Shaw™
Shaw E & I, Inc.

Geotechnical Laboratory
PO Box 4339
1570 Bear Creek Road
Oak Ridge TN 37830
(865) 482-6497

CERTIFICATE OF ANALYSIS

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

March 11, 2005

This is the Certificate of Analysis for the following samples:

Shaw Project ID:	**Eberline - Hanford**
Shaw Project Number:	**100846.54000000**
Client Sample Data Group:	H2977
Date Received by Lab:	January 26, 2005
Number of Samples:	One (1)
Sample Type:	Soil

I. Introduction/Case Narrative

One soil sample was received by the Shaw Geotechnical Laboratory on January 26, 2005. The sample was submitted for determination of moisture content, bulk density, sieve analysis, hydraulic conductivity, specific gravity, and calcium carbonate content. The sample number received was B19ND6.

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

Shaw Geotechnical Laboratory
Oak Ridge TN
(865) 482-6497

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)*, 2005. Shaw Environmental and infrastructure, Standard Operating Procedures.

Moisture Content of Soil and Rock	**ASTM D 2216**
Bulk Density of Soils	**EM 1110-2-1906**
Particle-size Analysis of Soils	**ASTM D 422**
Hydraulic Conductivity of Porous Materials Using a Flexible Wall Permeameter	**ASTM D 5084**
Specific Gravity of Soil	**ASTM D 854**
Bulk Specific Gravity of Coarse Aggregate	**ASTM C127**
Calcium Carbonate Content	**ASTM D 4373**

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.

Shaw Geotechnical Laboratory
Oak Ridge TN
(865) 482-6497

- 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 certified by the National Institute for Certification of Engineering Technicians (NICET) in geotechnical soil testing, and 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

March 11, 2005
Stephen Trent
Fluor Hanford, Inc.
Shaw Project Name: Eberline Hanford
Shaw Project No. 100846.54000000
SDG No. H2977

Shaw Geotechnical Laboratory
Oak Ridge TN
(865) 482-6497

SAMPLE NUMBER CROSS-REFERENCE LIST

LAB SAMPLE NO.	CLIENT SAMPLE NO.	MATRIX
BC0523	B19ND6	Soil

Appendix B
Sample Test Results

March 11, 2005
Stephen Trent
Fluor Hanford, Inc.
Shaw Project Name: Eberline Hanford
Shaw Project No. 100846.54000000
SDG No. H2977

Shaw Geotechnical Laboratory
Oak Ridge TN
(865) 482-6497

MOISTURE CONTENT

PROJECT NAME
Eberline Hanford

PROJECT NUMBER
100846.54000000

LAB SAMPLE NO.	CLIENT SAMPLE NO.	MOISTURE, % ASTM D 2216	MOISTURE , % SW846	SOLIDS, % SW846
BC0523	B19ND6	25.5	20.3	79.7

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.

00000007

March 11, 2005
Stephen Trent
Fluor Hanford, Inc.
Shaw Project Name: Eberline Hanford
Shaw Project No. 100846.54000000
SDG No. H2977

Shaw Geotechnical Laboratory
Oak Ridge TN
(865) 482-6497

BULK DENSITY/DRY DENSITY
EM-1110-2-1906, APPENDIX II

PROJECT NAME: **Eberline - Hanford**

PROJECT NUMBER: **100846.54000000**

LAB SAMPLE NUMBER	CLIENT SAMPLE NUMBER	AVERAGE LENGTH, inches	AVERAGE DIAMETER, inches	WET WEIGHT, grams	MOISTURE CONTENT, %	BULK DENSITY, pcf	DRY DENSITY, pcf
BC0523	B19ND6	5.9827	3.8598	2342.03	24.7	127.5	102.2

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.

