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RECEIVED FEBRUARY 12, 2010



**EBERLINE**  
SERVICES

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February 12, 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 S0-02-031-7763, SDG H4153**

Dear Mr. Neely:

Enclosed is a data report for one other liquid sample designated under SAF No. F10-021 received at Eberline Analytical on February 5, 2010. The sample was analyzed according to the accompanying chain-of-custody documents.

Please call if you have any questions concerning this report.

Sincerely,

N. Joseph Verville  
Client Services Manager

NJV/jag

Enclosure: Case Narrative

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JUL 21 2010  
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**1.0 GENERAL**

CH2M Hill Plateau Remediation Company (CHPRC) Sample Delivery Group H4153 was composed of one other liquid sample designated under SAF No. F10-021 with a Project Designation of: ARRA Upper & Lower ALE Building Science Laboratory – Other Liquids.

The samples were 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 Gross Alpha and Gross Beta Analysis**

No problems were encountered during the course of the analyses.

**2.2 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.

**2.3 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 Strontium-90 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 Technetium-99 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.

**2.6 Isotopic Thorium 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.

**2.7 Isotopic Uranium 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.

**2.8 Isotopic Plutonium Analysis**

No problems were encountered during the course of the analyses. No other problems were encountered during the course of the analyses.

**2.9 Plutonium-241 Analysis**

Due to the expedited TAT requested for the SDG the final plating solution from the alpha Pu chemistry was split prior to electroplating; half the solution was plated for alpha counting and the other half was used to prepare the beta Pu-241 planchet. As a consequence of the sample split, the yields are low and the resultant MDA's are greater than the RDL. No other problems were encountered during the course of the analyses.

**2.10 Americium-241 and Curium-243/244 Analysis**

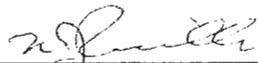
The results for both the original and duplicate analyses were less than their respective MDA's, therefore no RPD is calculated, and there is no associated control limit. No problems were encountered during the course of the analyses.

**2.11 Gamma Spectroscopy**

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."



\_\_\_\_\_  
N. Joseph Verville  
Senior Program Manager

2/12/10

\_\_\_\_\_  
Date

EBERLINE ANALYTICAL / RICHMOND  
SAMPLE DELIVERY GROUP H4153

SDG 7763  
Contact N. Joseph Verville

Client CHPRC  
Contract No. 33677  
Case no SDG\_H4153

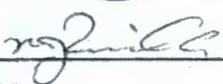
S U M M A R Y   D A T A   S E C T I O N

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Prepared by



Reviewed by



Lab id EBRLNE  
Protocol CHPRC  
Version Ver 1.0  
Form DVD-TOC  
Version 3.06  
Report date 02/12/10

EBERLINE ANALYTICAL / RICHMOND

SAMPLE DELIVERY GROUP H4153

SDG 7763  
Contact N. Joseph Verville

REPORT GUIDE

Client CHPRC  
Contract No. 33677  
Case no SDG\_H4153

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

Page 1

SUMMARY DATA SECTION

Page 1

Lab id EBRINE  
Protocol CHPRC  
Version Ver 1.0  
Form DVD-RG  
Version 3.06  
Report date 02/12/10

EBERLINE ANALYTICAL / RICHMOND

SAMPLE DELIVERY GROUP H4153

SDG 7763  
Contact N. Joseph Verville

GUIDE, cont.

Client CHPRC  
Contract No. 33677  
Case no SDG\_H4153

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.

Lab id EBRLNE  
Protocol CHPRC  
Version Ver 1.0  
Form DVD-RG  
Version 3.06  
Report date 02/12/10

EBERLINE ANALYTICAL/RICHMOND

SAMPLE DELIVERY GROUP H4153

SDG 7763  
 Contact N. Joseph Verville

LAB SAMPLE SUMMARY

Client CHPRC  
 Contract No. 33677  
 Case no SDG H4153

LAB							CHAIN OF	
SAMPLE ID	CLIENT SAMPLE ID	LOCATION	MATRIX	LEVEL	SAF NO	CUSTODY	COLLECTED	
S002031-01	B23K14	Uppr&LowrAleBld;Kitchen	LIQUID		F10-021	F10-021-025	02/04/10 10:57	
S002031-02	Lab Control Sample		LIQUID		F10-021			
S002031-03	Method Blank		LIQUID		F10-021			
S002031-04	Duplicate (S002031-01)	Uppr&LowrAleBld;Kitchen	LIQUID		F10-021		02/04/10 10:57	
S002031-05	Lab Control Sample		LIQUID		F10-021			
S002031-06	Method Blank		LIQUID		F10-021			
S002031-07	Duplicate (S002031-01)	Uppr&LowrAleBld;Kitchen	LIQUID		F10-021		02/04/10 10:57	

LAB SUMMARY

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SUMMARY DATA SECTION

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Lab id EBRLNE  
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EBERLINE ANALYTICAL/RICHMOND

SAMPLE DELIVERY GROUP H4153

SDG 7763  
 Contact N. Joseph Verville

QC SUMMARY

Client CHPRC  
 Contract No. 33677  
 Case no SDG H4153

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
7763	F10-021-025	B23K14	LIQUID		620 mL		02/05/10	1	S002031-01	7763-001
		Method Blank	LIQUID						S002031-03	7763-003
		Method Blank	LIQUID						S002031-06	7763-006
		Lab Control Sample	LIQUID						S002031-02	7763-002
		Lab Control Sample	LIQUID						S002031-05	7763-005
		Duplicate (S002031-01)	LIQUID		620 mL		02/05/10	1	S002031-04	7763-004
		Duplicate (S002031-01)	LIQUID		620 mL		02/05/10	1	S002031-07	7763-007

QC SUMMARY

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SUMMARY DATA SECTION

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**EBERLINE ANALYTICAL/RICHMOND**

SAMPLE DELIVERY GROUP H4153

SDG 7763  
 Contact N. Joseph Verville

**PREP BATCH SUMMARY**

Client CHPRC  
 Contract No. 33677  
 Case no SDG H4153

TEST	MATRIX	METHOD	PREPARATION ERROR		PLANCHETS ANALYZED				QUALI-	
			BATCH	2σ %	CLIENT	MORE	RE	BLANK		LCS
<b>Alpha Spectroscopy</b>										
PU	LIQUID	Plutonium-238,239/240, Liquid	7243-084	8.0	1			1	1	1/1
TH	LIQUID	Thorium, Isotopic in Liquid	7243-084	8.0	1			1	1	1/1
TP	LIQUID	Americium 241/Curium in Liquid	7243-084	8.0	1			1	1	1/1
U	LIQUID	Uranium in Liquid	7243-084	8.0	1			1	1	1/1
<b>Beta Counting</b>										
SR	LIQUID	Total Strontium in Liquids	7243-084	10.4	1			1	1	1/1
TC	LIQUID	Technetium-99 in Liquid	7243-084	13.2	1			1	1	1/1
<b>Gas Proportional Counting</b>										
93A	LIQUID	Gross Alpha in Liquid	7243-084	20.6	1			1	1	1/1
93B	LIQUID	Gross Beta in Liquid	7243-084	11.0	1			1	1	1/1
<b>Gamma Spectroscopy</b>										
GAM	LIQUID	Gamma Scan in Liquid	7243-084	7.6	1			1	1	1/1
<b>Liquid Scintillation Counting</b>										
H	LIQUID	Tritium in Liquid	7243-084	10.0	1			1	1	1/1
NI_L	LIQUID	Nickel-63 in Liquid	7243-084	11.2	1			1	1	1/1
PU_L	LIQUID	Plutonium 241 in Liquids	7243-084	12.4	1			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 EBERLINE  
 Protocol CHPRC  
 Version Ver 1.0  
 Form DVD-PBS  
 Version 3.06  
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EBERLINE ANALYTICAL/RICHMOND

