

**EBERLINE**  
SERVICES

RECEIVED FEBRUARY 24, 2010 REVISION 1

EBERLINE ANALYTICAL CORPORATION  
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January 29, 2010 (original)  
February 24, 2010 (revised)

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

Reference: **P.O. #33677**  
**Eberline Analytical R9-12-100-7541, SDG H4106**

Dear Mr. Neely:

Enclosed is a data report for two solid (soil) samples designated under SAF No. F10-011 received at Eberline Analytical on December 22, 2009. The samples were analyzed according to the accompanying chain-of-custody documents.

Please call if you have any questions concerning this report.

Sincerely,

N. Joseph Verville  
Client Services Manager

NJV/jag

Enclosure: Data Package

**RECEIVED**  
JUN 03 2010  
**EDMC**

**1.0 GENERAL**

CH2M Hill Plateau Remediation Company (CHPRC) Sample Delivery Group H4106 was composed of two solid (soil) samples designated under SAF No. F10-011 with a Project Designation of: ARRA 200-LW-2 OU Characterization Vadose Zone – Soil ("K" Well).

The samples were received as stated on the chain-of-custody documents. Any discrepancies are noted on the Eberline Analytical Sample Receipt Checklist.

**2.0 ANALYSIS NOTES****2.1 Tritium Analysis**

The results for both the original and duplicate analyses were less than their respective MDA's, therefore no RPD is calculated, and there is no associated control limit. No problems were encountered during the course of the analyses.

**2.2 Carbon-14 Analysis**

The results for both the original and duplicate analyses were less than their respective MDA's, therefore no RPD is calculated, and there is no associated control limit. No problems were encountered during the course of the analyses.

**2.3 Iodine-129 Analysis**

The results for both the original and duplicate analyses were less than their respective MDA's, therefore no RPD is calculated, and there is no associated control limit. No problems were encountered during the course of the analyses.

**2.4 Isotopic Thorium Analysis**

No problems were encountered during the course of the analyses.

**2.5 Neptunium-237 Analysis**

The Np-237 recovery for the QC LCS was 121%, greater than the control limit of 120%, but less than the absolute limit of 125%, as specified in DOE Quality Systems for Analytical Services, Revision 2.5, November 2009, page D-27, and since no Np-237 activity was observed in either the original or duplicate analysis and the RDL requirement was met, a reanalysis was not ordered. The results for both the original and duplicate analyses were less than their respective MDA's, therefore no RPD is calculated, and there is no associated control limit. No problems were encountered during the course of the reanalyses.

Eberline Analytical  
W.O. No. R9-12-100-7541

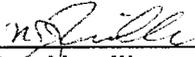
CH2M Hill Plateau Remediation Company  
SDG H4106

Case Narrative

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3.0 Case Narrative Certification Statement

"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 obtained in this hard copy data package has been authorized by the Laboratory Manager or a designee, as verified by the following signature."

  
\_\_\_\_\_  
N. Joseph Verville  
Client Services Manager

2/24/10  
\_\_\_\_\_  
Date

**Problem and Discrepancy Report**  
**Eberline**  
**SDG H4106**

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1. The data package has the following issues:

a) Discuss LCS out of limits for Neptunium 237 in narrative.

**Resolution:** *Provide correction.*

**Lab Response:** **Correction provided.**

Please correct the issues and resubmit the hard copy data package.

SDG 7541  
 Contact N. Joseph Verville

Client CHPRC  
 Contract No. 33677  
 Case no SDG H4106

S U M M A R Y   D A T A   S E C T I O N

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Prepared by   
 Reviewed by 

Lab id EBRLNE  
 Protocol CHPRC  
 Version Ver 1.0  
 Form DVD-TOC  
 Version 3.06  
 Report date 01/27/10

SDG 7541  
 Contact N. Joseph Verville

REPORT GUIDE

Client CHPRC  
 Contract No. 33677  
 Case no SDG\_H4106

ABOUT THE DATA SUMMARY SECTION

The Data Summary Section of a Data Package has all data, in several useful orders, necessary for first level, routine review of the data package for a Sample Delivery Group (SDG). This section follows the Data Package Narrative, which has an overview of the data package and a discussion of special problems. It is followed by the Raw Data Section, which has full details.

The Data Summary Section has several groups of reports:

SAMPLE SUMMARIES

The Sample and QC Summary Reports show all samples, including QC samples, reported in one SDG. These reports cross-reference client and lab sample identifiers.

PREPARATION BATCH SUMMARY

The Preparation Batch Summary Report shows all preparation batches (lab groupings reflecting how work was organized) relevant to the reported SDG with information necessary to check the completeness and consistency of the SDG.

WORK SUMMARY

The Work Summary Report shows all samples and work done on them relevant to the reported SDG.

METHOD BLANKS

The Method Blank Reports, one for each Method Blank relevant to the SDG, show all results and primary supporting information for the blanks.

LAB CONTROL SAMPLES

The Lab Control Sample Reports, one for each Lab Control Sample relevant to the SDG, show all results, recoveries and primary supporting information for these QC samples.

REPORT GUIDES

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SUMMARY DATA SECTION

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Lab id EBRLNE  
 Protocol CHPRC  
 Version Ver 1.0  
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SDG 7541  
 Contact N. Joseph Verville

GUIDE , c o n t .

Client CHPRC  
 Contract No. 33677  
 Case no SDG\_H4106

ABOUT THE DATA SUMMARY SECTION

DUPLICATES

The Duplicate Reports, one for each Duplicate and Original sample pair relevant to the SDG, show all results, differences and primary supporting information for these QC samples.

MATRIX SPIKES

The Matrix Spike Reports, one for each Spiked and Original sample pair relevant to the SDG, show all results, recoveries and primary supporting information for these QC samples.

DATA SHEETS

The Data Sheet Reports, one for each client sample in the SDG, show all results and primary supporting information for these samples.

METHOD SUMMARIES

The Method Summary Reports, one for each test used in the SDG, show all results, QC and method performance data for one analyte on one or two pages. (A test is a short code for the method used to do certain work to the client's specification.)

REPORT GUIDES

The Report Guides, one for each of the above groups of reports, have documentation on how to read the associated reports.

REPORT GUIDES

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SUMMARY DATA SECTION

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Lab id EBRLNE  
 Protocol CHPRC  
 Version Ver 1.0  
 Form DVD-RG  
 Version 3.06  
 Report date 01/27/10

EBERLINE ANALYTICAL/RICHMOND

SAMPLE DELIVERY GROUP H4106

REVISION 1

SDG 7541  
 Contact N. Joseph Verville

LAB SAMPLE SUMMARY

Client CHPRC  
 Contract No. 33677  
 Case no SDG H4106

LAB SAMPLE ID	CLIENT SAMPLE ID	LOCATION	MATRIX	LEVEL	SAF NO	CHAIN OF CUSTODY	COLLECTED
R912100-01	B22RM0	C5860 (299-E29-54) ;I-060	SOLID		F10-011	F10-011-048	12/11/09 13:33
R912100-02	B22RP1	C5860 (299-E29-54) ;I-075	SOLID		F10-011	F10-011-090	12/14/09 14:45
R912100-03	Lab Control Sample		SOLID		F10-011		
R912100-04	Method Blank		SOLID		F10-011		
R912100-05	Duplicate (R912100-01)	C5860 (299-E29-54) ;I-060	SOLID		F10-011		12/11/09 13:33

LAB SUMMARY

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SUMMARY DATA SECTION

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Lab id EBRLNE  
 Protocol CHPRC  
 Version Ver 1.0  
 Form DVD LS  
 Version 3.06  
 Report date 01/27/10

SAMPLE DELIVERY GROUP H4106

SDG 7541  
 Contact N. Joseph Verville

QC SUMMARY

Client CHPRC  
 Contract No. 33677  
 Case no SDG H4106

QC BATCH	CHAIN OF CUSTODY	CLIENT SAMPLE ID	MATRIX	% SOLIDS	SAMPLE AMOUNT	BASIS AMOUNT	DAYS SINCE RECEIVED	LAB COLL	LAB SAMPLE ID	DEPARTMENT SAMPLE ID
7541	F10-011-048	B22RM0	SOLID	96.5	166 g		12/22/09 11	R912100-01		7541-001
	F10-011-090	B22RP1	SOLID	96.5	214 g		12/22/09 8	R912100-02		7541-002
		Method Blank	SOLID					R912100-04		7541-004
		Lab Control Sample	SOLID					R912100-03		7541-003
		Duplicate (R912100-01)	SOLID	96.5	166 g		12/22/09 11	R912100-05		7541-005

