



HWA GEOSCIENCES INC.

Geotechnical & Pavement Engineering • Hydrogeology • Geoenvironmental • Inspection & Testing

May 24, 2013

HWA Project No. 2012-039-22

Seattle Department of Transportation

700 5th Avenue - Suite 3900

PO Box 35996

Seattle, WA 98124-4996

Attention: Jennifer Anderson

Subject: **SHALLOW SOILS AND GROUND WATER ASSESSMENT
Proposed Stormwater Main
West Duwamish Trail
Seattle, Washington**

Dear Ms. Anderson:

HWA GeoSciences Inc. (HWA) is pleased to present this letter report summarizing an assessment of shallow soils and ground water underlying the right-of-way (ROW) adjacent to South Portland Street at the City's proposed West Duwamish Trail project site in Seattle, Washington (Figure 1). We understand the City intends to install approximately 1,640 lineal feet of stormwater main along the route. The main will be installed to a depth of approximately five to thirteen feet below ground surface (bgs). Soils will be excavated as part of the pipe installation and the City requires characterization of the soils for reuse or disposal.

SCOPE OF WORK

HWA's scope of work is for soils characterization at the proposed stormwater line location for potential special handling and disposal during construction. HWA performed the following tasks as requested:

Soil Sampling and Assessment

- Collected soil samples at approximately 13 locations along the proposed alignment for characterization purposes using a direct-push ("GeoProbe") drilling rig. Borings were completed to approximately 12 feet bgs.
- Field screened all samples for organic vapors during sampling.
- Field screened borings within the 1,000 foot buffer of the former South Park landfill site for methane, oxygen content, and hydrogen sulfide.
- Collected two soil samples at each boring location: a shallow fill sample (less than four feet bgs) and a deeper sample collected at the ground water-soil interface and/or the approximate proposed pipe depth (six to ten feet bgs).
- Collected four ground water samples from selected borings.

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- Submitted the soil and ground water samples to Onsite Environmental, a Washington Department of Ecology-accredited analytical laboratory for the following analyses:
 - Diesel and Heavy Oil Range Petroleum Hydrocarbons by Washington Method NWTPH-Dx
 - Carcinogenic Polynuclear Aromatic Hydrocarbons (cPAHs) by EPA Method 8270B
 - Polychlorinated biphenyls (PCBs) by EPA Method 8082
 - RCRA Eight Metals by EPA Method 6010/7000 (As, Ba, Cd, Cr, Hg, Pb, Se, Ag)
 - RCRA Eight Metals by EPA Method 6010/7000 (As, Ba, Cd, Cr, Hg, Pb, Se, Ag), dissolved (ground water only)
- Prepared this summary report including sampling locations, analytical results, and recommendations for soil handling, reuse and/or disposal.

Subsurface Conditions

Thirteen direct-push borings were advanced along South Portland Street between 8th Avenue and the end of the right-of-way west of 5th Avenue South. The boring locations are depicted on Figure 2. Geologic information for the area was obtained from a map titled *The Geologic Map of Seattle, a Progress Report* (Troost, et al., 2005). According to the map, surficial soils in the vicinity of the project site are mapped as Recent Alluvium consisting of river-deposited silt, sand and gravel, with occasional peat and organic lenses.

Based on HWA's observations, soil at the site typically consisted of approximately one to four feet of silty gravel and sand fill over native soils. Fill occasionally contained brick or other debris. Native soils generally consisted of approximately four feet of medium sand overlying medium stiff silt and clay with minor amounts of peat or other organic material. Fine sands were encountered below the silt and clay at depth of eight to ten feet in six of the borings. Soil boring logs are included as Appendix A.

Ground water was encountered in the borings at depths of four to seven feet. Based on local topography, shallow ground water flow is likely to the east-northeast, toward the Duwamish River.

Analytical Results

Soil and ground water samples were submitted to Onsite Environmental of Redmond, Washington, an Ecology- accredited analytical laboratory. The laboratory analytical reports are included as Appendix B.

Soil

Two soil samples were collected from each boring. The samples consisted of soils collected between approximately one and nine feet bgs. Shallow samples were collected from fill soils (typically less than four feet deep) and the deeper samples representing underlying native soils. (collected between six and ten feet bgs) The analytical results of these samples are summarized in Table 1.

Diesel and oil-range petroleum hydrocarbons were detected in nine of the thirteen shallow fill soil samples. The concentrations exceeded MTCA Method A cleanup levels in five of those samples. Petroleum hydrocarbons were not detected in any of the native soil samples (greater than six feet bgs). Selected samples were also analyzed for cPAHs and PCBs. Two samples (B1-2 and B13-2) contained cPAHs above MTCA Method A cleanup levels. The deep soil samples at both of these locations were also analyzed. cPAHs were not detected at reporting limits in these two samples. PCBs were detected in the four selected samples, but below MTCA Method A cleanup levels.

Arsenic was detected above MTCA Method A cleanup levels in three samples (B1-2, B2-2, and B13-2). Because of the relatively high concentrations detected in these samples, one sample was subsequently analyzed by Toxicity Characteristic Leaching Procedure (TCLP) methods for Dangerous Waste characterization. Arsenic was not detected at reporting limits in the TCLP sample. Arsenic was either not detected, or detected within the range of background soils conditions in the remaining samples (Ecology, 1994). Barium was detected in all soil samples at concentrations ranging from 24 to 320 mg/kg, well below the MTCA Method B cleanup level of 5,600 mg/kg. Cadmium was detected above MTCA Method A cleanup levels in one sample (B7-1). Cadmium was either not detected, or detected within the range of background soils conditions in the remaining samples. Total chromium was detected in all soil samples at concentrations ranging from 6.4 to 1,800 mg/kg. The MTCA Method A cleanup levels are 19 mg/kg for Cr VI and 2000 mg/kg for Cr III. The analytical method used measures total (VI+III) chromium, and is used in most cases where there is no reason to suspect the presence of chromium VI (as for this site). Because of the relatively high concentrations detected in several samples, three samples were subsequently analyzed by TCLP methods. None of the selected samples exceeded Dangerous Waste limits. The remaining soil samples were within the range or slightly elevated from background concentrations in the Puget Sound region (42 mg/kg) (Ecology, 1994). Lead was detected above MTCA Method A cleanup levels in two samples (B7-1 and B8-2). Because of the relatively high concentrations detected in these samples, they were subsequently analyzed by TCLP methods. Both of the selected samples exceeded Dangerous Waste limits. These soils appear to be limited in extent, as neither native soils underlying these samples, nor soil samples at adjacent borings (B6 and B10) contained lead exceeding MTCA cleanup levels. The remaining soil samples were within the range or slightly elevated from background concentrations in the Puget Sound region (24 mg/kg) (Ecology, 1994). The metals mercury, selenium, and silver were either not detected in the soil samples or detected at concentrations below cleanup levels.

TABLE 1
SOIL ANALYTICAL DATA
(all results in milligrams per kilogram (mg/kg) unless noted)

Sample ID	B1-2	B1-6	B2-2	B2-6	B3-2	B3-6	B4-2	B4-6	B5-3	B5-6	B6-3	B6-6	B7-1	B7-8	B8-2	B8-9	B9-4	B9-9	B10-1	B10-7	B11-1	B11-7	B12-1	B12-7	B13-2	B13-7	MTCA-A or B	DW	BKGD	
Approximate Project Station	32+40		31+00		29+60		28+50		27+00		25+00		23+00		21+50		20+30		18+50		17+00		15+50		14+00					
Sample Depth, ft bgs	2-3	6-7	2-3	6-7	2-3	6-7	2-3	6-7	3-4	6-7	3-4	6-7	1-2	8-9	2-3	9-10	2-3	9-10	1-2	7-8	1-2	7-8	1-2	7-8	2-3	7-8				
Petroleum Hydrocarbons																														
TPH-Diesel	<140	<31	280	<33	<27	<31	<62	<31	<30	<37	<28	<46	<28	<46	860	<37	<28	<36	<270	<30	<150	<29	<470	<33	55	<31	2000			
TPH-Oil	1900	<62	1900	<66	180	<62	480	<62	<59	<74	<57	<92	<55	<92	3000	<75	<56	<71	5200	<60	3900	<58	3200	<65	420	<61	2000			
cPAHs																														
Benzo[a] anthracene	0.012	<0.0083					<0.0072						<0.0073												0.16	<0.0081	0.1 (by TEF*)			
Chrysene	0.021	<0.0083					<0.0072						0.0085												0.23	<0.0081				
Benzo[b] fluoranthene	0.023	<0.0083					<0.0072						0.0096												0.29	<0.0081				
Benzo(j,k) fluoranthene	<0.0072	<0.0083					<0.0072						<0.0073												0.098	<0.0081				
Benzo[a] pyrene	0.018	<0.0083					<0.0072						<0.0073												0.19	<0.0081				
Indeno(1,2,3-c,d)pyrene	0.019	<0.0083					0.0073						<0.0073												0.2	<0.0081				
Dibenz[a,h] anthracene	0.013	<0.0083					<0.0072						<0.0073												0.06	<0.0081				
cPAHs (by TEF)	0.02491	<0.0083					0.00073						0.001045												0.2731	<0.0081				
PCBs**																														
Aroclor 1254	<0.054						<0.054						0.23												0.13		1 (total)			
Aroclor 1260	0.27						0.46						<0.055											<0.055						
Metals, total**																														
Arsenic	35	<12	320	<13	<11	<12	<11	<12	<12	<15	<11	<18	<11	<18	14	<15	<11	<14	<11	<12	<11	<12	17	<13	50	<12	20		7	
Barium	51	33	320	36	56	33	84	31	24	51	24	70	120	73	170	42	31	36	110	27	46	28	68	32	74	36	5600(B)			
Cadmium	0.6	<0.62	1.7	<0.66	<0.53	<0.62	<0.54	<0.62	<0.59	<0.74	1.5	<0.92	140	<0.92	1.3	<0.75	<0.56	<0.71	<0.54	<0.60	<0.53	<0.58	1.5	<0.65	<0.55	<0.61	2		1	
Chromium	47	14	1800	16	18	12	240	13	7.8	13	8	17	97	18	29	13	24	13	430	7.3	92	6.4	36	11	22	7.2	19/2000**		48	
Lead	73	7.7	190	11	91	<6.2	56	<6.2	<5.9	<7.4	<5.7	<9.2	2100	<9.2	990	<7.5	<5.6	<7.1	48	<6.0	100	<5.8	210	<6.5	160	<6.1	250		24	
Mercury	<0.27	<0.31	0.6	<0.33	<0.27	<0.31	<0.27	<0.31	<0.30	<0.37	<0.28	<0.46	<0.27	<0.46	<0.28	<0.37	<0.28	<0.36	<0.27	<0.30	<0.26	<0.29	<0.28	<0.32	<0.27	<0.30	2		0.07	
Silver	<1.1	<1.2	1.6	<1.3	<1.1	<1.2	<1.1	<1.2	<1.2	<1.5	<1.1	<1.8	8.7	<1.8	<1.1	<1.5	<1.1	<1.4	<1.1	<1.2	<1.1	<1.2	<1.1	<1.3	<1.1	<1.2	400 (B)			
Metals, TCLP (mg/l)***																														
Arsenic			<0.4																								5			
Chromium			0.78				0.049												0.024								5			
Lead			<0.2										25		5.8						<0.2		0.36		<0.2		5			

Notes:
Bold - Analyte Detected
Bold/Highlighted - Analyte Detected above MTCA cleanup levels or Dangerous Waste limits
< - Analyte not detected at analytical method reporting limit
Listed cleanup levels may not apply at this site, and are provided as a screening level indication of the environmental quality of the site only.
MTCA Method A/B - Washington Model Toxics Control Act Method A or B soil cleanup levels for unrestricted land use
DW – Dangerous Waste limits per Washington Chapter 173-303 WAC: Dangerous Waste Regulations
Bkgd - State background concentrations per Natural Background Soil Metals Concentrations in Washington State, Publication #94-115, October 1994
* - Toxicity Equivalency Factors for Minimum Required Carcinogenic Polyaromatic Hydrocarbons (cPAHs) Washington Model Toxics Control Act Table 708-2)
** - The Method A soil cleanup levels for Chromium are 19 mg/kg for Cr VI and 2000 mg/kg for Cr III. Analyses are for total chromium.
*** - No other RCRA Metals were detected above laboratory reporting limits.

Ground Water

Ground water was collected at four boring locations (B2, B6, B10, and B13) and analyzed for petroleum hydrocarbons and dissolved metals. The analytical results of these samples are summarized in Table 2.

Oil-range hydrocarbons were detected above MTCA cleanup levels in one sample (B2-W) and detected in a second sample (B7-W). Arsenic was also detected in sample B2-W. While there was one detection above MTCA cleanup levels for petroleum hydrocarbons, the primary purpose for these ground water samples was for characterization in the event of dewatering discharge. The King County discharge limits for petroleum is 100 mg/l (100,000 ug/L) and arsenic is 1 mg/l (1,000 ug/L) (King County, 2009).

TABLE 2
GROUND WATER ANALYTICAL DATA
(all results in micrograms per liter (µg/l) unless noted)

Sample ID	B2-W	B6-W	B10-W	B13-W	MTCA-A
Approximate Project Station	31+00	25+00	18+50	14+00	
Approx. Depth to water, ft bgs	6	4.25	7	5	
Field Parameters					
pH	6.22	NA	6.40	6.53	
Conductance (µm/cm)	709	NA	671	372	
DO (mg/l)	1.66	NA	2.13	2.34	
Temperature (°C)	10.9	NA	11.3	11.2	
Petroleum Hydrocarbons					
TPH-Diesel	<300	<260	<280	<280	500
TPH-Oil	1200	460	<440	<440	500
Metals*					
Arsenic	3.8	<3.0	<3.0	<3.0	5

Notes:

Bold - Analyte Detected

Bold/Highlighted - Analyte Detected above MTCA cleanup levels

< - Analyte not detected at analytical method reporting limit

Listed cleanup levels may not apply at this site, and are provided as a screening level indication of the environmental quality of the site only.

MTCA Method A - Washington Model Toxics Control Act Method A ground water cleanup levels

* - No other RCRA Metals were detected above laboratory reporting limits.

Soil Gas

Because the western portion of the project alignment lies within the 1,000 foot buffer of the former South Park Landfill (SDOT Critical Areas Map, 2010, Appendix C), borings within this area were field screened using a Gastech GT302 three-gas meter. Field screening was conducted by inserting the meter probe into the open borehole and reading the stabilized reading. The field screening results are summarized in Table 3.

Boring B8 contained methane at a concentration of 20 percent of the Lower Explosive Limit, above the OSHA permissible level of five percent. Oxygen content was diminished accordingly. The westernmost borings either did not demonstrate elevated methane concentrations, or concentrations were below five percent LEL. This discrepancy is likely due to the paving of the ground surface in the vicinity of B8. The western borings locations are gravel-surfaced and landfill gasses may disperse through the ground surface.

**TABLE 3
LANDFILL GAS SCREENING DATA**

Boring ID	B8	B10	B11	B12	B13	OSHA Limits
Approximate Project Station	21+50	18+50	17+00	15+50	14+00	
Methane (%LEL)	20	2	<1	1	2	5
Oxygen (%)	10	17	19.7	18.4	20.3	19.5-23.5
Hydrogen Sulfide (ppm)	0	0	0	0	0	10

Notes:

Bold – Methane detected at boring location

Bold/Highlighted – Methane or oxygen outside of OSHA limits for safe work

Construction Impacts

Soils sampled during the subsurface investigation contain detectable concentrations of petroleum, polynuclear aromatic hydrocarbons, and metals. The affected soils appear to be limited to shallow fill soils. This is not unexpected in an area of historical industrial development and undocumented filling.

A portion of the soils designate as Dangerous Waste under 173-303 WAC due to TCLP lead exceeding state limits. These soils are located between Stations 20+30 and 23+00 (between borings B6 and B9) (Figure 2). The soils are limited to fill soils (less than five feet bgs). These soils should be disposed of at a Subtitle C Dangerous Waste landfill. Based on our understanding of the project, we estimate this to be approximately 160 cubic yards (260 tons) of soils.

The remainder of the shallow fill soils (less than five feet bgs) along the project alignment contains varying concentrations of petroleum hydrocarbons and metals. Selected soil samples also contained cPAHs and/or PCBs. These soils should be disposed of at a facility licensed to dispose, treat, or recycle contaminated soil, e.g., thermal desorption, asphalt or cement incorporation, or Subtitle D landfill disposal.

Deeper native soils (typically greater than five feet bgs) do not appear to be affected by contaminants of concern and detected metals are within the range expected for background conditions. Soils excavated during construction that do not contain contaminants exceeding cleanup levels may still require disposal at a facility licensed to treat, recycle or dispose of contaminated soils, as many fill sites will not accept soils with detectable concentrations of contaminants. If excavated materials are disposed off-site, property owners at the receiving site should be notified of the results of this study and any additional testing information available at that time. Criteria for unrestricted use of soils may be lower than some cleanup levels. Soils with contaminant concentrations above detection limits but below cleanup levels should not be used as fill near surface or ground water.

Portions of the project alignment are within the 1,000 foot buffer of the former South Park landfill. Based on field screening, there is the potential for accumulation of methane or other landfill gasses, and/or displacement of oxygen in trenches.

Construction bid documents (plans and specifications) should include all analytical and gas monitoring results and provisions for contaminated soil handling, treatment/disposal, and health and safety requirements.

Health and Safety

HWA recommends that appropriate health and safety measures be taken during excavation in areas where landfill gas, contaminated soils, ground water, or organic vapors are likely to be encountered. These measures may include, but are not limited to, preparation of a site specific health and safety plan, air monitoring, site control/access, protective and decontamination measures, worker training, certification, and medical monitoring. We recommend an industrial hygienist or health and safety specialist be consulted to determine the applicability of these requirements.

Limitations

We have prepared this report for use by City of Seattle, in design of a portion of this project. These data and report should be provided to prospective contractors for their bidding or estimating purposes, but the conclusions and interpretations presented should not be construed as a warranty of the subsurface conditions. The conclusions expressed by HWA are based solely on material referenced in this report. Observations were made under the conditions stated. Within the limitations of scope, schedule and budget, our investigation was performed in accordance with generally accepted professional consulting principles and practices in the area at the time the report was prepared. No warranty, expressed or implied, is made. Experience has shown that subsurface soil and ground water conditions can vary significantly over small distances. It is always possible that contamination may exist in areas that were not sampled. If, during future site operations, subsurface conditions are encountered which vary appreciably from those described herein, HWA should be notified for review of the recommendations of this report, and revision of such if necessary. We are not responsible for the impacts of any changes in environmental standards, practices or regulation subsequent to performance of services. We do not warrant the accuracy of information supplied by others, nor the use of segregated portions of this report.

This firm does not practice or consult in the field of safety engineering. We do not direct the contractor's operations, and we cannot be responsible for the safety of personnel other than our own on the site; the safety of others is the responsibility of the contractor. The contractor should notify the owner if he/she considers any of the recommended actions presented herein unsafe.

May 24, 2013
HWA Project No. 2012-039-22

We appreciate the opportunity of providing these services to the City. Should you have any questions regarding this proposal, or require additional services, please contact me at your convenience.

Sincerely,

HWA GEOSCIENCES INC.

A handwritten signature in blue ink, appearing to read 'Arnie Sugar', with a long horizontal flourish extending to the right.

Arnie Sugar, LG, LHG
President, Environmental Geologist

A handwritten signature in blue ink, appearing to read 'Vance Atkins', with a circular flourish at the end.