SAMPLE DELIVERY GROUP H4153

LAB WORK SUMMARY

SDG 7763  
 Contact N. Joseph Verville

Client CHPRC  
 Contract No. 33677  
 Case no SDG H4153

LAB SAMPLE	CLIENT SAMPLE ID				SUF-					
COLLECTED	LOCATION	MATRIX			FIX	ANALYZED	REVIEWED	BY	METHOD	
RECEIVED	CUSTODY	SAF No	PLANCHET	TEST						
S002031-01	B23K14		7763-001	93A/93		02/09/10	02/09/10	BW	Gross Alpha in Liquid	
02/04/10	Uppr&LowrAleBld;Kitchen	LIQUID	7763-001	93B/93		02/09/10	02/09/10	BW	Gross Beta in Liquid	
02/05/10	F10-021-025	F10-021	7763-001	GAM		02/08/10	02/11/10	CSS	Gamma Scan in Liquid	
			7763-001	H		02/08/10	02/10/10	BW	Tritium in Liquid	
			7763-001	NI_L		02/09/10	02/12/10	BW	Nickel-63 in Liquid	
			7763-001	PU		02/11/10	02/11/10	BW	Plutonium-238,239/240, Liquid	
			7763-001	PU_L		02/10/10	02/11/10	BW	Plutonium 241 in Liquids	
			7763-001	SR		02/10/10	02/12/10	BW	Total Strontium in Liquids	
			7763-001	TC		02/10/10	02/11/10	BW	Technetium-99 in Liquid	
			7763-001	TH		02/11/10	02/11/10	BW	Thorium, Isotopic in Liquid	
			7763-001	TP		02/11/10	02/12/10	MWT	Americium 241/Curium in Liquid	
			7763-001	U		02/09/10	02/09/10	BW	Uranium in Liquid	
S002031-02	Lab Control Sample		7763-002	93A/93		02/09/10	02/09/10	BW	Gross Alpha in Liquid	
		LIQUID	7763-002	93B/93		02/09/10	02/09/10	BW	Gross Beta in Liquid	
		F10-021	7763-002	GAM		02/08/10	02/11/10	CSS	Gamma Scan in Liquid	
			7763-002	H		02/08/10	02/10/10	BW	Tritium in Liquid	
			7763-002	NI_L		02/09/10	02/12/10	BW	Nickel-63 in Liquid	
			7763-002	PU		02/11/10	02/11/10	BW	Plutonium-238,239/240, Liquid	
			7763-002	PU_L		02/10/10	02/11/10	BW	Plutonium 241 in Liquids	
			7763-002	SR		02/10/10	02/12/10	BW	Total Strontium in Liquids	
			7763-002	TC		02/10/10	02/11/10	BW	Technetium-99 in Liquid	
			7763-002	TP		02/11/10	02/12/10	MWT	Americium 241/Curium in Liquid	
			7763-002	U		02/09/10	02/09/10	BW	Uranium in Liquid	
S002031-03	Method Blank		7763-003	93A/93		02/09/10	02/09/10	BW	Gross Alpha in Liquid	
		LIQUID	7763-003	93B/93		02/09/10	02/09/10	BW	Gross Beta in Liquid	
		F10-021	7763-003	GAM		02/10/10	02/11/10	CSS	Gamma Scan in Liquid	
			7763-003	H		02/08/10	02/10/10	BW	Tritium in Liquid	
			7763-003	NI_L		02/09/10	02/12/10	BW	Nickel-63 in Liquid	
			7763-003	PU		02/11/10	02/11/10	BW	Plutonium-238,239/240, Liquid	
			7763-003	PU_L		02/10/10	02/11/10	BW	Plutonium 241 in Liquids	
			7763-003	SR		02/10/10	02/12/10	BW	Total Strontium in Liquids	
			7763-003	TC		02/11/10	02/11/10	BW	Technetium-99 in Liquid	
			7763-003	TP		02/11/10	02/12/10	MWT	Americium 241/Curium in Liquid	
			7763-003	U		02/09/10	02/09/10	BW	Uranium in Liquid	

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 02/12/10

EBERLINE ANALYTICAL/RICHMOND

SAMPLE DELIVERY GROUP H4153

WORK SUMMARY, cont.

SDG 7763  
 Contact N. Joseph Verville

Client CHPRC  
 Contract No. 33677  
 Case no SDG H4153

LAB SAMPLE	CLIENT SAMPLE ID									
COLLECTED	LOCATION	MATRIX		SUF-						
RECEIVED	CUSTODY	SAF No	PLANCHET	TEST	FIX	ANALYZED	REVIEWED	BY	METHOD	
S002031-04	Duplicate (S002031-01)		7763-004	93A/93		02/09/10	02/09/10	BW	Gross Alpha in Liquid	
02/04/10	Uppr&LowrAleBld;Kitchen	LIQUID	7763-004	93B/93		02/09/10	02/09/10	BW	Gross Beta in Liquid	
02/05/10		F10-021	7763-004	GAM		02/10/10	02/11/10	CSS	Gamma Scan in Liquid	
			7763-004	H		02/08/10	02/10/10	BW	Tritium in Liquid	
			7763-004	NI_L		02/09/10	02/12/10	BW	Nickel-63 in Liquid	
			7763-004	PU		02/11/10	02/11/10	BW	Plutonium-238,239/240, Liquid	
			7763-004	PU_L		02/10/10	02/11/10	BW	Plutonium 241 in Liquids	
			7763-004	SR		02/10/10	02/12/10	BW	Total Strontium in Liquids	
			7763-004	TC		02/09/10	02/11/10	BW	Technetium-99 in Liquid	
			7763-004	TP		02/11/10	02/12/10	MWT	Americium 241/Curium in Liquid	
			7763-004	U		02/09/10	02/09/10	BW	Uranium in Liquid	
S002031-05	Lab Control Sample		7763-005	TH		02/11/10	02/11/10	BW	Thorium, Isotopic in Liquid	
		LIQUID								
		F10-021								
S002031-06	Method Blank		7763-006	TH		02/11/10	02/11/10	BW	Thorium, Isotopic in Liquid	
		LIQUID								
		F10-021								
S002031-07	Duplicate (S002031-01)		7763-007	TH		02/11/10	02/11/10	BW	Thorium, Isotopic in Liquid	
02/04/10	Uppr&LowrAleBld;Kitchen	LIQUID								
02/05/10		F10-021								

WORK SUMMARY

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**EBERLINE ANALYTICAL/RICHMOND**

SAMPLE DELIVERY GROUP H4153

SDG 7763  
 Contact N. Joseph Verville

**WORK SUMMARY, cont.**

Client CHPRC  
 Contract No. 33677  
 Case no SDG H4153

**COUNTS OF TESTS BY SAMPLE TYPE**

TEST	SAF No	METHOD	REFERENCE	CLIENT	MORE	RE	BLANK	LCS	DUP SPIKE	TOTAL
93A/93	F10-021	Gross Alpha in Liquid	900.0_ALPHABETA_GPC	1			1	1	1	4
93B/93	F10-021	Gross Beta in Liquid	900.0_ALPHABETA_GPC	1			1	1	1	4
GAM	F10-021	Gamma Scan in Liquid	GAMMA_GS	1			1	1	1	4
H	F10-021	Tritium in Liquid	TRITIUM_COX_LSC	1			1	1	1	4
NI_L	F10-021	Nickel-63 in Liquid	NI63_LSC	1			1	1	1	4
PU	F10-021	Plutonium-238,239/240, Liquid	PUISO_PLATE_AEA	1			1	1	1	4
PU_L	F10-021	Plutonium 241 in Liquids	PU241_IE_LSC	1			1	1	1	4
SR	F10-021	Total Strontium in Liquids	SRTOT_SEP_PRECIP_GPC	1			1	1	1	4
TC	F10-021	Technetium-99 in Liquid	TC99_TR_SEP_GPC	1			1	1	1	4
TH	F10-021	Thorium, Isotopic in Liquid	THISO_IE_PLATE_AEA	1			1	1	1	4
TP	F10-021	Americium 241/Curium in Liquid	AMCMISO_IE_PLATE_AEA	1			1	1	1	4
U	F10-021	Uranium in Liquid	UIISO_PLATE_AEA	1			1	1	1	4
<b>TOTALS</b>				<b>12</b>			<b>12</b>	<b>12</b>	<b>12</b>	<b>48</b>

WORK SUMMARY

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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 H4153

7763-003

Method Blank

METHOD BLANK

SDG <u>7763</u>	Client/Case no <u>CHPRC</u>	SDG <u>H4153</u>
Contact <u>N. Joseph Verville</u>	Contract No. <u>33677</u>	
Lab sample id <u>S002031-03</u>	Client sample id <u>Method Blank</u>	
Dept sample id <u>7763-003</u>	Material/Matrix <u>LIQUID</u>	
	SAF No <u>F10-021</u>	

