



**EBERLINE**  
SERVICES

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February 11, 2010

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 S0-01-019-7556, SDG H4121**

Dear Mr. Neely:

Enclosed is a data report for two solid (soil) samples designated under SAF No. F10-011 received at Eberline Analytical on January 7, 2010. 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/ljb

Enclosure: Data Package

**RECEIVED**  
JUL 14 2010  
**EDMC**

## 1.0 GENERAL

CH2M Hill Plateau Remediation Company (CHPRC) Sample Delivery Group H4121 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 Nickel-63 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 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.

### 2.5 Isotopic Thorium Analysis

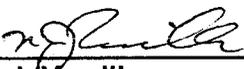
No problems were encountered during the course of the analyses.

### 2.5 Neptunium-237 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 reanalyses.

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

2/11/10  
\_\_\_\_\_  
Date

EBERLINE ANALYTICAL / RICHMOND  
SAMPLE DELIVERY GROUP H4121

SDG 7556  
Contact N. Joseph Verville

Client CHPRC  
Contract No. 33677  
Case no SDG H4121

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

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LB  
Prepared by \_\_\_\_\_  
ngjville  
Reviewed by \_\_\_\_\_

Lab id EBRLNE  
Protocol CHPRC  
Version Ver 1.0  
Form DVD-TOC  
Version 3.06  
Report date 02/11/10

EBERLINE ANALYTICAL / RICHMOND

SAMPLE DELIVERY GROUP H4121

SDG 7556  
Contact N. Joseph Verville

REPORT GUIDE

Client CHPRC  
Contract No. 33677  
Case no SDG\_H4121

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  
Form DVD-RG  
Version 3.06  
Report date 02/11/10

EBERLINE ANALYTICAL / RICHMOND

SAMPLE DELIVERY GROUP H4121

SDG 7556  
Contact N. Joseph Verville

GUIDE, cont.

Client CHPRC  
Contract No. 33677  
Case no SDG\_H4121

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 02/11/10

**EBERLINE ANALYTICAL/RICHMOND**

SAMPLE DELIVERY GROUP H4121

**LAB SAMPLE SUMMARY**

SDG 7556  
 Contact N. Joseph Verville

Client CHPRC  
 Contract No. 33677  
 Case no SDG H4121

LAB SAMPLE ID	CLIENT SAMPLE ID	LOCATION	MATRIX	LEVEL	SAF NO	CHAIN OF CUSTODY	COLLECTED
S001019-01	B22RT5	C5860(299-E29-54);I-099	SOLID		F10-011	F10-011-137	12/28/09 09:35
S001019-02	B22RV4	C5860(299-E29-54);I-114	SOLID		F10-011	F10-011-153	12/29/09 13:30
S001019-03	Lab Control Sample		SOLID		F10-011		
S001019-04	Method Blank		SOLID		F10-011		
S001019-05	Duplicate (S001019-01)	C5860(299-E29-54);I-099	SOLID		F10-011		12/28/09 09:35

Lab id EBRLNE  
 Protocol CHPRC  
 Version Ver 1.0  
 Form DVD-LS  
 Version 3.06  
 Report date 02/11/10

**EBERLINE ANALYTICAL/RICHMOND**

SAMPLE DELIVERY GROUP H4121

SDG 7556  
 Contact N. Joseph Verville

**QC SUMMARY**

Client CHPRC  
 Contract No. 33677  
 Case no SDG H4121

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
7556	F10-011-137	B22RT5	SOLID	96.0	203 g		01/07/10 10	S001019-01		7556-001
	F10-011-153	B22RV4	SOLID	94.1	237 g		01/07/10 9	S001019-02		7556-002
		Method Blank	SOLID					S001019-04		7556-004
		Lab Control Sample	SOLID					S001019-03		7556-003
		Duplicate (S001019-01)	SOLID	96.0	203 g		01/07/10 10	S001019-05		7556-005

QC SUMMARY

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SUMMARY DATA SECTION

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Lab id EBRLNE  
 Protocol CHPRC  
 Version Ver 1.0  
 Form DVD-QS  
 Version 3.06  
 Report date 02/11/10

**EBERLINE ANALYTICAL/RICHMOND**

SAMPLE DELIVERY GROUP H4121

SDG 7556  
Contact N. Joseph Verville

**PREP BATCH SUMMARY**

Client CHPRC  
Contract No. 33677  
Case no SDG H4121

TEST	MATRIX	METHOD	PREPARATION ERROR		PLANCHETS ANALYZED				QUALI-	
			BATCH	2σ %	CLIENT	MORE	RE	BLANK		LCS
<b>Alpha Spectroscopy</b>										
NP	SOLID	Neptunium in Solids	7232-204	14.8	2			1	1	1/1
TH	SOLID	Thorium, Isotopic in Solids	7232-204	8.0	2			1	1	1/1
<b>Gamma Spectroscopy</b>										
I	SOLID	Iodine 129 in Solids	7232-204	19.4	2			1	1	1/1
<b>Liquid Scintillation Counting</b>										
C	SOLID	Carbon 14 in Solids	7232-204	10.0	2			1	1	1/1
H	SOLID	Tritium in Solids	7232-204	10.0	2			1	1	1/1
NI_L	SOLID	Nickel 63 in Solids	7232-204	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**

