around times for samples	O-Phosphate Fluoride Nitrate+Nitrite	Bromide O-P	Sulfate	Chloride	Nitrate Nitrite	***Anions (Circle): Ni	*
9b Sb Se Sr Sn Ti Tl U V Zn	Cu Fe Hg K Mg Mn Mo Na Ni Pb	Ag Al As B Ba Be Ca Cd Co Cr	TAL Individual:	Priority Pollutants	RCRA-8 PI	e): MTCA-5	**Metals Analysis (Circle):	*
							10 PAI-	12
							9 PAI-	19
Yoz Bottle-				1520 5	5	15	PAI-21-14.4-	00
3 8077255 -				M 0051		160716	++ CINSE-1	N
Hoz Bottle -					-	-13,4		6
		8	XXX	1050 GW		0716	PAI- 22-10-160716	Ju
		8	88	IMI GW		160716	4 PAI- 22-5-10	4
		× ×		1010 5		200	S	ω
Yoz Bottle - Silt unit				S 5001	-	.13.6	PAI-22-13.4-	N
				100.0 5	9/16	3	PAI- 22 -12-1	11
Comments	444 454 454 454 454 454 454 454	x e a b	N-Senic (Ep	Sample Sample Type Time (Matrix)*	Sample Date		Sample Name	1
- Chounna waler, SW - Shuffit Waler, WW = Waste Water	/	Hered Led						
cdelavia@geoengineers.com	GW GW	PM Email: <u>sbsmit</u>	S = Soil. SD = Sediment.	P = Product.	B = Bulk. 0 = Other.	AQ = Aqueous. B = Bu	*Matrix Codes: A = Air, A	*
	Sandra Smith / Claudia De La Via	Report To (PM):			98103	Seattle, WA 98103	City, State, Zip:	
	Seattle	Location:		700	600 Stewart Street, Suite 1700	600 Stewart	Address:	
Collected by: GRL/CVD	0186-846-01 Task 1803	Project No:			SJ	GeoEngineers	Client:	
	Gas Works Park Site	Project Name:			Fax: 206-352-7178		Seattle, WA 98103	
Page: of: 31					Tel: 206-352-3790		3600 Fremont Ave N.	
Laboratory Project No (internal): 1609211 of	:: <u>9/ 16 /2016</u>	Date:			nalytical	Ana		
Tuemeauge services Agreement	hy necold allo La					remo		1
bouton Contine Areasont	dy Ronard and I a	Chain of Custody Rev						



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

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,

And c. Rady

Mike Ridgeway Laboratory Director

DoD/ELAP Certification #L2371, ISO/IEC 17025:2005 ORELAP Certification: WA 100009-007 (NELAP Recognized)



CLIENT: Project: Work Order:	GeoEngineers Gas Works Park Site 1609321	Work Order S	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



Case Narrative

Date: 11/7/2016

CLIENT:GeoEngineersProject: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 & Acronyms



WO#: **1609321** Date Reported: **11/7/2016**

Qualifiers:

- * Flagged value is not within established control limits
- B Analyte detected in the associated Method Blank
- D Dilution was required
- E Value above quantitation range
- H Holding times for preparation or analysis exceeded
- I Analyte with an internal standard that does not meet established acceptance criteria
- J Analyte detected below Reporting Limit
- N Tentatively Identified Compound (TIC)
- Q Analyte with an initial or continuing calibration that does not meet established acceptance criteria
- (<20%RSD, <20% Drift or minimum RRF)
- S Spike recovery outside accepted recovery limits
- ND Not detected at the Reporting Limit
- R High relative percent difference observed

Acronyms:

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



Analytical Report

 Work Order:
 1609321

 Date Reported:
 11/7/2016

Client:	GeoEngineers			(Collectio	n Date:	9/26/2016 11:56:00 AM
Project:	Gas Works Park Site						
Lab ID:	1609321-004			I	Matrix: G	roundw	ater
Client Sa	ample ID: PAI-23-S-160	926					
Analyse	S	Result	RL	Qual	Units	DF	Date Analyzed
Dissolv	red Metals by EPA Meth	<u>od 200.8</u>			Batc	h ID: 14	957 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



Analytical Report

 Work Order:
 1609321

 Date Reported:
 11/7/2016

Client: GeoEngineers				Collection	n Date: 9	9/26/2016 11:08:00 AM
Project: Gas Works Park Site						
Lab ID: 1609321-005			ļ	Matrix: G	roundwa	ater
Client Sample ID: PAI-23-D-160	926					
Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Dissolved Metals by EPA Meth	nod 200.8			Batc	h ID: 14	945 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



Analytical Report

 Work Order:
 1609321

 Date Reported:
 11/7/2016

Client: GeoEngineers				Collectior	Date: 9	0/26/2016
Project: Gas Works Park Site Lab ID: 1609321-006 Client Sample ID: D-160926			I	Matrix: G	roundwa	ater
Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Dissolved Metals by EPA Metho	<u>d 200.8</u>			Batcl	n ID: 149	945 Analyst: MW
Arsenic Iron	104 22,900	0.500 50.0		μg/L μg/L	1 1	9/27/2016 5:22:49 PM 9/27/2016 5:22:49 PM



Project: Gas Works Park Site Client: GeoEngineers Lab Project #: 1609321

UOM = Percent

Percent Finer (Passing) than the Indicated Size

Grain Size Classification			G	ravel			Coarse Sand	Mediur	n Sand	I	Fine Sar	nd		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-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%



Project: Gas Works Park Site Client: GeoEngineers Lab Project #: 1609321

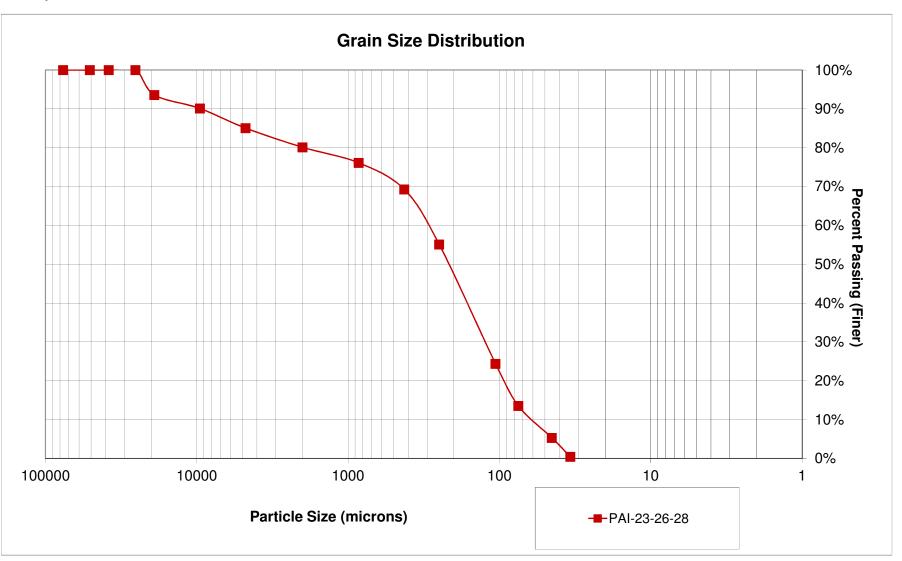
Percent Retained in Each Size Fraction

UOM = Percent

Grain Size Classification				Gravel				Coarse Sand	Medium	n Sand		Fine Sai	nd		Silt	
Sieve Size (Microns)	>76200		50800- 38100		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%



Project: Gas Works Park Site Client: GeoEngineers Lab Project #: 1609321





Project: Gas Works Park Site Client: GeoEngineers Lab Project #: 1609321

UOM = Percent

Percent Finer (Passing) than the Indicated Size

Grain Size Classification			G	ravel			Coarse Sand	Mediur	n Sand	ŀ	Fine Sar	nd		Silt	
Sieve Size	3''	2"	1 1/2"	1"	3/4''	3/8''	#4	#10	#20	#40	#60	#140	#200	#325	#450
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%



Project: Gas Works Park Site Client: GeoEngineers Lab Project #: 1609321

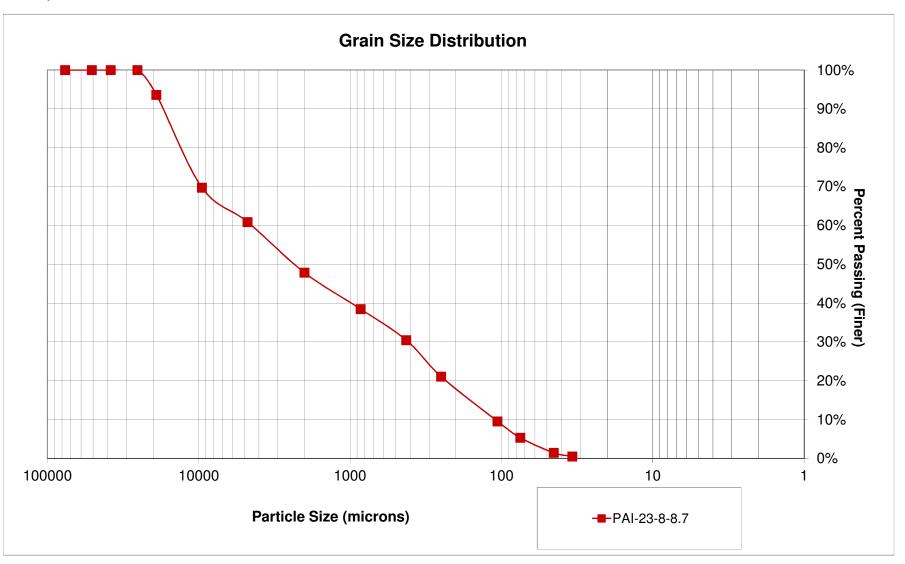
Percent Retained in Each Size Fraction

UOM = Percent

Grain Size Classification				Gravel				Coarse Sand	Mediu	m Sand		Fine Sand	d		Silt	
Sieve Size (Microns)	>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%



Project: Gas Works Park Site Client: GeoEngineers Lab Project #: 1609321





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

Analytical Report for Service Request No: 1611731

October 11, 2016

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

RE: COD

ear 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 re uest number **K1611731**.

Analyses were performed according to our laboratory's E AP-approved uality assurance program. The test results meet re uirements of the current E AP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of E AP-accredited analytes, refer to the certifications section at www.alsglobal.com. All results are intended to be considered in their entirety, and A S roup SA orp. dba A S Environmental (A S) 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) analy ed, as listed in the report.

Please contact me if you have any uestions. My extension is 3375. ou may also contact me via email at anet.Malloch@alsglobal.com.

Respectfully submitted,

ALS Group USA, Corp. dba ALS Environmental

anit malloch

anet Malloch Pro ect 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 Case Narrative Chain of Custody Total Solids

General Chemistry

R TSO TO S R TPART ER

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 MCL	Modified 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.
- $E \qquad \text{The result is an estimated value.}$
- 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

- ${f F}$ 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.pjlabs.com/	L16-57
Louisiana DEQ	http://www.deq.louisiana.gov/portal/DIVISIONS/PublicParticipationandPer mitSupport/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/EnvironmentalLaborator yAccreditation/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/anlayte 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

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ALS ENVIRONMENTAL

Client:Fremont AnalyticalProject:NASample 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.

Janet mallach 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

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CHAIN OF CUSTODY RECORD

Fremont

1

K1611731

ADDRESS

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

SUB CONTR.	ATOR: ALS	COMPANY:	ALS Enviror	nmental	SPECIAL INSTRUCTIONS		
ADDRESS:	1317 South 13th A	venue			Please email results to cward@fremontanaly		way and Chelsea Ward - mridgeway@fremontanalytical.com;
CITY, STATE	^{ZIP:} Kelso, WA 98626						
PHONE: (30	50) 577-7222 FAX:	EMA	L:				
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.
	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
1	TEST_SUB						
,	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
2	TEST_SUB					, 11 1 17 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	

Relinquished By:	Date: -7-24-16	Time:	Received By: Sight	Date: 7-30-6	Time: A.40	REPORT TRANSMITTAL DESIRED:
Relinquished By:	Date:	Time:	Received By:	Date:	Time:	🗋 HARDCOPY (extra cost) 📋 FAX 🔂 EMAIL 🗌 ONLINE
Relinquished By:	Date:	Time:	Received By:	Date:	Tirne:	FOR LAB USE ONLY
TAT:	Standard	RUSH	Next BD [] 2nd BD []	3rd Bl	▶ □	Temp of samples°C Attempt to Cool?
			Note: RUSH requests will incur sur	charges!		
						Page 22 of B

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If pres	ent, were cu	stody seals	intact?			N	- 		ey signed and			Y	N
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Total Solids

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

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Analytical Report **Client:** Service Request: K1611731 Fremont Analytical Date Collected: 09/26/16 **Project:** COD Sample Matrix: Soil **Date Received:** 09/30/16 **Analysis Method:** 160.3 Modified Units: Percent **Prep Method: Basis:** As Received None 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	

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QA/QC Report

Client:	Fremont Analytical	Service Request:K1611731
Project	COD	Date Collected:09/26/16
Sample Matrix:	Soil	Date Received:09/30/16
Analysis Method:	160.3 Modified	Units:Percent
Prep Method:	None	Basis: As Received
	I	olicate 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

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

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Analytical Report **Client:** Service Request: K1611731 Fremont Analytical Date Collected: 09/26/16 **Project:** COD **Sample Matrix:** Soil **Date Received:** 09/30/16 **Analysis Method:** SM 5220 C Modified Units: mg/Kg **Prep Method:** ALS SOP 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	

QA/QC Report

Client: Project Sample Matrix:	Fremont Analy COD Soil	tical				Date Date	e Request: Collected: Received:	NA NA	
		-	-	le Summ ry Param	•	Date 1	Analyzed:	10/07/16	
Sample Name: Lab Code:	Batch QC K1611836-001					Duplicate Sample K1611836-	Units: Basis:	mg/Kg Dry	
Analyte Name Chemical Oxygen Demar	nd (COD)	Analysis Method SM 5220 C Modified	MRL 610	MDL -	Sample Result 5970	001DUP Result 3720	Average 4850	RPD 47 *	RPD Limit 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.

QA/QC Report

Client: Project: Sample Matrix:	Fremont Analytical COD Soil			Service Requ Date Collecte Date Receive Date Analyze Date Extracte	d: 1: d:	K1611731 N/A N/A 10/7/16 10/7/16
		Matrix St	oike Summary			
		-	gen Demand (C	OD)		
Sample Name:	Batch QC			Uni	ts:	mg/Kg
Lab Code:	K1611836-001			Bas	is:	Dry
Analysis Method:	SM 5220 C Modified					
Prep Method:	ALS SOP					
		Matrix Spik	e			
		K1611836-001	MS			
Analyte Name		Sample Result	Result	Spike Amount	% Re	c % Rec Limits
Chemical Oxygen De	emand (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.

QA/QC Report

Client: Project: Sample Matrix:	Fremont Analytical COD Soil		Service Requ Date Analyz Date Extract	ed: 1	1611731 0/07/16 IA
		trol Sample Summary Oxygen Demand (CO			
Analysis Method: Prep Method:	SM 5220 C Modified None		Units: Basis: Analysis Lot	D	ng/Kg Dry 17791
Sample Name Lab Control Sample	Lab Code K1611731-LCS	Result 4540	Spike Amount 4840	% Rec 94	% Rec Limits 85-115

Fremont
Analytical

Work Order:1609321CLIENT:GeoEngineProject:Gas Work	eers s Park Site						Dis	QC Ssolved Me	SUMMAI etals by EP		-
Sample ID MB-14957	SampType: MBLK			Units: µg/L		Prep Date	e: 9/28/20	16	RunNo: 320	016	
Client ID: MBLKW	Batch ID: 14957					Analysis Date	e: 9/28/20	16	SeqNo: 60	5291	
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	e: 9/28/20	16	RunNo: 320)16	
Client ID: LCSW	Batch ID: 14957					Analysis Date	e: 9/28/20	16	SeqNo: 60	5292	
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	e: 9/28/20	16	RunNo: 320)16	
Client ID: BATCH	Batch ID: 14957					Analysis Date	e: 9/28/20	16	SeqNo: 60	5294	
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	e: 9/28/20	16	RunNo: 320)16	
Client ID: BATCH	Batch ID: 14957					Analysis Date	e: 9/28/20	16	SeqNo: 60	5295	
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	e: 9/28/20	16	RunNo: 320)16	
Client ID: BATCH	Batch ID: 14957					Analysis Date	e: 9/28/20	16	SeqNo: 60	5296	
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	
										Dag	o 32 of



Work Order: CLIENT: Project:	1609321 GeoEngineer Gas Works P							Di	QC S ssolved Me	SUMMAF		_
Sample ID 160933 Client ID: BATCH		SampType: MSD Batch ID: 14957			Units: µg/L		Prep Dat Analysis Dat	e: 9/28/20 e: 9/28/20		RunNo: 32(SeqNo: 60 5		
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	

Fremont
Analytical

Work Orde CLIENT: Project:	r: 1609321 GeoEnginee Gas Works							Di	QC S ssolved Me	SUMMAI		-
Sample ID M	B-14945	SampType: MBLK			Units: µg/L		Prep Date	e: 9/27/2	016	RunNo: 320	007	
Client ID: M	BLKW	Batch ID: 14945					Analysis Date	e: 9/27/2	016	SeqNo: 60	5108	
Analyte		Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic Iron		ND ND	0.500 50.0									
Sample ID L(CS-14945	SampType: LCS			Units: µg/L		Prep Date	e: 9/27/2	016	RunNo: 320	007	
Client ID: LC	csw	Batch ID: 14945					Analysis Date	e: 9/27/2	016	SeqNo: 60	5109	
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 16	09324-004ADUP	SampType: DUP			Units: µg/L		Prep Date	e: 9/27/2	016	RunNo: 320	007	
Client ID: B	АТСН	Batch ID: 14945					Analysis Date	e: 9/27/2	016	SeqNo: 60	5117	
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 16	09324-004AMS	SampType: MS			Units: µg/L		Prep Date	e: 9/27/2	016	RunNo: 320)07	
Client ID: B	АТСН	Batch ID: 14945					Analysis Date	e: 9/27/2	016	SeqNo: 60	5118	
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 16	09324-004AMSD	SampType: MSD			Units: µg/L		Prep Date	e: 9/27/2	016	RunNo: 320	007	
Client ID: B	АТСН	Batch ID: 14945					Analysis Date	e: 9/27/2	016	SeqNo: 60	5119	
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	



Work Order:	1609321								QC S	SUMMA	RY REF	PORT
CLIENT: Project:	GeoEnginee Gas Works							Di	ssolved Me	tals by EP	A Metho	d 200.8
Sample ID 160932	24-004AMSD	SampType: MSD			Units: µg/L		Prep Da	te: 9/27/20	016	RunNo: 320	007	
Client ID: BATCH	H	Batch ID: 14945					Analysis Da	te: 9/27/20	016	SeqNo: 60	5119	
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	



С	lient Name:	GEI	Work Order Numb	ber: 1609321		
Lo	ogged by:	Erica Silva	Date Received:	9/26/201	6 3:45:00 PM	
<u>Cha</u>	ain of Custe	ody				
1.	Is Chain of C	ustody complete?	Yes 🖌	No 🗌	Not Present	
2.	How was the	sample delivered?	<u>Courier</u>			
Log	ı In					
	Coolers are p	present?	Yes 🖌	No 🗌		
5.	0001010 0.10 p					
4.	Shipping con	tainer/cooler in good condition?	Yes 🗹	No 🗌		
5.		Is present on shipping container/cooler? nments for Custody Seals not intact)	Yes	No 🗌	Not Required ✔	
6.	Was an atten	npt made to cool the samples?	Yes 🗹	No 🗌	NA 🗌	
7	Were all item	is received at a temperature of >0°C to 10.0°C*	Yes	No 🔽		
1.			received at appropria			
8.	Sample(s) in	proper container(s)?	Yes 🖌	No 🗌		
9.	Sufficient sar	nple volume for indicated test(s)?	Yes 🖌	No 🗌		
10.	Are samples	properly preserved?	Yes	No 🗹		
11.	Was preserva	ative added to bottles?	Yes	No 🗹	NA 🗌	
12	Is there head	lspace in the VOA vials?	Yes	No 🗌	NA 🔽	
		es containers arrive in good condition(unbroken)	_			
-		vork match bottle labels?	Yes 🗹			
			_	_		
-		correctly identified on Chain of Custody?	Yes 🖌	No 🗌		
		at analyses were requested?	Yes 🗹	No 🗌		
17.	Were all hold	ling times able to be met?	Yes 🖌	No 🗌		
<u>Spe</u>	cial Handl	ing (if applicable)				
-		otified of all discrepancies with this order?	Yes 🖌	No 🗌	NA 🗌	
	Person	Notified: Claudia De La Via Da	ate	9/26/2016		
	By Who	m: Erica Silva Vi	a: 🖌 eMail 🗌 Phe	one 🗌 Fax	In Person	
	Regardi	ng: Volume provided for COD preserved	d with NaOH + Zn Aceta	ate		
	Client In	nstructions:				
19	Additional rer	marks:				