Vance Atkins, LG, LHG
Senior Hydrogeologist

Attachments:

Figure 1 – Site Location Map

Figure 2 – Site and Exploration Plan

Appendix A - Boring Logs

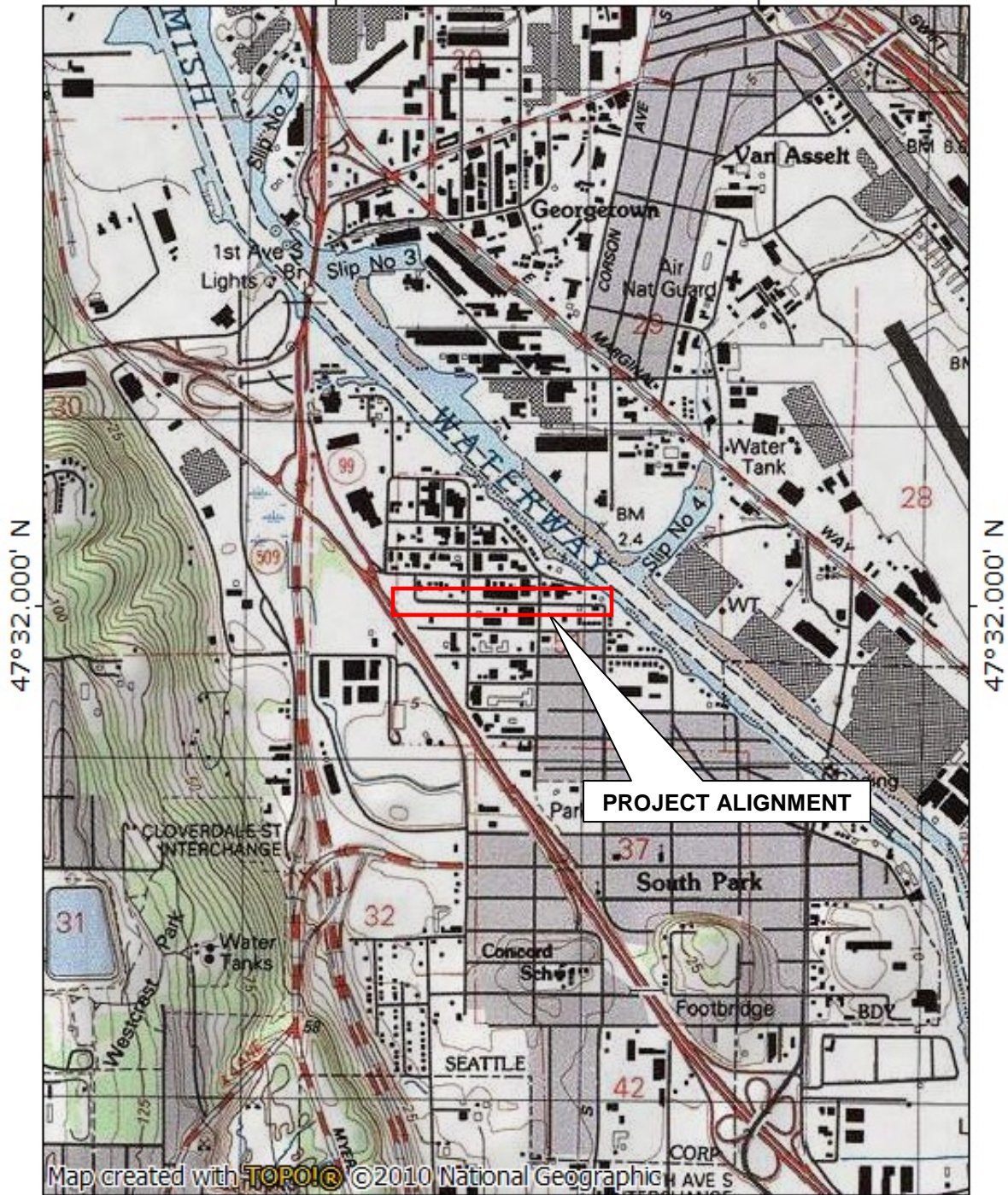
Appendix B - Laboratory Analytical Results

Appendix C - West Duwamish Trail Project - Critical Areas Map

TOPO! map printed on 04/19/13 from "Untitled.tpo"

122°20.000' W

WGS84 122°19.000' W



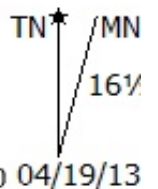
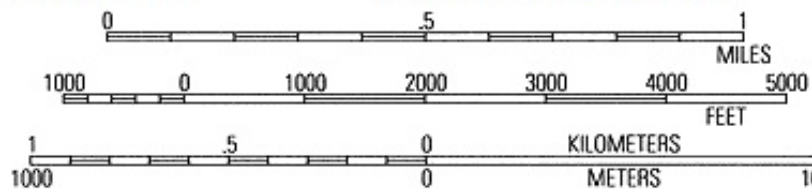
Map created with TOPO!® ©2010 National Geographic

122°20.000' W

WGS84 122°19.000' W



**NATIONAL
GEOGRAPHIC**



04/19/13

SITE LOCATION MAP

SHALLOW SOIL ASSESSMENT
SOUTH PORTLAND STREET
SEATTLE, WASHINGTON

FIGURE NO.

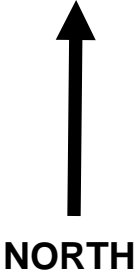
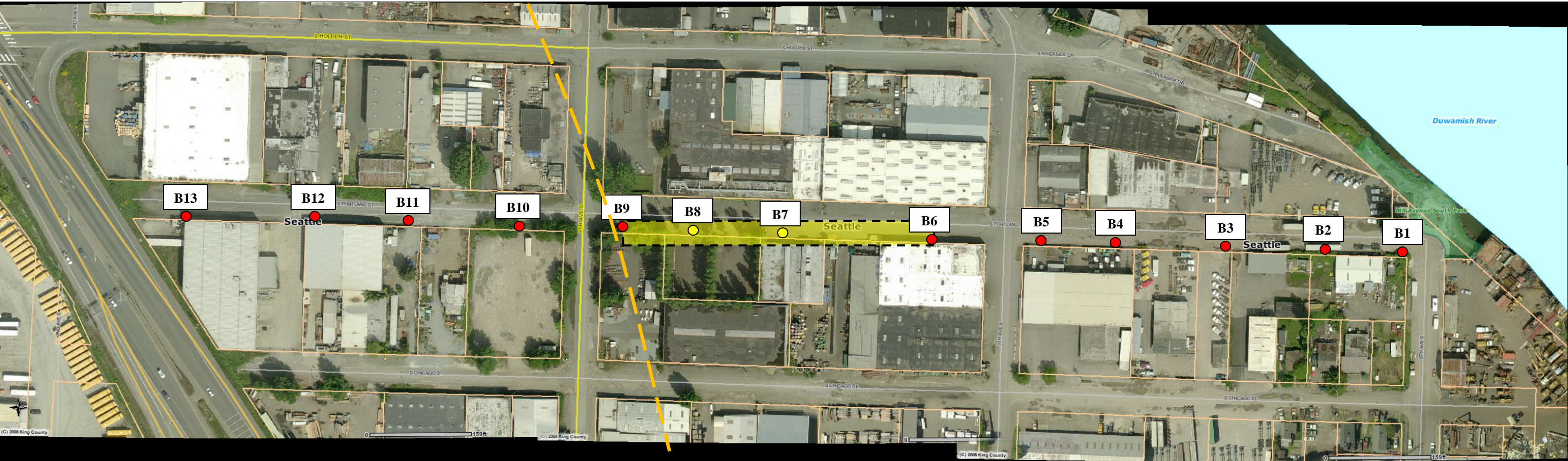
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PROJECT NO.

2012-039



HWA GEOSCIENCES INC.



Legend

- B1** Boring Location and ID
- Borings with shallow soils exceeding DW limit for lead
- Area of shallow fill soils (0 to 5 feet bgs) for DW disposal
- Approximate 1,000-ft methane buffer, former South Park Landfill















APPENDIX A

BORING LOGS

RELATIVE DENSITY OR CONSISTENCY VERSUS SPT N-VALUE

COHESIONLESS SOILS			COHESIVE SOILS		
Density	N (blows/ft)	Approximate Relative Density(%)	Consistency	N (blows/ft)	Approximate Undrained Shear Strength (psf)
Very Loose	0 to 4	0 - 15	Very Soft	0 to 2	<250
Loose	4 to 10	15 - 35	Soft	2 to 4	250 - 500
Medium Dense	10 to 30	35 - 65	Medium Stiff	4 to 8	500 - 1000
Dense	30 to 50	65 - 85	Stiff	8 to 15	1000 - 2000
Very Dense	over 50	85 - 100	Very Stiff	15 to 30	2000 - 4000
			Hard	over 30	>4000








USCS SOIL CLASSIFICATION SYSTEM

MAJOR DIVISIONS			GROUP DESCRIPTIONS		
Coarse Grained Soils	Gravel and Gravelly Soils	Clean Gravel (little or no fines)	 GW	Well-graded GRAVEL	
			 GP	Poorly-graded GRAVEL	
	More than 50% of Coarse Fraction Retained on No. 4 Sieve	Gravel with Fines (appreciable amount of fines)	 GM	Silty GRAVEL	
			 GC	Clayey GRAVEL	
	Sand and Sandy Soils	Clean Sand (little or no fines)	 SW	Well-graded SAND	
			 SP	Poorly-graded SAND	
		50% or More of Coarse Fraction Passing No. 4 Sieve	Sand with Fines (appreciable amount of fines)	 SM	Silty SAND
				 SC	Clayey SAND
Fine Grained Soils	Silt and Clay	Liquid Limit Less than 50%	 ML	SILT	
			 CL	Lean CLAY	
			 OL	Organic SILT/Organic CLAY	
	Silt and Clay	Liquid Limit 50% or More	 MH	Elastic SILT	
			 CH	Fat CLAY	
			 OH	Organic SILT/Organic CLAY	
Highly Organic Soils			PT	PEAT	



TEST SYMBOLS

%F	Percent Fines
AL	Atterberg Limits: PL = Plastic Limit LL = Liquid Limit
CBR	California Bearing Ratio
CN	Consolidation
DD	Dry Density (pcf)
DS	Direct Shear
GS	Grain Size Distribution
K	Permeability
MD	Moisture/Density Relationship (Proctor)
MR	Resilient Modulus
PID	Photoionization Device Reading
PP	Pocket Penetrometer Approx. Compressive Strength (tsf)
SG	Specific Gravity
TC	Triaxial Compression
TV	Torvane Approx. Shear Strength (tsf)
UC	Unconfined Compression

SAMPLE TYPE SYMBOLS

	2.0" OD Split Spoon (SPT) (140 lb. hammer with 30 in. drop)
	Shelby Tube
	3-1/4" OD Split Spoon with Brass Rings
	Small Bag Sample
	Large Bag (Bulk) Sample
	Core Run
	Non-standard Penetration Test (3.0" OD split spoon)

GROUNDWATER SYMBOLS

	Groundwater Level (measured at time of drilling)
	Groundwater Level (measured in well or open hole after water level stabilized)

COMPONENT DEFINITIONS

COMPONENT	SIZE RANGE
Boulders	Larger than 12 in
Cobbles	3 in to 12 in
Gravel	3 in to No 4 (4.5mm)
Coarse gravel	3 in to 3/4 in
Fine gravel	3/4 in to No 4 (4.5mm)
Sand	No. 4 (4.5 mm) to No. 200 (0.074 mm)
Coarse sand	No. 4 (4.5 mm) to No. 10 (2.0 mm)
Medium sand	No. 10 (2.0 mm) to No. 40 (0.42 mm)
Fine sand	No. 40 (0.42 mm) to No. 200 (0.074 mm)
Silt and Clay	Smaller than No. 200 (0.074mm)

COMPONENT PROPORTIONS

PROPORTION RANGE	DESCRIPTIVE TERMS
< 5%	Clean
5 - 12%	Slightly (Clayey, Silty, Sandy)
12 - 30%	Clayey, Silty, Sandy, Gravelly
30 - 50%	Very (Clayey, Silty, Sandy, Gravelly)
Components are arranged in order of increasing quantities.	

NOTES: Soil classifications presented on exploration logs are based on visual and laboratory observation. Soil descriptions are presented in the following general order:

Density/consistency, color, modifier (if any) GROUP NAME, additions to group name (if any), moisture content. Proportion, gradation, and angularity of constituents, additional comments.
(GEOLOGIC INTERPRETATION)

Please refer to the discussion in the report text as well as the exploration logs for a more complete description of subsurface conditions.

MOISTURE CONTENT

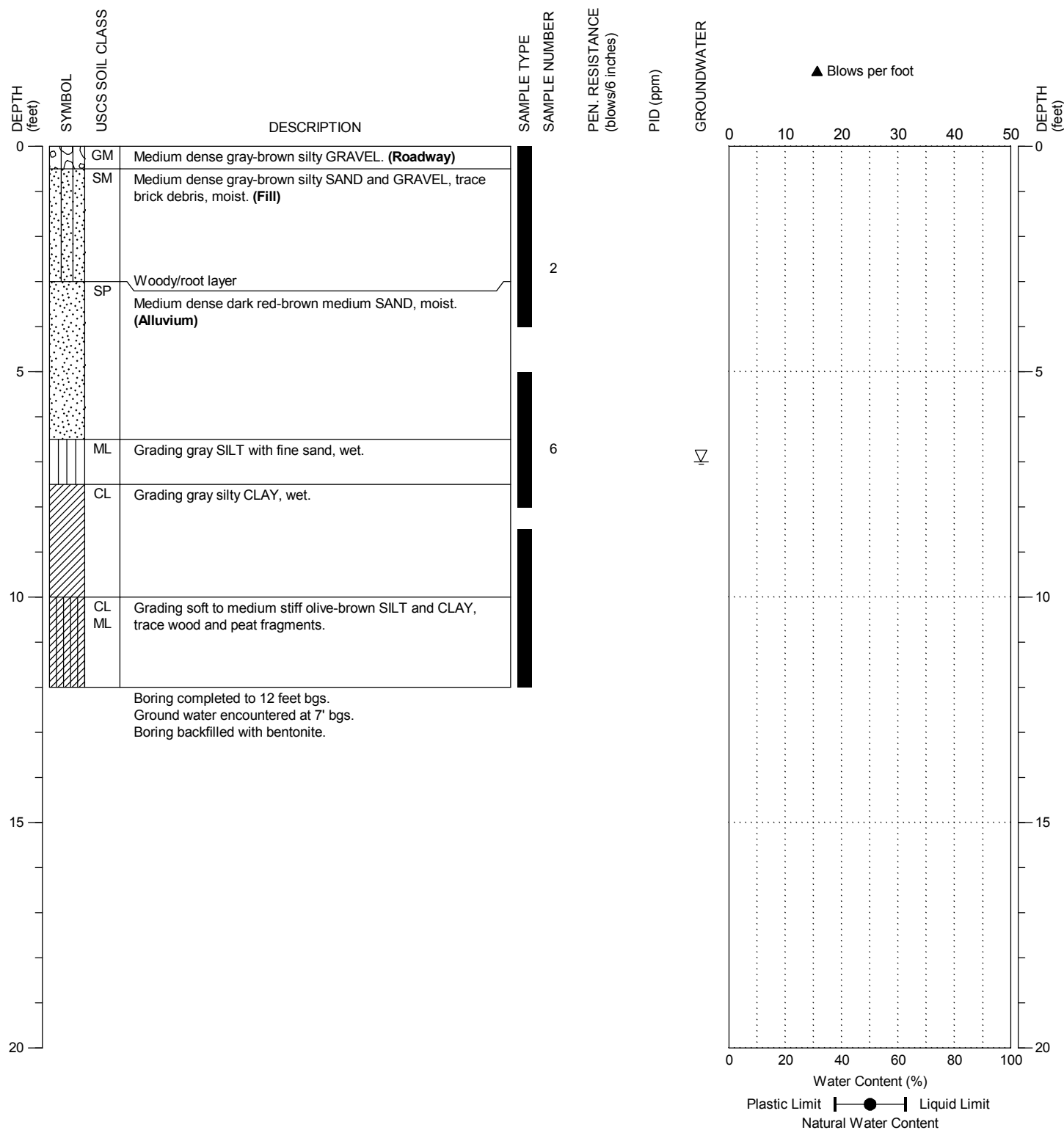
DRY	Absence of moisture, dusty, dry to the touch.
MOIST	Damp but no visible water.
WET	Visible free water, usually soil is below water table.

LEGEND OF TERMS AND SYMBOLS USED ON EXPLORATION LOGS

DRILLING COMPANY: ESN Northwest
 DRILLING METHOD: GeoProbe
 SAMPLING METHOD: 48" Macrocore Sampler with HDPE liner
 LOCATION:

SURFACE ELEVATION: ± feet
 CASING ELEVATION: ± feet

DATE STARTED: 4/15/2013
 DATE COMPLETED: 4/15/2013
 LOGGED BY: V. Atkins

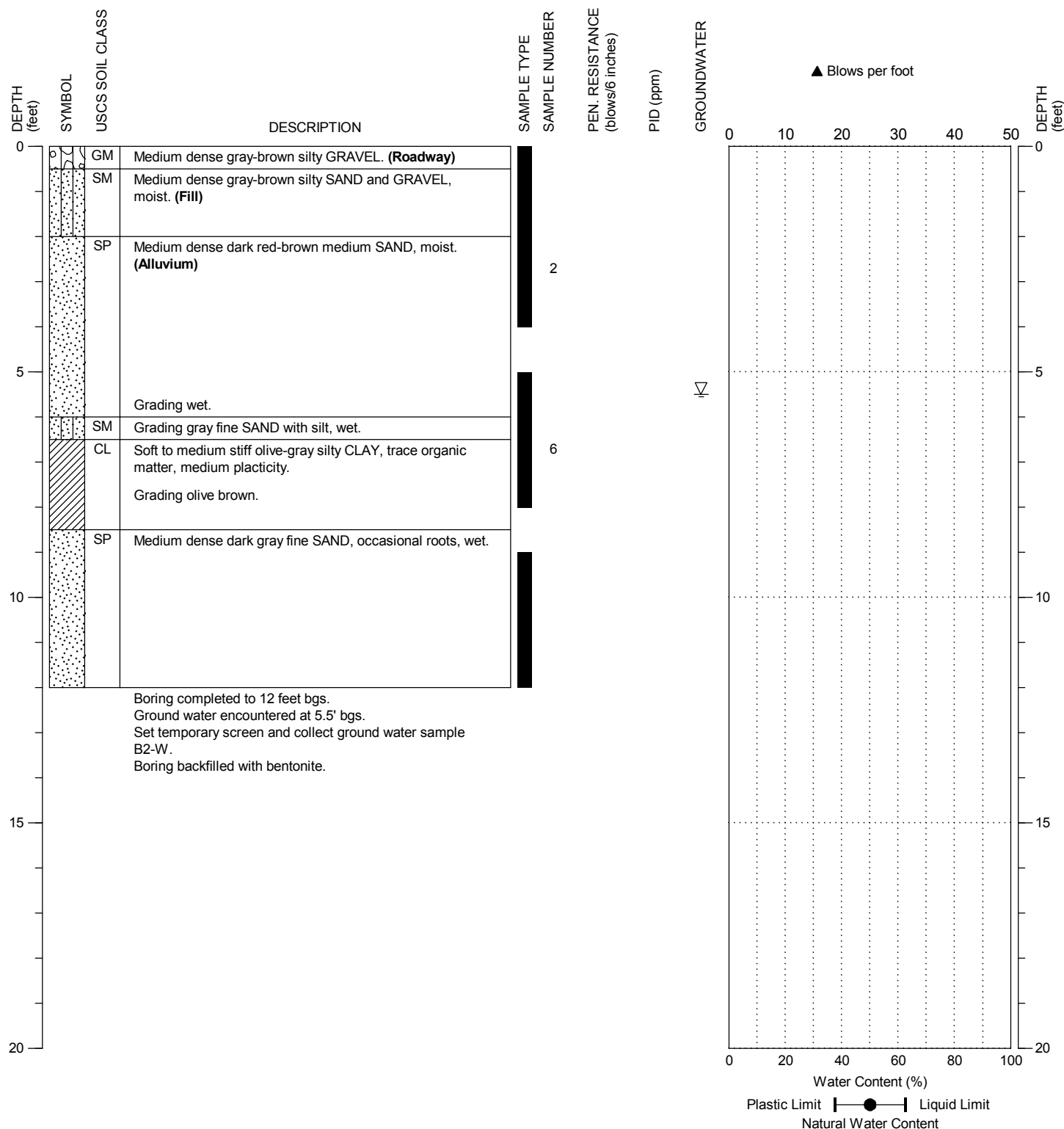


NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

DRILLING COMPANY: ESN Northwest
 DRILLING METHOD: GeoProbe
 SAMPLING METHOD: 48" Macrocore Sampler with HDPE liner
 LOCATION:

SURFACE ELEVATION: ± feet
 CASING ELEVATION: ± feet

DATE STARTED: 4/15/2013
 DATE COMPLETED: 4/15/2013
 LOGGED BY: V. Atkins

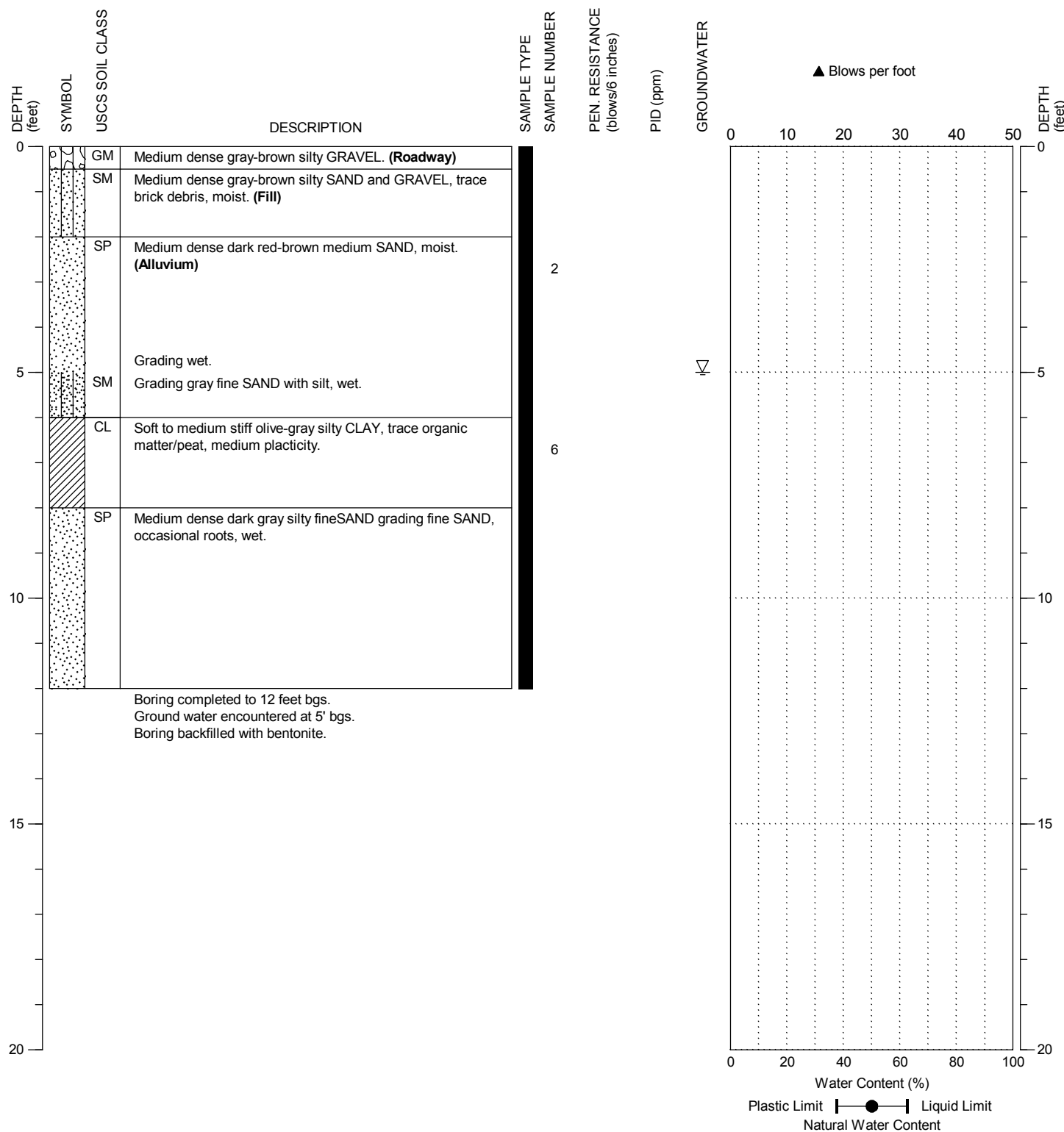


NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

DRILLING COMPANY: ESN Northwest
 DRILLING METHOD: GeoProbe
 SAMPLING METHOD: 48" Macrocore Sampler with HDPE liner
 LOCATION:

