



July 26, 2012

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

Reference: **P.O. #33677**  
**Eberline Analytical S2-07-053-7735, SDG H4734**

Dear Mr. Fitzgerald:

Enclosed is a data report for one solid (other solid) sample designated under SAF No. F11-031, received at Eberline Analytical on July 19, 2012. The sample was analyzed according to the accompanying chain-of-custody document.

Please call if you have any questions concerning this report.

Sincerely,

Joseph Verville  
Client Services Manager

NJV/

Enclosure: Case Narrative

**1.0 GENERAL**

CH2M Hill Plateau Remediation Company (CHPRC) Sample Delivery Group H4734 was composed of one solid (other solid) sample designated under SAF No. F11-031 with a Project Designation of: 200-PW-1 & 200-ZP-1 Spent GAC Canisters and Filters.

The sample was received as stated on the Chain-of-Custody document. Any discrepancies are noted on the Eberline Analytical Sample Receipt Checklist.

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

The relative percent difference (RPD) in the original and duplicate results was 84%, greater than the control limit of 30%, however per the SOW, "When either the DER or the RPD pass, then the duplicate is acceptable." In this case, the DER was 0.9, less than the control limit of 2.0. The difference in the results is most likely due to the non-homogeneous distribution of activity within the GAC matrix. No other problems were encountered during the course of the analyses.

**2.2 Carbon-14 Analysis**

The MDA's for the sample and the duplicate were 95.1 and 94.7 pCi/g respectively, greater than the RDL of 50 pCi/g. No other problems were encountered during the course of the analyses. The results for both the original and duplicate analyses were less than their respective MDA's therefore no RPD or statistical control limit is calculated.

**2.3 Nickel-63 Analysis**

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

**2.4 Technicium-99 Analysis**

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

**2.5 Selenium-79 Analysis**

No problems were encountered during the course of the analyses. The results for both the original and duplicate analyses were less than their respective MDA's therefore no RPD or statistical control limit is calculated. Eberline analytical does not maintain a stock of Se-79 activity therefore no QC LCS analysis was performed.

**2.6 Iodine-129 Analysis**

The MDA's for the sample and the duplicate were 3.29 and 2.82 pCi/g respectively, greater than the RDL of 2 pCi/g. No other problems were encountered during the course of the analyses. The results for both the original and duplicate analyses were less than their respective MDA's therefore no RPD or statistical control limit is calculated.

**2.7 Isotopic Thorium Analysis**

The relative percent difference (RPD) in the original and duplicate Th-232 results was 68%, greater than the control limit of 30%, and the DER was 2.2. The difference in the results is most likely due to the non-homogeneous distribution of activity within the GAC matrix. All isotopic thorium results were less than the RDL of 1.0 pCi/g. No other problems were encountered during the course of the analyses.

**2.8 Protactinium-231 Analysis**

The recovery for the LCS was 122%, slightly greater than the upper control limit of 120%. No problems were encountered during the course of the reanalyses. The results for both the original and duplicate analyses were less than their respective MDA's therefore no RPD or statistical control limit is calculated.

**2.9 Total Uranium Analysis**

No problems were encountered during the course of the analyses.

**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."**

  
\_\_\_\_\_  
**Joseph Verville**  
**Client Services Manager**

7/26/12  
\_\_\_\_\_  
**Date**

JULY 27, 2012

EBRLINE ANALYTICAL - RICHMOND  
SAMPLE DELIVERY GROUP H4734

SDG 7735  
Contact Joseph Verville

Client Hanford  
Contract No. 33677  
Case no SDG\_H4734

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Prepared by

  
Reviewed by

Lab id EBRLNE  
Protocol F11-031  
Version Ver 0.0  
Form DVD-TOC  
Version 3.06  
Report date 07/26/12

JULY 27, 2012

EBERLINE ANALYTICAL - RICHMOND

SAMPLE DELIVERY GROUP H4734

SDG 7735  
Contact Joseph Verville

REPORT GUIDE

Client Hanford  
Contract No. 33677  
Case no SDG\_H4734

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 F11-031  
Version Ver 0.0  
Form DVD-RG  
Version 3.06  
Report date 07/26/12

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EBERLINE ANALYTICAL - RICHMOND

SAMPLE DELIVERY GROUP H4734

SDG 7735  
Contact Joseph Verville

Client Hanford  
Contract No. 33677  
Case no SDG H4734

GUIDE, cont.

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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Protocol F11-031  
Version Ver 0.0  
Form DVD-RG  
Version 3.06  
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EBERLINE ANALYTICAL-RICHMOND

SAMPLE DELIVERY GROUP H4734

SDG 7735  
Contact Joseph Verville

LAB SAMPLE SUMMARY

Client Hanford  
Contract No. 33677  
Case no SDG H4734

LAB SAMPLE ID	CLIENT SAMPLE ID	LOCATION	MATRIX	LEVEL	SAF NO	CHAIN OF CUSTODY	COLLECTED
S207053-01	B2LTY8	ZP-1 Spent GAC; Comp.	SOLID		F11-031	F11-031-027	07/15/12 08:30
S207053-02	Lab Control Sample		SOLID		F11-031		
S207053-03	Method Blank		SOLID		F11-031		
S207053-04	Duplicate (S207053-01)	ZP-1 Spent GAC; Comp.	SOLID		F11-031		07/15/12 08:30