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

	remo					Chain o	Chain of Custody Re		d and L	cord and Laboratory Services Agreement	nent
	Ana	nalytical		Sec. 1.			Date:	9/ 26 /2016	6	Laboratory Project No (Internal): 100932	37 of
3600 Fremont Ave N.	Tel: 200	Tel: 206-352-3790								Page:	, ,
						Project Name:		Gas Works Park Site			
Client:	GeoEngineers					Project No:		0186-846-01 Task 1803	03	Collected by: GRL/CVD	
Address:	600 Stewart Street, Suite 1700	treet, Suite 1	700			Location:	Seattle	ttle			
City, State, Zip:	Seattle, WA 98103	8103				Report To (PM):		Sandra Smith / Claudia De La Via	ia De La Via		
Telephone:	253.722.2418	8	Fax:			PM Email:	sds	sbsmith@geoengineers.com	eers.com	cdelavia@geoengineers.com	
*Matrix Codes: A = Air, AQ	AQ = Aqueous, B = Bulk,	ulk, O = Other,	er, P = Product,	S = Soil,	SD = Sediment, SL = Solid, W = Water,	= Solid, W = Wate	DW = Drinking	er, GW=Groun	= Ground Water, SW = S	SW = Storm Water, WW = Waste Water	
Sample Name		Sample Date	Sample	• Sample Type (Matrix)*	43-56-11-11-11-11-11-11-11-11-11-11-11-11-11	Gai SARA DI FIEL ATTE	414 414 414 414 414 414 414 414	4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4		Comments	
1 PAI-23-26-28	00	9/26	×	-		1					
2 PAI- 23-9.2-9.8	9.8	-	2001			×				Valume for cets only	
3 PAI- 23 - 8-8.7	4		010							Jar for grain willy. SP- SNI above screen	Screel
4 PAI- 23-5-16.0926	0926		1156	2 V	XX					Altered	
5 PAI- 23-D-160926	2260		1/08		XX						1
5- D-160926	26	K	1		×				s de se	4	
7 PAI-						0000	6				
8 PAI-											1.
9 PAI-				-							
10 PAI-		4 					-				
**Metals Analysis (Circle):	MTCA-5	RCRA-8 PI	Priority Pollutants	its TAL	Individual: Ag	Al As B Ba Be	Ca Cd Co Cr Cu F	Fe Hg K Mg N	Mg Mn Mo Na Ni Pb	Pb Sb Se Sr Sn Tl Tl U V Zn	
***Anions (Circle): Nitrate	ate Nitrite	Chloride	Sulfate	Bromide	e O-Phosphate	e Fluoride	Nitrate+Nitrite	Turn-around tir received after 4	Turn-around times for samples received after 4:00pm will begin		
Sample Disposal:	Return to Client		assessed if sam	nples are reta	ursposal by Lab (Samples Will be neid for 30 day assessed if samples are retained after 30 days.)	shalf of the Citor	ursposal by Lab (samples will be neid for 30 days unless otherwise noted. A tee may be assessed if samples are retained after 30 days.) A mean and with Reamont A valuation on babalf of the Otions shows the	on the followin	following business day.	 Groundwater Irön and COD plus soli COD and grain size samples on standard TAT. 	nples on
a represent that I am authorized to enter into this Agreement with Fremont Analytical on benait of the Chent named above, that I have agreement to each of the terms on the front and backside of this Agreement.	terms on the fro	ont and bac	greement wi	Agreement.	Analytical on b	shall of the Chen	t named above, tha		verified Client's	 Groundwater and soll RLs per the WO 4. COD = Chemical oxygen demand 	
x X Palisinhuman		126/11	1530	Õ	x ,	4	1/26/11	520		5. Run for dissolved metals	
Relinquished	Date		Date/Time / / / / / / / / / / / / / / / / / /	7	Received	C	O Date/Time	5		TAT → SameDay [^] NextDay [^] 2 Day 3 Day STD	
		n llan	104	J	, non	1 h	1/24/1	6 15.43	45	^Please coordinate with the lab in advance	
						1			·		

Distribution: White - Lab, Yellow - File, Pink - Originator

www.fremontanalytical.com

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www.fremontanalytical.com

	Relinquished	Sample Disposal:	le): Nitrate	**Metais Analysis (Circle): MTCA-5	10 PAI-	9 PAI-	8 PAI-	7 PAI-	6 m D-160926	5 PA-23-D-160926	4 PA-23-5-160926	3 PAI- 23 - 8 - 8.7	2 PAI- 23- 9.2-9.8	1 PAI-23-26-28	Sample Name	*Matrix Codes: A = Air, AQ = Aqueous,		City, State, Zip: Seattle	Address: 600 Ste	Client: GeoEn	3600 Fremont Ave N. Te Seattle, WA 98103 Fa		Fremo
9/20/10 15	Date/Time	to Client assessed if s enter into this Agreement he front and backside of th	Chloride	RCRA-8 Priority Pollutants					*	80/1 3	1156	1010	1005	9/26 1000	Sample Sample Date Time	, B=Bulk, O=Other, P=Product,	253.722.2418 Fax:	Seattle, WA 98103	600 Stewart Street, Suite 1700	GeoEngineers	Tel: 206-352-3790 Fax: 206-352-7178	Analytical	nont
the ship	Received	assessed if samples are retained after 30 days.) Agreement with Fremont Analytical on behalf of the Client named above, th 'keide of this A groement	te Bromide O-Phosphate	itants TAL Individual: Ag					V X X	XX	w XX			CS .	Sample CSP v50 SH Lat Hill of SH	S = Soil, SD = Sedi							
nife 9/2	12	s.) behalf of the Client named al	hate Fluoride Nitrate+Nitrite	g Al As B Ba Be Ca Cd Co				0001240 140	×	×	×	8	×			N = Water,	PM Email:	Report To (PM):	Location:	Project Name: Project No:			Chain of Cus
12a/16 15:45	Date/Time	bove, that I have verified Client's	Nitrite Turn-around times for samples received after 4:00pm will begin	Cr Cu Fe Hg K Mg Mn Mo Na Ni											4167 434 434 434 434 434 434 434 434 434 43	DW = Drinking Water, GW = Ground Water, SW = 5	sbsmith@geoengineers.com	Sandra Smith / Claudia De La Via	Seattle	Gas Works Park Site 0186-846-01 Task 1803		Date: 9/26/2016	stody Record and L
TAT -> SameDay [^] NextDay [^] 2 Day 3 Day STD ^Please coordinate with the lab in advance	4. COD = Chemical oxygen demand 5. Run for dissolved metals	 Groundwater inserie and Soll COD plus soll COD and grain size samples on Groundwater and soll RLs per the WO 		Pb Sb Se Sr Sn Ti Ti U V Zn				SANA Andress miss w	<		Freld Pitered	Jar for grain with Sp- (2) above screen	Volume for cob only	vonintento	Comparte	SW = Storm Water, WW = Waste Water	cdelavia@geoengineers.com			Collected by: GRL/CVD	Page:	Laboratory Project No (Internal): 100932	Chain of Custody Record and Laboratory Services Agreement



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

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,

C. Kady

Mike Ridgeway Laboratory Director

DoD/ELAP Certification #L2371, ISO/IEC 17025:2005 ORELAP Certification: WA 100009-007 (NELAP Recognized)



CLIENT: Project: Work Order:	GeoEngineers Gas Works Park Site 1609324	Work Order S	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



Case Narrative

Date: 10/13/2016

CLIENT:GeoEngineersProject: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 & Acronyms



WO#: 1609324 Date Reported: 10/13/2016

Qualifiers:

- * Flagged value is not within established control limits
- B Analyte detected in the associated Method Blank
- D Dilution was required
- E Value above quantitation range
- H Holding times for preparation or analysis exceeded
- I Analyte with an internal standard that does not meet established acceptance criteria
- J Analyte detected below Reporting Limit
- N Tentatively Identified Compound (TIC)
- Q Analyte with an initial or continuing calibration that does not meet established acceptance criteria
- (<20%RSD, <20% Drift or minimum RRF)
- S Spike recovery outside accepted recovery limits
- ND Not detected at the Reporting Limit
- R High relative percent difference observed

Acronyms:

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



Analytical Report

Work Order: **1609324** Date Reported: **10/13/2016**

Client: GeoEngineers			(Collectior	Date:	9/26/2016 5:00:00 PM
Project: Gas Works Park Site Lab ID: 1609324-003 Client Sample ID: PAI-24-S-160926			I	Matrix: 🕅	/ater	
Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Dissolved Metals by EPA Method	<u>200.8</u>			Batc	n ID: 14	945 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	<u>5220D</u>			Batc	n ID: R3	2068 Analyst: MW
Chemical Oxygen Demand	45.2	20.0	D	mg/L	2	9/30/2016 3:18:15 PM



Analytical Report

Work Order: **1609324** Date Reported: **10/13/2016**

Client: GeoEngineers			(Collection	n Dat	e: 9/26/2016 4:02:00 PM
Project: Gas Works Park Site Lab ID: 1609324-004 Client Sample ID: PAI-24-D-160924	6		I	Matrix: W	/ater	
Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Dissolved Metals by EPA Method	200.8			Batc	h 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			Batc	h ID:	R32068 Analyst: MW
Chemical Oxygen Demand	54.5	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 #: 1609324

UOM = Percent

Percent Finer (Passing) than the Indicated Size

Grain Size Classification			Gı	ravel			Coarse Sand	Mediur	n Sand	F	ine Sar	d		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-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

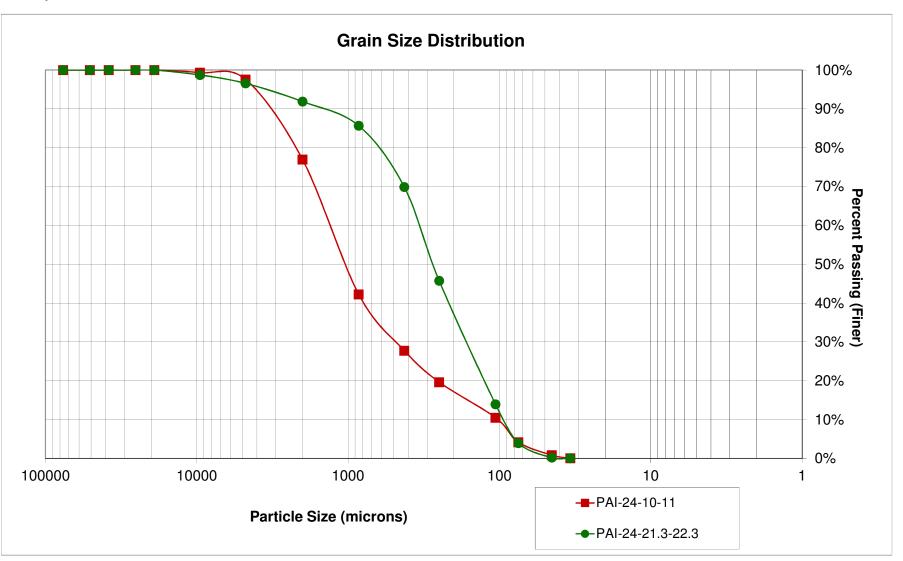
UOM = Percent

Grain Size Classification				Gravel	,			Coarse Sand	Medium	Sand		Fine Sa	nd		Silt	
Sieve Size (Microns)	>76200			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
(111010113)		00000	00100	20100	10000	5020	4700	2000	1	120	200	100				
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





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

Analytical Report for Service Request No: 1611736

October 11, 2016

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

RE: COD

ear 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 re uest number **K1611736**.

Analyses were performed according to our laboratory's E AP-approved uality assurance program. The test results meet re uirements of the current E AP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of E AP-accredited analytes, refer to the certifications section at www.alsglobal.com. All results are intended to be considered in their entirety, and A S roup SA orp. dba A S Environmental (A S) 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) analy ed, as listed in the report.

Please contact me if you have any uestions. My extension is 3375. ou may also contact me via email at anet.Malloch@alsglobal.com.

Respectfully submitted,

ALS Group USA, Corp. dba ALS Environmental

Janet mallich

anet Malloch Pro ect 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 Case Narrative Chain of Custody Total Solids

General Chemistry

R TSO TO S R TPART ER

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 MCL	Modified 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.pjlabs.com/	L16-57
Louisiana DEQ	http://www.deq.louisiana.gov/portal/DIVISIONS/PublicParticipationandPer mitSupport/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/EnvironmentalLaborator yAccreditation/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/anlayte 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

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ALS ENVIRONMENTAL

Client:Fremont AnalyticalProject:NASample Matrix:Soil

Service Request No.: Date Received:

K1611736 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.

Janet mallach Approved by



Chain of Custody

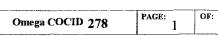
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CHAIN OF CUSTODY RECORD

Fremont

S: TITI MARTINA



1

K1611736

ADDRESS

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

SUB CONTR	ATOR: ALS	COMPANY:	ALS Enviro	nmental	SPECIAL INSTRUCTIONS		
ADDRESS:	1317 South 13th A	venue					20, Low Level RL. Standard TAT, please email results to ridgeway@fremontanalytical.com.
CITY, STATE	^{E, ZIP:} Kelso, WA 98626						
PHONE: (3	60) 577-7222 FAX:	EMA	1L:				
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.
:	1609324-001B	24-10-11	CLEAR JARS 4 C	Soil	9/26/2016 3:40:00 PM	1	Chemical Oxygen Demand by SM5220, Low Level RL
1	TEST_SUB			-			
: .	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
2	TEST_SUB						

Relinquished By:	Da	ate:	Time:	Recoined By: Sight	Date: 9-30-(Time:	REPOR	T TRANSMIT	TAL DESIRED:	
Relinquished By:	Da	10-7/76 ate:	Time:	Received By:	Date:	Time:	HARDCOPY (extra cost)	🗋 FAX	🔲 EMAIL	ONLINE
Relinquished By:	Da	ate:	Time:	Received By:	Date:	Time:		FOR LAB USE		
TAT:	Standard		RUSH	Next BD 🗍 2nd BD 📋	3rd BI		Temp of samples	°C	Attempt to Cool ?	<u> </u>
				Note: RUSH requests will incur sur	charges!					Page 18 of

				Cooler	Receipt and	d Preserv	ation For	m	. A	01	J	
lient _	Fremont	anad	y fical	2		Servio	e Request	K16		<u>56</u>	<u></u>	
eceive	d: <u>9-30-</u>	<u>-16</u>	/ Opened:_	9-30-	(6 By:	: <u>-</u> eŞ_	Unioa	aded: <u>9</u> -	30-16	By:	-L-	
Sami	ples were rece	ived via?	USPS	Fedex	UPS	DHL I	PDX Co	ourier Ha	- Ind Delivered	đ		
-	ples were rece			CoTer)		Envelope	Other				NA	
	e <u>custody seal</u>		<i>,</i>	$\mathcal{O}_{\mathcal{O}}$	x D	-		where?				
If pro	esent, were cu	stody seals	intact?	Y	' N	If pres	ent, were the	ey signed and	dated?		Y	N
Raw	Corrected.	Raw	Corrected	Corr.	Thermomete	r Coole			Tracking N	lumber		
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11 r					rap Gel Pac	KS Wet IC	e Dry Ice	5100705				
	e custody pap	ers properly	y filled out	(ink, signe	d, etc.)?		·	·	vv	NA	¢	N
	e custody pap	ers properly eived in goo	y filled out od conditio	(ink, signed	d, etc.)? ture, unbroken)? Indicate	e in the table	below.	Thawed	NA NA	Ø	N N
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Page____of____



Total Solids

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Analytical Report **Client:** Service Request: K1611736 Fremont Analytical Date Collected: 09/26/16 **Project:** COD Sample Matrix: Soil **Date Received:** 09/30/16 **Analysis Method:** 160.3 Modified Units: Percent **Prep Method:** Basis: As Received None 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	

QA/QC Report

Client: Project Sample Matrix:	Fremont Analytical COD Sediment		Service Request:K1611736 Date Collected:NA Date Received:NA					1736			
Analysis Method: Prep Method:	160.3 Modified None				Units:Percent Basis:As Received						
	Replicate Sample Summary Inorganic Parameters										
Sample Name: Batch QC	Lab Code: K1611778-001DUP	MRL -	Sample Result 16.7	Duplicate Result 16.8	Average 16.8	RPD <1	RPD Limit 20	Date Analyzed 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.

QA/QC Report

Client:	Fremont Analytical		Service Request:K1611736
Project	COD		Date Collected:NA
Sample Matrix:	Sludge, Solid		Date Received:NA
Analysis Method:	160.3 Modified		Units:Percent
Prep Method:	None		Basis:NA
		Replicate Sample Summary	
		Inorganic Parameters	

			Sample	Duplicate			RPD	Date	
Sample Name:	Lab Code:	MRL	Result	Result	Average	RPD	Limit	Analyzed	
Batch QC	K1611870-001DUP	-	23.6	22.2	22.9	6	20	10/06/16	-

Results flagged with an asterisk (\ast) 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

RIGHT SOLUTIONS | RIGHT PARTNER

Analytical Report **Client:** Service Request: K1611736 Fremont Analytical Date Collected: 09/26/16 **Project:** COD **Sample Matrix:** Soil **Date Received:** 09/30/16 **Analysis Method:** SM 5220 C Modified Units: mg/Kg **Prep Method:** ALS SOP 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	

QA/QC Report

Client: Project	Fremont Analy COD	tical				Date	e Request: Collected:	NA	
Sample Matrix:	Soil						Received: Analyzed:		
	-								
		General	Chemist	ry Param	eters				
Sample Name:	Batch QC						Units:	mg/Kg	
Lab Code:	K1611836-001						Basis:	Dry	
						Duplicate Sample K1611836-			
					Sample	001DUP			RPD
Analyte Name		Analysis Method	MRL	MDL	Result	Result	Average	RPD	Limit
Chemical Oxygen Demar	nd (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.

QA/QC Report

Client: Project: Sample Matrix:	Fremont Analytical COD Soil			Service Requ Date Collecte Date Receive Date Analyze	ed: d: ed:	K1611736 N/A N/A 10/7/16
		Matrix S	niko Summory	Date Extracto	eu:	10/7/16
			pike Summary gen Demand (C(OD)		
Sample Name:	Batch QC			Uni	ts:	mg/Kg
Lab Code:	K1611836-001			Bas	is:	Dry
Analysis Method:	SM 5220 C Modified					
Prep Method:	ALS SOP					
		Matrix Spik	e			
		K1611836-001	MS			
Analyte Name		Sample Result	Result	Spike Amount	% Re	
Chemical Oxygen De	emand (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.

QA/QC Report

Client: Project: Sample Matrix:	Fremont Analytical COD Soil		Service Request: Date Analyzed: Date Extracted:	K161173 10/07/16 NA	
		trol Sample Summary Oxygen Demand (COD)		
Analysis Method: Prep Method:	SM 5220 C Modified None		Units: Basis: Analysis Lot:	mg/Kg Dry 517791	
Sample Name Lab Control Sample	Lab Code K1611736-LCS	Result 4540		Rec	% Rec Limits 85-115



CLIENT:	1609324 GeoEngineers								Cha				
Project:	Gas Works Parl	k Site							Che	emical Oxy	gen Dema		5220
Sample ID MB-R32	068 S	ampType	MBLK			Units: mg/L		Prep Date	e: 9/30/20)16	RunNo: 32	068	
Client ID: MBLKW	В	atch ID:	R32068					Analysis Date	e: 9/30/20	016	SeqNo: 60	6398	
Analyte		F	lesult	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chemical Oxygen De	emand		ND	10.0									
Sample ID LCS-R3	2068 S	ampType	LCS			Units: mg/L		Prep Date	e: 9/30/20	016	RunNo: 32	068	
Client ID: LCSW	В	atch ID:	R32068					Analysis Date	e: 9/30/20)16	SeqNo: 60	6399	
Analyte		F	lesult	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chemical Oxygen De	emand		79.5	10.0	75.00	0	106	80	120				
Sample ID 1609315	5-001ADUP Sa	ampType	DUP			Units: mg/L		Prep Date	e: 9/30/20	016	RunNo: 32	068	
Client ID: BATCH	В	atch ID:	R32068					Analysis Date	e: 9/30/20)16	SeqNo: 60	6401	
Analyte		F	lesult	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chemical Oxygen De	emand		28.6	10.0						33.87	17.0	30	
Sample ID 1609315	5-001AMS S	ampType	MS			Units: mg/L		Prep Date	e: 9/30/20	016	RunNo: 32	068	
Client ID: BATCH	В	atch ID:	R32068					Analysis Date	e: 9/30/20)16	SeqNo: 60	6402	
Analyte		F	lesult	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chemical Oxygen De	emand		107	10.0	75.00	33.87	98.0	70	130				
Sample ID 1609315	5-001AMSD S	ampType	MSD			Units: mg/L		Prep Date	e: 9/30/20	016	RunNo: 32	068	
Client ID: BATCH	В	atch ID:	R32068					Analysis Date	e: 9/30/20)16	SeqNo: 60	6403	
Analyte		F	lesult	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chemical Oxygen De	emand		102	10.0	75.00	33.87	90.9	70	130	107.3	5.06	30	