ANALYTE	CAS NO	RESULT pCi/mL	2σ ERR (COUNT)	MDA pCi/mL	RDL pCi/mL	QUALI- FIERS	TEST
Gross Alpha	12587-46-1	0.792	1.8	3.80	10.0	U	93A
Gross Beta	12587-47-2	-0.988	2.5	4.52	15.0	U	93B
Tritium	10028-17-8	-4.13	49	84.6	400	U	H
Nickel 63	13981-37-8	-0.229	1.5	2.53	30.0	U	NI_L
Total Strontium	SR-RAD	-0.012	0.15	0.304	1.00	U	SR
Technetium 99	14133-76-7	-0.006	0.10	0.294	15.0	U	TC
Uranium 233/234	U-233/234	0	0.061	0.235	1.00	U	U
Uranium 235	15117-96-1	0	0.074	0.284	1.00	U	U
Uranium 238	U-238	0	0.061	0.235	1.00	U	U
Americium 241	14596-10-2	0	0.085	0.203		U	TP
Curium 242	15510-73-3	0	0.042	0.162	1.00	U	TP
Curium 243/244	CM-243/244	0	0.042	0.162	1.00	U	TP
Plutonium 238	13981-16-3	0	0.23	0.558	1.00	U	PU
Plutonium 239/240	PU-239/240	0	0.12	0.446	1.00	U	PU
Plutonium 241	14119-32-5	-1.58	10	<u>16.9</u>	15.0	U	PU_L
Tin 126	15832-50-5	U		0.056		U	GAM
Beryllium 7	13966-02-4	U		0.270		U	GAM
Potassium 40	13966-00-2	U		1.27		U	GAM
Cobalt 60	10198-40-0	U		0.040	0.050	U	GAM
Ruthenium 106	13967-48-1	U		0.390		U	GAM
Antimony 125	14234-35-6	U		0.103		U	GAM
Cesium 134	13967-70-9	U		0.046		U	GAM
Cesium 137	10045-97-3	U		0.044	0.050	U	GAM
Europium 152	14683-23-9	U		<u>0.120</u>	0.100	U	GAM
Europium 154	15585-10-1	U		<u>0.125</u>	0.100	U	GAM
Europium 155	14391-16-3	U		0.094	0.100	U	GAM
Niobium 94	14681-63-1	U		0.035		U	GAM
Radium 226	13982-63-3	U		0.078	0.100	U	GAM
Radium 228	15262-20-1	U		0.190	0.200	U	GAM

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>02/12/10</u>

EBERLINE ANALYTICAL/RICHMOND

SAMPLE DELIVERY GROUP H4153

7763-003

Method Blank

BLANK, cont.

SDG <u>7763</u>	Client/Case no <u>CHPRC</u>	<u>SDG H4153</u>
Contact <u>N. Joseph Verville</u>	Contract No. <u>33677</u>	
Lab sample id <u>S002031-03</u>	Client sample id <u>Method Blank</u>	
Dept sample id <u>7763-003</u>	Material/Matrix _____	<u>LIQUID</u>
	SAF No <u>F10-021</u>	

QC-BLANK #72284
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METHOD BLANKS

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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>02/12/10</u>

EBERLINE ANALYTICAL / RICHMOND

SAMPLE DELIVERY GROUP H4153

7763-006

Method Blank

METHOD BLANK

SDG <u>7763</u>	Client/Case no <u>CHPRC</u>	SDG <u>H4153</u>
Contact <u>N. Joseph Verville</u>	Contract <u>No. 33677</u>	
Lab sample id <u>S002031-06</u>	Client sample id <u>Method Blank</u>	
Dept sample id <u>7763-006</u>	Material/Matrix <u>LIQUID</u>	
	SAF No <u>F10-021</u>	

ANALYTE	CAS NO	RESULT pCi/mL	2σ ERR (COUNT)	MDA pCi/mL	RDL pCi/mL	QUALI- FIERS	TEST
Thorium 228	14274-82-9	0	0.19	0.382	1.00	U	TH
Thorium 230	14269-63-7	0.093	0.31	0.593	1.00	U	TH
Thorium 232	TH-232	-0.031	0.062	0.238	1.00	U	TH

QC-BLANK #72307

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>02/12/10</u>

**EBERLINE ANALYTICAL/RICHMOND**

SAMPLE DELIVERY GROUP H4153

7763-002

Lab Control Sample

**LAB CONTROL SAMPLE**

SDG <u>7763</u>	Client/Case no <u>CHPRC</u> SDG <u>H4153</u>
Contact <u>N. Joseph Verville</u>	Contract <u>No. 33677</u>
Lab sample id <u>S002031-02</u>	Client sample id <u>Lab Control Sample</u>
Dept sample id <u>7763-002</u>	Material/Matrix <u>LIQUID</u>
	SAF No <u>F10-021</u>

ANALYTE	RESULT	2σ ERR	MDA	RDL	QUALI-	ADDED	2σ ERR	REC	3σ LMTS	PROTOCOL
	pCi/mL	(COUNT)	pCi/mL	pCi/mL	FIERS TEST	pCi/mL	pCi/mL	%	(TOTAL)	LIMITS
Gross Alpha	96.7	12	3.38	10.0	93A	91.8	3.7	105	62-138	70-130
Gross Beta	76.4	6.7	5.86	15.0	93B	81.4	3.3	94	79-121	70-130
Tritium	10200	240	82.0	400	H	11200	450	91	85-115	80-120
Nickel 63	198	5.7	2.53	30.0	NI_L	218	8.7	91	83-117	80-120
Total Strontium	8.99	0.53	0.246	1.00	SR	8.06	0.32	112	79-121	80-120
Technetium 99	82.0	1.8	0.327	15.0	TC	73.6	2.9	111	77-123	80-120
Uranium 233/234	8.71	1.4	0.799	1.00	U	9.87	0.39	88	76-124	80-120
Uranium 235	6.93	1.3	0.325	1.00	U	8.02	0.32	86	73-127	80-120
Uranium 238	9.56	1.5	0.759	1.00	U	10.7	0.43	89	76-124	80-120
Americium 241	8.33	1.0	0.252		TP	8.82	0.35	94	79-121	80-120
Curium 243/244	6.94	0.94	0.252	1.00	TP	7.51	0.30	92	77-123	80-126
Plutonium 238	10.2	1.7	0.340	1.00	PU	10.1	0.40	101	71-129	80-120
Plutonium 239/240	9.87	1.7	0.340	1.00	PU	11.5	0.46	86	75-125	80-120
Plutonium 241	266	17	<u>18.2</u>	15.0	PU_L	292	12	91	80-120	80-120
Cobalt 60	2.47	0.12	<u>0.070</u>	0.050	GAM	2.31	0.092	107	85-115	80-120
Cesium 137	2.42	0.10	<u>0.074</u>	0.050	GAM	2.25	0.090	108	86-114	80-120

QC-LCS #72283

LAB CONTROL SAMPLES

Page 1

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-LCS</u>
Version <u>3.06</u>
Report date <u>02/12/10</u>

EBERLINE ANALYTICAL/RICHMOND

SAMPLE DELIVERY GROUP H4153

7763-005

Lab Control Sample

LAB CONTROL SAMPLE

SDG <u>7763</u>	Client/Case no <u>CHPRC</u>	<u>SDG H4153</u>
Contact <u>N. Joseph Verville</u>	Contract No. <u>33677</u>	
Lab sample id <u>S002031-05</u>	Client sample id <u>Lab Control Sample</u>	
Dept sample id <u>7763-005</u>	Material/Matrix <u>LIQUID</u>	
	SAF No <u>F10-021</u>	

ANALYTE	RESULT pCi/mL	2σ ERR (COUNT)	MDA pCi/mL	RDL pCi/mL	QUALI- FIERS	TEST	ADDED pCi/mL	2σ ERR pCi/mL	REC %	3σ LMTS (TOTAL)	PROTOCOL LIMITS
Thorium 230	18.4	2.2	0.634	1.00		TH	16.9	0.68	109	76-124	80-120

QC-LCS #72306

LAB CONTROL SAMPLES

Page 2

SUMMARY DATA SECTION

Page 13

Lab id <u>EBRLNE</u>
Protocol <u>CHPRC</u>
Version <u>Ver 1.0</u>
Form <u>DVD-LCS</u>
Version <u>3.06</u>
Report date <u>02/12/10</u>

EBERLINE ANALYTICAL/RICHMOND

SAMPLE DELIVERY GROUP H4153

7763-004

B23K14

DUPLICATE

SDG <u>7763</u>	Client/Case no <u>CHPRC</u>	<u>SDG H4153</u>
Contact <u>N. Joseph Verville</u>	Contract No. <u>33677</u>	
DUPLICATE	ORIGINAL	
Lab sample id <u>S002031-04</u>	Lab sample id <u>S002031-01</u>	Client sample id <u>B23K14</u>
Dept sample id <u>7763-004</u>	Dept sample id <u>7763-001</u>	Location/Matrix <u>Upr&amp;LowrAleHld;Kitchen LIQUID</u>
	Received <u>02/05/10</u>	Collected/Volume <u>02/04/10 10:57 620 mL</u>
		Custody/SAP No <u>F10-021-025 F10-021</u>

