



Shaw Environmental & Infrastructure, Inc.

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Geotechnical Laboratory  
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## ***CERTIFICATE OF ANALYSIS***

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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:	<b>Eberline - Hanford</b>
Shaw Project Number:	<b>100846.7900000</b>
Client SDG Number:	H3793
Date Received by Lab:	July 15, 2008
Number of Samples:	Three (3)
Sample Type:	Soil

### **I. Introduction/Case Narrative**

Three soil samples were received by the Shaw Geotechnical Laboratory on July 15, 2008. The samples were submitted for determination of moisture content, bulk density, and sieve analysis. The sample numbers received were B1VJ69, B1VJ70 and B1VJ71.

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

## 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.

- 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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SAMPLE NUMBER CROSS-REFERENCE LIST

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LAB SAMPLE NO.	CLIENT SAMPLE NO.	MATRIX
BC1414 .....	B1VJ69 .....	Soil
BC1415 .....	B1VJ70 .....	Soil
BC1416 .....	B1VJ71 .....	Soil

## **Appendix B Data Results**





**PARTICLE-SIZE DISTRIBUTION  
 ASTM D 422**

Project Name Eberline Hanford

Field Sample No. B1VJ69

Project No. 100846.79000000

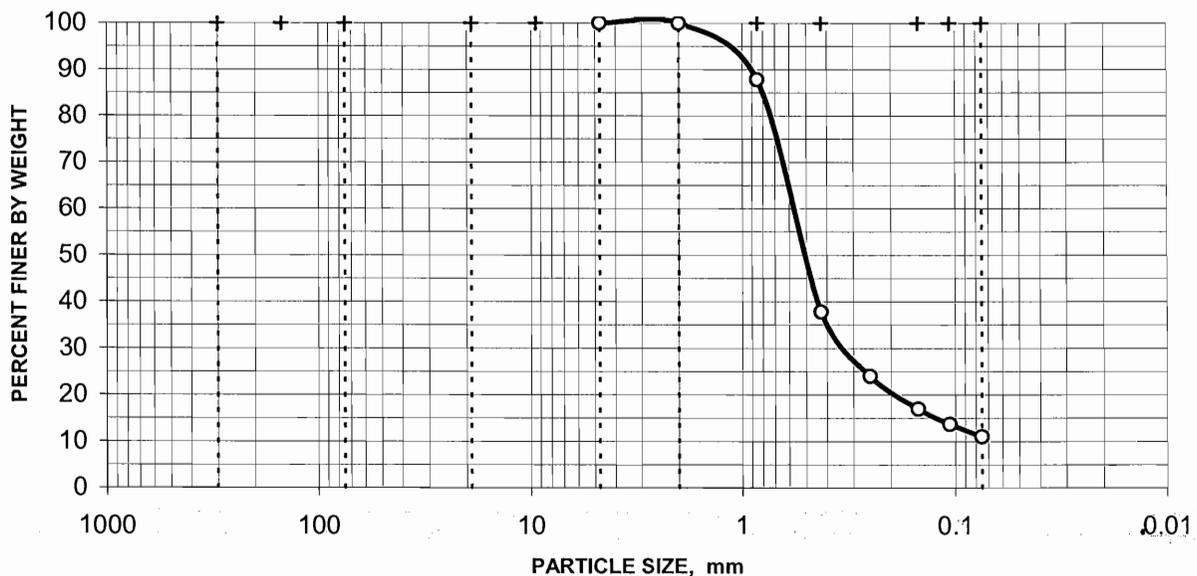
Lab Sample No. BC1414

**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	99.9%

F I N E	Sieve No.	Diameter mm	Percent Finer
	#20	0.850	87.7%
	#40	0.425	37.8%
	#60	0.250	24.0%
	#100	0.149	16.9%
	#140	0.106	13.6%
	#200	0.075	11.0%