Fremont
Analytical

Work Order CLIENT: Project:	: 1609324 GeoEngine Gas Works							Di	QC S	SUMMAI etals by EP		-
Sample ID MB	8-14945	SampType: MBLK			Units: µg/L		Prep Date	e: 9/27/2 0	016	RunNo: 320	007	
Client ID: MB	SLKW	Batch ID: 14945					Analysis Date	e: 9/27/2 0	016	SeqNo: 60	5108	
Analyte		Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic Iron		ND ND	0.500 50.0									
Sample ID LC	S-14945	SampType: LCS			Units: µg/L		Prep Date	e: 9/27/2 0	016	RunNo: 320	007	
Client ID: LC	sw	Batch ID: 14945					Analysis Date	e: 9/27/2 0	016	SeqNo: 60	5109	
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 160	9324-004ADUP	SampType: DUP			Units: µg/L		Prep Date	e: 9/27/2 0	016	RunNo: 320	007	
Client ID: PA	I-24-D-160926	Batch ID: 14945					Analysis Date	e: 9/27/2 0	016	SeqNo: 60	5117	
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 160)9324-004AMS	SampType: MS			Units: µg/L		Prep Date	e: 9/27/2 (016	RunNo: 320	007	
Client ID: PA	I-24-D-160926	Batch ID: 14945					Analysis Date	e: 9/27/2 0	016	SeqNo: 60	5118	
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 160)9324-004AMSD	SampType: MSD			Units: µg/L		Prep Date	e: 9/27/2 0	016	RunNo: 320	007	
Client ID: PA	I-24-D-160926	Batch ID: 14945					Analysis Date	e: 9/27/2 0	016	SeqNo: 60	5119	
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	
											Pad	a 30 of



Work Order: CLIENT: Project:	1609324 GeoEnginee Gas Works F							Di	QC S ssolved Me	SUMMAF		_
Sample ID 160932 Client ID: PAI-24	24-004AMSD -D-160926	SampType: MSD Batch ID: 14945			Units: µg/L		Prep Dat Analysis Dat	te: 9/27/20 te: 9/27/20	-	RunNo: 320 SeqNo: 605		
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	



Sample Log-In Check List

C	ient Name:	GEI	Work Orde	r Number:	1609324		
Lo	ogged by:	Clare Griggs	Date Rece	ived:	9/27/201	6 8:00:00 AM	
<u>Cha</u>	in of Custo	ody					
1.	Is Chain of C	ustody complete?	Yes 🖌	•	No 🗌	Not Present	
2.	How was the	sample delivered?	<u>Client</u>				
Log	In						
-	Coolers are p	resent?	Yes 🗸	•	No 🗌	NA	
4.	Shipping cont	tainer/cooler in good condition?	Yes 🗸		No 🗌		
	Custody Seal	s present on shipping container/cooler? ments for Custody Seals not intact)	Yes]	No 🗌	Not Required	✓
6.		npt made to cool the samples?	Yes 🖌	•	No 🗌	NA	
7.	Were all item	s received at a temperature of >0°C to 10.0°C*	Yes 🖌	Þ	No 🗌	NA	
8.	Sample(s) in	proper container(s)?	Yes 🖌	·	No 🗌		
9.	Sufficient san	nple volume for indicated test(s)?	Yes 🖌	•	No 🗌		
10.	Are samples	properly preserved?	Yes 🖌	•	No 🗌		
11.	Was preserva	ative added to bottles?	Yes]	No 🗹	NA	
12.	Is there head	space in the VOA vials?	Yes]	No 🗌	NA	✓
13.	Did all sample	es containers arrive in good condition(unbroken)?	Yes 🖌		No 🗌		
14.	Does paperw	ork match bottle labels?	Yes 🔽	•	No 🗌		
15.	Are matrices	correctly identified on Chain of Custody?	Yes 🖌	·	No 🗌		
16.	Is it clear what	at analyses were requested?	Yes 🖌	•	No 🗌		
17.	Were all hold	ing times able to be met?	Yes 🖌	•	No 🗌		
<u>Spe</u>	cial Handli	ing (if applicable)					
-		tified of all discrepancies with this order?	Yes		No 🗌	NA	✓
	Person I	Notified: Date			Ì		
	By Who	m: Via:	eMail	Phone	Fax	In Person	
	Regardi	ng:					
	Client In	structions:					
19.	Additional ren	narks:					

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

2
3
1
-
4.5
16
4
막
N

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	remo			Chain of Custody Re	stody Record and L	cord and Laboratory Services Agreement
	Analytical	hcal			Date: 9/76 /2016	Laboratory Project No (internal): 1109324
3600 Fremont Ave N.	Tel: 206-352-3790	12-3790				Page:
	GeoEngineers			Project Name:	Gas Works Park Site	
Address:	600 Stewart Street, Suite 1700	t, Suite 1700		Floject No.	Seattle	Conserved by Card Card
City State Zin:	Seattle, WA 98103	8		Deport To (DM).	Sandra Smith / Claudia De La Via	
City, state, zip.				Keport Io (PIVI):		
Telephone:	253.722.2418	Fax:		PM Email:	sbsmith@geoengineers.com	cdelavia@gecengineers.com
*Matrix Codes: A = Air, AQ =	AQ = Aqueous, B = Bulk,	O = Other, P = Product,	S = Soil, SD =	W = Water,	Water,	SW = Storm Water, WW = Waste Water .
	<i>ν</i>	Sample	Sample Type		Standard Constraints of the second se	
1 PAI-24-10-11	91	9/26/16 1540	5			comments
2 PAI- 24-21:3-22.	ŝ		S	XX		
3 PAI-24-5-160926	926	1700	WXX	×		Treld Fritesed
4 PAI-24-2-160	926091	V 1602	W XX	×		~
5 PAI-						
6 PAI-						
7 PAI-						
8 PAI-						
9 PAI-						
10 PAI-	31				1 N	
**Metals Analysis (Circle):	MTCA-5 RCRA-8	-8 Priority Pollutants	nts 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 Ti U V Zn
***Anions (Circle): Nitrate Sample Disposal:	te Nitrite Return to Client	Chloride Sulfate	s Sulfate Bromide O-Phospha Disposal by Lab (Samples will be held for 30 da assessed if samples are rotationed offer 20 daws	te Fluoride ys unless otherwise not	Nitrate+Nitrite Turn-around times for samples ed. A fee may be 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
I represent that I am authorized to enter into this Agreement with Fremont agreement to each of the terms on the front and backside of this Agreement.	erms on the front	to this Agreement wi and backside of this	ith Fremont Analyti Agreement.	cal on behalf of the Client named	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.	Standard TAT. 3. Groundware and soli RLs per the WO
x John W	9/16/16	6 1950		the culture	27/14 8:00	5. Run for dissolved metals
X	Date/ IIII	ā	x	And A A	Datey lime	TAT → SameDay^ NextDay^ 2 Day 3 Day STD



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

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,

lc. Kedy

Mike Ridgeway Laboratory Director

CC: Claudia De La Via

DoD/ELAP Certification #L2371, ISO/IEC 17025:2005 ORELAP Certification: WA 100009-007 (NELAP Recognized)



CLIENT: Project: Work Order:	GeoEngineers Gas Works Park Site 1609335	Work Order Sample Summa					
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				



Case Narrative

Date: 10/27/2016

CLIENT:GeoEngineersProject: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 & Acronyms



WO#: 1609335 Date Reported: 10/27/2016

Qualifiers:

- * Flagged value is not within established control limits
- B Analyte detected in the associated Method Blank
- D Dilution was required
- E Value above quantitation range
- H Holding times for preparation or analysis exceeded
- I Analyte with an internal standard that does not meet established acceptance criteria
- J Analyte detected below Reporting Limit
- N Tentatively Identified Compound (TIC)
- Q Analyte with an initial or continuing calibration that does not meet established acceptance criteria
- (<20%RSD, <20% Drift or minimum RRF)
- S Spike recovery outside accepted recovery limits
- ND Not detected at the Reporting Limit
- R High relative percent difference observed

Acronyms:

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



Analytical Report

Work Order: **1609335** Date Reported: **10/27/2016**

Client: GeoEngineers				Collectio	n Date:	9/27/2016 9:07:00 AM
Project: Gas Works Park S Lab ID: 1609335-005 Client Sample ID: PAI-25-D				Matrix: V	Vater	
Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Dissolved Metals by EPA	<u>Method 200.8</u>			Bato	ch ID: 14	957 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 Deman	d by SM 5220D			Bato	h ID: R3	2068 Analyst: MW
Chemical Oxygen Demand	736	100	D	mg/L	10	9/30/2016 3:18:15 PM



Analytical Report

Work Order: **1609335** Date Reported: **10/27/2016**

Client: GeoEngineers			(Collectior	Date:	9/27/2016 11:00:00 AM
Project: Gas Works Park Site Lab ID: 1609335-006 Client Sample ID: PAI-15-S-160927	7		I	Matrix: W	/ater	
Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Dissolved Metals by EPA Method	200.8			Batcl	h ID: 14	957 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			Batcl	h ID: R3	2068 Analyst: MW
Chemical Oxygen Demand	67.7	20.0	D	mg/L	2	9/30/2016 3:18:15 PM



Analytical Report

Work Order: **1609335** Date Reported: **10/27/2016**

Client: GeoEngineers			(Collectior	n Dat	e: 9/27/2016 11:54:00 AM
Project: Gas Works Park Site						
Lab ID: 1609335-007				Matrix: W	/ater	
Client Sample ID: PAI-15-D-160927	,					
Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Dissolved Metals by EPA Method	<u>200.8</u>			Batcl	h 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	<u>5220D</u>			Batcl	h ID:	R32068 Analyst: MW
Chemical Oxygen Demand	187	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 #: 1609335

UOM = Percent

Percent Finer (Passing) than the Indicated Size

Grain Size Classification			G	ravel			Coarse Sand	Mediur	n Sand		Fine San	d		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-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

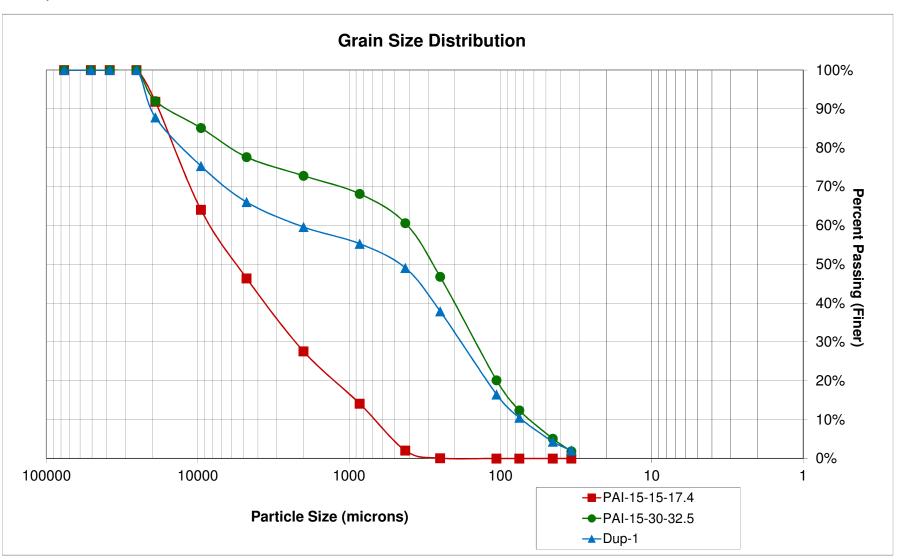
UOM = Percent

Grain Size Classification				Gravel				Coarse Sand	Mediun	n Sand		Fine San	d		Silt	
Sieve Size	>76200	76200-	50800-	38100-	25400-	19050-	9525-	4750-	2000-	850-	425-	250-106	106-62.5	72 5-45	45-34	<34
(Microns)	270200	50800	38100	25400	19000	9525	4750	2000	850	425	250	230-100	100-02.5	12.3-43	73-37	~37
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





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

Analytical Report for Service Request No: 1611734

October 11, 2016

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

RE: COD

ear 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 re uest number **K1611734**.

Analyses were performed according to our laboratory's E AP-approved uality assurance program. The test results meet re uirements of the current E AP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of E AP-accredited analytes, refer to the certifications section at www.alsglobal.com. All results are intended to be considered in their entirety, and A S roup SA orp. dba A S Environmental (A S) 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) analy ed, as listed in the report.

Please contact me if you have any uestions. My extension is 3375. ou may also contact me via email at anet.Malloch@alsglobal.com.

Respectfully submitted,

ALS Group USA, Corp. dba ALS Environmental

mail mallach

anet Malloch Pro ect 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 Case Narrative Chain of Custody Total Solids

General Chemistry

R TSO TO S R TPART ER

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 MCL	Modified 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 tr	Total Petroleum Hydrocarbons 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.
- $E \qquad \text{The result is an estimated value.}$
- 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.pjlabs.com/	L16-57
Louisiana DEQ	http://www.deq.louisiana.gov/portal/DIVISIONS/PublicParticipationandPer mitSupport/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/EnvironmentalLaborator yAccreditation/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/anlayte 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

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ALS ENVIRONMENTAL

Client:Fremont AnalyticalProject:NASample Matrix:Soil

Service Request No.: Date Received:

K1611734 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_

Janet mallach



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

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Fremont

CHAIN OF CUSTODY RECORD

Omega COCID 281

OF:

1

PAGE:

1

X1611734

ADDRESS

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

SUB CONTR.	ATOR: ALS	COMPANY:	ALS Enviror	imental	SPECIAL INSTRUCTIONS /		
ADDRESS:	1317 South 13th A	venue		,,,,,,,, ^{,,,} ,,,,,,,,,,,,,,,,,,,,,,,,,			0, Low Level RL. Please email results to ridgeway@fremontanalytical.com
CITY, STATE	Kelso, WA 98626			,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,			
PHONE: (30	60) 577-7222 FAX:	EMA	L:		The same survey of the		
ACCOUNT #:	· · · · · · · · · · · · · · · · · · ·						
ITEM #	SAMPLE ID	CLIENT SAMPLE ID	BOTTLE TYPE	MATRIX	DATE COLLECTED	NUMBER OF	COMMENTS: Methanol Preserved Weights HOT Sample Notation, Additional Sample Description.
	1609335-001B	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
1	TEST_SUB				· · · · · · · · · · · · · · · · · · ·		
· · .	1609335-003B	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
2	TEST_SUB						
	1609335-004B	Dup-1	CLEAR JARS 4 O	Soil	9/27/2016	1	Chemical Oxygen Demand by SM5220, Low Level RL
3	TEST_SUB		<u>, , , , , , , , , , , , , , , , , , , </u>	for Sanche Hautrie Lee names van een de stadie die die die die die die die Stadie Stadie Stadie Stadie Stadie S	99999999999999999999999999999999999999		rheenna maraali 6 n. Naadaalaa muunu aanna aa ala een in <mark>nan weenaanna aan a</mark> an a

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Relinquished By	,	<u></u> .	· .	Date:	Time:	Received By:		Date:	Time:	FOR LAB USE ONLY
	TAT:		Stand	ard 🗌	RUSH	Next BD 2nd	IBD	3rd BI) []	Temp of samples°C Attempt to Cool?
						Note: RUSH requests will	incur sur	charges!		Page 19 of 6

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Sample	es were rece es were rece	ived via?	USPS	Fed Ex Cooler	UPS	DHL I Envelope	PDX Co Other	purier H	and Delivered	đ	NA	
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Total Solids

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

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Analytical Report

Client:Fremont AnalyticalProject:CODSample Matrix:SoilAnalysis Method:160.3 ModifiedPrep 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	

QA/QC Report

Client:	Fremont Analytical	Service Request:K1611734
Project	COD	Date Collected:NA
Sample Matrix:	Soil	Date Received:NA
Analysis Method:	160.3 Modified	Units:Percent
Prep Method:	None	Basis: As Received
	Renlicate San	nnle Summary

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

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Analytical Report

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

QA/QC Report

Client: Project Sample Matrix:	Fremont Analy COD Soil	tical				Date Date	e Request: Collected: Received:	NA NA	
		Replic	ate Samu	le Summ	arv	Date A	Analyzed:	10/07/16	
		-	-	ry Param	•				
Sample Name:	Batch QC						Units:	mg/Kg	
Lab Code:	K1611836-001						Basis:	Dry	
						Duplicate Sample K1611836-			
Analyta Noma		Analysis Method	MRL	MDL	Sample Result	001DUP Result	A	RPD	RPD Limit
Analyte Name Chemical Oxygen Demai	nd (COD)	SM 5220 C Modified	610	-	5970	3720	Average 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.

QA/QC Report

Client: Project: Sample Matrix:	Fremont Analytical COD Soil			Service Requ Date Collecte Date Receive Date Analyze Date Extracte	d: d: d:	K1611734 N/A N/A 10/7/16 10/7/16
		Matrix Sı	oike Summary	Dute Latiuch		10/1/10
		-	gen Demand (C	OD)		
Sample Name:	Batch QC			Uni	ts:	mg/Kg
Lab Code:	K1611836-001			Bas	is:	Dry
Analysis Method:	SM 5220 C Modified					
Prep Method:	ALS SOP					
		Matrix Spik	e			
		K1611836-001	MS			
Analyte Name		Sample Result	Result	Spike Amount	% Re	
Chemical Oxygen De	emand (COD)	5970	64500	52400	112	2 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.

QA/QC Report

Client: Project: Sample Matrix:	Fremont Analytical COD Soil		Service Req Date Analyz Date Extrac	red: 1	X1611734 0/07/16 NA
		ntrol Sample Summary Oxygen Demand (CO			
Analysis Method: Prep Method:	SM 5220 C Modified None		Units: Basis: Analysis Lo	Γ	ng/Kg Dry 517791
Sample Name Lab Control Sample	Lab Code K1611734-LCS	Result 4540	Spike <u>Amount</u> 4840	% Rec 94	% Rec Limits 85-115



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

Analytical Report for Service Request No: 1612505

October 26, 2016

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

RE: 1609335

ear 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 re uest number **K1612505**.

Analyses were performed according to our laboratory's E AP-approved uality assurance program. The test results meet re uirements of the current E AP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of E AP-accredited analytes, refer to the certifications section at www.alsglobal.com. All results are intended to be considered in their entirety, and A S roup SA orp. dba A S Environmental (A S) 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) analy ed, as listed in the report.

Please contact me if you have any uestions. My extension is 3375. ou may also contact me via email at anet.Malloch@alsglobal.com.

Respectfully submitted,

ALS Group USA, Corp. dba ALS Environmental

Janet mallich

anet Malloch Pro ect 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 Total Solids General Chemistry

R TSO TO S R TPART ER

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 MCL	Modified 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

- ${f F}$ 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.pjlabs.com/	L16-57
Louisiana DEQ	http://www.deq.louisiana.gov/portal/DIVISIONS/PublicParticipationandPer mitSupport/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/EnvironmentalLaborator yAccreditation/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/anlayte is offered by that state.



