

**SAF-RC-186**  
**Water Sampling – Integrated Remedial**  
**Investigation/Feasibility Study,**  
**100-B/C Decision Unit**  
**FINAL DATA PACKAGE**

**COMPLETE COPY OF DATA PACKAGE TO:**

No Distribution Required

**COMMENTS:**

**SDG K3099**

**SAF-RC-186**

Rad only

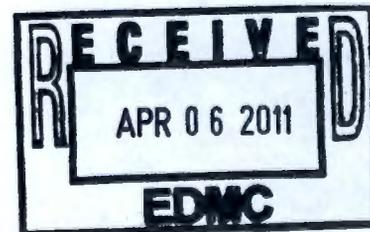
Chem only

Rad & Chem

Complete

Partial

**Sample Location: C7843 (116-C-5); I-012, I-012 DUP**





# EBERLINE SERVICES

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March 22, 2011

Ms. Joan Kessner  
Washington Closure Hanford  
2620 Fermi Avenue  
MSIN H4-21  
Richland, WA 99352



Reference: **P.O. #S00W235A00**  
**Eberline Analytical S1-02-053-7435, SDG K3099**

Dear Ms. Kessner:

Enclosed is the data report for two water samples designated under SAF No. RC-186. The samples were received at Eberline Analytical on February 3, 2011. The samples were analyzed according to the accompanying chain-of-custody documents.

Please call if you have any questions concerning this report.

Sincerely,

N. Joseph Verville  
Client Services Manager

NJV/ljb  
Enclosure: Data Package

## **1.0 GENERAL**

Washington Closure Hanford (WCH) Sample Delivery Group K3099 was composed of two water samples designated under SAF No. RC-186 with a Project Designation of: Water Sampling – Integrated Remedial Investigation/Feasibility Study - 100.

The samples were received as stated on the Chain-of-Custody documents. Any discrepancies are noted on the Eberline Analytical Sample Receipt Checklist. The results were transmitted to WCH via e-mail on March 22, 2011.

## **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**

No problems were encountered during the course of the analyses.

### **2.3 Carbon-14 Analysis**

No problems were encountered during the course of the analyses.

### **2.4 Nickel-63 Analysis**

No problems were encountered during the course of the analyses.

### **2.5 Total Strontium Analysis**

No problems were encountered during the course of the analyses.

### **2.6 Technetium-99 Analysis**

No problems were encountered during the course of the analyses.

### **2.7 Iodine-129 Analysis, low-level**

No problems were encountered during the course of the analyses.

### **2.8 Total Uranium Analysis**

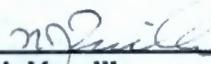
No problems were encountered during the course of the analyses.

### **2.9 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  
Client Services Manager

3/22/11  
\_\_\_\_\_  
Date

EBERLINE ANALYTICAL / RICHMOND  
SAMPLE DELIVERY GROUP K3099

SDG 7435  
Contact N. Joseph Verville

Client Hanford  
Contract No. S00W235A00  
Case no SDG K3099

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

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US

Prepared by

*N. Joseph Verville*

Reviewed by

Lab id EBRLNE  
Protocol RIFS-100  
Version Ver 1.0  
Form DVD-TOC  
Version 3.06  
Report date 03/19/11

EBERLINE ANALYTICAL / RICHMOND

SAMPLE DELIVERY GROUP K3099

SDG 7435  
Contact N. Joseph Verville

REPORT GUIDE

Client Hanford  
Contract No. S00W235A00  
Case no SDG K3099

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 RIFS-100  
Version Ver 1.0  
Form DVD-RG  
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EBERLINE ANALYTICAL/RICHMOND

SAMPLE DELIVERY GROUP K3099

SDG 7435  
Contact N. Joseph Verville

GUIDE, cont.

Client Hanford  
Contract No. S00W235A00  
Case no SDG\_K3099

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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Lab id EBRLNE  
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Version Ver 1.0  
Form DVD-RG  
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**EBERLINE ANALYTICAL/RICHMOND**

SAMPLE DELIVERY GROUP K3099

**LAB SAMPLE SUMMARY**

SDG 7435  
 Contact N. Joseph Verville

Client Hanford  
 Contract No. S00W235A00  
 Case no SDG K3099

LAB						CHAIN OF	
SAMPLE ID	CLIENT SAMPLE ID	LOCATION	MATRIX	LEVEL	SAF NO	CUSTODY	COLLECTED
S102053-01	B27FT4	C7843(116-C-5);I-012	WATER		RC-186	RC-186-024	02/01/11 10:35
S102053-02	B27FT7	C7843(116-C-5);I-012 DUP	WATER		RC-186	RC-186-027	02/01/11 10:35
S102053-03	Lab Control Sample		WATER		RC-186		
S102053-04	Method Blank		WATER		RC-186		
S102053-05	Duplicate (S102053-01)	C7843(116-C-5);I-012	WATER		RC-186		02/01/11 10:35
S102053-06	Spike (S102053-02)	C7843(116-C-5);I-012 DUP	WATER		RC-186		02/01/11 10:35

**LAB SUMMARY**

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**SUMMARY DATA SECTION**

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Lab id EBRLNE  
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 Version Ver 1.0  
 Form DVD-LS  
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**EBERLINE ANALYTICAL/RICHMOND**

SAMPLE DELIVERY GROUP K3099

SDG 7435  
 Contact N. Joseph Verville

**QC SUMMARY**

Client Hanford  
 Contract No. S00W235A00  
 Case no SDG K3099

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
7435	RC-186-024	B27FT4	WATER		12.75 L		02/03/11 2	S102053-01		7435-001
	RC-186-027	B27FT7	WATER		12.75 L		02/03/11 2	S102053-02		7435-002
		Method Blank	WATER					S102053-04		7435-004
		Lab Control Sample	WATER					S102053-03		7435-003
		Duplicate (S102053-01)	WATER		12.75 L		02/03/11 2	S102053-05		7435-005
		Spike (S102053-02)	WATER		12.75 L		02/03/11 2	S102053-06		7435-006

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**EBERLINE ANALYTICAL/RICHMOND**

SAMPLE DELIVERY GROUP K3099

SDG 7435  
 Contact N. Joseph Verville

**PREP BATCH SUMMARY**

Client Hanford  
 Contract No. S00W235A00  
 Case no SDG K3099

TEST	MATRIX	METHOD	PREPARATION ERROR		PLANCHETS ANALYZED				QUALI-	
			BATCH	2σ %	CLIENT	MORE	RE	BLANK		LCS
<b>Beta Counting</b>										
SR	WATER	Total Strontium in Water	7289-155	10.4	2			1	1	1/1
TC	WATER	Technetium 99 in Water	7289-155	13.2	2			1	1	1/1
<b>Gas Proportional Counting</b>										
93A	WATER	Gross Alpha in Water	7289-155	20.6	2			1	1	1/1
93B	WATER	Gross Beta in Water	7289-155	11.0	2			1	1	1/1
<b>Gamma Spectroscopy</b>										
GAM	WATER	Gamma Emitters	7289-155	7.0	2			1	1	1/1
<b>Gamma Spectroscopy</b>										
I	WATER	Iodine 129 in Water	7289-155	19.4	2			1	1	1/1
<b>Kinetic Phosphorimetry, ug</b>										
U_T	WATER	Uranium, Total in Water	7289-155		2			1	1	1/1
<b>Liquid Scintillation Counting</b>										
C	WATER	Carbon 14 in Water	7289-155	10.0	2			1	1	1/1 1/1 X
H	WATER	Tritium in Water	7289-155	10.0	2			1	1	1/1 1/1 X
NI_L	WATER	Nickel-63 in Liquid	7289-155	11.2	2			1	1	1/1

Duplicates and Spikes are those with original sample in the QC Batch of some Client sample in this SDG.  
 Blank and LCS planchets are those in the same preparation batch as some Client, Duplicate or Spike sample.