SAMPLE DELIVERY GROUP H4121

**LAB WORK SUMMARY**

SDG 7556  
Contact N. Joseph Verville

Client CHPRC  
Contract No. 33677  
Case no SDG H4121

LAB SAMPLE	CLIENT SAMPLE ID				SUP-					
COLLECTED	LOCATION	MATRIX			FIX	ANALYZED	REVIEWED	BY	METHOD	
RECEIVED	CUSTODY	SAF No	PLANCHET	TEST						
S001019-01	B22RT5		7556-001	C		01/16/10	02/08/10	BW	Carbon 14 in Solids	
12/28/09	C5860(299-E29-54);I-099	SOLID	7556-001	H		01/15/10	02/08/10	BW	Tritium in Solids	
01/07/10	F10-011-137	F10-011	7556-001	I		02/04/10	02/09/10	BW	Iodine 129 in Solids	
			7556-001	NI_L		01/27/10	01/29/10	BW	Nickel 63 in Solids	
			7556-001	NP		01/30/10	02/03/10	BW	Neptunium in Solids	
			7556-001	TH		01/22/10	01/22/10	BW	Thorium, Isotopic in Solids	
S001019-02	B22RV4		7556-002	C		01/16/10	02/08/10	BW	Carbon 14 in Solids	
12/29/09	C5860(299-E29-54);I-114	SOLID	7556-002	H		01/15/10	02/08/10	BW	Tritium in Solids	
01/07/10	F10-011-153	F10-011	7556-002	I		02/04/10	02/09/10	BW	Iodine 129 in Solids	
			7556-002	NI_L		01/27/10	01/29/10	BW	Nickel 63 in Solids	
			7556-002	NP		01/30/10	02/03/10	BW	Neptunium in Solids	
			7556-002	TH		01/22/10	01/22/10	BW	Thorium, Isotopic in Solids	
S001019-03	Lab Control Sample		7556-003	C		01/16/10	02/08/10	BW	Carbon 14 in Solids	
		SOLID	7556-003	H		01/15/10	02/08/10	BW	Tritium in Solids	
		F10-011	7556-003	I		02/04/10	02/09/10	BW	Iodine 129 in Solids	
			7556-003	NI_L		01/27/10	01/29/10	BW	Nickel 63 in Solids	
			7556-003	NP		01/30/10	02/03/10	BW	Neptunium in Solids	
			7556-003	TH		01/22/10	01/22/10	BW	Thorium, Isotopic in Solids	
S001019-04	Method Blank		7556-004	C		01/16/10	02/08/10	BW	Carbon 14 in Solids	
		SOLID	7556-004	H		01/15/10	02/08/10	BW	Tritium in Solids	
		F10-011	7556-004	I		02/04/10	02/09/10	BW	Iodine 129 in Solids	
			7556-004	NI_L		01/27/10	01/29/10	BW	Nickel 63 in Solids	
			7556-004	NP		02/02/10	02/03/10	BW	Neptunium in Solids	
			7556-004	TH		01/22/10	01/22/10	BW	Thorium, Isotopic in Solids	
S001019-05	Duplicate (S001019-01)		7556-005	C		01/16/10	02/08/10	BW	Carbon 14 in Solids	
12/28/09	C5860(299-E29-54);I-099	SOLID	7556-005	H		01/15/10	02/08/10	BW	Tritium in Solids	
01/07/10	F10-011		7556-005	I		02/04/10	02/09/10	BW	Iodine 129 in Solids	
			7556-005	NI_L		01/27/10	01/29/10	BW	Nickel 63 in Solids	
			7556-005	NP		02/01/10	02/03/10	BW	Neptunium in Solids	
			7556-005	TH		01/22/10	01/22/10	BW	Thorium, Isotopic in Solids	

WORK SUMMARY

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SUMMARY DATA SECTION

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Lab id EBERLINE  
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Version Ver 1.0  
Form DVD-LWS  
Version 3.06  
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EBERLINE ANALYTICAL/RICHMOND

SAMPLE DELIVERY GROUP H4121

WORK SUMMARY, cont.

