U.S. DEPARTMENT OF ENERGY

PNNL-18197

Prepared for the U.S. Department of Energy
under Contract DE-AC05-76RL01830

Analytical Data Report for Sediment Samples Collected From Well 299-E25-236 in the 200-PO-1 Operable Unit

Michael Lindberg

January 2009

Pacific Northwest
NATIONAL LABORATORY

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Pacific Northwest National Laboratory
Richland, Washington 99352

01/27/09 15:24

To: Dale Dyekman

From: Michael J. Lindberg

Environmental Sciences Laboratory
Energy and Environment Directorate, Pacific Northwest National Laboratory

Subject: Analytical Data Report for Sediment Samples Collected From Well 299-E25-236 in the 200-PO-1 Operable Unit, Sample Delivery Group ESL080031, SAF Number F08-150

This letter contains the following information for sample delivery group ESL080031

- Cover Sheet
- Narrative
- Analytical Results
- Quality Control
- Geologic Logs
- Geologic Photos
- Chain of Custodies

Introduction

On September 11, 2008 sediment samples were received from Well 299-E25-236 in the 200-PO-1 Operable Unit for geochemical studies.

Analytical Results/Methodology

The analyses for this project were performed at the 325 building located in the 300 Area of the Hanford Site. The analyses were performed according to Pacific Northwest National Laboratory (PNNL) approved procedures and/or nationally recognized test procedures. The data sets include the sample identification numbers, analytical results, estimated quantification limits (EQL), and quality control data.

Quality Control

The preparatory and analytical quality control requirements, calibration requirements, acceptance criteria, and failure actions are defined in the on-line QA plan "Conducting Analytical Work in Support of Regulatory Programs" (CAW). This QA plan implements the Hanford Analytical Services Quality Assurance Requirements Documents (HASQARD) for PNNL.

Definitions

Dup	Duplicate
RPD	Relative Percent Difference
NR	No Recovery (percent recovery less than zero)
ND	Non-Detectable
%REC	Percent Recovery

Sample Receipt

Samples were received with a chain of custody (COC) and were analyzed according to the sample identification numbers supplied by the client. All Samples were refrigerated upon receipt until prepared for analysis.

All samples were received with custody seals intact unless noted in the Case Narrative.

Holding Times

Holding time is defined as the time from sample preparation to the time of analyses. The prescribed holding times were met for all analytes unless noted in the Case Narrative.

Analytical Results

All reported analytical results meet the requirements of the CAW or client specified SOW unless noted in the case narrative.

Case Narrative Report

Hold Time:

All samples were analyzed within the recommended holding times.

Preparation Blank (PB):

No discrepancies noted.

Duplicate (DUP):

No discrepancies noted.

Laboratory Control Samples (LCS):

An LCS was not run for alkalinity, specific conductivity and pH for these samples. There is no commercially available material to monitor preparation effectiveness for these constituents, so a blank spike would be utilized. For this process the blank spike would be the same as the standard used for the calibration or calibration checks. There would no difference between the ICV and an LCS with the exception of filtering the sample through a 0.45 uM filter. The filtering process would not impact the calibration or calibration check solution concentrations. Therefore the ICV should be considered an LCS for these constituents.

The samples analyzed for this project were considered non-radiological. In order to run an LCS for Tc-99, the samples would have to be prepared in a radiological area. The samples and associated liquids prepared in a radiologically controlled area would be considered radiological. To maintain ALARA principals and to reduce the amount of radioactive waste produced, a radiological LCS is typically not performed. There should be no impact to data as reported since the same preparation for total and trace metals is used for radionuclides. The extraction efficiencies were monitored by the LCS for the total and trace metals.

The blank spike solution analyzed as the LCS for inductively coupled plasma optical emissions spectrometry does not contain strontium. Preparation effectiveness for this constituent is monitored by the recoveries of the other analytes contained in the blank spike. There should be no impact to the data as reported.

Post Spike (PS):

Post-Spike Recovery for Sulfate (45.1%) was outside acceptance limits (75-125) in 8I24001-PS1 for Anions by IC-WE
The native sample concentration was greater than 5 times the spiked concentration.

Post-Spike Recovery for Calcium (221%) was outside acceptance limits (75-125) in 8I26001-PS1 for ICP-OES Vadose-WE
The native sample concentration was greater than 5 times the spiked concentration.

Post-Spike Recovery for Magnesium (72.4%) was outside acceptance limits (75-125) in 8I26001-PS1 for ICP-OES Vadose-WE
The native sample concentration was greater than 5 times the spiked concentration.

Post-Spike Recovery for Sodium (150%) was outside acceptance limits (75-125) in 8I26001-PS1 for ICP-OES Vadose-WE
The native sample concentration was greater than 5 times the spiked concentration.

Matrix Spike (MS):

Not Applicable

Other QC Criteria:

No discrepancies noted.