ANALYTE	DUPLICATE pCi/mL	2σ ERR (COUNT)	MDA pCi/mL	RDL pCi/mL	QUALI- FIERS	TEST	ORIGINAL pCi/mL	2σ ERR (COUNT)	MDA pCi/mL	QUALI- FIERS	RPD %	3σ TOT	DER σ
Gross Alpha	0.101	0.85	1.70	10.0	U	93A	0.450	0.99	1.76	U	-		0.5
Gross Beta	22.9	4.0	4.78	15.0		93B	19.0	3.7	4.38		19	46	1.2
Tritium	-1.29	46	79.2	400	U	H	10.0	45	77.1	U	-		0.4
Nickel 63	-0.033	1.3	2.19	30.0	U	NI_L	1.09	1.3	2.19	U	-		1.2
Total Strontium	0.258	0.17	0.297	1.00	U	SR	0.215	0.14	0.243	U	-		0.4
Technetium 99	-0.019	0.094	0.251	15.0	U	TC	-0.073	0.080	0.255	U	-		0.9
Uranium 233/234	0	0.043	0.165	1.00	U	U	-0.022	0.044	0.169	U	-		0.7
Uranium 235	0.026	0.052	0.200	1.00	U	U	0	0.053	0.204	U	-		0.7
Uranium 238	0.043	0.043	0.165	1.00	U	U	0	0.044	0.169	U	-		1.4
Americium 241	0.088	0.13	0.242		U	TP	0	0.092	0.255	U	-		1.1
Curium 242	-0.023	0.045	0.173	1.00	U	TP	0.024	0.095	0.182	U	-		0.9
Curium 243/244	0	0.088	0.210	1.00	U	TP	0	0.092	0.221	U	-		0
Plutonium 238	-0.055	0.22	0.526	1.00	U	PU	0.043	0.087	0.331	U	-		0.8
Plutonium 239/240	0.110	0.22	0.420	1.00	U	PU	0.130	0.17	0.331	U	-		0.1
Plutonium 241	-6.97	12	<u>20.0</u>	15.0	U	PU_L	0.812	11	<u>19.1</u>	U	-		1.0
Tin 126	U		0.035		U	GAM	U		0.043	U	-		0.3
Beryllium 7	U		0.269		U	GAM	U		0.321	U	-		0.2
Potassium 40	9.88	0.75	0.400			GAM	11.0	0.88	0.445		11	22	1.4
Cobalt 60	U		0.041	0.050	U	GAM	U		<u>0.052</u>	U	-		0.3
Ruthenium 106	U		0.276		U	GAM	U		0.358	U	-		0.4
Antimony 125	U		0.083		U	GAM	U		0.096	U	-		0.2
Cesium 134	U		0.043		U	GAM	U		0.053	U	-		0.3
Cesium 137	U		0.034	0.050	U	GAM	U		0.044	U	-		0.4
Europium 152	U		0.098	0.100	U	GAM	U		0.096	U	-		0
Europium 154	U		<u>0.125</u>	0.100	U	GAM	U		<u>0.168</u>	U	-		0.4
Europium 155	U		0.076	0.100	U	GAM	U		0.083	U	-		0.1
Niobium 94	U		0.034		U	GAM	U		0.040	U	-		0.2
Radium 226	U		0.076	0.100	U	GAM	U		0.082	U	-		0.1

DUPLICATES

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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-DUP</u>
Version <u>3.06</u>
Report date <u>02/12/10</u>

EBERLINE ANALYTICAL/RICHMOND

SAMPLE DELIVERY GROUP H4153

7763-004

B23K14

DUPLICATE, cont.

SDG <u>7763</u>	Client/Case no <u>CHPRC</u>	<u>SDG H4153</u>
Contact <u>N. Joseph Verville</u>	Contract No. <u>33677</u>	
<u>DUPLICATE</u>	<u>ORIGINAL</u>	
Lab sample id <u>S002031-04</u>	Lab sample id <u>S002031-01</u>	Client sample id <u>B23K14</u>
Dept sample id <u>7763-004</u>	Dept sample id <u>7763-001</u>	Location/Matrix <u>Uppr&amp;LowrAleBld;Kitchen LIQUID</u>
	Received <u>02/05/10</u>	Collected/Volume <u>02/04/10 10:57 620 mL</u>
		Custody/SAF No <u>F10-021-025 F10-021</u>

ANALYTE	DUPLICATE pCi/mL	2σ ERR (COUNT)	MDA pCi/mL	RDL pCi/mL	QUALI- FIERS	TEST	ORIGINAL pCi/mL	2σ ERR (COUNT)	MDA pCi/mL	QUALI- FIERS	RPD %	3σ TOT	DER σ
Radium 228	U		0.146	0.200	U	GAM	U		0.199	U	-		0.4

QC-DUP#1 72205

ARRA Upper & Lower ALE Building Science Laboratory -  
Other Liquids

Lab id <u>EBRLNE</u>
Protocol <u>CHPRC</u>
Version <u>Ver 1.0</u>
Form <u>DVD-DUP</u>
Version <u>3.06</u>
Report date <u>02/12/10</u>

EBERLINE ANALYTICAL/RICHMOND

SAMPLE DELIVERY GROUP H4153

7763-007

B23K14

DUPLICATE

SDG <u>7763</u>	Client/Case no <u>CHPRC</u>	<u>SDG H4153</u>
Contact <u>N. Joseph Verville</u>	Contract No. <u>33677</u>	
DUPLICATE	ORIGINAL	
Lab sample id <u>S002031-07</u>	Lab sample id <u>S002031-01</u>	Client sample id <u>B23K14</u>
Dept sample id <u>7763-007</u>	Dept sample id <u>7763-001</u>	Location/Matrix <u>Uppr&amp;LowrAleBld;Kitchen LIQUID</u>
	Received <u>02/05/10</u>	Collected/Volume <u>02/04/10 10:57 620 mL</u>
		Custody/SAF No <u>F10-021-025 F10-021</u>

ANALYTE	DUPLICATE pCi/mL	2σ ERR (COUNT)	MDA pCi/mL	RDL pCi/mL	QUALI- FIERS	TEST	ORIGINAL pCi/mL	2σ ERR (COUNT)	MDA pCi/mL	QUALI- FIERS	RPD %	3σ TOT	DER σ
Thorium 228	0.043	0.26	0.532	1.00	U	TH	-0.024	0.14	0.295	U	-		0.5
Thorium 230	0.087	0.35	0.766	1.00	U	TH	0.215	0.29	0.503	U	-		0.6
Thorium 232	0.043	0.17	0.331	1.00	U	TH	-0.024	0.048	0.183	U	-		0.8

QC-DUP#1 72308

ARRA Upper & Lower ALE Building Science Laboratory -  
Other Liquids

DUPLICATES

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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-DUP</u>
Version <u>1.06</u>
Report date <u>02/12/10</u>

EBERLINE ANALYTICAL / RICHMOND  
SAMPLE DELIVERY GROUP H4153

7763-001

B23K14

DATA SHEET

SDG <u>7763</u>	Client/Case no <u>CHPRC</u>	SDG <u>H4153</u>
Contact <u>N. Joseph Verville</u>	Contract No. <u>33677</u>	
Lab sample id <u>S002031-01</u>	Client sample id <u>B23K14</u>	
Dept sample id <u>7763-001</u>	Location/Matrix <u>Uppr&amp;LowrAleBld;Kitchen</u>	<u>LIQUID</u>
Received <u>02/05/10</u>	Collected/Volume <u>02/04/10 10:57</u>	<u>620 mL</u>
	Custody/SAF No <u>F10-021-025</u>	<u>F10-021</u>

ANALYTE	CAS NO	RESULT pCi/mL	2σ ERR (COUNT)	MDA pCi/mL	RDL pCi/mL	QUALI- FIERS	TEST
Gross Alpha	12587-46-1	0.450	0.99	1.76	10.0	U	93A
Gross Beta	12587-47-2	19.0	3.7	4.38	15.0		93B
Tritium	10028-17-8	10.0	45	77.1	400	U	H
Nickel 63	13981-37-8	1.09	1.3	2.19	30.0	U	NI_L
Total Strontium	SR-RAD	0.215	0.14	0.243	1.00	U	SR
Technetium 99	14133-76-7	-0.073	0.080	0.255	15.0	U	TC
Thorium 228	14274-82-9	-0.024	0.14	0.295	1.00	U	TH
Thorium 230	14269-63-7	0.215	0.29	0.503	1.00	U	TH
Thorium 232	TH-232	-0.024	0.048	0.183	1.00	U	TH
Uranium 233/234	U-233/234	-0.022	0.044	0.169	1.00	U	U
Uranium 235	15117-96-1	0	0.053	0.204	1.00	U	U
Uranium 238	U-238	0	0.044	0.169	1.00	U	U
Americium 241	14596-10-2	0	0.092	0.255		U	TP
Curium 242	15510-73-3	0.024	0.095	0.182	1.00	U	TP
Curium 243/244	CM-243/244	0	0.092	0.221	1.00	U	TP
Plutonium 238	13981-16-3	0.043	0.087	0.331	1.00	U	PU
Plutonium 239/240	PU-239/240	0.130	0.17	0.331	1.00	U	PU
Plutonium 241	14119-32-5	0.812	11	<u>19.1</u>	15.0	U	PU_L
Tin 126	15832-50-5	U		0.043		U	GAM
Beryllium 7	13966-02-4	U		0.321		U	GAM
Potassium 40	13966-00-2	11.0	0.88	0.445			GAM
Cobalt 60	10198-40-0	U		<u>0.052</u>	0.050	U	GAM
Ruthenium 106	13967-48-1	U		0.358		U	GAM
Antimony 125	14234-35-6	U		0.096		U	GAM
Cesium 134	13967-70-9	U		0.053		U	GAM
Cesium 137	10045-97-3	U		0.044	0.050	U	GAM
Europium 152	14683-23-9	U		0.096	0.100	U	GAM
Europium 154	15585-10-1	U		<u>0.168</u>	0.100	U	GAM