Lab id EBRLNE  
 Protocol CHPRC  
 Version Ver 1.0  
 Form DVD-QS  
 Version 3.06  
 Report date 01/27/10

EBERLINE ANALYTICAL/RICHMOND

REVISION 1

SAMPLE DELIVERY GROUP H4106

SDG 7541  
 Contact N. Joseph Verville

PREP BATCH SUMMARY

Client CHPRC  
 Contract No. 33677  
 Case no SDG H4106

TEST	MATRIX	METHOD	PREPARATION ERROR			PLANCHETS ANALYZED			QUALITY
			BATCH	2σ %	CLIENT MORE	RE BLANK	LCS	DUP/ORIG MS/ORIG	
Alpha Spectroscopy									
NP	SOLID	Neptunium in Solids	7236-020	14.8	2	1	1	1/1	
TH	SOLID	Thorium, Isotopic in Solids	7236-020	8.0	2	1	1	1/1	
Gamma Spectroscopy									
I	SOLID	Iodine 129 in Solids	7236-020	19.4	2	1	1	1/1	
Liquid Scintillation Counting									
C	SOLID	Carbon 14 in Solids	7236-020	10.0	2	1	1	1/1	
H	SOLID	Tritium in Solids	7236-020	10.0	2	1	1	1/1	
NI_L	SOLID	Nickel 63 in Solids	7236-020	11.2	2	1	1	1/1	

Duplicates and Matrix Spikes are those with original (Client) sample in this Sample Delivery Group.  
 Blank and LCS planchets are those in the same preparation batch as some Client, Duplicate or Spike sample.

Lab id EBRLNE  
 Protocol CHPRC  
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EBERLINE ANALYTICAL/RICHMOND

REVISION 1

SAMPLE DELIVERY GROUP H4106

SDG 7541  
 Contact N. Joseph Verville

LAB WORK SUMMARY

Client CHPRC  
 Contract No. 33677  
 Case no SDG H4106

LAB SAMPLE COLLECTED RECEIVED	CLIENT SAMPLE ID LOCATTON CUSTODY	MATRIX SAF No	PLANCHET	TEST	SUF- FIX	ANALYZED	REVIEWED	BY	METHOD
R912100-01	B22RM0		7541-001	C		01/19/10	01/20/10	BW	Carbon 14 in Solids
12/11/09	C5860(299-E29-54);I-060	SOLID	7541-001	H		01/19/10	01/22/10	BW	Tritium in Solids
12/22/09	F10-011-048	F10-011	7541-001	I		01/20/10	01/22/10	BW	Iodine 129 in Solids
			7541-001	NI_L		01/20/10	01/22/10	BW	Nickel 63 in Solids
			7541-001	NP	R1	01/22/10	01/25/10	BW	Neptunium in Solids
			7541-001	TH		01/18/10	01/19/10	BW	Thorium, Isotopic in Solids
R912100-02	B22RP1		7541-002	C		01/19/10	01/20/10	BW	Carbon 14 in Solids
12/14/09	C5860(299-E29-54);I-075	SOLID	7541-002	H		01/19/10	01/22/10	BW	Tritium in Solids
12/22/09	F10-011-090	F10-011	7541-002	I		01/20/10	01/22/10	BW	Iodine 129 in Solids
			7541-002	NI_L		01/20/10	01/22/10	BW	Nickel 63 in Solids
			7541-002	NP	R1	01/22/10	01/25/10	BW	Neptunium in Solids
			7541-002	TH		01/18/10	01/19/10	BW	Thorium, Isotopic in Solids
R912100-03	Lab Control Sample		7541-003	C		01/19/10	01/20/10	BW	Carbon 14 in Solids
		SOLID	7541-003	H		01/19/10	01/22/10	BW	Tritium in Solids
		F10-011	7541-003	I		01/20/10	01/22/10	BW	Iodine 129 in Solids
			7541-003	NI_L		01/20/10	01/22/10	BW	Nickel 63 in Solids
			7541-003	NP	R1	01/22/10	01/25/10	BW	Neptunium in Solids
			7541-003	TH		01/19/10	01/19/10	BW	Thorium, Isotopic in Solids
R912100-04	Method Blank		7541-004	C		01/19/10	01/20/10	BW	Carbon 14 in Solids
		SOLID	7541-004	H		01/19/10	01/22/10	BW	Tritium in Solids
		F10-011	7541-004	I		01/21/10	01/22/10	BW	Iodine 129 in Solids
			7541-004	NI_L		01/20/10	01/22/10	BW	Nickel 63 in Solids
			7541-004	NP	R1	01/22/10	01/25/10	BW	Neptunium in Solids
			7541-004	TH		01/18/10	01/19/10	BW	Thorium, Isotopic in Solids
R912100-05	Duplicate (R912100-01)		7541-005	C		01/19/10	01/20/10	BW	Carbon 14 in Solids
12/11/09	C5860(299-E29-54);I-060	SOLID	7541-005	H		01/19/10	01/22/10	BW	Tritium in Solids
12/22/09	F10-011		7541-005	I		01/22/10	01/22/10	BW	Iodine 129 in Solids
			7541-005	NI_L		01/20/10	01/22/10	BW	Nickel 63 in Solids
			7541-005	NP	R1	01/22/10	01/25/10	BW	Neptunium in Solids
			7541-005	TH		01/18/10	01/19/10	BW	Thorium, Isotopic in Solids

WORK SUMMARY

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Lab id EBRLNE  
 Protocol CHPRC  
 Version Ver 1.0  
 Form DVD-LWS  
 Version 3.06  
 Report date 01/27/10

EBERLINE ANALYTICAL/RICHMOND

SAMPLE DELIVERY GROUP H4106

REVISION 1

SDG 7541  
 Contact N. Joseph Verville

WORK SUMMARY, cont.

Client CHPRC  
 Contract No. 33677  
 Case no SDG H4106

COUNTS OF TESTS BY SAMPLE TYPE										
TEST	SAF No	METHOD	REFERENCE	CLIENT	MORE	RE	BLANK	LCS	DUP SPIKE	TOTAL
C	F10-011	Carbon 14 in Solids	C14_COX_LSC	2			1	1	1	5
H	F10-011	Tritium in Solids	TRITIUM_COX_LSC	2			1	1	1	5
I	F10-011	Iodine 129 in Solids	I129_SEP_LEPS_GS	2			1	1	1	5
NI_L	F10-011	Nickel 63 in Solids	NI63_LSC	2			1	1	1	5
NP	F10 011	Neptunium in Solids	NP237_LLE_PLATE_AEA	2			1	1	1	5
TH	F10-011	Thorium, Isotopic in Solids	THISO_IE_PLATE_AEA	2			1	1	1	5
TOTALS				12			6	6	6	30

WORK SUMMARY

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Lab id EBRLNE  
 Protocol CHPRC  
 Version Ver 1.0  
 Form DVD-LWS  
 Version 3.06  
 Report date 01/27/10

EBERLINE ANALYTICAL / RICHMOND REVISION 1  
 SAMPLE DELIVERY GROUP H4106

7541-004

Method Blank

M E T H O D   B L A N K

SDG <u>7541</u>	Client/Case no <u>CHPRC</u>	SDG <u>H4106</u>
Contact <u>N. Joseph Verville</u>	Contract No. <u>33677</u>	
Lab sample id <u>R912100-04</u>	Client sample id <u>Method Blank</u>	
Dept sample id <u>7541-004</u>	Material/Matrix <u>SOLID</u>	
	SAF No <u>F10-011</u>	

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Tritium	10028-17-8	-0.408	4.8	8.34	400	U	H
Carbon 14	14762-75-5	2.25	3.9	6.48	50.0	U	C
Nickel 63	13981-37-8	-1.36	1.9	3.30	30.0	U	NI_L
Iodine 129	15046-84-1	0.359	1.2	1.46	5.00	U	I
Thorium 228	14274-82-9	0	0.22	0.498	1.00	U	TH
Thorium 230	14269-63-7	0.037	0.37	0.683	1.00	U	TH
Thorium 232	TH-232	0.037	0.074	0.284	1.00	U	TH
Neptunium 237	13994-20-2	0	0.068	0.102	1.00	U	NP