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**EBERLINE ANALYTICAL/RICHMOND**

SAMPLE DELIVERY GROUP K3099

SDG 7435  
 Contact N. Joseph Verville

Client Hanford  
 Contract No. S00W235A00  
 Case no SDG K3099

**LAB WORK SUMMARY**

LAB SAMPLE	CLIENT SAMPLE ID									
COLLECTED	LOCATION	MATRIX		SUF-						
RECEIVED	CUSTODY	SAF No	PLANCHET	TEST	FIX	ANALYZED	REVIEWED	BY	METHOD	
S102053-01	B27FT4		7435-001	93A/93		02/25/11	03/01/11	BW	Gross Alpha in Water	
02/01/11	C7843(116-C-5);I-012	WATER	7435-001	93B/93		02/25/11	03/01/11	BW	Gross Beta in Water	
02/03/11	RC-186-024	RC-186	7435-001	C		03/11/11	03/15/11	BW	Carbon 14 in Water	
			7435-001	GAM		02/18/11	02/22/11	MWT	Gamma Emitters	
			7435-001	H		03/11/11	03/18/11	BW	Tritium in Water	
			7435-001	I		03/17/11	03/18/11	BW	Iodine 129 in Water	
			7435-001	NI_L		03/16/11	03/18/11	BW	Nickel-63 in Liquid	
			7435-001	SR		02/24/11	03/18/11	BW	Total Strontium in Water	
			7435-001	TC		03/11/11	03/15/11	BW	Technetium 99 in Water	
			7435-001	U_T		03/08/11	03/18/11	BW	Uranium, Total in Water	
S102053-02	B27FT7		7435-002	93A/93		02/25/11	03/01/11	BW	Gross Alpha in Water	
02/01/11	C7843(116-C-5);I-012 DUP	WATER	7435-002	93B/93		02/25/11	03/01/11	BW	Gross Beta in Water	
02/03/11	RC-186-027	RC-186	7435-002	C		03/11/11	03/15/11	BW	Carbon 14 in Water	
			7435-002	GAM		02/18/11	02/22/11	MWT	Gamma Emitters	
			7435-002	H		03/11/11	03/18/11	BW	Tritium in Water	
			7435-002	I		03/17/11	03/18/11	BW	Iodine 129 in Water	
			7435-002	NI_L		03/16/11	03/18/11	BW	Nickel-63 in Liquid	
			7435-002	SR		02/24/11	03/18/11	BW	Total Strontium in Water	
			7435-002	TC		03/14/11	03/15/11	BW	Technetium 99 in Water	
			7435-002	U_T		03/08/11	03/18/11	BW	Uranium, Total in Water	
S102053-03	Lab Control Sample		7435-003	93A/93		02/25/11	03/01/11	BW	Gross Alpha in Water	
		WATER	7435-003	93B/93		02/25/11	03/01/11	BW	Gross Beta in Water	
		RC-186	7435-003	C		03/11/11	03/15/11	BW	Carbon 14 in Water	
			7435-003	GAM		02/18/11	02/22/11	MWT	Gamma Emitters	
			7435-003	H		03/11/11	03/18/11	BW	Tritium in Water	
			7435-003	I		03/17/11	03/18/11	BW	Iodine 129 in Water	
			7435-003	NI_L		03/16/11	03/18/11	BW	Nickel-63 in Liquid	
			7435-003	SR		02/24/11	03/18/11	BW	Total Strontium in Water	
			7435-003	TC		03/11/11	03/15/11	BW	Technetium 99 in Water	
			7435-003	U_T		03/08/11	03/18/11	BW	Uranium, Total in Water	

WORK SUMMARY

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**EBERLINE ANALYTICAL/RICHMOND**

SAMPLE DELIVERY GROUP K3099

SDG 7435  
 Contact N. Joseph Verville

**WORK SUMMARY, cont.**

Client Hanford  
 Contract No. S00W235A00  
 Case no SDG K3099

LAB SAMPLE	CLIENT SAMPLE ID									
COLLECTED	LOCATION	MATRIX		SUF-						
RECEIVED	CUSTODY	SAF No	PLANCHET	TEST	FIX	ANALYZED	REVIEWED	BY	METHOD	
S102053-04	Method Blank		7435-004	93A/93		02/25/11	03/01/11	BW	Gross Alpha in Water	
			7435-004	93B/93		02/25/11	03/01/11	BW	Gross Beta in Water	
		RC-186	7435-004	C		03/11/11	03/15/11	BW	Carbon 14 in Water	
			7435-004	GAM		02/18/11	02/22/11	MWT	Gamma Emitters	
			7435-004	H		03/11/11	03/18/11	BW	Tritium in Water	
			7435-004	I		03/17/11	03/18/11	BW	Iodine 129 in Water	
			7435-004	NI_L		03/16/11	03/18/11	BW	Nickel-63 in Liquid	
			7435-004	SR		02/24/11	03/18/11	BW	Total Strontium in Water	
			7435-004	TC		03/14/11	03/15/11	BW	Technetium 99 in Water	
			7435-004	U_T		03/08/11	03/18/11	BW	Uranium, Total in Water	
S102053-05	Duplicate (S102053-01)		7435-005	93A/93		02/25/11	03/01/11	BW	Gross Alpha in Water	
02/01/11	C7843(116-C-5);I-012	WATER	7435-005	93B/93		02/25/11	03/01/11	BW	Gross Beta in Water	
02/03/11		RC-186	7435-005	C		03/11/11	03/15/11	BW	Carbon 14 in Water	
			7435-005	GAM		02/19/11	02/22/11	MWT	Gamma Emitters	
			7435-005	H		03/11/11	03/18/11	BW	Tritium in Water	
			7435-005	I		03/17/11	03/18/11	BW	Iodine 129 in Water	
			7435-005	NI_L		03/16/11	03/18/11	BW	Nickel-63 in Liquid	
			7435-005	SR		02/24/11	03/18/11	BW	Total Strontium in Water	
			7435-005	TC		03/14/11	03/15/11	BW	Technetium 99 in Water	
			7435-005	U_T		03/08/11	03/18/11	BW	Uranium, Total in Water	
S102053-06	Spike (S102053-02)		7435-006	C		03/11/11	03/15/11	BW	Carbon 14 in Water	
02/01/11	C7843(116-C-5);I-012 DUP	WATER	7435-006	H		03/11/11	03/18/11	BW	Tritium in Water	
02/03/11		RC-186								

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

SAMPLE DELIVERY GROUP K3099

**WORK SUMMARY, cont.**

SDG 7435  
 Contact N. Joseph Verville

Client Hanford  
 Contract No. S00W235A00  
 Case no SDG K3099

**COUNTS OF TESTS BY SAMPLE TYPE**

TEST	SAF No	METHOD	REFERENCE	CLIENT	MORE	RE	BLANK	LCS	DUP SPIKE	TOTAL	
93A/93	RC-186	Gross Alpha in Water	900.0_ALPHABETA_GPC	2			1	1	1	5	
93B/93	RC-186	Gross Beta in Water	900.0_ALPHABETA_GPC	2			1	1	1	5	
C	RC-186	Carbon 14 in Water	C14_CHEM_LSC	2			1	1	1	6	
GAM	RC-186	Gamma Emitters	GAMMA_GS	2			1	1	1	5	
H	RC-186	Tritium in Water	906.0_H3_LSC	2			1	1	1	6	
I	RC-186	Iodine 129 in Water	I129_SEP_LEPS_GS	2			1	1	1	5	
NI_L	RC-186	Nickel-63 in Liquid	NI63_LSC	2			1	1	1	5	
SR	RC-186	Total Strontium in Water	SRTOT_SEP_PRECIP_GPC	2			1	1	1	5	
TC	RC-186	Technetium 99 in Water	TC99_TR_SEP_GPC	2			1	1	1	5	
U_T	RC-186	Uranium, Total in Water	UTOT_KPA	2			1	1	1	5	
<b>TOTALS</b>				20			10	10	10	2	52

WORK SUMMARY

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**EBERLINE ANALYTICAL / RICHMOND**  
**SAMPLE DELIVERY GROUP K3099**

7435-004

Method Blank

**METHOD BLANK**

SDG <u>7435</u>	Client/Case no <u>Hanford</u>	SDG <u>K3099</u>
Contact <u>N. Joseph Verville</u>	Contract No. <u>S00W235A00</u>	
Lab sample id <u>S102053-04</u>	Client sample id <u>Method Blank</u>	
Dept sample id <u>7435-004</u>	Material/Matrix _____	<u>WATER</u>
	SAF No <u>RC-186</u>	

ANALYTE	CAS NO	RESULT pCi/L	2σ ERR (COUNT)	MDA pCi/L	RDL pCi/L	QUALI- FIERS	TEST
Tritium	10028-17-8	0	86	146	400	U	H
Carbon 14	14762-75-5	18.4	39	65.4	200	U	C
Nickel 63	13981-37-8	-0.579	1.8	3.07	30.0	U	NI_L
Total Strontium	SR-RAD	-0.016	0.41	0.853	2.00	U	SR
Technetium 99	14133-76-7	-0.538	1.4	3.82	15.0	U	TC
Iodine 129	15046-84-1	-0.100	0.63	0.820	1.00	U	I
Total Uranium (ug/L)	7440-61-1	0	0.013	0.031	1.00	U	U_T
Beryllium 7	13966-02-4	U		43.5		U	GAM
Cesium 134	13967-70-9	U		7.77		U	GAM
Cesium 137	10045-97-3	U		5.54	15.0	U	GAM
Cobalt 60	10198-40-0	U		5.73	25.0	U	GAM
Europium 152	14683-23-9	U		17.6	50.0	U	GAM
Europium 154	15585-10-1	U		15.3	50.0	U	GAM
Europium 155	14391-16-3	U		18.5	50.0	U	GAM
Potassium 40	13966-00-2	U		112		U	GAM
Radium 226	13982-63-3	U		12.5		U	GAM
Antimony 125	14234-35-6	U		15.0		U	GAM
Ruthenium 106	13967-48-1	U		47.1		U	GAM
Americium 241	14596-10-2	U		23.9		U	GAM
Barium 133	13981-41-4	U		7.11		U	GAM
Radium 228	15262-20-1	U		28.1		U	GAM
Silver 108m	14391-65-2	U		4.94		U	GAM
Gross Alpha	12587-46-1	0.089	0.57	1.18	3.00	U	93A
Gross Beta	12587-47-2	-0.247	1.1	1.87	4.00	U	93B