DATA SHEETS

Page 1

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>02/12/10</u>

EBERLINE ANALYTICAL / RICHMOND  
 SAMPLE DELIVERY GROUP H4153

7763-001

B23K14

DATA SHEET, cont

SDG <u>7763</u>	Client/Case no <u>CHPRC</u>	SDG <u>H4153</u>
Contact <u>N. Joseph Verville</u>	Contract <u>No. 33677</u>	
Lab sample id <u>S002031-01</u>	Client sample id <u>B23K14</u>	
Dept sample id <u>7763-001</u>	Location/Matrix <u>Uppr&amp;LowrAleBld;Kitchen</u>	<u>LIQUID</u>
Received <u>02/05/10</u>	Collected/Volume <u>02/04/10 10:57</u>	<u>620 mL</u>
	Custody/SAF No <u>F10-021-025</u>	<u>F10-021</u>

ANALYTE	CAS NO	RESULT pCi/mL	2σ ERR (COUNT)	MDA pCi/mL	RDL pCi/mL	QUALI- FIERS	TEST
Europium 155	14391-16-3	U		0.083	0.100	U	GAM
Niobium 94	14681-63-1	U		0.040		U	GAM
Radium 226	13982-63-3	U		0.082	0.100	U	GAM
Radium 228	15262-20-1	U		0.199	0.200	U	GAM

ARRA Upper & Lower ALE Building Science Laboratory -  
 Other Liquids

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>02/12/10</u>

**EBERLINE ANALYTICAL/RICHMOND**

SAMPLE DELIVERY GROUP H4153

**LAB METHOD SUMMARY**

PLUTONIUM-238, 239/240, LIQUID  
ALPHA SPECTROSCOPY

Test PU Matrix LIQUID  
SDG 7763  
Contact N. Joseph Verville

Client CHPRC  
Contract No. 33677  
Contract SDG H4153

**RESULTS**

<b>LAB</b>	<b>RAW</b>	<b>SUF-</b>		<b>Plutonium</b>	<b>Plutonium</b>
<b>SAMPLE ID</b>	<b>TEST FIX</b>	<b>PLANCHET</b>	<b>CLIENT SAMPLE ID</b>	<b>238</b>	<b>239/240</b>

Preparation batch 7243-084

S002031-01	7763-001	B23K14		U	U
S002031-02	7763-002	Lab Control Sample		ok	ok
S002031-03	7763-003	Method Blank		U	U
S002031-04	7763-004	Duplicate (S002031-01)		- U	- U

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

**METHOD PERFORMANCE**

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

Preparation batch 7243-084      2σ prep error 8.0 %      Reference Lab Notebook No. 7243 pg 84

S002031-01	B23K14		0.331	0.575				40		109			7	02/10/10	02/11	SS-053
S002031-02	Lab Control Sample		0.340	0.575				39		110				02/10/10	02/11	SS-054
S002031-03	Method Blank		0.558	0.575				31		113				02/10/10	02/11	SS-061
S002031-04	Duplicate (S002031-01)		0.526	0.575				32		113			7	02/10/10	02/11	SS-062

Nominal values and limits from method      1.00      0.575      30-110      50      180

<b>PROCEDURES</b>	<b>REFERENCE</b>	<b>PUISO_PLATE_AEA</b>
SPP-040	Environmental Water Dissolution, rev 2	
CP-941	Plutonium in Water and Dissolved Samples by Extraction Chromatography, rev 12	
CP-008	Heavy Element Electroplating, rev 13	

<b>AVERAGES ± 2 SD</b>	<b>MDA</b>	<u>0.439 ± 0.240</u>
<b>FOR 4 SAMPLES</b>	<b>YIELD</b>	<u>36 ± 9</u>

METHOD SUMMARIES

Page 1

SUMMARY DATA SECTION

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Lab id EBRLNE  
Protocol CHPRC  
Version Ver 1.0  
Form DVD-LMS  
Version 3.06  
Report date 02/12/10

**EBERLINE ANALYTICAL/RICHMOND**

SAMPLE DELIVERY GROUP H4153

Test TH Matrix LIQUID  
 SDG 7763  
 Contact N. Joseph Verville

**LAB METHOD SUMMARY**

THORIUM, ISOTOPIC IN LIQUID  
 ALPHA SPECTROSCOPY

Client CHPRC  
 Contract No. 33677  
 Contract SDG H4153

**RESULTS**

LAB	RAW	SUF-					
SAMPLE ID	TEST FIX	PLANCHET	CLIENT SAMPLE ID	Thorium 228	Thorium 230	Thorium 232	
Preparation batch 7243-084							
S002031-01		7763-001	B23K14	U	U	U	
S002031-05		7763-005	Lab Control Sample		ok		
S002031-06		7763-006	Method Blank	U	U	U	
S002031-07		7763-007	Duplicate (S002031-01)	- U	- U	- U	
Nominal values and limits from method				RDLs (pCi/mL)	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/mL	mL	FAC	TION	%	%	min	keV	KeV	HELD	PREPARED	YZED	DETECTOR
Preparation batch 7243-084			2σ prep error 8.0 %		Reference Lab Notebook No. 7243 pg 84										
S002031-01		B23K14	0.503	0.287			102		163		7	02/11/10	02/11	SS-035	
S002031-05		Lab Control Sample	0.634	0.280			74		164			02/11/10	02/11	SS-036	
S002031-06		Method Blank	0.593	0.280			81		164			02/11/10	02/11	SS-037	
S002031-07		Duplicate (S002031-01)	0.766	0.287			66		164		7	02/11/10	02/11	SS-038	
Nominal values and limits from method			1.00	0.280			30-110		100	100		180			

PROCEDURES	REFERENCE	THISO_IE_PLATE_AEA
SPP-040	Environmental Water Dissolution, rev 2	
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>0.624</u> ± <u>0.219</u>
FOR 4 SAMPLES	YIELD	<u>81</u> ± <u>31</u>

METHOD SUMMARIES  
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Lab id EBRLNE  
 Protocol CHPRC  
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 Form DVD-LMS  
 Version 3.06  
 Report date 02/12/10

**EBERLINE ANALYTICAL/RICHMOND**

SAMPLE DELIVERY GROUP H4153

**LAB METHOD SUMMARY**

AMERICIUM 241/CURIUM IN LIQUID

ALPHA SPECTROSCOPY

Test TP Matrix LIQUID  
 SDG 7763  
 Contact N. Joseph Verville

Client CHPRC  
 Contract No. 33577  
 Contract SDG H4153

**RESULTS**

LAB	RAW	SUF-		Americium	Curium
SAMPLE ID	TEST FIX	PLANCHET	CLIENT SAMPLE ID	241	243/244
Preparation batch 7243-084					
S002031-01		7763-001	B23K14	U	U
S002031-02		7763-002	Lab Control Sample	ok	ok
S002031-03		7763-003	Method Blank	U	U
S002031-04		7763-004	Duplicate (S002031-01)	- U	- U

Nominal values and limits from method      RDLs (pCi/mL)      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/mL	mL	FAC	TION	%	%	min	keV	KeV	HELD	PREPARED	YZED	DETECTOR
Preparation batch 7243-084      2σ prep error 8.0 %      Reference Lab Notebook No. 7243 pg 84																
S002031-01			B23K14	0.221	0.575			73		120			7	02/11/10	02/11	SS-062
S002031-02			Lab Control Sample	0.252	0.575			73		119				02/11/10	02/11	SS-063
S002031-03			Method Blank	0.162	0.575			85		119				02/11/10	02/11	SS-064
S002031-04			Duplicate (S002031-01)	0.210	0.575			78		119			7	02/11/10	02/11	SS-065

Nominal values and limits from method      1.00      0.575      30-110      100      100      180

PROCEDURES	REFERENCE	AMCMISO_IE_PLATE_AEA
CP-062	Sample Aliquoting, rev 2	
CP-963	Americium and Curium in Water and Dissolved Samples by Extraction Chromatography, rev 6	
CP-008	Heavy Element Electroplating, rev 13	

AVERAGES ± 2 SD	MDA <u>0.211 ± 0.075</u>
FOR 4 SAMPLES	YIELD <u>77 ± 11</u>

METHOD SUMMARIES

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Lab id EBRLINE  
 Protocol CHPRC  
 Version Ver 1.0  
 Form DVD-LMS  
 Version 3.06  
 Report date 02/12/10