Chain of Custody

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PAGE: 1

о**г**: 1

ADDRESS

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

H1612505 Website: www.fremontanalytical.com

SUB CO	ONTRATOR: ALS		COMPANY:	ALS Enviro	onmental		SPECIAL INSTRUCTIONS/COMMENTS: Please enail results to ma	idgeway @frementanalytical.com				
ADDRE	I317 S	South 13th Avenu	ie				= Please enail results to maidgeway @fremontanalyti and cward@fremontanalytical.com					
CITY, S	TATE, ZIP: Kelso,	, WA 98626						5				
PHONE	(360) 577-72	22 FAX:	EMAIL:				ANALYTICAL PARAMETERS	COMMENTS				
ITEM	SAMPLE ID	Client Sample ID	Bottle Type	MATRIX	DATE COLLECTED	NUMBER OF CONTAINERS		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	√ a	hemical Oxygen Demand by SM5220, Low Level RL				

Relinquished By:	Date:	Time:	Received By:	Date:	Time:	REPORT TRANSMITTAL DESIRED:			
Relinquished By:	Date Date	Time:	Received Bu	Date:	Time:	HARDCOPY (extra cost) FAX EMAIL ONLINE			
Relinguished By:	Date:	Time:	Received By:	Date:	Time:	FOR LAB USE ONLY			
			ν			Temp of samples°C Attempt to Cool ?			
TAT: Stand	ard M	RUSH	Next BD 🗌 2nd BD 🗍	3rd BI		Comments:			
Note: RUSH requests will incur surcharges!					Page 35 of §				
					7 (10				



(A	LS)												P	rc La	met
	-	- 1		Cooler	Rec	eipt a	nd Pi							J	
Client _	-	remont						Servi	ce Req	uest k	KI6_12	505		\overline{A}	
Receive	1:10/4/1	1	Opened:1	0/14/1	Q	E	3y:		[Unloa	ded: <u>10</u>	14/16_	By:	£	
1. Sam	ples were rece	ived via?	USPS	Fed Ex	\subset	UPS	DE	IL	PDX	Coi	urier Ha	und Delivered			
2. Sam	ples were rece	ived in: (cir	cle)	Cooler	Bo	ur>	Envel	оре	Oth	1er				NA	
3. Wer	e <u>custody seal</u>	s on coolers	?	NA	γ C	N	lf	yes, ho	оw тапу	y and y	where?				
lf pr	esent, were cu	stody seals	intact?	,	Y	N		If pres	sent, we	ere the	y signed and	d dated?		Y	N
Raw Cooler Ter	Corrected.	Raw Temp Blank	Corrected Temp Blank	Corr. Factor	Th	ermome ID	eter	Coole	er/COC II	DNA		Tracking N	umber		NA Filed
2.8	2.7			-0.(3	75	- toron in the form	20	10		12×61	92× 03	3 990	Contraction of the local division of the loc	
			·	····				··							
L		l		and the state of the											
	ing material:			المحاجب والمراجع المحاجب والمحاجب والمحاجب والمحاجب والمحاجب والمحاجب والمحاجب والمحاجب والمحاجب والمحاجب والم		North St. Standards and Sold and	icks/	Wet I	ce Dry	v Ice	Sleeves			$\overline{\Omega}$	
	e custody pap			-									NA	Ý	N
6. Wer	e samples reco	-	d condition licable, tis	•				ndicat Fro z			below. I ly Thawed	Thawed	NA	\mathbf{Y}^{i}	Ν
7. Were	all sample la			•					,cn i	u, 11u,	ny inureu	11111114	NA	R	N
8. Did a	III sample labe	els and tags	agree with	custody p	apers?	? Indic	ate ma	jor dis	crepan	cies in	the table of	1 page 2.	NA	\widetilde{Q}	N
9. Wer	e appropriate	bottles/cont	ainers and	volumes r	eceive	d for th	ne tests	indica	ated?				NA	$\left(\mathbf{y} \right)$	N
10. We	re the pH-pres	erved bottle	s (see SMO	GEN SOP) recei	ived at	the app	oropria	te pH?	Indica	ate in the ta	ble below	(NA	Ý	N
11. We	re VOA vials	received wit	thout heads	space? In	dicate	in the I	table b	elow.					NA	Y	N
12. Wa	s C12/Res neg	ative?											NA	Y	Ν
	· · ·	····				 						<u> </u>			
	Sample ID o	n Bottle			Samp	le ID or	1 COC					Identified by:			<u> </u>
											·····				
i				L											
	Sample IC)				Head- space	Broke	pН	Rea	igent	Volume added	Reagent Lo Number		nitials	Time

	.														
												· · · · · · · · · · · · · · · · · · ·			

Notes, Discrepancies, & Resolutions:_

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7/25/16



Total Solids

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		Analytical Report					
Client:	Fremont Analytical			Service R	equest:	K1612505	
Project:	1609335			Date Co	llected:	09/27/16	
Sample Matrix:	Soil			Date Re	ceived:	10/14/16	
Analysis Method:	160.3 Modified				Units:	Percent	
Prep Method:	None				Basis:	As Received	
		Solids, Total					
Sample Name	Lab Code	Result	MRL	MDL	Dil.	Date Analyzed	Q

					-	J J	C
1609335-002A	K1612505-001	50.1	-	-	1	10/24/16 11:27	

QA/QC Report

Client:	Fremont Analytical	Service Request:K1612505
Project	1609335	Date Collected:NA
Sample Matrix:	Soil	Date Received:NA
Analysis Method:	160.3 Modified	Units:Percent
Prep Method:	None	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

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Analytical Report **Client:** Service Request: K1612505 Fremont Analytical Date Collected: 09/27/16 **Project:** 1609335 **Sample Matrix:** Soil **Date Received:** 10/14/16 **Analysis Method:** SM 5220 C Modified Units: mg/Kg **Prep Method:** ALS SOP 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	

QA/QC Report

Client:	Fremont Analyti	ical				Service	Request:	K1612505	
Project	1609335					Date (Collected:	NA	
Sample Matrix:	Soil					Date 1	Received:	NA	
						Date A	Analyzed:	10/24/16	
		Replic	ate Samp	le Summ	ary				
		General	l Chemist	ry Param	neters				
Sample Name:	Batch QC						Units:	mg/Kg	
Lab Code:	KQ1613642-07	,					Basis:	Wet	
						Duplicate Sample KQ1613642-			
A		Amalausia Mathad	MDI	MDI	Sample			DDD	RPD
	(COD)	l l					2		Limit 20
-	KQ1613642-07	General	-		neters	Sample		• •	Li

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.

QA/QC Report

Client: Project: Sample Matrix:	Fremont Analytical 1609335 Soil			Service Requ Date Collecte Date Receivee Date Analyze Date Extracte	d: N/A d: N/A d: 10/	
		Matrix S	pike Summary	Dute Extract	 10/	20/10
		Chemical Oxy	gen Demand (CC)D)		
Sample Name:	Batch QC			Uni	ts: mg	/Kg
Lab Code:	KQ1613642-07			Bas	is: We	et
Analysis Method:	SM 5220 C Modified					
Prep Method:	ALS SOP					
		Matrix Spik KQ1613642-07				
		-				
Analyte Name		Sample Result	Result	Spike Amount	% Rec	% Rec Limits
Chemical Oxygen De	emand (COD)	59	1070	1000	101	75-125

Results flagged with an asterisk (\ast) 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.

QA/QC Report

Client: Project: Sample Matrix:	Fremont Analytical 1609335 Soil		Service Req Date Analyz Date Extrac	ed:	K161250 10/24/16 10/20/16	
-		ntrol Sample Summary Oxygen Demand (CO				
Analysis Method: Prep Method:	SM 5220 C Modified ALS SOP		Units: Basis: Analysis Lot	t :	mg/Kg Dry 520274	
Sample Name Lab Control Sample	Lab Code K1612505-LCS1	Result 4860	Spike Amount 4840	<u>% Rec</u> 100		% Rec Limits 85-115

			Spike		% Rec
Sample Name	Lab Code	Result	Amount	% Rec	Limits
Lab Control Sample	K1612505-LCS1	4860	4840	100	85-115
Lab Control Sample	K1612505-LCS2	4860	4840	100	85-115



	1609335 GeoEnginee	rs							QC S	SUMMAI	RY REF	ORT
	Gas Works F							Che	emical Oxyg	gen Dema	nd by SM	5220D
Sample ID MB-R320	068	SampType: MBLK			Units: mg/L		Prep Date:	9/30/20)16	RunNo: 32	068	
Client ID: MBLKW		Batch ID: R32068					Analysis Date:	9/30/20)16	SeqNo: 60	6398	
Analyte		Result	RL	SPK value	SPK Ref Val	%REC	LowLimit H	lighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chemical Oxygen De	emand	ND	10.0									
Sample ID LCS-R32	2068	SampType: LCS			Units: mg/L		Prep Date:	9/30/20	016	RunNo: 32	068	
Client ID: LCSW		Batch ID: R32068					Analysis Date:	9/30/20	016	SeqNo: 60	6399	
Analyte		Result	RL	SPK value	SPK Ref Val	%REC	LowLimit H	lighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chemical Oxygen De	emand	79.5	10.0	75.00	0	106	80	120				
Sample ID 1609315	-001ADUP	SampType: DUP			Units: mg/L		Prep Date:	9/30/20	016	RunNo: 32	068	
Client ID: BATCH		Batch ID: R32068					Analysis Date:	9/30/20)16	SeqNo: 60	6401	
Analyte		Result	RL	SPK value	SPK Ref Val	%REC	LowLimit H	lighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chemical Oxygen De	emand	28.6	10.0						33.87	17.0	30	
Sample ID 1609315	-001AMS	SampType: MS			Units: mg/L		Prep Date:	9/30/20)16	RunNo: 32	068	
Client ID: BATCH		Batch ID: R32068					Analysis Date:	9/30/20)16	SeqNo: 60	6402	
Analyte		Result	RL	SPK value	SPK Ref Val	%REC	LowLimit H	lighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chemical Oxygen De	emand	107	10.0	75.00	33.87	98.0	70	130				
Sample ID 1609315	-001AMSD	SampType: MSD			Units: mg/L		Prep Date:	9/30/20	016	RunNo: 32	068	
Client ID: BATCH		Batch ID: R32068					Analysis Date:	9/30/20)16	SeqNo: 60	6403	
Analyte		Result	RL	SPK value	SPK Ref Val	%REC	LowLimit H	lighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chemical Oxygen De	emand	102	10.0	75.00	33.87	90.9	70	130	107.3	5.06	30	

Fremont
Analytical

	335 Engineers Works Park Site						Dis	QC Ssolved Me	SUMMAI etals by EP		-
Sample ID MB-14957	SampType: MBLK			Units: µg/L		Prep Date	e: 9/28/20)16	RunNo: 32	016	
Client ID: MBLKW	Batch ID: 14957					Analysis Date	e: 9/28/20)16	SeqNo: 60	5291	
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic Iron	ND ND	0.500 50.0									
Sample ID LCS-14957	SampType: LCS			Units: µg/L		Prep Date	e: 9/28/20)16	RunNo: 32	016	
Client ID: LCSW	Batch ID: 14957					Analysis Date	e: 9/28/20	016	SeqNo: 60	5292	
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 1609335-005A	DUP SampType: DUP			Units: µg/L		Prep Date	e: 9/28/20)16	RunNo: 32	016	
Client ID: PAI-25-D-1609	Batch ID: 14957					Analysis Date	e: 9/28/20	016	SeqNo: 60	5294	
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 1609335-005A	MS SampType: MS			Units: µg/L		Prep Date	e: 9/28/20)16	RunNo: 32	016	
Client ID: PAI-25-D-1609	Batch ID: 14957					Analysis Date	e: 9/28/20	016	SeqNo: 60	5295	
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 1609335-005A	MSD SampType: MSD			Units: µg/L		Prep Date	e: 9/28/20	016	RunNo: 320	016	
Client ID: PAI-25-D-1609	Batch ID: 14957					Analysis Date	e: 9/28/20	016	SeqNo: 60	5296	
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	
										Dag	0 /6 of



Work Order: CLIENT: Project:	1609335 GeoEngineer Gas Works F							Di	QC S ssolved Me	SUMMAF		-
Sample ID 160933 Client ID: PAI-25	35-005AMSD -D-160927	SampType: MSD Batch ID: 14957			Units: µg/L		Prep Dat Analysis Dat	e: 9/28/20 e: 9/28/20		RunNo: 320 SeqNo: 60		
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	



Sample Log-In Check List

CI	lient Name:	GEI	Work Orde	er Number: 16093	35	
Lo	ogged by:	Clare Griggs	Date Rece	ived: 9/27/20	016 3:09:00 PM	
<u>Cha</u>	in of Custe	ody				
1.	Is Chain of C	ustody complete?	Yes ៴	No 🗌	Not Present	
2.	How was the	sample delivered?	<u>Courier</u>			
<u>Log</u>	In					
-	Coolers are p	present?	Yes ៴	No 🗌	NA	
4	Shipping con	tainer/cooler in good condition?	Yes ៴	No 🗌		
		tainer/cooler in good condition?	_		Not Poquirod	•
5.		ls present on shipping container/cooler? ments for Custody Seals not intact)	Yes	No 🗌	Not Required	
6.	Was an atten	npt made to cool the samples?	Yes ៴	No 🗌	NA	
7.	Were all item	s received at a temperature of >0°C to 10.0°C*	Yes ៴	No 🗌	NA	
8.	Sample(s) in	proper container(s)?	Yes ៴	No 🗌		
9.	Sufficient sar	nple volume for indicated test(s)?	Yes ៴	No 🗌		
10.	Are samples	properly preserved?	Yes ៴	No 🗌		
11.	Was preserva	ative added to bottles?	Yes	No 🗸	NA	
12.	Is there head	space in the VOA vials?	Yes	No	NA	✓
13.	Did all sample	es containers arrive in good condition(unbroken)?	Yes ៴	No 🗌		
14.	Does paperw	ork match bottle labels?	Yes 🖣	No 🗌		
15.	Are matrices	correctly identified on Chain of Custody?	Yes ៴	No 🗌		
16.	Is it clear what	at analyses were requested?	Yes 💌	No 🗌		
17.	Were all hold	ing times able to be met?	Yes ៴	No 🗌		
<u>Spe</u>	cial Handli	ing (if applicable)				
18.	Was client no	otified of all discrepancies with this order?	Yes	□ No □	NA	✓
	Person	Notified: Date			-	
	By Who	m: Via:	eMail	Phone Fax	🕻 🗌 In Person	
	Regardi	ng:				
	Client In	structions:				
18.	Was client no Person By Who Regardi	Notified: Date m: Via: ng: Structions:				V

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

COC 1.1 - 4.5 16 - 1 of 2	ytical.com	www.fremontanalytical.com	k - Originator	Distribution: White - Lab, Yellow - File, Pink - Originator
		0 0	./ .	
^Please coordinate with the lab in advance	~ 9/27/16 1509	× MANA ×	1 JUM DIL	
neDay^ NextDay^ 2 Day 3	Date/Time A	eceived So ILAA	Date/Time Air ICAG	Relinquished) Da
6.0.7 9/28/12 WF	174110 1489	× N N N N X Y	NU1625 91421	9
5. Run for dissolved metals	Date/Time	Received Da	Date/Time	Relinquished Da
3. Groundwater and soll RLs per the WO	bove, that I have verified Client's	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.	er into this Agreement with Fremont A ront and backside of this Agreement.	I represent that I am authorized to enter into this Agreement with Fremont agreement to each of the terms on the front and backside of this Agreement.
 Groundwater iron and COD plus soil COD and grain size samples on standard ToT 	on the following business day.	assessed if samples are retained after 30 days.)	ient assessed if samples are retained after 30 days.	Sample Disposal: Return to Client
Special Remarks: 1. Groundwater arsenic and sulficle samples on ASAD TAT	Nitrite Turn-around times for samples received after 4:00pm will begin	O-Phosphate Fluoride Nitrate+Nitrite	Ch Ch	***Anions (Circle): Nitrate Nitrite
b Sb Se Sr Sn Ti Ti U V Zn	Cr Cu Fe Hg K Mg Mn Mo Na Ni Pb	Individual: Ag Al As B Ba Be Ca Cd Co	RCRA-8 Priority Pollutants TAL	**Metals Analysis (Circle): MTCA-5
				10 PAI-
				9 PAI-
				8 PAI-
		X	V IISY V X	7 PAI-15-0-160927
			1100	6 PAI-15-5-160927
		X	X (1) + 090 + (1) X	5 PAI-25-0-160927
		XX	1	4 +++ DUP = 1
		XX	0111	3 PAI-15-30-32.5
Collected 402 Jar (optional CON)			1055	2 PAI-15-17.4-17.6
	<u> </u>		2 0501 F5/P	1 PAI-15-15-174
Comments	STATUS CONTRACTOR CONT	45-61-11-11-11-11-11-11-11-11-11-11-11-11-	Sample Sample Type Date Time (Matrix)*	Sample Name
GW = Ground Water, SW = Storm Water, WW = Waste Water	DW = Drinking Water, GW = Ground Water, SW = Sto	N = Water,	O = Other, P = Product, S = Soil,	A = All, AQ = Aqueous, B = Bunk
<u>cdelavia@geoengineers.com</u>	sbsmith@geoengineers.com	PM Email:	Fax:	
	Sandra Smith / Claudia De La Via	Report To (PM):	198103	City, State, Zip: Seattle, WA 98103
	Seattle	Location:	600 Stewart Street, Suite 1700	Address: 600 Stewar
Collected by: GRL/CVD	Gas Works Park Site 0186-846-01 Task 1803	Project No:	ars	Client: GeoEngineers
Page:			Tel: 206-352-3790 Fax: 206-352-7178	3600 Fremont Ave N. Tel: 2 Seattle, WA 98103 Fax: 2
Date: <u>9/27/2016</u> Laboratory Project No (internal): 100935	Date: 9/27 /2016		Analytical	
aboratory Services Agreement	tody Record and La	Chain of Cust	ont	Fremon

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Distribution: White - Lab, Yellow - File, Pink - Originator

	mont	Chain of Cus	tody Record and L	Chain of Custody Record and Laboratory Services Agreement
	Analytical		Date: 9/2 / /2016	Laboratory Project No (Internal):
3600 Fremont Ave N. Tel: 2 Seattle, WA 98103 Fax: .	Tel: 206-352-3790 Fax: 206-352-7178			Page:
Client: GeoEngineers	eers	Project Name:	Gas Works Park Site 0186-846-01 Task 1803	Collected by: GRL/CVD
Address: 600 Stewa	600 Stewart Street, Suite 1700	Location:	Seattle	
City, State, Zip: Seattle, WA 98103	A 98103	Report To (PM):	Sandra Smith / Claudia De La Via	
Telephone: 253.722.2418	2418 Fax:	PM Email:	sbsmith@geoengineers.com	cdelavia@geoengineers.com
*Matrix Codes: A = Air, AQ = Aqueous, B	B = Bulk, O = Other, P = Product, S = Soil, SD = 1	N = Water,	DW = Drinking Water, GW = Ground Water, SW = St	SW = Storm Water, WW = Waste Water
Sample Name	x)*	4556115 15 9 5 10 5 10 10 10 10 10 10 10 10 10 10 10 10 10	5. 5. 5. 5. 5. 5. 5. 5. 5. 5.	Comments
1 PAI-15-15-17.4	9/27 1050 5			Comments
2 PAI-15-17-4-17-6	1055	8		Collected you Tar (optional (o.N)
3 PAI-15-30-32.5	illO	XX		Anchicic
A PALL DUP - 1	1	XX		and a set of the set of the set of
5 PAI-25-0-160927	X W TOPO			
6 PAI-15-5-160927	1100 X			
7 PAI-15-D-160927	V IISY V X			
8 PAI-				
10 PAI-				
**Metals Analysis (Circle): MTCA-5	RCRA-8 Priority Pollutants TAL In	Individual: Ag Al As B Ba Be Ca Cd Co	Cr Cu Fe Hg K Mg Mn Mo Na Ni Pb	b Sb Se Sr Sn Ti TI U V Zn
le): Nitrate	Chloride	O-Phosphate Fluoride Nitrate+Nitrite	Vitrite Turn-around times for samples received after 4:00pm will begin	Special Remarks: 1. Groundwater arsenic and sulfide samples on ASAD TAT
Sample Disposal: Return to Client	Slient ssessed if samples are retained after 30 days.	assessed if samples are retained after 30 days.)	may be on the following business day.	 Groundwater iron and COD plus soil COD and grain size samples on providered TAT
I represent that I am authorized to enter into this Agreement with Fremont agreement to each of the terms on the front and backside of this Agreement.	An	ytical on behalf of the Client named ab	ove, that I have verified Client's	-scandard IA1. 3. Groundwater and soll RLs per the WO 4. COD = Chemical oxveen demand
Relinquished	Date/Time R	Referived Da	Date/Time	5. Run for dissolved metals
×	ADAME VOL X	1 MANY	- 1/2 1/14 1509	Please coordinate with the lab in advance
SU				



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

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,

lc. Kedy

Mike Ridgeway Laboratory Director

CC: Claudia De La Via

DoD/ELAP Certification #L2371, ISO/IEC 17025:2005 ORELAP Certification: WA 100009-007 (NELAP Recognized)



CLIENT: Project: Work Order:	GeoEngineers Gas Works Park Site 1609348	Work Order S	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



Case Narrative

Date: 10/12/2016

CLIENT:GeoEngineersProject: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 & Acronyms



WO#: 1609348 Date Reported: 10/12/2016

Qualifiers:

- * Flagged value is not within established control limits
- B Analyte detected in the associated Method Blank
- D Dilution was required
- E Value above quantitation range
- H Holding times for preparation or analysis exceeded
- I Analyte with an internal standard that does not meet established acceptance criteria
- J Analyte detected below Reporting Limit
- N Tentatively Identified Compound (TIC)
- Q Analyte with an initial or continuing calibration that does not meet established acceptance criteria
- (<20%RSD, <20% Drift or minimum RRF)
- S Spike recovery outside accepted recovery limits
- ND Not detected at the Reporting Limit
- R High relative percent difference observed

Acronyms:

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



Analytical Report

 Work Order:
 1609348

 Date Reported:
 10/12/2016

CLIENT: GeoEngineers

Project: Gas Works Park Site

Lab ID: 1609348-004 Client Sample ID: PAI-26-D-1	60928			Collection Matrix: W	9/28/2016 11:31:00 AM	
Analyses	Result	RL G	lual	Units	Date Analyzed	
Dissolved Metals by EPA Meth	nod 200.8			Batch	n ID: 14	968 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	<u>SM 5220D</u>			Batch	ID: R3	32068 Analyst: MW
Chemical Oxygen Demand	24.0	20.0	D	mg/L	2	9/30/2016 3:18:15 PM

Lab ID: 1609348-005 Client Sample ID: PAI-26-S-1	60928			9/28/2016 10:46:00 AM		
Analyses	Result	RL Q	ual	Units	DF	Date Analyzed
Dissolved Metals by EPA Meth	nod 200.8			Batc	h ID: 149	968 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	<u>SM 5220D</u>			Batc	h ID: R3	2068 Analyst: MW
Chemical Oxygen Demand	49.2	20.0	D	mg/L	2	9/30/2016 3:18:15 PM



Analytical Report

 Work Order:
 1609348

 Date Reported:
 10/12/2016

CLIENT: GeoEngineers

Project: Gas Works Park Site

Lab ID: 1609348-006 Client Sample ID: D-160928		Collection Date: 9/28/2016 Matrix: Water									
Analyses	Result	RL Qual	Units	Analyzed							
Dissolved Metals by EPA Method	<u>200.8</u>		В	atch 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	В	atch 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 Client Sample ID: PAI-27-S-1	60928			Collection Date: 9/28/2016 4:14:00 Matrix: Water					
Analyses	Result	RL Qua	Units	DF	Date Analyzed				
Dissolved Metals by EPA Meth	od 200.8		Bato	ch ID: 14	968 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	<u>SM 5220D</u>		Bato	ch ID: R3	32068 Analyst: MW				
Chemical Oxygen Demand	70.4	20.0	D mg/L	2	9/30/2016 3:18:15 PM				



GeoEngineers

CLIENT:

Analytical Report

 Work Order:
 1609348

 Date Reported:
 10/12/2016

Project: Gas Works Park Site	9						
Lab ID: 1609348-008 Client Sample ID: PAI-27-D-1	60928			Collection Matrix: V		9/28/2	2016 4:47:00 PM
Analyses	Result	RL Q	lual	Units	DF	Date	e Analyzed
Dissolved Metals by EPA Meth	od 200.8			Batcl	n ID: 14	968	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
Chemical Oxygen Demand by	<u>SM 5220D</u>			Batcl	n ID: R	32068	Analyst: MW
Chemical Oxygen Demand	133	20.0	D	mg/L	2	9/30	/2016 3:18:15 PM



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	#450
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%



Project: Gas Works Park Site Client: GeoEngineers Lab Project #: 1609348

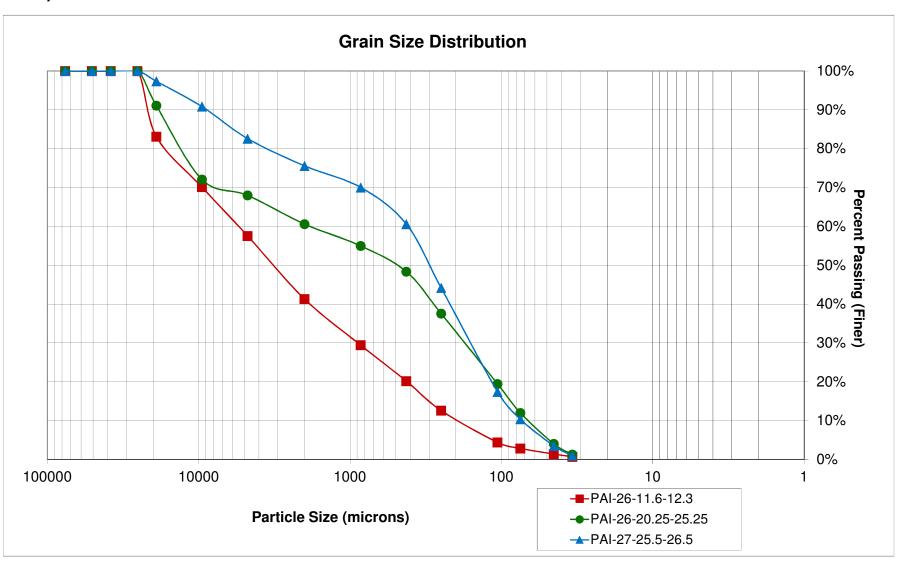
Percent Retained in Each Size Fraction

UOM = Percent

Grain Size Classification	Gravel						Coarse Sand	Medium	Fine Sand			Silt				
Sieve Size (Microns)	>76200		50800- 38100		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%



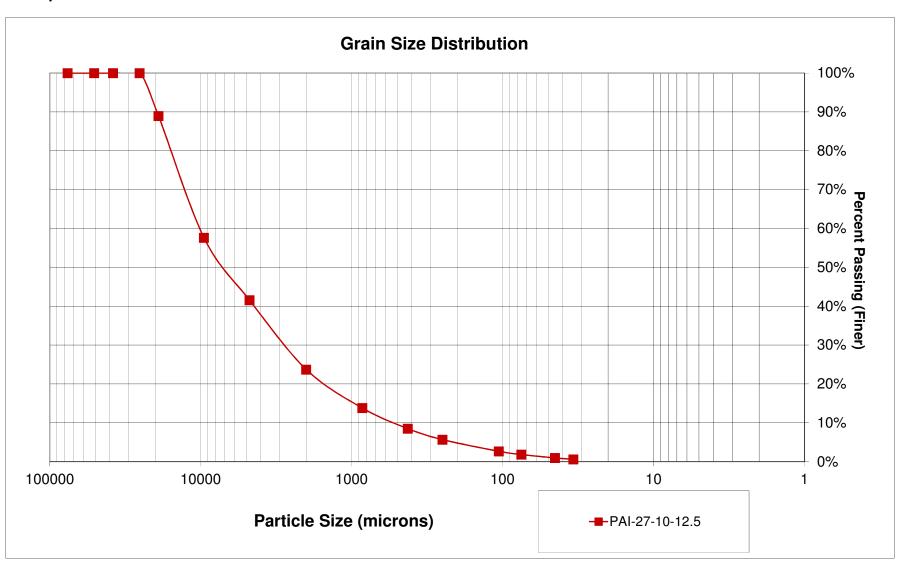
Project: Gas Works Park Site Client: GeoEngineers Lab Project #: 1609348



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Project: Gas Works Park Site Client: GeoEngineers Lab Project #: 1609348





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

Analytical Report for Service Request No:

October 11, 2016

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

RE: COD

ear 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 re uest number **K1611733**.

Analyses were performed according to our laboratory's E AP-approved uality assurance program. The test results meet re uirements of the current E AP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of E AP-accredited analytes, refer to the certifications section at www.alsglobal.com. All results are intended to be considered in their entirety, and A S roup SA orp. dba A S Environmental (A S) 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) analy ed, as listed in the report.

Please contact me if you have any uestions. My extension is 3375. ou may also contact me via email at anet.Malloch@alsglobal.com.

Respectfully submitted,

ALS Group USA, Corp. dba ALS Environmental

Janet malloch

anet Malloch Pro ect Manager

1611733



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 Case Narrative Chain of Custody

General Chemistry

R TSO TO S R TPART ER

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 MCL	Modified 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.pjlabs.com/	L16-57
Louisiana DEQ	http://www.deq.louisiana.gov/portal/DIVISIONS/PublicParticipationandPer mitSupport/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/EnvironmentalLaborator yAccreditation/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/anlayte 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

RIGHT SOLUTIONS | RIGHT PARTNER

ALS ENVIRONMENTAL

Client:Fremont AnalyticalProject:NASample Matrix:Soil

Service Request No.: K Date Received: 09

K1611733 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.

Janet mallach Approved by



Chain of Custody

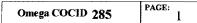
ALS Environmental—Kelso Laboratory 1317 South 13th Avenue, Kelso, WA 98626 Phone (360)577-7222 Fax (360)636-1068 www.alsglobal.com

RIGHT SOLUTIONS | RIGHT PARTNER

CHAIN OF CUSTODY RECORD

Fremont

S:MTINITAN



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

	Amniyan							Sour Fremont Ave. N. Seattle, WA 98103 TEL: 206-352-3790 FAX: 206-352-7178 Website: www.fremontanalytical.com
SUB CONTR	ATOR: ALS	COMPANY:	ALS Enviro	nmental		SPECIAL INSTRUCTIONS/	COMMENTS:	
ADDRESS:	1317 South 13th	Avenue			<u></u>	Please email results to cward@fremontanalyt		y at mridgeway@fremontanalytical.com and Chelsea Ward at
CITY, STATE	E, ZIP: Kelso, WA 98626	5						
PHONE: (3	60) 577-7222 FAX:	EMA	IL:					
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.
	1609348-001B	PAI-26-11.6-12.3	CLEAR JARS 4 O	Soil	9/2	8/2016 10:20:00 AM	1	Chemical Oxygen Demand by SM5220, Low Level RL
1	TEST_SUB					landa ana ang ang ang ang ang ang ang ang an	da hili ali da da mandi di ana erre reservoia	
	1609348-003B	PAI-26-20.25-25.2	CLEAR JARS 4 O	Soil	9/2	8/2016 10:30:00 AM	1	Chemical Oxygen Demand by SM5220, Low Level RL
2	TEST_SUB						12 24 12 12 12 12 12 12 12 12 12 12 12 12 12	
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
2	TEST_SUB							
4	1609348-010B	PAI-27-10-12.5	CLEAR JARS 4 O	Soil	9/2	28/2016 3:25:00 PM	1	Chemical Oxygen Demand by SM5220, Low Level RL
4	TEST_SUB					Wie Jaaren kan kerne di dikana dari di kana di kana di dikana di kana di dikana di kana di dikana di dikana di	a an e a dha an da an an an she nd e de ar da s	

Relinquished By	/apre 1 9/29/16 11.		Received By: Syft	Date: A - 30-16	Time: 9:40	REPORT TRANSMITTAL DESIRED:				
Relinquished By:			Received By:	Date:	Time:	HARDCOPY (extra cost)				
Relinquished By: Date:		Time:	Received By:	Date:	Time:	FOR LAB USE ONLY				
TAT: S			Next BD 2nd BD	3rd B		Temp of samples°C Attempt to Cool ?				
IAI: 5		RUSH		ם גענ		Comments:				
			Note: RUSH requests will incur sur							

ſ	~	•		Cooler	Receipt and	Preservation	ı Form	l	11/2	.7	`	<u>~~~</u> (
ient _+	remont	anad	y fical	2	······	Service Red	quest K	16	1112	<u> </u>		
ceived:	remont 01-30-	·16	Opened:	9-30-	<u>/6</u> By:	Service Red	Unload	led: 9	30-16	_By:	<u>C</u>	
	es were rece		USPS	Fedex	UPS	DHL PDX	Cou		- nd Delivered			
-	es were rece			Coster)			ther		nu Denverei		NA	
	custody seal			\sim	Y A	If yes, how man						
	ent, were cu			Y	0	If present, w	-				Y	N
				Corr.	Thermometer				Tracking N	lumber	· · · · · · · · · · · · · · · · · · ·	
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		_										-
Packir	ng material:	Inserts	Baggies	Babble B	rap Gel Pack	ts Wet Ice D	ry Ice	Sleeves				
XX /					\smile							
were	custody pap	ers properly	y filled out	(ink, signe	d, etc.)?					NA	Ý	IN
			-			? Indicate in the	e table b	elow.		NA NA	\bigtriangledown	N N
Were	samples reco	eived in go If ap	od conditio plicable, ti	on (tempera ssue sample	ture, unbroken) es were receive			elow. 'y Thawed	Thawed	NA	~	N
Were Were a	samples reco all sample la	eived in goo If ap bels compl	od conditio plicable, ti ete (i.e ana	on (tempera ssue sample lysis, prese	ture, unbroken) es were receive rvation, etc.)?	d: <i>Frozen</i>	Partiall	'y Thawed		NA NA	~	N N
Were Were a Did all	samples reco all sample la sample labo	eived in go If ap bels compl els and tags	od conditio plicable, ti ete (i.e ana agree with	on (tempera ssue sample lysis, prese n custody p	ture, unbroken) es were received rvation, etc.)? apers? Indicate	d: Frozen e major discrepan	Partiall	'y Thawed		NA NA NA	66	N N N
Were Were a Did all Were	samples reco all sample la sample labo appropriate	eived in go If ap bels compl els and tags bottles/con	od conditio plicable, ti ete (i.e ana agree with tainers and	on (tempera ssue sample lysis, prese a custody p volumes re	ture, unbroken) es were receive rvation, etc.)? apers? <i>Indicate</i> eceived for the	d: Frozen e major discrepan tests indicated?	Partiall	ly Thawed the table on	1 page 2.	NA NA	669	N N N
Were Were a Did all Were). Were	samples reco all sample la sample labo appropriate the pH-pres	eived in go If ap bels comple els and tags bottles/con served bottl	od conditio plicable, ti ete (i.e ana agree with tainers and les (<i>see SM</i> (on (tempera ssue sample lysis, prese a custody p volumes r O GEN SOP	ture, unbroken) es were received ervation, etc.)? apers? <i>Indicate</i> eceived for the) received at the	d: Frozen e major discrepan tests indicated? e appropriate pH?	Partiall	ly Thawed the table on	1 page 2.	NA NA NA	A A A Y	N N N N
Were Were a Did all Were . Were . Were	samples reco all sample la sample labo appropriate the pH-pres VOA vials	eived in go If ap bels completels and tags bottles/con served bottl received w	od conditio plicable, ti ete (i.e ana agree with tainers and les (<i>see SM</i> (on (tempera ssue sample lysis, prese a custody p volumes r O GEN SOP	ture, unbroken) es were receive rvation, etc.)? apers? <i>Indicate</i> eceived for the	d: Frozen e major discrepan tests indicated? e appropriate pH?	Partiall	ly Thawed the table on	1 page 2.	NA NA NA	P P P Y Y Y	N N N N
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Were Were a Did all Were . Were . Were	samples reco all sample la sample labo appropriate the pH-pres VOA vials C12/Res neg	eived in go If ap bels complete els and tags bottles/con served bottl received w gative?	od conditio plicable, ti ete (i.e ana agree with tainers and les (<i>see SM</i> (on (tempera ssue sample lysis, prese n custody p volumes r O GEN SOP	ture, unbroken) es were received ervation, etc.)? apers? <i>Indicate</i> eceived for the) received at the <i>dicate in the tab</i>	d: Frozen e major discrepan tests indicated? e appropriate pH? ble below.	Partiall	ly Thawed the table on the in the tab	n page 2. ble below	NA NA NA	P P P Y Y Y	N N N N N
Were Were a Did all Were . Were . Were	samples reco all sample la sample labo appropriate the pH-pres VOA vials	eived in go If ap bels complete els and tags bottles/con served bottl received w gative?	od conditio plicable, ti ete (i.e ana agree with tainers and les (<i>see SM</i> (on (tempera ssue sample lysis, prese n custody p volumes r O GEN SOP	ture, unbroken) es were received ervation, etc.)? apers? <i>Indicate</i> eceived for the) received at the	d: Frozen e major discrepan tests indicated? e appropriate pH? ble below.	Partiall	ly Thawed the table on the in the tab	i page 2. ble below	NA NA NA	P P P Y Y Y	N N N N
Were Were a Did all Were Were Were	samples reco all sample la sample labo appropriate the pH-pres VOA vials C12/Res neg	eived in go If ap bels complete els and tags bottles/con served bottl received w gative?	od conditio plicable, ti ete (i.e ana agree with tainers and les (<i>see SM</i> (on (tempera ssue sample lysis, prese n custody p volumes r O GEN SOP	ture, unbroken) es were received ervation, etc.)? apers? <i>Indicate</i> eceived for the) received at the <i>dicate in the tab</i>	d: Frozen e major discrepan tests indicated? e appropriate pH? ble below.	Partiall	ly Thawed the table on the in the tab	n page 2. ble below	NA NA NA	P P P Y Y Y	N N N N
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Were Were a Did all Were . Were . Were	samples reco all sample la sample labo appropriate the pH-pres VOA vials C12/Res neg	eived in go If ap bels complete els and tags bottles/con served bottl received w gative?	od conditio plicable, ti ete (i.e ana a agree with tainers and les (<i>see SM</i> C ithout head	on (tempera ssue sample lysis, prese a custody pr volumes ro O GEN SOP lspace? Inc	ture, unbroken) es were received avation, etc.)? apers? <i>Indicate</i> eccived for the) received at the <i>dicate in the tab</i> Sample ID on C	d: Frozen e major discrepan tests indicated? e appropriate pH? ble below.	Partiall	ty Thawed the table on the in the tab	a page 2. ble below Identified by	NA NA NA	P P P Y Y Y	N N N N
Were a Did all Were Were Were Were	samples reco all sample la sample labo appropriate the pH-pres VOA vials C12/Res neg	eived in goo If ap bels comple els and tags bottles/con served bottl received w gative?	od conditio plicable, ti ete (i.e ana a agree with tainers and les (<i>see SMC</i> ithout head	en (tempera ssue sample lysis, prese a custody pr volumes ro <i>O GEN SOP</i> lspace? <i>Ind</i>	ture, unbroken) es were received ervation, etc.)? apers? <i>Indicate</i> eceived for the) received at the <i>dicate in the tab</i>	d: Frozen e major discrepan tests indicated? e appropriate pH? ble below.	Partiall	ly Thawed the table on the in the tab	n page 2. ble below	NA NA NA NA	V V V V V	N N N N
Were a Did all Were Were Were Were	samples reco all sample lab appropriate the pH-pres VOA vials C12/Res neg Sample ID c	eived in goo If ap bels comple els and tags bottles/con served bottl received w gative?	od conditio plicable, ti ete (i.e ana a agree with tainers and les (<i>see SMC</i> ithout head	en (tempera ssue sample lysis, prese a custody pr volumes ro <i>O GEN SOP</i> lspace? <i>Ind</i>	ture, unbroken) es were received rvation, etc.)? apers? <i>Indicate</i> eccived for the) received at the <i>dicate in the tab</i> Sample ID on C	d: Frozen e major discrepan tests indicated? e appropriate pH? ble below.	Partiall	ty Thawed the table on the in the tab Volume	a page 2. ble below Identified by Reagent L	NA NA NA NA	V V V V V	N N N N
Were a Did all Were Were Were Were	samples reco all sample lab appropriate the pH-pres VOA vials C12/Res neg Sample ID c	eived in goo If ap bels comple els and tags bottles/con served bottl received w gative?	od conditio plicable, ti ete (i.e ana a agree with tainers and les (<i>see SMC</i> ithout head	en (tempera ssue sample lysis, prese a custody pr volumes ro <i>O GEN SOP</i> lspace? <i>Ind</i>	ture, unbroken) es were received rvation, etc.)? apers? <i>Indicate</i> eccived for the) received at the <i>dicate in the tab</i> Sample ID on C	d: Frozen e major discrepan tests indicated? e appropriate pH? ble below.	Partiall	ty Thawed the table on the in the tab Volume	a page 2. ble below Identified by Reagent L	NA NA NA NA	V V V V V	N N N N
Were a Did all Were 0. Were 2. Was	samples reco all sample lab appropriate the pH-pres VOA vials C12/Res neg Sample ID c	eived in goo If ap bels comple els and tags bottles/con served bottl received w gative?	od conditio plicable, ti ete (i.e ana a agree with tainers and les (<i>see SMC</i> ithout head	en (tempera ssue sample lysis, prese a custody pr volumes ro <i>O GEN SOP</i> lspace? <i>Ind</i>	ture, unbroken) es were received rvation, etc.)? apers? <i>Indicate</i> eccived for the) received at the <i>dicate in the tab</i> Sample ID on C	d: Frozen e major discrepan tests indicated? e appropriate pH? ble below.	Partiall	ty Thawed the table on the in the tab Volume	a page 2. ble below Identified by Reagent L	NA NA NA NA	V V V V V	N N N N
Were a Did all Were 0. Were 2. Was	samples reco all sample lab appropriate the pH-pres VOA vials C12/Res neg Sample ID c	eived in goo If ap bels comple els and tags bottles/con served bottl received w gative?	od conditio plicable, ti ete (i.e ana a agree with tainers and les (<i>see SMC</i> ithout head	en (tempera ssue sample lysis, prese a custody pr volumes ro <i>O GEN SOP</i> lspace? <i>Ind</i>	ture, unbroken) es were received rvation, etc.)? apers? <i>Indicate</i> eccived for the) received at the <i>dicate in the tab</i> Sample ID on C	d: Frozen e major discrepan tests indicated? e appropriate pH? ble below.	Partiall	ty Thawed the table on the in the tab Volume	a page 2. ble below Identified by Reagent L	NA NA NA NA	V V V V V	N N N N
Were a Did all Were Were Were Were	samples reco all sample lab appropriate the pH-pres VOA vials C12/Res neg Sample ID c	eived in goo If ap bels comple els and tags bottles/con served bottl received w gative?	od conditio plicable, ti ete (i.e ana a agree with tainers and les (<i>see SMC</i> ithout head	en (tempera ssue sample lysis, prese a custody pr volumes ro <i>O GEN SOP</i> lspace? <i>Ind</i>	ture, unbroken) es were received rvation, etc.)? apers? <i>Indicate</i> eccived for the) received at the <i>dicate in the tab</i> Sample ID on C	d: Frozen e major discrepan tests indicated? e appropriate pH? ble below.	Partiall	ty Thawed the table on the in the tab Volume	a page 2. ble below Identified by Reagent L	NA NA NA NA	V V V V V	N N N N



General Chemistry

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

RIGHT SOLUTIONS | RIGHT PARTNER

Analytical Report **Client:** Service Request: K1611733 Fremont Analytical Date Collected: 09/28/16 **Project:** COD **Sample Matrix:** Soil **Date Received:** 09/30/16 **Analysis Method:** SM 5220 C Modified Units: mg/Kg **Prep Method:** ALS SOP 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	

QA/QC Report

Client: Project Sample Matrix:	Fremont Analy COD Soil	tical				Date Date	e Request: Collected: Received:	NA NA	
		-	-	ole Summ ry Param	•	Date A	Analyzed:	10/07/16	
Sample Name: Lab Code:	Batch QC K1611836-001					Duplicate Sample K1611836-	Units: Basis:	mg/Kg Dry	
Analyte Name Chemical Oxygen Dema	nd (COD)	Analysis Method SM 5220 C Modified	MRL 610	MDL -	Sample Result 5970	001DUP Result 3720	Average 4850	RPD 47 *	RPD Limit 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.

QA/QC Report

Client: Project: Sample Matrix:	Fremont Analytical COD Soil			Service Requ Date Collecte Date Receive Date Analyze Date Extract	ed: d: ed:	K1611733 N/A N/A 10/7/16 10/7/16
		Matrix S	pike Summary	Duc Extract	cu.	10/ // 10
		Chemical Oxy	gen Demand (C	OD)		
Sample Name:	Batch QC			Uni	its:	mg/Kg
Lab Code:	K1611836-001			Bas	sis:	Dry
Analysis Method:	SM 5220 C Modified					
Prep Method:	ALS SOP					
		Matrix Spik	e			
		K1611836-001	MS			
Analyte Name		Sample Result	Result	Spike Amount	% R	
Chemical Oxygen De	emand (COD)	5970	64500	52400	112	2 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.