LAB SUMMARY

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SUMMARY DATA SECTION

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Lab id EBRLNE  
Protocol F11-031  
Version Ver 0.0  
Form DVD-LS  
Version 3.06  
Report date 07/26/12

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EBERLINE ANALYTICAL - RICHMOND

SAMPLE DELIVERY GROUP H4734

SDG 7735  
Contact Joseph Verville

Client Hanford  
Contract No. 33677  
Case no SDG H4734

QC SUMMARY

QC BATCH	CHAIN OF CUSTODY	CLIENT SAMPLE ID	MATRIX	% SOLIDS	SAMPLE AMOUNT	BASIS AMOUNT	DAYS SINCE RECEIVED	LAB COLL	DEPARTMENT SAMPLE ID
7735	F11-031-027	B2LTY8	SOLID	100.0	126 g		07/19/12	4	S207053-01 7735-001
		Method Blank	SOLID						S207053-03 7735-003
		Lab Control Sample	SOLID						S207053-02 7735-002
		Duplicate (S207053-01)	SOLID	100.0	126 g		07/19/12	4	S207053-04 7735-004

QC SUMMARY

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SUMMARY DATA SECTION

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Lab id EBRLNE  
Protocol F11-031  
Version Ver 0.0  
Form DVD-QS  
Version 3.06  
Report date 07/26/12

JULY 27, 2012

EBERLINE ANALYTICAL-RICHMOND

SAMPLE DELIVERY GROUP H4734

SDG 7735  
Contact Joseph Verville

PREP BATCH SUMMARY

Client Hanford  
Contract No. 33677  
Case no SDG H4734

TEST	MATRIX	METHOD	PREPARATION ERROR		PLANCHETS ANALYZED				QUALI-	
			BATCH	2σ %	CLIENT	MORE	RE	BLANK		LCS
Alpha Spectroscopy										
PA	SOLID	Pa 231 in Solids	7732-102	14.8	1			1	1	1/1
TH	SOLID	Thorium, Isotopic in Solids	7732-102	8.0	1			1	1	1/1
Beta Counting										
TC	SOLID	Technetium 99 in Solids	7732-102	13.2	1			1	1	1/1
Gamma Spectroscopy										
I	SOLID	Iodine 129 in Solids	7732-102	19.4	1			1	1	1/1
Kinetic Phosphorimetry										
U_T	SOLID	Uranium, Total in Solids	7732-102		1			1	1	1/1
Liquid Scintillation Counting										
C	SOLID	Carbon 14 in Solids	7732-102	10.0	1			1	1	1/1
H	SOLID	Tritium in Solids	7732-102	10.0	1			1	1	1/1
NI_L	SOLID	Nickel 63 in Solids	7732-102	11.2	1			1	1	1/1
SE_L	SOLID	Selenium 79 in Solids	7732-102	11.2	1			1		1/1

Blank, LCS, Duplicate and Spike planchets are those in the same preparation batch as some Client sample.

Lab id EBRLINE  
Protocol F11-031  
Version Ver 0.0  
Form DVD-PBS  
Version 3.06  
Report date 07/26/12

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EBERLINE ANALYTICAL - RICHMOND