March 11, 2005
Stephen Trent
Fluor Hanford, Inc.
Shaw Project Name: Eberline Hanford
Shaw Project No. 100846.54000000
SDG No. H2977

Shaw Geotechnical Laboratory
Oak Ridge TN
(865) 482-6497

PARTICLE-SIZE DISTRIBUTION
ASTM D 422

Project Name Eberline Hanford

Project No. 100846.54000000

Field Sample No. B19ND6

Lab Sample No. BC0523

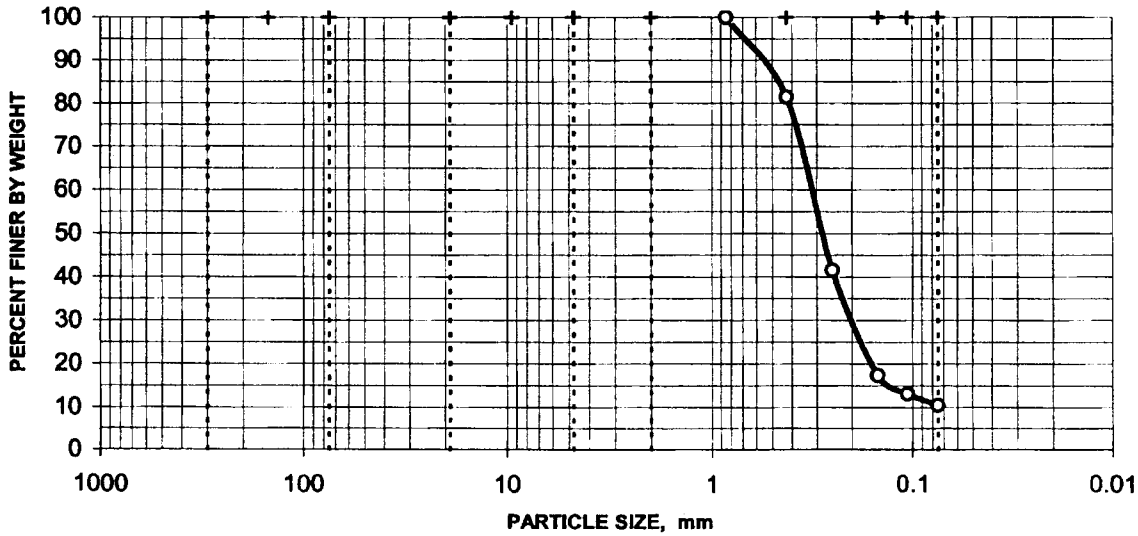
Moisture Content = 24.7%
based on dry sample weight

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	100.0%
	#10	2.000	100.0%

	Sieve No.	Diameter mm	Percent Finer
FINE	#20	0.850	99.9%
	#40	0.425	81.4%
	#60	0.250	41.5%
	#100	0.149	17.3%
	#140	0.106	13.1%
	#200	0.075	10.4%

DISTRIBUTION CURVE



0.0% Gravel 89.6% Sand 10.4% Silt/Clay

00000009

March 11, 2005
Stephen Trent
Fluor Hanford, Inc.
Shaw Project Name: Eberline Hanford
Shaw Project No. 100846.54000000
SDG No. H2977

Shaw Geotechnical Laboratory
Oak Ridge TN
(865) 482-6497

Carbonate Content of Soils ASTM D 4373

PROJECT NAME: **Eberline Hanford**

PROJECT NUMBER: **100846.54000000**

LAB SAMPLE NO.	CLIENT SAMPLE NO.	CO3, %
BC0523	B19ND6	0

March 11, 2005
Stephen Trent
Fluor Hanford, Inc.
Shaw Project Name: Eberline Hanford
Shaw Project No. 100846.54000000
SDG No. H2977

Shaw Geotechnical Laboratory
Oak Ridge TN
(865) 482-6497

SPECIFIC GRAVITY
ASTM D 854

PROJECT NAME:
Eberline Hanford

PROJECT NUMBER:
100846.54000000

LAB SAMPLE NO.	CLIENT SAMPLE NO.	SPECIFIC GRAVITY
BC0523	B19ND6	2.6836

March 11, 2005
Stephen Trent
Fluor Hanford, Inc.
Shaw Project Name: Eberline Hanford
Shaw Project No. 100846.54000000
SDG No. H2977