QC-BLANK #72014

Lab id <u>EBERLINE</u>
Protocol <u>CHPRC</u>
Version <u>Ver 1.0</u>
Form <u>DVD-DS</u>
Version <u>3.06</u>
Report date <u>01/27/10</u>

EBERLINE ANALYTICAL/RICHMOND

REVISION 1

SAMPLE DELIVERY GROUP H4106

7541-003

Lab Control Sample

LAB CONTROL SAMPLE

SDG <u>7541</u>	Client/Case no <u>CHPRC</u>	<u>SDG H4106</u>
Contact <u>N. Joseph Verville</u>	Contract No. <u>33E77</u>	
Lab sample id <u>R912100-03</u>	Client sample id <u>Lab Control Sample</u>	
Dept sample id <u>7541-003</u>	Material/Matrix <u>SOLID</u>	
	SAF No <u>F10-011</u>	

ANALYTE	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALIT- FIERS TEST	ADDED pCi/g	2σ ERR pCi/g	RFC %	3σ IMTS (TOTAL)	PROTOCOL LIMITS
Tritium	1110	25	8.82	400	H	1120	45	99	84-116	80-120
Carbon 14	3290	66	14.6	50.0	C	3190	130	103	83-117	80-120
Nickel 63	213	6.4	3.30	30.0	NI_L	218	8.7	98	82-118	80-120
Iodine 129	116	3.4	1.46	5.00	I	116	4.6	100	70-130	80-120
Thorium 230	35.8	4.6	0.896	1.00	TH	37.8	1.5	95	78-122	80-120
Neptunium 237	12.0	1.7	0.349	1.00	NP	9.92	0.40	121	62-138	80-120

QC-LCS #72013

Lab id <u>EBRLNE</u>
Protocol <u>CHPRC</u>
Version <u>Ver 1.0</u>
Form <u>DVD-LCS</u>
Version <u>3.06</u>
Report date <u>01/27/10</u>

EBERLINE ANALYTICAL/RICHMOND

REVISION 1

SAMPLE DELIVERY GROUP H4106

7541-005

B22RMO

DUPLICATE

SDG <u>7541</u>	Client/Case no <u>CHPRC</u>	<u>SDG H4106</u>
Contact <u>N. Joseph Verville</u>	Contract No. <u>33677</u>	
DUPLICATE	ORIGINAL	
Lab sample id <u>R912100-05</u>	Lab sample id <u>R912100-01</u>	Client sample id <u>B22RMO</u>
Dept sample id <u>7541-005</u>	Dept sample id <u>7541-001</u>	Location/Matrix <u>C5860(299-329-54);I-060 SOLID</u>
	Received <u>12/22/09</u>	Collected/Weight <u>12/11/09 13:33 165 g</u>
% solids <u>96.5</u>	% solids <u>96.5</u>	Custody/SAP No <u>F10 011 048 F10-011</u>

ANALYTE	DUPLICATE pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST	ORIGINAL pCi/g	2σ ERR (COUNT)	MDA pCi/g	QUALI- FIERS	RPD %	3σ TOT	DER σ
Tritium	-0.117	4.1	7.17	400	U	H	-1.66	4.1	7.25	U	-	-	0.5
Carbon 14	-0.580	3.2	5.52	50.0	U	C	-0.639	3.2	5.52	U	-	-	0
Nickel 63	-2.54	2.1	3.75	30.0	U	NI_L	-2.73	2.0	3.60	U	-	-	0.1
Iodine 129	-0.084	1.6	1.91	5.00	U	I	0.306	1.1	1.40	U	-	-	0.4
Thorium 228	0.394	0.32	0.484	1.00	U	TH	0.424	0.43	0.676	U	-	-	0.1
Thorium 230	0.275	0.39	0.694	1.00	U	TH	0.282	0.56	1.01	U	-	-	0
Thorium 232	0.510	0.32	0.300	1.00	U	TH	0.634	0.43	0.539		22	142	0.5
Neptunium 237	0.087	0.087	0.130	1.00	U	NP	0	0.098	0.148	U	-	-	1.3

QC-DUP#1 72015

ARRA 200-LW-2 OU Characterization Vadose Zone -  
Soil ("K" Well)

DUPLICATES  
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Lab id EBRLNE  
Protocol CHERC  
Version Ver 1.0  
Form DVD-DUP  
Version 3.06  
Report date 01/27/10

7541-001

B22RM0

DATA SHEET

SDG <u>7541</u>	Client/Case no <u>CHPRC</u>	SDG <u>H4106</u>
Contact <u>N. Joseph Verville</u>	Contract No. <u>33677</u>	
Lab sample id <u>R912100-01</u>	Client sample id <u>B22RM0</u>	
Dept sample id <u>7541-001</u>	Location/Matrix <u>C5860 (299-E29-54);I-060</u>	<u>SOLID</u>
Received <u>12/22/09</u>	Collected/Weight <u>12/11/09 13:33</u>	<u>166 g</u>
% solids <u>96.5</u>	Custody/SAF No <u>F10-011-048</u>	<u>F10-011</u>

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Tritium	10028-17-8	-1.66	4.1	7.25	400	U	H
Carbon 14	14762-75-5	-0.639	3.2	5.52	50.0	U	C
Nickel 63	13981-37-8	-2.73	2.0	3.60	30.0	U	NI_L
Iodine 129	15046-84-1	0.306	1.1	1.40	5.00	U	I
Thorium 228	14274-82-9	0.424	0.43	0.676	1.00	U	TH
Thorium 230	14269-63-7	0.282	0.56	1.01	1.00	U	TH
Thorium 232	TH-232	0.634	0.43	0.539	1.00		TH
Neptunium 237	13994-20-2	0	0.098	0.148	1.00	U	NP

ARRA 200-LW-2 OU Characterization Vadose Zone -  
 Soil ("K" Well)

Lab id <u>EBRLINE</u>
Protocol <u>CHPRC</u>
Version <u>Ver 1.0</u>
Form <u>DVD-DS</u>
Version <u>3.06</u>
Report date <u>01/27/10</u>

7541-002

B22RP1

DATA SHEET

SDG <u>7541</u>	Client/Case no <u>CHPRC</u>	SDG <u>H4106</u>
Contact <u>N. Joseph Verville</u>	Contract <u>No. 33677</u>	
Lab sample id <u>R912100-02</u>	Client sample id <u>B22RP1</u>	
Dept sample id <u>7541-002</u>	Location/Matrix <u>C5860(299-E29-54);I-075</u>	<u>SOLID</u>
Received <u>12/22/09</u>	Collected/Weight <u>12/14/09 14:45</u>	<u>214 g</u>
% solids <u>96.5</u>	Custody/SAF No <u>F10-011-090</u>	<u>F10-011</u>

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Tritium	10028-17-8	0.540	4.8	8.28	400	U	H
Carbon 14	14762-75-5	-0.882	3.8	6.45	50.0	U	C
Nickel 63	13981-37-8	<u>-2.91</u>	2.0	3.72	30.0	U	NI_L
Iodine 129	15046-84-1	0.270	1.1	1.37	5.00	U	I
Thorium 228	14274-82-9	0.678	0.42	0.499	1.00		TH
Thorium 230	14269-63-7	0.468	0.42	0.795	1.00	U	TH
Thorium 232	TH-232	0.780	0.42	0.398	1.00		TH
Neptunium 237	13994-20-2	0	0.10	0.157	1.00	U	NP

ARRA 200-LW-2 OU Characterization Vadose Zone -  
 Soil ("K" Well)

Lab id <u>EBRLNE</u>
Protocol <u>CHPRC</u>
Version <u>Ver 1.0</u>
Form <u>DVD-DS</u>
Version <u>3.06</u>
Report date <u>01/27/10</u>

EBERLINE ANALYTICAL/RICHMOND

REVISION 1

SAMPLE DELIVERY GROUP H4106

Test NP Matrix SOLID  
 SDG 7541  
 Contact N. Joseph Verville

LAB METHOD SUMMARY

NEPTUNIUM IN SOLIDS  
 ALPHA SPECTROSCOPY

Client CHPRC  
 Contract No. 33677  
 Contract SDG H4106

RESULTS

LAB	RAW	SUF-	Neptunium		
SAMPLE ID	TEST	FIX	PLANCHET	CLIENT SAMPLE ID	237

Preparation batch 7236-020

R912100-01	R1	7541-001	B22RMO	U
R912100-02	R1	7541-002	B22RPI	U
R912100-03	R1	7541-003	Lab Control Sample	<u>HIGH</u>
R912100-04	R1	7541-004	Method Blank	U
R912100-05	R1	7541-005	Duplicate (R912100-01)	- U