SAMPLE DELIVERY GROUP H4734

SDG 7735  
Contact Joseph Verville

LAB WORK SUMMARY

Client Hanford  
Contract No. 33677  
Case no SDG H4734

LAB SAMPLE	CLIENT SAMPLE ID				SUF-					
COLLECTED	LOCATION	MATRIX			FIX	ANALYZED	REVIEWED	BY	METHOD	
RECEIVED	CUSTODY	SAF No	PLANCHET	TEST						
S207053-01	B2LTY8		7735-001	C		07/21/12	07/25/12	BW	Carbon 14 in Solids	
07/15/12	ZP-1 Spent GAC; Comp.	SOLID	7735-001	H		07/21/12	07/24/12	BW	Tritium in Solids	
07/19/12	F11-031-027	F11-031	7735-001	I		07/23/12	07/24/12	BW	Iodine 129 in Solids	
			7735-001	NI_L		07/24/12	07/25/12	BW	Nickel 63 in Solids	
			7735-001	PA		07/22/12	07/26/12	BW	Pa 231 in Solids	
			7735-001	SE_L		07/25/12	07/25/12	BW	Selenium 79 in Solids	
			7735-001	TC		07/24/12	07/24/12	BW	Technetium 99 in Solids	
			7735-001	TH		07/23/12	07/24/12	BW	Thorium, Isotopic in Solids	
			7735-001	U_T		07/24/12	07/24/12	CSS	Uranium, Total in Solids	
S207053-02	Lab Control Sample		7735-002	C		07/21/12	07/25/12	BW	Carbon 14 in Solids	
		SOLID	7735-002	H		07/21/12	07/24/12	BW	Tritium in Solids	
		F11-031	7735-002	I		07/23/12	07/24/12	BW	Iodine 129 in Solids	
			7735-002	NI_L		07/24/12	07/25/12	BW	Nickel 63 in Solids	
			7735-002	PA		07/22/12	07/26/12	BW	Pa 231 in Solids	
			7735-002	TC		07/23/12	07/24/12	BW	Technetium 99 in Solids	
			7735-002	TH		07/23/12	07/24/12	BW	Thorium, Isotopic in Solids	
			7735-002	U_T		07/24/12	07/24/12	CSS	Uranium, Total in Solids	
S207053-03	Method Blank		7735-003	C		07/21/12	07/25/12	BW	Carbon 14 in Solids	
		SOLID	7735-003	H		07/21/12	07/24/12	BW	Tritium in Solids	
		F11-031	7735-003	I		07/24/12	07/24/12	BW	Iodine 129 in Solids	
			7735-003	NI_L		07/24/12	07/25/12	BW	Nickel 63 in Solids	
			7735-003	PA		07/22/12	07/26/12	BW	Pa 231 in Solids	
			7735-003	SE_L		07/25/12	07/25/12	BW	Selenium 79 in Solids	
			7735-003	TC		07/24/12	07/24/12	BW	Technetium 99 in Solids	
			7735-003	TH		07/23/12	07/24/12	BW	Thorium, Isotopic in Solids	
			7735-003	U_T		07/24/12	07/24/12	CSS	Uranium, Total in Solids	
S207053-04	Duplicate (S207053-01)		7735-004	C		07/21/12	07/25/12	BW	Carbon 14 in Solids	
07/15/12	ZP-1 Spent GAC; Comp.	SOLID	7735-004	H		07/21/12	07/24/12	BW	Tritium in Solids	
07/19/12	F11-031		7735-004	I		07/23/12	07/24/12	BW	Iodine 129 in Solids	
			7735-004	NI_L		07/24/12	07/25/12	BW	Nickel 63 in Solids	
			7735-004	PA		07/22/12	07/26/12	BW	Pa 231 in Solids	
			7735-004	SE_L		07/25/12	07/25/12	BW	Selenium 79 in Solids	
			7735-004	TC		07/24/12	07/24/12	BW	Technetium 99 in Solids	
			7735-004	TH		07/23/12	07/24/12	BW	Thorium, Isotopic in Solids	
			7735-004	U_T		07/24/12	07/24/12	CSS	Uranium, Total in Solids	

WORK SUMMARY

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SUMMARY DATA SECTION

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Lab id EBRLNE  
Protocol F11-031  
Version Ver 0.0  
Form DVD-LWS  
Version 3.06  
Report date 07/26/12

JULY 27, 2012

EBERLINE ANALYTICAL-RICHMOND

SAMPLE DELIVERY GROUP H4734

SDG 7735  
Contact Joseph Verville

WORK SUMMARY, cont.

Client Hanford  
Contract No. 33677  
Case no SDG H4734

COUNTS OF TESTS BY SAMPLE TYPE

TEST	SAF NO	METHOD	REFERENCE	CLIENT	MORE	RE	BLANK	LCS	DUP SPIKE	TOTAL
C	F11-031	Carbon 14 in Solids	C14_LSC	1			1	1	1	4
H	F11-031	Tritium in Solids	TRITIUM_COX_LSC	1			1	1	1	4
I	F11-031	Iodine 129 in Solids	I129_SEP_LEPS_GS	1			1	1	1	4
NI_L	F11-031	Nickel 63 in Solids	NI63_LSC	1			1	1	1	4
PA	F11-031	Pa 231 in Solids	PA231_IE_PLATE_AEA	1			1	1	1	4
SE_L	F11-031	Selenium 79 in Solids	SE79_SEP_IE_LSC	1			1		1	3
TC	F11-031	Technetium 99 in Solids	TC99_TR_SEP_GPC	1			1	1	1	4
TH	F11-031	Thorium, Isotopic in Solids	THISO_IE_PLATE_AEA	1			1	1	1	4
U_T	F11-031	Uranium, Total in Solids	UTOT_KPA	1			1	1	1	4
TOTALS				9			9	8	9	35

WORK SUMMARY

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SUMMARY DATA SECTION

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Lab id EBRLNE  
Protocol F11-031  
Version Ver 0.0  
Form DVD-LWS  
Version 3.06  
Report date 07/26/12

JULY 27, 2012

EBERLINE ANALYTICAL - RICHMOND  
SAMPLE DELIVERY GROUP H4734

7735-003

Method Blank

METHOD BLANK

SDG <u>7735</u>	Client/Case no <u>Hanford</u>	SDG <u>H4734</u>
Contact <u>Joseph Verville</u>	Contract No. <u>33677</u>	
Lab sample id <u>S207053-03</u>	Client sample id <u>Method Blank</u>	
Dept sample id <u>7735-003</u>	Material/Matrix <u>SOLID</u>	
	SAF No <u>F11-031</u>	

ANALYTE	CAS NO	RESULT pCi/g	2 $\sigma$ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Tritium	10028-17-8	-24.8	59	102	400	U	H
Carbon 14	14762-75-5	-35.6	58	<u>98.0</u>	50.0	U	C
Nickel 63	13981-37-8	0.652	1.7	2.85	30.0	U	NI_L
Selenium-79	15758-45-9	0.724	1.9	3.17	10.0	U	SE_L
Technetium 99	14133-76-7	-0.190	0.24	0.605	15.0	U	TC
Iodine 129	15046-84-1	-0.341	2.8	<u>3.53</u>	2.00	U	I
Thorium 228	14274-82-9	0.014	0.042	0.094	1.00	U	TH
Thorium 230	14269-63-7	-0.218	0.25	0.268	1.00	U	TH
Thorium 232	TH-232	-0.014	0.028	0.078	1.00	U	TH
Total Uranium (ug/g)	7440-61-1	0	0.004	0.009	1.00	U	U_T
Protactinium 231	14331-85-2	0.021	0.043	0.082	1.00	U	PA

