



Shaw Environmental & Infrastructure, Inc.

RECEIVED APRIL 14, 2011

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

EBER0311086

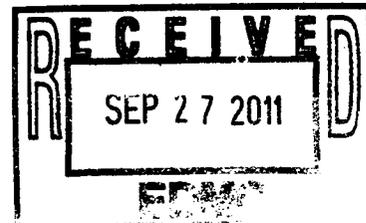
CERTIFICATE OF ANALYSIS

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

April 13, 2011

This is the Certificate of Analysis for the following samples:

Shaw Project ID: Eberline Analytical
Shaw Project Number: 139736
Date Received by Lab: 03/31/11
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 31, 2011. The sample was submitted for determination of bulk density, moisture content, particle size and hydraulic conductivity/permeability as listed on the Chain of Custody/Sample Analysis Request. The sample number for the received sample was B29CJ3.

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
Moisture Content.....	ASTM D 2216
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

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Report No.: EBER0311086
Mr. Michael Neely
Client: CH2M Hill Plateau Remediation Company
Shaw Project Name: Eberline Analytical
Shaw Project No.: 139736

**Shaw
Geotechnical Laboratory
Knoxville, TN
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SAMPLE NUMBER CROSS-REFERENCE LIST

Lab Sample ID	Client Sample ID	MATRIX
SEK 5642	B29CJ3	SOIL

Appendix B
Data Results

PARTICLE-SIZE DISTRIBUTION
ASTM D 422

Project Name Eberine

Field Sample No. B29CJ3

Project No. 139736.15000000

Lab Sample No. SEK 5642

Moisture Content = 28.3%

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	98.6%
	#40	0.425	94.6%
	#60	0.250	71.0%
	#100	0.149	39.5%
	#140	0.106	27.5%
	#200	0.075	17.4%

0.0% Gravel

82.6% Sand

17.4% Silt/Clay

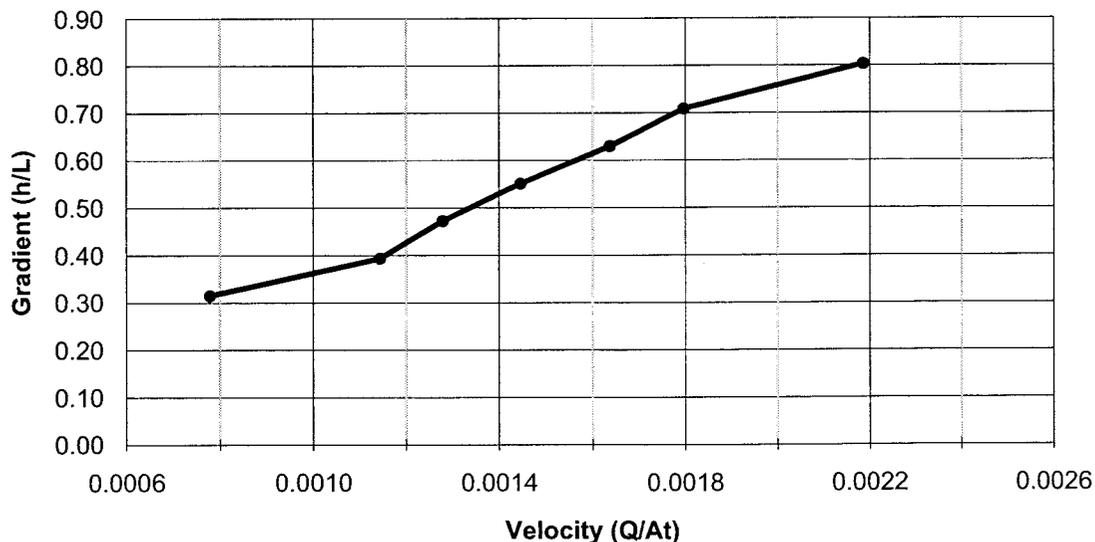
HYDRAULIC CONDUCTIVITY / PERMEABILITY
ASTM D 2434

PROJECT NAME:	Eberline	CLIENT SAMPLE NO.	B29CJ3
PROJECT NO.	139736	LAB SAMPLE NO.	SEK 5642
Specimen diameter, cm	6.35	Void ratio	1.07
Specimen length, cm	12.45		
Wet weight of specimen, g.	541.02	Specific gravity of solids, assumed	2.80
Specimen cross-sect. area, cm ²	31.67		
Water content, %	1.53	Permeant Fluid	Tap Water
Wet unit weight, pcf	85.7	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	2.0	68	2760	0.000778	0.3150	21.5	2.38E-03
2	2.5	50	1380	0.00114	0.3937	21.5	2.80E-03
3	3.0	68	1680	0.00128	0.4724	21.5	2.61E-03
4	3.5	31	677	0.00145	0.5512	22.0	2.50E-03
5	4.0	48	926	0.00164	0.6299	22.0	2.48E-03
6	4.5	31	545	0.00180	0.7087	22.0	2.42E-03
7	5.1	54	780	0.00219	0.8031	21.5	2.63E-03

Coefficient of Permeability, cm/s **2.42E-03**

Velocity vs. Hydraulic Gradient



Appendix C
Chain of Custody Records

