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Shaw Environmental & Infrastructure, Inc.

Geotechnical Laboratory
 304 Directors Drive
 Knoxville, TN 37923
 (865) 690-3211

EBER 0311083
 KB 4-20-11

CERTIFICATE OF ANALYSIS

Mr. Michael Neely
 CH2M Hill Plateau Remediation Company
 P.O. Box 1600
 Mail Stop – B6-06
 Richland, WA 99352

April 6, 2011

This is the Certificate of Analysis for the following samples:

Shaw Project ID: Eberline Analytical
 Shaw Project Number: 139736
 Date Received by Lab: 03/24/2011
 Number of Samples: One (1)
 Sample Type: Soil

I. Introduction/Case Narrative

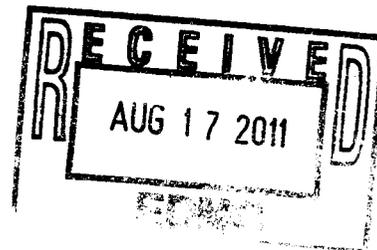
One (1) soil sample was received by the Shaw Geotechnical Laboratory on March 24, 2011. The sample was submitted for determination of bulk density, particle size and hydraulic conductivity/permeability as listed on the Chain of Custody/Sample Analysis Request. The sample number for the received sample was B29R28.

Please see Appendix A, Sample Number Cross Reference List; Appendix B, Analysis Results; and Appendix C, Chain-of-Custody/Sample Receipt Records

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

Reviewed and Approved:

R. Gregory Bennett
 Geotechnical Laboratory Manager, Technology Applications Group



II. Analytical Results/Methodology

REFERENCES: United Nations, *Recommendations on the Transport of Dangerous Goods, Manual of Tests and Criteria*, third ed. New York, 1999. United States Army Corps of Engineers (USACE), Engineer Manual 1110-2-1906, *Laboratory Soils Testing*, appendix II, 1970; United States Environmental Protection Agency, SW846, *Test Methods for Examining Solid Waste, Physical/Chemical Methods*, 3rd ed., Nov 1986 (EPA SW-846). Annual Book of ASTM Standards, Section 4, Construction, Volume 04.08, *Soil and Rock (I)*, and Volume 04.09, *Soil and Rock (II)*, 2008. Shaw Environmental and Infrastructure, Standard Operating Procedures.

Bulk Density **ASTM D 2937**
Particle Size (sieve only) **ASTM D 422**
Permeability of Granular Soils **ASTM D 2434**

III. Quality Control

Quality control checks such as duplicates and spikes (QC samples), are not normally applicable to geotechnical testing. This is due largely to the inability of obtaining samples with known characteristics, the heterogeneous nature of the samples, and quality control procedures built-in to the analytical method.

QC measures to ensure accuracy and precision of test results include the following:

- 100% verification of all numerical results - raw data entries, transcriptions and calculations entered by lab technicians are checked, recalculated and verified. Most data calculations are performed by computer programs.
- Data validation through test reasonableness - summaries of all test results for individual reports are reviewed to determine the overall reasonableness of data and to determine the presence of any data that may be considered outliers.
- Quality control procedures are built into most standardized geotechnical procedures. For example, liquid limit and plastic limit analyses call for re-analyses and specify acceptance criteria.
- Routine instrument calibration - instruments, gauges and equipment used in testing are calibrated on a routine basis. All instrument calibration follows ASTM or manufacturer guidelines.
- Maintenance of all past calibration records - calibration records and certification documents of all instruments, gauges and equipment are updated routinely and maintained in the Quality Control Coordinators Quality/Operations files.

- Certified and trained personnel - all technicians are trained in the application of standard laboratory procedures for geotechnical analyses as well as the quality assurance measures implemented by Shaw.
- Quantitative analyses frequently used in geotechnical/physical testing programs do not use QC tools common to wet chemistry or radiochemistry laboratories. Measures not employed in the analysis of samples reported in this report include: laboratory control samples (LCS), blanks, matrix spikes (MS), duplicate analyses, dilutions, digestions, correction factors, surrogate sample analyses, detection limit determinations, control charts, and/or tentatively identified compounds (TICs).