QC-BLANK #77401

Lab id <u>EBRLNE</u>
Protocol <u>RIFS-100</u>
Version <u>Ver 1.0</u>
Form <u>DVD-DS</u>
Version <u>3.06</u>
Report date <u>03/19/11</u>

**EBERLINE ANALYTICAL/RICHMOND**

SAMPLE DELIVERY GROUP K3099

7435-003

Lab Control Sample

**LAB CONTROL SAMPLE**

SDG <u>7435</u> Contact <u>N. Joseph Verville</u>	Client/Case no <u>Hanford</u> <u>SDG K3099</u> Contract No. <u>S00W235A00</u>
Lab sample id <u>S102053-03</u> Dept sample id <u>7435-003</u>	Client sample id <u>Lab Control Sample</u> Material/Matrix <u>WATER</u> SAF No <u>RC-186</u>

ANALYTE	RESULT	2σ ERR	MDA	RDL	QUALI-	ADDED	2σ ERR	REC	3σ LMTS	PROTOCOL
	pCi/L	(COUNT)	pCi/L	pCi/L	FIERS TEST	pCi/L	pCi/L	%	(TOTAL)	LIMITS
Tritium	2120	140	149	400	H	2220	89	96	82-118	80-120
Carbon 14	11700	180	62.4	200	C	12000	480	98	84-116	80-120
Nickel 63	187	5.3	2.69	30.0	NI_L	216	8.6	87	84-116	80-120
Total Strontium	17.9	1.1	0.531	2.00	SR	17.5	0.70	102	81-119	80-120
Technetium 99	291	8.4	3.96	15.0	TC	273	11	107	78-122	80-120
Iodine 129	56.4	1.8	0.860	1.00	I	58.0	2.3	97	71-129	80-120
Total Uranium (ug/L)	79.0	8.8	0.312	1.00	U_T	82.5	3.3	96	83-117	80-120
Cesium 137	460	23	<u>17.2</u>	15.0	GAM	440	18	104	85-115	80-120
Cobalt 60	509	28	13.3	25.0	GAM	504	20	101	85-115	80-120
Gross Alpha	33.3	3.8	1.21	3.00	93A	33.7	1.3	99	65-135	80-120
Gross Beta	25.0	2.2	1.63	4.00	93B	29.1	1.2	86	81-119	80-120

QC-LCS #77400

**EBERLINE ANALYTICAL/RICHMOND**

SAMPLE DELIVERY GROUP K3099

7435-005

B27FT4

**DUPLICATE**

SDG <u>7435</u> Contact <u>N. Joseph Verville</u> DUPLICATE Lab sample id <u>S102053-05</u> Dept sample id <u>7435-005</u>	ORIGINAL Lab sample id <u>S102053-01</u> Dept sample id <u>7435-001</u> Received <u>02/03/11</u>	Client/Case no <u>Hanford</u> SDG <u>K3099</u> Contract <u>No. S00W235A00</u> Client sample id <u>B27FT4</u> Location/Matrix <u>C7843(116-C-5);I-012</u> <u>WATER</u> Collected/Volume <u>02/01/11 10:35</u> <u>12.75 L</u> Custody/SAF No <u>RC-186-024</u> <u>RC-186</u>
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ANALYTE	DUPLICATE	2σ ERR	MDA	RDL	QUALI-	TEST	ORIGINAL	2σ ERR	MDA	QUALI-	RPD	3σ	DER
	pCi/L	(COUNT)	pCi/L	pCi/L	FIERS		pCi/L	(COUNT)	pCi/L	FIERS	%	TOT	σ
Tritium	13600	300	147	400		H	12600	290	146		8	22	1.1
Carbon 14	6.34	25	41.8	200	U	C	14.9	25	41.8	U	-		0.5
Nickel 63	0.036	1.7	2.89	30.0	U	NI_L	0.187	1.7	2.97	U	-		0.1
Total Strontium	58.9	2.5	0.805	2.00		SR	54.1	2.2	0.660		8	24	1.1
Technetium 99	13.8	1.9	3.97	15.0		TC	13.0	1.9	3.92		6	41	0.4
Iodine 129	<u>-0.588</u>	0.56	0.800	1.00	U	I	0.367	0.92	<u>1.04</u>	U	-		1.8
Total Uranium (ug/L)	3.06	0.32	0.031	1.00		U_T	3.00	0.32	0.031		2	22	0.3
Beryllium 7	U		67.9		U	GAM	U		47.0	U	-		0.5
Cesium 134	U		8.53		U	GAM	U		6.43	U	-		0.4
Cesium 137	U		7.27	15.0	U	GAM	U		4.84	U	-		0.6
Cobalt 60	U		7.64	25.0	U	GAM	U		5.10	U	-		0.6
Europium 152	U		20.3	50.0	U	GAM	U		14.1	U	-		0.5
Europium 154	U		18.9	50.0	U	GAM	U		15.2	U	-		0.3
Europium 155	U		24.3	50.0	U	GAM	U		16.8	U	-		0.5
Potassium 40	U		84.2		U	GAM	U		60.8	U	-		0.4
Radium 226	U		29.2		U	GAM	U		23.4	U	-		0.3
Antimony 125	U		18.0		U	GAM	U		12.7	U	-		0.5
Ruthenium 106	U		63.4		U	GAM	U		62.3	U	-		0
Americium 241	U		47.3		U	GAM	U		33.7	U	-		0.5
Barium 133	U		8.07		U	GAM	U		5.94	U	-		0.4
Radium 228	U		33.2		U	GAM	U		23.6	U	-		0.5
Silver 108m	U		5.76		U	GAM	U		4.27	U	-		0.4
Gross Alpha	0.906	1.6	1.66	3.00	U	93A	1.44	1.9	2.34	U	-		0.4
Gross Beta	118	4.6	2.80	4.00		93B	103	4.1	1.95		14	25	1.6

DUPLICATES

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Lab id <u>EBRLNE</u>
Protocol <u>RIFS-100</u>
Version <u>Ver 1.0</u>
Form <u>DVD-DUP</u>
Version <u>3.06</u>
Report date <u>03/19/11</u>

EBERLINE ANALYTICAL/RICHMOND

SAMPLE DELIVERY GROUP K3099

7435-005

B27FT4

DUPLICATE, cont.

SDG <u>7435</u>	Client/Case no <u>Hanford</u>	<u>SDG K3099</u>
Contact <u>N. Joseph Verville</u>	Contract No. <u>S00W235A00</u>	
<b>DUPLICATE</b>	<b>ORIGINAL</b>	
Lab sample id <u>S102053-05</u>	Lab sample id <u>S102053-01</u>	Client sample id <u>B27FT4</u>
Dept sample id <u>7435-005</u>	Dept sample id <u>7435-001</u>	Location/Matrix <u>C7843(116-C-5);I-012</u> <u>WATER</u>
	Received <u>02/03/11</u>	Collected/Volume <u>02/01/11 10:35</u> <u>12.75 L</u>
		Custody/SAF No <u>RC-186-024</u> <u>RC-186</u>

QC-DUP#1 77402

Water Sampling - Integrated Remedial Investigation/  
Feasibility Study - 100

DUPLICATES

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SUMMARY DATA SECTION

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Lab id <u>EBRLNE</u>
Protocol <u>RIFS-100</u>
Version <u>Ver 1.0</u>
Form <u>DVD-DUP</u>
Version <u>3.06</u>
Report date <u>03/19/11</u>

**EBERLINE ANALYTICAL/RICHMOND**

SAMPLE DELIVERY GROUP K3099

7435-006

B27FT7

**MATRIX SPIKE**

SDG <u>7435</u>	Client/Case no <u>Hanford</u>	SDG <u>K3099</u>
Contact <u>N. Joseph Verville</u>	Contract No. <u>S00W235A00</u>	
<b>MATRIX SPIKE</b>	<b>ORIGINAL</b>	
Lab sample id <u>S102053-06</u>	Lab sample id <u>S102053-02</u>	Client sample id <u>B27FT7</u>
Dept sample id <u>7435-006</u>	Dept sample id <u>7435-002</u>	Location/Matrix <u>C7843(116-C-5);I-012 DUP WATER</u>
	Received <u>02/03/11</u>	Collected/Volume <u>02/01/11 10:35 12.75 L</u>
		Custody/SAF No <u>RC-186-027</u> <u>RC-186</u>

ANALYTE	SPIKE	2σ ERR	MDA	RDL	QUALI-		ADDED	2σ ERR	ORIGINAL	2σ ERR	REC 3σ	LMTS	PROTOCOL
	pCi/L	(COUNT)	pCi/L	pCi/L	FIERS	TEST	pCi/L	pCi/L	pCi/L	(COUNT)	‡ (TOTAL)	LIMITS	LIMITS
Tritium	37000	480	146	400	X	H	22600	900	13400	290	104	73-127	70-130
Carbon 14	24100	260	64.8	200	X	C	23900	960	25.0	26	101	84-116	70-130

QC-MS#2 77403

Water Sampling - Integrated Remedial Investigation/  
Feasibility Study - 100

MATRIX SPIKES

Page 1

SUMMARY DATA SECTION

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Lab id <u>EBRLNE</u>
Protocol <u>RIFS-100</u>
Version <u>Ver 1.0</u>
Form <u>DVD-MS</u>
Version <u>3.06</u>
Report date <u>03/19/11</u>