QC-BLANK #82147

METHOD BLANKS

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Protocol <u>F11-031</u>
Version <u>Ver 0.0</u>
Form <u>DVD-DS</u>
Version <u>3.06</u>
Report date <u>07/26/12</u>

JULY 27, 2012

EBERLINE ANALYTICAL-RICHMOND

SAMPLE DELIVERY GROUP H4734

7735-002

Lab Control Sample

LAB CONTROL SAMPLE

SDG <u>7735</u>	Client/Case no <u>Hanford</u>	SDG <u>H4734</u>
Contact <u>Joseph Verville</u>	Contract No. <u>33677</u>	
Lab sample id <u>S207053-02</u>	Client sample id <u>Lab Control Sample</u>	
Dept sample id <u>7735-002</u>	Material/Matrix <u>SOLID</u>	
	SAF No <u>F11-031</u>	

ANALYTE	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS TEST	ADDED pCi/g	2σ ERR pCi/g	REC %	3σ LMTS (TOTAL)	PROTOCOL LIMITS
Tritium	19200	200	73.2	400	H	19500	780	98	84-116	80-120
Carbon 14	63000	1300	<u>311</u>	50.0	C	63800	2600	99	84-116	80-120
Nickel 63	231	6.1	2.80	30.0	NI_L	258	10	90	83-117	80-120
Technetium 99	236	3.5	0.609	15.0	TC	218	8.7	108	78-122	80-120
Iodine 129	259	7.7	<u>3.08</u>	2.00	I	232	9.3	112	67-133	80-120
Thorium 230	20.5	1.1	0.266	1.00	TH	22.7	0.91	90	86-114	80-120
Total Uranium (ug/g)	33.0	3.8	0.091	1.00	U_T	33.0	1.3	100	82-118	80-120
Protactinium 231	5.55	0.50	0.104	1.00	PA	4.54	0.18	<u>122</u>	68-132	80-120

QC-LCS #82146

Lab id <u>EBRLNE</u>
Protocol <u>F11-031</u>
Version <u>Ver 0.0</u>
Form <u>DVD-LCS</u>
Version <u>3.06</u>
Report date <u>07/26/12</u>

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EBERLINE ANALYTICAL-RICHMOND

SAMPLE DELIVERY GROUP H4734

7735-004

B2LTY8

DUPLICATE

SDG <u>7735</u>	Client/Case no <u>Hanford</u>	SDG <u>H4734</u>
Contact <u>Joseph Verville</u>	Contract No. <u>33677</u>	
DUPLICATE	ORIGINAL	
Lab sample id <u>S207053-04</u>	Lab sample id <u>S207053-01</u>	Client sample id <u>B2LTY8</u>
Dept sample id <u>7735-004</u>	Dept sample id <u>7735-001</u>	Location/Matrix <u>ZP-1 Spent GAC; Comp.</u> <u>SOLID</u>
	Received <u>07/19/12</u>	Collected/Weight <u>07/15/12 08:30</u> <u>126 g</u>
% solids <u>100.0</u>	% solids <u>100.0</u>	Custody/SAF No <u>F11-031-027</u> <u>F11-031</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	37.8	75	82.2	400	U	H	92.7	90	80.8		84	270	0.9
Carbon 14	-31.8	56	<u>94.7</u>	50.0	U	C	-51.9	55	<u>95.1</u>	U	-		0.5
Nickel 63	1.63	1.7	2.81	30.0	U	NI_L	1.28	1.7	2.89	U	-		0.3
Selenium-79	2.38	2.3	3.69	10.0	U	SE_L	1.60	2.2	3.59	U	-		0.5
Technetium 99	-0.102	0.40	0.919	15.0	U	TC	-0.046	0.36	0.806	U	-		0.2
Iodine 129	1.06	2.1	<u>2.82</u>	2.00	U	I	1.56	2.5	<u>3.29</u>	U	-		0.3
Thorium 228	0.131	0.083	0.122	1.00		TH	0.168	0.094	0.114		25	127	0.6
Thorium 230	-0.110	0.25	0.260	1.00	U	TH	-0.188	0.24	0.262	U	-		0.4
Thorium 232	0.220	0.083	0.053	1.00		TH	0.108	0.054	0.051		68	92	2.2
Total Uranium (ug/g)	0.885	0.099	0.009	1.00		U_T	0.918	0.10	0.009		4	23	0.5
Protactinium 231	0.077	0.057	0.092	1.00	U	PA	0.102	0.090	0.125	U	-		0.5

QC-DUP#1 82148

200-PW-1 & 200-ZP-1 Spent GAC Canisters & Filters

DUPLICATES

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SUMMARY DATA SECTION

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Lab id <u>EBRLNE</u>
Protocol <u>F11-031</u>
Version <u>Ver 0.0</u>
Form <u>DVD-DUP</u>
Version <u>3.06</u>
Report date <u>07/26/12</u>

