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Shaw™
Shaw Environmental & Infrastructure, Inc.

Geotechnical Laboratory
1570 Bear Creek Road
Kingston TN 37763
(865) 482-6497

CERTIFICATE OF ANALYSIS

Stephen Trent
Fluor Hanford, Inc.
825 Jadwin Avenue
Richland, Washington 99352

November 14, 2008

This is the Certificate of Analysis for the following samples:

Shaw Project ID:	**Eberline - Hanford**
Shaw Project Number:	**100846.7800000**
Client SDG Number:	H3788
Date Received by Lab:	July 11, 2008
Number of Samples:	Two (2)
Sample Type:	Soil

FOB-12C

I. Introduction/Case Narrative

Two soil samples were received by the Shaw Geotechnical Laboratory on July 11, 2008. The samples were submitted for determination of moisture content, bulk density, and sieve analysis. The sample numbers received were B1VJ67 and B1VJ68.

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:

Ralph Cole
Laboratory Manager, Geotechnical Services

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II. Analytical Results/Methodology

REFERENCES: 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.

Moisture Content of Soil and Rock ..... **ASTM D 2216**
Particle-Size Distribution of Soils ..... **ASTM D 422**
Unit Weight ..... **USACE EM 1110-2-1906 app. II**

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.

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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

A separate sample container was submitted for moisture determination. The entire contents of the sample container was used to determine the moisture content of the sample. An aliquot of this sample was not used. The moisture content of the sieve analysis sample is given on the sieve results sheet.

Appendix A
Sample Cross-Reference List

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Shaw Project Name: Eberline Hanford
Shaw Project No. 100846.78000000
SDG No. H3788

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SAMPLE NUMBER CROSS-REFERENCE LIST

LAB SAMPLE NO.	CLIENT SAMPLE NO.	MATRIX
BC1412	B1VJ67	Soil
BC1413	B1VJ68	Soil

Appendix B
Data Results

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PARTICLE-SIZE DISTRIBUTION
ASTM D 422

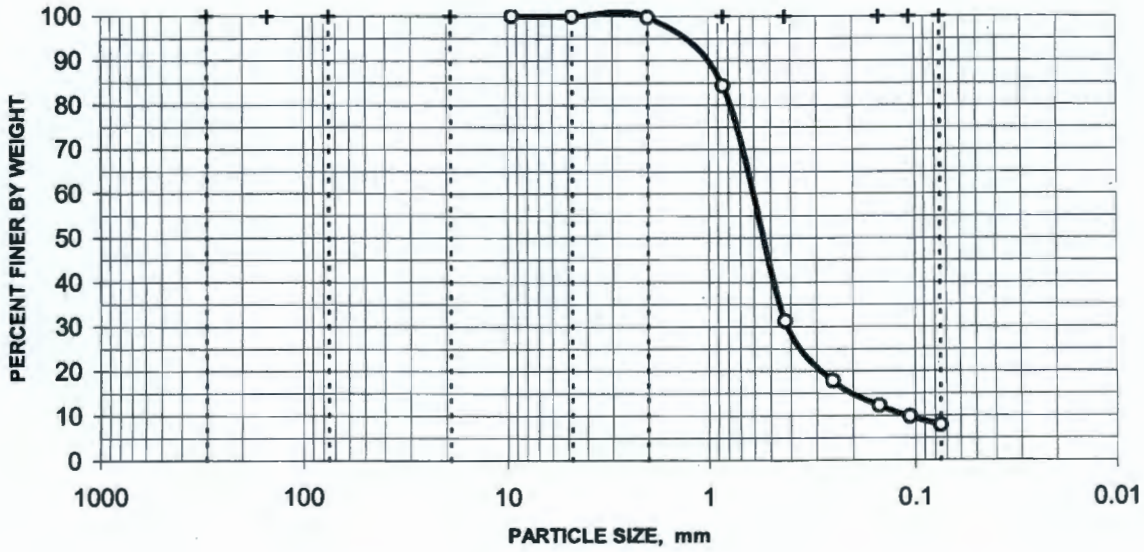
Project Name	Eberline Hanford	Field Sample No.	B1VJ67
Project No.	100846.78000000	Lab Sample No.	BC1412

SIEVE ANALYSIS

	Sieve No.	Diameter mm	Percent Finer
COARSE	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	99.9%
	#10	2.000	99.7%