**EBERLINE ANALYTICAL / RICHMOND**  
**SAMPLE DELIVERY GROUP K3099**

7435-001

B27FT4

**DATA SHEET**

SDG <u>7435</u>	Client/Case no <u>Hanford</u>	SDG <u>K3099</u>
Contact <u>N. Joseph Verville</u>	Contract No. <u>S00W235A00</u>	
Lab sample id <u>S102053-01</u>	Client sample id <u>B27FT4</u>	
Dept sample id <u>7435-001</u>	Location/Matrix <u>C7843 (116-C-5);I-012</u> <u>WATER</u>	
Received <u>02/03/11</u>	Collected/Volume <u>02/01/11 10:35</u> <u>12.75 L</u>	
	Custody/SAF No <u>RC-186-024</u> <u>RC-186</u>	

ANALYTE	CAS NO	RESULT pCi/L	2σ ERR (COUNT)	MDA pCi/L	RDL pCi/L	QUALI- FIERS	TEST
Tritium	10028-17-8	12600	290	146	400		H
Carbon 14	14762-75-5	14.9	25	41.8	200	U	C
Nickel 63	13981-37-8	0.187	1.7	2.97	30.0	U	NI_L
Total Strontium	SR-RAD	54.1	2.2	0.660	2.00		SR
Technetium 99	14133-76-7	13.0	1.9	3.92	15.0		TC
Iodine 129	15046-84-1	0.367	0.92	<u>1.04</u>	1.00	U	I
Total Uranium (ug/L)	7440-61-1	3.00	0.32	0.031	1.00		U_T
Beryllium 7	13966-02-4	U		47.0		U	GAM
Cesium 134	13967-70-9	U		6.43		U	GAM
Cesium 137	10045-97-3	U		4.84	15.0	U	GAM
Cobalt 60	10198-40-0	U		5.10	25.0	U	GAM
Europium 152	14683-23-9	U		14.1	50.0	U	GAM
Europium 154	15585-10-1	U		15.2	50.0	U	GAM
Europium 155	14391-16-3	U		16.8	50.0	U	GAM
Potassium 40	13966-00-2	U		60.8		U	GAM
Radium 226	13982-63-3	U		23.4		U	GAM
Antimony 125	14234-35-6	U		12.7		U	GAM
Ruthenium 106	13967-48-1	U		62.3		U	GAM
Americium 241	14596-10-2	U		33.7		U	GAM
Barium 133	13981-41-4	U		5.94		U	GAM
Radium 228	15262-20-1	U		23.6		U	GAM
Silver 108m	14391-65-2	U		4.27		U	GAM
Gross Alpha	12587-46-1	1.44	1.9	2.34	3.00	U	93A
Gross Beta	12587-47-2	103	4.1	1.95	4.00		93B

Lab id <u>EBRLNE</u>
Protocol <u>RIFS-100</u>
Version <u>Ver 1.0</u>
Form <u>DVD-DS</u>
Version <u>3.06</u>
Report date <u>03/19/11</u>

EBERLINE ANALYTICAL / RICHMOND

SAMPLE DELIVERY GROUP K3099

7435-001

B27FT4

DATA SHEET, cont

SDG <u>7435</u>	Client/Case no <u>Hanford</u>	SDG <u>K3099</u>
Contact <u>N. Joseph Verville</u>	Contract No. <u>S00W235A00</u>	
Lab sample id <u>S102053-01</u>	Client sample id <u>B27FT4</u>	
Dept sample id <u>7435-001</u>	Location/Matrix <u>C7843(116-C-5);I-012</u>	<u>WATER</u>
Received <u>02/03/11</u>	Collected/Volume <u>02/01/11 10:35</u>	<u>12.75 L</u>
	Custody/SAF No <u>RC-186-024</u>	<u>RC-186</u>

Water Sampling - Integrated Remedial Investigation/  
Feasibility Study - 100

Lab id <u>EBRLNE</u>
Protocol <u>RIFS-100</u>
Version <u>Ver 1.0</u>
Form <u>DVD-DS</u>
Version <u>3.06</u>
Report date <u>03/19/11</u>

DATA SHEETS

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SUMMARY DATA SECTION

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EBERLINE ANALYTICAL / RICHMOND

SAMPLE DELIVERY GROUP K3099

7435-002

B27FT7

DATA SHEET

SDG <u>7435</u>	Client/Case no <u>Hanford</u>	SDG <u>K3099</u>
Contact <u>N. Joseph Verville</u>	Contract <u>No. S00W235A00</u>	
Lab sample id <u>S102053-02</u>	Client sample id <u>B27FT7</u>	
Dept sample id <u>7435-002</u>	Location/Matrix <u>C7843(116-C-5); I-012 DUP WATER</u>	
Received <u>02/03/11</u>	Collected/Volume <u>02/01/11 10:35 12.75 L</u>	
	Custody/SAF No <u>RC-186-027 RC-186</u>	

ANALYTE	CAS NO	RESULT pCi/L	2σ ERR (COUNT)	MDA pCi/L	RDL pCi/L	QUALI- FIERS	TEST
Tritium	10028-17-8	13400	290	145	400		H
Carbon 14	14762-75-5	25.0	26	41.9	200	U	C
Nickel 63	13981-37-8	-0.793	1.7	3.00	30.0	U	NI_L
Total Strontium	SR-RAD	53.9	2.4	0.770	2.00		SR
Technetium 99	14133-76-7	11.6	1.8	3.69	15.0		TC
Iodine 129	15046-84-1	-0.200	0.86	1.04	1.00	U	I
Total Uranium (ug/L)	7440-61-1	2.98	0.32	0.031	1.00		U_T
Beryllium 7	13966-02-4	U		58.8		U	GAM
Cesium 134	13967-70-9	U		7.94		U	GAM
Cesium 137	10045-97-3	U		6.36	15.0	U	GAM
Cobalt 60	10198-40-0	U		7.96	25.0	U	GAM
Europium 152	14683-23-9	U		17.6	50.0	U	GAM
Europium 154	15585-10-1	U		20.2	50.0	U	GAM
Europium 155	14391-16-3	U		13.2	50.0	U	GAM
Potassium 40	13966-00-2	U		74.0		U	GAM
Radium 226	13982-63-3	U		13.9		U	GAM
Antimony 125	14234-35-6	U		12.8		U	GAM
Ruthenium 106	13967-48-1	U		56.0		U	GAM
Americium 241	14596-10-2	U		8.19		U	GAM
Barium 133	13981-41-4	U		6.22		U	GAM
Radium 228	15262-20-1	U		27.7		U	GAM
Silver 108m	14391-65-2	U		4.52		U	GAM
Gross Alpha	12587-46-1	1.12	1.6	1.87	3.00	U	93A
Gross Beta	12587-47-2	104	4.1	2.19	4.00		93B

Lab id <u>EBRLNE</u>
Protocol <u>RIFS-100</u>
Version <u>Ver 1.0</u>
Form <u>DVD-DS</u>
Version <u>3.06</u>
Report date <u>03/19/11</u>

EBERLINE ANALYTICAL / RICHMOND  
SAMPLE DELIVERY GROUP K3099

7435-002

B27FT7

DATA SHEET, cont

SDG <u>7435</u>	Client/Case no <u>Hanford</u>	<u>SDG K3099</u>
Contact <u>N. Joseph Verville</u>	Contract No. <u>S00W235A00</u>	
Lab sample id <u>S102053-02</u>	Client sample id <u>B27FT7</u>	
Dept sample id <u>7435-002</u>	Location/Matrix <u>C7843(116-C-5);I-012 DUP WATER</u>	
Received <u>02/03/11</u>	Collected/Volume <u>02/01/11 10:35 12.75 L</u>	
	Custody/SAF No <u>RC-186-027</u>	<u>RC-186</u>

Water Sampling - Integrated Remedial Investigation/  
Feasibility Study - 100

Lab id <u>EBRLNE</u>
Protocol <u>RIFS-100</u>
Version <u>Ver 1.0</u>
Form <u>DVD-DS</u>
Version <u>3.06</u>
Report date <u>03/19/11</u>

**EBERLINE ANALYTICAL/RICHMOND**

SAMPLE DELIVERY GROUP K3099

Test SR Matrix WATER  
 SDG 7435  
 Contact N. Joseph Verville

**LAB METHOD SUMMARY**

TOTAL STRONTIUM IN WATER

BETA COUNTING

Client Hanford  
 Contract No. S00W235A00  
 Contract SDG K3099

**RESULTS**

LAB	RAW	SUF-		Total
SAMPLE ID	TEST FIX	PLANCHET	CLIENT SAMPLE ID	Strontium
Preparation batch 7289-155				
S102053-01		7435-001	B27FT4	54.1
S102053-02		7435-002	B27FT7	53.9
S102053-03		7435-003	Lab Control Sample	ok
S102053-04		7435-004	Method Blank	U
S102053-05		7435-005	Duplicate (S102053-01)	ok