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EBERLINE ANALYTICAL - RICHMOND  
SAMPLE DELIVERY GROUP H4734

7735-001

B2LTY8

DATA SHEET

SDG <u>7735</u>	Client/Case no <u>Hanford</u>	<u>SDG H4734</u>
Contact <u>Joseph Verville</u>	Contract <u>No. 33677</u>	
Lab sample id <u>S207053-01</u>	Client sample id <u>B2LTY8</u>	
Dept sample id <u>7735-001</u>	Location/Matrix <u>ZP-1 Spent GAC; Comp.</u>	<u>SOLID</u>
Received <u>07/19/12</u>	Collected/Weight <u>07/15/12 08:30</u>	<u>126 g</u>
% solids <u>100.0</u>	Custody/SAF No <u>F11-031-027</u>	<u>F11-031</u>

ANALYTE	CAS NO	RESULT pCi/g	2 $\sigma$ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Tritium	10028-17-8	92.7	90	80.8	400		H
Carbon 14	14762-75-5	-51.9	55	<u>95.1</u>	50.0	U	C
Nickel 63	13981-37-8	1.28	1.7	2.89	30.0	U	NI_L
Selenium-79	15758-45-9	1.60	2.2	3.59	10.0	U	SE_L
Technetium 99	14133-76-7	-0.046	0.36	0.806	15.0	U	TC
Iodine 129	15046-84-1	1.56	2.5	<u>3.29</u>	2.00	U	I
Thorium 228	14274-82-9	0.168	0.094	0.114	1.00		TH
Thorium 230	14269-63-7	-0.188	0.24	0.262	1.00	U	TH
Thorium 232	TH-232	0.108	0.054	0.051	1.00		TH
Total Uranium (ug/g)	7440-61-1	0.918	0.10	0.009	1.00		U_T
Protactinium 231	14331-85-2	0.102	0.090	0.125	1.00	U	PA

200-PW-1 & 200-ZP-1 Spent GAC Canisters & Filters

DATA SHEETS

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SUMMARY DATA SECTION

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Lab id <u>EBRLNE</u>
Protocol <u>F11-031</u>
Version <u>Ver 0.0</u>
Form <u>DVD-DS</u>
Version <u>3.06</u>
Report date <u>07/26/12</u>

JULY 27, 2012

EBERLINE ANALYTICAL-RICHMOND

SAMPLE DELIVERY GROUP H4734

Test PA Matrix SOLID
SDG 7735
Contact Joseph Verville

LAB METHOD SUMMARY

PA 231 IN SOLIDS
ALPHA SPECTROSCOPY

Client Hanford
Contract No. 33677
Contract SDG H4734

RESULTS

LAB RAW SUP- Protactinium
SAMPLE ID TEST FIX PLANCHET CLIENT SAMPLE ID 231

Preparation batch 7732-102

S207053-01 7735-001 B2LTY8 U
S207053-02 7735-002 Lab Control Sample HIGH
S207053-03 7735-003 Method Blank U
S207053-04 7735-004 Duplicate (S207053-01) - U

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

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 7732-102 2 sigma prep error 14.8 % Reference Lab Notebook 7732 pg. 106

S207053-01 B2LTY8 0.125 0.200 52 10 7 07/22/12 07/22 GRB-101
S207053-02 Lab Control Sample 0.104 0.200 62 50 07/22/12 07/22 LSC-005
S207053-03 Method Blank 0.082 0.200 55 10 07/22/12 07/22 GRB-101
S207053-04 Duplicate (S207053-01) 0.092 0.200 55 10 7 07/22/12 07/22 GRB-105

Nominal values and limits from method 1.00 0.200 30-110 50 180

PROCEDURES REFERENCE PA231\_IE\_PLATE\_AEA
SPP-061 Determination of Moisture Content in Solid Samples
rev 0
SPP-070 Soil Dissolution, < 1.0g Aliquot, rev 1
CP-910 Protactinium-231 in Soil, (0 to 0.25 g) Aliquot,
rev 9
CP-008 Heavy Element Electroplating, rev 13

AVERAGES +/- 2 SD MDA 0.101 +/- 0.037
FOR 4 SAMPLES YIELD 56 +/- 8

METHOD SUMMARIES

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SUMMARY DATA SECTION

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Lab id EBRLNE
Protocol F11-031
Version Ver 0.0
Form DVD-LMS
Version 3.06
Report date 07/26/12

JULY 27, 2012

EBERLINE ANALYTICAL-RICHMOND

SAMPLE DELIVERY GROUP H4734

Test TH Matrix SOLID
SDG 7735
Contact Joseph Verville

LAB METHOD SUMMARY

THORIUM, ISOTOPIC IN SOLIDS

ALPHA SPECTROSCOPY

Client Hanford
Contract No. 33677
Contract SDG H4734

RESULTS

LAB RAW SUF-
SAMPLE ID TEST FIX PLANCHET CLIENT SAMPLE ID Thorium 228 Thorium 230 Thorium 232

Preparation batch 7732-102

Table with 7 columns: SAMPLE ID, TEST FIX, PLANCHET, CLIENT SAMPLE ID, Thorium 228, Thorium 230, Thorium 232. Rows include S207053-01 to S207053-04.

Nominal values and limits from method RDLs (pCi/g) 1.00 1.00 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 7732-102 2σ prep error 8.0 % Reference Lab Notebook 7732 pg. 106

Table with 13 columns: SAMPLE ID, TEST FIX, CLIENT SAMPLE ID, MAX MDA, ALIQ, PREP, DILU-, YIELD, EFF, COUNT, FWHM, DRIFT, DAYS, ANAL-. Rows include S207053-01 to S207053-04.

