



Shaw Environmental & Infrastructure, Inc.

RECEIVED MARCH 15, 2011

0097697

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

EBER0111055

KB 3-21-11

**CERTIFICATE OF ANALYSIS**

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

March 14, 2011

This is the Certificate of Analysis for the following samples:

Shaw Project ID: Eberline Analytical  
Shaw Project Number: 139736  
Date Received by Lab: 02/07/2011  
Number of Samples: Four (4)  
Sample Type: Soil

I. Introduction/Case Narrative

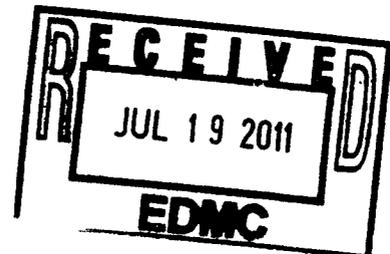
Four (4) soil samples were received by the Shaw Geotechnical Laboratory on February 7, 2011. The samples were submitted for determination of bulk density, moisture content, particle size, and hydraulic conductivity/permeability as listed on the Chain of Custody/Sample Analysis Request. The sample numbers for the received samples were B29C45, B2B925, B2B926, B2BBP2.

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:

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 .....	<b>ASTM D 2937</b>
Moisture Content.....	<b>ASTM D 2216</b>
Particle Size (sieve Only).....	<b>ASTM D 422</b>
Permeability .....	<b>ASTM D 5084</b>

## 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

None

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

Page 4 of 14  
Report No.: EBER0111055  
Mr. Michael Neely  
Client: CH2M Hill Plateau Remediation Company  
Shaw Project Name: Eberline Analytical  
Shaw Project No.: 139736

**Shaw  
Geotechnical Laboratory  
Knoxville, TN  
(865) 690-3211**

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**SAMPLE NUMBER CROSS-REFERENCE LIST**

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<b>Lab Sample ID</b>	<b>Client Sample ID</b>	<b>MATRIX</b>
<b>SEK 5409</b>	<b>B29C45</b>	<b>SOIL</b>
<b>SEK 5410</b>	<b>B2B925</b>	<b>SOIL</b>
<b>SEK 5411</b>	<b>B2B926</b>	<b>SOIL</b>
<b>SEK 5412</b>	<b>B2BBP2</b>	<b>SOIL</b>

**Appendix B**  
**Data Results**





**PARTICLE-SIZE DISTRIBUTION**  
**ASTM D 422**

Project Name Eberine

Field Sample No. B2B925

Project No. 139736.12000000

Lab Sample No. SEK 5410

Moisture Content = 5.4%

**SIEVE ANALYSIS**

C O A R S E	Sieve No.	Diameter mm	Percent Finer
	3"	75.000	100.0%
	1.5"	37.500	87.2%
	0.75"	19.000	49.6%
	0.375"	9.500	32.0%
	#4	4.750	25.4%
	#10	2.000	21.8%

F I N E	Sieve No.	Diameter mm	Percent Finer
	#20	0.850	19.3%
	#40	0.425	15.9%
	#60	0.250	7.1%
	#100	0.149	3.9%
	#140	0.106	2.8%
	#200	0.075	2.1%

74.6% Gravel

23.3% Sand

2.1% Silt/Clay

**PARTICLE-SIZE DISTRIBUTION**  
**ASTM D 422**

Project Name Eberine

Field Sample No. B2B926

Project No. 139736.12000000

Lab Sample No. SEK 5411

Moisture Content = 27.5%

**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	96.6%
	#4	4.750	91.8%
	#10	2.000	88.5%

F I N E	Sieve No.	Diameter mm	Percent Finer
	#20	0.850	86.1%
	#40	0.425	83.3%
	#60	0.250	76.2%
	#100	0.149	49.4%
	#140	0.106	33.5%
	#200	0.075	24.2%

8.2% Gravel

67.5% Sand

24.2% Silt/Clay

**PARTICLE-SIZE DISTRIBUTION**  
**ASTM D 422**

Project Name Eberine

Field Sample No. B2BBP2

Project No. 139736.12000000

Lab Sample No. SEK 5412

Moisture Content = 17.0%

**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	96.2%

F I N E	Sieve No.	Diameter mm	Percent Finer
	#20	0.850	44.0%
	#40	0.425	10.5%
	#60	0.250	4.8%
	#100	0.149	3.4%
	#140	0.106	3.1%
	#200	0.075	2.7%