Shaw Geotechnical Laboratory
Oak Ridge TN
(865) 482-6497

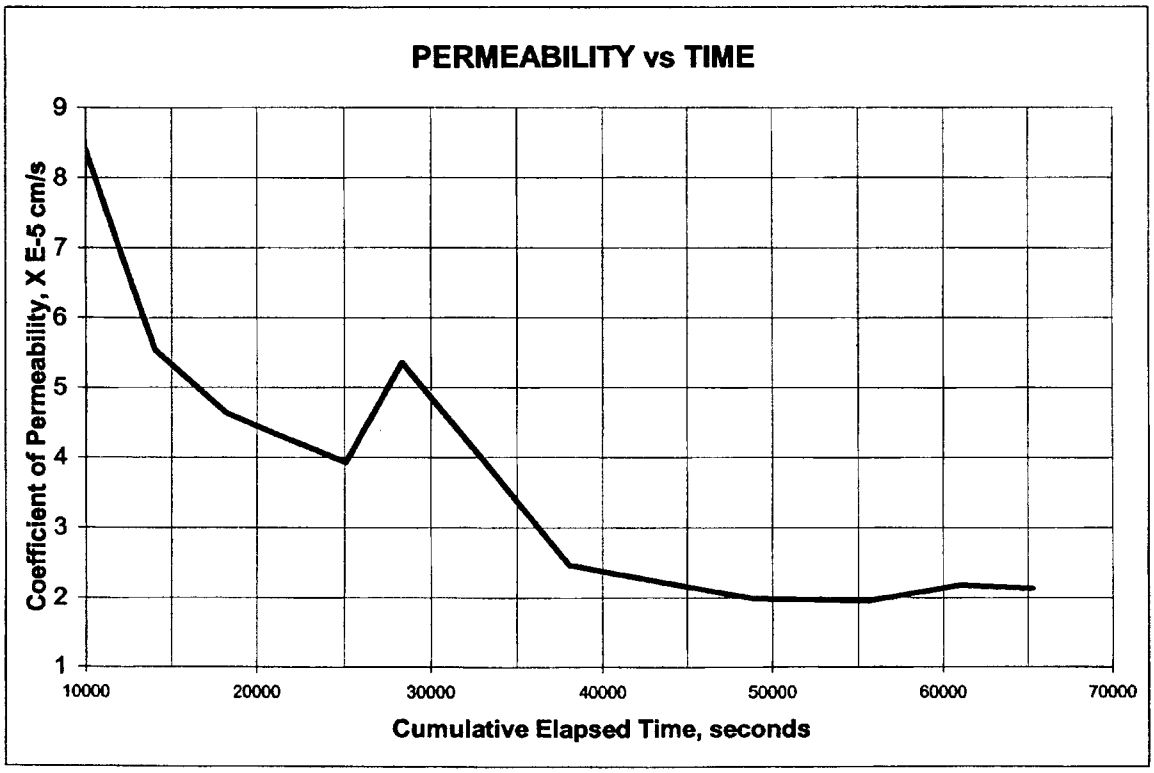
HYDRAULIC CONDUCTIVITY / PERMEABILITY ASTM D 5084

PROJECT NAME:	Eberline Hanford	CLIENT SAMPLE NO.	B19ND6
PROJECT NO.	100846.54000000	LAB SAMPLE NO.	BC0523

	INITIAL	FINAL
Specimen diameter, cm	5.13	
Specimen length, cm	9.23	
Wet weight of specimen, g.	384.52	
Specimen cross-sect. area, cm^2	20.67	
Water content, %	24.7	
Wet unit weight, pcf	125.8	
Dry unit weight, pcf	100.9	
Degree of saturation, %	100.4	
Specific gravity of solids	2.68	

Hydraulic gradient	3.8
Min. consolidation stress, psi	2.0
Max. consolidation stress, psi	2.5
Total backpressure, psi	10.5
Permeant Fluid	Deaired DI Water