DISCLAIMER

SAMPLES INCLUDED IN THIS REPORT

A-AX, C6542

HEIS No.	Laboratory ID	Matrix	Date Collected	Date Received
B1WPB6	0809002-01	SOIL	9/8/08 10:10	9/11/08 10:05
B1WPB7	0809002-02	SOIL	9/8/08 10:40	9/11/08 10:05
B1WPB8	0809002-03	SOIL	9/9/08 07:45	9/11/08 10:05
B1WPB9	0809002-04	SOIL	9/9/08 08:30	9/11/08 10:05

The following analyses were performed on the following samples included in this report:

Metals 1:1 DI Water Extract by ICPMS

Metals 1:1 Water Extract by ICPOES

Alkalinity, Titrimetic (pH 4.5)

Anions By Ion Chromatography

Geological Description

Moisture Content

pH of Waters By Electrode

Specific Conductance

Tc_U 1:1 DI Water Extract by ICPMS

SAMPLES ANALYZED IN THIS REPORT

HEIS No.	Laboratory ID	Matrix	Date Collected	Date Received
B1WPB6	0809002-01	SOIL	9/8/08 10:10	9/11/08 10:05
B1WPB7	0809002-02	SOIL	9/8/08 10:40	9/11/08 10:05
B1WPB8	0809002-03	SOIL	9/9/08 07:45	9/11/08 10:05
B1WPB9	0809002-04	SOIL	9/9/08 08:30	9/11/08 10:05

Wet Chemistry

Alkalinity as CaCO3 (ug/g dry) by Standard Methods 2320B

Lab ID	HEIS No.	Results	EQL	Analyzed	Batch
0809002-01	B1WPB6	3.05E1	2.34E1	10/01/08	8I29002
0809002-02	B1WPB7	3.37E1	2.35E1	10/01/08	8I29002
0809002-03	B1WPB8	3.43E1	2.35E1	10/01/08	8I29002
0809002-04	B1WPB9	4.82E1	2.35E1	10/01/08	8I29002

Wet Chemistry

Specific Conductance (EC) (mS/cm) by EPA 120.1

Lab ID	HEIS No.	Results	EQL	Analyzed	Batch
0809002-01	B1WPB6	2.61E-1	1.00E-2	9/24/08	8I23003
0809002-02	B1WPB7	2.82E-1	1.00E-2	9/24/08	8I23003
0809002-03	B1WPB8	4.99E-1	1.00E-2	9/24/08	8I23003
0809002-04	B1WPB9	9.90E-1	1.00E-2	9/24/08	8I23003

Wet Chemistry

Moisture Content (% by Weight) by AGG-WC-001

Lab ID	HEIS No.	Results	EQL	Analyzed	Batch
0809002-01	B1WPB6	4.31E0	N/A	9/19/08	8I11007
0809002-02	B1WPB7	4.83E0	N/A	9/19/08	8I11007
0809002-03	B1WPB8	1.16E1	N/A	9/19/08	8I11007
0809002-04	B1WPB9	2.33E1	N/A	9/19/08	8I11007

Wet Chemistry

pH (pH Units) by AGG-pH-001

Lab ID	HEIS No.	Results	EQL	Analyzed	Batch
0809002-01	B1WPB6	7.95E0	N/A	9/24/08	8I23002
0809002-02	B1WPB7	7.81E0	N/A	9/24/08	8I23002
0809002-03	B1WPB8	7.64E0	N/A	9/24/08	8I23002
0809002-04	B1WPB9	7.72E0	N/A	9/24/08	8I23002