SURFACE ELEVATION: ± feet
 CASING ELEVATION: ± feet

DATE STARTED: 4/15/2013
 DATE COMPLETED: 4/15/2013
 LOGGED BY: V. Atkins

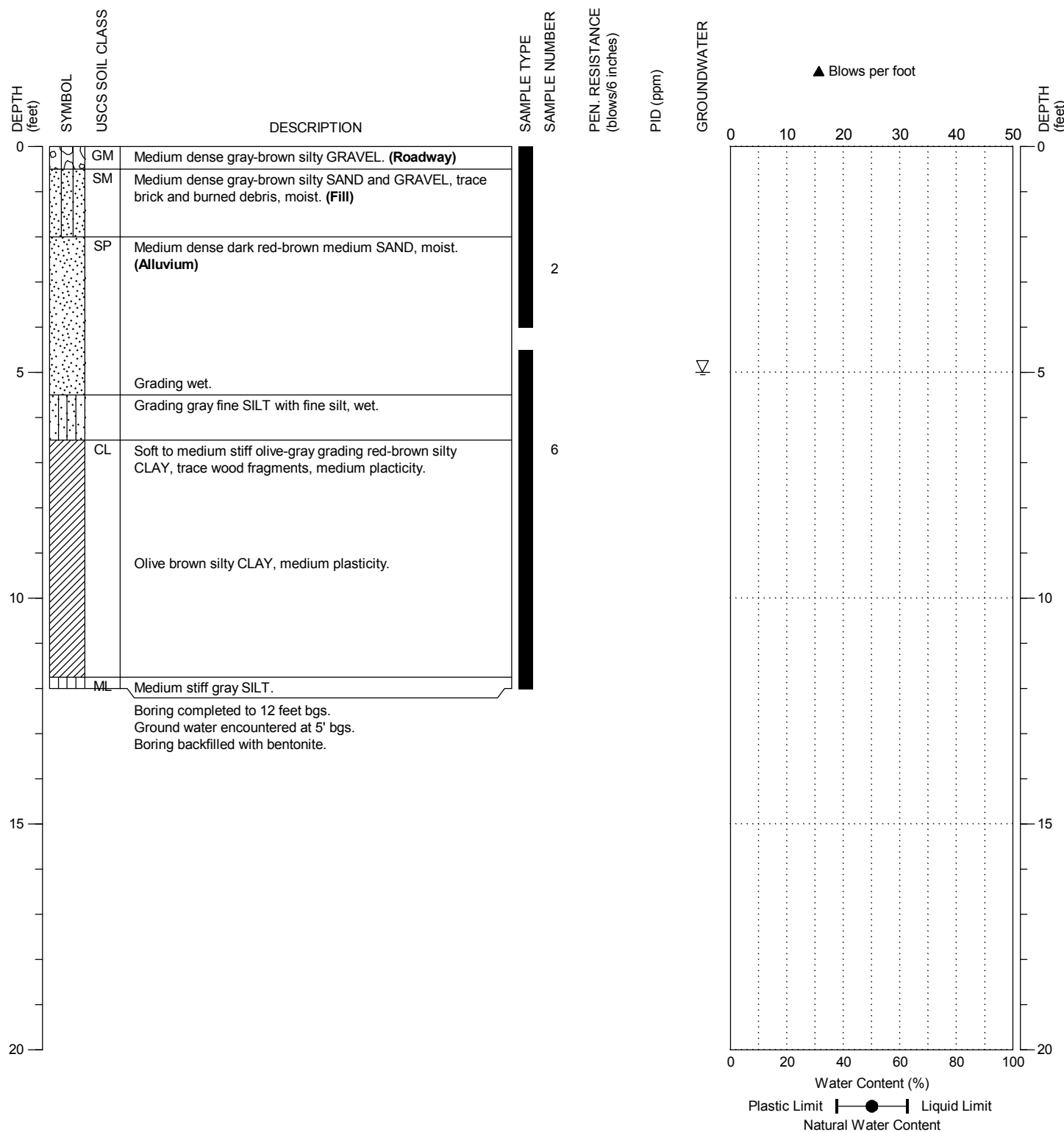


NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

DRILLING COMPANY: ESN Northwest
 DRILLING METHOD: GeoProbe
 SAMPLING METHOD: 48" Macrocore Sampler with HDPE liner
 LOCATION:

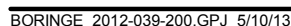
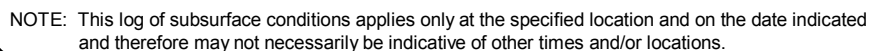
SURFACE ELEVATION: ± feet
 CASING ELEVATION: ± feet

DATE STARTED: 4/15/2013
 DATE COMPLETED: 4/15/2013
 LOGGED BY: V. Atkins



NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

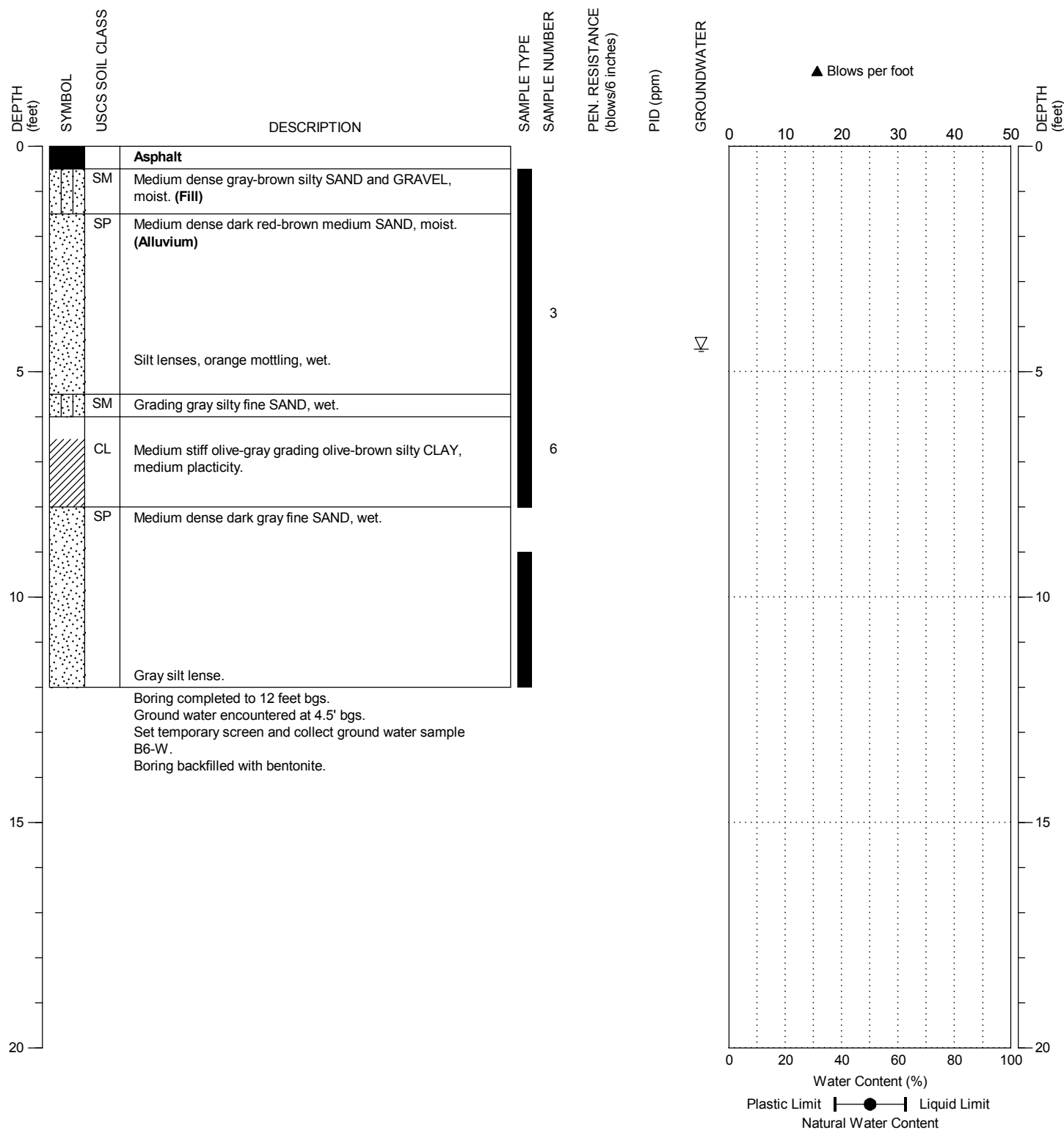
DATE STARTED: 4/15/2013
DATE COMPLETED: 4/15/2013
LOGGED BY: V. Atkins



DRILLING COMPANY: ESN Northwest
 DRILLING METHOD: GeoProbe
 SAMPLING METHOD: 48" Macrocore Sampler with HDPE liner
 LOCATION:

SURFACE ELEVATION: ± feet
 CASING ELEVATION: ± feet

DATE STARTED: 4/15/2013
 DATE COMPLETED: 4/15/2013
 LOGGED BY: V. Atkins

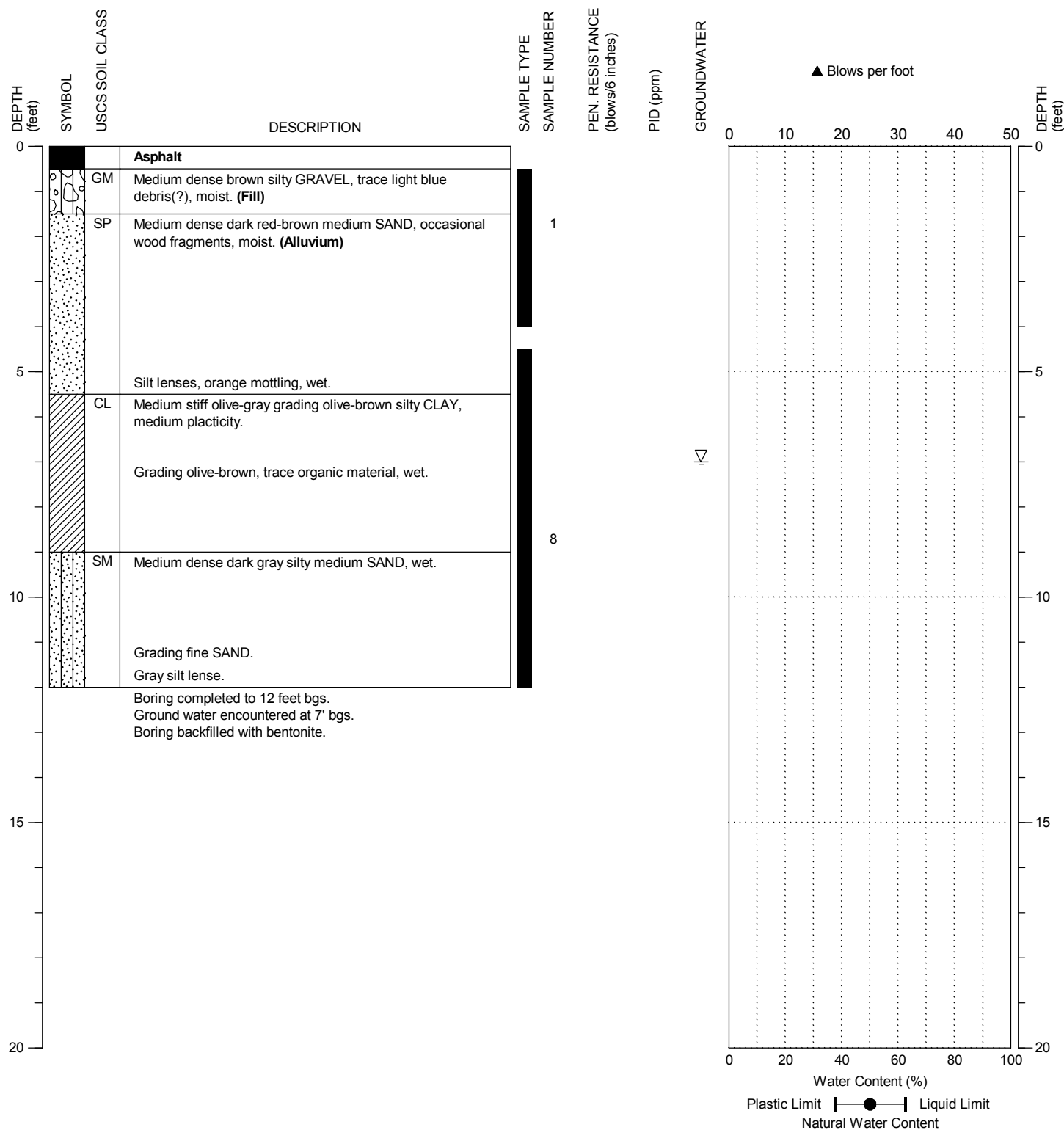


NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

DRILLING COMPANY: ESN Northwest
 DRILLING METHOD: GeoProbe
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 LOCATION:

SURFACE ELEVATION: ± feet
 CASING ELEVATION: ± feet

DATE STARTED: 4/15/2013
 DATE COMPLETED: 4/15/2013
 LOGGED BY: V. Atkins

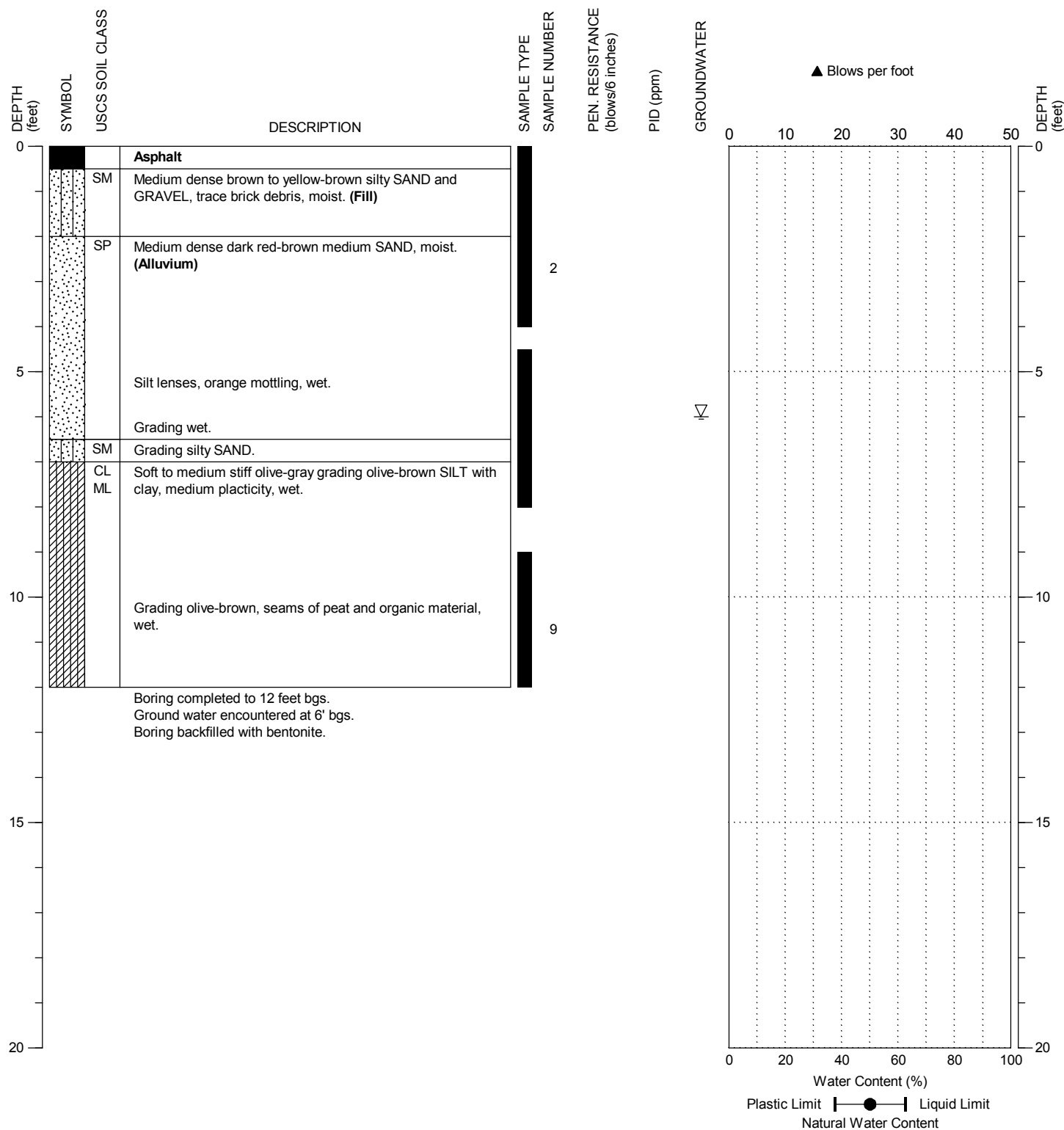


NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

DRILLING COMPANY: ESN Northwest
 DRILLING METHOD: GeoProbe
 SAMPLING METHOD: 48" Macrocore Sampler with HDPE liner
 LOCATION:

SURFACE ELEVATION: ± feet
 CASING ELEVATION: ± feet

DATE STARTED: 4/16/2013
 DATE COMPLETED: 4/16/2013
 LOGGED BY: V. Atkins

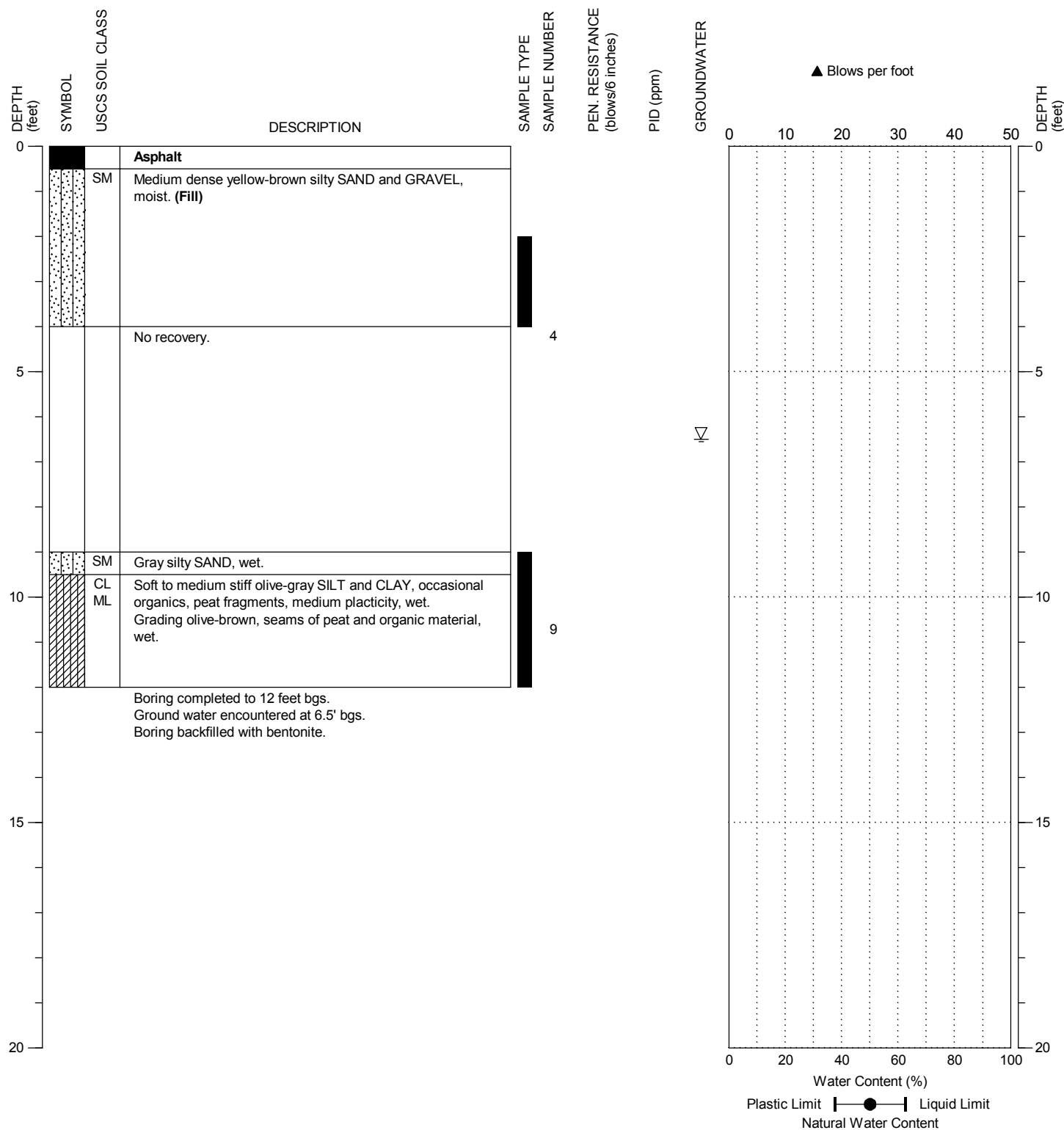


NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

DRILLING COMPANY: ESN Northwest
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 LOCATION:

SURFACE ELEVATION: ± feet
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 LOGGED BY: V. Atkins

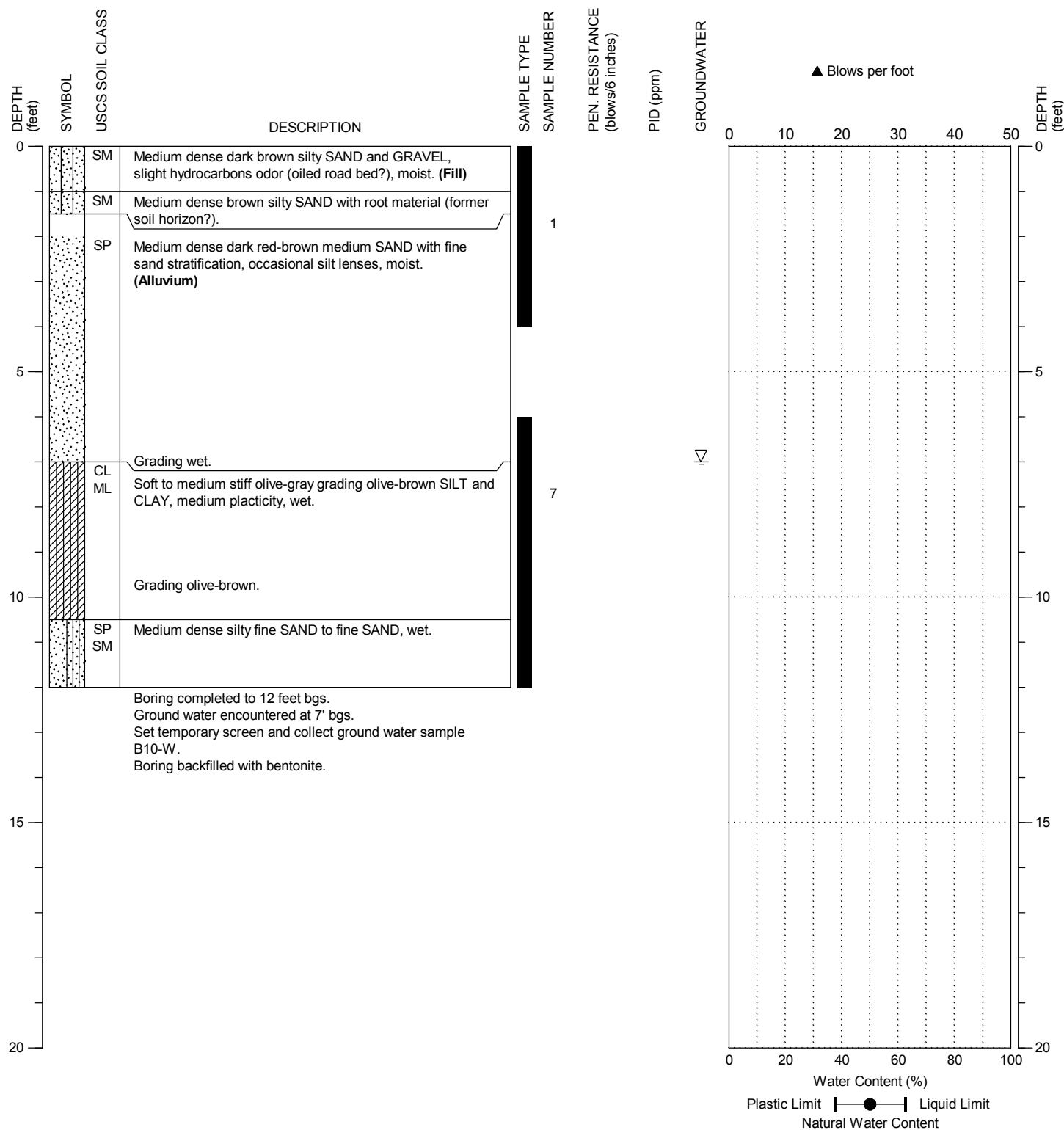


NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

DRILLING COMPANY: ESN Northwest
 DRILLING METHOD: GeoProbe
 SAMPLING METHOD: 48" Macrocore Sampler with HDPE liner
 LOCATION:

SURFACE ELEVATION: ± feet
 CASING ELEVATION: ± feet

DATE STARTED: 4/16/2013
 DATE COMPLETED: 4/16/2013
 LOGGED BY: V. Atkins

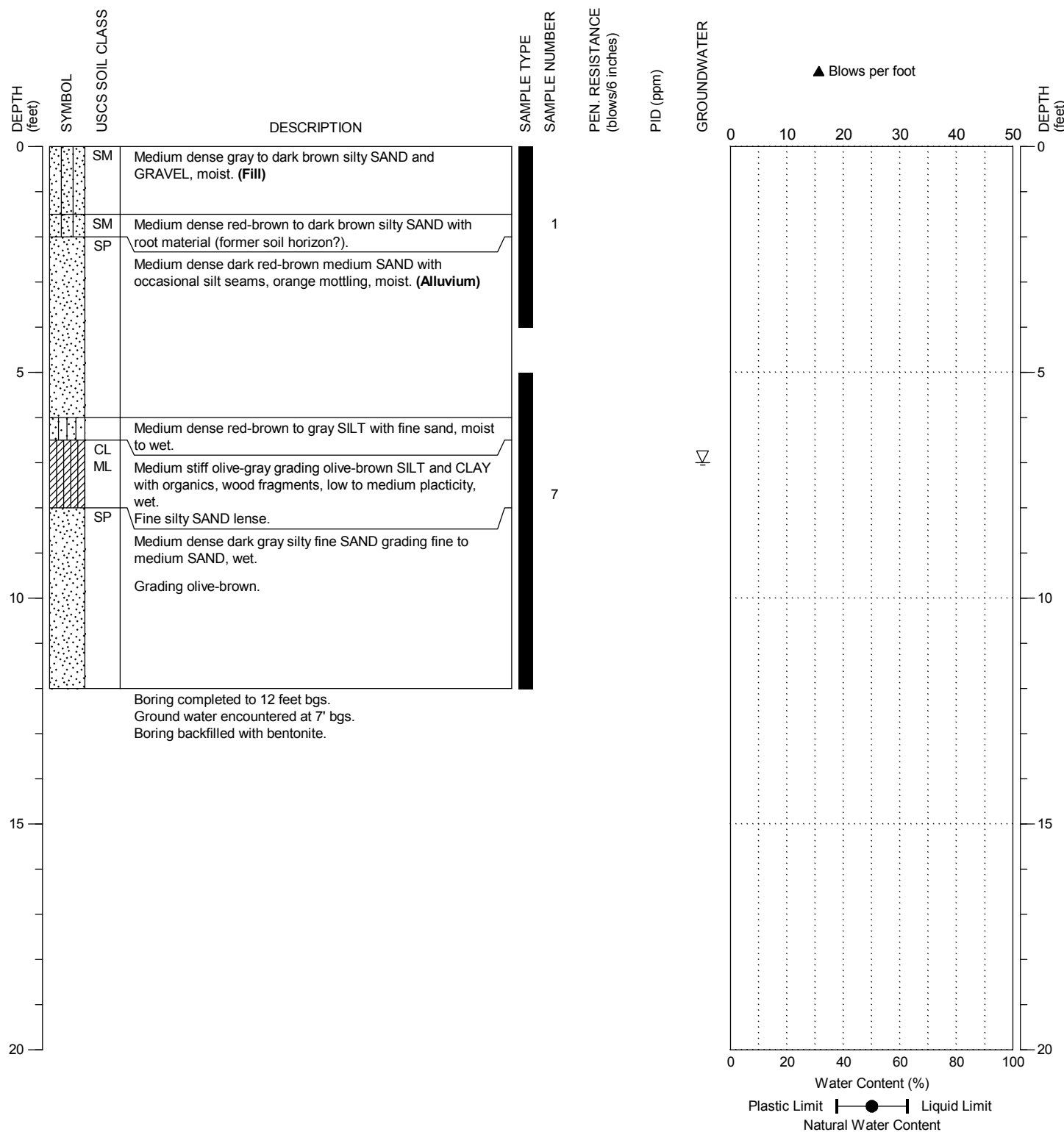


NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

DRILLING COMPANY: ESN Northwest
 DRILLING METHOD: GeoProbe
 SAMPLING METHOD: 48" Macrocore Sampler with HDPE liner
 LOCATION:

SURFACE ELEVATION: ± feet
 CASING ELEVATION: ± feet

DATE STARTED: 4/16/2013
 DATE COMPLETED: 4/16/2013
 LOGGED BY: V. Atkins

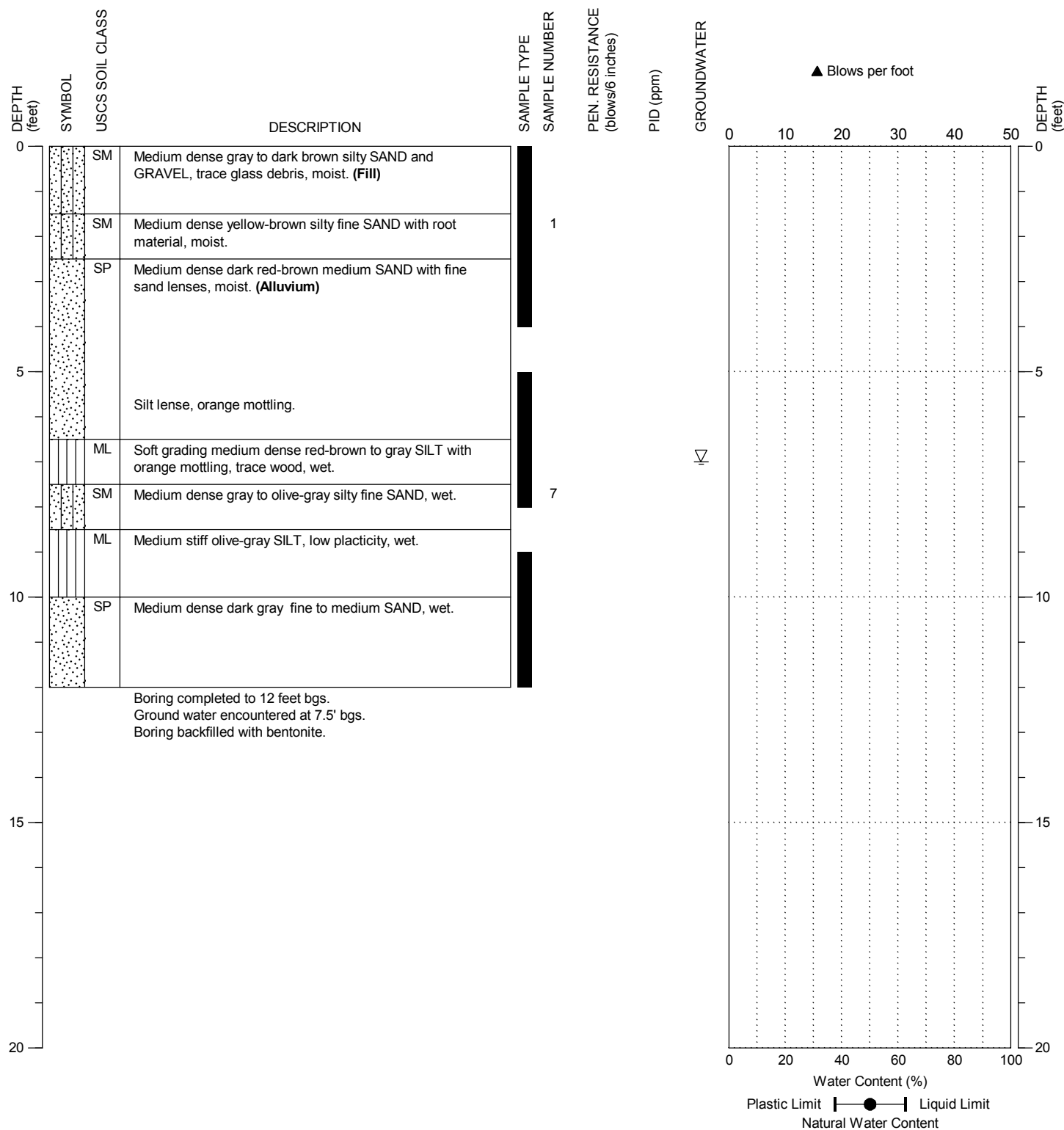


NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

DRILLING COMPANY: ESN Northwest
 DRILLING METHOD: GeoProbe
 SAMPLING METHOD: 48" Macrocore Sampler with HDPE liner
 LOCATION:

SURFACE ELEVATION: ± feet
 CASING ELEVATION: ± feet

DATE STARTED: 4/16/2013
 DATE COMPLETED: 4/16/2013
 LOGGED BY: V. Atkins

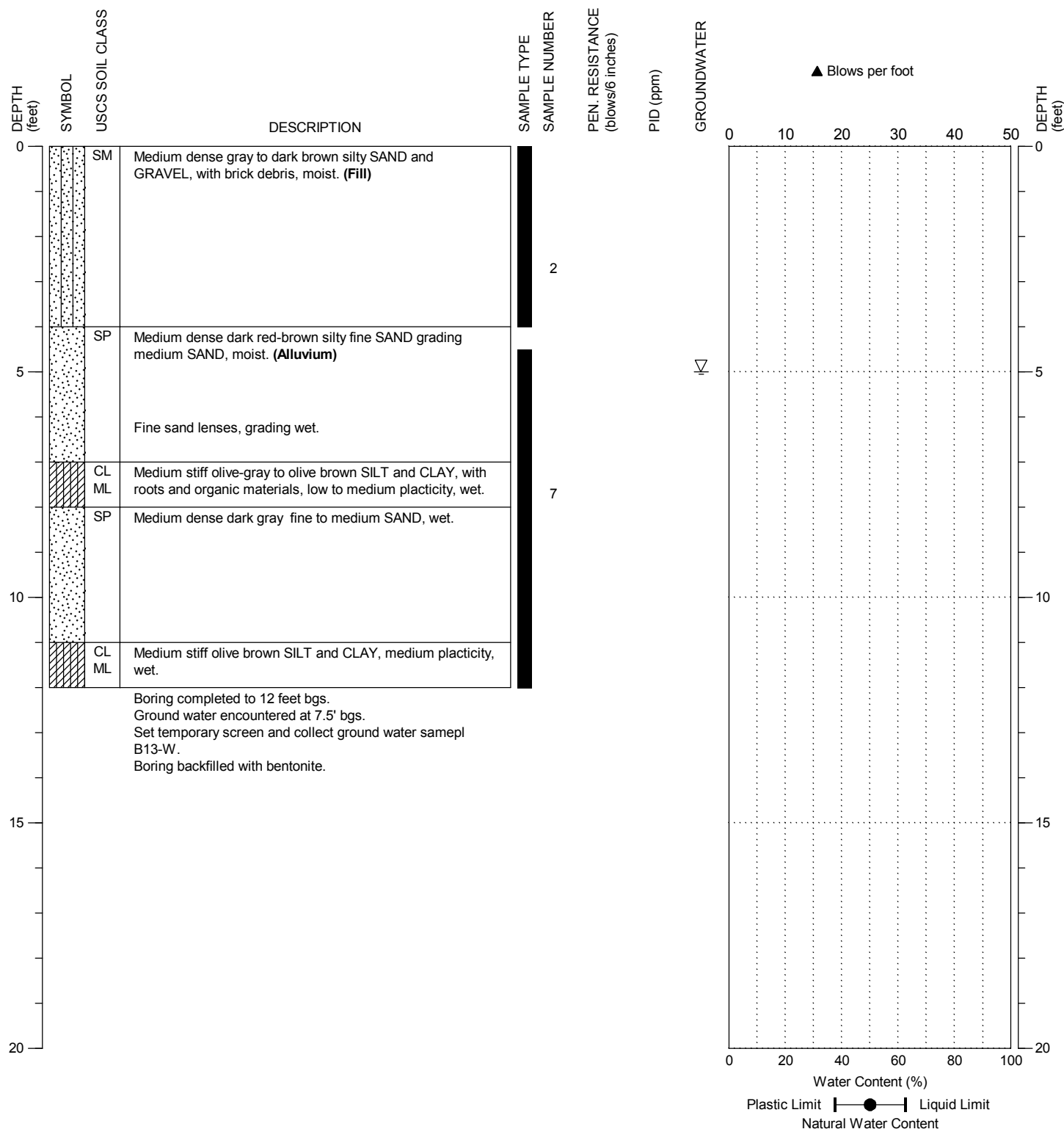


NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

DRILLING COMPANY: ESN Northwest
 DRILLING METHOD: GeoProbe
 SAMPLING METHOD: 48" Macrocore Sampler with HDPE liner
 LOCATION:

SURFACE ELEVATION: ± feet
 CASING ELEVATION: ± feet

DATE STARTED: 4/16/2013
 DATE COMPLETED: 4/16/2013
 LOGGED BY: V. Atkins



NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

APPENDIX B

ANALYTICAL LABORATORY REPORTS



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

April 24, 2013

Vance Atkins
HWA GeoSciences, Inc.
21312 30th Drive SE, Suite 110
Bothell, WA 98021

Re: Analytical Data for Project 2012-039
Laboratory Reference No. 1304-132

Dear Vance:

Enclosed are the analytical results and associated quality control data for samples submitted on April 16, 2013.

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

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

Sincerely,

A handwritten signature in black ink, appearing to read 'DB', followed by a long horizontal flourish.

David Baumeister
Project Manager

Enclosures

Date of Report: April 24, 2013
Samples Submitted: April 16, 2013
Laboratory Reference: 1304-132
Project: 2012-039

Case Narrative

Samples were collected on April 15 and 16, 2013 and received by the laboratory on April 16, 2013. They were maintained at the laboratory at a temperature of 2°C to 6°C.