**EBERLINE ANALYTICAL/RICHMOND**

SAMPLE DELIVERY GROUP H4153

Test U Matrix LIQUID  
 SDG 7763  
 Contact N. Joseph Verville

**LAB METHOD SUMMARY**

URANIUM IN LIQUID  
 ALPHA SPECTROSCOPY

Client CHPRC  
 Contract No. 33677  
 Contract SDG H4153

**RESULTS**

LAB	RAW	SUF-		1: Uranium	2: Uranium	3: Uranium	RESULT RATIOS (%)				
SAMPLE ID	TEST	FIX	PLANCHET	CLIENT SAMPLE ID	233/234	235	238	1+3	2σ	2+3	2σ

Preparation batch 7243-084

S002031-01			7763-001	B23K14	U	U	U				
S002031-02			7763-002	Lab Control Sample	ok	ok	ok				
S002031-03			7763-003	Method Blank	U	U	U				
S002031-04			7763-004	Duplicate (S002031-01)	- U	- U	- U				

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

Averages

**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/mL	mL	FAC	TION	%	%	min	keV	KeV	HELD	PREPARED	YZED	DETECTOR

Preparation batch 7243-084 2σ prep error 8.0 % Reference Lab Notebook No. 7243 pg 84

S002031-01			B23K14	0.204	0.575			87		110			5	02/09/10	02/09	SS-033
S002031-02			Lab Control Sample	0.799	0.470			78		110				02/09/10	02/09	SS-034
S002031-03			Method Blank	0.284	0.470			71		111				02/09/10	02/09	SS-039
S002031-04			Duplicate (S002031-01)	0.200	0.575			79		111			5	02/09/10	02/09	SS-040

Nominal values and limits from method 1.00 0.470 30-110 100 180

PROCEDURES	REFERENCE	UIISO_PLATE_AEA
SPP-040	Environmental Water Dissolution, rev 2	
CP-921	Uranium in Water and Dissolved Samples by Extraction Chromatography, rev 5	
CP-008	Heavy Element Electroplating, rev 13	

AVERAGES ± 2 SD	MDA <u>0.372 ± 0.575</u>
FOR 4 SAMPLES	YIELD <u>79 ± 13</u>

METHOD SUMMARIES

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SUMMARY DATA SECTION

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Lab id EBRLNE  
 Protocol CHPRC  
 Version Ver 1.0  
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 Version 3.06  
 Report date 02/12/10

**EBERLINE ANALYTICAL/RICHMOND**

SAMPLE DELIVERY GROUP H4153

**LAB METHOD SUMMARY**

TOTAL STRONTIUM IN LIQUIDS

BETA COUNTING

Test SR Matrix LIQUID  
 SDG 7763  
 Contact N. Joseph Verville

Client CHPRC  
 Contract No. 33677  
 Contract SDG H4153

**RESULTS**

LAB	RAW	SUF-		Total
SAMPLE ID	TEST FIX	PLANCHET	CLIENT SAMPLE ID	Strontium
Preparation batch 7243-084				
S002031-01		7763-001	B23K14	U
S002031-02		7763-002	Lab Control Sample	ok
S002031-03		7763-003	Method Blank	U
S002031-04		7763-004	Duplicate (S002031-01)	- U

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

**METHOD PERFORMANCE**

LAB	RAW	SUF-	MDA	ALIQ	PREP	DILU-	YIELD	EPF	COUNT	FWHM	DRIFT	DAYS	ANAL-		
SAMPLE ID	TEST FIX	CLIENT SAMPLE ID	pCi/mL	mL	FAC	TION	%	%	min	keV	KeV	HELD	PREPARED	YZED	DETECTOR
Preparation batch 7243-084      2σ prep error 10.4 %      Reference Lab Notebook No. 7243 pg 84															
S002031-01		B23K14	0.243	1.12			87	100				6	02/10/10	02/10	GRB-224
S002031-02		Lab Control Sample	0.246	1.11			93	100					02/10/10	02/10	GRB-225
S002031-03		Method Blank	0.304	1.11			93	100					02/10/10	02/10	GRB-231
S002031-04		Duplicate (S002031-01)	0.297	1.12			91	100				6	02/10/10	02/10	GRB-232

Nominal values and limits from method      1.00      1.11      40-110      100      180

PROCEDURES      REFERENCE      SRTOT\_SEP\_PRECIP\_GPC  
 SPP-040      Environmental Water Dissolution, rev 2  
 CP-383      Strontium in Dissolved Solid of < 5.0g Aliquot,  
 rev 4

AVERAGES ± 2 SD      MDA 0.272 ± 0.065  
 FOR 4 SAMPLES      YIELD 91 ± 6

METHOD SUMMARIES

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Lab id EBRLNE  
 Protocol CHPRC  
 Version Ver 1.0  
 Form DVD-LMS  
 Version 3.06  
 Report date 02/12/10

**EBERLINE ANALYTICAL/RICHMOND**

SAMPLE DELIVERY GROUP H4153

**LAB METHOD SUMMARY**

TECHNETIUM-99 IN LIQUID  
BETA COUNTING

Test TC Matrix LIQUID  
SDG 7763  
Contact N. Joseph Verville

Client CHPRC  
Contract No. 33677  
Contract SDG H4153

**RESULTS**

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

Preparation batch 7243-084

S002031-01	7763-001	B23K14	U
S002031-02	7763-002	Lab Control Sample	ok
S002031-03	7763-003	Method Blank	U
S002031-04	7763-004	Duplicate (S002031-01)	- U

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

**METHOD PERFORMANCE**

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

Preparation batch 7243-084 2σ prep error 13.2 % Reference Lab Notebook No. 7243 pg 84

S002031-01	B23K14	0.255	1.48			92	100				6	02/06/10	02/10	GRB-202
S002031-02	Lab Control Sample	0.327	1.48			72	100					02/06/10	02/10	GRB-203
S002031-03	Method Blank	0.294	1.48			88	100					02/06/10	02/11	GRB-201
S002031-04	Duplicate (S002031-01)	0.251	1.48			85	120				5	02/06/10	02/09	GRB-222

Nominal values and limits from method 15.0 1.48 30-110 100 180

PROCEDURES	REFERENCE	TC99_TR_SEP_GPC
	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	0.282 ± 0.072
FOR 4 SAMPLES	YIELD	84 ± 17

METHOD SUMMARIES

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Lab id	<u>EBRLNE</u>
Protocol	<u>CHPRC</u>
Version	<u>Ver 1.0</u>
Form	<u>DVD-IMS</u>
Version	<u>3.06</u>
Report date	<u>02/12/10</u>

**EBERLINE ANALYTICAL/RICHMOND**

SAMPLE DELIVERY GROUP H4153

**LAB METHOD SUMMARY**

GROSS ALPHA IN LIQUID  
GAS PROPORTIONAL COUNTING

Test 93A Matrix LIQUID  
SDG 7763  
Contact N. Joseph Verville

Client CHPRC  
Contract No. 33677  
Contract SDG H4153

**RESULTS**

LAB	RAW	SUF-			
SAMPLE ID	TEST FIX	PLANCHET	CLIENT SAMPLE ID	Gross Alpha	
Preparation batch 7243-084					
S002031-01	93	7763-001	B23K14	U	
S002031-02	93	7763-002	Lab Control Sample	ok	
S002031-03	93	7763-003	Method Blank	U	
S002031-04	93	7763-004	Duplicate (S002031-01)	-	U

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

**METHOD PERFORMANCE**

LAB	RAW	SUF-	MDA	ALIQ	PREP	DILU-	RESID	EFF	COUNT	FWHM	DRIFT	DAYS	ANAL-		
SAMPLE ID	TEST FIX	CLIENT SAMPLE ID	pCi/mL	mL	FAC	TION	mg	%	min	keV	KeV	HELD	PREPARED	YZED	DETECTOR
Preparation batch 7243-084      2σ prep error 20.6 %      Reference Lab Notebook No. 7243 pg 84															
S002031-01	93	B23K14	1.76	0.112			<u>4</u>		100			5	02/09/10	02/09	GRB-101
S002031-02	93	Lab Control Sample	3.38	0.110			65		100				02/09/10	02/09	GRB-103
S002031-03	93	Method Blank	3.80	0.110			66		100				02/09/10	02/09	GRB-104
S002031-04	93	Duplicate (S002031-01)	1.70	0.112			<u>4</u>		100			5	02/09/10	02/09	GRB-105

Nominal values and limits from method      10.0      0.110      5-250      100      180

PROCEDURES      REFERENCE      900.0\_ALPHABETA\_GPC  
SPP-040      Environmental Water Dissolution, rev 2  
SPP-120      Gross Alpha and Gross Beta in Water, rev 3

AVERAGES ± 2 SD      MDA 2.66 ± 2.18  
FOR 4 SAMPLES      RESIDUE 35 ± 71

Lab id EBRLNE  
Protocol CHPRC  
Version Ver 1.0  
Form DVD-LMS  
Version 3.06  
Report date 02/12/10