Nominal values and limits from method RDLs (pCi/g) 1.00

METHOD PERFORMANCE

LAB	RAW	SUF-	MDA	ALIQ	PREP	DILU-	YIELD	EFF	COUNT	FWHM	DRIFT	DAYS	ANAL-				
SAMPLE ID	TEST	FIX	CLIENT	SAMPLE ID	pCi/g	g	FAC	TION	%	%	min	keV	KeV	HELD	PREPARED	YZED	DETECTOR

Preparation batch 7236-020 2σ prep error 14.8 % Reference Lab Notebook No. 7232 pg 020

R912100-01	R1	B22RMO	0.146	0.500			43	109			42	01/22/10	01/22	SS-065
R912100-02	R1	B22RPI	0.157	0.500			40	109			39	01/22/10	01/22	SS-066
R912100-03	R1	Lab Control Sample	0.349	0.500			32	155				01/22/10	01/22	SS-063
R912100-04	R1	Method Blank	0.102	0.500			46	155				01/22/10	01/22	SS-064
R912100-05	R1	Duplicate (R912100-01)	0.130	0.500			34	155			42	01/22/10	01/22	SS-065

Nominal values and limits from method 1.00 0.500 30-110 100 180

PROCEDURES	REFERENCE	DESCRIPTION
	NF237_LLE_PLATE_AEA	
SPP-071	Soil Dissolution, > 1.0g Aliquot, rev 1	
CP-930	Neptunium from Solids and Water by Extraction Chromatography, rev 5	
CP-008	Heavy Element Electroplating, rev 13	

AVERAGES ± 2 SD	MDA <u>0.177 ± 0.197</u>
FOR 5 SAMPLES	YIELD <u>39 ± 12</u>

METHOD SUMMARIES

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SUMMARY DATA SECTION

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Lab id	<u>EBRLNE</u>
Protocol	<u>CHPRC</u>
Version	<u>Ver 1.0</u>
Form	<u>DVD-LMS</u>
Version	<u>3.06</u>
Report date	<u>01/27/10</u>

EBERLINE ANALYTICAL/RICHMOND

REVISION 1

SAMPLE DELIVERY GROUP H4106

LAB METHOD SUMMARY

THORIUM, ISOTOPIC IN SOLIDS

ALPHA SPECTROSCOPY

Test TH Matrix SOLID

SDG 7541

Contact N. Joseph Verville

Client CHPRC

Contract No. 33677

Contract SDG H4106

RESULTS

LAB RAW SUF-  
SAMPLE ID TEST FIX PLANCHET CLIENT SAMPLE ID Thorium 230

Preparation batch 7236-020

R912100-01	7541-001	B22RMO	U
R912100-02	7541-002	B22RP1	U
R912100-03	7541-003	Lab Control Sample	ok
R912100-04	7541-004	Method Blank	U
R912100-05	7541-005	Duplicate (R912100-01)	- U

Nominal values and limits from method RDLs (pCi/g) 1.00

METHOD PERFORMANCE

LAB RAW SUF- MAX MDA ALIQ PREP DILU- YIELD EFF COUNT FWHM DRIFT DAYS ANAL-  
SAMPLE ID TEST FIX CLIENT SAMPLE ID pCi/g g FAC TION % % min keV KeV HELD PREPARED YZED DETECTOR

Preparation batch 7236-020 2σ prep error 8.0 % Reference Lab Notebook No. 7232 pg 020

R912100-01	B22RMO	1.01	0.250	42	153	38	01/18/10	01/18	SS-039
R912100-02	B22RP1	0.795	0.250	57	154	35	01/18/10	01/18	SS-055
R912100-03	Lab Control Sample	0.896	0.250	50	178		01/18/10	01/19	SS-033
R912100-04	Method Blank	0.683	0.250	81	154		01/18/10	01/18	SS-061
R912100-05	Duplicate (R912100-01)	0.694	0.250	76	154	38	01/18/10	01/18	SS-062

Nominal values and limits from method 1.00 0.250 30-110 150 180

PROCEDURES	REFERENCE	THISO_IE_PLATE_AEA
	SPP-071	Soil Dissolution, > 1.0g Aliquot, rev 1
	CP-900	Thorium in Water and Dissolved Solid Samples by Extraction Chromatography, rev 5
	CP-008	Heavy Element Electroplating, rev 13

AVERAGES ± 2 SD	MDA	0.816 ± 0.278
FOR 5 SAMPLES	YIELD	61 ± 34

METHOD SUMMARIES

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SUMMARY DATA SECTION

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Lab id EBRLINE  
Protocol CHPRC  
Version Ver 1.0  
Form DVD-LMS  
Version 3.06  
Report date 01/27/10

EBERLINE ANALYTICAL/RICHMOND

REVISION 1

SAMPLE DELIVERY GROUP H4106

LAB METHOD SUMMARY

IODINE 129 IN SOLIDS

GAMMA SPECTROSCOPY

Test I        Matrix SOLID  
 SDG 7541  
 Contact N. Joseph Verville

Client CHPRC  
 Contract No. 33677  
 Contract SDG H4106

RESULTS

LAB RAW SUP-  
 SAMPLE ID TEST FIX PLANCHET CLIENT SAMPLE ID Iodine 129

Preparation batch 7236-020

R912100-01	7541-001	B22RM0	U
R912100-02	7541-002	B22RP1	U
R912100-03	7541-003	Lab Control Sample	ok
R912100-04	7541-004	Method Blank	U
R912100-05	7541-005	Duplicate (R912100-01)	- U

Nominal values and limits from method RDLs (pCi/g) 5.00

METHOD PERFORMANCE

LAB RAW SUP- MDA ALIQ PREP DILU- YIELD EFF COUNT FWHM DRIFT DAYS ANAL-  
 SAMPLE ID TEST FIX CLIENT SAMPLE ID pCi/g g FAC TION % % min keV KeV HELD PREPARED YZED DETECTOR

Preparation batch 7236-020 2σ prep error 19.4 % Reference Lab Notebook No. 7232 pg 020

R912100-01	B22RM0	1.40	1.00	81	500	40	01/20/10	01/20	GRB-202
R912100-02	B22RP1	1.37	1.00	84	500	37	01/20/10	01/20	GRB-203
R912100-03	Lab Control Sample	1.46	1.00	87	500		01/20/10	01/20	GRB-204
R912100-04	Method Blank	1.46	1.00	80	500		01/20/10	01/21	GRB-217
R912100-05	Duplicate (R912100-01)	1.91	1.00	94	600	42	01/20/10	01/22	GRB-217

Nominal values and limits from method 5.00 1.00 40-110 300 180

PROCEDURES	REFERENCE	I129_SEP_LEPS_GS
SPP-070	Soil Dissolution, < 1.0g Aliquot, rev 1	
SPP-062	Sample Aliquoting, rev 1	
CP-024	Iodine-129, Sample Dissolution, rev 8	
CP-530	Iodine-129 Purification, rev 6	
CP-008	Heavy Element Electroplating, rev 13	

AVERAGES ± 2 SD	MDA	<u>1.52</u> ± <u>0.443</u>
FOR 5 SAMPLES	YIELD	<u>85</u> ± <u>11</u>

METHOD SUMMARIES

Page 3

SUMMARY DATA SECTION

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Lab id EBRLNE  
 Protocol CHPRC  
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 Form DVD-LMS  
 Version 3.06  
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EBERLINE ANALYTICAL/RICHMOND

REVISION 1

SAMPLE DELIVERY GROUP H4106

Test C Matrix SOLID  
 SDG 7541  
 Contact N. Joseph Verville

LAB METHOD SUMMARY

CARBON 14 IN SOLIDS

LIQUID SCINTILLATION COUNTING

Client CHPRC  
 Contract No. 33677  
 Contract SDG H4106

RESULTS

LAB RAW SUF-  
 SAMPLE ID TEST FIX PLANCHET CLIENT SAMPLE ID Carbon 14

Preparation batch 7236-020

R912100-01	7541-001	B22RMO	U
R912100-02	7541-002	B22RPI	U
R912100-03	7541-003	Lab Control Sample	ok
R912100-04	7541-004	Method Blank	U
R912100-05	7541-005	Duplicate (R912100-01)	- U