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

Date of Report: April 24, 2013
 Samples Submitted: April 16, 2013
 Laboratory Reference: 1304-132
 Project: 2012-039

NWTPH-Dx

Matrix: Soil
 Units: mg/Kg (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID: B-1-2						
Laboratory ID:	04-132-01					
Diesel Range Organics	ND	140	NWTPH-Dx	4-18-13	4-18-13	
Lube Oil	1900	270	NWTPH-Dx	4-18-13	4-18-13	
<i>Surrogate:</i>	<i>Percent Recovery</i>	<i>Control Limits</i>				
<i>o-Terphenyl</i>	90	50-150				
Client ID: B-1-6						
Laboratory ID:	04-132-02					
Diesel Range Organics	ND	31	NWTPH-Dx	4-18-13	4-18-13	
Lube Oil Range Organics	ND	62	NWTPH-Dx	4-18-13	4-18-13	
<i>Surrogate:</i>	<i>Percent Recovery</i>	<i>Control Limits</i>				
<i>o-Terphenyl</i>	73	50-150				
Client ID: B2-2						
Laboratory ID:	04-132-03					
Diesel Range Organics	280	130	NWTPH-Dx	4-18-13	4-18-13	
Lube Oil	1900	270	NWTPH-Dx	4-18-13	4-18-13	
<i>Surrogate:</i>	<i>Percent Recovery</i>	<i>Control Limits</i>				
<i>o-Terphenyl</i>	93	50-150				
Client ID: B2-6						
Laboratory ID:	04-132-04					
Diesel Range Organics	ND	33	NWTPH-Dx	4-18-13	4-18-13	
Lube Oil Range Organics	ND	66	NWTPH-Dx	4-18-13	4-18-13	
<i>Surrogate:</i>	<i>Percent Recovery</i>	<i>Control Limits</i>				
<i>o-Terphenyl</i>	79	50-150				
Client ID: B3-2						
Laboratory ID:	04-132-06					
Diesel Range Organics	ND	27	NWTPH-Dx	4-18-13	4-19-13	
Lube Oil	180	54	NWTPH-Dx	4-18-13	4-19-13	
<i>Surrogate:</i>	<i>Percent Recovery</i>	<i>Control Limits</i>				
<i>o-Terphenyl</i>	70	50-150				
Client ID: B3-6						
Laboratory ID:	04-132-07					
Diesel Range Organics	ND	31	NWTPH-Dx	4-18-13	4-18-13	
Lube Oil Range Organics	ND	62	NWTPH-Dx	4-18-13	4-18-13	
<i>Surrogate:</i>	<i>Percent Recovery</i>	<i>Control Limits</i>				
<i>o-Terphenyl</i>	80	50-150				

Date of Report: April 24, 2013
 Samples Submitted: April 16, 2013
 Laboratory Reference: 1304-132
 Project: 2012-039

NWTPH-Dx

Matrix: Soil
 Units: mg/Kg (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID: B4-2						
Laboratory ID:	04-132-08					
Diesel Range Organics	ND	62	NWTPH-Dx	4-18-13	4-18-13	U1
Lube Oil	480	54	NWTPH-Dx	4-18-13	4-18-13	
<i>Surrogate:</i>	<i>Percent Recovery</i>	<i>Control Limits</i>				
<i>o-Terphenyl</i>	88	50-150				
Client ID: B4-6						
Laboratory ID:	04-132-09					
Diesel Range Organics	ND	31	NWTPH-Dx	4-18-13	4-18-13	
Lube Oil Range Organics	ND	62	NWTPH-Dx	4-18-13	4-18-13	
<i>Surrogate:</i>	<i>Percent Recovery</i>	<i>Control Limits</i>				
<i>o-Terphenyl</i>	103	50-150				
Client ID: B5-3						
Laboratory ID:	04-132-10					
Diesel Range Organics	ND	30	NWTPH-Dx	4-18-13	4-18-13	
Lube Oil Range Organics	ND	59	NWTPH-Dx	4-18-13	4-18-13	
<i>Surrogate:</i>	<i>Percent Recovery</i>	<i>Control Limits</i>				
<i>o-Terphenyl</i>	85	50-150				
Client ID: B5-6						
Laboratory ID:	04-132-11					
Diesel Range Organics	ND	37	NWTPH-Dx	4-18-13	4-18-13	
Lube Oil Range Organics	ND	74	NWTPH-Dx	4-18-13	4-18-13	
<i>Surrogate:</i>	<i>Percent Recovery</i>	<i>Control Limits</i>				
<i>o-Terphenyl</i>	53	50-150				
Client ID: B6-3						
Laboratory ID:	04-132-12					
Diesel Range Organics	ND	28	NWTPH-Dx	4-18-13	4-18-13	
Lube Oil Range Organics	ND	57	NWTPH-Dx	4-18-13	4-18-13	
<i>Surrogate:</i>	<i>Percent Recovery</i>	<i>Control Limits</i>				
<i>o-Terphenyl</i>	89	50-150				
Client ID: B6-6						
Laboratory ID:	04-132-13					
Diesel Range Organics	ND	46	NWTPH-Dx	4-18-13	4-18-13	
Lube Oil Range Organics	ND	92	NWTPH-Dx	4-18-13	4-18-13	
<i>Surrogate:</i>	<i>Percent Recovery</i>	<i>Control Limits</i>				
<i>o-Terphenyl</i>	70	50-150				

Date of Report: April 24, 2013
 Samples Submitted: April 16, 2013
 Laboratory Reference: 1304-132
 Project: 2012-039

NWTPH-Dx

Matrix: Soil
 Units: mg/Kg (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID: B7-1						
Laboratory ID:	04-132-15					
Diesel Range Organics	ND	28	NWTPH-Dx	4-18-13	4-18-13	
Lube Oil Range Organics	ND	55	NWTPH-Dx	4-18-13	4-18-13	
<i>Surrogate:</i>	<i>Percent Recovery</i>	<i>Control Limits</i>				
<i>o-Terphenyl</i>	78	50-150				
Client ID: B7-8						
Laboratory ID:	04-132-16					
Diesel Range Organics	ND	46	NWTPH-Dx	4-18-13	4-18-13	
Lube Oil Range Organics	ND	92	NWTPH-Dx	4-18-13	4-18-13	
<i>Surrogate:</i>	<i>Percent Recovery</i>	<i>Control Limits</i>				
<i>o-Terphenyl</i>	78	50-150				
Client ID: B9-4						
Laboratory ID:	04-132-17					
Diesel Range Organics	ND	28	NWTPH-Dx	4-18-13	4-18-13	
Lube Oil Range Organics	ND	56	NWTPH-Dx	4-18-13	4-18-13	
<i>Surrogate:</i>	<i>Percent Recovery</i>	<i>Control Limits</i>				
<i>o-Terphenyl</i>	92	50-150				
Client ID: B9-9						
Laboratory ID:	04-132-18					
Diesel Range Organics	ND	36	NWTPH-Dx	4-18-13	4-18-13	
Lube Oil Range Organics	ND	71	NWTPH-Dx	4-18-13	4-18-13	
<i>Surrogate:</i>	<i>Percent Recovery</i>	<i>Control Limits</i>				
<i>o-Terphenyl</i>	93	50-150				
Client ID: B8-2						
Laboratory ID:	04-132-19					
Diesel Range Organics	860	140	NWTPH-Dx	4-18-13	4-19-13	
Lube Oil	3000	280	NWTPH-Dx	4-18-13	4-19-13	
<i>Surrogate:</i>	<i>Percent Recovery</i>	<i>Control Limits</i>				
<i>o-Terphenyl</i>	93	50-150				
Client ID: B8-9						
Laboratory ID:	04-132-20					
Diesel Range Organics	ND	37	NWTPH-Dx	4-18-13	4-18-13	
Lube Oil Range Organics	ND	75	NWTPH-Dx	4-18-13	4-18-13	
<i>Surrogate:</i>	<i>Percent Recovery</i>	<i>Control Limits</i>				
<i>o-Terphenyl</i>	84	50-150				

Date of Report: April 24, 2013
 Samples Submitted: April 16, 2013
 Laboratory Reference: 1304-132
 Project: 2012-039

NWTPH-Dx

Matrix: Soil
 Units: mg/Kg (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID: B10-1						
Laboratory ID:	04-132-21					
Diesel Range Organics	ND	270	NWTPH-Dx	4-18-13	4-19-13	
Lube Oil	5200	550	NWTPH-Dx	4-18-13	4-19-13	
<i>Surrogate:</i>	<i>Percent Recovery</i>	<i>Control Limits</i>				
<i>o-Terphenyl</i>	---	50-150				S
Client ID: B10-7						
Laboratory ID:	04-132-22					
Diesel Range Organics	ND	30	NWTPH-Dx	4-18-13	4-18-13	
Lube Oil Range Organics	ND	60	NWTPH-Dx	4-18-13	4-18-13	
<i>Surrogate:</i>	<i>Percent Recovery</i>	<i>Control Limits</i>				
<i>o-Terphenyl</i>	90	50-150				
Client ID: B11-1						
Laboratory ID:	04-132-24					
Diesel Range Organics	ND	150	NWTPH-Dx	4-19-13	4-22-13	U1
Lube Oil	3900	260	NWTPH-Dx	4-19-13	4-22-13	
<i>Surrogate:</i>	<i>Percent Recovery</i>	<i>Control Limits</i>				
<i>o-Terphenyl</i>	99	50-150				
Client ID: B11-7						
Laboratory ID:	04-132-25					
Diesel Range Organics	ND	29	NWTPH-Dx	4-19-13	4-19-13	
Lube Oil Range Organics	ND	58	NWTPH-Dx	4-19-13	4-19-13	
<i>Surrogate:</i>	<i>Percent Recovery</i>	<i>Control Limits</i>				
<i>o-Terphenyl</i>	97	50-150				
Client ID: B12-1						
Laboratory ID:	04-132-26					
Diesel Range Organics	ND	470	NWTPH-Dx	4-19-13	4-22-13	U1
Lube Oil	3200	280	NWTPH-Dx	4-19-13	4-22-13	
<i>Surrogate:</i>	<i>Percent Recovery</i>	<i>Control Limits</i>				
<i>o-Terphenyl</i>	104	50-150				
Client ID: B12-7						
Laboratory ID:	04-132-27					
Diesel Range Organics	ND	33	NWTPH-Dx	4-19-13	4-19-13	
Lube Oil Range Organics	ND	65	NWTPH-Dx	4-19-13	4-19-13	
<i>Surrogate:</i>	<i>Percent Recovery</i>	<i>Control Limits</i>				
<i>o-Terphenyl</i>	92	50-150				

Date of Report: April 24, 2013
 Samples Submitted: April 16, 2013
 Laboratory Reference: 1304-132
 Project: 2012-039

NWTPH-Dx

Matrix: Soil
 Units: mg/Kg (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID: B13-2						
Laboratory ID:	04-132-28					
Diesel Range Organics	55	28	NWTPH-Dx	4-19-13	4-19-13	
Lube Oil	420	55	NWTPH-Dx	4-19-13	4-19-13	
<i>Surrogate:</i>	<i>Percent Recovery</i>	<i>Control Limits</i>				
<i>o-Terphenyl</i>	111	50-150				
Client ID: B13-7						
Laboratory ID:	04-132-29					
Diesel Range Organics	ND	31	NWTPH-Dx	4-19-13	4-19-13	
Lube Oil Range Organics	ND	61	NWTPH-Dx	4-19-13	4-19-13	
<i>Surrogate:</i>	<i>Percent Recovery</i>	<i>Control Limits</i>				
<i>o-Terphenyl</i>	104	50-150				

Date of Report: April 24, 2013
 Samples Submitted: April 16, 2013
 Laboratory Reference: 1304-132
 Project: 2012-039

**NWTPH-Dx
 QUALITY CONTROL**

Matrix: Soil
 Units: mg/Kg (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
METHOD BLANK						
Laboratory ID:	MB0418S1					
Diesel Range Organics	ND	25	NWTPH-Dx	4-18-13	4-18-13	
Lube Oil Range Organics	ND	50	NWTPH-Dx	4-18-13	4-18-13	
Surrogate:	Percent Recovery	Control Limits				
<i>o</i> -Terphenyl	87	50-150				
Laboratory ID:	MB0419S1					
Diesel Range Organics	ND	25	NWTPH-Dx	4-19-13	4-19-13	
Lube Oil Range Organics	ND	50	NWTPH-Dx	4-19-13	4-19-13	
Surrogate:	Percent Recovery	Control Limits				
<i>o</i> -Terphenyl	109	50-150				

Analyte	Result	Percent Recovery	Recovery Limits	RPD	RPD Limit	Flags
DUPLICATE						
Laboratory ID:	04-132-17					
	ORIG	DUP				
Diesel Range Organics	ND	ND		NA	NA	
Lube Oil Range Organics	ND	ND		NA	NA	
Surrogate:						
<i>o</i> -Terphenyl			92 80	50-150		
Laboratory ID:	04-132-19					
	ORIG	DUP				
Diesel Range Organics	764	173		126	NA	
Lube Oil	2710	943		97	NA	
Surrogate:						
<i>o</i> -Terphenyl			93 94	50-150		
Laboratory ID:	04-132-26					
	ORIG	DUP				
Diesel Range Organics	ND	ND		NA	NA	U1
Lube Oil	2860	1020		95	NA	
Surrogate:						
<i>o</i> -Terphenyl			104 92	50-150		

Date of Report: April 24, 2013
 Samples Submitted: April 16, 2013
 Laboratory Reference: 1304-132
 Project: 2012-039

NWTPH-Dx

Matrix: Water
 Units: mg/L (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID: B2-W						
Laboratory ID:	04-132-05					
Diesel Range Organics	ND	0.30	NWTPH-Dx	4-22-13	4-22-13	
Lube Oil	1.2	0.47	NWTPH-Dx	4-22-13	4-22-13	
<i>Surrogate:</i>	<i>Percent Recovery</i>	<i>Control Limits</i>				
<i>o-Terphenyl</i>	79	50-150				
Client ID: B6-W						
Laboratory ID:	04-132-14					
Diesel Range Organics	ND	0.26	NWTPH-Dx	4-22-13	4-23-13	
Lube Oil	0.46	0.42	NWTPH-Dx	4-22-13	4-23-13	
<i>Surrogate:</i>	<i>Percent Recovery</i>	<i>Control Limits</i>				
<i>o-Terphenyl</i>	73	50-150				
Client ID: B10-W						
Laboratory ID:	04-132-23					
Diesel Range Organics	ND	0.28	NWTPH-Dx	4-22-13	4-22-13	
Lube Oil Range Organics	ND	0.44	NWTPH-Dx	4-22-13	4-22-13	
<i>Surrogate:</i>	<i>Percent Recovery</i>	<i>Control Limits</i>				
<i>o-Terphenyl</i>	86	50-150				
Client ID: B13-W						
Laboratory ID:	04-132-30					
Diesel Range Organics	ND	0.28	NWTPH-Dx	4-22-13	4-22-13	
Lube Oil Range Organics	ND	0.44	NWTPH-Dx	4-22-13	4-22-13	
<i>Surrogate:</i>	<i>Percent Recovery</i>	<i>Control Limits</i>				
<i>o-Terphenyl</i>	84	50-150				

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**NWTPH-Dx
 QUALITY CONTROL**

Matrix: Water
 Units: mg/L (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
METHOD BLANK						
Laboratory ID:	MB0422W1					
Diesel Range Organics	ND	0.25	NWTPH-Dx	4-22-13	4-22-13	
Lube Oil Range Organics	ND	0.40	NWTPH-Dx	4-22-13	4-22-13	
<i>Surrogate:</i>	<i>Percent Recovery</i>	<i>Control Limits</i>				
<i>o-Terphenyl</i>	79	50-150				

Analyte	Result		Percent Recovery		Recovery Limits	RPD	RPD Limit	Flags
DUPLICATE								
Laboratory ID:	04-132-05							
	ORIG	DUP						
Diesel Range Organics	ND	ND					NA	NA
Lube Oil	1.16	ND					NA	NA
Surrogate:								
o-Terphenyl			79	84	50-150			

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PAHs by EPA 8270D/SIM

Matrix: Soil
 Units: mg/Kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	B-1-2					
Laboratory ID:	04-132-01					
Benzo[a]anthracene	0.012	0.0072	EPA 8270D/SIM	4-19-13	4-22-13	
Chrysene	0.021	0.0072	EPA 8270D/SIM	4-19-13	4-22-13	
Benzo[b]fluoranthene	0.023	0.0072	EPA 8270D/SIM	4-19-13	4-22-13	
Benzo(j,k)fluoranthene	ND	0.0072	EPA 8270D/SIM	4-19-13	4-22-13	
Benzo[a]pyrene	0.018	0.0072	EPA 8270D/SIM	4-19-13	4-22-13	
Indeno(1,2,3-c,d)pyrene	0.019	0.0072	EPA 8270D/SIM	4-19-13	4-22-13	
Dibenz[a,h]anthracene	0.013	0.0072	EPA 8270D/SIM	4-19-13	4-22-13	
<i>Surrogate:</i>	<i>Percent Recovery</i>	<i>Control Limits</i>				
<i>2-Fluorobiphenyl</i>	<i>57</i>	<i>43 - 116</i>				
<i>Pyrene-d10</i>	<i>57</i>	<i>33 - 124</i>				
<i>Terphenyl-d14</i>	<i>66</i>	<i>38 - 125</i>				

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PAHs by EPA 8270D/SIM

Matrix: Soil
 Units: mg/Kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	B4-2					
Laboratory ID:	04-132-08					
Benzo[a]anthracene	ND	0.0072	EPA 8270D/SIM	4-19-13	4-19-13	
Chrysene	ND	0.0072	EPA 8270D/SIM	4-19-13	4-19-13	
Benzo[b]fluoranthene	ND	0.0072	EPA 8270D/SIM	4-19-13	4-19-13	
Benzo(j,k)fluoranthene	ND	0.0072	EPA 8270D/SIM	4-19-13	4-19-13	
Benzo[a]pyrene	ND	0.0072	EPA 8270D/SIM	4-19-13	4-19-13	
Indeno(1,2,3-c,d)pyrene	0.0073	0.0072	EPA 8270D/SIM	4-19-13	4-19-13	
Dibenz[a,h]anthracene	ND	0.0072	EPA 8270D/SIM	4-19-13	4-19-13	
<i>Surrogate:</i>	<i>Percent Recovery</i>	<i>Control Limits</i>				
<i>2-Fluorobiphenyl</i>	<i>52</i>	<i>43 - 116</i>				
<i>Pyrene-d10</i>	<i>54</i>	<i>33 - 124</i>				
<i>Terphenyl-d14</i>	<i>58</i>	<i>38 - 125</i>				

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PAHs by EPA 8270D/SIM

Matrix: Soil
 Units: mg/Kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	B7-1					
Laboratory ID:	04-132-15					
Benzo[a]anthracene	ND	0.0073	EPA 8270D/SIM	4-19-13	4-19-13	
Chrysene	0.0085	0.0073	EPA 8270D/SIM	4-19-13	4-19-13	
Benzo[b]fluoranthene	0.0096	0.0073	EPA 8270D/SIM	4-19-13	4-19-13	
Benzo(j,k)fluoranthene	ND	0.0073	EPA 8270D/SIM	4-19-13	4-19-13	
Benzo[a]pyrene	ND	0.0073	EPA 8270D/SIM	4-19-13	4-19-13	
Indeno(1,2,3-c,d)pyrene	ND	0.0073	EPA 8270D/SIM	4-19-13	4-19-13	
Dibenz[a,h]anthracene	ND	0.0073	EPA 8270D/SIM	4-19-13	4-19-13	
<i>Surrogate:</i>	<i>Percent Recovery</i>	<i>Control Limits</i>				
<i>2-Fluorobiphenyl</i>	<i>67</i>	<i>43 - 116</i>				
<i>Pyrene-d10</i>	<i>62</i>	<i>33 - 124</i>				
<i>Terphenyl-d14</i>	<i>65</i>	<i>38 - 125</i>				

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PAHs by EPA 8270D/SIM

Matrix: Soil
 Units: mg/Kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	B13-2					
Laboratory ID:	04-132-28					
Benzo[a]anthracene	0.16	0.037	EPA 8270D/SIM	4-19-13	4-20-13	
Chrysene	0.23	0.037	EPA 8270D/SIM	4-19-13	4-20-13	
Benzo[b]fluoranthene	0.29	0.037	EPA 8270D/SIM	4-19-13	4-20-13	
Benzo(j,k)fluoranthene	0.098	0.037	EPA 8270D/SIM	4-19-13	4-20-13	
Benzo[a]pyrene	0.19	0.037	EPA 8270D/SIM	4-19-13	4-20-13	
Indeno(1,2,3-c,d)pyrene	0.20	0.037	EPA 8270D/SIM	4-19-13	4-20-13	
Dibenz[a,h]anthracene	0.060	0.037	EPA 8270D/SIM	4-19-13	4-20-13	
<i>Surrogate:</i>	<i>Percent Recovery</i>	<i>Control Limits</i>				
<i>2-Fluorobiphenyl</i>	<i>58</i>	<i>43 - 116</i>				
<i>Pyrene-d10</i>	<i>54</i>	<i>33 - 124</i>				
<i>Terphenyl-d14</i>	<i>68</i>	<i>38 - 125</i>				

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**PAHs by EPA 8270D/SIM
 METHOD BLANK QUALITY CONTROL**

Matrix: Soil
 Units: mg/Kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
<hr/>						
Laboratory ID:	MB0419S2					
Benzo[a]anthracene	ND	0.0067	EPA 8270D/SIM	4-19-13	4-19-13	
Chrysene	ND	0.0067	EPA 8270D/SIM	4-19-13	4-19-13	
Benzo[b]fluoranthene	ND	0.0067	EPA 8270D/SIM	4-19-13	4-19-13	
Benzo[j,k]fluoranthene	ND	0.0067	EPA 8270D/SIM	4-19-13	4-19-13	
Benzo[a]pyrene	ND	0.0067	EPA 8270D/SIM	4-19-13	4-19-13	
Indeno(1,2,3-c,d)pyrene	ND	0.0067	EPA 8270D/SIM	4-19-13	4-19-13	
Dibenz[a,h]anthracene	ND	0.0067	EPA 8270D/SIM	4-19-13	4-19-13	
<hr/>						
<i>Surrogate:</i>	<i>Percent Recovery</i>	<i>Control Limits</i>				
<i>2-Fluorobiphenyl</i>	<i>94</i>	<i>43 - 116</i>				
<i>Pyrene-d10</i>	<i>90</i>	<i>33 - 124</i>				
<i>Terphenyl-d14</i>	<i>84</i>	<i>38 - 125</i>				

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**PAHs by EPA 8270D/SIM
 MS/MSD QUALITY CONTROL**

Matrix: Soil
 Units: mg/Kg

Analyte	Result		Spike Level		Source Result	Percent Recovery		Recovery Limits	RPD	RPD Limit	Flags
MATRIX SPIKES											
Laboratory ID:	04-132-15										
	MS	MSD	MS	MSD		MS	MSD				
Benzo[a]anthracene	0.0617	0.0626	0.0833	0.0833	ND	74	75	33 - 126	1	26	
Chrysene	0.0657	0.0652	0.0833	0.0833	0.00776	70	69	35 - 123	1	25	
Benzo[b]fluoranthene	0.0611	0.0636	0.0833	0.0833	0.00873	63	66	30 - 125	4	28	
Benzo(j,k)fluoranthene	0.0531	0.0529	0.0833	0.0833	ND	64	64	31 - 122	0	30	
Benzo[a]pyrene	0.0577	0.0564	0.0833	0.0833	ND	69	68	29 - 125	2	28	
Indeno(1,2,3-c,d)pyrene	0.0745	0.0735	0.0833	0.0833	ND	89	88	28 - 125	1	27	
Dibenz[a,h]anthracene	0.0575	0.0604	0.0833	0.0833	ND	69	73	32 - 124	5	27	
Surrogate:											
2-Fluorobiphenyl						63	63	43 - 116			
Pyrene-d10						59	62	33 - 124			
Terphenyl-d14						65	71	38 - 125			