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 0.264 ± 0.007
FOR 4 SAMPLES YIELD 92 ± 6

Lab id EBERLINE
Protocol F11-031
Version Ver 0.0
Form DVD-LMS
Version 3.06
Report date 07/26/12

JULY 27, 2012

EBERLINE ANALYTICAL-RICHMOND

SAMPLE DELIVERY GROUP H4734

Test TC Matrix SOLID
SDG 7735
Contact Joseph Verville

LAB METHOD SUMMARY

TECHNETIUM 99 IN SOLIDS

BETA COUNTING

Client Hanford
Contract No. 33677
Contract SDG H4734

RESULTS

LAB RAW SUP- Technetium
SAMPLE ID TEST FIX PLANCHET CLIENT SAMPLE ID 99

Preparation batch 7732-102

S207053-01 7735-001 B2LTY8 U
S207053-02 7735-002 Lab Control Sample ok
S207053-03 7735-003 Method Blank U
S207053-04 7735-004 Duplicate (S207053-01) - U

Nominal values and limits from method RDLs (pCi/g) 15.0

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 7732-102 2 sigma prep error 13.2 % Reference Lab Notebook 7732 pg. 106

S207053-01 B2LTY8 0.806 0.510 59 200 9 07/20/12 07/24 GRB-202
S207053-02 Lab Control Sample 0.609 0.500 79 200 07/20/12 07/23 GRB-222
S207053-03 Method Blank 0.605 0.500 80 200 07/20/12 07/24 GRB-203
S207053-04 Duplicate (S207053-01) 0.919 0.530 51 200 9 07/20/12 07/24 GRB-204

Nominal values and limits from method 15.0 0.500 30-110 50 180

PROCEDURES REFERENCE TC99\_TR\_SEP\_GPC
SPP-062 Sample Aliquoting, rev 1
CP-021 Preparation of Tc-99m Tracer, rev 6
CP-431 Technetium-99 Purification of Soil or Resin by
Extraction Chromatography, rev 8
CP-008 Heavy Element Electroplating, rev 13

AVERAGES + 2 SD MDA 0.735 + 0.309
FOR 4 SAMPLES YIELD 67 + 29

METHOD SUMMARIES

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SUMMARY DATA SECTION

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Lab id EBRLINE
Protocol F11-031
Version Ver 0.0
Form DVD-LMS
Version 3.06
Report date 07/26/12

JULY 27, 2012

EBERLINE ANALYTICAL-RICHMOND

SAMPLE DELIVERY GROUP H4734

Test I Matrix SOLID
SDG 7735
Contact Joseph Verville

LAB METHOD SUMMARY

IODINE 129 IN SOLIDS
GAMMA SPECTROSCOPY

Client Hanford
Contract No. 33677
Contract SDG H4734

RESULTS

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

Preparation batch 7732-102

S207053-01 7735-001 B2LTY8 U
S207053-02 7735-002 Lab Control Sample ok
S207053-03 7735-003 Method Blank U
S207053-04 7735-004 Duplicate (S207053-01) - U

Nominal values and limits from method RDLs (pCi/g) 2.00

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 7732-102 2 sigma prep error 19.4 % Reference Lab Notebook 7732 pg. 106

S207053-01 B2LTY8 3.29 0.510 89 400 8 07/23/12 07/23 GRB-229
S207053-02 Lab Control Sample 3.08 0.500 94 400 07/23/12 07/23 GRB-230
S207053-03 Method Blank 3.53 0.500 92 400 07/23/12 07/24 GRB-207
S207053-04 Duplicate (S207053-01) 2.82 0.550 89 400 8 07/23/12 07/23 GRB-232

Nominal values and limits from method 2.00 0.500 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 3.18 +/- 0.605
FOR 4 SAMPLES YIELD 91 +/- 5

METHOD SUMMARIES

Page 4

SUMMARY DATA SECTION

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Lab id EBRLE
Protocol F11-031
Version Ver 0.0
Form DVD-LMS
Version 3.06
Report date 07/26/12

JULY 27, 2012

EBERLINE ANALYTICAL - RICHMOND

SAMPLE DELIVERY GROUP H4734

Test U T Matrix SOLID  
SDG 7735  
Contact Joseph Verville

Client Hanford  
Contract No. 33677  
Contract SDG H4734

LAB METHOD SUMMARY

URANIUM, TOTAL IN SOLIDS  
KINETIC PHOSPHORIMETRY

RESULTS

LAB RAW SUP- Total  
SAMPLE ID TEST FIX PLANCHET CLIENT SAMPLE ID Uranium

Preparation batch 7732-102

S207053-01		7735-001	B2LTY8	0.918
S207053-02		7735-002	Lab Control Sample	ok
S207053-03		7735-003	Method Blank	U
S207053-04		7735-004	Duplicate (S207053-01)	ok

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

METHOD PERFORMANCE

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

Preparation batch 7732-102 2σ prep error Reference Lab Notebook 7732 pg. 106

S207053-01		B2LTY8	0.009	0.0500							9	07/24/12	07/24	KPA-001
S207053-02		Lab Control Sample	0.091	0.0500								07/24/12	07/24	KPA-001
S207053-03		Method Blank	0.009	0.0500								07/24/12	07/24	KPA-001
S207053-04		Duplicate (S207053-01)	0.009	0.0500							9	07/24/12	07/24	KPA-001

