



0065943

Geotechnical Laboratory  
PO Box 4339  
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Oak Ridge TN 37830  
(865) 482-6497

## CERTIFICATE OF ANALYSIS

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

January 5, 2005

This is the Certificate of Analysis for the following samples:

Shaw Project ID:	Eberline - Hanford
Shaw Project Number:	100846.36000000
Client Sample Data Group:	H2843
Date Received by Lab:	November 23, 2004
Number of Samples:	One (1)
Sample Type:	Soil

**RECEIVED**  
AUG 22 2005  
**EDMC**

### I. Introduction/Case Narrative

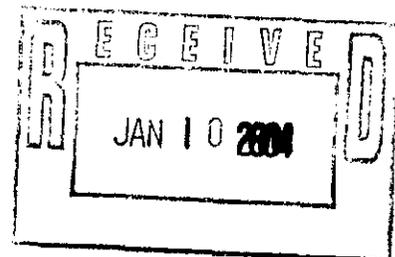
One soil sample was received by the Shaw Geotechnical Laboratory on November 23, 2004. The sample was submitted for determination of moisture content, bulk density, sieve analysis, permeability, specific gravity and calcium carbonate content. The sample number received was B19ND3.

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)*, 2004. 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
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.
- 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

This soil sample contained a significant amount of oversize particles. Therefore, in addition to the normal specific gravity test (ASTM D 854) the specific gravity of the coarse fraction was determined by ASTM C 127. The value representing the overall sample specific gravity is given as "average bulk specific gravity". Other values are given that relate to materials used in civil engineering fields.

**Appendix A**  
**Sample Cross-Reference List**

Page 4 of 12  
January 5, 2005  
Stephen Trent  
Fluor Hanford, Inc.  
Shaw Project Name: Eberline Hanford  
Shaw Project No. 100846.36000000  
SDG No. H2843

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

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**SAMPLE NUMBER CROSS-REFERENCE LIST**

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LAB SAMPLE NO.	CLIENT SAMPLE NO.	MATRIX
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BC0475 .....	B19ND3.....	Soil
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**Appendix B**  
**Sample Test Results**





**PARTICLE-SIZE DISTRIBUTION  
 ASTM D 422**

Project Name Eberline Hanford

Field Sample No. B19ND3

Project No. 100846.36000000

Lab Sample No. BC0475

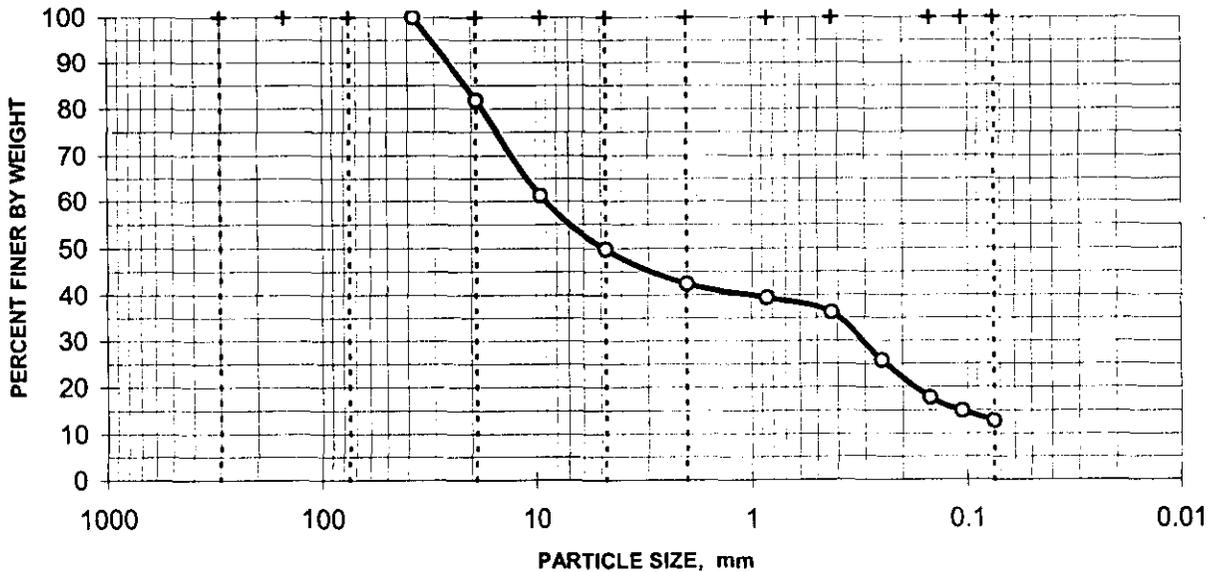
Moisture Content = 12.3%  
 based on dry sample weight