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 Samples Submitted: April 16, 2013
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 Project: 2012-039

PCBs by EPA 8082A

Matrix: Soil
 Units: mg/Kg (ppm)

Client: B-1-2			Date Prepared		Date Analyzed	
Analyte	Result	PQL	Method			Flags
Client ID: B-1-2						
Laboratory ID:	04-132-01					
Aroclor 1016	ND	0.054	EPA 8082A	4-22-13	4-22-13	
Aroclor 1221	ND	0.054	EPA 8082A	4-22-13	4-22-13	
Aroclor 1232	ND	0.054	EPA 8082A	4-22-13	4-22-13	
Aroclor 1242	ND	0.054	EPA 8082A	4-22-13	4-22-13	
Aroclor 1248	ND	0.054	EPA 8082A	4-22-13	4-22-13	
Aroclor 1254	ND	0.054	EPA 8082A	4-22-13	4-22-13	
Aroclor 1260	0.27	0.054	EPA 8082A	4-22-13	4-22-13	
Surrogate:	Percent Recovery	Control Limits				
DCB	98	47-120				
Client ID: B4-2						
Laboratory ID:	04-132-08					
Aroclor 1016	ND	0.054	EPA 8082A	4-22-13	4-22-13	
Aroclor 1221	ND	0.054	EPA 8082A	4-22-13	4-22-13	
Aroclor 1232	ND	0.054	EPA 8082A	4-22-13	4-22-13	
Aroclor 1242	ND	0.054	EPA 8082A	4-22-13	4-22-13	
Aroclor 1248	ND	0.054	EPA 8082A	4-22-13	4-22-13	
Aroclor 1254	ND	0.054	EPA 8082A	4-22-13	4-22-13	
Aroclor 1260	0.46	0.054	EPA 8082A	4-22-13	4-22-13	
Surrogate:	Percent Recovery	Control Limits				
DCB	94	47-120				
Client ID: B7-1						
Laboratory ID:	04-132-15					
Aroclor 1016	ND	0.055	EPA 8082A	4-22-13	4-22-13	
Aroclor 1221	ND	0.055	EPA 8082A	4-22-13	4-22-13	
Aroclor 1232	ND	0.055	EPA 8082A	4-22-13	4-22-13	
Aroclor 1242	ND	0.055	EPA 8082A	4-22-13	4-22-13	
Aroclor 1248	ND	0.055	EPA 8082A	4-22-13	4-22-13	
Aroclor 1254	0.23	0.055	EPA 8082A	4-22-13	4-22-13	
Aroclor 1260	ND	0.055	EPA 8082A	4-22-13	4-22-13	
Surrogate:	Percent Recovery	Control Limits				
DCB	91	47-120				
Client ID: B13-2						
Laboratory ID:	04-132-28					
Aroclor 1016	ND	0.055	EPA 8082A	4-22-13	4-22-13	
Aroclor 1221	ND	0.055	EPA 8082A	4-22-13	4-22-13	
Aroclor 1232	ND	0.055	EPA 8082A	4-22-13	4-22-13	
Aroclor 1242	ND	0.055	EPA 8082A	4-22-13	4-22-13	
Aroclor 1248	ND	0.055	EPA 8082A	4-22-13	4-22-13	
Aroclor 1254	0.13	0.055	EPA 8082A	4-22-13	4-22-13	
Aroclor 1260	ND	0.055	EPA 8082A	4-22-13	4-22-13	
Surrogate:	Percent Recovery	Control Limits				
DCB	94	47-120				

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**PCBs by EPA 8082A
 QUALITY CONTROL**

Matrix: Soil
 Units: mg/Kg (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
METHOD BLANK						
Laboratory ID:	MB0422S1					
Aroclor 1016	ND	0.050	EPA 8082A	4-22-13	4-22-13	
Aroclor 1221	ND	0.050	EPA 8082A	4-22-13	4-22-13	
Aroclor 1232	ND	0.050	EPA 8082A	4-22-13	4-22-13	
Aroclor 1242	ND	0.050	EPA 8082A	4-22-13	4-22-13	
Aroclor 1248	ND	0.050	EPA 8082A	4-22-13	4-22-13	
Aroclor 1254	ND	0.050	EPA 8082A	4-22-13	4-22-13	
Aroclor 1260	ND	0.050	EPA 8082A	4-22-13	4-22-13	
Surrogate:	Percent Recovery	Control Limits				
DCB	95	47-120				

Analyte	Result		Spike Level		Source	Percent	Recovery	RPD		RPD	Flags
					Result	Recovery	Limits			Limit	
MATRIX SPIKES											
Laboratory ID:	04-118-33										
	MS	MSD	MS	MSD		MS	MSD				
Aroclor 1260	0.356	0.324	0.500	0.500	ND	71	65	42-133	9	15	
Surrogate:											
DCB						81	79	47-120			

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**TOTAL METALS
 EPA 6010C/7471B**

Matrix: Soil
 Units: mg/kg (ppm)

Analyte	Result	PQL	EPA Method	Date Prepared	Date Analyzed	Flags
<hr/>						
Lab ID:	04-132-01					
Client ID:	B-1-2					
<hr/>						
Arsenic	35	11	6010C	4-22-13	4-22-13	
Barium	51	2.7	6010C	4-23-13	4-23-13	
Cadmium	0.60	0.54	6010C	4-23-13	4-23-13	
Chromium	47	0.54	6010C	4-23-13	4-23-13	
Lead	73	5.4	6010C	4-23-13	4-23-13	
Mercury	ND	0.27	7471B	4-22-13	4-22-13	
Selenium	ND	11	6010C	4-23-13	4-23-13	
Silver	ND	1.1	6010C	4-23-13	4-23-13	

Lab ID:	04-132-02					
Client ID:	B-1-6					
<hr/>						
Arsenic	ND	12	6010C	4-22-13	4-22-13	
Barium	33	3.1	6010C	4-23-13	4-23-13	
Cadmium	ND	0.62	6010C	4-23-13	4-23-13	
Chromium	14	0.62	6010C	4-23-13	4-23-13	
Lead	7.7	6.2	6010C	4-23-13	4-23-13	
Mercury	ND	0.31	7471B	4-22-13	4-22-13	
Selenium	ND	12	6010C	4-23-13	4-23-13	
Silver	ND	1.2	6010C	4-23-13	4-23-13	

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**TOTAL METALS
 EPA 6010C/7471B**

Matrix: Soil
 Units: mg/kg (ppm)

Analyte	Result	PQL	EPA Method	Date Prepared	Date Analyzed	Flags
Lab ID:	04-132-03					
Client ID:	B2-2					
Arsenic	320	11	6010C	4-22-13	4-22-13	
Barium	320	2.7	6010C	4-23-13	4-23-13	
Cadmium	1.7	0.53	6010C	4-23-13	4-23-13	
Chromium	1800	5.3	6010C	4-23-13	4-24-13	
Lead	190	5.3	6010C	4-23-13	4-23-13	
Mercury	0.60	0.27	7471B	4-22-13	4-22-13	
Selenium	ND	11	6010C	4-23-13	4-23-13	
Silver	1.6	1.1	6010C	4-23-13	4-23-13	

Lab ID:	04-132-04					
Client ID:	B2-6					
Arsenic	ND	13	6010C	4-22-13	4-22-13	
Barium	36	3.3	6010C	4-23-13	4-23-13	
Cadmium	ND	0.66	6010C	4-23-13	4-23-13	
Chromium	16	0.66	6010C	4-23-13	4-23-13	
Lead	11	6.6	6010C	4-23-13	4-23-13	
Mercury	ND	0.33	7471B	4-22-13	4-22-13	
Selenium	ND	13	6010C	4-23-13	4-23-13	
Silver	ND	1.3	6010C	4-23-13	4-23-13	

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**TOTAL METALS
 EPA 6010C/7471B**

Matrix: Soil
 Units: mg/kg (ppm)

Analyte	Result	PQL	EPA Method	Date Prepared	Date Analyzed	Flags
Lab ID:	04-132-06					
Client ID:	B3-2					
Arsenic	ND	11	6010C	4-22-13	4-22-13	
Barium	56	2.7	6010C	4-23-13	4-23-13	
Cadmium	ND	0.53	6010C	4-23-13	4-23-13	
Chromium	18	0.53	6010C	4-23-13	4-23-13	
Lead	91	5.3	6010C	4-23-13	4-23-13	
Mercury	ND	0.27	7471B	4-22-13	4-22-13	
Selenium	ND	11	6010C	4-23-13	4-23-13	
Silver	ND	1.1	6010C	4-23-13	4-23-13	

Lab ID:	04-132-07					
Client ID:	B3-6					
Arsenic	ND	12	6010C	4-22-13	4-22-13	
Barium	33	3.1	6010C	4-23-13	4-23-13	
Cadmium	ND	0.62	6010C	4-23-13	4-23-13	
Chromium	12	0.62	6010C	4-23-13	4-23-13	
Lead	ND	6.2	6010C	4-23-13	4-23-13	
Mercury	ND	0.31	7471B	4-22-13	4-22-13	
Selenium	ND	12	6010C	4-23-13	4-23-13	
Silver	ND	1.2	6010C	4-23-13	4-23-13	

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**TOTAL METALS
 EPA 6010C/7471B**

Matrix: Soil
 Units: mg/kg (ppm)

Analyte	Result	PQL	EPA Method	Date Prepared	Date Analyzed	Flags
Lab ID:	04-132-08					
Client ID:	B4-2					
Arsenic	ND	11	6010C	4-22-13	4-22-13	
Barium	84	2.7	6010C	4-23-13	4-23-13	
Cadmium	ND	0.54	6010C	4-23-13	4-23-13	
Chromium	240	0.54	6010C	4-23-13	4-23-13	
Lead	56	5.4	6010C	4-23-13	4-23-13	
Mercury	ND	0.27	7471B	4-22-13	4-22-13	
Selenium	ND	11	6010C	4-23-13	4-23-13	
Silver	ND	1.1	6010C	4-23-13	4-23-13	

Lab ID:	04-132-09					
Client ID:	B4-6					
Arsenic	ND	12	6010C	4-22-13	4-22-13	
Barium	31	3.1	6010C	4-23-13	4-23-13	
Cadmium	ND	0.62	6010C	4-23-13	4-23-13	
Chromium	13	0.62	6010C	4-23-13	4-23-13	
Lead	ND	6.2	6010C	4-23-13	4-23-13	
Mercury	ND	0.31	7471B	4-22-13	4-22-13	
Selenium	ND	12	6010C	4-23-13	4-23-13	
Silver	ND	1.2	6010C	4-23-13	4-23-13	

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**TOTAL METALS
 EPA 6010C/7471B**

Matrix: Soil
 Units: mg/kg (ppm)

Analyte	Result	PQL	EPA Method	Date Prepared	Date Analyzed	Flags
Lab ID:	04-132-10					
Client ID:	B5-3					
Arsenic	ND	12	6010C	4-22-13	4-22-13	
Barium	24	3.0	6010C	4-23-13	4-23-13	
Cadmium	ND	0.59	6010C	4-23-13	4-23-13	
Chromium	7.8	0.59	6010C	4-23-13	4-23-13	
Lead	ND	5.9	6010C	4-23-13	4-23-13	
Mercury	ND	0.30	7471B	4-22-13	4-22-13	
Selenium	ND	12	6010C	4-23-13	4-23-13	
Silver	ND	1.2	6010C	4-23-13	4-23-13	

Lab ID:	04-132-11					
Client ID:	B5-6					
Arsenic	ND	15	6010C	4-22-13	4-22-13	
Barium	51	3.7	6010C	4-23-13	4-23-13	
Cadmium	ND	0.74	6010C	4-23-13	4-23-13	
Chromium	13	0.74	6010C	4-23-13	4-23-13	
Lead	ND	7.4	6010C	4-23-13	4-23-13	
Mercury	ND	0.37	7471B	4-22-13	4-22-13	
Selenium	ND	15	6010C	4-23-13	4-23-13	
Silver	ND	1.5	6010C	4-23-13	4-23-13	

Date of Report: April 24, 2013
 Samples Submitted: April 16, 2013
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**TOTAL METALS
 EPA 6010C/7471B**

Matrix: Soil
 Units: mg/kg (ppm)

Analyte	Result	PQL	EPA Method	Date Prepared	Date Analyzed	Flags
Lab ID:	04-132-12					
Client ID:	B6-3					
Arsenic	ND	11	6010C	4-22-13	4-22-13	
Barium	24	2.8	6010C	4-23-13	4-23-13	
Cadmium	1.5	0.57	6010C	4-23-13	4-23-13	
Chromium	8.0	0.57	6010C	4-23-13	4-23-13	
Lead	ND	5.7	6010C	4-23-13	4-23-13	
Mercury	ND	0.28	7471B	4-22-13	4-22-13	
Selenium	ND	11	6010C	4-23-13	4-23-13	
Silver	ND	1.1	6010C	4-23-13	4-23-13	

Lab ID:	04-132-13					
Client ID:	B6-6					
Arsenic	ND	18	6010C	4-22-13	4-22-13	
Barium	70	4.6	6010C	4-23-13	4-23-13	
Cadmium	ND	0.92	6010C	4-23-13	4-23-13	
Chromium	17	0.92	6010C	4-23-13	4-23-13	
Lead	ND	9.2	6010C	4-23-13	4-23-13	
Mercury	ND	0.46	7471B	4-22-13	4-22-13	
Selenium	ND	18	6010C	4-23-13	4-23-13	
Silver	ND	1.8	6010C	4-23-13	4-23-13	

Date of Report: April 24, 2013
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**TOTAL METALS
 EPA 6010C/7471B**

Matrix: Soil
 Units: mg/kg (ppm)

Analyte	Result	PQL	EPA Method	Date Prepared	Date Analyzed	Flags
Lab ID:	04-132-15					
Client ID:	B7-1					
Arsenic	ND	11	6010C	4-22-13	4-22-13	
Barium	120	2.7	6010C	4-23-13	4-23-13	
Cadmium	140	0.55	6010C	4-23-13	4-23-13	
Chromium	97	0.55	6010C	4-23-13	4-23-13	
Lead	2100	5.5	6010C	4-23-13	4-23-13	
Mercury	ND	0.27	7471B	4-22-13	4-22-13	
Selenium	ND	11	6010C	4-23-13	4-23-13	
Silver	8.7	1.1	6010C	4-23-13	4-23-13	

Lab ID:	04-132-16					
Client ID:	B7-8					
Arsenic	ND	18	6010C	4-23-13	4-23-13	
Barium	73	4.6	6010C	4-23-13	4-23-13	
Cadmium	ND	0.92	6010C	4-23-13	4-23-13	
Chromium	18	0.92	6010C	4-23-13	4-23-13	
Lead	ND	9.2	6010C	4-23-13	4-23-13	
Mercury	ND	0.46	7471B	4-22-13	4-22-13	
Selenium	ND	18	6010C	4-23-13	4-23-13	
Silver	ND	1.8	6010C	4-23-13	4-23-13	

Date of Report: April 24, 2013
 Samples Submitted: April 16, 2013
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**TOTAL METALS
 EPA 6010C/7471B**

Matrix: Soil
 Units: mg/kg (ppm)

Analyte	Result	PQL	EPA Method	Date Prepared	Date Analyzed	Flags
<hr/>						
Lab ID:	04-132-17					
Client ID:	B9-4					
<hr/>						
Arsenic	ND	11	6010C	4-23-13	4-23-13	
Barium	31	2.8	6010C	4-23-13	4-23-13	
Cadmium	ND	0.56	6010C	4-23-13	4-23-13	
Chromium	24	0.56	6010C	4-23-13	4-23-13	
Lead	ND	5.6	6010C	4-23-13	4-23-13	
Mercury	ND	0.28	7471B	4-22-13	4-22-13	
Selenium	ND	11	6010C	4-23-13	4-23-13	
Silver	ND	1.1	6010C	4-23-13	4-23-13	

Lab ID:	04-132-18					
Client ID:	B9-9					
<hr/>						
Arsenic	ND	14	6010C	4-23-13	4-23-13	
Barium	36	3.6	6010C	4-23-13	4-23-13	
Cadmium	ND	0.71	6010C	4-23-13	4-23-13	
Chromium	13	0.71	6010C	4-23-13	4-23-13	
Lead	ND	7.1	6010C	4-23-13	4-23-13	
Mercury	ND	0.36	7471B	4-22-13	4-22-13	
Selenium	ND	14	6010C	4-23-13	4-23-13	
Silver	ND	1.4	6010C	4-23-13	4-23-13	

Date of Report: April 24, 2013
 Samples Submitted: April 16, 2013
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 Project: 2012-039

**TOTAL METALS
 EPA 6010C/7471B**

Matrix: Soil
 Units: mg/kg (ppm)

Analyte	Result	PQL	EPA Method	Date Prepared	Date Analyzed	Flags
Lab ID:	04-132-19					
Client ID:	B8-2					
Arsenic	14	11	6010C	4-23-13	4-23-13	
Barium	170	2.8	6010C	4-23-13	4-23-13	
Cadmium	1.3	0.56	6010C	4-23-13	4-23-13	
Chromium	29	0.56	6010C	4-23-13	4-23-13	
Lead	990	5.6	6010C	4-23-13	4-23-13	
Mercury	ND	0.28	7471B	4-22-13	4-22-13	
Selenium	ND	11	6010C	4-23-13	4-23-13	
Silver	ND	1.1	6010C	4-23-13	4-23-13	

Lab ID:	04-132-20					
Client ID:	B8-9					
Arsenic	ND	15	6010C	4-23-13	4-23-13	
Barium	42	3.7	6010C	4-23-13	4-23-13	
Cadmium	ND	0.75	6010C	4-23-13	4-23-13	
Chromium	13	0.75	6010C	4-23-13	4-23-13	
Lead	ND	7.5	6010C	4-23-13	4-23-13	
Mercury	ND	0.37	7471B	4-22-13	4-22-13	
Selenium	ND	15	6010C	4-23-13	4-23-13	
Silver	ND	1.5	6010C	4-23-13	4-23-13	

Date of Report: April 24, 2013
 Samples Submitted: April 16, 2013
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**TOTAL METALS
 EPA 6010C/7471B**

Matrix: Soil
 Units: mg/kg (ppm)

Analyte	Result	PQL	EPA Method	Date Prepared	Date Analyzed	Flags
Lab ID:	04-132-21					
Client ID:	B10-1					
Arsenic	ND	11	6010C	4-23-13	4-23-13	
Barium	110	2.7	6010C	4-23-13	4-23-13	
Cadmium	ND	0.54	6010C	4-23-13	4-23-13	
Chromium	430	5.4	6010C	4-23-13	4-24-13	
Lead	48	5.4	6010C	4-23-13	4-23-13	
Mercury	ND	0.27	7471B	4-22-13	4-22-13	
Selenium	ND	11	6010C	4-23-13	4-23-13	
Silver	ND	1.1	6010C	4-23-13	4-23-13	

Lab ID:	04-132-22					
Client ID:	B10-7					
Arsenic	ND	12	6010C	4-23-13	4-23-13	
Barium	27	3.0	6010C	4-23-13	4-23-13	
Cadmium	ND	0.60	6010C	4-23-13	4-23-13	
Chromium	7.3	0.60	6010C	4-23-13	4-23-13	
Lead	ND	6.0	6010C	4-23-13	4-23-13	
Mercury	ND	0.30	7471B	4-22-13	4-22-13	
Selenium	ND	12	6010C	4-23-13	4-23-13	
Silver	ND	1.2	6010C	4-23-13	4-23-13	

Date of Report: April 24, 2013
 Samples Submitted: April 16, 2013
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**TOTAL METALS
 EPA 6010C/7471B**

Matrix: Soil
 Units: mg/kg (ppm)

Analyte	Result	PQL	EPA Method	Date Prepared	Date Analyzed	Flags
Lab ID:	04-132-24					
Client ID:	B11-1					
Arsenic	ND	11	6010C	4-23-13	4-23-13	
Barium	46	2.6	6010C	4-23-13	4-23-13	
Cadmium	ND	0.53	6010C	4-23-13	4-23-13	
Chromium	92	0.53	6010C	4-23-13	4-23-13	
Lead	100	5.3	6010C	4-23-13	4-23-13	
Mercury	ND	0.26	7471B	4-22-13	4-22-13	
Selenium	ND	11	6010C	4-23-13	4-23-13	
Silver	ND	1.1	6010C	4-23-13	4-23-13	

Lab ID:	04-132-25					
Client ID:	B11-7					
Arsenic	ND	12	6010C	4-23-13	4-23-13	
Barium	28	2.9	6010C	4-23-13	4-23-13	
Cadmium	ND	0.58	6010C	4-23-13	4-23-13	
Chromium	6.4	0.58	6010C	4-23-13	4-23-13	
Lead	ND	5.8	6010C	4-23-13	4-23-13	
Mercury	ND	0.29	7471B	4-22-13	4-22-13	
Selenium	ND	12	6010C	4-23-13	4-23-13	
Silver	ND	1.2	6010C	4-23-13	4-23-13	

Date of Report: April 24, 2013
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**TOTAL METALS
 EPA 6010C/7471B**