0.0% Gravel

97.3% Sand

2.7% Silt/Clay

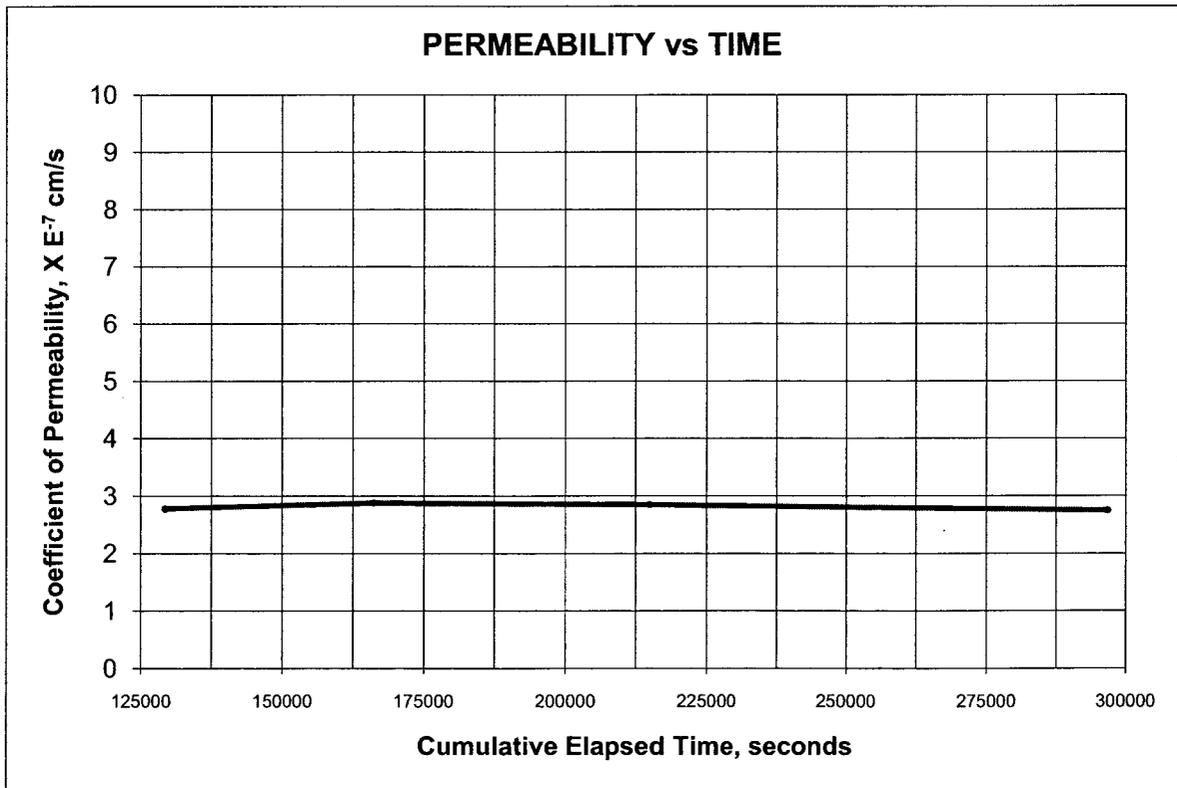
**HYDRAULIC CONDUCTIVITY / PERMEABILITY**  
**ASTM D 5084**

PROJECT NAME: Eberline  
 PROJECT NO. 139736.12000000

CLIENT SAMPLE NO. B29C45  
 LAB SAMPLE NO. SEK 5409

	INITIAL	FINAL		
Specimen diameter, cm	7.25			
Specimen length, cm	14.24		Hydraulic gradient	24.7
Wet weight of specimen, g.	1202.86		Min. consolidation stress, psi	2.0
Specimen cross-sect. area, cm <sup>2</sup>	41.29		Max. consolidation stress, psi	7.0
Water content, %	27.1		Total backpressure, psi	63.0
Wet unit weight, pcf	127.8		Permeant Fluid	Deaired Tap Water
Dry unit weight, pcf	100.5			
Est. degree of saturation, %	111.2	111.2		
Specific gravity of solids, assumed	2.65			

