



Shaw Environmental & Infrastructure, Inc.

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

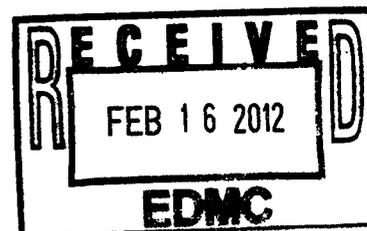
CERTIFICATE OF ANALYSIS

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

May 18, 2011

This is the Certificate of Analysis for the following samples:

Shaw Project ID: Eberline Analytical
Shaw Project Number: 139736
Date Received by Lab: 04/08/11
Number of Samples: One (1)
Sample Type: Soil



I. Introduction/Case Narrative

One (1) soil sample was received by the Shaw Geotechnical Laboratory on April 8, 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 B2C4B0.

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:

A handwritten signature in black ink, appearing to read "R. Gregory Bennett".

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 **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 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.

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Report No.: EBER0411087

Mr. Michael Neely

Client: CH2M Hill Plateau Remediation Company

Shaw Project Name: Eberline Analytical

Shaw Project No.: 139736

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- 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.: EBER0411087

Mr. Michael Neely

Client: CH2M Hill Plateau Remediation Company

Shaw Project Name: Eberline Analytical

Shaw Project No.: 139736

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SAMPLE NUMBER CROSS-REFERENCE LIST

Lab Sample ID	Client Sample ID	MATRIX
SEK 5657	B2C4B0	SOIL

Appendix B
Data Results

PARTICLE-SIZE DISTRIBUTION
ASTM D 422

Project Name Eberine

Field Sample No. B2C4B0

Project No. 139736.15100000

Lab Sample No. SEK 5657

Moisture Content = 23.8%

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	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	99.7%
	#40	0.425	98.0%
	#60	0.250	89.6%
	#100	0.149	78.9%
	#140	0.106	72.7%
	#200	0.075	67.4%