SDG 7556  
 Contact N. Joseph Verville

Client CHPRC  
 Contract No. 33677  
 Case no SDG H4121

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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SUMMARY DATA SECTION

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Lab id EBRLNE  
 Protocol CHPRC  
 Version Ver 1.0  
 Form DVD-LWS  
 Version 3.06  
 Report date 02/11/10

EBERLINE ANALYTICAL / RICHMOND

SAMPLE DELIVERY GROUP H4121

7556-004

Method Blank

METHOD BLANK

SDG <u>7556</u>	Client/Case no <u>CHPRC</u>	SDG <u>H4121</u>
Contact <u>N. Joseph Verville</u>	Contract No. <u>33677</u>	
Lab sample id <u>S001019-04</u>	Client sample id <u>Method Blank</u>	
Dept sample id <u>7556-004</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	-2.40	4.4	7.75	400	U	H
Carbon 14	14762-75-5	-0.401	3.9	6.68	50.0	U	C
Nickel 63	13981-37-8	-0.563	1.7	2.98	30.0	U	NI_L
Iodine 129	15046-84-1	-0.154	1.1	1.54	5.00	U	I
Thorium 228	14274-82-9	0.059	0.24	0.423	1.00	U	TH
Thorium 230	14269-63-7	-0.264	0.29	0.599	1.00	U	TH
Thorium 232	TH-232	0	0.059	0.225	1.00	U	TH
Neptunium 237	13994-20-2	-0.009	0.019	0.052	1.00	U	NP

QC-BLANK #71980

METHOD BLANKS

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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-DS</u>
Version <u>3.06</u>
Report date <u>02/11/10</u>

**EBERLINE ANALYTICAL/RICHMOND**

SAMPLE DELIVERY GROUP H4121

7556-003

Lab Control Sample

**LAB CONTROL SAMPLE**

SDG <u>7556</u>	Client/Case no <u>CHPRC</u> <u>SDG H4121</u>
Contact <u>N. Joseph Verville</u>	Contract No. <u>33677</u>
Lab sample id <u>S001019-03</u>	Client sample id <u>Lab Control Sample</u>
Dept sample id <u>7556-003</u>	Material/Matrix _____ <u>SOLID</u>
	SAF No <u>F10-011</u>

ANALYTE	RESULT	2σ ERR	MDA	RDL	QUALI-	ADDED	2σ ERR	REC	3σ	LMTS	PROTOCOL
	pCi/g	(COUNT)	pCi/g	pCi/g	FIERS TEST	pCi/g	pCi/g	†	(TOTAL)	LIMITS	
Tritium	1070	25	8.62	400	H	1120	45	96	84-116	80-120	
Carbon 14	3290	30	7.17	50.0	C	3190	130	103	83-117	80-120	
Nickel 63	211	6.2	3.29	30.0	NI_L	218	8.7	97	82-118	80-120	
Iodine 129	124	3.7	1.58	5.00	I	127	5.1	98	71-129	80-120	
Thorium 230	21.1	2.2	0.616	1.00	TH	22.7	0.91	93	81-119	80-120	
Neptunium 237	11.1	1.2	0.078	1.00	NP	11.9	0.48	93	74-126	80-120	

QC-LCS #71979

LAB CONTROL SAMPLES

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Report date <u>02/11/10</u>

**EBERLINE ANALYTICAL/RICHMOND**

SAMPLE DELIVERY GROUP H4121

7556-005

B22RT5

**DUPLICATE**

SDG <u>7556</u>	Client/Case no <u>CHPRC</u>	SDG <u>H4121</u>
Contact <u>N. Joseph Verville</u>	Contract No. <u>33677</u>	
<b>DUPLICATE</b>	<b>ORIGINAL</b>	
Lab sample id <u>S001019-05</u>	Lab sample id <u>S001019-01</u>	Client sample id <u>B22RT5</u>
Dept sample id <u>7556-005</u>	Dept sample id <u>7556-001</u>	Location/Matrix <u>C5860(299-E29-54);I-099 SOLID</u>
	Received <u>01/07/10</u>	Collected/Weight <u>12/28/09 09:35 203 g</u>
% solids <u>96.0</u>	% solids <u>96.0</u>	Custody/SAF No <u>F10-011-137 F10-011</u>