**DISTRIBUTION CURVE**



0.0% Gravel

89.0% Sand

11.0% Silt/Clay

**PARTICLE-SIZE DISTRIBUTION  
 ASTM D 422**

Project Name Eberline Hanford

Field Sample No. B1VJ70

Project No. 100846.79000000

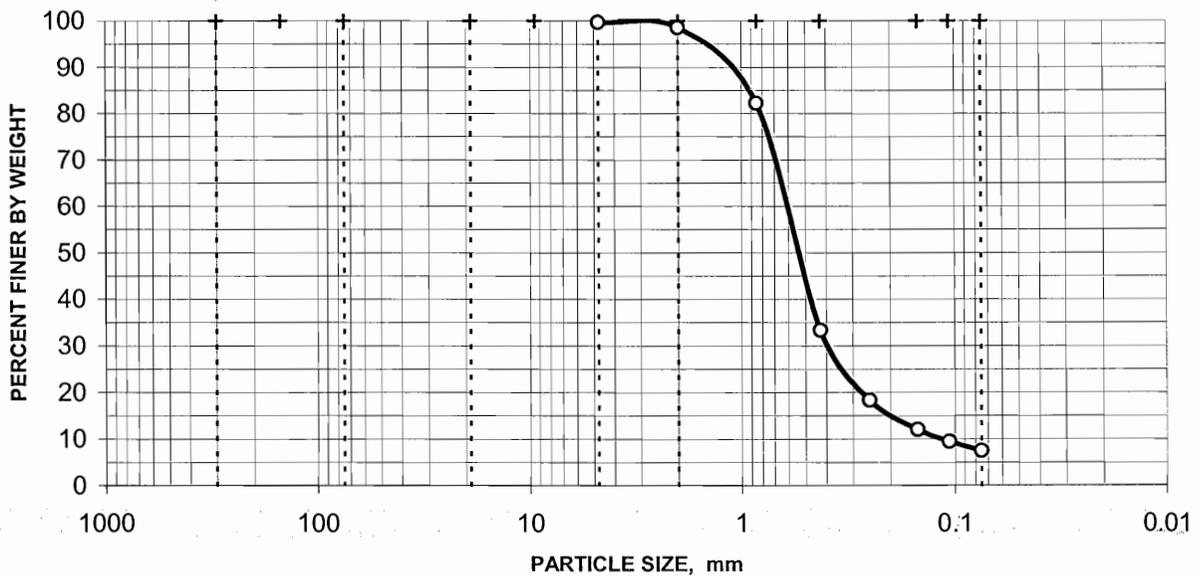
Lab Sample No. BC1415

**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	99.6%
	#10	2.000	98.5%

F I N E	Sieve No.	Diameter mm	Percent Finer
	#20	0.850	82.2%
	#40	0.425	33.3%
	#60	0.250	18.3%
	#100	0.149	12.0%
	#140	0.106	9.4%
	#200	0.075	7.5%