Nominal values and limits from method RDLs (pCi/g) 50.0

METHOD PERFORMANCE

LAB RAW SUF- MDA ALIQ PREP DILU- YIELD EFF COUNT FWHM DRIFT DAYS ANAL-  
 SAMPLE ID TEST FIX CLIENT SAMPLE ID pCi/g g FAC TTON % % min keV KeV HELD PREPARED YZED DETECTOR

Preparation batch 7236-020 2σ prep error 10.0 % Reference Lab Notebook No. 7232 pg 020

R912100-01	B22RMO	5.52	0.234	100	50	39	01/18/10	01/19	LSC-007
R912100-02	B22RPI	6.45	0.201	100	50	36	01/18/10	01/19	LSC-007
R912100-03	Lab Control Sample	14.6	0.200	100	10		01/18/10	01/19	LSC-007
R912100-04	Method Blank	6.48	0.200	100	50		01/18/10	01/19	LSC-007
R912100-05	Duplicate (R912100-01)	5.52	0.235	100	50	39	01/18/10	01/19	LSC-007

Nominal values and limits from method 50.0 0.200 10 180

PROCEDURES REFERENCE C14\_COX\_LSC  
 CP-251 Tritium/Carbon-14 Oxidation, rev 11

AVERAGES ± 2 SD MDA 7.71 ± 7.76  
 FOR 5 SAMPLES YIELD 100 ± 0

METHOD SUMMARIES

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SUMMARY DATA SECTION

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Lab id EBRLNE  
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EBERLINE ANALYTICAL/RICHMOND

SAMPLE DELIVERY GROUP H4106

REVISION 1

Test H        Matrix SOLID  
 SDG 7541  
 Contact N. Joseph Verville

LAB METHOD SUMMARY

TRITIUM IN SOLIDS

LIQUID SCINTILLATION COUNTING

Client CHPRC  
 Contract No. 33677  
 Contract SDG H4106

RESULTS

LAB	RAW	SUF-			
SAMPLE ID	TEST FIX	PLANCHET	CLIENT SAMPLE ID		Tritium
Preparation batch 7236-020					
R912100-01		7541-001	B22RM0		U
R912100-02		7541-002	B22RP1		U
R912100-03		7541-003	Lab Control Sample		ok
R912100-04		7541-004	Method Blank		U
R912100-05		7541-005	Duplicate (R912100-01)	-	U

Nominal values and limits from method RDLs (pCi/g) 400

METHOD PERFORMANCE

LAB	RAW	SUF-	MDA	ALIQ	PREP	DILU-	YIELD	EFF	COUNT	FWHM	DRIFT	DAYS	ANAL-		
SAMPLE ID	TEST FIX	CLIENT SAMPLE ID	pCi/g	g	FAC	TION	%	%	min	keV	KeV	HELD	PREPARED	YZED	DETECTOR
Preparation batch 7236-020 2σ prep error 10.0 % Reference Lab Notebook No. 7232 pg 020															
R912100-01		B22RM0	7.25	0.234			100		50			39	01/18/10	01/19	LSC-007
R912100-02		B22RP1	8.28	0.201			100		50			36	01/18/10	01/19	LSC-007
R912100-03		Lab Control Sample	8.82	0.200			100		50				01/18/10	01/19	LSC-007
R912100-04		Method Blank	8.34	0.200			100		50				01/18/10	01/19	LSC-007
R912100-05		Duplicate (R912100-01)	7.17	0.235			100		50			39	01/18/10	01/19	LSC-007

Nominal values and limits from method 400 0.200 25 180

PROCEDURES REFERENCE TRITIUM\_COX\_LSC  
 CP-251 Tritium/Carbon-14 Oxidation, rev 11

AVERAGES ± 2 SD MDA 7.97 ± 1.45  
 FOR 5 SAMPLES YIELD 100 ± 0

METHOD SUMMARIES

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SUMMARY DATA SECTION

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Lab id EBRLNE  
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EBERLINE ANALYTICAL/RICHMOND

REVISION 1

SAMPLE DELIVERY GROUP H4106

LAB METHOD SUMMARY

NICKEL 63 IN SOLIDS

LIQUID SCINTILLATION COUNTING

Test NI\_L Matrix SOLID

SDG 7541

Contact N. Joseph Verville

Client CHPRC

Contract No. 33677

Contract SDG H4106

RESULTS

LAB RAW SUP- CLIENT SAMPLE ID Nickel 63

Preparation batch 7236-020

R912100-01	7541-001	B22RMO	U
R912100-02	7541-002	B22RP1	U
R912100-03	7541-003	Lab Control Sample	ok
R912100-04	7541-004	Method Blank	U
R912100-05	7541-005	Duplicate (R912100 01)	- U

Nominal values and limits from method RDLs (pCi/g) 30.0

METHOD PERFORMANCE

LAB RAW SUP- MDA ALIQ PREP DILU- YIELD EFF COUNT FWHM DRIFT DAYS ANAL-  
 SAMPLE ID TEST FIX CLIENT SAMPLE ID pCi/g g FAC TION % % min keV KeV HELD PREPARED YZED DETECTOR

Preparation batch 7236-020 2σ prep error 11.2 % Reference Lab Notebook No. 7232 pg 020

R912100-01	B22RMO	3.60	0.500	75	50	40	01/20/10	01/20	LSC-005
R912100-02	B22RP1	3.72	0.500	72	50	37	01/20/10	01/20	LSC-005
R912100-03	Lab Control Sample	3.30	0.500	80	50		01/20/10	01/20	LSC-005
R912100-04	Method Blank	3.30	0.500	80	50		01/20/10	01/20	LSC-005
R912100-05	Duplicate (R912100-01)	3.75	0.500	72	50	40	01/20/10	01/20	LSC-005

Nominal values and limits from method 30.0 0.500 40-110 25 180

PROCEDURES REFERENCE NI63\_LSC  
 SPP-071 Soil Dissolution, > 1.0g Aliquot, rev 1  
 CP 281 Nickel-63 Purification By Extraction  
 Chromatography, rev 5

AVERAGES ± 2 SD MDA 3.53 ± 0.442  
 FOR 5 SAMPLES YIELD 76 ± 8

METHOD SUMMARIES

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SUMMARY DATA SECTION

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Lab id EBRLNE  
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 Version Ver 1.0  
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SDG 7541  
Contact N. Joseph Verville

REPORT GUIDE

Client CHPRC  
Contract No. 33677  
Case no SDG\_H4106

SAMPLE SUMMARY

The Sample and QC Summary Reports show all samples, including QC samples, reported in one Sample Delivery Group (SDG).

The Sample Summary Report fully identifies client samples and gives the corresponding lab sample identification. The QC Summary Report shows at the sample level how the lab organized the samples into batches and generated QC samples. The Preparation Batch and Method Summary Reports show this at the analysis level.

The following notes apply to these reports:

- \* LAB SAMPLE ID is the lab's primary identification for a sample.
- \* DEPARTMENT SAMPLE ID is an alternate lab id, forexample one assigned by a radiochemistry department in a lab.
- \* CLIENT SAMPLE ID is the client's primary identification for a sample. It includes any sample preparation done by the client that is necessary to identify the sample.
- \* QC BATCH is a lab assigned code that groups samples to be processed and QCed together. These samples should have similar matrices.

QC BATCH is not necessarily the same as SDG, which reflects samples received and reported together.

- \* All Lab Control Samples, Method Blanks, Duplicates and Matrix Spikes are shown that QC any of the samples. Due to possible reanalyses, not all results for all these QC samples may be relevant to the SDG. The Lab Control Sample, Method Blank, Duplicate, Matrix Spike and Method Summary Reports detail these relationships.

REPORT GUIDES

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SUMMARY DATA SECTION

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Lab id EBRLNE  
Protocol CHPRC  
Version Ver 1.0  
Form DVD-RG  
Version 3.06  
Report date 01/27/10

SDG 7541  
Contact N. Joseph Verville

REPORT GUIDE

Client CHPRC  
Contract No. 33677  
Case no SDG\_H4106

PREPARATION BATCH SUMMARY

The Preparation Batch Summary Report shows all preparation batches in one Sample Delivery Group (SDG) with information necessary to check the completeness and consistency of the SDG.