ANALYTE	DUPLICATE		MDA	RDL	QUALI- FIERS	TEST	ORIGINAL		MDA	QUALI- FIERS	RPD %	3σ TOT	DER σ
	pCi/g	2σ ERR (COUNT)					pCi/g	2σ ERR (COUNT)					
Tritium	-1.35	4.1	7.27	400	U	H	0.373	4.7	8.03	U	-	0.6	
Carbon 14	-0.250	3.7	6.25	50.0	U	C	-0.847	3.5	6.04	U	-	0.2	
Nickel 63	-0.049	2.3	3.93	30.0	U	NI_L	-0.682	3.9	6.77	U	-	0.3	
Iodine 129	-0.301	1.3	1.80	5.00	U	I	1.29	1.4	1.85	U	-	1.7	
Thorium 228	0.518	0.28	0.365	1.00		TH	0.632	0.35	0.385		20	118	0.5
Thorium 230	0.381	0.38	0.572	1.00	U	TH	0.344	0.40	0.585	U	-	0.1	
Thorium 232	0.708	0.28	0.208	1.00		TH	0.402	0.23	0.219		55	100	1.7
Neptunium 237	0	0.060	0.091	1.00	U	NP	0	0.050	0.074	U	-	0	

QC-DUP#1 71981

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

Lab id EBRLNE  
Protocol CHPRC  
Version Ver 1.0  
Form DVD-DUP  
Version 3.06  
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EBERLINE ANALYTICAL / RICHMOND

SAMPLE DELIVERY GROUP H4121

7556-001

B22RT5

DATA SHEET

SDG <u>7556</u>	Client/Case no <u>CHPRC</u>	SDG <u>H4121</u>
Contact <u>N. Joseph Verville</u>	Contract No. <u>33677</u>	
Lab sample id <u>S001019-01</u>	Client sample id <u>B22RT5</u>	
Dept sample id <u>7556-001</u>	Location/Matrix <u>C5860(299-E29-54);I-099 SOLID</u>	
Received <u>01/07/10</u>	Collected/Weight <u>12/28/09 09:35</u> <u>203 g</u>	
% solids <u>96.0</u>	Custody/SAF No <u>F10-011-137</u> <u>F10-011</u>	

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALIFIERS	TEST
Tritium	10028-17-8	0.373	4.7	8.03	400	U	H
Carbon 14	14762-75-5	-0.847	3.5	6.04	50.0	U	C
Nickel 63	13981-37-8	-0.682	3.9	6.77	30.0	U	NI_L
Iodine 129	15046-84-1	1.29	1.4	1.85	5.00	U	I
Thorium 228	14274-82-9	0.632	0.35	0.385	1.00		TH
Thorium 230	14269-63-7	0.344	0.40	0.585	1.00	U	TH
Thorium 232	TH-232	0.402	0.23	0.219	1.00		TH
Neptunium 237	13994-20-2	0	0.050	0.074	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>02/11/10</u>

EBERLINE ANALYTICAL / RICHMOND  
SAMPLE DELIVERY GROUP H4121

7556-002

B22RV4

DATA SHEET

SDG <u>7556</u>	Client/Case no <u>CHPRC</u>	SDG <u>H4121</u>
Contact <u>N. Joseph Verville</u>	Contract No. <u>33677</u>	
Lab sample id <u>S001019-02</u>	Client sample id <u>B22RV4</u>	
Dept sample id <u>7556-002</u>	Location/Matrix <u>C5860(299-E29-54);I-114</u>	<u>SOLID</u>
Received <u>01/07/10</u>	Collected/Weight <u>12/29/09 13:30</u>	<u>237 g</u>
% solids <u>94.1</u>	Custody/SAF No <u>F10-011-153</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	-2.29	3.8	6.70	400	U	H
Carbon 14	14762-75-5	-0.116	3.4	5.79	50.0	U	C
Nickel 63	13981-37-8	0.606	2.8	4.81	30.0	U	NI_L
Iodine 129	15046-84-1	-0.422	1.3	1.76	5.00	U	I
Thorium 228	14274-82-9	0.600	0.28	0.284	1.00		TH
Thorium 230	14269-63-7	0.346	0.37	0.524	1.00	U	TH
Thorium 232	TH-232	0.737	0.28	0.176	1.00		TH
Neptunium 237	13994-20-2	0	0.028	0.042	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>02/11/10</u>

**EBERLINE ANALYTICAL/RICHMOND**

SAMPLE DELIVERY GROUP H4121

**LAB METHOD SUMMARY**

NEPTUNIUM IN SOLIDS

ALPHA SPECTROSCOPY

Test NP Matrix SOLID  
 SDG 7556  
 Contact N. Joseph Verville

Client CHPRC  
 Contract No. 33677  
 Contract SDG H4121

**RESULTS**

LAB	RAW	SUF-	Neptunium	
SAMPLE ID	TEST FIX	PLANCHET	CLIENT SAMPLE ID	237
Preparation batch 7232-204				
S001019-01	7556-001	B22RT5		U
S001019-02	7556-002	B22RV4		U
S001019-03	7556-003	Lab Control Sample		ok
S001019-04	7556-004	Method Blank		U
S001019-05	7556-005	Duplicate (S001019-01)		- 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 7232-204 2σ prep error 14.8 % Reference Lab Notebook No. 7232 pg 204															
S001019-01		B22RT5	0.074	0.500			62	142				33	01/30/10	01/30	SS-051
S001019-02		B22RV4	0.042	1.00			54	142				32	01/30/10	01/30	SS-052
S001019-03		Lab Control Sample	0.078	0.500			59	142					01/30/10	01/30	SS-053
S001019-04		Method Blank	0.052	0.500			50	929					12/31/09	02/02	SS-052
S001019-05		Duplicate (S001019-01)	0.091	0.500			66	122				35	02/01/10	02/01	SS-064