**DISTRIBUTION CURVE**



0.4% Gravel

92.2% Sand

7.5% Silt/Clay

**PARTICLE-SIZE DISTRIBUTION  
 ASTM D 422**

Project Name Eberline Hanford

Field Sample No. B1VJ71

Project No. 100846.79000000

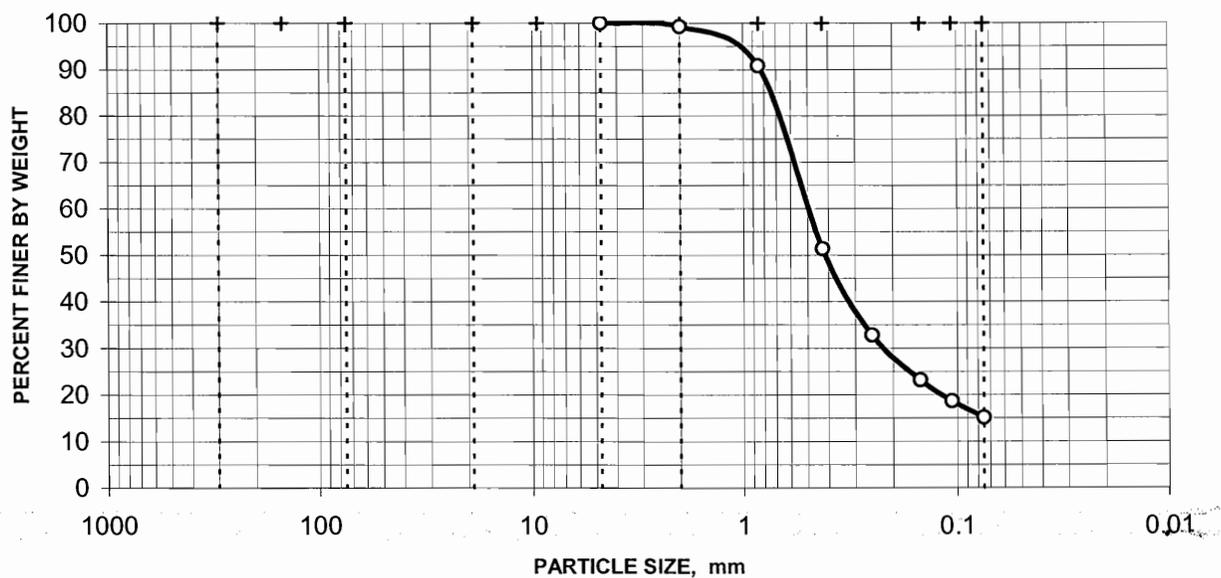
Lab Sample No. BC1416

**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	99.3%

F I N E	Sieve No.	Diameter mm	Percent Finer
	#20	0.850	90.8%
	#40	0.425	51.4%
	#60	0.250	32.8%
	#100	0.149	23.1%
	#140	0.106	18.7%
	#200	0.075	15.1%

**DISTRIBUTION CURVE**



0.0% Gravel

84.9% Sand

15.1% Silt/Clay

**Appendix C**  
**Chain of Custody Records**

Fluor Hanford Inc.		CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST				F08-126-019	PAGE 1 OF 1		
COLLECTOR <i>KACZ/MCINTYRE</i>		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-009		PROJECT DESIGNATION 216-A-5 Crib Characterization Sampling and Analysis - Soil				SAF NO. F08-126		AIR QUALITY <input type="checkbox"/>	
ICE CHEST NO. <i>GRP-04-001</i>		FIELD LOGBOOK NO. <i>HNF-N-585-2</i>		ACTUAL SAMPLE DEPTH <i>49.6 to 52.1</i>		COA 123124ES10		METHOD OF SHIPMENT FEDERAL EXPRESS	
SHIPPED TO Shaw Group		OFFSITE PROPERTY NO. SEE PTR				BILL OF LADING/AIR BILL NO. <i>7984-7889-2661</i>			
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 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)		PRESERVATION	None	None				
			TYPE OF CONTAINER	Split Spoon Liner	Moisture Resistant Cont				
			NO. OF CONTAINER(S)	1	1				
			VOLUME	1000g	200g				
	SPECIAL HANDLING AND/OR STORAGE Radioactive Tie To: B1VHY1		SAMPLE ANALYSIS	SEE ITEM (1) IN SPECIAL INSTRUCTIONS	Moisture Content - D2216;				
SAMPLE NO.		MATRIX*	SAMPLE DATE	SAMPLE TIME					
B1VJ69		SOIL	<i>07-08-08</i>	<i>1317</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			
									BC 1414
		<i>LOT<sup>D</sup></i>			<i>n/a</i>	<i>n/a</i>			
CHAIN OF POSSESSION			SIGN/ PRINT NAMES			SPECIAL INSTRUCTIONS			
RELINQUISHED BY/REMOVED FROM <i>Ed Kacz / Ed Schultz</i>	DATE/TIME <i>7-8-08 1530</i>	RECEIVED BY/STORED IN <i>Site Ref #1</i>	DATE/TIME <i>7-8-08 1530</i>	** The 200 Area S&GRP Characterization and Monitoring Sampling and Analysis GKI applies to this SAF.					
RELINQUISHED BY/REMOVED FROM <i>A.S. Site Ref #1</i>	DATE/TIME <i>7-14-8 1100</i>	RECEIVED BY/STORED IN <i>D. Connolly</i>	DATE/TIME <i>7-14-8 1100</i>	** Analytical batch QC must be run on a sample associated with this SAF.					
RELINQUISHED BY/REMOVED FROM <i>D. Connolly</i>	DATE/TIME <i>7-14-8 1400</i>	RECEIVED BY/STORED IN <i>FedEx</i>	DATE/TIME	(1) Bulk Density - D2937; Particle Size (Dry Sieve) - D422;					
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						
LABORATORY SECTION	RECEIVED BY <i>DM Huley</i>	TITLE <i>LAB TECH</i>		DATE/TIME <i>7/15/08/0930</i>					
FINAL SAMPLE DISPOSITION	DISPOSAL METHOD <i>SHAWELZ</i>	DISPOSED BY		DATE/TIME					