**EBERLINE ANALYTICAL/RICHMOND**

SAMPLE DELIVERY GROUP H4153

**LAB METHOD SUMMARY**

GROSS BETA IN LIQUID

GAS PROPORTIONAL COUNTING

Test 93B Matrix LIQUID  
 SDG 7763  
 Contact N. Joseph Verville

Client CHPRC  
 Contract No. 33677  
 Contract SDG H4153

**RESULTS**

LAB	RAW	SUF-			
SAMPLE ID	TEST FIX	PLANCHET	CLIENT SAMPLE ID		Gross Beta
Preparation batch 7243-084					
S002031-01	93	7763-001	B23K14		19.0
S002031-02	93	7763-002	Lab Control Sample		ok
S002031-03	93	7763-003	Method Blank		U
S002031-04	93	7763-004	Duplicate (S002031-01)		ok

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

**METHOD PERFORMANCE**

LAB	RAW	SUF-	MDA	ALIQ	PREP	DILU-	RESID	EFF	COUNT	FWHM	DRIFT	DAYS	ANAL-		
SAMPLE ID	TEST FIX	CLIENT SAMPLE ID	pCi/mL	mL	FAC	TION	mg	%	min	keV	KeV	HELD	PREPARED	YZED	DETECTOR
Preparation batch 7243-084      2σ prep error 11.0 %      Reference Lab Notebook No. 7243 pg 84															
S002031-01	93	B23K14	4.38	0.112			<u>4</u>		100		5	02/09/10	02/09		GRB-101
S002031-02	93	Lab Control Sample	5.86	0.110			65		100			02/09/10	02/09		GRB-103
S002031-03	93	Method Blank	4.52	0.110			66		100			02/09/10	02/09		GRB-104
S002031-04	93	Duplicate (S002031-01)	4.78	0.112			<u>4</u>		100		5	02/09/10	02/09		GRB-105

Nominal values and limits from method      15.0      0.110      5-250      100      180

PROCEDURES      REFERENCE      900.0\_ALPHABETA\_GPC  
 SPP-040      Environmental Water Dissolution, rev 2  
 SPP-120      Gross Alpha and Gross Beta in Water, rev 3

AVERAGES ± 2 SD      MDA 4.88 ± 1.34  
 FOR 4 SAMPLES      RESIDUE 35 ± 71

Lab id EBRINE  
 Protocol CHPRC  
 Version Ver 1.0  
 Form DVD-LMS  
 Version 3.06  
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**EBERLINE ANALYTICAL/RICHMOND**

SAMPLE DELIVERY GROUP H4153

**LAB METHOD SUMMARY**

GAMMA SCAN IN LIQUID  
GAMMA SPECTROSCOPY

Test GAM Matrix LIQUID  
SDG 7763  
Contact N. Joseph Verville

Client CHPRC  
Contract No. 33677  
Contract SDG H4153

**RESULTS**

LAB	RAW	SUF-				
SAMPLE ID	TEST FIX	PLANCHET	CLIENT SAMPLE ID	Cobalt 60	Cesium 137	
Preparation batch 7243-084						
S002031-01		7763-001	B23K14	U	U	
S002031-02		7763-002	Lab Control Sample	ok	ok	
S002031-03		7763-003	Method Blank	U	U	
S002031-04		7763-004	Duplicate (S002031-01)	- U	- U	
Nominal values and limits from method						
			RDLs (pCi/mL)	0.050	0.050	

**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/mL	mL	FAC	TION	%	%	min	keV	KeV	HELD	PREPARED	YZED	DETECTOR
Preparation batch 7243-084      2σ prep error 7.0 %      Reference Lab Notebook No. 7243 pg 84																
S002031-01		B23K14		<u>0.052</u>	104					505		4	02/06/10	02/08	JR,07,00	
S002031-02		Lab Control Sample		<u>0.074</u>	100					505			02/06/10	02/08	JR,01,00	
S002031-03		Method Blank		0.044	100					732			02/06/10	02/10	JR,05,00	
S002031-04		Duplicate (S002031-01)		0.041	104					732		6	02/06/10	02/10	JR,07,00	
Nominal values and limits from method																
				0.050	100					100						180

PROCEDURES REFERENCE GAMMA\_GS  
SPP-100 Preparation of Sample for Gamma Spectroscopy,  
rev 0

AVERAGES ± 2 SD MDA 0.053 ± 0.030  
FOR 4 SAMPLES YIELD \_\_\_\_\_ ± \_\_\_\_\_

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**EBERLINE ANALYTICAL/RICHMOND**

SAMPLE DELIVERY GROUP H4153

**LAB METHOD SUMMARY**

TRITIUM IN LIQUID

LIQUID SCINTILLATION COUNTING

Test H Matrix LIQUID  
 SDG 7763  
 Contact N. Joseph Verville

Client CHPRC  
 Contract No. 33677  
 Contract SDG H4153

**RESULTS**

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

Preparation batch 7243-084

S002031-01		7763-001	B23K14	U
S002031-02		7763-002	Lab Control Sample	ok
S002031-03		7763-003	Method Blank	U
S002031-04		7763-004	Duplicate (S002031-01)	- U

Nominal values and limits from method RDLs (pCi/mL) 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/mL mL FAC TION % % min keV KeV HELD PREPARED YZED DETECTOR

Preparation batch 7243-084 2σ prep error 10.0 % Reference Lab Notebook No. 7243 pg 84

S002031-01		B23K14	77.1	0.0216	100	50	4	02/08/10	02/08	LSC-004
S002031-02		Lab Control Sample	82.0	0.0200	100	50		02/08/10	02/08	LSC-004
S002031-03		Method Blank	84.6	0.0200	100	50		02/08/10	02/08	LSC-004
S002031-04		Duplicate (S002031-01)	79.2	0.0210	100	50	4	02/08/10	02/08	LSC-004

Nominal values and limits from method 400 0.0200 5 180

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

AVERAGES ± 2 SD MDA 80.7 ± 6.54  
 FOR 4 SAMPLES YIELD 100 ± 0

METHOD SUMMARIES

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Lab id EBRLNE  
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 Version 3.06  
 Report date 02/12/10

**EBERLINE ANALYTICAL/RICHMOND**

SAMPLE DELIVERY GROUP H4153

**LAB METHOD SUMMARY**

NICKEL-63 IN LIQUID

LIQUID SCINTILLATION COUNTING

Test NI L Matrix LIQUID

SDG 7763

Contact N. Joseph Verville

Client CHPRC

Contract No. 33677

Contract SDG H4153

**RESULTS**

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

Preparation batch 7243-084

S002031-01	7763-001	B23K14	U
S002031-02	7763-002	Lab Control Sample	ok
S002031-03	7763-003	Method Blank	U
S002031-04	7763-004	Duplicate (S002031-01)	- U

Nominal values and limits from method RDLs (pCi/mL) 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/mL	mL	FAC	TION	%	%	min	keV	KeV	HELD PREPARED	YZED DETECTOR

Preparation batch 7243-084 2σ prep error 11.2 % Reference Lab Notebook No. 7243 pg 84

S002031-01	B23K14		2.19	0.575			99		50		5	02/09/10	02/09 LSC-005
S002031-02	Lab Control Sample		2.53	0.500			98		50			02/09/10	02/09 LSC-005
S002031-03	Method Blank		2.53	0.500			98		50			02/09/10	02/09 LSC-005
S002031-04	Duplicate (S002031-01)		2.19	0.575			98		50		5	02/09/10	02/09 LSC-005

Nominal values and limits from method 30.0 0.500 40-110 10 180

PROCEDURES	REFERENCE	NI63_LSC
	SPP-062	Sample Aliquoting, rev 1
	CP-280	Nickel-63 Purification, rev 5

AVERAGES ± 2 SD	MDA	<u>2.36</u> ± <u>0.393</u>
FOR 4 SAMPLES	YIELD	<u>98</u> ± <u>1</u>

METHOD SUMMARIES

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SUMMARY DATA SECTION

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Lab id	<u>EBRLNE</u>
Protocol	<u>CHPRC</u>
Version	<u>Ver 1.0</u>
Form	<u>DVD-LMS</u>
Version	<u>3.06</u>
Report date	<u>02/12/10</u>

**EBERLINE ANALYTICAL/RICHMOND**

SAMPLE DELIVERY GROUP H4153

**LAB METHOD SUMMARY**

PLUTONIUM 241 IN LIQUIDS  
LIQUID SCINTILLATION COUNTING

Test PU L Matrix LIQUID  
SDG 7763  
Contact N. Joseph Verville

Client CHPRC  
Contract No. 33677  
Contract SDG H4153

**RESULTS**

<b>LAB</b>	<b>RAW</b>	<b>SUF-</b>		<b>Plutonium</b>
<b>SAMPLE ID</b>	<b>TEST FIX</b>	<b>PLANCHET</b>	<b>CLIENT SAMPLE ID</b>	<b>241</b>

Preparation batch 7243-084

S002031-01	7763-001	B23K14		U
S002031-02	7763-002	Lab Control Sample		ok
S002031-03	7763-003	Method Blank		U
S002031-04	7763-004	Duplicate (S002031-01)	-	U