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

PROCEDURES	REFERENCE	NP237_LLE_PLATE_AEA
SPP-070	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>0.067</u> ± <u>0.040</u>
FOR 5 SAMPLES	YIELD	<u>58</u> ± <u>13</u>

METHOD SUMMARIES

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SUMMARY DATA SECTION

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Lab id EBRLNE  
 Protocol CHPRC  
 Version Ver 1.0  
 Form DVD-LMS  
 Version 3.06  
 Report date 02/11/10

**EBERLINE ANALYTICAL/RICHMOND**

SAMPLE DELIVERY GROUP H4121

Test TH Matrix SOLID  
 SDG 7556  
 Contact N. Joseph Verville

**LAB METHOD SUMMARY**

THORIUM, ISOTOPIC IN SOLIDS

ALPHA SPECTROSCOPY

Client CHPRC  
 Contract No. 33677  
 Contract SDG H4121

**RESULTS**

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

Preparation batch 7232-204

S001019-01	7556-001	B22RT5	U
S001019-02	7556-002	B22RV4	U
S001019-03	7556-003	Lab Control Sample	ok
S001019-04	7556-004	Method Blank	U
S001019-05	7556-005	Duplicate (S001019-01)	- 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 7232-204 2σ prep error 8.0 % Reference Lab Notebook No. 7232 pg 204

S001019-01	B22RT5	0.585	0.250	86	219	25	01/21/10	01/22	SS-032
S001019-02	B22RV4	0.524	0.250	100	219	24	01/21/10	01/22	SS-033
S001019-03	Lab Control Sample	0.616	0.250	86	219		01/21/10	01/22	SS-034
S001019-04	Method Blank	0.599	0.250	87	218		01/21/10	01/22	SS-035
S001019-05	Duplicate (S001019-01)	0.572	0.250	91	218	25	01/21/10	01/22	SS-038

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 <u>0.579 ± 0.070</u>
FOR 5 SAMPLES	YIELD <u>90 ± 12</u>

METHOD SUMMARIES

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SUMMARY DATA SECTION

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Lab id EBRLNE  
 Protocol CHPRC  
 Version Ver 1.0  
 Form DVD-LMS  
 Version 3.06  
 Report date 02/11/10

**EBERLINE ANALYTICAL/RICHMOND**

SAMPLE DELIVERY GROUP H4121

Test I Matrix SOLID  
 SDG 7556  
 Contact N. Joseph Verville

**LAB METHOD SUMMARY**

IODINE 129 IN SOLIDS  
 GAMMA SPECTROSCOPY

Client CHPRC  
 Contract No. 33677  
 Contract SDG H4121

**RESULTS**

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

Preparation batch 7232-204

S001019-01		7556-001	B22RT5	U
S001019-02		7556-002	B22RV4	U
S001019-03		7556-003	Lab Control Sample	ok
S001019-04		7556-004	Method Blank	U
S001019-05		7556-005	Duplicate (S001019-01)	- 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 7232-204 2σ prep error 19.4 % Reference Lab Notebook No. 7232 pg 204

S001019-01		B22RT5	1.85	1.00			64	400			38	02/04/10	02/04	GRB-221
S001019-02		B22RV4	1.76	1.00			66	400			37	02/04/10	02/04	GRB-222
S001019-03		Lab Control Sample	1.58	1.00			89	400				02/04/10	02/04	GRB-223
S001019-04		Method Blank	1.54	1.00			89	400				02/04/10	02/04	GRB-224
S001019-05		Duplicate (S001019-01)	1.80	1.00			66	400			38	02/04/10	02/04	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>1.71</u> ± <u>0.276</u>
FOR 5 SAMPLES	YIELD	<u>75</u> ± <u>26</u>

METHOD SUMMARIES

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SUMMARY DATA SECTION

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Lab id EBRLNE  
 Protocol CHPRC  
 Version Ver 1.0  
 Form DVD-LMS  
 Version 3.05  
 Report date 02/11/10