IV. Data Qualification

None

Appendix A
Sample Cross-Reference List

Page 4 of 8
Report No.: EBER0311083
Mr. Michael Neely
Client: CH2M Hill Plateau Remediation Company
Shaw Project Name: Eberline Analytical
Shaw Project No.: 139736

**Shaw
Geotechnical Laboratory
Knoxville, TN
(865) 690-3211**

SAMPLE NUMBER CROSS-REFERENCE LIST

Lab Sample ID	Client Sample ID	MATRIX
SEK 5634	B29R28	SOIL

Appendix B
Data Results

PARTICLE-SIZE DISTRIBUTION
ASTM D 422

Project Name Eberine

Field Sample No. B29R28

Project No. 139736.14700000

Lab Sample No. SEK 5634

Moisture Content = 30.6%

SIEVE ANALYSIS

C O A R S E	Sieve No.	Diameter mm	Percent Finer
	3"	75.000	100.0%
	1.5"	37.500	100.0%
	0.75"	19.000	100.0%
	0.375"	9.500	100.0%
	#4	4.750	100.0%
	#10	2.000	100.0%

F I N E	Sieve No.	Diameter mm	Percent Finer
	#20	0.850	100.0%
	#40	0.425	99.8%
	#60	0.250	84.4%
	#100	0.149	21.4%
	#140	0.106	8.4%
	#200	0.075	4.7%

0.0% Gravel

95.3% Sand

4.7% Silt/Clay

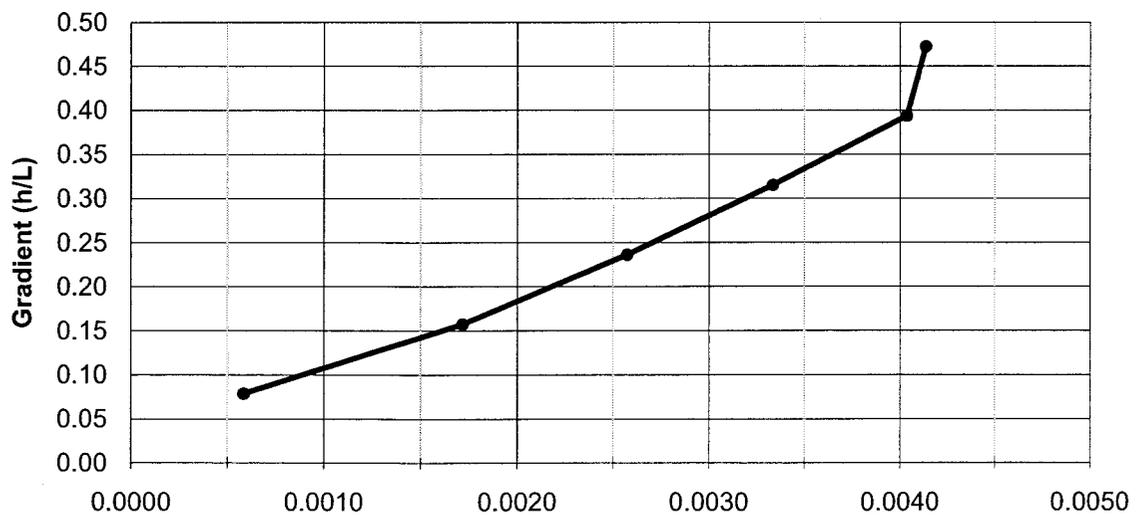
HYDRAULIC CONDUCTIVITY / PERMEABILITY
ASTM D 2434

PROJECT NAME:	Eberline	CLIENT SAMPLE NO.	B29R28
PROJECT NO.	139736	LAB SAMPLE NO.	SEK 5634
Specimen diameter, cm	6.35	Void ratio	1.07
Specimen length, cm	12.42		
Wet weight of specimen, g.	536.91	Specific gravity of solids, assumed	2.80
Specimen cross-sect. area, cm ²	31.67		
Water content, %	0.96	Permeant Fluid	Tap Water
Wet unit weight, pcf	85.3	Material Used	-3/8 inch
Dry unit weight, pcf	84.4		