0.0% Gravel

32.6% Sand

67.4% Silt/Clay

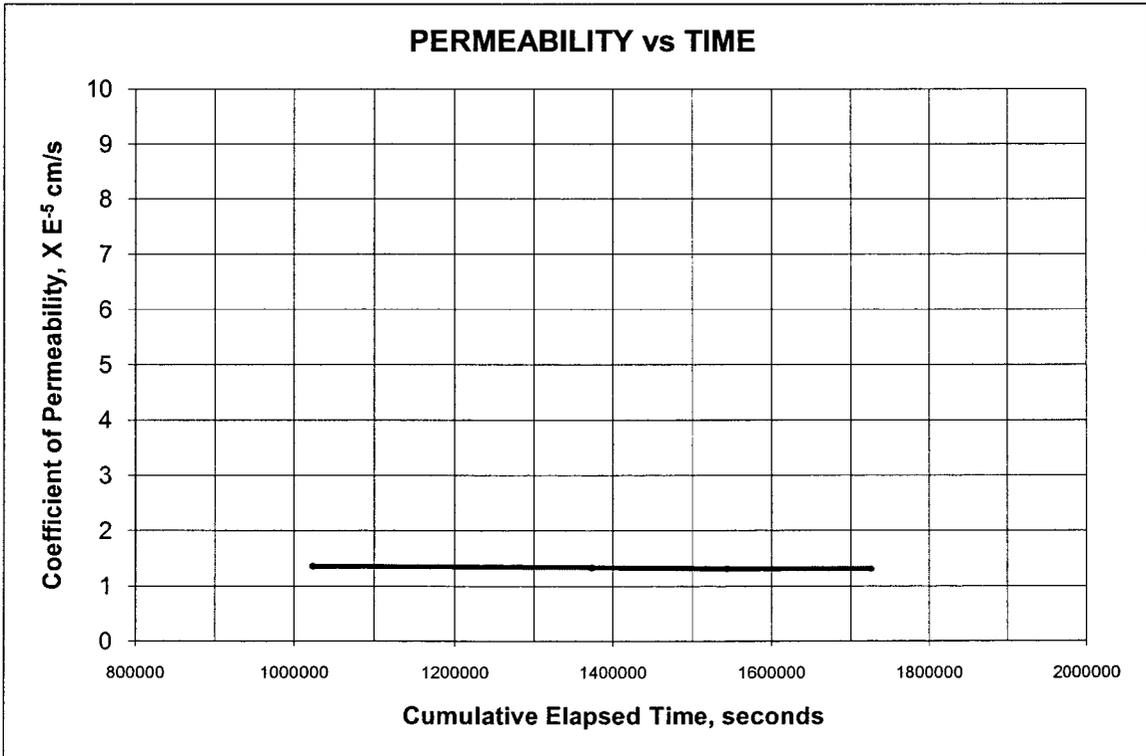
**HYDRAULIC CONDUCTIVITY / PERMEABILITY
ASTM D 5084**

PROJECT NAME: Eberline
PROJECT NO. 139736.15100000

CLIENT SAMPLE NO. B2C4B0
LAB SAMPLE NO. SEK 5657

	INITIAL	FINAL		
Specimen diameter, cm	7.26			
Specimen length, cm	14.25		Hydraulic gradient	29.6
Wet weight of specimen, g.	1218.62		Min. consolidation stress, psi	2.0
Specimen cross-sect. area, cm ²	41.41		Max. consolidation stress, psi	8.0
Water content, %	23.8		Total backpressure, psi	37.0
Wet unit weight, pcf	129.0		Permeant Fluid	Deaired Tap Water
Dry unit weight, pcf	104.2			
Est. degree of saturation, %	107.2	107.2		
Specific gravity of solids, assumed	2.65			

Coefficient of Permeability, cm/s 1.3E-08



Appendix C
Chain of Custody Records

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CH2M Hill Plateau Remediation Company		CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST		F11-057-055	PAGE 1 OF 1
COLLECTOR <i>Turner</i>	COMPANY CONTACT RADLOFF, AW	TELEPHONE NO. 376-4554	PROJECT COORDINATOR RADLOFF, AW	PRICE CODE 8N	DATA TURNAROUND 45 Days / 45 Days
SAMPLING LOCATION C8187 (199-N-185); I-017	PROJECT DESIGNATION 100 Area Remedial Investigation/Feasibility Analysis - 100-NR-2 - Sediment	ACTUAL SAMPLE DEPTH 44.7-52.3 ft	SAF NO. F11-057	AIR QUALITY <input type="checkbox"/>	METHOD OF SHIPMENT FEDERAL EXPRESS
ICE CHEST NO. G25-244	FIELD LOGBOOK NO. HNF-N-486-1 p. 36	OFFSITE PROPERTY NO. SEE PTR	COA 300104ES10	BILL OF LADING/AIR BILL NO. SEE PTR 7946 6193 8581	
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 Split Spoon Liner	NO. OF CONTAINER(S) 1
SPECIAL HANDLING AND/OR STORAGE	VOLUME 1000g	SAMPLE ANALYSIS SEE ITEM (1) IN SPECIAL INSTRUCTIONS	SAMPLE DATE 3-31-11	SAMPLE TIME 1125	X
SAMPLE NO. B2C4B0	MATRIX* SOIL				

Disposal weight 5.65 lbs.

SEK 5657

CHAIN OF POSSESSION		SIGN/PRINT NAMES		SPECIAL INSTRUCTIONS	
RELINQUISHED BY/REMOVED FROM <i>A. Turner</i>	DATE/TIME 3-31-11 1240	RECEIVED BY/STORED IN <i>M. 413 554 R1</i>	DATE/TIME 3-31-11 1240	** The 100 Area S&GRP Characterization and Monitoring Sampling and Analysis GKI applies to this SAF.	
RELINQUISHED BY/REMOVED FROM <i>M. 413 550 - R1</i>	DATE/TIME 4-7-11 0700	RECEIVED BY/STORED IN <i>Calvin Ferris / Caltrans</i>	DATE/TIME 4-7-11 0700	** Physical Properties laboratory: Conduct the hydraulic conductivity test (ASTM D5084 or D2434) as appropriate to the sample matrix.	
RELINQUISHED BY/REMOVED FROM <i>Calvin Ferris / Caltrans</i>	DATE/TIME 4-7-11 1400	RECEIVED BY/STORED IN <i>FC DEX</i>	DATE/TIME 4-7-11 1400	(1) Bulk Density - D2937; Particle Size (Dry Sieve) - D422;	
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN <i>M. Boxer / Lab 4</i>	DATE/TIME 4-8-11 1017	Permeability - D2434; Saturated Hydraulic Conductivity (Hydraulic Conductivity);	
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME	TITLE	
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME	DISPOSED BY	
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME	DATE/TIME	
LABORATORY SECTION	RECEIVED BY	TITLE		DATE/TIME	
FINAL SAMPLE DISPOSITION	DISPOSAL METHOD	TITLE		DATE/TIME	