

RECEIVED JANUARY 21, 2011



Shaw Environmental & Infrastructure, Inc.

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

EBER1210045
 KB
 2-14-11

CERTIFICATE OF ANALYSIS

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

January 21, 2011

This is the Certificate of Analysis for the following samples:

Shaw Project ID: Eberline Analytical
 Shaw Project Number: 139736
 Date Received by Lab: 01/04/11
 Number of Samples: Three (3)
 Sample Type: Soil

I. Introduction/Case Narrative

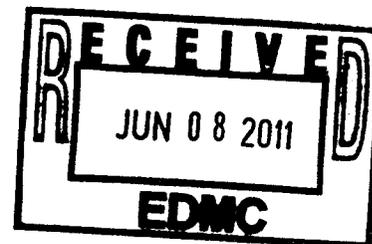
Three (3) soil samples were received by the Shaw Geotechnical Laboratory on January 4, 2011. The samples were submitted for determination of bulk density, moisture content, particle size, and saturated hydraulic conductivity/ permeability as listed on the Chain of Custody/Sample Analysis Request. The sample numbers received were B29FF0, B29FF3, and B29BN0.

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 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 of Soil and Rock	ASTM D 2216
Particle Size (sieve only).....	ASTM D 422
Permeability.....	ASTM D 5084

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 heterogenous 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

Appendix A
Sample Cross-Reference List

Page 4 of 12
Report No.: EBER1210045
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 5240	B29FF0	SOIL
SEK 5241	B29FF3	SOIL
SEK 5242	B29BN0	SOIL

Appendix B
Data Results

PARTICLE-SIZE DISTRIBUTION
ASTM D 422

Project Name Eberine

Field Sample No. B29FF0

Project No. 139736.11200000

Lab Sample No. SEK 5240

Moisture Content = 19.1%

SIEVE ANALYSIS

C O A R S E	Sieve No.	Diameter mm	Percent Finer
	3"	75.000	100.0%
	1.5"	37.500	91.4%
	0.75"	19.000	81.1%
	0.375"	9.500	70.8%
	#4	4.750	68.0%
	#10	2.000	64.0%

F I N E	Sieve No.	Diameter mm	Percent Finer
	#20	0.850	55.5%
	#40	0.425	43.8%
	#60	0.250	19.0%
	#100	0.149	9.5%
	#140	0.106	7.8%
	#200	0.075	6.9%

32.0% Gravel

61.1% Sand

6.9% Silt/Clay

PARTICLE-SIZE DISTRIBUTION
ASTM D 422

Project Name Eberine

Field Sample No. B29FF3

Project No. 139736.11200000

Lab Sample No. SEK 5241

Moisture Content = 19.8%

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	63.5%
	0.375"	9.500	53.2%
	#4	4.750	51.5%
	#10	2.000	49.9%

F I N E	Sieve No.	Diameter mm	Percent Finer
	#20	0.850	45.4%
	#40	0.425	38.3%
	#60	0.250	26.3%
	#100	0.149	18.2%
	#140	0.106	15.9%
	#200	0.075	14.4%

48.5% Gravel

37.2% Sand

14.4% Silt/Clay

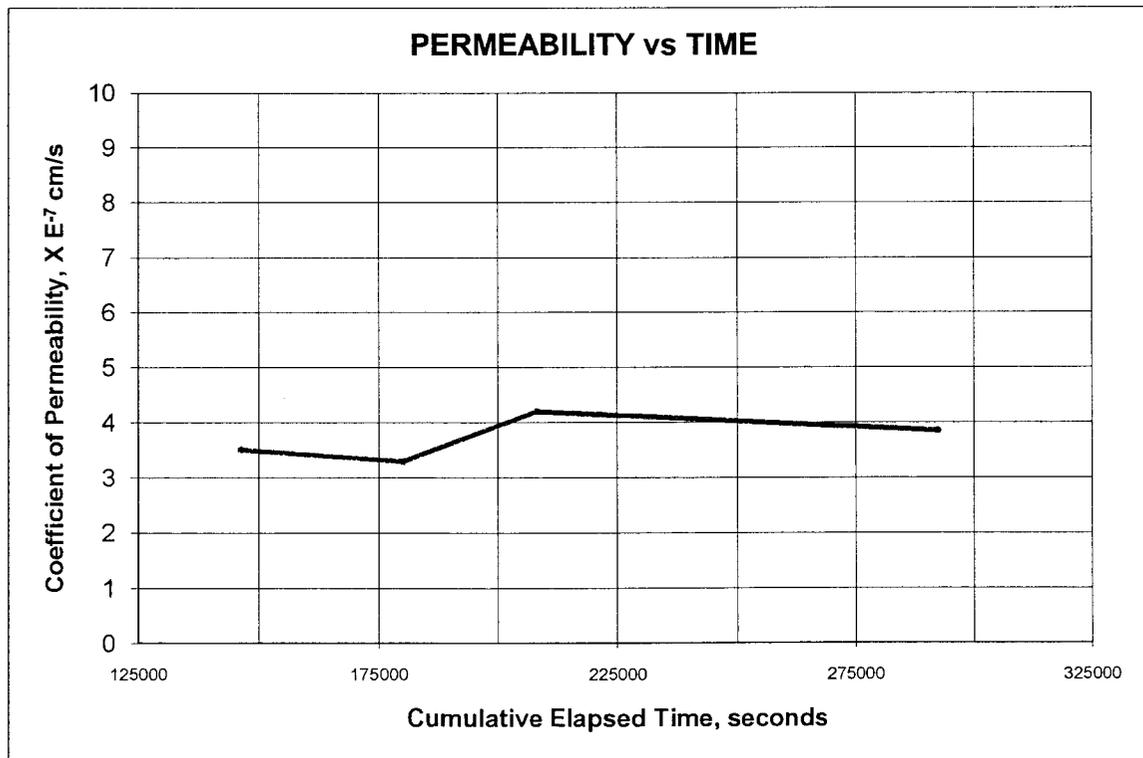
HYDRAULIC CONDUCTIVITY / PERMEABILITY
ASTM D 5084

PROJECT NAME: Eberline
 PROJECT NO. 139736.11200000

CLIENT SAMPLE NO. B29BN0
 LAB SAMPLE NO. SEK 5242

	INITIAL	FINAL		
Specimen diameter, cm	7.31			
Specimen length, cm	9.28		Hydraulic gradient	15.2
Wet weight of specimen, g.	789.27		Min. consolidation stress, psi	2.0
Specimen cross-sect. area, cm ²	42.02		Max. consolidation stress, psi	4.0
Water content, %	23.9		Total backpressure, psi	56.0
Wet unit weight, pcf	126.3		Permeant Fluid	Deaired DI Water
Dry unit weight, pcf	101.9	101.7		
Est. degree of saturation, %	101.7	101.7		
Specific gravity of solids, assumed	2.65			

Coefficient of Permeability, cm/s 3.7E-07



Appendix C
Chain of Custody Records