Nominal values and limits from method RDLs (pCi/L) 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/L	L	FAC	TION	%	%	min	keV	KeV	HELD PREPARED	YZED DETECTOR
Preparation batch 7289-155 2σ prep error 10.4 % Reference Lab Notebook No. 7289 pg 155													
S102053-01		B27FT4	0.660	0.500			80		86		23	02/24/11	02/24 GRB-230
S102053-02		B27FT7	0.770	0.500			69		86		23	02/24/11	02/24 GRB-232
S102053-03		Lab Control Sample	0.531	0.500			73		100			02/24/11	02/24 GRB-202
S102053-04		Method Blank	0.853	0.500			64		100			02/24/11	02/24 GRB-203
S102053-05		Duplicate (S102053-01)	0.805	0.500			71		86		23	02/24/11	02/24 GRB-231

Nominal values and limits from method 2.00 0.500 40-110 100 180

PROCEDURES REFERENCE SRTOT\_SEP\_PRECIP\_GPC  
 SPP-062 Sample Aliquoting, rev 1  
 CP-380 Strontium in Water Samples, rev 5

AVERAGES ± 2 SD MDA 0.724 ± 0.258  
 FOR 5 SAMPLES YIELD 71 ± 12

METHOD SUMMARIES

Page 1

SUMMARY DATA SECTION

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Lab id EBRLNE  
 Protocol RIFS-100  
 Version Ver 1.0  
 Form DVD-LMS  
 Version 3.06  
 Report date 03/19/11

**EBERLINE ANALYTICAL/RICHMOND**

SAMPLE DELIVERY GROUP K3099

Test TC Matrix WATER  
 SDG 7435  
 Contact N. Joseph Verville

**LAB METHOD SUMMARY**

TECHNETIUM 99 IN WATER

BETA COUNTING

Client Hanford  
 Contract No. S00W235A00  
 Contract SDG K3099

**RESULTS**

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

Preparation batch 7289-155

S102053-01	7435-001	B27FT4	13.0
S102053-02	7435-002	B27FT7	11.6
S102053-03	7435-003	Lab Control Sample	ok
S102053-04	7435-004	Method Blank	U
S102053-05	7435-005	Duplicate (S102053-01)	ok

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

Preparation batch 7289-155 2σ prep error 13.2 % Reference Lab Notebook No. 7289 pg 155

S102053-01	B27FT4	3.92	0.100	90	100	38	03/08/11	03/11	GRB-228
S102053-02	B27FT7	3.69	0.100	96	100	41	03/08/11	03/14	GRB-202
S102053-03	Lab Control Sample	3.96	0.100	94	100		03/08/11	03/11	GRB-232
S102053-04	Method Blank	3.82	0.100	94	100		03/08/11	03/14	GRB-203
S102053-05	Duplicate (S102053-01)	3.97	0.100	93	100	41	03/08/11	03/14	GRB-204

Nominal values and limits from method 15.0 0.100 30-110 50 180

PROCEDURES	REFERENCE	TC99_TR_SEP_GPC
	SPP-062	Sample Aliquoting, rev 1
	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	<u>3.87</u> ± <u>0.236</u>
FOR 5 SAMPLES	YIELD	<u>93</u> ± <u>4</u>

METHOD SUMMARIES

Page 2

SUMMARY DATA SECTION

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Lab id EBRLNE  
 Protocol RIFS-100  
 Version Ver 1.0  
 Form DVD-LMS  
 Version 3.06  
 Report date 03/19/11

**EBERLINE ANALYTICAL/RICHMOND**

SAMPLE DELIVERY GROUP K3099

**LAB METHOD SUMMARY**

GROSS ALPHA IN WATER

GAS PROPORTIONAL COUNTING

Test 93A Matrix WATER  
 SDG 7435  
 Contact N. Joseph Verville

Client Hanford  
 Contract No. S00W235A00  
 Contract SDG K3099

**RESULTS**

LAB	RAW	SUF-			
SAMPLE ID	TEST FIX	PLANCHET	CLIENT SAMPLE ID	Gross Alpha	
Preparation batch 7289-155					
S102053-01	93	7435-001	B27FT4	U	
S102053-02	93	7435-002	B27FT7	U	
S102053-03	93	7435-003	Lab Control Sample	ok	
S102053-04	93	7435-004	Method Blank	U	
S102053-05	93	7435-005	Duplicate (S102053-01)	-	U

Nominal values and limits from method      RDLs (pCi/L)      3.00

**METHOD PERFORMANCE**

LAB	RAW	SUF-	MDA	ALIQ	PREP	DILU-	RESID	EFF	COUNT	FWHM	DRIFT	DAYS	ANAL-		
SAMPLE ID	TEST FIX	CLIENT SAMPLE ID	pCi/L	L	FAC	TION	mg	%	min	keV	KeV	HELD	PREPARED	YZED	DETECTOR
Preparation batch 7289-155      2σ prep error 20.6 %      Reference Lab Notebook No. 7289 pg 155															
S102053-01	93	B27FT4	2.34	0.300			118		100			24	02/25/11	02/25	GRB-101
S102053-02	93	B27FT7	1.87	0.300			119		100			24	02/25/11	02/25	GRB-103
S102053-03	93	Lab Control Sample	1.21	0.300			65		100				02/25/11	02/25	GRB-104
S102053-04	93	Method Blank	1.18	0.300			62		100				02/25/11	02/25	GRB-105
S102053-05	93	Duplicate (S102053-01)	1.66	0.300			118		100			24	02/25/11	02/25	GRB-107

Nominal values and limits from method      3.00      0.300      0-250      100      180

PROCEDURES      REFERENCE      900.0\_ALPHABETA\_GPC  
 SPP-007      Aqueous Sample Receipt by Chemistry Laboratory,  
 rev 1  
 SPP-120      Gross Alpha and Gross Beta in Water, rev 3

AVERAGES ± 2 SD      MDA 1.65 ± 0.969  
 FOR 5 SAMPLES      RESIDUE 96 ± 60

METHOD SUMMARIES

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SUMMARY DATA SECTION

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Lab id EBRLNE  
 Protocol RIFS-100  
 Version Ver 1.0  
 Form DVD-LMS  
 Version 3.06  
 Report date 03/19/11

**EBERLINE ANALYTICAL/RICHMOND**

SAMPLE DELIVERY GROUP K3099

**LAB METHOD SUMMARY**

GROSS BETA IN WATER

GAS PROPORTIONAL COUNTING

Test 93B Matrix WATER  
SDG 7435  
Contact N. Joseph Verville

Client Hanford  
Contract No. S00W235A00  
Contract SDG K3099

**RESULTS**

LAB RAW SUF-  
SAMPLE ID TEST FIX PLANCHET CLIENT SAMPLE ID Gross Beta

Preparation batch 7289-155

S102053-01	93	7435-001	B27FT4	103
S102053-02	93	7435-002	B27FT7	104
S102053-03	93	7435-003	Lab Control Sample	ok
S102053-04	93	7435-004	Method Blank	U
S102053-05	93	7435-005	Duplicate (S102053-01)	ok

Nominal values and limits from method RDLs (pCi/L) 4.00

**METHOD PERFORMANCE**

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

Preparation batch 7289-155 2σ prep error 11.0 % Reference Lab Notebook No. 7289 pg 155

S102053-01	93	B27FT4	1.95	0.300	118	100	24	02/25/11	02/25	GRB-101
S102053-02	93	B27FT7	2.19	0.300	119	100	24	02/25/11	02/25	GRB-103
S102053-03	93	Lab Control Sample	1.63	0.300	65	100		02/25/11	02/25	GRB-104
S102053-04	93	Method Blank	1.87	0.300	62	100		02/25/11	02/25	GRB-105
S102053-05	93	Duplicate (S102053-01)	2.80	0.300	118	100	24	02/25/11	02/25	GRB-107

Nominal values and limits from method 4.00 0.300 0-250 100 180

PROCEDURES REFERENCE 900.0\_ALPHABETA\_GPC  
SPP-007 Aqueous Sample Receipt by Chemistry Laboratory, rev 1  
SPP-120 Gross Alpha and Gross Beta in Water, rev 3

AVERAGES ± 2 SD MDA 2.09 ± 0.891  
FOR 5 SAMPLES RESIDUE 96 ± 60

METHOD SUMMARIES

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SUMMARY DATA SECTION

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Lab id EBRLNE  
Protocol RIFS-100  
Version Ver 1.0  
Form DVD-LMS  
Version 3.06  
Report date 03/19/11

**EBERLINE ANALYTICAL/RICHMOND**

SAMPLE DELIVERY GROUP K3099

Test GAM Matrix WATER  
 SDG 7435  
 Contact N. Joseph Verville

**LAB METHOD SUMMARY**

GAMMA EMITTERS  
 GAMMA SPECTROSCOPY

Client Hanford  
 Contract No. S00W235A00  
 Contract SDG K3099

**RESULTS**

LAB RAW SUP-  
 SAMPLE ID TEST FIX PLANCHET CLIENT SAMPLE ID Cesium 137 Cobalt 60

Preparation batch 7289-155

SAMPLE ID	TEST FIX	PLANCHET	CLIENT SAMPLE ID	Cesium 137	Cobalt 60
S102053-01		7435-001	B27FT4	U	U
S102053-02		7435-002	B27FT7	U	U
S102053-03		7435-003	Lab Control Sample	ok	ok
S102053-04		7435-004	Method Blank	U	U
S102053-05		7435-005	Duplicate (S102053-01)	- U	- U