Anions by Ion Chromatography

CAS #	Analyte	Results	Units	EQL	Analyzed	Batch	Method
HEIS No.	**B1WPB6**		**Lab ID:**	**0809002-01**			
16984-48-8	Fluoride	2.49E-1	ug/g dry	1.99E-1	9/24/08	8I24001	AGG-IC-001
16887-00-6	Chloride	1.96E0	ug/g dry	4.99E-1	9/24/08	8I24001	AGG-IC-001
14797-55-8	Nitrate	1.23E1	ug/g dry	9.97E-1	9/24/08	8I24001	AGG-IC-001
14808-79-8	Sulfate	8.27E1	ug/g dry	1.50E0	9/24/08	8I24001	AGG-IC-001
l4265-44-2	Phosphate	<1.50E0	ug/g dry	1.50E0	9/24/08	8I24001	AGG-IC-001
HEIS No.	**B1WPB7**		**Lab ID:**	**0809002-02**			
16984-48-8	Fluoride	2.98E-1	ug/g dry	2.00E-1	9/24/08	8I24001	AGG-IC-001
16887-00-6	Chloride	2.11E0	ug/g dry	5.01E-1	9/24/08	8I24001	AGG-IC-001
14797-55-8	Nitrate	1.22E1	ug/g dry	1.00E0	9/24/08	8I24001	AGG-IC-001
14808-79-8	Sulfate	9.36E1	ug/g dry	1.50E0	9/24/08	8I24001	AGG-IC-001
l4265-44-2	Phosphate	<1.50E0	ug/g dry	1.50E0	9/24/08	8I24001	AGG-IC-001
HEIS No.	**B1WPB8**		**Lab ID:**	**0809002-03**			
16984-48-8	Fluoride	2.76E-1	ug/g dry	2.00E-1	9/24/08	8I24001	AGG-IC-001
16887-00-6	Chloride	5.00E0	ug/g dry	4.99E-1	9/24/08	8I24001	AGG-IC-001
14797-55-8	Nitrate	2.87E1	ug/g dry	9.98E-1	9/24/08	8I24001	AGG-IC-001
14808-79-8	Sulfate	2.03E2	ug/g dry	1.50E1	9/25/08	8I24001	AGG-IC-001
l4265-44-2	Phosphate	<1.50E0	ug/g dry	1.50E0	9/24/08	8I24001	AGG-IC-001
HEIS No.	**B1WPB9**		**Lab ID:**	**0809002-04**			
16984-48-8	Fluoride	<2.00E0	ug/g dry	2.00E0	9/24/08	8I24001	AGG-IC-001
16887-00-6	Chloride	1.00E1	ug/g dry	5.00E0	9/24/08	8I24001	AGG-IC-001
14797-55-8	Nitrate	6.12E1	ug/g dry	1.00E1	9/24/08	8I24001	AGG-IC-001
14808-79-8	Sulfate	4.70E2	ug/g dry	1.50E1	9/24/08	8I24001	AGG-IC-001
l4265-44-2	Phosphate	<1.50E1	ug/g dry	1.50E1	9/24/08	8I24001	AGG-IC-001

Total Metals by PNNL-AGG-ICP-AES/Water Extract

CAS #	Analyte	Results	Units	EQL	Analyzed	Batch	Method
HEIS No.	**B1WPB6**		**Lab ID:**	**0809002-01**			
7440-70-2	Calcium	2.56E1	ug/g dry	3.86E-1	9/26/08	8I26001	PNNL-AGG-ICP-AES
7440-09-7	Potassium	3.16E0	ug/g dry	2.32E0	9/26/08	8I26001	PNNL-AGG-ICP-AES
7439-95-4	Magnesium	5.44E0	ug/g dry	8.32E-2	9/26/08	8I26001	PNNL-AGG-ICP-AES
7440-24-6	Strontium	9.64E-2	ug/g dry	5.21E-2	9/26/08	8I26001	PNNL-AGG-ICP-AES
7440-23-5	Sodium	1.49E1	ug/g dry	6.67E-1	9/26/08	8I26001	PNNL-AGG-ICP-AES
HEIS No.	**B1WPB7**		**Lab ID:**	**0809002-02**			
7440-70-2	Calcium	2.87E1	ug/g dry	3.87E-1	9/26/08	8I26001	PNNL-AGG-ICP-AES
7440-09-7	Potassium	3.67E0	ug/g dry	2.33E0	9/26/08	8I26001	PNNL-AGG-ICP-AES
7439-95-4	Magnesium	5.84E0	ug/g dry	8.35E-2	9/26/08	8I26001	PNNL-AGG-ICP-AES
7440-24-6	Strontium	1.15E-1	ug/g dry	5.23E-2	9/26/08	8I26001	PNNL-AGG-ICP-AES
7440-23-5	Sodium	1.68E1	ug/g dry	6.70E-1	9/26/08	8I26001	PNNL-AGG-ICP-AES
HEIS No.	**B1WPB8**		**Lab ID:**	**0809002-03**			
7440-70-2	Calcium	5.88E1	ug/g dry	3.86E-1	9/26/08	8I26001	PNNL-AGG-ICP-AES
7440-09-7	Potassium	4.79E0	ug/g dry	2.32E0	9/26/08	8I26001	PNNL-AGG-ICP-AES
7439-95-4	Magnesium	1.44E1	ug/g dry	8.33E-2	9/26/08	8I26001	PNNL-AGG-ICP-AES
7440-24-6	Strontium	2.85E-1	ug/g dry	5.21E-2	9/26/08	8I26001	PNNL-AGG-ICP-AES
7440-23-5	Sodium	2.58E1	ug/g dry	6.68E-1	9/26/08	8I26001	PNNL-AGG-ICP-AES
HEIS No.	**B1WPB9**		**Lab ID:**	**0809002-04**			
7440-70-2	Calcium	1.25E2	ug/g dry	3.87E-1	9/26/08	8I26001	PNNL-AGG-ICP-AES
7440-09-7	Potassium	7.19E0	ug/g dry	2.33E0	9/26/08	8I26001	PNNL-AGG-ICP-AES
7439-95-4	Magnesium	3.62E1	ug/g dry	8.35E-2	9/26/08	8I26001	PNNL-AGG-ICP-AES
7440-24-6	Strontium	6.00E-1	ug/g dry	5.22E-2	9/26/08	8I26001	PNNL-AGG-ICP-AES
7440-23-5	Sodium	5.28E1	ug/g dry	6.70E-1	9/26/08	8I26001	PNNL-AGG-ICP-AES