**EBERLINE ANALYTICAL/RICHMOND**

SAMPLE DELIVERY GROUP H4121

**LAB METHOD SUMMARY**

CARBON 14 IN SOLIDS

LIQUID SCINTILLATION COUNTING

Test C Matrix SOLID

SDG 7556

Contact N. Joseph Verville

Client CHPRC

Contract No. 33677

Contract SDG H4121

**RESULTS**

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

Preparation batch 7232-204

S001019-01	7556-001	B22RT5	U
S001019-02	7556-002	B22RV4	U
S001019-03	7556-003	Lab Control Sample	ok
S001019-04	7556-004	Method Blank	U
S001019-05	7556-005	Duplicate (S001019-01)	- U

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

**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 7232-204 2σ prep error 10.0 % Reference Lab Notebook No. 7232 pg 204

S001019-01	B22RT5	6.04	0.221	100	50	19	01/15/10	01/16	LSC-004
S001019-02	B22RV4	5.79	0.231	100	50	18	01/15/10	01/16	LSC-004
S001019-03	Lab Control Sample	7.17	0.200	100	50		01/15/10	01/16	LSC-004
S001019-04	Method Blank	6.68	0.200	100	50		01/15/10	01/16	LSC-004
S001019-05	Duplicate (S001019-01)	6.25	0.213	100	50	19	01/15/10	01/16	LSC-004

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 6.39 ± 1.09  
FOR 5 SAMPLES YIELD 100 ± 0

METHOD SUMMARIES

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SUMMARY DATA SECTION

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Lab id EBRLNE  
Protocol CHPRC  
Version Ver 1.0  
Form DVD-LMS  
Version 3.06  
Report date 02/11/10

**EBERLINE ANALYTICAL/RICHMOND**

SAMPLE DELIVERY GROUP H4121

**LAB METHOD SUMMARY**

TRITIUM IN SOLIDS

LIQUID SCINTILLATION COUNTING

Test H        Matrix SOLID  
 SDG 7556  
 Contact N. Joseph Verville

Client CHPRC  
 Contract No. 33677  
 Contract SDG H4121

**RESULTS**

LAB            RAW    SUF-  
 SAMPLE ID    TEST FIX    PLANCHET    CLIENT SAMPLE ID            Tritium

Preparation batch 7232-204

S001019-01	7556-001	B22RT5		U
S001019-02	7556-002	B22RV4		U
S001019-03	7556-003	Lab Control Sample		ok
S001019-04	7556-004	Method Blank		U
S001019-05	7556-005	Duplicate (S001019-01)	-	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 7232-204            2σ prep error 10.0 %            Reference Lab Notebook No. 7232 pg 204

S001019-01		B22RT5	8.03	0.221			100	50			18	01/15/10	01/15	LSC-004
S001019-02		B22RV4	6.70	0.231			100	50			17	01/15/10	01/15	LSC-004
S001019-03		Lab Control Sample	8.62	0.200			100	50				01/15/10	01/15	LSC-004
S001019-04		Method Blank	7.75	0.200			100	50				01/15/10	01/15	LSC-004
S001019-05		Duplicate (S001019-01)	7.27	0.213			100	50			18	01/15/10	01/15	LSC-004

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 7.67 ± 1.46  
 FOR 5 SAMPLES            YIELD 100 ± 0

METHOD SUMMARIES

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SUMMARY DATA SECTION

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Lab id EBRLNE  
 Protocol CHPRC  
 Version Ver 1.0  
 Form DVD-LMS  
 Version 3.06  
 Report date 02/11/10

**EBERLINE ANALYTICAL/RICHMOND**

SAMPLE DELIVERY GROUP H4121

**LAB METHOD SUMMARY**

NICKEL 63 IN SOLIDS

LIQUID SCINTILLATION COUNTING

Test NI L Matrix SOLID

SDG 7556

Contact N. Joseph Verville

Client CHPRC

Contract No. 33677

Contract SDG H4121

**RESULTS**

LAB RAW SUF-  
SAMPLE ID TEST FIX PLANCHET CLIENT SAMPLE ID Nickel 63

Preparation batch 7232-204

S001019-01	7556-001	B22RT5	U
S001019-02	7556-002	B22RV4	U
S001019-03	7556-003	Lab Control Sample	ok
S001019-04	7556-004	Method Blank	U
S001019-05	7556-005	Duplicate (S001019-01)	- U

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

**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 TION % % min keV KeV HELD PREPARED YZED DETECTOR

Preparation batch 7232-204 2σ prep error 11.2 % Reference Lab Notebook No. 7232 pg 204