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

**METHOD PERFORMANCE**

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

Preparation batch 7243-084      2σ prep error 12.4 %      Reference Lab Notebook No. 7243 pg 84

S002031-01	B23K14		<u>19.1</u>	0.575				36	50			6	02/10/10	02/10	LSC-004
S002031-02	Lab Control Sample		<u>18.2</u>	0.575				37	50				02/10/10	02/10	LSC-004
S002031-03	Method Blank		<u>16.9</u>	0.575				40	50				02/10/10	02/10	LSC-004
S002031-04	Duplicate (S002031-01)		<u>20.0</u>	0.575				34	50			6	02/10/10	02/10	LSC-004

Nominal values and limits from method      15.0      0.575      30-110      50      180

<b>PROCEDURES</b>	<b>REFERENCE</b>	<b>PU241_IE_LSC</b>
SPP-071	Soil Dissolution, > 1.0g Aliquot, rev 1	
CP-941	Plutonium in Water and Dissolved Samples by Extraction Chromatography, rev 12	
RP-948	Plutonium-241 by Liquid Scintillation Counting, rev 4	

<b>AVERAGES ± 2 SD</b>	<b>MDA</b>	<u>18.6</u>	±	<u>2.65</u>
<b>FOR 4 SAMPLES</b>	<b>YIELD</b>	<u>37</u>	±	<u>5</u>

METHOD SUMMARIES

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SAMPLE DELIVERY GROUP H4153

SDG 7763  
 Contact N. Joseph Verville

REPORT GUIDE

Client CHPRC  
 Contract No. 33677  
 Case no SDG\_H4153

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.

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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.

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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.

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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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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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DATA SHEET

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

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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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CH2MHill Plateau Remediation Company		CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST				F10-021-025	PAGE 1 OF 1		
COLLECTOR <i>AL McIntyre</i>		COMPANY CONTACT WIDRIG, DL <i>H4153</i>		TELEPHONE NO. 376-2858 <i>(7763)</i>		PROJECT COORDINATOR WIDRIG, DL		PRICE CODE 9B	DATA TURNAROUND 7 Days / 15 Days
SAMPLING LOCATION Upper & Lower Ale Build; Kitchen		PROJECT DESIGNATION ARRA Upper & Lower ALE Building Science Laboratory - Other Liquids				SAF NO. F10-021		AIR QUALITY <input type="checkbox"/>	
ICE CHEST NO. <i>GW5-121</i>		FIELD LOGBOOK NO. <i>HNF-N-507-8</i>		ACTUAL SAMPLE DEPTH		COA 302228ES10		METHOD OF SHIPMENT GOVERNMENT VEHICLE	
SHIPPED TO <i>Ebeeline</i> Waste Sampling & Characterization		OFFSITE PROPERTY NO. <i>N/A M 2-4-10 00727</i>				BILL OF LADING/AIR BILL NO. <i>N/A M 2-4-10 2983 6540 5740</i>			
MATRIX* A=Air DL=Drum Liquids DS=Drum Solids 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	None			
	SPECIAL HANDLING AND/OR STORAGE		TYPE OF CONTAINER		P	G/P			
			NO. OF CONTAINER(S)		1	1			
			VOLUME		60mL	500mL			
			SAMPLE ANALYSIS		pH (Soil) - 9045; SEE ITEM (1) IN SPECIAL INSTRUCTIONS				
SAMPLE NO.		MATRIX*		SAMPLE DATE		SAMPLE TIME			
B23K14		OTHER LIQUID		<i>2/4/10</i>		<i>1057</i>		<input checked="" type="checkbox"/>	
CHAIN OF POSSESSION				SIGN/ PRINT NAMES				SPECIAL INSTRUCTIONS	
RELINQUISHED BY/REMOVED FROM <i>AR McIntyre</i>		DATE/TIME <i>2/4/10 1400</i>		RECEIVED BY/STORED IN <i>Fed Ex</i>		DATE/TIME		** The CACN for all analytical work at WSCF laboratory is 401587.  ** The analyses are listed on the SAF in the order that they should be performed. If you have questions, contact the SMR Project Coordinator. (1)Gamma Spectroscopy {Europium-155, Cesium-137, Europium-154, Europium-152, Cobalt-60} Gamma Spec - Add-on {Americium-241, Radium-228, Sodium-22} Gross Alpha {Gross alpha} Gross Beta {Gross beta} Isotopic Plutonium; Isotopic Uranium {Uranium-233/234, Uranium-235, Uranium-238} Strontium-89,90 -- Total Sr; Technetium-99; Americium-241/Curium-244 {Curium-244} Plutonium-241 - <i>CJH 1-18-10</i> {Plutonium-241} Tritium - H3 {Tritium} RADISO_ICPMS {Thorium-232} <i>CJH 1-18-10</i>  	
RELINQUISHED BY/REMOVED FROM <i>Fed Ex</i>		DATE/TIME		RECEIVED BY/STORED IN <i>M. W. K. / [Signature]</i>		DATE/TIME <i>02/05/10 0915</i>			
RELINQUISHED BY/REMOVED FROM		DATE/TIME		RECEIVED BY/STORED IN		DATE/TIME			
RELINQUISHED BY/REMOVED FROM		DATE/TIME		RECEIVED BY/STORED IN		DATE/TIME			
RELINQUISHED BY/REMOVED FROM		DATE/TIME		RECEIVED BY/STORED IN		DATE/TIME			
RELINQUISHED BY/REMOVED FROM		DATE/TIME		RECEIVED BY/STORED IN		DATE/TIME			
LABORATORY SECTION		RECEIVED BY				TITLE		DATE/TIME	
FINAL SAMPLE DISPOSITION		DISPOSAL METHOD				DISPOSED BY		DATE/TIME	

CH2M Hill Plateau Remediation Company		CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST				F10-021-026	PAGE 1 OF 1			
COLLECTOR <i>AL McIntyre</i>		COMPANY CONTACT WIDRIG, DL <i>H4153</i>		TELEPHONE NO. 376-2858 ( <i>7763</i> )	PROJECT COORDINATOR WIDRIG, DL		PRICE CODE 9B	DATA TURNAROUND 7 Days / 15 Days		
SAMPLING LOCATION Upper & Lower Ale Build; Kitchen		PROJECT DESIGNATION ARRA Upper & Lower ALE Building Science Laboratory - Other Liquids			SAF NO. F10-021		AIR QUALITY <input type="checkbox"/>			
ICE CHEST NO. <i>GWS-121</i>		FIELD LOGBOOK NO. <i>HNF-N-507-8</i>		ACTUAL SAMPLE DEPTH		COA 302228ES10		METHOD OF SHIPMENT FEDERAL EXPRESS		
SHIPPED TO Eberline Services		OFFSITE PROPERTY NO. <i>SEE PTR 2-4-10 00727</i>			BILL OF LADING/AIR BILL NO. <i>SEE PTR 2-4-10 7983 6540 5740</i>					
MATRIX* A=Air DL=Drum Liquids DS=Drum Solids 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	125mL							
	SPECIAL HANDLING AND/OR STORAGE	SAMPLE ANALYSIS	Nickel-63;							
SAMPLE NO.	MATRIX*	SAMPLE DATE	SAMPLE TIME							
B23K14	OTHER LIQUID	<i>2/4/10</i>	<i>1057</i>	<i>✓</i>						
CHAIN OF POSSESSION		SIGN/ PRINT NAMES				SPECIAL INSTRUCTIONS				
RELINQUISHED BY/REMOVED FROM <i>AR McIntyre</i>	DATE/TIME <i>2/4/10 1400</i>	RECEIVED BY/STORED IN <i>Fed Ex</i>	DATE/TIME		** Ni-63 analyses shall be performed with minimum QC to meet RDLs as previously agreed.  <i>ORIGINAL</i>					
RELINQUISHED BY/REMOVED FROM <i>Fed Ex</i>	DATE/TIME	RECEIVED BY/STORED IN <i>FF WATKINS</i>	DATE/TIME <i>02/05/10 0915</i>							
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME							
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME							
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME							
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME							
LABORATORY SECTION	RECEIVED BY	TITLE			DATE/TIME					
FINAL SAMPLE DISPOSITION	DISPOSAL METHOD	DISPOSED BY			DATE/TIME					

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7705



# RICHMOND, CA LABORATORY

## SAMPLE RECEIPT CHECKLIST

Client: CHPRC City: RICHMOND State: WA  
 Date/Time received: 04/05/10 0915 CoC No. F10-021-025, 026  
 Container I.D. No. GWS-121 Requested TAT (Days) 2/15 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: 1 Sample Matrix X LIQUID
7. Number of containers per sample: 2 (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: 04/05/10 Time: 12:30

Customer Sample No.	Beta/Gamma cpm	Ion Chamber mR/hr	Wipe	Customer Sample No.	Beta/Gamma cpm	Ion Chamber mR/hr	wipe
B23K1A	660						

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