Radionuclides by ICP-MS/Water Extract

CAS #	Analyte	Results	Units	EQL	Analyzed	Batch	Method
HEIS No.	**B1WPB6**		**Lab ID:**	**0809002-01**			
14133-76-7	Technetium-99	<2.29E-5	ug/g dry	2.29E-5	9/26/08	8I26004	PNNL-AGG-415
HEIS No.	**B1WPB7**		**Lab ID:**	**0809002-02**			
14133-76-7	Technetium-99	<2.30E-5	ug/g dry	2.30E-5	9/26/08	8I26004	PNNL-AGG-415
HEIS No.	**B1WPB8**		**Lab ID:**	**0809002-03**			
14133-76-7	Technetium-99	<2.30E-5	ug/g dry	2.30E-5	9/26/08	8I26004	PNNL-AGG-415
HEIS No.	**B1WPB9**		**Lab ID:**	**0809002-04**			
14133-76-7	Technetium-99	<2.30E-5	ug/g dry	2.30E-5	9/26/08	8I26004	PNNL-AGG-415

RCRA Metals By PNNL-AGG-415/Water Extract

CAS #	Analyte	Results	Units	EQL	Analyzed	Batch	Method
HEIS No.	**B1WPB6**		**Lab ID:**	**0809002-01**			
13966-28-4	Lead	<5.59E-4	ug/g dry	5.59E-4	9/26/08	8I26002	PNNL-AGG-415
HEIS No.	**B1WPB7**		**Lab ID:**	**0809002-02**			
13966-28-4	Lead	<5.61E-4	ug/g dry	5.61E-4	9/26/08	8I26002	PNNL-AGG-415
HEIS No.	**B1WPB8**		**Lab ID:**	**0809002-03**			
13966-28-4	Lead	<5.59E-4	ug/g dry	5.59E-4	9/26/08	8I26002	PNNL-AGG-415
HEIS No.	**B1WPB9**		**Lab ID:**	**0809002-04**			
13966-28-4	Lead	<5.60E-4	ug/g dry	5.60E-4	9/26/08	8I26002	PNNL-AGG-415

Wet Chemistry - Quality Control
Environmental Science Laboratory

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 8I23002 - 1:1 Water Extract (pH_EC_Alk)										
Duplicate (8I23002-DUP1)		**Source: 0809002-04**		Prepared: 09/23/08	Analyzed: 09/24/08					
pH	7.70E0	N/A	pH Units		7.72E0			0.259	35	
Batch 8I23003 - 1:1 Water Extract (pH_EC_Alk)										
Blank (8I23003-BLK1)				Prepared: 09/23/08	Analyzed: 09/24/08					
Specific Conductance (EC)	<1.00E-2	1.00E-2	mS/cm							
Duplicate (8I23003-DUP1)		**Source: 0809002-04**		Prepared: 09/23/08	Analyzed: 09/24/08					
Specific Conductance (EC)	1.02E0	1.00E-2	mS/cm		9.90E-1			2.59	35	
Batch 8I29002 - 1:1 Water Extract (pH_EC_Alk)										
Blank (8I29002-BLK1)				Prepared: 09/29/08	Analyzed: 10/01/08					
Alkalinity as CaCO3	<2.35E1	2.35E1	ug/g wet							
Duplicate (8I29002-DUP1)		**Source: 0809002-04**		Prepared: 09/29/08	Analyzed: 10/01/08					
Alkalinity as CaCO3	4.90E1	2.35E1	ug/g dry		4.82E1			1.62	35	