Nominal values and limits from method 1.00 0.0500 180

PROCEDURES REFERENCE UTOT\_KPA  
SPP-062 Sample Aliquoting, rev 1  
SPP-044 Sample Preparation for Total Uranium by Kinetic Phosphorimetry, rev 0  
CP-928 Total Uranium by Kinetic Phosphorimetry, rev 11

AVERAGES ± 2 SD MDA 0.030 ± 0.082  
FOR 4 SAMPLES YIELD \_\_\_\_\_ ± \_\_\_\_\_

METHOD SUMMARIES

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SUMMARY DATA SECTION

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Lab id EBRLNE  
Protocol F11-031  
Version Ver 0.0  
Form DVD-LMS  
Version 3.06  
Report date 07/26/12

JULY 27, 2012

EBERLINE ANALYTICAL-RICHMOND

SAMPLE DELIVERY GROUP H4734

Test C Matrix SOLID
SDG 7735
Contact Joseph Verville

LAB METHOD SUMMARY

CARBON 14 IN SOLIDS

LIQUID SCINTILLATION COUNTING

Client Hanford
Contract No. 33677
Contract SDG H4734

RESULTS

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

Preparation batch 7732-102

Table with 4 columns: Sample ID, Test Fix, Client Sample ID, and Carbon 14. Rows include S207053-01 to S207053-04 with various sample descriptions and results.

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 TION % % min keV KeV HELD PREPARED YZED DETECTOR

Preparation batch 7732-102 2σ prep error 10.0 % Reference Lab Notebook 7732 pg. 106

Table with 13 columns: Sample ID, Test Fix, Client Sample ID, MDA (pCi/g), Aliq (g), Prep Fac, Dilution, Yield (%), Efficiency (%), Count (min), FWHM (keV), Drift (KeV), Days Held, Prepared, Yzed, and Detector. Rows include S207053-01 to S207053-04.

Nominal values and limits from method 50.0 0.0100 10 180

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

AVERAGES ± 2 SD MDA 150 ± 215
FOR 4 SAMPLES YIELD 100 ± 0

METHOD SUMMARIES

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SUMMARY DATA SECTION

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Lab id EBRLINE
Protocol F11-031
Version Ver 0.0
Form DVD-LMS
Version 3.06
Report date 07/26/12

JULY 27, 2012

EBERLINE ANALYTICAL-RICHMOND

SAMPLE DELIVERY GROUP H4734

Test H Matrix SOLID
SDG 7735
Contact Joseph Verville

LAB METHOD SUMMARY

TRITIUM IN SOLIDS

LIQUID SCINTILLATION COUNTING

Client Hanford
Contract No. 33677
Contract SDG H4734

RESULTS

Table with columns: LAB, RAW, SUF-, SAMPLE ID, TEST FIX, PLANCHET, CLIENT SAMPLE ID, Tritium. Rows include preparation batch 7732-102 and sample IDs S207053-01 to S207053-04.

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

METHOD PERFORMANCE

Table with columns: LAB, RAW, SUF-, SAMPLE ID, TEST FIX, CLIENT SAMPLE ID, MDA, ALIQ, PREP, DILU-, YIELD, EFF, COUNT, FWHM, DRIFT, DAYS, ANAL-DETECTOR. Includes preparation batch 7732-102 and sample IDs S207053-01 to S207053-04.

Nominal values and limits from method 400 0.0100 50 180

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

AVERAGES ± 2 SD MDA 84.6 ± 24.6
FOR 4 SAMPLES YIELD 100 ± 0

METHOD SUMMARIES

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SUMMARY DATA SECTION

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Lab id EBRLINE
Protocol F11-031
Version Ver 0.0
Form DVD-LMS
Version 3.06
Report date 07/26/12

JULY 27, 2012

EBERLINE ANALYTICAL-RICHMOND

SAMPLE DELIVERY GROUP H4734

Test NI L Matrix SOLID  
SDG 7735  
Contact Joseph Verville

LAB METHOD SUMMARY

NICKEL 63 IN SOLIDS

LIQUID SCINTILLATION COUNTING

Client Hanford  
Contract No. 33677  
Contract SDG H4734

RESULTS

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

Preparation batch 7732-102

S207053-01 7735-001 B2LTY8 U  
S207053-02 7735-002 Lab Control Sample ok  
S207053-03 7735-003 Method Blank U  
S207053-04 7735-004 Duplicate (S207053-01) - 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 7732-102 2σ prep error 11.2 % Reference Lab Notebook 7732 pg. 106

S207053-01 B2LTY8 2.89 0.500 100 50 9 07/24/12 07/24 LSC-006  
S207053-02 Lab Control Sample 2.80 0.500 100 50 07/24/12 07/24 LSC-006  
S207053-03 Method Blank 2.85 0.500 100 50 07/24/12 07/24 LSC-006  
S207053-04 Duplicate (S207053-01) 2.81 0.500 99 50 9 07/24/12 07/24 LSC-006

Nominal values and limits from method 30.0 0.500 40-110 50 180

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 2.84 ± 0.082  
FOR 4 SAMPLES YIELD 100 ± 1