S001019-01	B22RT5	6.77	0.500	43	50	30	01/25/10	01/27	LSC-006
S001019-02	B22RV4	4.81	0.500	62	50	29	01/25/10	01/27	LSC-006
S001019-03	Lab Control Sample	3.29	0.500	86	50		01/25/10	01/27	LSC-006
S001019-04	Method Blank	2.98	0.500	96	50		01/25/10	01/27	LSC-006
S001019-05	Duplicate (S001019-01)	3.93	0.500	72	50	30	01/25/10	01/27	LSC-006

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

PROCEDURES REFERENCE NI63\_LSC  
SPP-070 Soil Dissolution, < 1.0g Aliquot, rev 1  
CP-281 Nickel-63 Purification By Extraction  
Chromatography, rev 5

AVERAGES ± 2 SD MDA 4.36 ± 3.04  
FOR 5 SAMPLES YIELD 72 ± 41

METHOD SUMMARIES

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Lab id EBRLNE

Protocol CHPRC

Version Ver 1.0

Form DVD-LMS

Version 3.06

Report date 02/11/10

EBERLINE ANALYTICAL / RICHMOND

SAMPLE DELIVERY GROUP H4121

SDG 7556  
Contact N. Joseph Verville

REPORT GUIDE

Client CHPRC  
Contract No. 33677  
Case no SDG H4121

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, for example 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 EBERLINE  
Protocol CHPRC  
Version Ver 1.0  
Form DVD-RG  
Version 3.06  
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EBERLINE ANALYTICAL / RICHMOND

SAMPLE DELIVERY GROUP H4121

SDG 7556  
Contact N. Joseph Verville

REPORT GUIDE

Client CHPRC  
Contract No. 33677  
Case no SDG\_H4121

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 plachets 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 plachet 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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SUMMARY DATA SECTION

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Lab id EBRLNE  
Protocol CHPRC  
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EBERLINE ANALYTICAL / RICHMOND

SAMPLE DELIVERY GROUP H4121

SDG 7556  
 Contact N. Joseph Verville

REPORT GUIDE

Client CHPRC  
 Contract No. 33677  
 Case no SDG\_H4121

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.

REPORT GUIDES

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SUMMARY DATA SECTION

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Lab id EBRLNE  
 Protocol CHPRC  
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EBERLINE ANALYTICAL / RICHMOND

SAMPLE DELIVERY GROUP H4121

SDG 7556  
 Contact N. Joseph Verville

REPORT GUIDE

Client CHPRC  
 Contract No. 33677  
 Case no SDG H4121

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).

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 Protocol CHPRC  
 Version Ver 1.0  
 Form DVD-RG  
 Version 3.06  
 Report date 02/11/10

EBERLINE ANALYTICAL / RICHMOND

SAMPLE DELIVERY GROUP H4121

SDG 7556  
 Contact N. Joseph Verville

GUIDE, cont.

Client CHPRC  
 Contract No. 33677  
 Case no SDG\_H4121

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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 Report date 02/11/10

EBERLINE ANALYTICAL / RICHMOND

SAMPLE DELIVERY GROUP H4121

SDG 7556  
Contact N. Joseph Verville

GUIDE, cont.

Client CHPRC  
Contract No. 33677  
Case no SDG H4121

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.

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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EBERLINE ANALYTICAL / RICHMOND

SAMPLE DELIVERY GROUP H4121

SDG 7556  
 Contact N. Joseph Verville

REPORT GUIDE

Client CHPRC  
 Contract No. 33677  
 Case no SDG H4121

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.

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EBERLINE ANALYTICAL / RICHMOND

SAMPLE DELIVERY GROUP H4121

SDG 7556  
 Contact N. Joseph Verville

REPORT GUIDE

Client CHPRC  
 Contract No. 33677  
 Case no SDG\_H4121

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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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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SDG 7556  
Contact N. Joseph Verville

R E P O R T   G U I D E

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M A T R I X   S P I K E

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 H4121

SDG 7556

Contact N. Joseph Verville

GUIDE, cont.

Client CHPRC

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Case no SDG\_H4121

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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SDG 7556  
 Contact N. Joseph Verville

REPORT GUIDE

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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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GUIDE, cont.

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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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GUIDE, cont.

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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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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.