The following notes apply to this report:

- \* The preparation batches are shown in the same order as the Method Summary Reports are printed.
- \* Only analyses of planchets relevant to the SDG are included.
- \* Each preparation batch should have at least one Method Blank and LCS in it to validate client sample results.
- \* The QUALIFIERS shown are all qualifiers other than U, J, B, L and H that occur on any analysis in the preparation batch. The Method Summary Report has these qualifiers on a per sample basis.

These qualifiers should be reviewed as follows:

- X Some data has been manually entered or modified. Transcription errors are possible.
- P One or more results are 'preliminary'. The data is not ready for final reporting.
- 2 There were two or more results for one analyte on one planchet imported at one time. The results in DVD may not be the same as on the raw data sheets.

Other lab defined qualifiers may occur. In general, these should be addressed in the SDG narrative.

REPORT GUIDES

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Protocol CHPRC  
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SDG 7541  
 Contact N. Joseph Verville

REPORT GUIDE

Client CHPRC  
 Contract No. 33677  
 Case no SDG\_H4106

WORK SUMMARY

The Work Summary Report shows all samples, including QC samples, and all relevant analyses in one Sample Delivery Group (SDG). This report is often useful as supporting documentation for an invoice.

The following notes apply to this report:

- \* TEST is a code for the method used to measure associated analytes. Results and related information for each analyte are on the Data Sheet Report. In special cases, a test code used in the summary data section is not the same as in associated raw data. In this case, both codes are shown on the Work Summary.
- \* SUFFIX is the lab's code to distinguish multiple analyses (recounts, reworks, reanalyses) of a fraction of the sample. The suffix indicates which result is being reported. An empty suffix normally identifies the first attempt to analyze the sample.
- \* The LAB SAMPLE ID, TEST and SUFFIX uniquely identify all supporting data for a result. The Method Summary Report for each TEST has method performance data, such as yield, for each lab sample id and suffix and procedures used in the method.
- \* PLANCHET is an alternate lab identifier for work done for one test. It, combined with the TEST and SUFFIX, may be the best link to raw data.
- \* For QC samples, only analyses that directly QC some regular sample are shown. The Lab Control Sample, Method Blank, Duplicate, Matrix Spike and Method Summary Reports detail these relationships.
- \* The SAS (Special Analytical Services) Number is a client or lab assigned code that reflects special processing for samples, such as rapid turn around. Counts of tests done are lists by SAS number since it is likely to affect prices.

Lab id EBRLNE  
 Protocol CHPRC  
 Version Ver 1.0  
 Form DVD-RG  
 Version 3.06  
 Report date 01/27/10

SDG 7541  
 Contact N. Joseph Verville

## REPORT GUIDE

Client CHPRC  
 Contract No. 33677  
 Case no SDG H4106

## DATA SHEET

The Data Sheet Report shows all results and primary supporting information for one client sample or Method Blank. This report corresponds to both the CLP Inorganics and Organics Data Sheet.

The following notes apply to this report:

- \* TEST is a code for the method used to measure an analyte. If the TEST is empty, no data is available; the analyte was not analyzed for.
  - \* The LAB SAMPLE ID and TEST uniquely identify work within the Summary Data Section of a Data Package. The Work Summary and Method Summary Reports further identify raw data that underlies this work.
- The Method Summary Report for each TEST has method performance data, such as yield, for each Lab Sample ID and a list of procedures used in the method.
- \* ERRORS can be labeled TOTAL or COUNT. TOTAL implies a preparation (non-counting method) error has been added, as square root of sum of squares, to the counting error denoted by COUNT. The preparation errors, which may vary by preparation batch, are shown on the Method Summary Report.
  - \* A RESULT can be 'N.R.' (Not Reported). This means the lab did this work but chooses not to report it now, possibly because it was reported at another time.
  - \* When reporting a Method Blank, a RESULT can be 'N.A.' (Not Applicable). This means there is no reported client sample work in the same preparation batch as the Blank's result. This is likely to occur when the Method Blank is associated with reanalyses of selected work for a few samples in the SDG.

The following qualifiers are defined by the DVD system:

- U The RESULT is less than the MDA (Minimum Detectable Activity).

## REPORT GUIDES

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## SUMMARY DATA SECTION

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SDG 7541  
 Contact N. Joseph Verville

GUIDE, cont.

Client CHPRC  
 Contract No. 33677  
 Case no SDG\_H4106

DATA SHEET

If the MDA is blank, the ERROR is used as the limit.

- J The RESULT is less than the RDL (Required Detection Limit) and no U qualifier is assigned.
  - B A Method Blank associated with this sample had a result without a U flag and, after correcting for possibly different aliquots, that result is greater than or equal to the MDA for this sample.
- Normally, B is not assigned if U is. When method blank subtraction is shown on this report, B flags are assigned based on the unsubtracted values while U's are assigned based on the subtracted ones. Both flags can be assigned in this case.
- For each sample result, all Method Blank results in the same preparation batch are compared. The Method Summary Report documents this and other QC relationships.
- L Some Lab Control Sample that QC's this sample had a low recovery. The lab can disable assignment of this qualifier.
  - H Similar to 'L' except the recovery was high.
  - P The RESULT is 'preliminary'.
  - X Some data necessary to compute the RESULT, ERROR or MDA was manually entered or modified.
  - 2 There were two or more results available for this analyte. The reported result may not be the same as in the raw data.

Other qualifiers are lab defined. Definitions should be in the SDG narrative.

The following values are underlined to indicate possible problems:

- \* An MDA is underlined if it is bigger than its RDL.

REPORT GUIDES

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SUMMARY DATA SECTION

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Lab id EBRLNE  
 Protocol CHPRC  
 Version Ver 1.0  
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SDG 7541  
 Contact N. Joseph Verville

GUIDE, cont.

Client CHPRC  
 Contract No. 33677  
 Case no SDG H4106

DATA SHEET

- \* An ERROR is underlined if the 1.645 sigma counting error is bigger than both the MDA and the RESULT, implying that the MDA may not be a good estimate of the 'real' minimum detectable activity.
- \* A negative RESULT is underlined if it is less than the negative of its 2 sigma counting ERROR.
- \* When reporting a Method Blank, a RESULT is underlined if greater than its MDA. If the MDA is blank, the 2 sigma counting error is used in the comparison.

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SDG 7541  
 Contact N. Joseph Verville

REPORT GUIDE

Client CHPRC  
 Contract No. 33677  
 Case no SDG H4106

LAB CONTROL SAMPLE

The Lab Control Sample Report shows all results, recoveries and primary supporting information for one Lab Control Sample.

The following notes apply to this report:

- \* All fields in common with the Data Sheet Report have similar usage. Refer to its Report Guide for details.
- \* An amount ADDED is the lab's value for the actual amount spiked into this sample with its ERROR an estimate of the error of this amount.

An amount added is underlined if its ratio to the corresponding RDL is outside protocol specified limits.

- \* REC (Recovery) is RESULT divided by ADDED expressed as a percent.
- \* The first, computed limits for the recovery reflect:
  1. The error of RESULT, including that introduced by rounding the result prior to printing.
 

If the limits are labeled (TOTAL), they include preparation error in the result. If labeled (COUNT), they do not.
  2. The error of ADDED.
  3. A lab specified, per analyte bias. The bias changes the center of the computed limits.
- \* The second limits are protocol defined upper and lower QC limits for the recovery.
- \* The recovery is underlined if it is outside either of these ranges.

REPORT GUIDES

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SUMMARY DATA SECTION

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Lab id EBRLNE  
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SDG 7541  
 Contact N. Joseph Verville

REPORT GUIDE

Client CHPRC  
 Contract No. 33677  
 Case no SDG H4106

DUPLICATE

The Duplicate Report shows all results, differences and primary supporting information for one Duplicate and associated Original sample.

The following notes apply to this report:

- \* All fields in common with the Data Sheet Report have similar usage. This applies both to the Duplicate and Original sample data. Refer to the Data Sheet Report Guide for details.

If the Duplicate has data for a TEST and the lab did not do this test to the Original, the Original's RESULTS are underlined.

- \* The RPD (Relative Percent Difference) is the absolute value of the difference of the RESULTS divided by their average expressed as a percent.