Nominal values and limits from method RDLs (pCi/L) 15.0 25.0

**METHOD PERFORMANCE**

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

Preparation batch 7289-155 2σ prep error 7.0 % Reference Lab Notebook No. 7289 pg 155

SAMPLE ID	TEST FIX	CLIENT SAMPLE ID	MDA pCi/L	ALIQ L	PREP FAC	DILU- TION	YIELD %	EFF %	COUNT min	FWHM keV	DRIFT KeV	DAYS HELD	PREPARED	ANAL- YZED	DETECTOR
S102053-01		B27FT4	28.4	0.500					600			17	02/16/11	02/18	MB,08,00
S102053-02		B27FT7	26.2	0.500					600			17	02/16/11	02/18	01,01,00
S102053-03		Lab Control Sample	17.2	0.500					601				02/16/11	02/18	MB,05,00
S102053-04		Method Blank	36.9	0.500					601				02/16/11	02/18	01,02,00
S102053-05		Duplicate (S102053-01)	40.7	0.500					303			18	02/16/11	02/19	MB,08,00

Nominal values and limits from method 15.0 0.500 100 180

PROCEDURES REFERENCE GAMMA\_GS  
 SPP-007 Aqueous Sample Receipt by Chemistry Laboratory, rev 1  
 SPP-100 Preparation of Sample for Gamma Spectroscopy, rev 0

AVERAGES ± 2 SD MDA 29.9 ± 18.5  
 FOR 5 SAMPLES YIELD \_\_\_\_\_ ± \_\_\_\_\_

METHOD SUMMARIES

Page 5

SUMMARY DATA SECTION

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Lab id EBRLNE  
 Protocol RIFS-100  
 Version Ver 1.0  
 Form DVD-LMS  
 Version 3.06  
 Report date 03/19/11

**EBERLINE ANALYTICAL/RICHMOND**

SAMPLE DELIVERY GROUP K3099

Test I Matrix WATER  
 SDG 7435  
 Contact N. Joseph Verville

**LAB METHOD SUMMARY**

IODINE 129 IN WATER  
 GAMMA SPECTROSCOPY

Client Hanford  
 Contract No. S00W235A00  
 Contract SDG K3099

**RESULTS**

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

Preparation batch 7289-155

S102053-01	7435-001	B27FT4	U
S102053-02	7435-002	B27FT7	U
S102053-03	7435-003	Lab Control Sample	ok
S102053-04	7435-004	Method Blank	U
S102053-05	7435-005	Duplicate (S102053-01)	- U

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

**METHOD PERFORMANCE**

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

Preparation batch 7289-155 2σ prep error 19.4 % Reference Lab Notebook No. 7289 pg 155

S102053-01	B27FT4	<u>1.04</u>	2.00	82	400	44	03/17/11	03/17	GRB-206
S102053-02	B27FT7	<u>1.04</u>	2.00	70	400	44	03/17/11	03/17	GRB-207
S102053-03	Lab Control Sample	0.860	2.00	87	400		03/17/11	03/17	GRB-225
S102053-04	Method Blank	0.820	2.00	90	400		03/17/11	03/17	GRB-227
S102053-05	Duplicate (S102053-01)	0.800	2.00	79	400	44	03/17/11	03/17	GRB-228

Nominal values and limits from method 1.00 2.00 40-110 200 100 180

PROCEDURES REFERENCE I129\_SEP\_LEPS\_GS  
 SPP-007 Aqueous Sample Receipt by Chemistry Laboratory, rev 1  
 SPP-062 Sample Aliquoting, rev 1  
 CP-530 Iodine-129 Purification, rev 6

AVERAGES ± 2 SD MDA 0.912 ± 0.238  
 FOR 5 SAMPLES YIELD 82 ± 16

METHOD SUMMARIES

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SUMMARY DATA SECTION

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Lab id EBRLNE  
 Protocol RIFS-100  
 Version Ver 1.0  
 Form DVD-LMS  
 Version 3.06  
 Report date 03/19/11

**EBERLINE ANALYTICAL/RICHMOND**

SAMPLE DELIVERY GROUP K3099

Test U T Matrix WATER  
 SDG 7435  
 Contact N. Joseph Verville

**LAB METHOD SUMMARY**

URANIUM, TOTAL IN WATER  
 KINETIC PHOSPHORIMETRY, UG

Client Hanford  
 Contract No. S00W235A00  
 Contract SDG K3099

**RESULTS**

LAB	RAW	SUF-		Total
SAMPLE ID	TEST FIX	PLANCHET	CLIENT SAMPLE ID	Uranium
Preparation batch 7289-155				
S102053-01		7435-001	B27FT4	3.00
S102053-02		7435-002	B27FT7	2.98
S102053-03		7435-003	Lab Control Sample	ok
S102053-04		7435-004	Method Blank	U
S102053-05		7435-005	Duplicate (S102053-01)	ok

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

**METHOD PERFORMANCE**

LAB	RAW	SUF-	MDA	ALIQ	PREP	DILU-	YIELD	EFF	COUNT	FWHM	DRIFT	DAYS	ANAL-		
SAMPLE ID	TEST FIX	CLIENT SAMPLE ID	ug/L	L	FAC	TION	%	%	min	keV	KeV	HELD	PREPARED	YZED	DETECTOR
Preparation batch 7289-155			2σ prep error		Reference Lab Notebook No. 7289 pg 155										
S102053-01		B27FT4	0.031	0.0200								35	03/08/11	03/08	KPA-001
S102053-02		B27FT7	0.031	0.0200								35	03/08/11	03/08	KPA-001
S102053-03		Lab Control Sample	0.312	0.0200									03/08/11	03/08	KPA-001
S102053-04		Method Blank	0.031	0.0200									03/08/11	03/08	KPA-001
S102053-05		Duplicate (S102053-01)	0.031	0.0200								35	03/08/11	03/08	KPA-001

Nominal values and limits from method      1.00    0.0200      180

PROCEDURES    REFERENCE    UTOT\_KPA  
 CP-929        Calibration of the Kinetic Phosphorimeter, rev 13  
 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 0.087 ± 0.251  
 FOR 5 SAMPLES        YIELD \_\_\_\_\_ ± \_\_\_\_\_

METHOD SUMMARIES

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SUMMARY DATA SECTION

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Lab id EBRLNE  
 Protocol RIFS-100  
 Version Ver 1.0  
 Form DVD-LMS  
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 Report date 03/19/11

**EBERLINE ANALYTICAL/RICHMOND**

SAMPLE DELIVERY GROUP K3099

**LAB METHOD SUMMARY**

CARBON 14 IN WATER

LIQUID SCINTILLATION COUNTING

Test C        Matrix WATER  
 SDG 7435  
 Contact N. Joseph Verville

Client Hanford  
 Contract No. S00W235A00  
 Contract SDG K3099

**RESULTS**

LAB	RAW	SUF-		
SAMPLE ID	TEST FIX	PLANCHET	CLIENT SAMPLE ID	Carbon 14
Preparation batch 7289-155				
S102053-01		7435-001	B27FT4	U
S102053-02		7435-002	B27FT7	U
S102053-03		7435-003	Lab Control Sample	ok
S102053-04		7435-004	Method Blank	U
S102053-05		7435-005	Duplicate (S102053-01)	- U
S102053-06		7435-006	Spike (S102053-02)	ok X

Nominal values and limits from method      RDLs (pCi/L)      200

**METHOD PERFORMANCE**

LAB	RAW	SUF-	MDA	ALIQ	PREP	DILU-	YIELD	EFF	COUNT	FWHM	DRIFT	DAYS	ANAL-		
SAMPLE ID	TEST FIX	CLIENT SAMPLE ID	pCi/L	L	FAC	TION	%	%	min	keV	KeV	HELD	PREPARED	YZED	DETECTOR
Preparation batch 7289-155      2σ prep error 10.0 %      Reference Lab Notebook No. 7289 pg 155															
S102053-01		B27FT4	41.8	0.0300			100		50		38	03/10/11	03/11	LSC-005	
S102053-02		B27FT7	41.9	0.0300			100		50		38	03/10/11	03/11	LSC-005	
S102053-03		Lab Control Sample	62.4	0.0200			100		50			03/10/11	03/11	LSC-005	
S102053-04		Method Blank	65.4	0.0200			100		50			03/10/11	03/11	LSC-005	
S102053-05		Duplicate (S102053-01)	41.8	0.0300			100		50		38	03/10/11	03/11	LSC-005	
S102053-06		Spike (S102053-02)	64.8	0.0200			100		50		38	03/10/11	03/11	LSC-005	

Nominal values and limits from method      200      0.0200      50      180

PROCEDURES      REFERENCE      C14\_CHEM\_LSC  
 CP-241      Carbon-14 in Aqueous Samples, rev 8

AVERAGES ± 2 SD      MDA 53.0 ± 24.6  
 FOR 6 SAMPLES      YIELD 100 ± 0

**METHOD SUMMARIES**

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**SUMMARY DATA SECTION**

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Lab id EBRLNE  
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 Version Ver 1.0  
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**EBERLINE ANALYTICAL/RICHMOND**