Matrix: Soil
 Units: mg/kg (ppm)

Analyte	Result	PQL	EPA Method	Date Prepared	Date Analyzed	Flags
Lab ID:	04-132-26					
Client ID:	B12-1					
Arsenic	17	11	6010C	4-23-13	4-23-13	
Barium	68	2.8	6010C	4-23-13	4-23-13	
Cadmium	1.5	0.55	6010C	4-23-13	4-23-13	
Chromium	36	0.55	6010C	4-23-13	4-23-13	
Lead	210	5.5	6010C	4-23-13	4-23-13	
Mercury	ND	0.28	7471B	4-22-13	4-22-13	
Selenium	ND	11	6010C	4-23-13	4-23-13	
Silver	ND	1.1	6010C	4-23-13	4-23-13	

Lab ID:	04-132-27					
Client ID:	B12-7					
Arsenic	ND	13	6010C	4-23-13	4-23-13	
Barium	32	3.2	6010C	4-23-13	4-23-13	
Cadmium	ND	0.65	6010C	4-23-13	4-23-13	
Chromium	11	0.65	6010C	4-23-13	4-23-13	
Lead	ND	6.5	6010C	4-23-13	4-23-13	
Mercury	ND	0.32	7471B	4-22-13	4-22-13	
Selenium	ND	13	6010C	4-23-13	4-23-13	
Silver	ND	1.3	6010C	4-23-13	4-23-13	

Date of Report: April 24, 2013
 Samples Submitted: April 16, 2013
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**TOTAL METALS
 EPA 6010C/7471B**

Matrix: Soil
 Units: mg/kg (ppm)

Analyte	Result	PQL	EPA Method	Date Prepared	Date Analyzed	Flags
Lab ID:	04-132-28					
Client ID:	B13-2					
Arsenic	50	11	6010C	4-23-13	4-23-13	
Barium	74	2.7	6010C	4-23-13	4-23-13	
Cadmium	ND	0.55	6010C	4-23-13	4-23-13	
Chromium	22	0.55	6010C	4-23-13	4-23-13	
Lead	160	5.5	6010C	4-23-13	4-23-13	
Mercury	ND	0.27	7471B	4-22-13	4-22-13	
Selenium	ND	11	6010C	4-23-13	4-23-13	
Silver	ND	1.1	6010C	4-23-13	4-23-13	

Lab ID:	04-132-29					
Client ID:	B13-7					
Arsenic	ND	12	6010C	4-23-13	4-23-13	
Barium	36	3.0	6010C	4-23-13	4-23-13	
Cadmium	ND	0.61	6010C	4-23-13	4-23-13	
Chromium	7.2	0.61	6010C	4-23-13	4-23-13	
Lead	ND	6.1	6010C	4-23-13	4-23-13	
Mercury	ND	0.30	7471B	4-22-13	4-22-13	
Selenium	ND	12	6010C	4-23-13	4-23-13	
Silver	ND	1.2	6010C	4-23-13	4-23-13	

Date of Report: April 24, 2013
Samples Submitted: April 16, 2013
Laboratory Reference: 1304-132
Project: 2012-039

**TOTAL METALS
EPA 6010C/7471B
METHOD BLANK QUALITY CONTROL**

Date Extracted: 4-22&23-13

Date Analyzed: 4-22&23-13

Matrix: Soil

Units: mg/kg (ppm)

Lab ID: MB0422S1,MB0422SM1&MB0423SM2

Analyte	Method	Result	PQL
Arsenic	6010C	ND	10
Barium	6010C	ND	2.5
Cadmium	6010C	ND	0.50
Chromium	6010C	ND	0.50
Lead	6010C	ND	5.0
Mercury	7471B	ND	0.25
Selenium	6010C	ND	10
Silver	6010C	ND	1.0

Date of Report: April 24, 2013
Samples Submitted: April 16, 2013
Laboratory Reference: 1304-132
Project: 2012-039

**TOTAL METALS
EPA 6010C/7471B
METHOD BLANK QUALITY CONTROL**

Date Extracted: 4-22&23-13

Date Analyzed: 4-22&23-13

Matrix: Soil

Units: mg/kg (ppm)

Lab ID: MB0422S2&MB0423SM3

Analyte	Method	Result	PQL
Arsenic	6010C	ND	10
Barium	6010C	ND	2.5
Cadmium	6010C	ND	0.50
Chromium	6010C	ND	0.50
Lead	6010C	ND	5.0
Mercury	7471B	ND	0.25
Selenium	6010C	ND	10
Silver	6010C	ND	1.0

Date of Report: April 24, 2013
 Samples Submitted: April 16, 2013
 Laboratory Reference: 1304-132
 Project: 2012-039

**TOTAL METALS
 EPA 6010C/7471B
 DUPLICATE QUALITY CONTROL**

Date Extracted: 4-22&23-13
 Date Analyzed: 4-22&23-13

Matrix: Soil
 Units: mg/kg (ppm)

Lab ID: 04-132-01

Analyte	Sample Result	Duplicate Result	RPD	PQL	Flags
Arsenic	32.7	34.3	5	10	
Barium	47.7	48.3	1	2.5	
Cadmium	0.557	ND	NA	0.50	
Chromium	44.0	47.0	7	0.50	
Lead	67.8	64.1	6	5.0	
Mercury	ND	ND	NA	0.25	
Selenium	ND	ND	NA	10	
Silver	ND	ND	NA	1.0	

Date of Report: April 24, 2013
 Samples Submitted: April 16, 2013
 Laboratory Reference: 1304-132
 Project: 2012-039

**TOTAL METALS
 EPA 6010C/7471B
 DUPLICATE QUALITY CONTROL**

Date Extracted: 4-22&23-13
 Date Analyzed: 4-22&23-13

Matrix: Soil
 Units: mg/kg (ppm)

Lab ID: 04-132-26

Analyte	Sample Result	Duplicate Result	RPD	PQL	Flags
Arsenic	15.3	14.9	2	10	
Barium	61.4	61.6	0	2.5	
Cadmium	1.33	1.42	7	0.50	
Chromium	32.9	32.2	2	0.50	
Lead	187	188	1	5.0	
Mercury	ND	0.252	NA	0.25	
Selenium	ND	ND	NA	10	
Silver	ND	ND	NA	1.0	

Date of Report: April 24, 2013
 Samples Submitted: April 16, 2013
 Laboratory Reference: 1304-132
 Project: 2012-039

**TOTAL METALS
 EPA 6010C/7471B
 MS/MSD QUALITY CONTROL**

Date Extracted: 4-22&23-13

Date Analyzed: 4-22&23-13

Matrix: Soil

Units: mg/kg (ppm)

Lab ID: 04-132-01

Analyte	Spike Level	MS	Percent Recovery	MSD	Percent Recovery	RPD	Flags
Arsenic	100	113	80	114	81	1	
Barium	100	132	84	150	103	13	
Cadmium	50.0	43.8	86	46.6	92	6	
Chromium	100	140	96	142	98	1	
Lead	250	267	80	302	94	12	
Mercury	0.500	0.461	92	0.499	100	8	
Selenium	100	93.2	93	91.4	91	2	
Silver	25.0	20.9	84	21.5	86	3	

Date of Report: April 24, 2013
 Samples Submitted: April 16, 2013
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 Project: 2012-039

**TOTAL METALS
 EPA 6010C/7471B
 MS/MSD QUALITY CONTROL**

Date Extracted: 4-22&23-13

Date Analyzed: 4-22&23-13

Matrix: Soil

Units: mg/kg (ppm)

Lab ID: 04-132-26

Analyte	Spike Level	MS	Percent Recovery	MSD	Percent Recovery	RPD	Flags
Arsenic	100	108	93	104	89	4	
Barium	100	149	88	165	104	10	
Cadmium	50.0	44.9	87	45.4	88	1	
Chromium	100	116	83	122	90	6	
Lead	250	427	96	438	101	3	
Mercury	0.500	0.465	93	0.446	89	4	
Selenium	100	90.8	91	92.5	93	2	
Silver	25.0	22.0	88	23.7	95	7	

Date of Report: April 24, 2013
 Samples Submitted: April 16, 2013
 Laboratory Reference: 1304-132
 Project: 2012-039

DISSOLVED METALS
EPA 200.8/7470A

Matrix: Water
 Units: ug/L (ppb)

Analyte	Result	PQL	EPA Method	Date Prepared	Date Analyzed	Flags
<hr/>						
Lab ID:	04-132-05					
Client ID:	B2-W					
Arsenic	3.8	3.0	200.8		4-17-13	
Barium	ND	25	200.8		4-17-13	
Cadmium	ND	4.0	200.8		4-17-13	
Chromium	ND	10	200.8		4-17-13	
Lead	ND	1.0	200.8		4-17-13	
Mercury	ND	0.50	7470A		4-18-13	
Selenium	ND	5.0	200.8		4-17-13	
Silver	ND	10	200.8		4-23-13	

Lab ID:	04-132-14					
Client ID:	B6-W					
Arsenic	ND	3.0	200.8		4-17-13	
Barium	ND	25	200.8		4-17-13	
Cadmium	ND	4.0	200.8		4-17-13	
Chromium	ND	10	200.8		4-17-13	
Lead	ND	1.0	200.8		4-17-13	
Mercury	ND	0.50	7470A		4-18-13	
Selenium	ND	5.0	200.8		4-17-13	
Silver	ND	10	200.8		4-23-13	

Date of Report: April 24, 2013
 Samples Submitted: April 16, 2013
 Laboratory Reference: 1304-132
 Project: 2012-039

DISSOLVED METALS
EPA 200.8/7470A

Matrix: Water
 Units: ug/L (ppb)

Analyte	Result	PQL	EPA Method	Date Prepared	Date Analyzed	Flags
Lab ID:	04-132-23					
Client ID:	B10-W					
Arsenic	ND	3.0	200.8		4-17-13	
Barium	ND	25	200.8		4-17-13	
Cadmium	ND	4.0	200.8		4-17-13	
Chromium	ND	10	200.8		4-17-13	
Lead	ND	1.0	200.8		4-17-13	
Mercury	ND	0.50	7470A		4-18-13	
Selenium	ND	5.0	200.8		4-17-13	
Silver	ND	10	200.8		4-23-13	

Lab ID:	04-132-30					
Client ID:	B13-W					
Arsenic	ND	3.0	200.8		4-17-13	
Barium	ND	25	200.8		4-17-13	
Cadmium	ND	4.0	200.8		4-17-13	
Chromium	ND	10	200.8		4-17-13	
Lead	ND	1.0	200.8		4-17-13	
Mercury	ND	0.50	7470A		4-18-13	
Selenium	ND	5.0	200.8		4-17-13	
Silver	ND	10	200.8		4-23-13	

Date of Report: April 24, 2013
Samples Submitted: April 16, 2013
Laboratory Reference: 1304-132
Project: 2012-039

**DISSOLVED METALS
EPA 200.8/7470A
METHOD BLANK QUALITY CONTROL**

Date Analyzed: 4-17,18&23-13

Matrix: Water
Units: ug/L (ppb)

Lab ID: MB0417D1,MB0418D1&MB0423D2

Analyte	Method	Result	PQL
Arsenic	200.8	ND	3.0
Barium	200.8	ND	25
Cadmium	200.8	ND	4.0
Chromium	200.8	ND	10
Lead	200.8	ND	1.0
Mercury	7470A	ND	0.50
Selenium	200.8	ND	5.0
Silver	200.8	ND	10

Date of Report: April 24, 2013
 Samples Submitted: April 16, 2013
 Laboratory Reference: 1304-132
 Project: 2012-039

**DISSOLVED METALS
 EPA 200.8/7470A
 DUPLICATE QUALITY CONTROL**

Date Analyzed: 4-17,18&23-13

Matrix: Water
 Units: ug/L (ppb)

Lab ID: 04-132-05

Analyte	Sample Result	Duplicate Result	RPD	PQL	Flags
Arsenic	3.79	3.88	2	3.0	
Barium	ND	ND	NA	25	
Cadmium	ND	ND	NA	4.0	
Chromium	ND	ND	NA	10	
Lead	ND	ND	NA	1.0	
Mercury	ND	ND	NA	0.50	
Selenium	ND	ND	NA	5.0	
Silver	ND	ND	NA	10	

Date of Report: April 24, 2013
 Samples Submitted: April 16, 2013
 Laboratory Reference: 1304-132
 Project: 2012-039

**DISSOLVED METALS
 EPA 200.8/7470A
 MS/MSD QUALITY CONTROL**

Date Analyzed: 4-17,18&23-13

Matrix: Water
 Units: ug/L (ppb)

Lab ID: 04-132-05

Analyte	Spike Level	MS	Percent Recovery	MSD	Percent Recovery	RPD	Flags
Arsenic	200	211	104	216	106	3	
Barium	200	205	103	207	103	1	
Cadmium	200	197	99	200	100	1	
Chromium	200	184	92	189	95	3	
Lead	200	191	96	195	98	2	
Mercury	12.5	12.5	100	12.4	99	1	
Selenium	200	220	110	225	112	2	
Silver	200	180	90	182	91	1	

Date of Report: April 24, 2013
 Samples Submitted: April 16, 2013
 Laboratory Reference: 1304-132
 Project: 2012-039

% MOISTURE

Date Analyzed: 4-18-13

Client ID	Lab ID	% Moisture
B-1-2	04-132-01	7
B-1-6	04-132-02	20
B2-2	04-132-03	6
B2-6	04-132-04	24
B3-2	04-132-06	6
B3-6	04-132-07	19
B4-2	04-132-08	7
B4-6	04-132-09	19
B5-3	04-132-10	15
B5-6	04-132-11	33
B6-3	04-132-12	12
B6-6	04-132-13	46
B7-1	04-132-15	9
B7-8	04-132-16	45
B9-4	04-132-17	11
B9-9	04-132-18	30
B8-2	04-132-19	11
B8-9	04-132-20	33
B10-1	04-132-21	8
B10-7	04-132-22	17
B11-1	04-132-24	5
B11-7	04-132-25	13
B12-1	04-132-26	10
B12-7	04-132-27	23
B13-2	04-132-28	9
B13-7	04-132-29	18



Data Qualifiers and Abbreviations

- A - Due to a high sample concentration, the amount spiked is insufficient for meaningful MS/MSD recovery data.
- B - The analyte indicated was also found in the blank sample.
- C - The duplicate RPD is outside control limits due to high result variability when analyte concentrations are within five times the quantitation limit.
- E - The value reported exceeds the quantitation range and is an estimate.
- F - Surrogate recovery data is not available due to the high concentration of coeluting target compounds.
- H - The analyte indicated is a common laboratory solvent and may have been introduced during sample preparation, and be impacting the sample result.
- I - Compound recovery is outside of the control limits.
- J - The value reported was below the practical quantitation limit. The value is an estimate.
- K - Sample duplicate RPD is outside control limits due to sample inhomogeneity. The sample was re-extracted and re-analyzed with similar results.
- L - The RPD is outside of the control limits.
- M - Hydrocarbons in the gasoline range are impacting the diesel range result.
- M1 - Hydrocarbons in the gasoline range (toluene-naphthalene) are present in the sample.
- N - Hydrocarbons in the lube oil range are impacting the diesel range result.
- N1 - Hydrocarbons in diesel range are impacting lube oil range results.
- O - Hydrocarbons indicative of heavier fuels are present in the sample and are impacting the gasoline result.
- P - The RPD of the detected concentrations between the two columns is greater than 40.
- Q - Surrogate recovery is outside of the control limits.
- S - Surrogate recovery data is not available due to the necessary dilution of the sample.
- T - The sample chromatogram is not similar to a typical _____.
- U - The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
- U1 - The practical quantitation limit is elevated due to interferences present in the sample.
- V - Matrix Spike/Matrix Spike Duplicate recoveries are outside control limits due to matrix effects.
- W - Matrix Spike/Matrix Spike Duplicate RPD are outside control limits due to matrix effects.
- X - Sample extract treated with a mercury cleanup procedure.
- Y - The calibration verification for this analyte exceeded the 20% drift specified in method 8260C, and therefore the reported result should be considered an estimate. The overall performance of the calibration verification standard met the acceptance criteria of the method.
- Z -
- ND - Not Detected at PQL
- PQL - Practical Quantitation Limit
- RPD - Relative Percent Difference



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Chain of Custody

Page 1 of 2[illegible]



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Page 3 of 3

Turnaround Request
(in working days)

Laboratory Number:

04-132

(Check One)

☐ Same Day ☐ 1 Day

☐ 2 Days ☐ 3 Days

☒ Standard (7 Days)
(TPH analysis 5 Days)

☐ _____
(other)

Company: Atmos

Project Number: 2012-039

Project Name: SDOS - 8. Poursans BT

Project Manager: Atmos

Sampled by: Atmos

21	B10-1	4/10/13	850	S	1	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	X
22	B10-7	4/10/13	855	L	1	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	X
23	B10-2		920	L	2	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	X
24	B11-1		940	S	1	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	X
25	B11-7		945	L	1	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	X
26	B12-1		1010	L	1	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	X
27	B12-7		1015	L	1	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	X
28	B13-2		1035	L	1	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	X
29	B13-7		1040	L	1	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	X
30	B13-2		1100	L	3	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	X

Signature: Atmos Company: Atmos Date: 4/10/13 Time: 1255 Comments/Special Instructions: Chromatograms with final report

Relinquished: Atmos Date: 4-16-13 Time: 1255

Received: Atmos

Relinquished: Atmos

Received: Atmos

Relinquished: Atmos

Received: Atmos

Reviewed/Date: Atmos



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May 3, 2013

Vance Atkins
HWA GeoSciences, Inc.
21312 30th Drive SE, Suite 110
Bothell, WA 98021

Re: Analytical Data for Project 2012-039
Laboratory Reference No. 1304-132B

Dear Vance:

Enclosed are the analytical results and associated quality control data for samples submitted on April 16, 2013.

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

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

Sincerely,

A handwritten signature in black ink, appearing to read "DB", followed by a long horizontal flourish.

David Baumeister
Project Manager

Enclosures

Date of Report: May 3, 2013
Samples Submitted: April 16, 2013
Laboratory Reference: 1304-132B
Project: 2012-039

Case Narrative

Samples were collected on April 15 and 16, 2013 and received by the laboratory on April 16, 2013. They were maintained at the laboratory at a temperature of 2°C to 6°C.