Anions by Ion Chromatography - Quality Control
Environmental Science Laboratory

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 8I24001 - 1:1 Water Extract (IC)										
Blank (8I24001-BLK1)				Prepared & Analyzed: 09/24/08						
Fluoride	<2.00E-1	2.00E-1	ug/g wet							
Chloride	<5.00E-1	5.00E-1	"							
Nitrate	<1.00E0	1.00E0	"							
Sulfate	<1.50E0	1.50E0	"							
Phosphate	<1.50E0	1.50E0	"							
LCS (8I24001-BS1)				Prepared & Analyzed: 09/24/08						
Fluoride	2.06E0	2.00E-1	ug/g wet	2.00E0		103	80-120			
Chloride	4.92E0	5.00E-1	"	5.00E0		98.4	80-120			
Nitrate	1.08E1	1.00E0	"	1.00E1		108	80-120			
Sulfate	1.51E1	1.50E0	"	1.50E1		101	80-120			
Phosphate	1.50E1	1.50E0	"	1.50E1		99.7	80-120			
Duplicate (8I24001-DUP1)		**Source: 0809002-04**		Prepared & Analyzed: 09/24/08						
Fluoride	<2.00E0	2.00E0	ug/g dry		ND				35	
Chloride	1.01E1	5.01E0	"		1.00E1			0.943	35	
Nitrate	6.21E1	1.00E1	"		6.12E1			1.56	35	
Sulfate	4.85E2	1.50E1	"		4.70E2			3.19	35	
Phosphate	<1.50E1	1.50E1	"		ND				35	
Post Spike (8I24001-PS1)		**Source: 0809002-01**		Prepared & Analyzed: 09/24/08						
Fluoride	1.04E0	N/A	ug/mL	8.00E-1	2.50E-1	98.5	75-125			
Chloride	3.85E0	N/A	"	2.00E0	1.96E0	94.3	75-125			
Nitrate	1.60E1	N/A	"	4.00E0	1.23E1	93.4	75-125			
Sulfate	8.57E1	N/A	"	6.00E0	8.30E1	45.1	75-125			
Phosphate	5.56E0	N/A	"	6.00E0	ND	92.7	75-125			

Total Metals by PNNL-AGG-ICP-AES/Water Extract - Quality Control
Environmental Science Laboratory

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 8I26001 - 1:1 Water Extract (ICP/ICPMS)										
Blank (8I26001-BLK1)				Prepared: 09/23/08 Analyzed: 09/26/08						
Calcium	<3.87E-1	3.87E-1	ug/g wet							
Potassium	<2.33E0	2.33E0	"							
Magnesium	<8.34E-2	8.34E-2	"							
Strontium	<5.22E-2	5.22E-2	"							
Sodium	<6.69E-1	6.69E-1	"							
LCS (8I26001-BS1)				Prepared: 09/23/08 Analyzed: 09/26/08						
Calcium	4.79E0	3.87E-1	ug/g wet	4.99E0		96.0	80-120			
Potassium	4.95E1	2.33E0	"	4.99E1		99.1	80-120			
Magnesium	4.86E0	8.34E-2	"	4.99E0		97.4	80-120			
Strontium	NA	NA	"				80-120			
Sodium	5.16E0	6.69E-1	"	4.99E0		103	80-120			
Duplicate (8I26001-DUP1)		**Source: 0809002-04**		Prepared: 09/23/08 Analyzed: 09/26/08						
Calcium	1.30E2	3.88E-1	ug/g dry		1.25E2			4.24	35	
Potassium	7.17E0	2.33E0	"		7.19E0			0.290	35	
Magnesium	3.69E1	8.35E-2	"		3.62E1			2.10	35	
Strontium	6.17E-1	5.23E-2	"		6.00E-1			2.78	35	
Sodium	5.41E1	6.70E-1	"		5.28E1			2.32	35	
Post Spike (8I26001-PS1)		**Source: 0809002-04**		Prepared & Analyzed: 09/26/08						
Calcium	4.26E4	N/A	ug/L	5.00E2	4.15E4	221	75-125			
Potassium	3.68E3	N/A	"	1.25E3	2.39E3	103	75-125			
Magnesium	1.24E4	N/A	"	5.00E2	1.20E4	72.4	75-125			
Strontium	6.95E2	N/A	"	5.00E2	2.00E2	99	75-125			
Sodium	1.83E4	N/A	"	5.00E2	1.76E4	150	75-125			

Radionuclides by ICP-MS/Water Extract - Quality Control
Environmental Science Laboratory

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 8I26004 - 1:1 Water Extract (ICP/ICPMS)										
Blank (8I26004-BLK1)				Prepared & Analyzed: 09/26/08						
Technetium-99	<2.30E-5	2.30E-5	ug/g wet							
Duplicate (8I26004-DUP1)		**Source: 0809002-04**		Prepared & Analyzed: 09/26/08						
Technetium-99	<2.30E-5	2.30E-5	ug/g dry		ND				35	
Post Spike (8I26004-PS1)		**Source: 0809002-04**		Prepared & Analyzed: 09/26/08						
Technetium-99	5.03E-1	N/A	ug/L	5.00E-1	ND	101	75-125			

RCRA Metals By PNNL-AGG-415/Water Extract - Quality Control

Environmental Science Laboratory

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 8I26002 - 1:1 Water Extract (ICP/ICPMS)										
Blank (8I26002-BLK1)				Prepared & Analyzed: 09/26/08						
Lead	<5.60E-4	5.60E-4	ug/g wet							
LCS (8I26002-BS1)				Prepared & Analyzed: 09/26/08						
Lead	5.00E0	5.60E-2	ug/g wet	4.99E0		100	80-120			
Duplicate (8I26002-DUP1)		**Source: 0809002-04**		Prepared & Analyzed: 09/26/08						
Lead	<5.61E-4	5.61E-4	ug/g dry		ND				35	
Post Spike (8I26002-PS1)		**Source: 0809002-04**		Prepared & Analyzed: 09/26/08						
Lead	4.96E0	N/A	ug/L	5.00E0	1.78E-2	98.9	75-125			