SAMPLE DELIVERY GROUP K3099

**LAB METHOD SUMMARY**

TRITIUM IN WATER

LIQUID SCINTILLATION COUNTING

Test H Matrix WATER  
 SDG 7435  
 Contact N. Joseph Verville

Client Hanford  
 Contract No. S00W235A00  
 Contract SDG K3099

**RESULTS**

LAB	RAW	SUF-		
SAMPLE ID	TEST FIX	PLANCHET	CLIENT SAMPLE ID	Tritium
Preparation batch 7289-155				
S102053-01		7435-001	B27FT4	12600
S102053-02		7435-002	B27FT7	13400
S102053-03		7435-003	Lab Control Sample	ok
S102053-04		7435-004	Method Blank	U
S102053-05		7435-005	Duplicate (S102053-01)	ok
S102053-06		7435-006	Spike (S102053-02)	ok X

Nominal values and limits from method RDLs (pCi/L) 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/L	L	FAC	TION	%	%	min	keV	KeV	HELD PREPARED	YZED DETECTOR
Preparation batch 7289-155 2σ prep error 10.0 % Reference Lab Notebook No. 7289 pg 155													
S102053-01		B27FT4	146	0.0100			100	150			38	03/10/11 03/11	LSC-007
S102053-02		B27FT7	145	0.0100			100	150			38	03/10/11 03/11	LSC-007
S102053-03		Lab Control Sample	149	0.100			10	150				03/10/11 03/11	LSC-007
S102053-04		Method Blank	146	0.100			10	150				03/10/11 03/11	LSC-007
S102053-05		Duplicate (S102053-01)	147	0.0100			100	150			38	03/10/11 03/11	LSC-007
S102053-06		Spike (S102053-02)	146	0.0300			33	150			38	03/10/11 03/11	LSC-007

Nominal values and limits from method 400 0.0100 25 180

PROCEDURES REFERENCE 906.0\_H3\_LSC  
 CP-210 Tritium in Water Samples by Distillation, rev 11

AVERAGES ± 2 SD MDA 146 ± 2.76  
 FOR 6 SAMPLES YIELD 59 ± 92

METHOD SUMMARIES

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SUMMARY DATA SECTION

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Lab id EBRLNE  
 Protocol RIFS-100  
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 Version 3.06  
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**EBERLINE ANALYTICAL/RICHMOND**

SAMPLE DELIVERY GROUP K3099

Test NI L Matrix WATER  
 SDG 7435  
 Contact N. Joseph Verville

**LAB METHOD SUMMARY**

NICKEL-63 IN LIQUID

LIQUID SCINTILLATION COUNTING

Client Hanford  
 Contract No. S00W235A00  
 Contract SDG K3099

**RESULTS**

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

Preparation batch 7289-155

S102053-01	7435-001	B27FT4	U
S102053-02	7435-002	B27FT7	U
S102053-03	7435-003	Lab Control Sample	ok
S102053-04	7435-004	Method Blank	U
S102053-05	7435-005	Duplicate (S102053-01)	- U

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

Preparation batch 7289-155 2σ prep error 11.2 % Reference Lab Notebook No. 7289 pg 155

S102053-01	B27FT4	2.97	0.500	98	50	43	03/11/11	03/16	LSC-004
S102053-02	B27FT7	3.00	0.500	97	50	43	03/11/11	03/16	LSC-004
S102053-03	Lab Control Sample	2.69	0.500	107	50		03/11/11	03/16	LSC-004
S102053-04	Method Blank	3.07	0.500	94	50		03/11/11	03/16	LSC-004
S102053-05	Duplicate (S102053-01)	2.89	0.500	100	50	43	03/11/11	03/16	LSC-004

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

PROCEDURES REFERENCE NI63\_LSC  
 SPP-040 Environmental Water Dissolution, rev 2  
 CP-280 Nickel-63 Purification, rev 5

AVERAGES ± 2 SD MDA 2.92 ± 0.292  
 FOR 5 SAMPLES YIELD 99 ± 10

Lab id EBRLNE  
 Protocol RIFS-100  
 Version Ver 1.0  
 Form DVD-LMS  
 Version 3.06  
 Report date 03/19/11

EBERLINE ANALYTICAL / RICHMOND

SAMPLE DELIVERY GROUP K3099

SDG 7435  
Contact N. Joseph Verville

REPORT GUIDE

Client Hanford  
Contract No. S00W235A00  
Case no SDG K3099

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 RIFS-100  
Version Ver 1.0  
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EBERLINE ANALYTICAL / RICHMOND

SAMPLE DELIVERY GROUP K3099

SDG 7435  
Contact N. Joseph Verville

REPORT GUIDE

Client Hanford  
Contract No. S00W235A00  
Case no SDG\_K3099

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  
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EBERLINE ANALYTICAL / RICHMOND

SAMPLE DELIVERY GROUP K3099

SDG 7435  
 Contact N. Joseph Verville

Client Hanford  
 Contract No. S00W235A00  
 Case no SDG K3099

REPORT GUIDE

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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 Version Ver 1.0  
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EBERLINE ANALYTICAL / RICHMOND

SAMPLE DELIVERY GROUP K3099

SDG 7435  
 Contact N. Joseph Verville

Client Hanford  
 Contract No. S00W235A00  
 Case no SDG K3099

REPORT GUIDE

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).

EBERLINE ANALYTICAL / RICHMOND

SAMPLE DELIVERY GROUP K3099

SDG 7435  
Contact N. Joseph Verville

GUIDE , cont .

Client Hanford  
Contract No. S00W235A00  
Case no SDG K3099

DATA SHEET

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

J The RESULT is less than the RDL (Required Detection Limit) and no U qualifier is assigned.

B A Method Blank associated with this sample had a result without a U flag and, after correcting for possibly different aliquots, that result is greater than or equal to the MDA for this sample.

Normally, B is not assigned if U is. When method blank subtraction is shown on this report, B flags are assigned based on the unsubtracted values while U's are assigned based on the subtracted ones. Both flags can be assigned in this case.

For each sample result, all Method Blank results in the same preparation batch are compared. The Method Summary Report documents this and other QC relationships.

L Some Lab Control Sample that QC's this sample had a low recovery. The lab can disable assignment of this qualifier.

H Similar to 'L' except the recovery was high.

P The RESULT is 'preliminary'.

X Some data necessary to compute the RESULT, ERROR or MDA was manually entered or modified.

2 There were two or more results available for this analyte. The reported result may not be the same as in the raw data.

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

The following values are underlined to indicate possible problems:

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

REPORT GUIDES

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SUMMARY DATA SECTION

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Protocol RIFS-100  
Version Ver 1.0  
Form DVD-RG  
Version 3.06  
Report date 03/19/11

EBERLINE ANALYTICAL / RICHMOND

SAMPLE DELIVERY GROUP K3099

SDG 7435  
 Contact N. Joseph Verville

Client Hanford  
 Contract No. S00W235A00  
 Case no SDG\_K3099

GUIDE, cont.

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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Contact N. Joseph Verville

REPORT GUIDE

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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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DUPLICATE

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

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

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

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

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MATRIX SPIKE

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

The following notes apply to this report:

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

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

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

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

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

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

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

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

2. The error of ADDED.

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

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

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MATRIX SPIKE

for the recovery.

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

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

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METHOD SUMMARY

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

The following notes apply to this report:

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

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

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

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

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

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

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

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METHOD SUMMARY

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

- \* Duplicate sample results are shown as: ok, No data, or OUT, with the last two underlined. 'No data' means there was no original sample data found for this duplicate. 'OUT' corresponds to when the RPD is underlined on the Duplicate Report. See this report for supporting data.
- \* If the MDA column is labeled 'MAX MDA', there was more than one result measured by the reported method and the MDA shown is the largest MDA. If not all these results have the same RDL, the MAX MDA reflects only those results with RDL equal to the smallest one.

MDAs are underlined if greater than the printed RDL.

- \* Aliquots are underlined if less than the nominal value specified for the method.
- \* Preparation factors are underlined if greater than the nominal value specified for the method.
- \* Dilution factors are underlined if greater than the nominal value specified for the method.
- \* Residues are underlined if outside the range specified for the method. Residues are not printed if yields are.
- \* Yields, which may be gravimetric, radiometric or some type of recovery depending on the method, are underlined if outside the range specified for the method.
- \* Efficiencies are underlined if outside the range specified for the method. Efficiencies are detector and geometry dependent so this test is only approximate.