**Coefficient of Permeability, cm/s      2.8E-07**



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

**CH2M Hill Plateau Remediation Company**

**COLLECTOR**  
Emerson

**SAMPLING LOCATION**  
C7688 (199-K-188); I-057

**ICE CHEST NO.**  
CWS-197

**SHIPPED TO**  
Shaw Group

**CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST**

**COMPANY CONTACT**  
DYEKMAN, DL

**TELEPHONE NO.**  
373-2530

**PROJECT COORDINATOR**  
RADLOFF, AW

**PRICE CODE**  
8N

**PAGE 1 OF 1**

**PROJECT DESIGNATION**  
100 Area Remedial Investigation/Feasibility Analysis - 100-KR-4 Soils

**SAF NO.**  
F10-207

**AIR QUALITY**

**Data Turnaround**  
30 Days/30 Days

**FIELD LOGBOOK NO.**  
HNF-N-585-1/45

**ACTUAL SAMPLE DEPTH**  
209.4-211.9 ft

**COA**  
300082ES10

**METHOD OF SHIPMENT**  
FEDERAL EXPRESS

**OFFSITE PROPERTY NO.**  
SEE PTR

**BILL OF LADING/AIR BILL NO.**  
796729923992

POSSIBLE SAMPLE HAZARDS/ REMARKS	PRESERVATION	None	None
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)	None	None	None
<b>HOLDING TIME</b>	None	None	None
<b>TYPE OF CONTAINER</b>	Liner	Moisture Resistant	1
<b>NO. OF CONTAINER(S)</b>	1	1	1
<b>VOLUME</b>	1000g	200g	200g
<b>SAMPLE ANALYSIS</b>	SEE ITEM (1) IN SPECIAL INSTRUCTIONS	Moisture Content - D2216	✓
<b>SAMPLE DATE</b>	2/3/11	1250	✓
<b>SAMPLE TIME</b>			

**SEK 5409**

**SAMPLE NO.** B29C45

**MATRIX\*** SOIL

**SPECIAL HANDLING AND/OR STORAGE**

14 of 17

**CHAIN OF POSSESSION**

RELINQUISHED BY/REMOVED FROM	DATE/TIME	SIGN/ PRINT NAMES	RECEIVED BY/STORED IN	DATE/TIME
William Emerson	2/3/11 1400		M.A. White	2/3/11 1400
MO-413 SSU/RI	FEB 04 2011 0910		M.A. White	FEB 04 2011 0910
RELINQUISHED BY/REMOVED FROM	DATE/TIME		RECEIVED BY/STORED IN	DATE/TIME
M.A. White	FEB 04 2011 1400		FEDEX	
RELINQUISHED BY/REMOVED FROM	DATE/TIME		RECEIVED BY/STORED IN	DATE/TIME
			FEDEX	
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**  
Jed Johnson

**RECEIVED BY**  
R50

**FINAL SAMPLE DISPOSITION**  
DISPOSAL METHOD

**SPECIAL INSTRUCTIONS**  
\*\* Physical Properties laboratory: Conduct the hydraulic conductivity test (ASTM 5084 or 2434) as appropriate to the sample matrix.  
(1) Bulk Density - D2937; Saturated Hydraulic Conductivity {Hydraulic Conductivity}; Permeability - D2434 {Hydraulic Conductivity};

**ORIGINAL**

**DATE/TIME**  
2-7-11 10:10

**DISPOSED BY**

**TITLE**

**DATE/TIME**

CH2M Hill Plateau Remediation Company

COLLECTOR: *Lozano Rest Higuer*

SAMPLING LOCATION: C7662 (399-4-15); I-022

ICE CHEST NO.: *6205-197*

SHIPPED TO: Shaw Group

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

COMPANY CONTACT: RADLOFF, AW

TELEPHONE NO.: 376-4554

PROJECT COORDINATOR: RADLOFF, AW

PRICE CODE: 8H

DATA TURNAROUND: 30 Days / 30 Days

PROJECT DESIGNATION: 300 Area Remedial Investigation/Feasibility Analysis - 300-FF-5 Soils

FIELD LOGBOOK NO.: *HMI-N-503-2 pg 96*

ACTUAL SAMPLE DEPTH: *102.4 - 104.9*

SAF NO.: F10-196

COA: 300206ES10

METHOD OF SHIPMENT: FEDERAL EXPRESS

BILL OF LADING/AIR BILL NO.: *796729923992*

SEE PTR

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: Liner

NO. OF CONTAINER(S): 1

VOLUME: 1000g

SAMPLE ANALYSIS: SEE ITEM (1) IN SPECIAL INSTRUCTIONS

SPECIAL HANDLING AND/OR STORAGE:

SAMPLE NO.: 1028925

MATRIX\*: SOIL

SAMPLE DATE: *2-3-11*

SAMPLE TIME: *0838*

SEK 5410

*@ 4.5 lbs.*

CHAIN OF POSSESSION

RELINQUISHED BY/REMOVED FROM	DATE/TIME	SIGN/ PRINT NAMES	RECEIVED BY/STORED IN	DATE/TIME
<i>Lozano Rest Higuer</i>	<i>2-3-11 1450</i>		<i>M.A. White</i>	<i>2-3-11 1450</i>
<i>M.A. White</i>	<i>2-3-11 1545</i>		<i>SSU-R1</i>	<i>2-3-11 1545</i>
<i>MO-413 SSURT</i>	<i>FEB 04 2011 0910</i>		<i>M.A. White</i>	<i>FEB 04 2011 0910</i>
<i>M.A. White</i>	<i>FEB 04 2011 1400</i>		<i>FEDEX</i>	

SPECIAL INSTRUCTIONS: \*\* The 300 Area S&GRP Characterization and Monitoring Sampling and Analysis GKI applies to this SAF. (1) Bulk Density - D2937; Particle Size (Dry Sieve) - D422;

ORIGINAL

LABORATORY SECTION: *Lab*

RECEIVED BY: *Lab*

DISPOSAL METHOD: *R50*

TITLE: *R50*

DATE/TIME: *2-7-11 @ 1100*

DISPOSED BY: *R50*

DATE/TIME: *2-7-11 @ 1100*

A-6003-618 (REV 2)

**CH2M Hill Plateau Remediation Company**

**COLLECTOR**  
*Rosanne Higgins*

**SAMPLING LOCATION**  
C7662 (399-4-15); I-023

**ICE CHEST NO.**  
Cews-197

**CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST**

**COMPANY CONTACT**  
RADLOFF, AW  
TELEPHONE NO.  
376-4554

**PROJECT DESIGNATION**  
300 Area Remedial Investigation/Feasibility Analysis - 300-FF-5 Soils

**FIELD LOGBOOK NO.**  
HNF-N-583-2 A 94  
OFFSITE PROPERTY NO.  
86.5-87.0

**PROJECT COORDINATOR**  
RADLOFF, AW

**SAF NO.**  
F10-196

**COA**  
300206ES10

**BILL OF LADING/AIR BILL NO.**  
796729923992

**PRICE CODE**  
8H

**AIR QUALITY**

**METHOD OF SHIPMENT**  
FEDERAL EXPRESS

**PAGE 1 OF 1**

**DATA TURNAROUND**  
30 Days / 30 Days

**SHIPPED TO**  
Shaw Group

**PRESERVATION**  
None

**HOLDING TIME**  
None

**TYPE OF CONTAINER**  
Liner

**NO. OF CONTAINER(S)**  
1

**VOLUME**  
1000g

**SAMPLE ANALYSIS**  
SEE ITEM (1) IN SPECIAL INSTRUCTIONS

**SEK 5411**

**25.1 lbs.**

**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)

**SPECIAL HANDLING AND/OR STORAGE**

**SAMPLE NO.**  
102B926

**MATRIX\***  
SOIL

**SAMPLE DATE**  
2-1-11

**SAMPLE TIME**  
1455

CHAIN OF POSSESSION	SIGN/ PRINT NAMES	RECEIVED BY/STORED IN	DATE/TIME
RELINQUISHED BY/REMOVED FROM <i>Larry Rozzi - Tony Rozzi</i>		MO-744 SSU-R3	2-1-11 1600
RELINQUISHED BY/REMOVED FROM T.A. Wallace		RECEIVED BY/STORED IN T.A. Wallace	2-2-11 1250
RELINQUISHED BY/REMOVED FROM T.A. Wallace		RECEIVED BY/STORED IN MO-413 SSU-R1	2-2-11 1530
RELINQUISHED BY/REMOVED FROM M.A. White		RECEIVED BY/STORED IN M.A. White	FEB 04 2011 0910
RELINQUISHED BY/REMOVED FROM		RECEIVED BY/STORED IN FEDEX	FEB 04 2011 1400
RELINQUISHED BY/REMOVED FROM		RECEIVED BY/STORED IN	DATE/TIME
RELINQUISHED BY/REMOVED FROM		RECEIVED BY/STORED IN	DATE/TIME