Pacific Northwest National Laboratory	GEOLOGIC LOG	Boring/Well No C6542/299-E25-236	Depth 269.6-280.5	Date 9/18/08	Sheet 1 of 1
		Location A-AX WMA	Project		

Logged by Michelle Valenta (Print) Michelle Valenta (Sign) ______ (Print) ______ (Sign)

Drilling Contractor ______

Reviewed by ______ (Print) ______ (Sign) Date ______

Driller ______

Lithologic Class. Scheme Folk-Wentworth Procedure ______ Rev ______

Drill Method ______

DEPTH (ft)	SAMPLES TYPE	SAMPLES ID NUMBER	MOISTURE	GRAPHIC LOG C Z S G	LITHOLOGIC DESCRIPTION sediment class, range in particle size, maximum particle size, mafic %, sorting, roundness, color, consolidation, reaction to 10% HCl, structure, fabric, and any other characteristics
269.6	G	B1VPB6	M		S- med sand. well-sorted. loose. max size = med sand. 10-20% mafic. 2.5Y 5/2 (grayish brown). weak rxn to HCl.
272	G	B1VPB7	M		same as above
275	G	B1VPB8	M		S- med sand. 5% Z. loose w/ few consol. agg. (90mm) containing Z and laminations. max size = med. sand. 2.5Y 5/2 (grayish brown). no rxn to HCl.
278	G	B1VPB9	M		mS- muddy sand. 60% v. fine to fine sand, 40% Z. well-sorted. mica visible. max size = med sand. 2.5Y 4/2 (dk. grayish brown) cohesive.

COMMENTS

G = grab samples - 1 L poly bottle poured into weigh boats for photos & description

med = medium
Z = fines (silt & clay)
max = maximum
v. = very
rxn = reaction
agg = aggregate

W = Wet, M = Moist, SM = Slightly Moist, D = Dry

2008/DCL/FORMS/GeoLog/001 (03/18)

C6542 B1WPB6 269.6-272.1 ft Grab

Borehole ID Sample Number Depth from Chain-of-Custody Sample

C6542 B1WPB7 272.0-274.5 ft Grab

Borehole ID Sample Number Depth from Chain-of-Custody Sample

C6542 B1WPB8 275.0-277.5 ft Grab Sample

Borehole ID Sample Number Depth from Chain-of-Custody

C6542 B1WPB9 278.0-280.5 ft Grab

Borehole ID Sample Number Depth from Chain-of-Custody Sample

Fluor Hanford Inc.	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST		F08-150-002	PAGE 1 OF 1
COLLECTOR Fulton	**COMPANY CONTACT** TRENT, SJ	**TELEPHONE NO.** 373-5869	**PROJECT COORDINATOR** WIDRIG, DL	**PRICE CODE** 8N **DATA TURNAROUND**
SAMPLING LOCATION 299-E25-236, I-001 C-6542	**PROJECT DESIGNATION** Well 299-E25-236 Vadose Zone - Geochemical Modeling Parameters		**SAF NO.** F08-150	**AIR QUALITY** ☐ 45 Days / 45 Days
ICE CHEST NO.	**FIELD LOGBOOK NO.** HNF-N-585-1	**ACTUAL SAMPLE DEPTH** 269.6 - 272.1	**COA** 122543ES10	**METHOD OF SHIPMENT** GOVERNMENT VEHICLE
SHIPPED TO Environmental Sciences Laboratory	**OFFSITE PROPERTY NO.** N/A		**BILL OF LADING/AIR BILL NO.** N/A	

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 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
Radioactive Tie To: B1WPB2

PRESERVATION	Cool~4C	None											
TYPE OF CONTAINER	G/P	Moisture Resistant Cont											
NO. OF CONTAINER(S)	1	1											
VOLUME	1L	200g											
SAMPLE ANALYSIS	SEE ITEM (1) IN SPECIAL INSTRUCTIONS	Moisture Content - D2216;											
SAMPLE NO.	**MATRIX***	**SAMPLE DATE**	**SAMPLE TIME**										
B1WPB6	SOIL	9-8-08	1010	✓	✓								
				333152	N/A								

CHAIN OF POSSESSION

RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME
Fulton	9-8-08 1255	MO 413 Fridge	9-8-08 1255
MO 413 FRIDGE	SEP 11 2008 0800		SEP 11 2008 0800
	SEP 11 2008 1005	Kevin Miller	9/11/08 1005