	Sieve No.	Diameter mm	Percent Finer
FINE	#20	0.850	84.3%
	#40	0.425	31.3%
	#60	0.250	17.9%
	#100	0.149	12.3%
	#140	0.106	9.8%
	#200	0.075	7.9%

DISTRIBUTION CURVE



0.1% Gravel 92.0% Sand 7.9% Silt/Clay

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MOISTURE CONTENT ASTM D 2216

PROJECT NAME
Eberline Hanford

PROJECT NUMBER
100846.78000000

LAB SAMPLE NO.	CLIENT SAMPLE NO.	MOISTURE, % ASTM D 2216	MOISTURE , % SW846	SOLIDS, % SW846
BC1412	B1VJ67	5.6	5.3	94.7
BC1413	B1VJ68	5.4	5.1	94.9

ASTM D 2216 results are based on dry sample weight.
SW846 results are based on wet sample weight.
Solids content is determined by subtracting the SW846 moisture (%) from 100.

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BULK DENSITY/DRY DENSITY
ASTM D 2937

PROJECT NAME: **Eberline Hanford**

PROJECT NUMBER: **100846.78000000**

LAB SAMPLE NUMBER	CLIENT SAMPLE NUMBER	AVERAGE LENGTH, inches	AVERAGE DIAMETER, inches*	WET WEIGHT, grams	MOISTURE CONTENT, %	BULK DENSITY, pcf	DRY DENSITY, pcf
BC1412	B1VJ67	5.9883	3.8652	2066.60	6.0	112.1	105.7

Moisture content calculated by ASTM D 2216 based on sample dry weight.
Bulk density is the weight of wet sample divided by the volume of the wet sample (as-received).
Dry density is the weight of the dry sample solids divided by the volume of the original sample.

Appendix C
Chain of Custody Records

Fluor Hanford Inc.	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST			F08-126-012	PAGE 1 OF 1
COLLECTOR Kover McAffee	**COMPANY CONTACT** TRENT, SJ	**TELEPHONE NO.** 373-5869	**PROJECT COORDINATOR** WIDRIG, DL	**PRICE CODE** 8N	**DATA TURNAROUND**
SAMPLING LOCATION C6552, I-004	**PROJECT DESIGNATION** 216-A-5 Crib Characterization Sampling and Analysis - Soil		**SAF NO.** F08-126	**AIR QUALITY** ☐	45 Days / 45 Days
ICE CHEST NO. GRP-08-13	**FIELD LOGBOOK NO.** HNF-N-585-2	**ACTUAL SAMPLE DEPTH** 37.5 - 40.0	**COA** 123124ES10	**METHOD OF SHIPMENT** FEDERAL EXPRESS	
SHIPPED TO Shaw Group	**OFFSITE PROPERTY NO.** SEE PTR		**BILL OF LADING/AIR BILL NO.** SEE PTR		

MATRIX*
A=Air
DL=Drum Liquids
DS=Drum Solids
L=Liquid
O=Oil
S=Soil
SE=Sediment
T=Tissue
V=Vegitation
W=Water
WI=Wipe
X=Other

POSSIBLE SAMPLE HAZARDS/ REMARKS
Contains Radioactive Material at concentrations that are not regulated for transportation per 49 CFR but are not releasable per DOE Order 5400.5 (1990/1993)

H3788

SPECIAL HANDLING AND/OR STORAGE
Radioactive Tie To: B1VHY1

PRESERVATION	None	None												
TYPE OF CONTAINER	Split Spoon Liner	Moisture Resistant Cont												
NO. OF CONTAINER(S)	1	1												
VOLUME	1000g	200g												
SAMPLE ANALYSIS	SEE ITEM (1) IN SPECIAL INSTRUCTIONS	Moisture Content - D2216;												
SAMPLE NO.	**MATRIX***	**SAMPLE DATE**	**SAMPLE TIME**											
B1VJ67	SOIL	7/7/08	12:38	✓	✓									

BC 1412

CHAIN OF POSSESSION / **SIGN/ PRINT NAMES**

RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME
Brotherton	7/7/08 14:00	A-5 FRIDGE	7/7/08 1400
A-5 Fridge	7-10-8 0830	DConnolly	7-10-8 0830
DConnolly	7-10-8 1400	Fed Ex	