METHOD SUMMARIES

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SUMMARY DATA SECTION

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Lab id EBRLNE  
Protocol F11-031  
Version Ver 0.0  
Form DVD-LMS  
Version 3.06  
Report date 07/26/12

JULY 27, 2012

EBERLINE ANALYTICAL-RICHMOND

SAMPLE DELIVERY GROUP H4734

Test SE L Matrix SOLID  
SDG 7735  
Contact Joseph Verville

LAB METHOD SUMMARY

SELENIUM 79 IN SOLIDS

LIQUID SCINTILLATION COUNTING

Client Hanford  
Contract No. 33677  
Contract SDG H4734

RESULTS

LAB RAW SUF-  
SAMPLE ID TEST FIX PLANCHET CLIENT SAMPLE ID Selenium-79

Preparation batch 7732-102

S207053-01 7735-001 B2LTY8 U  
S207053-03 7735-003 Method Blank U  
S207053-04 7735-004 Duplicate (S207053-01) - U

Nominal values and limits from method RDLs (pCi/g) 10.0

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 7732-102 2σ prep error 11.2 % Reference Lab Notebook 7732 pg. 106

S207053-01 B2LTY8 3.59 0.540 60 50 10 07/25/12 07/25 LSC-004  
S207053-03 Method Blank 3.17 0.500 73 50 07/25/12 07/25 LSC-004  
S207053-04 Duplicate (S207053-01) 3.69 0.540 59 50 10 07/25/12 07/25 LSC-004

Nominal values and limits from method 10.0 0.500 40-110 50 180

PROCEDURES REFERENCE SE79\_SEP\_IE\_LSC  
SPP-070 Soil Dissolution, < 1.0g Aliquot, rev 1  
CP-340 Selenium-79 in Soilds and Water, rev 0  
CP-008 Heavy Element Electroplating, rev 13

AVERAGES ± 2 SD MDA 3.48 ± 0.552  
FOR 3 SAMPLES YIELD 64 ± 16

METHOD SUMMARIES

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SUMMARY DATA SECTION

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Lab id EBRLNE  
Protocol F11-031  
Version Ver 0.0  
Form DVD-LMS  
Version 3.06  
Report date 07/26/12

JULY 27, 2012

EBERLINE ANALYTICAL - RICHMOND

SAMPLE DELIVERY GROUP H4734

SDG 7735  
Contact Joseph Verville

REPORT GUIDE

Client Hanford  
Contract No. 33677  
Case no SDG\_H4734

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 EBRLNE  
Protocol F11-031  
Version Ver 0.0  
Form DVD-RG  
Version 3.06  
Report date 07/26/12

JULY 27, 2012

EBERLINE ANALYTICAL - RICHMOND

SAMPLE DELIVERY GROUP H4734

SDG 7735  
Contact Joseph Verville

REPORT GUIDE

Client Hanford  
Contract No. 33677  
Case no SDG H4734

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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SUMMARY DATA SECTION

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Lab id EBRLNE  
Protocol F11-031  
Version Ver 0.0  
Form DVD-RG  
Version 3.06  
Report date 07/26/12

JULY 27, 2012

EBERLINE ANALYTICAL - RICHMOND

SAMPLE DELIVERY GROUP H4734

SDG 7735  
Contact Joseph Verville

REPORT GUIDE

Client Hanford  
Contract No. 33677  
Case no SDG H4734

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 F11-031  
Version Ver 0.0  
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Version 3.06  
Report date 07/26/12

JULY 27, 2012

EBERLINE ANALYTICAL - RICHMOND

SAMPLE DELIVERY GROUP H4734

SDG 7735  
Contact Joseph Verville

REPORT GUIDE

Client Hanford  
Contract No. 33677  
Case no SDG H4734

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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Lab id EBRLNE  
Protocol F11-031  
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Version 3.06  
Report date 07/26/12

JULY 27, 2012

EBERLINE ANALYTICAL - RICHMOND

SAMPLE DELIVERY GROUP H4734

SDG 7735  
Contact Joseph Verville

GUIDE, cont.

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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.

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

Client: CLPRC City RICHMOND State WA

Date/Time received 7/19/12 10:30 C No. F11-031-027

Container I.D. No. GW-192 Requested TAT (Days) 7 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 [ ] N/A
- 6. Number of samples in shipping container: 1 Sample Matrix OTHER SOLID
- 7. Number of containers per sample: 3 (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 \_\_\_\_\_ Preservative \_\_\_\_\_
- 13. Describe any anomalies:  
\_\_\_\_\_  
\_\_\_\_\_
- 14. Was P.M. notified of any anomalies? Yes [ ] No [ ] Date \_\_\_\_\_
- 15. Inspected by JK Date: 7/19/11 Time: 10:30

Customer Sample No.	Beta/Gamma cpm	Ion Chamber mR/hr	Wipe	Customer Sample No.	Beta/Gamma cpm	Ion Chamber mR/hr	wipe
<u>B2LT78</u>	<u>480</u>						

Ion Chamber Ser. No. \_\_\_\_\_ Calibration date \_\_\_\_\_  
 Alpha Meter Ser. No. \_\_\_\_\_ Calibration date \_\_\_\_\_  
 Beta/Gamma Meter Ser. No. 100482 Calibration date 6 DEC 2011