QA/QC Report

Client: Project: Sample Matrix:	Fremont Analytical COD Soil		Service Requ Date Analyze Date Extract	ed:	K1611733 10/07/16 NA
		ntrol Sample Summary Oxygen Demand (COl			
Analysis Method: Prep Method:	SM 5220 C Modified None		Units: Basis: Analysis Lot		mg/Kg Dry 517791
Sample Name Lab Control Sample	Lab Code K1611733-LCS	Result 4540	Spike Amount 4840	% Rec 94	% Rec Limits 85-115



	609348									QC S	SUMMA	RY REF	ORT
	eoEngineers as Works Park S	Site							Che	emical Oxy	gen Dema	nd by SM	5220
Sample ID MB-R320			BLK			Units: mg/L		Prep Date	e: 9/30/2	016	RunNo: 320	068	
Client ID: MBLKW		h ID:	R32068					Analysis Date			SeqNo: 606		
Analyte		F	Result	RL	SPK value	SPK Ref Val	%REC			RPD Ref Val	%RPD	RPDLimit	Qual
Chemical Oxygen Den	nand		ND	10.0									
Sample ID LCS-R320	068 Sam	рТуре	LCS			Units: mg/L		Prep Date	e: 9/30/2	016	RunNo: 320	068	
Client ID: LCSW	Bate	h ID:	R32068					Analysis Date	e: 9/30/2	016	SeqNo: 606	6399	
Analyte		F	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chemical Oxygen Den	nand		79.5	10.0	75.00	0	106	80	120				
Sample ID 1609315-0	001ADUP Sam	рТуре	: DUP			Units: mg/L		Prep Date	e: 9/30/2	016	RunNo: 320	068	
Client ID: BATCH	Bate	h ID:	R32068					Analysis Date	e: 9/30/2	016	SeqNo: 606	6401	
Analyte		F	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chemical Oxygen Den	nand		28.6	10.0						33.87	17.0	30	
Sample ID 1609315-0	001AMS Sam	рТуре	: MS			Units: mg/L		Prep Date	e: 9/30/2	016	RunNo: 320	068	
Client ID: BATCH	Bate	h ID:	R32068					Analysis Date	e: 9/30/2	016	SeqNo: 606	6402	
Analyte		F	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chemical Oxygen Den	nand		107	10.0	75.00	33.87	98.0	70	130				
Sample ID 1609315-0	001AMSD Sam	рТуре	: MSD			Units: mg/L		Prep Date	e: 9/30/2	016	RunNo: 320	068	
Client ID: BATCH	Bato	h ID:	R32068					Analysis Date	e: 9/30/2	016	SeqNo: 606	6403	
Analyte		F	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chemical Oxygen Den	nand		102	10.0	75.00	33.87	90.9	70	130	107.3	5.06	30	

Fremont
Analytical

CLIENT: G	609348 eoEngineers as Works Park Site						Di	QC Ssolved Me	SUMMAI etals by EF		-
Sample ID MB-14968	SampType: MBLK	(Units: µg/L		Prep Date	e: 9/29/20	016	RunNo: 32	034	
Client ID: MBLKW	Batch ID: 14968	3				Analysis Date	e: 9/29/20	016	SeqNo: 60	5751	
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic Iron	ND ND	0.500 50.0									
Sample ID LCS-1496	8 SampType: LCS			Units: µg/L		Prep Date	e: 9/29/2 (016	RunNo: 32	034	
Client ID: LCSW	Batch ID: 14968	3				Analysis Date	e: 9/29/20	016	SeqNo: 60	5752	
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	e: 9/29/2 0	016	RunNo: 32	034	
Client ID: PAI-26-D-	160928 Batch ID: 14968	3				Analysis Date	e: 9/29/20	016	SeqNo: 60	5754	
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	e: 9/29/2 (016	RunNo: 32	034	
Client ID: PAI-26-D-	160928 Batch ID: 14968	3				Analysis Date	e: 9/29/20	016	SeqNo: 60	5755	
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	e: 9/29/20	016	RunNo: 32	034	
Client ID: PAI-26-D-	160928 Batch ID: 14968	3				Analysis Date	e: 9/29/20	016	SeqNo: 60	5759	
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	
										Pag	e 28 of



Work Order: CLIENT: Project:	1609348 GeoEngineer Gas Works F		QC SUMMARY REPOR Dissolved Metals by EPA Method 200						-			
Sample ID 16093 4 Client ID: PAI-26	48-004AMSD -D-160928	SampType: MSD Batch ID: 14968			Units: µg/L		Prep Dat Analysis Dat	te: 9/29/20 te: 9/29/20		RunNo: 320 SeqNo: 60 5	-	
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	



Sample Log-In Check List

	lient Name:	GEI	Work Ore	der Number:	1609348		
Lo	ogged by:	Erica Silva	Date Rec	ceived:	9/28/201	6 5:32:00 PM	
<u>Cha</u>	nin of Custo	ody					
1.	Is Chain of C	ustody complete?	Yes	✓	No 🗌	Not Present	
2.	How was the	sample delivered?	<u>Client</u>				
Log	ı In						
-	Coolers are p	present?	Yes	✓	No 🗌	NA	
	Chinaina cont		Yes				
		tainer/cooler in good condition?			No 🗌		
5.		s present on shipping container/cooler? ments for Custody Seals not intact)	Yes		No 🗌	Not Required	✓
6.	Was an atten	npt made to cool the samples?	Yes	✓	No 🗌	NA	
7.	Were all item	s 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 san	nple volume for indicated test(s)?	Yes	✓	No 🗌		
10.	Are samples	properly preserved?	Yes	✓	No 🗌		
11.	Was preserva	ative added to bottles?	Yes		No 🗹	NA	
12.	Is there head	space in the VOA vials?	Yes		No 🗌	NA	✓
13.	Did all sample	es containers arrive in good condition(unbroken)?	Yes	✓	No 🗌		
14.	Does paperw	ork match bottle labels?	Yes		No 🗌		
15.	Are matrices	correctly identified on Chain of Custody?	Yes	✓	No 🗌		
16.	Is it clear what	at analyses were requested?	Yes	✓	No 🗌		
17.	Were all hold	ing times able to be met?	Yes	✓	No 🗌		
<u>Spe</u>	cial Handli	ing (if applicable)					
18.	Was client no	tified of all discrepancies with this order?	Yes		No 🗌	NA	✓
	Person	Notified: Date					
	By Who	m: Via:	eMai	I 🗌 Phone	e 🗌 Fax	In Person	
	Regardi	ng:					
	Client In	structions:					

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

COC 1.1 - 4.5.16 - 1 of 2

www.fremontanalytical.com

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Ave N. Tel: 206-332.3700 Geologinees Four 206-322.7178 Poject Name: (usedout) Gas Works park Sin (usedout) Good Saund Street, Sub 300 Saunda Saund Street, Sub 300 Saunda Saund Street, Sub 300 Saunda Saund Street, Sub 300 Mr, All = Auguona, B = Bull, O = Other, P = Product, S = Subl., Ya = Subl.,	^Please coordinate with the lab in advance		1. 	.,				
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Anch. Tet: 200-322-3790 Point Name Can Mark in Mr. Sin 0005/000000000000000000000000000000000	3. Groundwater and soil RLs per the WO 4. COD = Chemical oxygen demand	, that I have verified Client's	behalf of the Client named above	nont Analytical on nent.	reement with Free side of this Agreer	er into this Ag ront and back	e terms on the fi	agreement to each of the Relinguished
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Ave N. Tel: 206-352-3790 For the form of	Storm Water, WW = Waste Water		N = Water, DW = Dri	SD = Sediment,	P = Product,			
Ave N. Tel: 206-352-3790 Project Name: Page:	cdelavia@geoengineers.com	sbsmith@geoengineers.com			Fax:			
Tel: 206-352-3790 Page: of Fax: 206-352-7178 Project Name: Page: of: GeoEngineers Project No: 0186-846-01 Task 1803 Collected by: GRL/CVD 600 Stewart Street, Suite 1700 Location: Seattle		Sandra Smith / Claudia De La Via	Report To (PM):			A 98103	Seattle, W	City, State, Zip:
Tel: 206-352-3790 Page:		Seattle	Location:	~~~	700	rt Street, Suite 1	600 Stewa	Address:
Tel: 206-352-3790 Fax: 206-352-7178		Gas Works Park Site 0186-846-01 Task 1803	Project Name:			ers	GeoEngine	Client:
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Femont Chain of Custody Record and Laboratory Services Agreement	aboratory Services Agreemen		Chain of Custo					



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

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,

lc. Kedy

Mike Ridgeway Laboratory Director

CC: Claudia De La Via

DoD/ELAP Certification #L2371, ISO/IEC 17025:2005 ORELAP Certification: WA 100009-007 (NELAP Recognized)



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



Case Narrative

Date: 10/27/2016

CLIENT:GeoEngineersProject: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 & Acronyms



WO#: 1609367 Date Reported: 10/27/2016

Qualifiers:

- * Flagged value is not within established control limits
- B Analyte detected in the associated Method Blank
- D Dilution was required
- E Value above quantitation range
- H Holding times for preparation or analysis exceeded
- I Analyte with an internal standard that does not meet established acceptance criteria
- J Analyte detected below Reporting Limit
- N Tentatively Identified Compound (TIC)
- Q Analyte with an initial or continuing calibration that does not meet established acceptance criteria
- (<20%RSD, <20% Drift or minimum RRF)
- S Spike recovery outside accepted recovery limits
- ND Not detected at the Reporting Limit
- R High relative percent difference observed

Acronyms:

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



Analytical Report

Work Order: **1609367** Date Reported: **10/27/2016**

Client: GeoEngineers			(Collectior	n Date	e: 9/29/2016 10:21:00 AM	
Project: Gas Works Park Site Lab ID: 1609367-002 Client Sample ID: PAI-28-S-160929	I	Matrix: Water					
Analyses	Result	RL	Qual	Units	DF	Date Analyzed	
Dissolved Metals by EPA Method	200.8			Batc	h 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			Batc	h ID:	R32169 Analyst: MW	
Chemical Oxygen Demand	28.0	20.0	D	mg/L	2	10/6/2016 2:02:37 PM	



Analytical Report

Work Order: **1609367** Date Reported: **10/27/2016**

Client:	GeoEngineers			(Collectior	n Date	e: 9/29/2016 2:30:00 PM				
Lab ID:	Gas Works Park Site 1609367-003 mple ID: RINSE-160929		Matrix: Water								
Analyses	5	Result	RL	Qual	Units	DF	Date Analyzed				
Dissolve	ed Metals by EPA Method	<u>200.8</u>			Batcl	h ID: 1	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				
<u>Chemica</u>	al Oxygen Demand by SM	<u>5220D</u>			Batcl	h ID: I	R32169 Analyst: MW				
Chemica	al Oxygen Demand	ND	10.0		mg/L	1	10/6/2016 2:02:37 PM				



Analytical Report

Work Order: **1609367** Date Reported: **10/27/2016**

Client: GeoEngineers			(Collectior	n Dat	e: 9/29/2016 4:40:00 PM				
Project: Gas Works Park Site Lab ID: 1609367-008 Client Sample ID: PAI-30-S-16	60929	Matrix: Water								
Analyses	Result	RL	Qual	Units	DF	Date Analyzed				
Dissolved Metals by EPA Me	<u>thod 200.8</u>			Batcl	h 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 b	<u>y SM 5220D</u>			Batcl	h ID:	R32169 Analyst: MW				
Chemical Oxygen Demand	26.7	20.0	D	mg/L	2	10/6/2016 2:02:37 PM				



Grain Size by ASTM D422

Project: Gas Works Park Site Client: GeoEngineers Lab Project #: 1609367

UOM = Percent

Percent Finer (Passing) than the Indicated Size

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-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

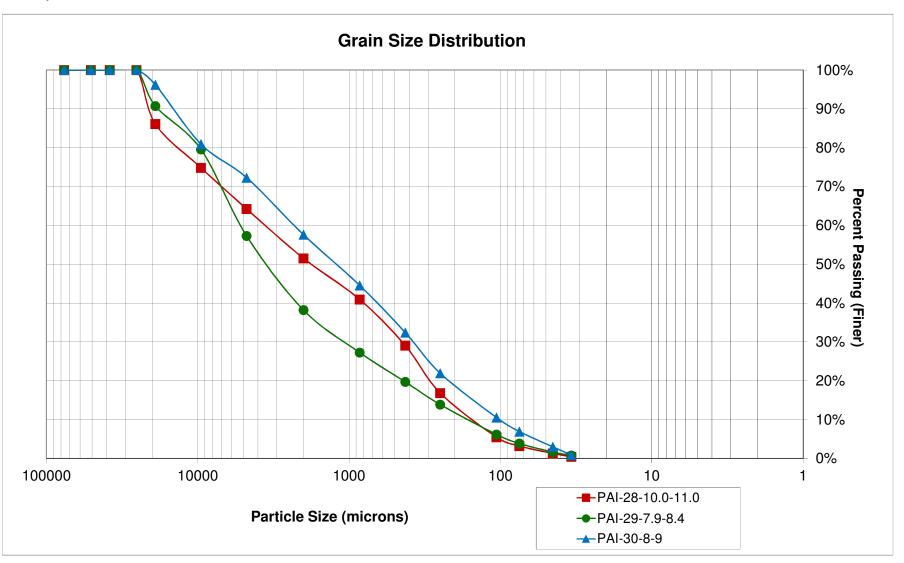
UOM = Percent

Grain Size Classification		Gravel Coarse Medium Sand		ŀ	Fine Sa	nd		Silt								
Sieve Size (Microns)	>76200			38100- 25400		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





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

October 26, 2016

Analytical Report for Service Request No: 1612019

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

RE: 1609367

ear 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 re uest number **K1612019**.

Analyses were performed according to our laboratory's E AP-approved uality assurance program. The test results meet re uirements of the current E AP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of E AP-accredited analytes, refer to the certifications section at www.alsglobal.com. All results are intended to be considered in their entirety, and A S roup SA orp. dba A S Environmental (A S) 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) analy ed, as listed in the report.

Please contact me if you have any uestions. My extension is 3375. ou may also contact me via email at anet.Malloch@alsglobal.com.

Respectfully submitted,

ALS Group USA, Corp. dba ALS Environmental

mail mallach

anet Malloch Pro ect 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 Total Solids General Chemistry

R TSO TO S R TPART ER

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 MCL	Modified 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

- ${f F}$ 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.pjlabs.com/	L16-57
Louisiana DEQ	http://www.deq.louisiana.gov/portal/DIVISIONS/PublicParticipationandPer mitSupport/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/EnvironmentalLaborator yAccreditation/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/anlayte is offered by that state.



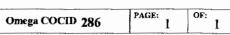
Chain of Custody

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

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CHAIN OF CUSTODY RECORD



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 CONTR.	ATOR: ALS	COMPANY:	ALS Environ	mental	SPECIAL INSTRUCTIONS		
ADDRESS:	1317 South 13th A	venue			Please email results to cward@fremontanaly		y at mridgeway@fremontanalytical.com and Chelsea Ward at
CITY, STATE	^{ZIP:} Kelso, WA 98626						
PHONE: (36	50) 577-7222 FAX:						
ACCOUNT #:							
пем #	SAMPLE ID	CLIENT SAMPLE ID	BOTTLE TYPE	MATRIX	DATE COLLECTED	NUMBER OF CONTAINERS	COMMENTS: Methanol Preserved Weights HOT Sample Notation, Additional Sample Description.
	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
1	TEST_SUB						
_	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
2	TEST_SUB		an a				-
;	1609367-006B	PA1-30-8-9	CLEAR JARS 4 O	Soil	9/29/2016 4:35:00 PM	1	Chemical Oxygen Demand by SM5220, Low Level RL
3	TEST_SUB						

Relinquished By:	Date: 10/5-/16	Time: 16:09	Received By Grand AS	Date: 10/6/16	Time: 1030	REPORT TRANSMITTAL DESIRED:	
Relinquished By:	Date:	Time:	Received By:	Date:	Time:	HARDCOPY (extra cost) 🗍 FAX 🔂 🖉 MAIL 📋 ONLINE	
Relinquished By:	Date:	Time:	Received By:	Date:	Time:	FOR LAB USE ONLY	
TAT: Standard RUSH Next BD 2nd BD 3rd BD Comments:							
Note: RUSH requests will incur surcharges?							



PC_	Jane	Ł
-----	------	---

Coolar	Pecoint and	l Preservation	Form
COOLER	кесени ан	і г гезегуацоп	гогш

				COOLEI	cecerpt and i	reservation For					
Client	Frem	ent f	Inalyt	ica 🔔		Service Request				-	_
Received:	10/6/	16	Opened:	10/6/1	6 Ву:	<u> </u>	uded: 10	16/16	By:(<u>"G</u>	
1. Sample	es were rece	ived via?	Mail	Fed Ex	UPS DI	HL PDX Cou	rier Har	nd Deliver	ed		
2. Sample	es were rece	vived in: (ci	^{rcle)}	Cooler	Box Env	elope Other				NA	
3. Were <u>c</u>	custody seal	<u>s</u> on cooler	s?	NA Y	N I	If yes, how many and	where?				
If pres	ent, were cu	istody seals	intact?	Y	N	If present, were the	ey signed an	d dated?		Y	Ν
Rew Cooler Temp	Corrected. Cooler Temp	Raw Temp Blank	Corrected Temp Blank	Corr. Factor	Thermometer ID	Cooler/COC ID		Tracking	g Nümber	NA	Filed
5.4	6.3		- Statement and a second second	-0-1	325	286	12 X61	92X 0	B 3205	4292	
				· · · · · · · · · · · · · · · · · · ·					<u></u>	·· <u>··</u> ····	
4. Packi	ng material:	Inserts	Baggies	Bubble W	rad Gel Packs	Wet Ice Dry Ice	Sleeves	- <u></u>			L
	custody pap			······································		, , , , , , , , , , , , , , , , , , ,	0100700		NA	\bigcirc	N
			•		? Indicate in the	e table below.			NA	Ŵ	N
7. Were	all sample la	abels comp	lete (i.e ana	lysis, prese	rvation, etc.)?				NA	\bigcirc	N
8. Did al											N
					eceived for the te			. 0	NA	D	N
10. Were	e the pH-pre	served bott	tes (see SM	O GEN SOP) received at the	appropriate pH? Indi	cate in the to	able below	NA	Y	N
11. Were	e VOA vials	received v	vithout head	lspace? Inc	dicate in the tabl	e below.			(NA)	Y	N
12. Was	C12/Res ne	gative?							NA	Y	N

Sample ID	Bottle Count Bottle Type	Out of Temp	Head- space	Broke	рН	Reagent	Volume added	Reagent Lot Number	Initials	Time
								·····		- <u></u>
······································										

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

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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	

QA/QC Report

Client:	Fremont Analytical	Service Request:K1612019
Project	1609367	Date Collected:09/29/16
Sample Matrix:	Soil	Date Received: 10/06/16
Analysis Method:	160.3 Modified	Units:Percent
Prep Method:	None	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 Batch OC	K1612019-002DUP K1612064-001DUP	-	82.6 84.3	84.8 84.2	83.7 84.3	3	20 20	10/13/16 10/13/16
Batch QC	K1012004-001DUF	-	04.5	04.2	04.5	<1	20	10/13/10

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

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Analytical Report **Client:** Service Request: K1612019 Fremont Analytical Date Collected: 09/29/16 **Project:** 1609367 **Sample Matrix:** Soil **Date Received:** 10/6/16 **Analysis Method:** SM 5220 C Modified Units: mg/Kg **Prep Method:** ALS SOP 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	

QA/QC Report

Client: Project Sample Matrix:	Fremont Analyt 1609367 Soil	ical				Date (Request: Collected: Received:		
						Date A	Analyzed:	10/24/16	
		Replic	ate Samp	le Summ	ary				
		General	Chemist	ry Param	eters				
Sample Name:	Batch QC						Units:	mg/Kg	
Lab Code:	KQ1613642-07	7					Basis:	Wet	
						Duplicate Sample KQ1613642-			
					Sample	07DUP			RPD
Analyte Name		Analysis Method	MRL	MDL	Result	Result	Average		Limit
Chemical Oxygen Deman	nd (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.

QA/QC Report

Client: Project: Sample Matrix:	Fremont Analytical 1609367 Soil			Service Requ Date Collecte Date Receivee Date Analyze Date Extracte	d: N/A l: N/A d: 10/	
		Matrix S	pike Summary	Date Extraction	u. 10/	20/10
			gen Demand (CC)D)		
Sample Name:	Batch QC			Uni	ts: mg	/Kg
Lab Code:	KQ1613642-07			Bas	is: We	et
Analysis Method:	SM 5220 C Modified					
Prep Method:	ALS SOP					
		Matrix Spik				
		KQ1613642-07	MS			
Analyte Name		Sample Result	Result	Spike Amount	% Rec	% Rec Limits
Chemical Oxygen De	emand (COD)	59	1070	1000	101	75-125

Results flagged with an asterisk (\ast) 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.