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CH2M Hill Plateau Remediation Company		CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST		F10-D11-153	PAGE 1 OF 1
COLLECTOR <i>Rosanne Rest Chamberlain</i>	COMPANY CONTACT DYKMAN, DL	TELEPHONE NO. 373-2530	PROJECT COORDINATOR DYKMAN, DL	PRICE CODE 8N	DATA TURNAROUND 45 Days / 45 Days
SAMPLING LOCATION C5860 (299-E29-54); I-114	PROJECT DESIGNATION ARRA 200-LW-2 OU Characterization Vadose Zone - Soil ("K" Well)		SAF NO. F10-011	AIR QUALITY <input type="checkbox"/>	
ICE CHEST NO. <i>GWS-149 (1-6P) 117</i>	FIELD LOGBOOK NO. HNF-N-576-3 <i>ps 99</i>	ACTUAL SAMPLE DEPTH <i>279.6 ± 282.3</i>	COA 302143ES10	METHOD OF SHIPMENT FEDERAL EXPRESS	
SHIPPED TO Eberline Services	OFFSITE PROPERTY NO. H4121 (1556)		BILL OF LADING/AIR BILL NO. SEE PTR 793157206344		
MATRIX* A=Air DL=Drum L=Liquid O=Oil S=Soil SE=Sediment T=Tissue V=Vegetation W=Water WI=Wipe X=Other	POSSIBLE SAMPLE HAZARDS/ REMARKS Contains Radioactive Material at concentrations that 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			
	TYPE OF CONTAINER G/P				
	NO. OF CONTAINER(S) 1				
	VOLUME 120mL				
	SPECIAL HANDLING AND/OR STORAGE RADIOACTIVE TIE TO: 822732	SEE ITEM (1) IN SPECIAL INSTRUCTIONS			
SAMPLE NO. B22RV4	MATRIX* SOIL	SAMPLE DATE 12-29-09	SAMPLE TIME 1330		
CHAIN OF POSSESSION					
RELINQUISHED BY/REMOVED FROM <i>Larry Restone Jimmy Rowan</i>	DATE/TIME 12-29-09 1530	SIGN/PRINT NAMES		DATE/TIME 12-29-09 1530	
RELINQUISHED BY/REMOVED FROM <i>MO-413 F10-413 SSURM</i>	DATE/TIME JAN 06 2010	RECEIVED BY/STORED IN CHPRC		DATE/TIME JAN 06 2010	
RELINQUISHED BY/REMOVED FROM <i>CHPRC</i>	DATE/TIME JAN 06 2010	RECEIVED BY/STORED IN <i>Fed EX</i>		DATE/TIME 07100920	
RELINQUISHED BY/REMOVED FROM <i>CHPRC</i>	DATE/TIME JAN 06 2010	RECEIVED BY/STORED IN <i>CHPRC</i>		DATE/TIME 07100920	
RELINQUISHED BY/REMOVED FROM <i>CHPRC</i>	DATE/TIME JAN 06 2010	RECEIVED BY/STORED IN <i>CHPRC</i>		DATE/TIME 07100920	
RELINQUISHED BY/REMOVED FROM <i>CHPRC</i>	DATE/TIME JAN 06 2010	RECEIVED BY/STORED IN <i>CHPRC</i>		DATE/TIME 07100920	
RELINQUISHED BY/REMOVED FROM <i>CHPRC</i>	DATE/TIME JAN 06 2010	RECEIVED BY/STORED IN <i>CHPRC</i>		DATE/TIME 07100920	
RELINQUISHED BY/REMOVED FROM <i>CHPRC</i>	DATE/TIME JAN 06 2010	RECEIVED BY/STORED IN <i>CHPRC</i>		DATE/TIME 07100920	
LABORATORY SECTION	RECEIVED BY	TITLE		DATE/TIME	
FINAL SAMPLE DISPOSITION	DISPOSAL METHOD	DISPOSED BY		DATE/TIME	

**ORIGINAL**



**RICHMOND, CA LABORATORY**  
**SAMPLE RECEIPT CHECKLIST**

*He* 1/7/10

Client: CHPRC City RICHMOND State WA  
 Date/Time received 01/07/10 0920 CoC No. F10-011-137, F10-011-153 US 1/01/10  
 Container I.D. No. GWS-117 Requested TAT (Days) 45 P.O. Received Yes [ ] No [ ]

**INSPECTION**

1. Custody seals on shipping container intact? Yes [] No [ ] N/A [ ]
2. Custody seals on shipping container dated & signed? Yes [] No [ ] N/A [ ]
3. Custody seals on sample containers intact? Yes [] No [ ] N/A [ ]
4. Custody seals on sample containers dated & signed? Yes [] No [ ] N/A [ ]
5. Packing material is: Wet [ ] Dry []
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 [] No [ ]
9. Paperwork agrees with samples? Yes [] No [ ]
10. Samples have: Tape [ ] Hazard labels [ ] Rad labels [ ] Appropriate sample labels []
11. Samples are: In good condition [] Leaking [ ] Broken Container [ ] Missing [ ]
12. Samples are: Preserved [ ] Not preserved [ ] pH N/A Preservative \_\_\_\_\_
13. Describe any anomalies:  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

14. Was P.M. notified of any anomalies? Yes [ ] No [ ] Date \_\_\_\_\_
15. Inspected by [Signature] Date: 01/07/10 Time: 1015

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>L60</u>						

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