If both RESULTS are less than their MDAs, no RPD is computed and a '-' is printed.

For an analyte, if the lab did work for both samples but has data for only one, the MDA from the sample with data is used as the other's result in the RPD.

- \* The first, computed limit is the sum, as square root of sum of squares, of the errors of the results divided by the average result as a percent, hence the relative error of the difference rather than the error of the relative difference. The errors include those introduced by rounding the RESULTS prior to printing.

If this limit is labeled TOT, it includes the preparation error in the RESULTS. If labeled CNT, it does not.

This value reported for this limit is at most 999.

- \* The second limit for the RPD is the larger of:

1. A fixed percentage specified in the protocol.

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 Contact N. Joseph Verville

GUIDE, cont.

Client CHPRC  
 Contract No. 33677  
 Case no SDG\_H4106

DUPLICATE

2. A protocol factor (typically 2) times the average MDA as a percent of the average result. This limit applies when the results are close to the MDAs.

- \* The RPD is underlined if it is greater than either limit.
- \* If specified by the lab, the second limit column is replaced by the Difference Error Ratio (DER), which is the absolute value of the difference of the results divided by the quadratic sum of their one sigma errors, the same errors as used in the first limit.

Except for differences due to rounding, the DER is the same as the RPD divided by the first RPD limit with the limit scaled to 1 sigma.

- \* The DER is underlined if it is greater than the sigma factor, typically 2 or 3, shown in the header for the first RPD limit.

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MATRIX SPIKE

The Matrix Spike Report shows all results, recoveries and primary supporting information for one Matrix Spike and associated Original sample.

The following notes apply to this report:

- \* All fields in common with the Data Sheet Report have similar usage. This applies both to the Spiked and Original sample data. Refer to the Data Sheet Report Guide for details.

If the Spike has data for a TEST and the lab did not do this test to the Original, the Original's RESULTS are underlined.

- \* An amount ADDED is the lab's value for the actual amount spiked into the Spike sample with its ERROR an estimate of the error of this amount.

An amount is underlined if its ratio to the corresponding RDL is outside protocol specified limits.

- \* REC (Recovery) is the Spike RESULT minus the Original RESULT divided by ADDED expressed as a percent.

- \* The first, computed limits for the recovery reflect:

1. The errors of the two RESULTS, including those introduced by rounding them prior to printing.

If the limits are labeled (TOTAL), they include preparation error in the result. If labeled (COUNT), they do not.

2. The error of ADDED.
3. A lab specified, per analyte bias. The bias changes the center of the computed limits.

- \* The second limits are protocol defined upper and lower QC limits

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SAMPLE DELIVERY GROUP H4106

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 Contact N. Joseph Verville

GUIDE, cont.

Client CHPRC  
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MATRIX SPIKE

for the recovery.

These limits are left blank if the Original RESULT is more than a protocol defined factor (typically 4) times ADDED. This is a way of accounting for that when the spike is small compared to the amount in the original sample, the recovery is unreliable.

\* The recovery is underlined (out of spec) if it is outside either of these ranges.

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METHOD SUMMARY

The Method Summary Report has two tables. One shows up to five results measured using one method. The other has performance data for the method. There is one report for each TEST, as used on the Data Sheet Report.

The following notes apply to this report:

- \* Each table is subdivided into sections, one for each preparation batch. A preparation batch is a group of aliquots prepared at roughly the same time in one work area of the lab using the same method.

There should be Lab Control Sample and Method Blank results in each preparation batch since this close correspondence makes the QC meaningful. Depending on lab policy, Duplicates need not occur in each batch since they QC sample dependencies such as matrix effects.

- \* The RAW TEST column shows the test code used in the raw data to identify a particular analysis if it is different than the test code in the header of the report. This occurs in special cases due to method specific details about how the lab labels work.

The Lab Sample or Planchet ID combined with the (Raw) Test Code and Suffix uniquely identify the raw data for each analysis.

- \* If a result is less than both its MDA and RDL, it is replaced by just 'U' on this report. If it is greater than or equal to the RDL but less than the MDA, the result is shown with a 'U' flag.

The J and X flags are as on the data sheet.

- \* Non-U results for Method Blanks are underlined to indicate possible contamination of other samples in the preparation batch. The Method Blank Report has supporting data.
- \* Lab Control Sample and Matrix Spike results are shown as: ok, No data, LOW or HIGH, with the last two underlined. 'No data'

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METHOD SUMMARY

means no amount ADDED was specified. 'LOW' and 'HIGH' correspond to when the recovery is underlined on the Lab Control Sample or Matrix Spike Report. See these reports for supporting data.

- \* Duplicate sample results are shown as: ok, No data, or OUT, with the last two underlined. 'No data' means there was no original sample data found for this duplicate. 'OUT' corresponds to when the RPD is underlined on the Duplicate Report. See this report for supporting data.
  - \* If the MDA column is labeled 'MAX MDA', there was more than one result measured by the reported method and the MDA shown is the largest MDA. If not all these results have the same RDL, the MAX MDA reflects only those results with RDL equal to the smallest one.
- MDAs are underlined if greater than the printed RDL.
- \* Aliquots are underlined if less than the nominal value specified for the method.
  - \* Preparation factors are underlined if greater than the nominal value specified for the method.
  - \* Dilution factors are underlined if greater than the nominal value specified for the method.
  - \* Residues are underlined if outside the range specified for the method. Residues are not printed if yields are.
  - \* Yields, which may be gravimetric, radiometric or some type of recovery depending on the method, are underlined if outside the range specified for the method.
  - \* Efficiencies are underlined if outside the range specified for the method. Efficiencies are detector and geometry dependent so this test is only approximate.

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Client CHPRC  
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 Case no SDG H4106

METHOD SUMMARY

- \* Count times are underlined if less than the nominal value specified for the method.
- \* Resolutions (as FWHM; Full Width at Half Max) are underlined if greater than the method specified limit.
- \* Tracer drifts are underlined if their absolute values are greater than the method specified limit. Tracer drifts are not printed if percent moistures are.
- \* Days Held are underlined if greater than the holding time specified in the protocol.
- \* Analysis dates are underlined if before their planchet's preparation date or, if a limit is specified, too far after it.

For some methods, ratios as percentages and error estimates for them are computed for pairs of results. A ratio column header like '1+3' means the ratio of the first result column and the third result column.

Ratios are not computed for Lab Control Sample, Method Blank or Matrix Spike results since their matrices are not necessarily similar to client samples'.

The error estimate for a ratio of results from one planchet reflects only counting errors since other errors should be correlated. For a ratio involving different planchets, if QC limits are computed based on total errors, the error for the ratio allows for the preparation errors for the planchets.

The ratio is underlined (out of spec) if the absolute value of its difference from the nominal value is greater than its error estimate. If no nominal value is specified, this test is not done.

For Gross Alpha or Gross Beta results, there may be a column showing the sum of other Alpha or Beta emitters. This sum includes all relevant

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GUIDE, cont.

Client CHPRC  
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 Case no SDG H4106

METHOD SUMMARY

results in the DVD database, whether reported or not. Results in the sum are weighted by a particles/decay value specified by the lab for each relevant analyte. Results less than their MDA are not included. No sums are computed for Lab Control, Method Blank or Matrix Spike samples since their various planchets may not be physically related.

If a ratio of total isotopic to Gross Alpha or Beta is shown, the error for the ratio reflects both the error in the Gross result and the sum, as square root of sum of squares, of the errors in the isotopic results.

For total elemental uranium or thorium results, there may be a column showing the total weight computed from associated isotopic results. Ignoring results less than their MDAs, this is a weighted sum of the isotopic results. The weights depend on the molecular weight and half-life of each isotope so as to convert activities (decays) to weight (atoms).

If a ratio of total computed to measured elemental uranium or thorium is shown, the error for the ratio reflects the errors in all the measurements.