**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	81.8%
	0.375"	9.500	61.2%
	#4	4.750	49.7%
	#10	2.000	42.3%

F I N E	Sieve No.	Diameter mm	Percent Finer
	#20	0.850	39.3%
	#40	0.425	36.2%
	#60	0.250	25.6%
	#100	0.149	17.7%
	#140	0.106	14.9%
	#200	0.075	12.7%

**DISTRIBUTION CURVE**



50.3% Gravel

37.0% Sand

12.7% Silt/Clay

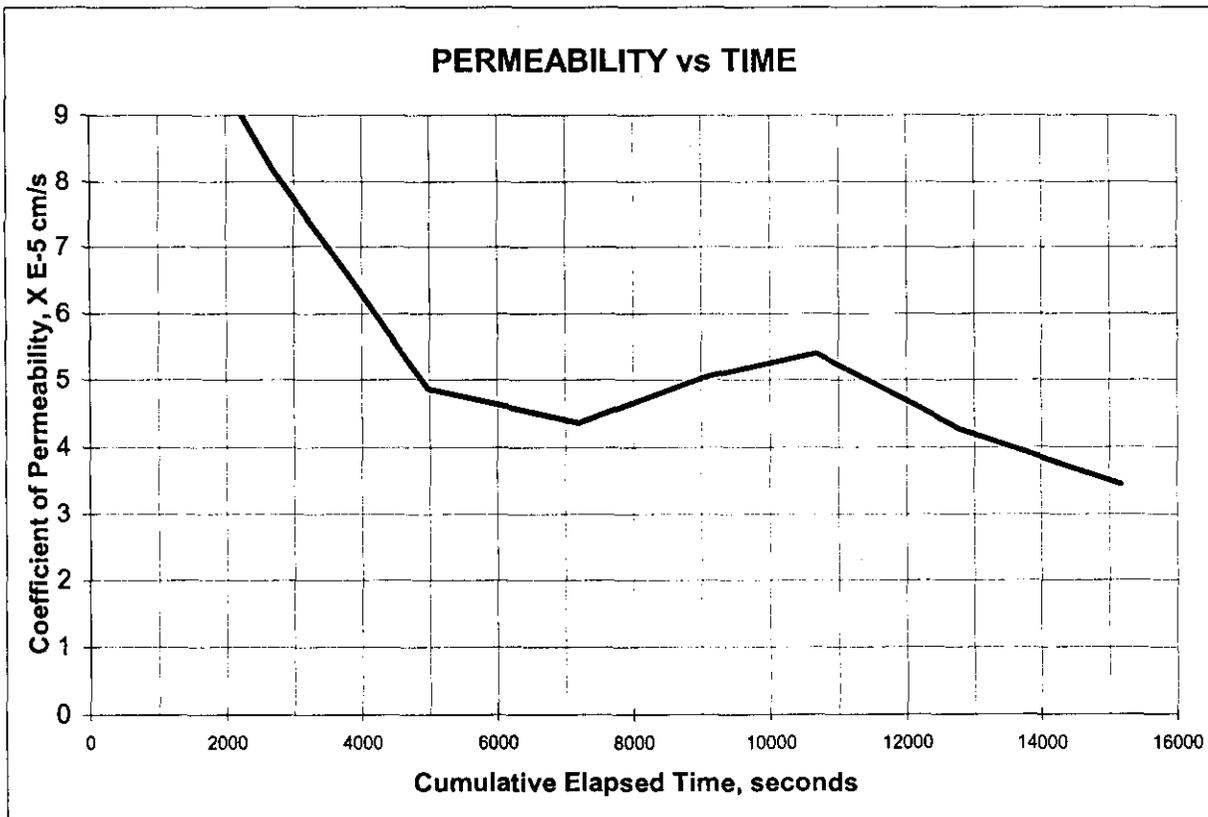
**HYDRAULIC CONDUCTIVITY / PERMEABILITY  
 ASTM D 5084**

PROJECT NAME: Eberline Hanford  
 PROJECT NO. 100846.36000000

CLIENT SAMPLE NO. B19ND3  
 LAB SAMPLE NO. BC0475

	INITIAL	FINAL		
Specimen diameter, cm	6.35		Hydraulic gradient	6.7
Specimen length, cm	5.28		Min. consolidation stress, psi	2.0
Wet weight of specimen, g.	366.87		Max. consolidation stress, psi	2.5
Specimen cross-sect. area, cm <sup>2</sup>	31.71		Total backpressure, psi	7.5
Water content, %	12.3			
Wet unit weight, pcf	136.7		Permeant Fluid	Deaired DI Water
Dry unit weight, pcf	121.7			
Degree of saturation, %	95.5			
Specific gravity of solids	2.60			