QA/QC Report

Client: Project: Sample Matrix:	Fremont Analytical 1609367 Soil		Service Re Date Anal Date Extr	lyzed:	K161201 10/24/16 10/20/16	-
		trol Sample Summary Oxygen Demand (CO				
Analysis Method:	SM 5220 C Modified		Units:		mg/Kg	
Prep Method:	ALS SOP		Basis:		Dry	
			Analysis I	Lot:	520274	
			Spike			% Rec
Sample Name	Lab Code	Result	Amount	% Rec		Limits
Lab Control Sample	K1612019-LCS1	4860	4840	100		85-115
Lab Control Sample	K1612019-LCS2	4860	4840	100		85-115



Work Order: CLIENT:	1609367 GeoEnginee							Chemic		SUMMA gen Demai		
Project:	Gas Works	Park Site						Chenne		Jen Demai		J220D
Sample ID MB-R3	2169	SampType: MBLK			Units: mg/L			10/6/2016		RunNo: 321	169	
Client ID: MBLKW	N	Batch ID: R32169					Analysis Date:	10/6/2016		SeqNo: 608	8337	
Analyte		Result	RL	SPK value	SPK Ref Val	%REC	LowLimit H	lighLimit RPI	D Ref Val	%RPD	RPDLimit	Qual
Chemical Oxygen D	Demand	ND	10.0									
Sample ID LCS-R	32169	SampType: LCS			Units: mg/L		Prep Date:	10/6/2016		RunNo: 321	169	
Client ID: LCSW		Batch ID: R32169					Analysis Date:	10/6/2016		SeqNo: 608	8338	
Analyte		Result	RL	SPK value	SPK Ref Val	%REC	LowLimit H	lighLimit RPI	D Ref Val	%RPD	RPDLimit	Qual
Chemical Oxygen D	Demand	78.9	10.0	75.00	0	105	80	120				
Sample ID 160936	7-002BDUP	SampType: DUP			Units: mg/L		Prep Date:	10/6/2016		RunNo: 321	169	
Client ID: PAI-28-	-S-160929	Batch ID: R32169					Analysis Date:	10/6/2016		SeqNo: 608	8340	
Analyte		Result	RL	SPK value	SPK Ref Val	%REC	LowLimit H	lighLimit RPI	D Ref Val	%RPD	RPDLimit	Qual
Chemical Oxygen D	Demand	36.0	20.0						28.01	24.8	30	D
Sample ID 160936	7-002BMS	SampType: MS			Units: mg/L		Prep Date:	10/6/2016		RunNo: 321	169	
Client ID: PAI-28-	-S-160929	Batch ID: R32169					Analysis Date:	10/6/2016		SeqNo: 608	8341	
Analyte		Result	RL	SPK value	SPK Ref Val	%REC	LowLimit H	lighLimit RPI	D Ref Val	%RPD	RPDLimit	Qual
Chemical Oxygen D	Demand	197	20.0	150.0	28.01	113	70	130				D
Sample ID 160936	7-002BMSD	SampType: MSD			Units: mg/L		Prep Date:	10/6/2016		RunNo: 321	169	
Client ID: PAI-28-	-S-160929	Batch ID: R32169					Analysis Date:	10/6/2016		SeqNo: 608	8342	
Analyte		Result	RL	SPK value	SPK Ref Val	%REC	LowLimit H	lighLimit RPI	D Ref Val	%RPD	RPDLimit	Qual
Chemical Oxygen D	Demand	192	20.0	150.0	28.01	109	70	130	197.5	2.72	30	D

Fremont
Analytical

Work Order: 1609367								QC S	SUMMAI	RY REF	POR
CLIENT: GeoEngin Project: Gas Work	s Park Site						Di	ssolved Me	tals by EP	PA Metho	d 200
Sample ID MB-14980	SampType: MBLK			Units: µg/L		Prep Dat	e: 9/30/20	016	RunNo: 32	059	
Client ID: MBLKW	Batch ID: 14980					Analysis Dat	e: 9/30/2 0	016	SeqNo: 60	6207	
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 Dat	e: 9/30/20	016	RunNo: 32	059	
Client ID: LCSW	Batch ID: 14980					Analysis Dat	e: 9/30/20	016	SeqNo: 60	6208	
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 Dat	e: 9/30/20	016	RunNo: 32	059	
Client ID: RINSE-160929	Batch ID: 14980					Analysis Dat	e: 9/30/2 0	016	SeqNo: 60	6210	
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 Dat	e: 9/30/20	016	RunNo: 32	059	
Client ID: RINSE-160929	Batch ID: 14980					Analysis Dat	e: 9/30/2 0	016	SeqNo: 60	6211	
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 Dat	e: 9/30/20	016	RunNo: 320	059	
Client ID: RINSE-160929	Batch ID: 14980					Analysis Dat	e: 9/30/2 0	016	SeqNo: 60	6212	
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	
<u></u>										Pan	e 28 c



Work Order: CLIENT: Project:	1609367 GeoEnginee Gas Works F							Di	QC S ssolved Me	SUMMAF		_
Sample ID 160936 Client ID: RINSE	67-003AMSD -160929	SampType: MSD Batch ID: 14980			Units: µg/L		Prep Dat Analysis Dat	e: 9/30/20 e: 9/30/20	-	RunNo: 320 SeqNo: 606		
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	



Sample Log-In Check List

C	ient Name:	GEI	Work Orde	r Number:	1609367	<u>_</u>	
Lo	ogged by:	Erica Silva	Date Recei	ved:	9/29/201	6 5:42:00 PM	
<u>Cha</u>	in of Custo	<u>ody</u>					
1.	Is Chain of C	ustody complete?	Yes 🖌] [No 🗌	Not Present	
2.	How was the	sample delivered?	<u>Client</u>				
Log	In						
-	Coolers are p	resent?	Yes 🗸] 1	No 🗌	NA	
4.	Shipping cont	ainer/cooler in good condition?	Yes 🗸] [No 🗌		
5.		s present on shipping container/cooler? ments for Custody Seals not intact)	Yes] 1	No 🗌	Not Required	✓
6.	Was an atten	npt made to cool the samples?	Yes 🗸] [No 🗌	NA	
7.	Were all item	s received at a temperature of $>0^{\circ}C$ to $10.0^{\circ}C^{*}$	Yes 🗸] [No 🗌	NA	
8.	Sample(s) in	proper container(s)?	Yes 🗸] [No 🗌		
9.	Sufficient san	nple volume for indicated test(s)?	Yes 🗸] [No 🗌		
10.	Are samples	properly preserved?	Yes 🖌] [No 🗌		
11.	Was preserva	ative added to bottles?	Yes] [No 🗹	NA	
12.	Is there head	space in the VOA vials?	Yes] [No 🗌	NA	✓
13.	Did all sample	es containers arrive in good condition(unbroken)?	Yes 🗸		No 🗌		
14.	Does paperw	ork match bottle labels?	Yes 🗸	j 1	No 🗌		
15.	Are matrices	correctly identified on Chain of Custody?	Yes 🖌]	No 🗌		
16.	Is it clear what	at analyses were requested?	Yes 🗸] [No 🗌		
17.	Were all hold	ing times able to be met?	Yes 🖌] [No 🗌		
<u>Spe</u>	cial Handli	ng (if applicable)					
-		tified of all discrepancies with this order?	Yes] [No 🗌	NA	✓
	Person	Notified: Date					
	By Who	m: Via:	eMail	Phone	🗌 Fax	In Person	
	Regardi	ng:					
	Client In	structions:					
19.	Additional rer	narks:					1

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

^Please coordinate with the lab in advance									
TAT → SameDay^ NextDay^ 2 Day 3 Day STD		Date/Time	/	X					
5. Run for dissolved metals	16 17:42	Date/Time	Cred	Received	742	-16 1	Date/Time	Enderry	
 Groundwater and soil RLs per the WO GOD = Chemical axween remaind 	agreement to each of the terms on the front and backside of this Agreement.	Client named above, th	on behalf of the	t Analytical t.	Agreemen	greement w kside of this	er into this A ront and bac	n authorized to ent f the terms on the f	1 represent that 1 am authorized to enter into this Agreement with Fremont agreement to each of the terms on the front and backside of this Agreement.
 Groundwater iron and COD plus soil COD and grain size samples on erbody.cr TAT 	on the following business day.	unsposal by Lab (Samples will be neid for 30 days unless otherwise noted. A fee may be assessed if samples are retained after 30 days.)	days.)	ained after 30	nples are ret	assessed if samples are retained after 30 days.)	ient	Return to Client	Sample Disposal:
1 Groundwater arcenic and sulfido comelos on ACAD TAT	Turn-around times for samples	Fluoride Nitrate+Nitrite	O-Phosphate Fluc	de O-Ph	Bromide	Sulfate	Chlorid	Nitrate Nitrite	***Anions (Circle):
Pb Sb Se Sr Sn Ti TI U V Zn	Fe Hg K Mg Mn Mo Na Ni Pb	Ba Be Ca Cd Co Cr Cu	Al As B	Individual: Ag	nts TAL	Priority Pollutants	RCRA-8 P	rcle): MTCA-5	**Metals Analysis (Circle): MTCA-5
								. 6	10 PAI-
									9 PAI-
			X	XX	E	1640	9/24	60929	8 PAI 30-5-1609 29
402 Tr + 32 00 -					62	1640	9/29	16.7-18.2	7 PAI-30-16.
			XX		s	1635	9/29	p.	6 PAI- 30 - 8-9
400 Jar -					5	1505	9/29	-9.2	5 PAI-29-8.4-9.2
			XX		5	1500	9/29	1.8.4	4 PAI-29-7.9-8.4
			X	XX	C	1430	9/29	160929	3 PAT- RINSE-160929
			×	X	B	1021	9/29	60929	2 PAI-28-5-160929
			XX		S	0975	9/29/16	0-11.02	1 PAI- 28-10-
Comments	44 E 18 1 5 1 6 2 6 2 0 1 7 6 2 9 1 1 1 1 1 5 5 5 6 1 1 1 1 1 5 5 5 6 1 1 1 1	1280 - 240 - 128	N :50 101 N :50 N :10 N :1	Weenic Hope	Sample Type (Matrix)*	Sample Time	Sample	140727	Sample Name
SW = Storm Water, WW = Waste Water	GW = Ground Water,	DW = Drinking	nt, SL=Solid, W	S = Soil, SD = Sediment,	S = Soil,	ier, P = Product,	= Bulk, O = Other,	r, AQ = Aqueous, B =	*Matrix Codes: A = Air, AQ = Aqueous, B = Bulk,
cdelavia@geoengineers.com	sbsmith@geoengineers.com	PM Email: <u>sl</u>	PM			Fax:	418	253.722.2418	Telephone:
	Sandra Smith / Claudia De La Via	Report To (PM): Sa	Rep				A 98103	Seattle, WA 98103	City, State, Zip:
	Seattle	Location: Se				1700	600 Stewart Street, Suite 1700	600 Stewar	Address:
Collected by: GRL/CVD / CARS	Gas Works Park Site 0186-846-01 Task 1803	Project No: 0:	Pro				ers	GeoEngineers	Client
Page of of age 31						60 -	Tel: 206-352-3790 Fax: 206-352-7178	.<	3600 Fremont Ave N. Seattle, WA 98103
Laboratory Project No (internal): 1009367 of 3	9/29/2016	Date:				61	nalytical	And	
ord and Laboratory Services Agreement	y Record and La	Chain of Custody Rec	Chai					remo	



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

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,

Mohal c. Rady

Mike Ridgeway Laboratory Director

CC: Claudia De La Via

DoD/ELAP Certification #L2371, ISO/IEC 17025:2005 ORELAP Certification: WA 100009-007 (NELAP Recognized)



CLIENT: Project: Work Order:	GeoEngineers Gas Works Park Site 1610280	Work Order S	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



WO#: 1610280

Date: 11/28/2016

CLIENT:GeoEngineersProject: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 & Acronyms



WO#: 1610280 Date Reported: 11/28/2016

Qualifiers:

- * Flagged value is not within established control limits
- B Analyte detected in the associated Method Blank
- D Dilution was required
- E Value above quantitation range
- H Holding times for preparation or analysis exceeded
- I Analyte with an internal standard that does not meet established acceptance criteria
- J Analyte detected below Reporting Limit
- N Tentatively Identified Compound (TIC)
- Q Analyte with an initial or continuing calibration that does not meet established acceptance criteria
- (<20%RSD, <20% Drift or minimum RRF)
- S Spike recovery outside accepted recovery limits
- ND Not detected at the Reporting Limit
- R High relative percent difference observed

Acronyms:

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



Analytical Report

Work Order: **1610280** Date Reported: **11/28/2016**

Client: GeoEngineers			(Collection	Date: 1	0/16/2016 3:30:00 PM
Project: Gas Works Park Site Lab ID: 1610280-004 Client Sample ID: PAI-21B-S-16101	7		I	Matrix: Pr	oduct	
Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Total Metals by EPA Method 6020				Batch	n ID: 151	67 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	<u>5220D</u>			Batch	1D: R32	2441 Analyst: MW
Chemical Oxygen Demand	12,700	1,000	D	mg/L	100	10/20/2016 1:28:05 PM



Analytical Report

Work Order: **1610280** Date Reported: **11/28/2016**

Client: GeoEngineers				Collection	n Date	: 10/16/2016 2:33:00 PM
Project: Gas Works Park Site						
Lab ID: 1610280-005				Matrix: G	round	water
Client Sample ID: PAI-21B-D-16101	7					
Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Dissolved Metals by EPA Method 2	200.8			Batcl	n ID: 1	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
Chemical Oxygen Demand by SM	<u>5220D</u>			Batcl	n ID: F	R32441 Analyst: MW
Chemical Oxygen Demand	ND	10.0		mg/L	1	10/20/2016 1:28:05 PM



#450

34

0.766%

0.0247%

Grain Size by ASTM D422

Project: Gas Works Park Site Client: GeoEngineers Lab Project #: 1610280

UOM = Percent

Percent Finer (Passing) than the Indicated Size

Grain Size Coarse Medium Sand Fine Sand Gravel Silt Classification Sand 3" 2" 1 1/2" 1" 3/4" 3/8" Sieve Size #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 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% 32.5% 2.90% PAI-21B-15.8-16.5 100% 100% 100% 40.1% 5.75% 1.88% 100% 27.3% 21.1% 14.3% 8.63% 0.933%



Grain Size by ASTM D422

Project: Gas Works Park Site Client: GeoEngineers Lab Project #: 1610280

Percent Retained in Each Size Fraction

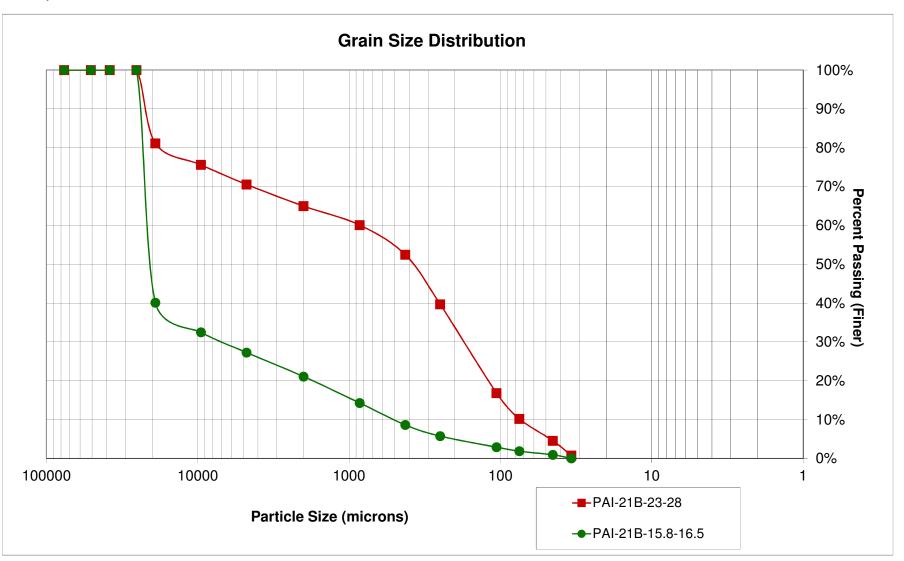
UOM = Percent

Grain Size Classification				Gravel	,			Coarse Sand	Mediu	m Sand		Fine San	nd		Silt	
Sieve Size (Microns)	>76200		50800- 38100			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



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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

ovember 14, 2016

Analytical Report for Service Request No: 1612823

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

RE: 1610280

ear 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 re uest number **K1612823**.

Analyses were performed according to our laboratory's E AP-approved uality assurance program. The test results meet re uirements of the current E AP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of E AP-accredited analytes, refer to the certifications section at www.alsglobal.com. All results are intended to be considered in their entirety, and A S roup SA orp. dba A S Environmental (A S) 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) analy ed, as listed in the report.

Please contact me if you have any uestions. My extension is 3375. ou may also contact me via email at anet.Malloch@alsglobal.com.

Respectfully submitted,

ALS Group USA, Corp. dba ALS Environmental

mail mallach

anet Malloch Pro ect 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 Total Solids General Chemistry

R TSO TO S R TPART ER

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 MCL	Modified 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 tr	Total Petroleum Hydrocarbons 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.pjlabs.com/	L16-57
Louisiana DEQ	http://www.deq.louisiana.gov/portal/DIVISIONS/PublicParticipationandPer mitSupport/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/EnvironmentalLaborator yAccreditation/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/anlayte 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

RIGHT SOLUTIONS | RIGHT PARTNER

CHAIN OF CUSTODY RECORD

Omega COCID 292 PAGE: 1 OF:

41612823

1

ADDRESS

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

SUB CONTR.	ATOR: ALS	COMPANY:	ALS Enviror	nmental	SPECIAL INSTRUCTIONS		
ADDRESS:	1317 South 13th A	venue			Please email results to cward@fremontanaly		y at mridgeway@fremontanalytical.com and Chelsea Ward at
CITY, STATE,	, ZIP: Kelso, WA 98626						
PHONE: (36	60) 577-7222 FAX:	EMA	L:				
ACCOUNT #:							
ПЕМ #	SAMPLE ID	CLIENT SAMPLE ID	BOTTLE TYPE	MATRIX	DATE COLLECTED	NUMBER OF CONTAINERS	COMMENTS: Methanol Preserved Weights HOT Sample Notation, Additional Sample Description.
	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
T	TEST_SUB	an a			n en en de elemente el cel·led partes de recente de la Marine de la desta de la desta de la desta de elemente d		
<u>,</u>	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
2	TEST_SUB						

Relinquished By		, 19943	Regisser 1	DIZNIO	Time MAIS	REPORT TRANSMITTAL DESIRED:
Relinquished By:	Date:	Time:	Received by:	Ilate:	Time:	HARDCOPY (extra cost)
Relinquished By:	Date:	Time:	Received By:	Date:	Time:	FOR LAB USE ONLY
TAT:	Standard X	RUSH	Next BD 2nd BD	3rd B	 D []	Temp of samples°C Attempt to Cool ?Comments:
	,		Note: RUSH requests will incur su	rcharges!		
						Tage to or a



ceived: IDPUILE Opened: IDPUILE By: Were Unloaded: IDPUILE By:	A the second of	Coole		and Duca	anation For			PCJ	ane
ceived: ID IV By: IV Unloaded: ID IV By: IV Samples were received via? USPS Fed Ex UPS DHL PDX Courier Hand Delivered Samples were received in: (circle) NA V N If yes, how many and where? NA If present, were custody seals intact? Y N If present, were they signed and dated? Y N Rever one could the reverse custody seals intact? Y N If present, were they signed and dated? Y N Rever one could the reverse custody seals intact? Y N If present, were they signed and dated? Y N Rever one could the reverse custody seals intact? Y N If present, were they signed and dated? Y N Rever one could the reverse custody seals intact? Y N If present, were they signed and dated? Y N Packing material: Inserts Baggies Ethole Wrat Cell Pack Wet ice Dry ice Sieves NA N N Were custody papers properly filled out (ink, signed, etc.)? Indicate in the table below.	1	Coole	er Receipt				012	0	
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Samples were received in: (circle) NA Bax Envelope Other		,	1)) האו	PDX Co	l urier Ha	l Ind Delivered		
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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 NA Y N Were all sample labels complete (i.e analysis, preservation, etc.)? NA Y N N 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 Was C12/Res negative? NA Y N NA Y N Sample ID on Bottle Sample ID on COC Identified by: Identified by: Identified by: Bottle Count Out of Head- Volume Reagent Lot Volume Reagent Lot	_			acks we	Tice Dry Ice	Sleeves			<u> </u>
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 MA Y N Was C12/Res negative? MA Y N Sample ID on Bottle Sample ID on COC Identified by: Identified by: Bottle Count Out of Head- Volume Reagent Lot Volume		· · · · ·						\leq	
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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: Identified by: Bottle Count Out of Head- Volume Reagent Lot Identified by:	1 uppn			vived F	rozen Partia	ly Thawed	Thawed	\sim	
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Were VOA vials received without headspace? Indicate in the table below. MA Y N Was C12/Res negative? NA Y N Sample ID on Bottle Sample ID on COC Identified by: Identified by: Bottle Count Out of Head- Volume Reagent Lot Identified by:		e (i.e analysis, pres	servation, etc.	.)?			١		1
Was C12/Res negative? N Sample ID on Bottle Sample ID on COC Identified by: Bottle Count Out of Head-Volume Reagent Lot	Did all sample labels and tags ag	e (i.e analysis, pres gree with custody	servation, etc. papers? Indi	.)? cate major	discrepancies in		N page 2.	NA Y) и
Sample ID on Bottle Sample ID on COC Identified by:	Did all sample labels and tags ag Were appropriate bottles/contain	(i.e analysis, pres gree with custody ners and volumes	servation, etc. papers? <i>Indi</i> received for t	.)? <i>cate major</i> the tests ind	discrepancies in licated?	the table on	n page 2. N	$\mathbb{V}_{A} = \begin{pmatrix} \mathbf{v} \\ \mathbf{v} \\ \mathbf{v} \\ \mathbf{v} \\ \mathbf{v} \end{pmatrix}$) и
Sample ID on Bottle Sample ID on COC Identified by:	Did all sample labels and tags ag Were appropriate bottles/contain Were the pH-preserved bottles	e (i.e analysis, pres gree with custody ners and volumes (<i>see SMO GEN SO</i>	ervation, etc. papers? <i>Indi</i> received for P) received at	.)? cate major the tests ind t the approp	discrepancies in licated? priate pH? Indic	the table on	n page 2. N	$ \begin{array}{c} & \\ & \\ & \\ & \\ & \\ & \\ & \\ & \\ & \\ & $	и (и (
Bottle Count Out of Head- Volume Reagent Lot	Did all sample labels and tags ag Were appropriate bottles/contain Were the pH-preserved bottles Were VOA vials received with	e (i.e analysis, pres gree with custody ners and volumes (<i>see SMO GEN SO</i>	ervation, etc. papers? <i>Indi</i> received for P) received at	.)? cate major the tests ind t the approp	discrepancies in licated? priate pH? Indic	the table on	n page 2. N	, × × (<) </td <td>א (א (א א</td>	א (א (א א
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	Did all sample labels and tags ag Were appropriate bottles/contain Were the pH-preserved bottles Were VOA vials received with Was C12/Res negative? Sample ID on Bottle	e (i.e analysis, pres gree with custody ners and volumes (<i>see SMO GEN SO</i> , out headspace? <i>In</i> Bottle Count	papers? Indi received for P) received at ndicate in the Sample ID c)? cate major the tests ind t the approp table below	discrepancies in licated? priate pH? Indic v.	the table on ate in the tab	n page 2. N hle below 2 Identified by: Reagent Lot		א (א א א
	Did all sample labels and tags ag Were appropriate bottles/contain Were the pH-preserved bottles Were VOA vials received with Was C12/Res negative? Sample ID on Bottle	e (i.e analysis, pres gree with custody ners and volumes (<i>see SMO GEN SO</i> , out headspace? <i>In</i> Bottle Count	papers? Indi received for P) received at ndicate in the Sample ID c)? cate major the tests ind t the approp table below	discrepancies in licated? priate pH? Indic v.	the table on ate in the tab	n page 2. N hle below 2 Identified by: Reagent Lot		א (א א א
	Did all sample labels and tags ag Were appropriate bottles/contain Were the pH-preserved bottles Were VOA vials received with Was C12/Res negative? Sample ID on Bottle	e (i.e analysis, pres gree with custody ners and volumes (<i>see SMO GEN SO</i> , out headspace? <i>In</i> Bottle Count	papers? Indi received for P) received at ndicate in the Sample ID c)? cate major the tests ind t the approp table below	discrepancies in licated? priate pH? Indic v.	the table on ate in the tab	n page 2. N hle below 2 Identified by: Reagent Lot) N N N N
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7/25/16