Fluor Hanford Inc.		CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST				F08-126-023	PAGE 1 OF 1
COLLECTOR <i>Kavir Rosare, McIntyre</i>		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-011		PROJECT DESIGNATION 216-A-5 Crib Characterization Sampling and Analysis - Soil			SAF NO. F08-126	AIR QUALITY <input type="checkbox"/>	
ICE CHEST NO. <i>GRP-04-001</i>		FIELD LOGBOOK NO. <i>HNF-N-585-2</i>	ACTUAL SAMPLE DEPTH <i>57.9-60</i>	COA 123124ES10	METHOD OF SHIPMENT FEDERAL EXPRESS		
SHIPPED TO Shaw Group		OFFSITE PROPERTY NO. SEE PTR		BILL OF LADING/AIR BILL NO. <i>79FY-7889-2661</i>			
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 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)		PRESERVATION	None	None		
	<i>H3793</i>		TYPE OF CONTAINER	Split Spoon Liner	Moisture Resistant Cont		
			NO. OF CONTAINER(S)	1	1		
			VOLUME	1000g	200g		
	SPECIAL HANDLING AND/OR STORAGE Radioactive Tie To: B1VHY8 <i>Lot #</i>		SAMPLE ANALYSIS	SEE ITEM (1) IN SPECIAL INSTRUCTIONS <i>031204</i>	Moisture Content - D2216;		
SAMPLE NO.	MATRIX*	SAMPLE DATE	SAMPLE TIME				
B1VJ70	SOIL	7-9-08	0830	✓	✓	BC 1415	
CHAIN OF POSSESSION				SIGN/ PRINT NAMES		SPECIAL INSTRUCTIONS	
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME	** The 200 Area S&GRP Characterization and Monitoring Sampling and Analysis GKI applies to this SAF.			
<i>Larry Rosare</i>	<i>7-9-08 1100</i>	<i>A-S Ref</i>	<i>7-9-08 1100</i>	** Analytical batch QC must be run on a sample associated with this SAF.			
<i>A-S Ref</i>	<i>7-14-8 1100</i>	<i>Donnelly OS</i>	<i>7-14-8 1100</i>	(1) Bulk Density - D2937; Particle Size (Dry Sieve) - D422;			
<i>Donnelly OS</i>	<i>7-14-8 1400</i>	<i>Fel Ex</i>					
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				
LABORATORY SECTION	RECEIVED BY <i>Shaw E+I</i>	TITLE <i>LAB TEST</i>		DATE/TIME <i>7/15/08/0930</i>			
FINAL SAMPLE DISPOSITION	DISPOSAL METHOD	DISPOSED BY		DATE/TIME			

31 125

Fluor Hanford Inc.		CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST				F08-126-027	PAGE 1 OF 1
COLLECTOR <i>Karin Rosane, McIntyre</i>		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-013		PROJECT DESIGNATION 216-A-5 Crib Characterization Sampling and Analysis - Soil		SAF NO. F08-126	AIR QUALITY <input type="checkbox"/>		
ICE CHEST NO. <i>GRP-04-001</i>		FIELD LOGBOOK NO. <i>HWF-N-585-2</i>	<sup>fist</sup> ACTUAL SAMPLE DEPTH <i>59.2 to 62.0</i>	COA 123124ES10	METHOD OF SHIPMENT FEDERAL EXPRESS		
SHIPPED TO Shaw Group		OFFSITE PROPERTY NO. SEE PTR		BILL OF LADING/AIR BILL NO. <i>7984-7889-2661</i>			
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 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)  <i>H3793</i>		PRESERVATION None	None			
			TYPE OF CONTAINER Split Spoon Liner	Moisture Resistant Cont			
			NO. OF CONTAINER(S)	1	1		
			VOLUME	1000g	200g		
		SPECIAL HANDLING AND/OR STORAGE Radioactive Tie To: B1VJ00	SAMPLE ANALYSIS	SEE ITEM (1) IN SPECIAL INSTRUCTIONS	Moisture Content - D2216;		

SAMPLE NO.	MATRIX*	SAMPLE DATE	SAMPLE TIME						
B1VJ71	SOIL	07-09-08	09:35	✓	✓				
									BC 1416

CHAIN OF POSSESSION		SIGN/ PRINT NAMES	
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME
<i>El Karin / [Signature]</i>	<i>07-09-08 / 1100</i>	<i>A. Site Ref</i>	<i>07-09-08 / 1100</i>
<i>A. Site Ref</i>	<i>7-14-8 1100</i>	<i>D. Connolly</i>	<i>7-14-8 1100</i>
<i>D. Connolly</i>	<i>7-14-8 1400</i>	<i>Fed Ex</i>	
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;

LABORATORY SECTION	RECEIVED BY <i>[Signature]</i>	TITLE <i>LMB Tech</i>	DATE/TIME <i>7/15/08 / 0930</i>
FINAL SAMPLE DISPOSITION	DISPOSAL METHOD	DISPOSED BY	DATE/TIME