SPECIAL INSTRUCTIONS

** The 200 Area S&GRP Characterization and Monitoring Sampling and Analysis GKI applies to this SAF.

** Analytical batch QC must be run on a sample associated with this SAF.
(1)Bulk Density - D2937; Particle Size (Dry Sieve) - D422;

LABORATORY SECTION	**RECEIVED BY** Don Huskey DONHUSKEY SHAW E+I/ETDC	**TITLE** LAB TECH.	**DATE/TIME** 7/11/08 0900
FINAL SAMPLE DISPOSITION	**DISPOSAL METHOD**	**DISPOSED BY**	**DATE/TIME**

A-6003-618(01/06)

12 165

Fluor Hanford Inc.	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST			F08-126-015	PAGE 1 OF 1
COLLECTOR Kauer / McInTyre	**COMPANY CONTACT** TRENT, SJ	**TELEPHONE NO.** 373-5869	**PROJECT COORDINATOR** WIDRIG, DL	**PRICE CODE** 8N	**DATA TURNAROUND** 45 Days / 45 Days
SAMPLING LOCATION C6552, I-004-D	**PROJECT DESIGNATION** 216-A-5 Crib Characterization Sampling and Analysis - Soil		**SAF NO.** F08-126	**AIR QUALITY** ☐	
ICE CHEST NO. GRP-08-13	**FIELD LOGBOOK NO.** HNF-N-585-2	**ACTUAL SAMPLE DEPTH** 37.5 - 40	**COA** 123124ES10	**METHOD OF SHIPMENT** FEDERAL EXPRESS	
SHIPPED TO Shaw Group	**OFFSITE PROPERTY NO.** SEE PTR		**BILL OF LADING/AIR BILL NO.** SEE PTR		

MATRIX*: A=Air, DL=Drum Liquids, DS=Drum Solids, L=Liquid, O=Oil, S=Soil, SE=Sediment, T=Tissue, V=Vegitation, W=Water, WI=Wipe, X=Other

POSSIBLE SAMPLE HAZARDS/ REMARKS
Contains Radioactive Material at concentrations that are not regulated for transportation per 49 CFR but are not releasable per DOE Order 5400.5 (1990/1993)

H3788

SPECIAL HANDLING AND/OR STORAGE
Radioactive Tie To: B1VHY1

PRESERVATION	None	None															
TYPE OF CONTAINER	~~Split Spoon Liner~~	Moisture Resistant Cont															
NO. OF CONTAINER(S)	1	1															
VOLUME	~~1000g~~	200g															
SAMPLE ANALYSIS	~~SEE ITEM (1) IN SPECIAL INSTRUCTIONS~~	Moisture Content - D2216;															

SAMPLE NO.	MATRIX*	SAMPLE DATE	SAMPLE TIME
B1VJ68	SOIL	7/7/08	12:35

BC 1413

CHAIN OF POSSESSION

SIGN/ PRINT NAMES			
RELINQUISHED BY/REMOVED FROM: Brothers on Truck	DATE/TIME: 7/7/08 14:00	RECEIVED BY/STORED IN: A-5 Fridge	DATE/TIME: 7/7/08 14:0
RELINQUISHED BY/REMOVED FROM: A-5 Fridge	DATE/TIME: 7-10-8 0850	RECEIVED BY/STORED IN: DCannady OS	DATE/TIME: 7-10-8 083
RELINQUISHED BY/REMOVED FROM: DCannady OS	DATE/TIME: 7-10-8 1400	RECEIVED BY/STORED IN: Fed Ex	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:
RELINQUISHED BY/REMOVED FROM:	DATE/TIME:	RECEIVED BY/STORED IN:	DATE/TIME:

SPECIAL INSTRUCTIONS

** The 200 Area S&GRP Characterization and Monitoring Sampling and Analysis GKI applies to this SAF.

** Analytical batch QC must be run on a sample associated with this SAF.
(1)Bulk Density - D2937; Particle Size (Dry Sieve) - D422;

* UNABLE TO COLLECT DUP DUE TO SLUFF MATERIAL
Jim Mehrer 7-7-08

LABORATORY SECTION	**RECEIVED BY** Don Huskey DON HUSKEY / SHAW E+I / LAB TECH.	**TITLE**	**DATE/TIME** 7/11/08 / 0900
FINAL SAMPLE DISPOSITION	**DISPOSAL METHOD**	**DISPOSED BY**	**DATE/TIME**

A-6003-618(01/06)