**LABORATORY SECTION**  
*RSD*

**RECEIVED BY**  
*[Signature]*

**DISPOSAL METHOD**

**TITLE**  
RSD

**DATE/TIME**  
2-7-11 0100

**DISPOSED BY**

**DATE/TIME**

**SPECIAL INSTRUCTIONS**  
\*\* The 300 Area S&GRP Characterization and Monitoring Sampling and Analysis GKI applies to this SAF.  
(1) Bulk Density - D2937; Particle Size (Dry Sieve) - D422;

**ORIGINAL**

CH2MHill Plateau Remediation Company

COLLECTOR: *Rosario Higueras*

SAMPLING LOCATION: C7662 (399-4-15); 1-019

ICE CHEST NO.: *Celex - 197*

SHIPPED TO: Shaw Group

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

COMPANY CONTACT: RADLOFF, AW 376-4554

PROJECT DESIGNATION: 300 Area Remedial Investigation/Feasibility Analysis - 300-FF-5 Soils

FIELD LOGBOOK NO.: *71.5-73.2*

OFFSITE PROPERTY NO.: *74*

SEE PTR

PROJECT COORDINATOR: RADLOFF, AW

SAF NO.: F10-196

COA: 300206ES10

BILL OF LADING/AIR BILL NO.: *796729923992*

SEE PTR

F10-196-211

PRICE CODE: 8H

AIR QUALITY:

METHOD OF SHIPMENT: FEDERAL EXPRESS

PAGE 1 OF 1

DATA TURNAROUND: 30 Days / 30 Days

MATRIX*	POSSIBLE SAMPLE HAZARDS/ REMARKS	PRESERVATION	Note
A=Air	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)	HOLDING TIME	None
DL=Drum		TYPE OF CONTAINER	Liner
DS=Drum		NO. OF CONTAINER(S)	1
L=Liquid		VOLUME	100kg
O=Oil		SAMPLE ANALYSIS	SEE ITEM (1) IN SPECIAL INSTRUCTIONS
S=Soil		SAMPLE DATE	2-1-11
SE=Sediment		SAMPLE TIME	1008
T=Tissue			
V=Vegetation			
W=Water			
WI=Wipe			
X=Other			

SEK 5412

*25.5 lbs.*

17 of 17

SPECIAL INSTRUCTIONS

\*\* The CACN for WSCF Analytical is 401980.  \*\* The 300 Area S&GRP Characterization and Monitoring Sampling and Analysis GKI applies to this SAF.

(1) Bulk Density - D2937; Particle Size (Dry Sieve) - D422;

ORIGINAL

CHAIN OF POSSESSION	SIGN/ PRINT NAMES	DATE/TIME	DATE/TIME
RELINQUISHED BY/REMOVED FROM	RECEIVED BY/STORED IN	DATE/TIME	DATE/TIME
<i>Levy Rose</i>	<i>M.A. White</i>	2-1-11 1408	2-1-11 1400
RELINQUISHED BY/REMOVED FROM	RECEIVED BY/STORED IN	DATE/TIME	DATE/TIME
<i>M.A. White</i>	<i>SSU-R1</i>	2-1-11 1530	2-1-11 1530
RELINQUISHED BY/REMOVED FROM	RECEIVED BY/STORED IN	DATE/TIME	DATE/TIME
<i>M.A. White</i>	<i>M.A. White</i>	FEB 04 2011 0910	FEB 04 2011 0910
RELINQUISHED BY/REMOVED FROM	RECEIVED BY/STORED IN	DATE/TIME	DATE/TIME
<i>M.A. White</i>	<i>FEDEX</i>	FEB 04 2011 1400	
RELINQUISHED BY/REMOVED FROM	RECEIVED BY/STORED IN	DATE/TIME	DATE/TIME
RELINQUISHED BY/REMOVED FROM	RECEIVED BY/STORED IN	DATE/TIME	DATE/TIME
RELINQUISHED BY/REMOVED FROM	RECEIVED BY/STORED IN	DATE/TIME	DATE/TIME

LABORATORY SECTION: *Paul Adams*

RECEIVED BY: *Paul Adams*

DISPOSAL METHOD: *R50*

DATE/TIME: *2-7-11 @ 1100*

DISPOSED BY:

TITLE: *R50*