Trial no.	Head, h	Q, cm ³	Time, sec	Q/At	h/L	Temp, °C	k, cm/s
1	0.5	30	1620	0.000585	0.0787	23.0	6.91E-03
2	1.0	124	2280	0.00172	0.157	23.0	1.02E-02
3	1.5	44	540	0.00257	0.236	23.0	1.01E-02
4	2.0	38	360	0.00333	0.315	23.0	9.85E-03
5	2.5	23	180	0.00403	0.394	23.0	9.54E-03
6	2.5	23	180	0.00403	0.394	23.0	9.54E-03
7	3.0	55	420	0.00414	0.472	23.5	8.06E-03

Coefficient of Permeability, cm/s **9.54E-03**

Velocity vs. Hydraulic Gradient



Appendix C
Chain of Custody Records

CH2MHill Plateau Remediation Company		CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST		F10-214-134	PAGE 1 OF 1
COLLECTOR <i>Karee Romo Sutherland</i>	COMPANY CONTACT RADLOFF, AW	TELEPHONE NO. 376-4554	PROJECT COORDINATOR RADLOFF, AW	PRICE CODE 8N	DATA TURNAROUND 45 Days / 45 Days
SAMPLING LOCATION C7625 (199-D5-141); I-036	PROJECT DESIGNATION 100 Area Remedial Investigation/Feasibility Analysis - 100-HR-3 - Sediment	FIELD LOGBOOK NO. <i>1586</i>	ACTUAL SAMPLE DEPTH <i>34.2 - 36.7 FT</i>	AIR QUALITY <input type="checkbox"/>	METHOD OF SHIPMENT FEDERAL EXPRESS
ICE CHEST NO. <i>6WS-200</i>	OFFSITE PROPERTY NO. SEE PTR	COA 300110ES10	BILL OF LADING/AIR BILL NO. 796902223845	ORIGINAL	

MATRIX* A=Air DL=Drum L=Liquid O=Oil S=Soil SE=Sediment T=Tissue V=Vegetation W=Water WI=Wipe X=Other	POSSIBLE SAMPLE HAZARDS/ REMARKS Contains Radioactive Material at concentrations that may or may not be regulated for transportation per 49 CFR / IATA Dangerous Goods Regulations but are not releasable per DOE Order 5400.5 (1990/1993)	PRESERVATION None	HOLDING TIME None	TYPE OF CONTAINER Liner	NO. OF CONTAINER(S) 1	VOLUME 1000mL	SAMPLE ANALYSIS SEE ITEM (1) IN SPECIAL INSTRUCTIONS
11	SAMPLE NO.	MATRIX*	SAMPLE DATE	SAMPLE TIME			
B29R28		SOIL	3-21-11	1059	✓		

Disposal weight: 4.91 lb

SEK 5634

CHAIN OF POSSESSION		SIGN/ PRINT NAMES		SPECIAL INSTRUCTIONS	
RELINQUISHED BY/REMOVED FROM <i>Bethann Kowal</i>	DATE/TIME 3-21-11 1400	RECEIVED BY/STORED IN <i>MR 443 SSU R 1</i>	DATE/TIME 3-21-11 1400	** The 100 Area S&GRP Characterization and Monitoring Sampling and Analysis GKI applies to this SAF.	
RELINQUISHED BY/REMOVED FROM <i>SSU R 1</i>	DATE/TIME MAR 23 2011 0800	RECEIVED BY/STORED IN <i>MR Aquilino</i>	DATE/TIME MAR 23 2011 0800	(1) Bulk Density - D2937; Saturated Hydraulic Conductivity; Permeability - D2434; Particle Size (Dry Sieve) - D422;	
RELINQUISHED BY/REMOVED FROM <i>MR Aquilino</i>	DATE/TIME MAR 23 2011 0800	RECEIVED BY/STORED IN FEDEX	DATE/TIME MAR 23 2011		
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME		
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME		
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME		
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME		
LABORATORY SECTION	RECEIVED BY <i>James</i>	TITLE <i>Scientist</i>	DATE/TIME <i>3/21/11 10:15</i>		
FINAL SAMPLE DISPOSITION	DISPOSAL METHOD	DISPOSED BY	DATE/TIME		