SIGN/ PRINT NAMES

SPECIAL INSTRUCTIONS

** The 200 Area S&GRP Characterization and Monitoring Sampling and Analysis GKI applies to this SAF.
(1)6010M_METALS_ICP_WE (TAL) {Calcium, Magnesium, Potassium, Sodium} 6010M_METALS_ICP_WE (Add-On) {Lead, Strontium} IC Anions - 9056_WE {Chloride, Fluoride, Nitrate, Phosphate, Sulfate} 2320_ALKALINITY {Alkalinity, Bicarbonate, Calcium Carbonate, Carbonate ion} Conductivity - 9050_WE; pH (Water) - 9045_WE {pH Measurement} Tc-99 by ICPMS {Technetium-99}

LABORATORY SECTION	**RECEIVED BY**	**TITLE**	**DATE/TIME**
FINAL SAMPLE DISPOSITION	**DISPOSAL METHOD**	**DISPOSED BY**	**DATE/TIME**

A-6003-618(01/06)

Fluor Hanford Inc.	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST			F08-150-004	PAGE 1 OF 1
COLLECTOR Fulton	**COMPANY CONTACT** TRENT, SJ	**TELEPHONE NO.** 373-5869	**PROJECT COORDINATOR** WIDRIG, DL	**PRICE CODE** 8N	**DATA TURNAROUND**
SAMPLING LOCATION 299-E25-236, I-002 C-6542	**PROJECT DESIGNATION** Well 299-E25-236 Vadose Zone - Geochemical Modeling Parameters		**SAF NO.** F08-150	**AIR QUALITY** ☐	45 Days / 45 Days
ICE CHEST NO.	**FIELD LOGBOOK NO.** HNF-N-595-1	**ACTUAL SAMPLE DEPTH** 272-294.5'	**COA** 122543ES10	**METHOD OF SHIPMENT** GOVERNMENT VEHICLE	
SHIPPED TO Environmental Sciences Laboratory	**OFFSITE PROPERTY NO.** N/A		**BILL OF LADING/AIR BILL NO.** N/A		

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 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
Radioactive Tie To: B1WPB3

PRESERVATION	Cool~4C	None											
TYPE OF CONTAINER	G/P	Moisture Resistant Cont											
NO. OF CONTAINER(S)	1	1											
VOLUME	1L	200g											
SAMPLE ANALYSIS	SEE ITEM (1) IN SPECIAL INSTRUCTIONS	Moisture Content - D2216;											

SAMPLE NO.	MATRIX*	SAMPLE DATE	SAMPLE TIME										
B1WPB7	SOIL	9-9-08	1040	✓	✓								
				033150	N 18								

CHAIN OF POSSESSION

RELINQUISHED BY/REMOVED FROM	DATE/TIME	SIGN/ PRINT NAMES RECEIVED BY/STORED IN	DATE/TIME
C Fulton	9-9-08 1255	MO413 Fridge	9-9-08 1255
MO413 FRIDGE	SEP 11 2008 0800		SEP 11 2008 0900
	SEP 11 2008 1005	Kevin Miller Kevin Miller	9/11/00 1005

SPECIAL INSTRUCTIONS

** The 200 Area S&GRP Characterization and Monitoring Sampling and Analysis GKI applies to this SAF.
(1)6010M_METALS_ICP_WE (TAL) {Calcium, Magnesium, Potassium, Sodium} 6010M_METALS_ICP_WE (Add-On) {Lead, Strontium} IC Anions - 9056_WE {Chloride, Fluoride, Nitrate, Phosphate, Sulfate} 2320_ALKALINITY {Alkalinity, Bicarbonate, Calcium Carbonate, Carbonate ion} Conductivity - 9050_WE; pH (Water) - 9045_WE {pH Measurement} Tc-99 by ICPMS {Technetium-99}

LABORATORY SECTION	**RECEIVED BY**	**TITLE**	**DATE/TIME**
FINAL SAMPLE DISPOSITION	**DISPOSAL METHOD**	**DISPOSED BY**	**DATE/TIME**

Fluor Hanford Inc.	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST		F08-150-006	PAGE 1 OF 1
COLLECTOR Fulton	**COMPANY CONTACT** TRENT, SJ	**TELEPHONE NO.** 373-5869	**PROJECT COORDINATOR** WIDRIG, DL	**PRICE CODE** 8N / **DATA TURNAROUND**
SAMPLING LOCATION 299-E25-236, I-003 C-6542	**PROJECT DESIGNATION** Well 299-E25-236 Vadose Zone - Geochemical Modeling Parameters		**SAF NO.** F08-150	**AIR QUALITY** ☐ / 45 Days / 45 Days
ICE CHEST NO.	**FIELD LOGBOOK NO.** HNFN 595-1	**ACTUAL SAMPLE DEPTH** 275 - 279.5	**COA** 122543ES10	**METHOD OF SHIPMENT** GOVERNMENT VEHICLE
SHIPPED TO Environmental Sciences Laboratory	**OFFSITE PROPERTY NO.** N/A		**BILL OF LADING/AIR BILL NO.** N/A	

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 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
Radioactive Tie To: B1WPB4