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

Date of Report: May 3, 2013
 Samples Submitted: April 16, 2013
 Laboratory Reference: 1304-132B
 Project: 2012-039

cPAHs by EPA 8270D/SIM

Matrix: Soil
 Units: mg/Kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	B-1-6					
Laboratory ID:	04-132-02					
Benzo[a]anthracene	ND	0.0083	EPA 8270D/SIM	4-25-13	4-26-13	
Chrysene	ND	0.0083	EPA 8270D/SIM	4-25-13	4-26-13	
Benzo[b]fluoranthene	ND	0.0083	EPA 8270D/SIM	4-25-13	4-26-13	
Benzo(j,k)fluoranthene	ND	0.0083	EPA 8270D/SIM	4-25-13	4-26-13	
Benzo[a]pyrene	ND	0.0083	EPA 8270D/SIM	4-25-13	4-26-13	
Indeno(1,2,3-c,d)pyrene	ND	0.0083	EPA 8270D/SIM	4-25-13	4-26-13	
Dibenz[a,h]anthracene	ND	0.0083	EPA 8270D/SIM	4-25-13	4-26-13	
<i>Surrogate:</i>	<i>Percent Recovery</i>	<i>Control Limits</i>				
2-Fluorobiphenyl	61	43 - 116				
Pyrene-d10	51	33 - 124				
Terphenyl-d14	50	38 - 125				

Date of Report: May 3, 2013
 Samples Submitted: April 16, 2013
 Laboratory Reference: 1304-132B
 Project: 2012-039

**cPAHs by EPA 8270D/SIM
 METHOD BLANK QUALITY CONTROL**

Matrix: Soil
 Units: mg/Kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Laboratory ID: MB0425S1						
Benzo[a]anthracene	ND	0.0067	EPA 8270D/SIM	4-25-13	4-25-13	
Chrysene	ND	0.0067	EPA 8270D/SIM	4-25-13	4-25-13	
Benzo[b]fluoranthene	ND	0.0067	EPA 8270D/SIM	4-25-13	4-25-13	
Benzo[j,k]fluoranthene	ND	0.0067	EPA 8270D/SIM	4-25-13	4-25-13	
Benzo[a]pyrene	ND	0.0067	EPA 8270D/SIM	4-25-13	4-25-13	
Indeno(1,2,3-c,d)pyrene	ND	0.0067	EPA 8270D/SIM	4-25-13	4-25-13	
Dibenz[a,h]anthracene	ND	0.0067	EPA 8270D/SIM	4-25-13	4-25-13	
<i>Surrogate:</i>	<i>Percent Recovery</i>	<i>Control Limits</i>				
<i>2-Fluorobiphenyl</i>	<i>85</i>	<i>43 - 116</i>				
<i>Pyrene-d10</i>	<i>90</i>	<i>33 - 124</i>				
<i>Terphenyl-d14</i>	<i>91</i>	<i>38 - 125</i>				

Date of Report: May 3, 2013
 Samples Submitted: April 16, 2013
 Laboratory Reference: 1304-132B
 Project: 2012-039

cPAHs by EPA 8270D/SIM
SB/SBD QUALITY CONTROL

Matrix: Soil
 Units: mg/Kg

Analyte	Result		Spike Level		Percent Recovery		Recovery Limits	RPD	RPD Limit	Flags
SPIKE BLANKS										
Laboratory ID:	SB0425S1									
	SB	SBD	SB	SBD	SB	SBD				
Benzo[a]anthracene	0.0934	0.0935	0.0833	0.0833	112	112	58 - 115	0	13	
Chrysene	0.0724	0.0710	0.0833	0.0833	87	85	64 - 114	2	11	
Benzo[b]fluoranthene	0.0816	0.0799	0.0833	0.0833	98	96	52 - 125	2	19	
Benzo(j,k)fluoranthene	0.0580	0.0554	0.0833	0.0833	70	67	50 - 126	5	22	
Benzo[a]pyrene	0.0742	0.0717	0.0833	0.0833	89	86	43 - 123	3	16	
Indeno(1,2,3-c,d)pyrene	0.0666	0.0768	0.0833	0.0833	80	92	55 - 118	14	16	
Dibenz[a,h]anthracene	0.0709	0.0787	0.0833	0.0833	85	94	57 - 120	10	15	
Surrogate:										
2-Fluorobiphenyl					105	93	43 - 116			
Pyrene-d10					91	88	33 - 124			
Terphenyl-d14					91	86	38 - 125			

Date of Report: May 3, 2013
 Samples Submitted: April 16, 2013
 Laboratory Reference: 1304-132B
 Project: 2012-039

cPAHs by EPA 8270D/SIM

Matrix: Soil
 Units: mg/Kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	B13-7					
Laboratory ID:	04-132-29					
Benzo[a]anthracene	ND	0.0081	EPA 8270D/SIM	4-29-13	4-29-13	
Chrysene	ND	0.0081	EPA 8270D/SIM	4-29-13	4-29-13	
Benzo[b]fluoranthene	ND	0.0081	EPA 8270D/SIM	4-29-13	4-29-13	
Benzo(j,k)fluoranthene	ND	0.0081	EPA 8270D/SIM	4-29-13	4-29-13	
Benzo[a]pyrene	ND	0.0081	EPA 8270D/SIM	4-29-13	4-29-13	
Indeno(1,2,3-c,d)pyrene	ND	0.0081	EPA 8270D/SIM	4-29-13	4-29-13	
Dibenz[a,h]anthracene	ND	0.0081	EPA 8270D/SIM	4-29-13	4-29-13	
<i>Surrogate:</i>	<i>Percent Recovery</i>	<i>Control Limits</i>				
2-Fluorobiphenyl	67	43 - 116				
Pyrene-d10	66	33 - 124				
Terphenyl-d14	62	38 - 125				

Date of Report: May 3, 2013
 Samples Submitted: April 16, 2013
 Laboratory Reference: 1304-132B
 Project: 2012-039

**cPAHs by EPA 8270D/SIM
 METHOD BLANK QUALITY CONTROL**

Matrix: Soil
 Units: mg/Kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Laboratory ID: MB0429S1						
Benzo[a]anthracene	ND	0.0067	EPA 8270D/SIM	4-29-13	4-29-13	
Chrysene	ND	0.0067	EPA 8270D/SIM	4-29-13	4-29-13	
Benzo[b]fluoranthene	ND	0.0067	EPA 8270D/SIM	4-29-13	4-29-13	
Benzo[j,k]fluoranthene	ND	0.0067	EPA 8270D/SIM	4-29-13	4-29-13	
Benzo[a]pyrene	ND	0.0067	EPA 8270D/SIM	4-29-13	4-29-13	
Indeno(1,2,3-c,d)pyrene	ND	0.0067	EPA 8270D/SIM	4-29-13	4-29-13	
Dibenz[a,h]anthracene	ND	0.0067	EPA 8270D/SIM	4-29-13	4-29-13	
<i>Surrogate:</i>	<i>Percent Recovery</i>	<i>Control Limits</i>				
<i>2-Fluorobiphenyl</i>	<i>98</i>	<i>43 - 116</i>				
<i>Pyrene-d10</i>	<i>95</i>	<i>33 - 124</i>				
<i>Terphenyl-d14</i>	<i>91</i>	<i>38 - 125</i>				

Date of Report: May 3, 2013
 Samples Submitted: April 16, 2013
 Laboratory Reference: 1304-132B
 Project: 2012-039

**cPAHs by EPA 8270D/SIM
 MS/MSD QUALITY CONTROL**

Matrix: Soil
 Units: mg/Kg

Analyte	Result		Spike Level		Source Result	Percent Recovery	Recovery Limits	RPD	RPD Limit	Flags
MATRIX SPIKES										
Laboratory ID:	04-132-29									
	MS	MSD	MS	MSD		MS	MSD			
Benzo[a]anthracene	0.0715	0.0732	0.0833	0.0833	ND	86	88	33 - 126	2	26
Chrysene	0.0600	0.0631	0.0833	0.0833	ND	72	76	35 - 123	5	25
Benzo[b]fluoranthene	0.0775	0.0696	0.0833	0.0833	ND	93	84	30 - 125	11	28
Benzo(j,k)fluoranthene	0.0561	0.0519	0.0833	0.0833	ND	67	62	31 - 122	8	30
Benzo[a]pyrene	0.0613	0.0643	0.0833	0.0833	ND	74	77	29 - 125	5	28
Indeno(1,2,3-c,d)pyrene	0.0758	0.0675	0.0833	0.0833	ND	91	81	28 - 125	12	27
Dibenz[a,h]anthracene	0.0791	0.0701	0.0833	0.0833	ND	95	84	32 - 124	12	27
Surrogate:										
2-Fluorobiphenyl						77	80	43 - 116		
Pyrene-d10						72	74	33 - 124		
Terphenyl-d14						69	72	38 - 125		

Date of Report: May 3, 2013
 Samples Submitted: April 16, 2013
 Laboratory Reference: 1304-132B
 Project: 2012-039

**TCLP METALS
 EPA 1311/6010C**

Matrix: TCLP Extract
 Units: mg/L (ppm)

Analyte	Result	PQL	EPA Method	Date Prepared	Date Analyzed	Flags
<hr/>						
Lab ID:	04-132-03					
Client ID:	B2-2					
<hr/>						
Arsenic	ND	0.40	6010C	4-29-13	4-29-13	
Chromium	0.078	0.020	6010C	4-29-13	4-29-13	
Lead	ND	0.20	6010C	4-29-13	4-29-13	
<hr/>						
Lab ID:	04-132-15					
Client ID:	B7-1					
<hr/>						
Lead	25	0.20	6010C	4-29-13	4-29-13	
<hr/>						
Lab ID:	04-132-19					
Client ID:	B8-2					
<hr/>						
Lead	5.8	0.20	6010C	4-29-13	4-29-13	
<hr/>						
Lab ID:	04-132-21					
Client ID:	B10-1					
<hr/>						
Chromium	0.024	0.020	6010C	4-29-13	4-29-13	
<hr/>						

Date of Report: May 3, 2013
Samples Submitted: April 16, 2013
Laboratory Reference: 1304-132B
Project: 2012-039

**TCLP METALS
EPA 1311/6010C
METHOD BLANK QUALITY CONTROL**

Date Prepared: 4-25-13
Date Extracted: 4-29-13
Date Analyzed: 4-29-13

Matrix: TCLP Extract
Units: mg/L (ppm)

Lab ID: MB0429T1

Analyte	Method	Result	PQL
Arsenic	6010C	ND	0.40
Chromium	6010C	ND	0.020
Lead	6010C	ND	0.20

Date of Report: May 3, 2013
Samples Submitted: April 16, 2013
Laboratory Reference: 1304-132B
Project: 2012-039

**TCLP METALS
EPA 1311/6010C
DUPLICATE QUALITY CONTROL**

Date Prepared: 4-25-13
Date Extracted: 4-29-13
Date Analyzed: 4-29-13

Matrix: TCLP Extract
Units: mg/L (ppm)

Lab ID: 04-132-03

Analyte	Sample Result	Duplicate Result	RPD	PQL	Flags
Arsenic	ND	ND	NA	0.40	
Chromium	0.0784	0.0765	3	0.020	
Lead	ND	ND	NA	0.20	

Date of Report: May 3, 2013
 Samples Submitted: April 16, 2013
 Laboratory Reference: 1304-132B
 Project: 2012-039

**TCLP METALS
 EPA 1311/6010C
 MS/MSD QUALITY CONTROL**

Date Prepared: 4-25-13

Date Extracted: 4-29-13

Date Analyzed: 4-29-13

Matrix: TCLP Extract

Units: mg/L (ppm)

Lab ID: 04-132-03

Analyte	Spike Level	MS	Percent Recovery	MSD	Percent Recovery	RPD	Flags
Arsenic	4.00	3.80	95	3.83	96	1	
Chromium	4.00	3.83	94	3.87	95	1	
Lead	10.0	9.41	94	9.55	95	2	

Date of Report: May 3, 2013
 Samples Submitted: April 16, 2013
 Laboratory Reference: 1304-132B
 Project: 2012-039

**TCLP METALS
 EPA 1311/6010C**

Matrix: TCLP Extract
 Units: mg/L (ppm)

Analyte	Result	PQL	EPA Method	Date Prepared	Date Analyzed	Flags
Lab ID:	04-132-08					
Client ID:	B4-2					
Chromium	0.049	0.020	6010C	5-2-13	5-2-13	
Lab ID:	04-132-24					
Client ID:	B11-1					
Lead	ND	0.20	6010C	5-2-13	5-2-13	
Lab ID:	04-132-26					
Client ID:	B12-1					
Lead	0.36	0.20	6010C	5-2-13	5-2-13	
Lab ID:	04-132-28					
Client ID:	B13-2					
Lead	ND	0.20	6010C	5-2-13	5-2-13	

Date of Report: May 3, 2013
Samples Submitted: April 16, 2013
Laboratory Reference: 1304-132B
Project: 2012-039

**TCLP METALS
EPA 1311/6010C
METHOD BLANK QUALITY CONTROL**

Date Prepared: 5-1-13
Date Extracted: 5-2-13
Date Analyzed: 5-2-13

Matrix: TCLP Extract
Units: mg/L (ppm)

Lab ID: MB0502T1

Analyte	Method	Result	PQL
Chromium	6010C	ND	0.020
Lead	6010C	ND	0.20

Date of Report: May 3, 2013
Samples Submitted: April 16, 2013
Laboratory Reference: 1304-132B
Project: 2012-039

**TCLP METALS
EPA 1311/6010C
DUPLICATE QUALITY CONTROL**

Date Prepared: 5-1-13
Date Extracted: 5-2-13
Date Analyzed: 5-2-13

Matrix: TCLP Extract
Units: mg/L (ppm)

Lab ID: 04-132-08

Analyte	Sample Result	Duplicate Result	RPD	PQL	Flags
Chromium	0.0489	0.0389	23	0.020	C
Lead	ND	ND	NA	0.20	

Date of Report: May 3, 2013
Samples Submitted: April 16, 2013
Laboratory Reference: 1304-132B
Project: 2012-039

**TCLP METALS
EPA 1311/6010C
MS/MSD QUALITY CONTROL**

Date Prepared: 5-1-13

Date Extracted: 5-2-13

Date Analyzed: 5-2-13

Matrix: TCLP Extract

Units: mg/L (ppm)

Lab ID: 04-132-08

Analyte	Spike Level	MS	Percent Recovery	MSD	Percent Recovery	RPD	Flags
Chromium	4.00	3.77	93	3.78	93	0	
Lead	10.0	9.51	95	9.55	95	0	



Data Qualifiers and Abbreviations

- A - Due to a high sample concentration, the amount spiked is insufficient for meaningful MS/MSD recovery data.
- B - The analyte indicated was also found in the blank sample.
- C - The duplicate RPD is outside control limits due to high result variability when analyte concentrations are within five times the quantitation limit.
- E - The value reported exceeds the quantitation range and is an estimate.
- F - Surrogate recovery data is not available due to the high concentration of coeluting target compounds.
- H - The analyte indicated is a common laboratory solvent and may have been introduced during sample preparation, and be impacting the sample result.
- I - Compound recovery is outside of the control limits.
- J - The value reported was below the practical quantitation limit. The value is an estimate.
- K - Sample duplicate RPD is outside control limits due to sample inhomogeneity. The sample was re-extracted and re-analyzed with similar results.
- L - The RPD is outside of the control limits.
- M - Hydrocarbons in the gasoline range are impacting the diesel range result.
- M1 - Hydrocarbons in the gasoline range (toluene-naphthalene) are present in the sample.
- N - Hydrocarbons in the lube oil range are impacting the diesel range result.
- N1 - Hydrocarbons in diesel range are impacting lube oil range results.
- O - Hydrocarbons indicative of heavier fuels are present in the sample and are impacting the gasoline result.
- P - The RPD of the detected concentrations between the two columns is greater than 40.
- Q - Surrogate recovery is outside of the control limits.
- S - Surrogate recovery data is not available due to the necessary dilution of the sample.
- T - The sample chromatogram is not similar to a typical _____.
- U - The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
- U1 - The practical quantitation limit is elevated due to interferences present in the sample.
- V - Matrix Spike/Matrix Spike Duplicate recoveries are outside control limits due to matrix effects.
- W - Matrix Spike/Matrix Spike Duplicate RPD are outside control limits due to matrix effects.
- X - Sample extract treated with a mercury cleanup procedure.
- Y - The calibration verification for this analyte exceeded the 20% drift specified in method 8260C, and therefore the reported result should be considered an estimate. The overall performance of the calibration verification standard met the acceptance criteria of the method.
- Z -
- ND - Not Detected at PQL
- PQL - Practical Quantitation Limit
- RPD - Relative Percent Difference

Chain of Custody

Company: Alva			Turnaround Request (in working days)		Laboratory Number: 04-132																					
Project Number: 2012-039			<input type="checkbox"/> Same Day <input type="checkbox"/> 1 Day																							
Project Name: SDOT S. Portano Ave			<input type="checkbox"/> 2 Days <input type="checkbox"/> 3 Days																							
Project Manager: Arvus			<input checked="" type="checkbox"/> Standard (7 Days) (TPH analysis 5 Days)																							
Sampled by: Arvus			<input type="checkbox"/> (other)																							
Lab ID	Sample Identification	Date Sampled	Time Sampled	Matrix	Number of Containers																					
1	B3-1-2	4/15/13	830	S	1	NWTPH-HCID	NWTPH-Gx/BTEX	NWTPH-Gx	NWTPH-Dx	Volatiles 8260C	Halogenated Volatiles 8260C	Semivolatiles 8270D/SIM (with low-level PAHs)	PAHs 8270D/SIM (low-level)	PCBs 8082A	Organochlorine Pesticides 8081B	Organophosphorus Pesticides 8270D/SIM	Chlorinated Acid Herbicides 8151A	Total RCRA Metals/ MTCA Metals (circle one)	TCLP Metals	HEM (oil and grease) 1664A	Dissolved Heavy Metals	TCLP As	TCLP Cr	TCLP Pb	% Moisture	
2	B3-1-6		840	S		/	/	/	/	/	/	X	/	/	/	/	/	/	/	/	/	/	/	/	/	X
3	B2-2		940	L		/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	X	X	X	X
4	B2-6		945	L		/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	X	X	X	X
5	B2-W		1015	W	3	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	X				X
6	B3-2		1030	S	1	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	X			X
7	B3-6		1040			/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	X			X
8	B1-2		1100			/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	X			X
9	B4-6		1105			/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	X			X
10	B5-3		1130			/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	X			X
Signature		Company		Date	Time	Comments/Special Instructions																				
Relinquished		Alva		4/16/13	1255	X Added 4/24/13 .DB (STA)																				
Received		Onsite		4-16-13	1255	O Added 4/25/13 DB (STA)																				
Relinquished																										
Received																										
Relinquished																										
Received																										
Reviewed/Date		Reviewed/Date		Reviewed/Date		Chromatograms with final report <input type="checkbox"/>																				



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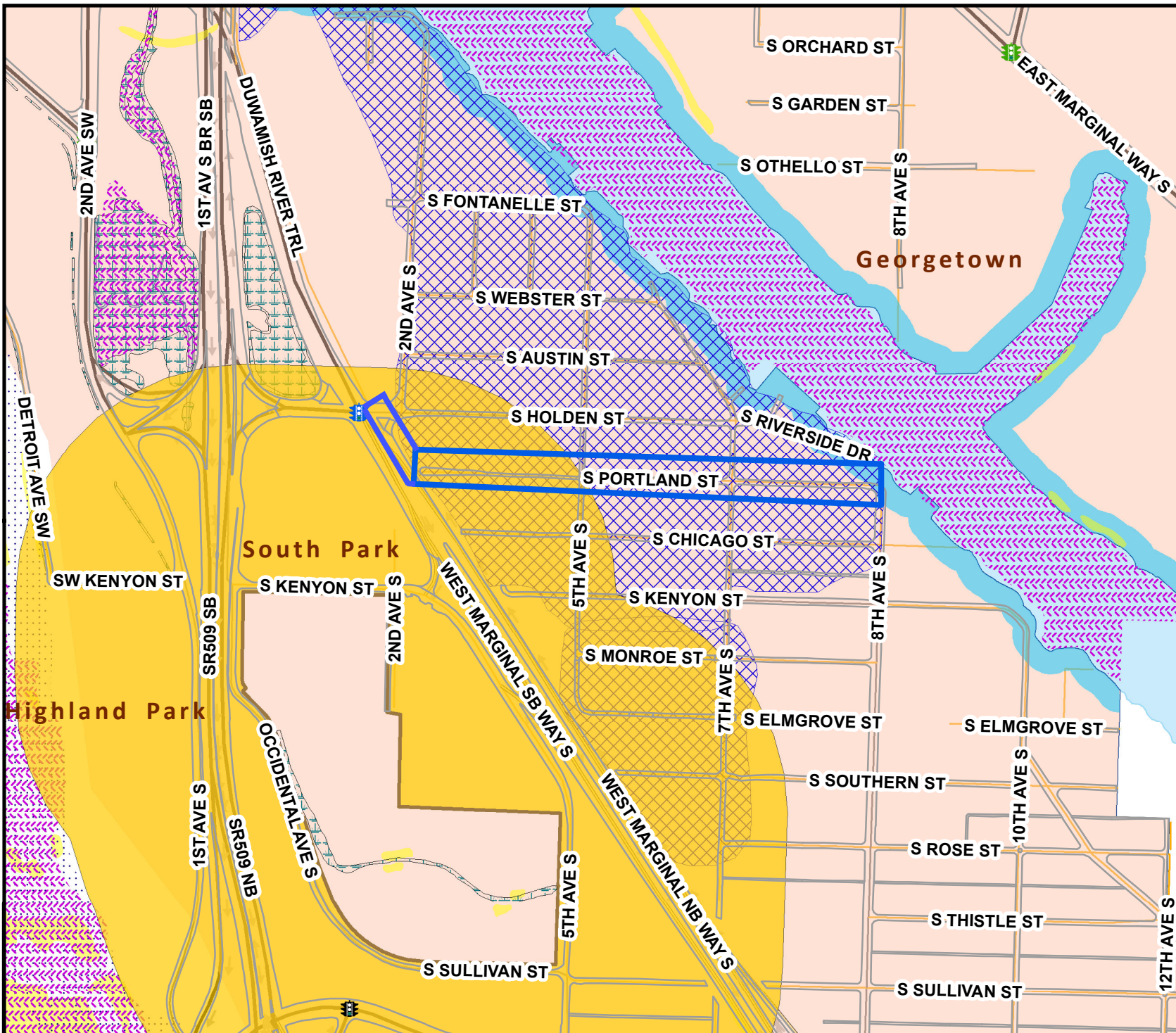
Chain of Custody





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Company: <u>HWA</u>					
Project Number: <u>2012-039</u>					
Project Name: <u>SPOC - 8. Ponds and ST.</u>					
Project Manager: <u>Alexis</u>					
Sampled by: <u>W</u>					
Turnaround Request (in working days) (Check One) <input type="checkbox"/> Same Day <input type="checkbox"/> 1 Day <input type="checkbox"/> 2 Days <input type="checkbox"/> 3 Days <input checked="" type="checkbox"/> Standard (7 Days) (TPH analysis 5 Days)					
(other) _____					
Lab ID	Sample Identification	Date Sampled	Time Sampled	Matrix	Number of Containers
21	B10-1	4/10/13	850	S	1
22	B10-7	4/10/13	855	L	1
23	B10-W		920	W	3
24	B11-1		940	S	1
25	B11-7		945	I	1
26	B12-1		1010	I	1
27	B12-7		105	I	1
28	B13-2		1035	I	1
29	B13-7		1040	I	1
30	B13-W		1100	W	3
Relinquished	Signature: <u>[Signature]</u>	Company: <u>HWA</u>	Date: <u>4/10/13</u>	Time: <u>1255</u>	Comments/Special Instructions: <u>(X) Added 4/24/13 DB (STA)</u>
Received					
Relinquished					
Received					
Relinquished					
Received					
Reviewed/Date					Chromatograms with final report <input type="checkbox"/>

APPENDIX C

WEST DUWAMISH TRAIL PROJECT - CRITICAL AREAS MAP



- Legend**
-  Flood Prone Area
 -  Historical Landfill Boundary
 -  1000' Methane Buffer
 -  Project Boundary

0 200 400 600 800 Feet

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Coordinate System:
State Plane, NAD83-91,
Washington, North Zone
Orthophoto Source:
Pictometry

PLOT DATE : <Date Printed>
AUTHOR : <Your Name>
<Map Location>



West Duwamish Trail Project - Critical Areas Map