Coefficient of Permeability, cm/s 2.1E-05



00000012

Appendix C
Chain-of-Custody and Request-for-Analysis Records

FLUOR Hanford Inc.	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	F03-018-149	PAGE 1 OF 1

COLLECTOR	COMPANY CONTACT	TELEPHONE NO.	PROJECT COORDINATOR	PRICE CODE 8N	DATA TURNAROUND
Pope/Pfister/Wiberg/Tyra	Steve Trent	373-5869	TRENT, SJ	AIR QUALITY ☐	45 Days / 45 Days
SAMPLING LOCATION	**PROJECT DESIGNATION**		**SAF NO.**		
216-Z-9/C3426 - Interval 482FT - 484.5FT	216-Z-9 Trench Characterization Borehole - Soil		F03-018		
ICE CHEST NO. GRP-05-005	**FIELD LOGBOOK NO.** HNF-N-360 1	**COA** 119325ES10	**METHOD OF SHIPMENT** Federal Express		
SHIPPED TO Shaw Group	**OFFSITE PROPERTY NO.** See PTR 14710		**BILL OF LADING/AIR BILL NO.** See PTR 14710		

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
RADIOACTIVE TIE TO: B19LL0

SDG# H2977

SPECIAL HANDLING AND/OR STORAGE

PRESERVATION	None	None												
TYPE OF CONTAINER	Moisture Resistant Cont	Liner												
NO. OF CONTAINER(S)	1	2												
VOLUME	200g	1000g												
SAMPLE ANALYSIS	Moisture Content - D2216;	SEE ITEM (1) IN SPECIAL INSTRUCTIONS												

SAMPLE NO.	MATRIX*	SAMPLE DATE	SAMPLE TIME											
B19ND6	SOIL	1-10-05	11:15	✓	✓									

BC 0523

CHAIN OF POSSESSION

SIGN/ PRINT NAMES			
RELINQUISHED BY/REMOVED FROM: Dana Wiberg 7-9	DATE/TIME: 1/19/05 1115	RECEIVED BY/STORED IN: MO-026 Sitton Fuss #1	DATE/TIME: 1/19/05 1405
RELINQUISHED BY/REMOVED FROM: MO-026 Sitton Fuss #1 M.L. Bullock	DATE/TIME: 1/20/05 0825	RECEIVED BY/STORED IN: M.L. Bullock	DATE/TIME: 1/20/05 0825
RELINQUISHED BY/REMOVED FROM: M.L. Bullock	DATE/TIME: 1/20/05 0825	RECEIVED BY/STORED IN: LEO EX	DATE/TIME:
RELINQUISHED BY/REMOVED FROM: FED EX	DATE/TIME: 1/21/05	RECEIVED BY/STORED IN: ZLG 1/21/05	DATE/TIME: 10:00
RELINQUISHED BY/REMOVED FROM: ZLG	DATE/TIME: 1/25/05	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
(1)Bulk Density - D2937; Particle Size (Dry Sieve) - D422; Saturated Hydraulic Conductivity; Particle Density - D854; Calcium Carbonate Content;

LABORATORY SECTION	RECEIVED BY: [signature]	TITLE: R50	DATE/TIME: 1-26-05 / 1000	
FINAL SAMPLE DISPOSITION	DISPOSAL METHOD:	DISPOSED BY:	DATE/TIME:	

A-6003-618(03/03)

7400000

SDG# H2977

PAGE 1 Eberline Srvces CHAIN OF CUSTODY ORD # R5-01-173

01/21/05 14:40:09 WORK ID: SAF# F03-018 SDG H2977

RCVD: 01/21/05 DUE: 03/07/05 KEEP: 03/07/06 DISP: S

DASH	SAMPLE IDENTIFICATION	STORED	TESTS
01A-S	B19ND6	SHAW	DISPOS E329S E331S E333S E335S E342S

RELEASED BY	DATE	TRANSFERRED TO	DATE	RECEIVED BY	DATE
[signature]	1/25/05	SHAW LAB		[signature]	1-26-05

BC0523