**Coefficient of Permeability, cm/s      4.5E-05**







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

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COLLECTOR: Pope/Pfister/Wiberg/Tyra / HUGHES  
 COMPANY CONTACT: Steve Trent TELEPHONE NO.: 373-5869 PROJECT COORDINATOR: TRENT, SJ  
 PRICE CODE: 8N DATA TURNAROUND: 45 Days / 45 Days  
 SAMPLING LOCATION: 216-Z-9/C3426 - Interval 377FT - 379.5FT PROJECT DESIGNATION: 216-Z-9 Trench Characterization Borehole - Soil SAF NO.: F03-018  
 AIR QUALITY:

ICE CHEST NO.: **GRP-03-016** FIELD LOGBOOK NO.: HNF-N-360 1 COA: 119325ES10 METHOD OF SHIPMENT: Federal Express

SHIPPED TO: Shaw Group OFFSITE PROPERTY NO.: **2u PTR 14450** BILL OF LADING/AIR BILL NO.: **2u PTR 14450**

MATRIX* A=Air DL=Drum Liquids DS=Drum Solids L=Liquid O=Oil S=Soil SE=Sediment T=Tissue V=Vegetation W=Water WI=Wipe X=Other	POSSIBLE SAMPLE HAZARDS/ REMARKS RADIOACTIVE TIE TO: B19LK7  SDG# H2843	PRESERVATION	None	None																
		TYPE OF CONTAINER	Moisture Resistant Cont.	Liner																
		NO. OF CONTAINER(S)	1	2																
		VOLUME	200g	1000g																
SPECIAL HANDLING AND/OR STORAGE		SAMPLE ANALYSIS	Moisture Content - D2216;	SEE ITEM (1) IN SPECIAL INSTRUCTIONS																

SAMPLE NO.	MATRIX*	SAMPLE DATE	SAMPLE TIME																
B19ND3	SOIL	11-11-04	13:45	✓	✓														
BC 0475																			

RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME
<i>Kay D. Hughes</i>	11-11-04 15:50	<i>Mo-026 site Fred</i>	11-11-04 15:30
<i>MR-026 site</i>	11/17/04 0910	<i>MR-026 site</i>	11/17/04 0910
<i>MR-026 site</i>	11/17/04 0910	<i>MR-026 site</i>	11/17/04 0910
<i>Fred</i>	11/18/04 10:00	<i>Raymondo Sch-2</i>	11/18/04 10:00
<i>And James</i>	11/22/04 3:30	<i>Fred</i>	11/22/04

SPECIAL INSTRUCTIONS  
 (1) Bulk Density - D2937; Particle Size (Dry Sieve) - D422; Saturated Hydraulic Conductivity; Particle Density - D854; Calcium Carbonate Content;

LABORATORY SECTION: RECEIVED BY: *Tulala* TITLE: SHAW ENVIRONMENTAL DATE/TIME: 11/23/04 @ 1000  
 FINAL SAMPLE DISPOSITION: DISPOSAL METHOD: DISPOSED BY: DATE/TIME:

SDG# H2843  
Eberline Srvcas

CHAIN OF CUSTODY

ORD # R4-11-172

11/19/04 10:22:55

WORK ID: SAF# F03-018 SDG H2843

RCVD: 11/18/04 DOE: 01/02/05

KEEP: 01/02/06 DISP: S

DASH	SAMPLE IDENTIFICATION	STORED	TESTS				
01A-S	B19ND3	SHAW	DISPOS	E331S	E333S	E335S	E342S

RELEASED BY	DATE	TRANSFERRED TO	DATE	RECEIVED BY	DATE
<i>[Signature]</i>	11/22/04	<i>Shaw</i>	11/21/04	<i>[Signature]</i>	11-23/04
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____