PRESERVATION	Cool~4C	None		
TYPE OF CONTAINER	G/P	Moisture Resistant Cont		
NO. OF CONTAINER(S)	1	1		
VOLUME	1L	200g		
SAMPLE ANALYSIS	SEE ITEM (1) IN SPECIAL INSTRUCTIONS	Moisture Content - D2216;		

SAMPLE NO.	MATRIX*	SAMPLE DATE	SAMPLE TIME			
B1WPB8	SOIL	9-9-08	0945	✓	—	—
				033152	N/A	

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

RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME
C. Fulton	9-9-08 0942	N0413 Fridge	9-9-08 0942
N0413 FRIDGE	SEP 11 2008 (859)		SEP 11 2008 (859)
	SEP 11 2008 1005	Kevin Miller	9/11/08 1005

SPECIAL INSTRUCTIONS

** The 200 Area S&GRP Characterization and Monitoring Sampling and Analysis GKI applies to this SAF.
(1)6010M_METALS_ICP_WE (TAL) {Calcium, Magnesium, Potassium, Sodium} 6010M_METALS_ICP_WE (Add-On) {Lead, Strontium} IC Anions - 9056_WE {Chloride, Fluoride, Nitrate, Phosphate, Sulfate} 2320_ALKALINITY {Alkalinity, Bicarbonate, Calcium Carbonate, Carbonate ion} Conductivity - 9050_WE; pH (Water) - 9045_WE {pH Measurement} Tc-99 by ICPMS {Technetium-99}

LABORATORY SECTION	**RECEIVED BY**	**TITLE**	**DATE/TIME**
FINAL SAMPLE DISPOSITION	**DISPOSAL METHOD**	**DISPOSED BY**	**DATE/TIME**

Fluor Hanford Inc.	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST			F08-150-008	PAGE 1 OF 1
COLLECTOR Fulton	**COMPANY CONTACT** TRENT, SJ	**TELEPHONE NO.** 373-5869	**PROJECT COORDINATOR** WIDRIG, DL	**PRICE CODE** 8N	**DATA TURNAROUND**
SAMPLING LOCATION 299-E25-236, I-004 C-6542	**PROJECT DESIGNATION** Well 299-E25-236 Vadose Zone - Geochemical Modeling Parameters		**SAF NO.** F08-150	**AIR QUALITY** ☐	45 Days / 45 Days
ICE CHEST NO.	**FIELD LOGBOOK NO.** HNF-N-585-1	**ACTUAL SAMPLE DEPTH** 278-280.5	**COA** 122543ES10	**METHOD OF SHIPMENT** GOVERNMENT VEHICLE	
SHIPPED TO Environmental Sciences Laboratory	**OFFSITE PROPERTY NO.** N/A		**BILL OF LADING/AIR BILL NO.** N/A		

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 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
Radioactive Tie To: B1WPB5

PRESERVATION	Cool~4C	None	
TYPE OF CONTAINER	G/P	Moisture Resistant Cont	
NO. OF CONTAINER(S)	1	1	
VOLUME	1L	200g	
SAMPLE ANALYSIS	SEE ITEM (1) IN SPECIAL INSTRUCTIONS	Moisture Content - D2216;	

SAMPLE NO.	MATRIX*	SAMPLE DATE	SAMPLE TIME										
B1WPB9	SOIL	9-9-08	0930	✓	✓								
				033152	N/A								

CHAIN OF POSSESSION

SIGN/ PRINT NAMES			
RELINQUISHED BY/REMOVED FROM	**DATE/TIME**	**RECEIVED BY/STORED IN**	**DATE/TIME**
CFulton	9-9-08 0942	MO 413 Fridge	9-9-08 0942
RELINQUISHED BY/REMOVED FROM	**DATE/TIME**	**RECEIVED BY/STORED IN**	**DATE/TIME**
Mo 413 Fridge	SEP 11 2008 1000	Kevin Patterson Fluor Hanford	SEP 11 2008 1000
RELINQUISHED BY/REMOVED FROM	**DATE/TIME**	**RECEIVED BY/STORED IN**	**DATE/TIME**
	SEP 11 2008 1005	Kevin Miller	9/11/08 1005
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.
(1)6010M_METALS_ICP_WE (TAL) {Calcium, Magnesium, Potassium, Sodium} 6010M_METALS_ICP_WE (Add-On) {Lead, Strontium} IC Anions - 9056_WE {Chloride, Fluoride, Nitrate, Phosphate, Sulfate} 2320_ALKALINITY {Alkalinity, Bicarbonate, Calcium Carbonate, Carbonate ion} Conductivity - 9050_WE; pH (Water) - 9045_WE {pH Measurement} Tc-99 by ICPMS {Technetium-99}

LABORATORY SECTION	**RECEIVED BY**	**TITLE**	**DATE/TIME**
FINAL SAMPLE DISPOSITION	**DISPOSAL METHOD**	**DISPOSED BY**	**DATE/TIME**