Lab id EBRLNE  
 Protocol CHPRC  
 Version Ver 1.0  
 Form DVD-RG  
 Version 3.06  
 Report date 01/27/10

CH2M HILL Plateau Remediation Company		CHAIN OF CUSTODY / SAMPLE ANALYSIS REQUEST		F10-011-048	PAGE 1 OF 1
COLLECTOR <i>Rosanne Rust Young</i>	COMPANY CONTACT DYKMAN, DL	TELEPHONE NO. 373-2530	PROJECT COORDINATOR DYKMAN, DL	PRICE CODE 8N	DATA TURNAROUND 45 Days / 45 Days
SAMPLING LOCATION CS860 (299-E29-54); 1-060	PROJECT DESIGNATION ARRA 200-LW-2 OU Characterization Vadose Zone - Soil ("K" Well)	FIELD LOGBOOK NO. HNF-N-576-3e 93	SAF NO. F10-011	AIR QUALITY	
ICE CHEST NO. GWS-099	ACTUAL SAMPLE DEPTH 189.3 - 191.8'	COA 302143ES10	METHOD OF SHIPMENT FEDERAL EXPRESS		
SHIPPED TO Eberline Services	OFFSITE PROPERTY NO. H4106	BILL OF LADING/AIR BILL NO. 7931 2173 6589			
MATRIX* A=Air DL=Drum L=Liquid DS=Drum S=Solids L=Liquid O=Oil S=Soil SC=Sediment T=Tissue V=Vegetation 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)	PRESERVATION None			
SPECIAL HANDLING AND/OR STORAGE RADIOACTIVE TIE TO: B22T20	TYPE OF CONTAINER G/P	NO. OF CONTAINER(S) 1			
	VOLUME 120ml				
	SEE ITEM (1) IN SPECIAL INSTRUCTIONS				
SAMPLE NO.	MATRIX*	SAMPLE DATE	SAMPLE TIME		
B22RM0	SOIL	12-11-09	1333		

CHAIN OF POSSESSION		SIGN / PRINT NAMES		SPECIAL INSTRUCTIONS	
RELINQUISHED BY/REMOVED FROM <i>Larry Rosanne Young</i>	DATE/TIME 12-11-09	RECEIVED BY/STORED IN <i>MD-413 550-R1</i>	DATE/TIME 12-11-09 / 1505	** The 200 Area S&GRP Characterization and Monitoring Sampling and Analysis GKI applies to this SAF. <input type="checkbox"/>	
RELINQUISHED BY/REMOVED FROM <i>MD 413 550 R1</i>	DATE/TIME 12-21-09	RECEIVED BY/STORED IN <i>DE Patchen</i>	DATE/TIME 12-21-09	(1) Carbon-14; Nickel-63; Neptunium-237; Iodine-129; Isotopic Thorium {Thorium-232} Tritium - H3;	
RELINQUISHED BY/REMOVED FROM <i>MD 413 550 R1</i>	DATE/TIME 12-21-09	RECEIVED BY/STORED IN <i>Fed Ex</i>	DATE/TIME 12-21-09		
RELINQUISHED BY/REMOVED FROM <i>Fed Ex</i>	DATE/TIME 12-21-09	RECEIVED BY/STORED IN <i>F. Patchen</i>	DATE/TIME 12-21-09		
RELINQUISHED BY/REMOVED FROM <i>F</i>	DATE/TIME 12-21-09	RECEIVED BY/STORED IN	DATE/TIME		
RELINQUISHED BY/REMOVED FROM <i>F</i>	DATE/TIME 12-21-09	RECEIVED BY/STORED IN	DATE/TIME		
RELINQUISHED BY/REMOVED FROM <i>F</i>	DATE/TIME 12-21-09	RECEIVED BY/STORED IN	DATE/TIME		

REVISION 1

**ORIGINAL**

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

CH2M Hill Plateau Remediation Company

COLLECTOR: *Roscoe Rust*

SAMPLING LOCATION: C5860 (299-E29-54); 1-075

ICE CHEST NO.: *GWS-099*

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

COMPANY CONTACT: DYEKMAN, DL  
TELEPHONE NO.: 373-2530

PROJECT COORDINATOR: DYEKMAN, DL

PRICE CODE: 8N

DATA TURNAROUND: 45 Days / 45 Days

PROJECT DESIGNATION: ARRA 200-LW-2 OU Characterization Vadose Zone - Soil ("K" Well)

SAF NO.: F10-011

AIR QUALITY:

METHOD OF SHIPMENT: FEDERAL EXPRESS

FIELD LOGBOOK NO.: *HNF-N-576-3 P 94*

ACTUAL SAMPLE DEPTH: *208.9' - 211.4'*

COA: 302143ES10

BILL OF LADING/AIR BILL NO.: *7931 2173 6589*

OFFSITE PROPERTY NO.: *H7106 (7541)*

SEE PTR

SAMPLE NO.	MATRIX*	SPECIAL HANDLING AND/OR STORAGE RADIOACTIVE TIE TO: B22149	PRESERVATION	TYPE OF CONTAINER	NO. OF CONTAINER(S)	VOLUME	SAMPLE ANALYSIS	SAMPLE TIME	
								SAMPLE DATE	SAMPLE TIME
B22RP1	SOIL		None	G/P	1	120ml	SEE ITEM (1) IN SPECIAL INSTRUCTIONS	<i>12-14-09</i>	<i>1445</i>

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. <input type="checkbox"/>	
<i>Larry Roscoe Rust</i>	<i>12-14-09 1530</i>	<i>MW-413 SSU-R1</i>	<i>12-14-09 1530</i>	(1) Carbon-14; Neptunium-237; Iodine-129; Isotopic Thorium (Thorium-232) Tritium - H3;	
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME	ORIGINAL	
<i>MW-413 SSU-R1</i>	<i>12-21-09 0900</i>	<i>CHPRC ASG</i>	<i>12-21-09</i>		
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME		
<i>CHPRC ASG</i>	<i>12-21-09</i>	<i>Fed Ex</i>	<i>12-21-09</i>		
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME		
<i>Fed Ex</i>	<i>12-21-09</i>	<i>FE. Baitkus</i>	<i>12-21-09</i>		
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME		
<i>0</i>					
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME		
<i>1</i>					
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME		
<i>1</i>					

LABORATORY SECTION: RECEIVED BY

FINAL SAMPLE DISPOSITION: DISPOSAL METHOD

TITLE: \_\_\_\_\_ DATE/TIME: \_\_\_\_\_

DISPOSED BY: \_\_\_\_\_ DATE/TIME: \_\_\_\_\_

REVISION 1

A-6003-618(01/06)



**RICHMOND, CA LABORATORY**  
SAMPLE RECEIPT CHECKLIST

Client: CHPRC City MICHIGAN State WA  
 Date/Time received 2/27/09 10:20 CoC No. F10-011-048-090  
 Container I.D. No. GWS-099 Requested TAT (Days) 45 P.O. Received Yes [ ] No [ ]

INSPECTION

1. Custody seals on shipping container intact? Yes [X] No [ ] N/A [ ]
2. Custody seals on shipping container dated & signed? Yes [X] No [ ] N/A [ ]
3. Custody seals on sample containers intact? Yes [X] No [ ] N/A [ ]
4. Custody seals on sample containers dated & signed? Yes [X] No [ ] N/A [ ]
5. Packing material is: Wet [ ] Dry [X]
6. Number of samples in shipping container: 2 Sample Matrix S
7. Number of containers per sample: 1 (Or see CoC \_\_\_\_\_)
8. Samples are in correct container Yes [X] No [ ]
9. Paperwork agrees with samples? Yes [X] No [ ]
10. Samples have: Tape [ ] Hazard labels [ ] Rad labels [ ] Appropriate sample labels [X]
11. Samples are: In good condition [X] Leaking [ ] Broken Container [ ] Missing [ ]
12. Samples are: Preserved [ ] Not preserved [ ] pH 7.2 Preservative \_\_\_\_\_
13. Describe any anomalies:  
\_\_\_\_\_  
\_\_\_\_\_

14. Was P.M. notified of any anomalies? Yes [ ] No [ ] Date \_\_\_\_\_  
 15. Inspected by [Signature] Date: 2/27/09 Time: 8:50

Customer Sample No.	Beta/Gamma cpm	Ion Chamber mR/hr	Wipe	Customer Sample No.	Beta/Gamma cpm	Ion Chamber mR/hr	wipe
<u>All samples</u>	<u>260</u>						

Ion Chamber Ser. No. \_\_\_\_\_ Calibration date \_\_\_\_\_  
 Alpha Meter Ser. No. \_\_\_\_\_ Calibration date \_\_\_\_\_  
 Beta/Gamma Meter Ser. No. 100482 Calibration date 05/AUG 09