Total Solids

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

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Analytical Report **Client:** Service Request: K1612823 Fremont Analytical Date Collected: 10/16/16 **Project:** 1610280 Sample Matrix: Soil **Date Received:** 10/21/16 **Analysis Method:** 160.3 Modified Units: Percent **Prep Method:** Basis: As Received None Solids, Total

Sample Name	Lab Code	Result	MRL	MDL	Dil.	Date Analyzed	Q
1610280-001B PAI-21-23-28	K1612823-001	89.2 80.2	-	-	1	11/08/16 11:13 11/08/16 11:13	
1610280-002B PAI-21-15,8-16.5	K1612823-002	89.2	-	-	1	11/08/10 11:15	

QA/QC Report

Client:	Fremont Analytical	Service Request:K1612823
Project	1610280	Date Collected:NA
Sample Matrix:	Sediment	Date Received:NA
Analysis Method:	160.3 Modified	Units:Percent
Prep Method:	None	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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RIGHT SOLUTIONS | RIGHT PARTNER

		Analytical Report	
Client:	Fremont Analytical	Service Request: k	K1612823
Project:	1610280	Date Collected: 1	0/16/16
Sample Matrix:	Soil	Date Received: 1	0/21/16
Analysis Method: Prep Method:	SM 5220 C Modified ALS SOP	Units: n Basis: I	0 0

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	

QA/QC Report

Client: Project Sample Matrix:	Fremont Analy 1610280 Soil	tical				Date	e Request: Collected: Received:	NA	
•						Date	Analyzed:	10/27/16	
		Replic	ate Samp	le Summ	ary				
		General	Chemist	ry Param	eters				
Sample Name:	Batch QC						Units:	mg/Kg	
Lab Code:	K1612822-001						Basis:	Dry	
						Duplicate Sample K1612822-			
Analyte Name		Analysis Method	MRL	MDL	Sample Result	001DUP Result	Average	RPD	RPD Limit
Chemical Oxygen Demar	nd (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.

QA/QC Report

Client: Project: Sample Matrix:	Fremont Analytical 1610280 Soil			Service Reque Date Collected Date Received Date Analyzed Date Extracte	l: N/. l: N/. l: 10,	
		Matrix S	pike Summary			
		Chemical Oxy	gen Demand (Co	OD)		
Sample Name:	Batch QC			Unit	s: mg	g/Kg
Lab Code:	K1612822-001			Basi	s: Dr	у
Analysis Method:	SM 5220 C Modified					
Prep Method:	ALS SOP					
		Matrix Spik	e			
		K1612822-001	MS			
Analyte Name		Sample Result	Result	Spike Amount	% Rec	% Rec Limits
Chemical Oxygen De	emand (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.

QA/QC Report

Client: Project: Sample Matrix:	Fremont Analytical 1610280 Soil		Service Req Date Analyz Date Extrac	zed:	K161282 10/27/16 10/27/16	3
		ntrol Sample Summary Oxygen Demand (COD))			
Analysis Method: Prep Method:	SM 5220 C Modified ALS SOP		Units: Basis: Analysis Lo	t:	mg/Kg Dry 520929	
Sample Name Lab Control Sample	Lab Code K1612823-LCS	Result 226	Spike Amount 242	% Rec 93		% Rec Limits 85-115



Work Order: CLIENT:	1610280 GeoEnginee							Cho	QC S			
Project:	Gas Works	Park Site						Cile		Jen Dema		52200
Sample ID MB-R3	2441	SampType: MBLK			Units: mg/L		Prep Date:	10/20/2	016	RunNo: 32	441	
Client ID: MBLKV	N	Batch ID: R3244	1				Analysis Date:	10/20/2	016	SeqNo: 61	3971	
Analyte		Result	RL	SPK value	SPK Ref Val	%REC	LowLimit H	lighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chemical Oxygen D	Demand	ND	10.0									
Sample ID LCS-R3	32441	SampType: LCS			Units: mg/L		Prep Date:	10/20/2	016	RunNo: 32	441	
Client ID: LCSW		Batch ID: R3244	1				Analysis Date:	10/20/2	016	SeqNo: 61	3972	
Analyte		Result	RL	SPK value	SPK Ref Val	%REC	LowLimit H	lighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chemical Oxygen D	Demand	73.6	10.0	75.00	0	98.1	80	120				
Sample ID 161028	8-001ADUP	SampType: DUP			Units: mg/L		Prep Date:	10/20/2	016	RunNo: 32	441	
Client ID: BATCH	ł	Batch ID: R3244	1				Analysis Date:	10/20/2	016	SeqNo: 61	3974	
Analyte		Result	RL	SPK value	SPK Ref Val	%REC	LowLimit H	lighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chemical Oxygen D	Demand	46.4	10.0						42.47	8.93	30	
Sample ID 161028	8-001AMS	SampType: MS			Units: mg/L		Prep Date:	10/20/2	016	RunNo: 32	441	
Client ID: BATCH	ł	Batch ID: R3244	1				Analysis Date:	10/20/2	016	SeqNo: 61	3975	
Analyte		Result	RL	SPK value	SPK Ref Val	%REC	LowLimit H	lighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chemical Oxygen D	Demand	118	10.0	75.00	42.47	101	70	130				
Sample ID 161028	8-001AMSD	SampType: MSD			Units: mg/L		Prep Date:	10/20/2	016	RunNo: 32	441	
Client ID: BATCH	ł	Batch ID: R3244	1				Analysis Date:	10/20/2	016	SeqNo: 61	3976	
Analyte		Result	RL	SPK value	SPK Ref Val	%REC	LowLimit H	lighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chemical Oxygen D	Demand	114	10.0	75.00	42.47	95.3	70	130	117.9	3.43	30	

Fremont
Analytical

Work Order: 1610280							QC	SUMMARY REF	OR.
CLIENT: GeoEngine							Dissolved M	otale by EBA Mothe	4 200
Project: Gas Works	s Park Site						DISSOIVED IVIO	etals by EPA Metho	u 200
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 H	lighLimit 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 H	lighLimit 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 H	lighLimit 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 H	lighLimit 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 H	lighLimit RPD Ref Val	%RPD RPDLimit	Qual
Arsenic	1,850	0.500	500.0	1,444	81.8	70	130 1,967	5.96 30	
N · · · · ·								Pag	e 27 c



Work Order: CLIENT: Project:	1610280 GeoEnginee Gas Works F		QC SUMMARY REPOR Dissolved Metals by EPA Method 200							-		
Sample ID 161028 Client ID: PAI-21	80-005AMSD B-D-161017	SampType: MSD Batch ID: 15153			Units: µg/L		Prep Date Analysis Date	e: 10/18/2 e: 10/18/2		RunNo: 323 SeqNo: 61 2		
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: CLIENT: Project:	1610280 GeoEngine Gas Works								C SUMMARY RE I Metals by EPA Meth	
Sample ID MB-1	5167	SampType: MBLK			Units: mg/Kg		Prep Date:	10/19/2016	RunNo: 32424	
Client ID: MBL	KS	Batch ID: 15167					Analysis Date:	10/19/2016	SeqNo: 613491	
Analyte		Result	RL	SPK value	SPK Ref Val	%REC	LowLimit H	lighLimit RPD Ref	√al %RPD RPDLimit	Qual
Arsenic Iron		ND ND	0.0806 4.44							
Sample ID LCS-	15167	SampType: LCS			Units: mg/Kg		Prep Date:	10/19/2016	RunNo: 32424	
Client ID: LCSS	S	Batch ID: 15167					Analysis Date:	10/19/2016	SeqNo: 613492	
Analyte		Result	RL	SPK value	SPK Ref Val	%REC	LowLimit H	lighLimit RPD Ref	√al %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 1610	194-001ADUP	SampType: DUP			Units: mg/Kg-	dry	Prep Date:	10/19/2016	RunNo: 32424	
Client ID: BATC	СН	Batch ID: 15167					Analysis Date:	10/19/2016	SeqNo: 613494	
Analyte		Result	RL	SPK value	SPK Ref Val	%REC	LowLimit H	lighLimit RPD Ref	√al %RPD RPDLimit	Qual
Arsenic		4.81	0.0854					4.3	10.7 20	
Iron		23,700	4.70					19,1	50 21.4 20	R
NOTES: R - High RPD o	observed. The me	ethod is in control as indic	ated by the I	LCS.						
Sample ID 1610	194-001AMS	SampType: MS			Units: mg/Kg-	dry	Prep Date:	10/19/2016	RunNo: 32424	
Client ID: BATC	СН	Batch ID: 15167					Analysis Date:	10/19/2016	SeqNo: 613498	
Analyte		Result	RL	SPK value	SPK Ref Val	%REC	LowLimit H	lighLimit 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: CLIENT: Project:	1610280 GeoEnginee Gas Works									SUMMA etals by E		-
Sample ID 16101 Client ID: BATC		SampType: MSD Batch ID: 15167			Units: mg /	/Kg-dry	Prep Dat Analysis Dat			RunNo: 32 SeqNo: 61		
Analyte		Result	RL	SPK value	SPK Ref Val	%REC	,		RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic		53.0	0.0874	43.72	4.324	111	75	125	51.79	2.25	20	
Iron NOTES: S - Outlying spil	ke recovery(ies) o	21,100 observed. A duplicate a	4.81 nalysis was pe	437.2 erformed with	19,150 similar results ind	457 icating a poss	75 sible matrix ef	125 fect.	20,050	5.35	20	S

Sample ID 1610194-001APDS	SampType: PDS			Units: mg	/Kg-dry	Prep Da	te: 10/19/2	2016	RunNo: 324	424	
Client ID: BATCH	Batch ID: 15167					Analysis Da	te: 10/19/2	2016	SeqNo: 61:	3500	
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

NOTES:

S - Spike recovery indicates a possible matrix effect. The method is in control as indicated by the Laboratory Control Sample (LCS).



Sample Log-In Check List

Clien	nt Name:	GEI	Work Order Nu	mber: 1610280	
Logg	jed by:	Erica Silva	Date Received:	10/17/201	6 4:18:00 PM
<u>Chain</u>	of Custo	ody			
1. Is	Chain of Cu	ustody complete?	Yes 🖌	No 🗌	Not Present
2. Ho	ow was the	sample delivered?	<u>Courier</u>		
<u>Log In</u>	<u>1</u>				
_	- oolers are p	resent?	Yes 🔽	No 🗌	
4. Sh	nipping cont	ainer/cooler in good condition?	Yes 🖌	No 🗌	
		s present on shipping container/cooler? ments for Custody Seals not intact)	Yes	No 🗌	Not Required 🗹
6. W	as an attem	npt made to cool the samples?	Yes 🖌	No 🗌	
7. W	ere all item	s received at a temperature of >0°C to 10.0°C*	Yes 🗹	No 🗌	
8. Sa	ample(s) in	proper container(s)?	Yes 🖌	No 🗌	
9. Su	ufficient sam	nple volume for indicated test(s)?	Yes 🖌	No 🗌	
10. Ar	e samples	properly preserved?	Yes 🖌	No 🗌	
11. W	as preserva	tive added to bottles?	Yes	No 🔽	NA 🗌
12. ^{Is}	there heads	space in the VOA vials?	Yes	No 🗌	NA 🗹
13. Die	d all sample	es containers arrive in good condition(unbroken)?	Yes 🖌	No 🗌	
14. Do	pes paperwo	ork match bottle labels?	Yes 🗹	No	
15. Ar	e matrices	correctly identified on Chain of Custody?	Yes 🖌	No 🗌	
16. ^{Is}	it clear wha	t analyses were requested?	Yes 🖌	No 🗌	
17. W	ere all holdi	ng times able to be met?	Yes 🗹	No 🗌	
<u>Specia</u>	al Handli	ng (if applicable)			
18. W	as client no	tified of all discrepancies with this order?	Yes	No 🗌	NA 🗹
	Person N	Notified: Date			
	By Who	m: Via:	eMail 🗌 I	Phone 🗌 Fax 🛛	In Person
	Regardir	ng:			
	Client In	structions:			

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

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Distribution: White - Lab, Yellow - File, Pink - Originator

Priese coordinate with the lab in advance		Acred	C						_
- but o but	12/10/10/X		×	9	1619		0	×	
TAT -> SameDavA NextDavA 2 Dav 3 Dav STD	Date/Time (LOOV)	Date	Received	2	1606	Date/Time	Dat	Relinquished	-
5. Run for dissolved metals	Date/Time) Date	Received			Date/Time	Da	Relinquished	
 Groundwater and soil RLs per the WO GOD = Chemical exceen demand 		agreement to each of the terms on the front and backside of this Agreement.	ont Analytical or ent.	t with Fren his Agreem	Agreement ckside of tl	ront and ba	he terms on the f	agreement to each of the terms on the front and backside of this Agreement.	
 Groundwater iron and COD plus soil COD and grain size samples on standard TAT 	day.	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.)	Disposal by Lab (Samples will be held for 30 da assessed if samples are retained after 30 days.	/ Lab (Sample samples are	Disposal by assessed if	ient	Return to Client	Sample Disposal:	
Special Remarks:	Turn-around times for samples	phate Fluoride Nitrate+Nitrite	Bromide O-Phosphate	ate Bro	e Sulfate	Chloride	Nitrate Nitrite	***Anions (Circle): N	1
b Sb Se Sr Sn Ti Ti U V Zn	Cu Fe Hg K Mg Mn Mo Na Ni Pb	Ag Al As B Ba Be Ca Cd Co Cr	TAL Individual:		Priority Pollutants	RCRA-8	e): MTCA-5	**Metals Analysis (Circle):	
								10 PAI-	
								9 PAI-	
							Ŷ	8 PAI-	
								7 PAI-	
								6 PAI-	
			XXX	(Sw)	1433	Ł	61017	5 PAI- 21-0-16	
			×××	GW	0251		41017	4 PAI-21-5-16	
HALD				5	1220		4.7	3 PAI-21-14-1	
		XX		5	1225	-	-16.S	2 PAI-21-15.8-16,	
				5	1215	10/16	28	1 PAI-21-23-28	
Comments	431 431 431 431 431 431 431 431	Contraction of the second seco	N-Senic (19)	Sample Type (Matrix)*	Sample	Sample		Sample Name	
= Ground Water, SW = Storm Water, WW = Waste Water	DW = Drinking Water, GW = Ground Water, SW = Sto	v = Water,		P = Product, S = Soil,		B = Bulk, O = Other,	AQ = Aqueous, B	*Matrix Codes: A = Air,	
cdelavia@geoengineers.com	sbsmith@geoengineers.com	PM Email:			Fax:	418	253.722.2418	Telephone:	
	Sandra Smith / Claudia De La Via	Report To (PM):				A 98103	Seattle, WA 98103	City, State, Zip:	
	Seattle	Location:			e 1700	600 Stewart Street, Suite 1700	600 Stewa	Address:	
Collected by: MWB/CVD	Gas Works Park Site 0186-846-01 Task 1803	Project No:				ers	GeoEngineers	Client:	
Page: of:					78 06	Tel: 206-352-3790 Fax: 206-352-7178	.<	3600 Fremont Ave N. Seattle, WA 98103	
Laboratory Project No (Internal): 1610280	Date: 10/ 17/2016	Ę			11	malytical	Am		
Laboratory Services Agreement	cord and	Chain of Custody Re				Ö	remo		

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Distribution: White - Lab, Yellow - File, Pink - Originator

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Aplease coordinate with the lah in arlyance	SIMIAINO 1018	1 V V V	×	UNIC -		1	5
TAT → SameDay [∧] NextDay [∧] 2 Day 3 Day STD	Date/Time	いこう	Received	2 2 2	40. 14.	3))
5. Run for dissolved metals	0/17/11/0 11/00/0	P	x	1600	a	a l	x Relinguished
3. Groundwater and soli RLs per the WO 4. COD = Chemical oxygen demand	a 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 Date/Time	chalf of the Client named	emont Analytical on ement.	reement with Fy ide of this Agre	e front and backs	te terms on the f	agreement to each of the terms on the front and backside of this Agreement. Reinquished Date/Time
 Groundwater arsenic and sumde samples on ASAP TAT. Groundwater iron and COD plus soil COD and grain size samples on 	tee may be on the following business day.	usposal by Lab (Samples will be held for 30 days unless otherwise noted. A fee may be assessed if samples are retained after 30 days.)	Uisposal by Lab (Samples will be held for 30 da assessed if samples are retained after 30 days.	sposal by Lab (San sessed if samples		Return to Client	Sample Disposal:
Special Remarks:		ate Fluoride Nitrat	Bromide O-Phosphate	Sulfate	Chlorid	Nitrate Nitrite	***Anions (Circle): Ni
b Sb Se Sr Sn Ћ Ҥ Џ Ѵ Zn	Co Cr Cu Fe Hg K Mg Mn Mo Na Ni Pb	As B Ba Be Ca Cd	TAL Individual: Ag Al	Priority Pollutants	RCRA-8 Prio	e): MTCA-5	**Metals Analysis (Circle):
							10 PAI-
							9 PAI-
							8 PAI-
							7 PAL
							6 PAI-
			XXX	1433 GW	4	1017	5 PAI-21-0-161017
Hold aurs. smith Mislin 22			XXX (m9 021		1017	4 PAI-21-5-161017
HARD				1220 5		七方	3 PAI-21-14-14.7
		XX		1225 5		-16.5	2 PA-21-15-8-16.5
				215 5	10/16	28	1 PAI-21-23-28
Comments		Call States and a state of the states of the	Nonenii: Ca	Sample Sample Type Time (Matrix)*	Sample		Sample Name
torm Water, WW = Waste Water	SD = Sediment, SL = Solid, W = Water, DW = Drinking Water, GW = Ground Water, SW = Storm Water,	SL = Solid, W = Water, DW =	S = Soil, SD = Sediment,	P = Product,	B=Bulk, O=Other,	AQ = Aqueous, B	ivialitix Lodes: A = Air, AQ = Aqueous,
cdelavia@geoengineers.com	sbsmith@geoengineers.com	PM Email:				253.722.2418	Telephone:
	Sandra Smith / Claudia De La Via	Report To (PM):			VA 98103	Seattle, WA 98103	City, State, Zip:
	Seattle	Location:		700	600 Stewart Street, Suite 1700	600 Stewa	Address:
Collected by: MWB/CVD	Gas Works Park Site 0186-846-01 Task 1803	Project Name: Project No:			eers	GeoEngineers	Client
					Tel: 206-352-3790 Fax: 206-352-7178	Ş	3600 Fremont Ave N. Seattle, WA 98103
Date: 10/ 17 Join Laboratory Services Agreement	Date: 10/ $7/2016$			6 77	mont	remo	

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