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METHOD SUMMARY

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

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

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

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

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

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

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METHOD SUMMARY

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

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

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

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

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CH2M Hill Plateau Remediation Company		CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST						RC-186-024		PAGE 1 OF 1				
<b>COLLECTOR</b> Southernland		<b>COMPANY CONTACT</b> DALE DYCKMAN K3099		<b>TELEPHONE NO.</b> (509) 373-2530 (7435)		<b>PROJECT COORDINATOR</b> KESSNER, JH		<b>PRICE CODE</b> 7N		<b>DATA TURNAROUND</b> 45 Days / 45 Days				
<b>SAMPLING LOCATION</b> C7843 (116-C-5); I-012		<b>PROJECT DESIGNATION</b> Water Sampling - Integrated Remedial Investigation/Feasibility Study - 100				<b>SAF NO.</b> RC-186		<b>AIR QUALITY</b> <input type="checkbox"/>						
<b>ICE CHEST NO.</b> GWS-242		<b>FIELD LOGBOOK NO.</b> NWF-N-583-1 PG#101		<b>ACTUAL SAMPLE DEPTH</b> 58.7 Ft		<b>COA</b> 302512ES10		<b>METHOD OF SHIPMENT</b> FEDERAL EXPRESS		<b>ORIGINAL</b>				
<b>SHIPPED TO</b> Eberline Services		<b>OFFSITE PROPERTY NO.</b> SEE PTR				<b>BILL OF LADING/AIR BILL NO.</b> SEE PTR 7967 2153 0742								
<b>MATRIX*</b> A=Air DL=Drum L=Liquid DS=Drum S=Solids L=Liquid O=Oil S=Soil SE=Sediment T=Tissue V=Vegetation W=Water WI=Wipe X=Other	<b>POSSIBLE SAMPLE HAZARDS/ REMARKS</b> 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)		<b>PRESERVATION</b>		HNO3 to pH <2	HNO3 to pH <2	None	None	HNO3 to pH <2	HNO3 to pH <2	HCl to pH <2	None	HNO3 to pH <2	
			<b>HOLDING TIME</b>		6 Months	6 Months	6 Months	6 Months	6 Months	6 Months	6 Months	6 Months	6 Months	6 Months
			<b>TYPE OF CONTAINER</b>		G/P	G/P	G/P	G/P	G/P	G/P	G/P	G/P	P	G/P
			<b>NO. OF CONTAINER(S)</b>		1	2	1	4	2	2	1	1	1	
			<b>VOLUME</b>		1000mL	1000mL	125mL	1000mL	1000mL	1000mL	250mL	125mL	500mL	
<b>SPECIAL HANDLING AND/OR STORAGE</b>		<b>SAMPLE ANALYSIS</b>		SEE ITEM (1) IN SPECIAL INSTRUCTIONS	SEE ITEM (2) IN SPECIAL INSTRUCTIONS	Carbon-14 (100 Area RIFS);	I-129 Low Level (100 Area RIFS);	Nickel-63 (100 Area RIFS);	Strontium-89,90 - Total Sr (100 Area RIFS);	Technetium-99 (100 Area RIFS);	Tritium - H3 (100 Area RIFS);	Total Uranium;		
<b>SAMPLE NO.</b>	<b>MATRIX*</b>	<b>SAMPLE DATE</b>	<b>SAMPLE TIME</b>											
B27FT4	WATER	2-1-11	1035	X	X	X	X	X	X	X	X	X		

CHAIN OF POSSESSION		SIGN/ PRINT NAMES		SPECIAL INSTRUCTIONS	
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME	(1) Gamma Spec (100 Area RIFS); Gamma Spec - Add-on (100 Area RIFS) {Americium-241, Barium-133, Radium-226, Radium-228, Silver-108 metastable}; (2) Gross Alpha (100 Area RIFS); Gross Beta (100 Area RIFS);	
Southernland	2-1-11 1200	SSU-RM	FEB 01 2011 1200		
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME		
SSU-RM	2-2-11 1230	T.A. Wallace	2-2-11 1230		
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME		
T.A. Wallace	2-2-11 1230	FEDEX			
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME		
CHRPC	2-2-11 1400	NE. MATAJANA	02/03/11 0930		
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		
<b>LABORATORY SECTION</b>	<b>RECEIVED BY</b>	<b>TITLE</b>		<b>DATE/TIME</b>	
<b>FINAL SAMPLE DISPOSITION</b>	<b>DISPOSAL METHOD</b>	<b>DISPOSED BY</b>		<b>DATE/TIME</b>	

CH2M Hill Plateau Remediation Company		CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST				RC-186-027	PAGE 1 OF 1	
COLLECTOR Southernland		COMPANY CONTACT DALE DYEKMAN K3099		TELEPHONE NO. (509) 373-2530 (7435)	PROJECT COORDINATOR KESSNER, JH		PRICE CODE 7N	DATA TURNAROUND 45 Days / 45 Days
SAMPLING LOCATION C7843 (116-C-5); I-012 DUP		PROJECT DESIGNATION Water Sampling - Integrated Remedial Investigation/Feasibility Study - 100			SAF NO. RC-186		AIR QUALITY <input type="checkbox"/>	
ICE CHEST NO. GWS-026		FIELD LOGBOOK NO. NNF-N-583-1 PG#101		ACTUAL SAMPLE DEPTH 58.7 F+		COA 302512ES10		METHOD OF SHIPMENT FEDERAL EXPRESS ORIGINAL
SHIPPED TO Eberline Services		OFFSITE PROPERTY NO. SEE PTR			BILL OF LADING/AIR BILL NO. SEE PTR 7967 2153 0569			

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	HNO3 to pH <2	HNO3 to pH <2	None	None	HNO3 to pH <2	HNO3 to pH <2	HCl to pH <2	None	HNO3 to pH <2	
		HOLDING TIME	6 Months	6 Months	6 Months	6 Months	6 Months	6 Months	6 Months	6 Months	6 Months	6 Months
		TYPE OF CONTAINER	G/P	G/P	G/P	G/P	G/P	G/P	G/P	G/P	P	G/P
		NO. OF CONTAINER(S)	1	2	1	4	2	2	1	1	1	
		VOLUME	1000mL	1000mL	125mL	1000mL	1000mL	1000mL	250mL	125mL	500mL	
		SPECIAL HANDLING AND/OR STORAGE	SAMPLE ANALYSIS	SEE ITEM (1) IN SPECIAL INSTRUCTIONS	SEE ITEM (2) IN SPECIAL INSTRUCTIONS	Carbon-14 (100 Area RIFS);	I-129 Low Level (100 Area RIFS);	Nickel-63 (100 Area RIFS);	Strontium-89,90 - Total Sr (100 Area RIFS);	Technetium-99 (100 Area RIFS);	Tritium - H3 (100 Area RIFS);	Total Uranium;
SAMPLE NO.	MATRIX*	SAMPLE DATE	SAMPLE TIME									
B27FT7	WATER	2-1-11	1035	X	X	X	X	X	X	X	X	

CHAIN OF POSSESSION		SIGN/ PRINT NAMES		SPECIAL INSTRUCTIONS	
RELINQUISHED BY/REMOVED FROM Southernland	DATE/TIME 2-1-11 1200	RECEIVED BY/STORED IN SSU-RA	DATE/TIME FEB 01 2011 1200	(1) Gamma Spec (100 Area RIFS); Gamma Spec - Add-on (100 Area RIFS) {Americium-241, Barium-133, Radium-226, Radium-228, Silver-108 metastable}; (2) Gross Alpha (100 Area RIFS); Gross Beta (100 Area RIFS);	
RELINQUISHED BY/REMOVED FROM SSU-RA	DATE/TIME 2-2-11 1230	RECEIVED BY/STORED IN T.A. Wallace	DATE/TIME 2-2-11 1230		
RELINQUISHED BY/REMOVED FROM T.A. Wallace	DATE/TIME 2-2-11 1400	RECEIVED BY/STORED IN CHRPC	DATE/TIME		
RELINQUISHED BY/REMOVED FROM CHRPC	DATE/TIME	RECEIVED BY/STORED IN FEDEX	DATE/TIME		
RELINQUISHED BY/REMOVED FROM FEDEX	DATE/TIME	RECEIVED BY/STORED IN RE-NATAWAMAN	DATE/TIME 02/03/11 1500		
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	



# RICHMOND, CA LABORATORY

## SAMPLE RECEIPT CHECKLIST

Client: CHPRC City RICHMOND State WA  
 Date/Time received 02/03/11 1500 CoC No. PC-186-024,027  
 Container I.D. No. SW-026 Requested TAT (Days) 45 P.O. Received Yes [ ] No [ ]

### INSPECTION

1. Custody seals on shipping container intact? Yes  No [ ] N/A [ ]
2. Custody seals on shipping container dated & signed? Yes  No [ ] N/A [ ]
3. Custody seals on sample containers intact? Yes  No [ ] N/A [ ]
4. Custody seals on sample containers dated & signed? Yes  No [ ] N/A [ ]
5. Packing material is: Wet [ ] Dry
6. Number of samples in shipping container: 2 Sample Matrix W
7. Number of containers per sample: 15 (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 22/6 Preservative HNO3, HCL
13. Describe any anomalies:  
 \_\_\_\_\_  
 \_\_\_\_\_

14. Was P.M. notified of any anomalies? Yes [ ] No [ ] Date \_\_\_\_\_  
 15. Inspected by [Signature] Date: 02/04/11 Time: 1045

Customer Sample No.	Beta/Gamma cpm	Ion Chamber mR/hr	Wipe	Customer Sample No.	Beta/Gamma cpm	Ion Chamber mR/hr	wipe
<u>Acc Sample 1</u>	<u>460</u>						

Ion Chamber Ser. No. \_\_\_\_\_ Calibration date \_\_\_\_\_  
 Alpha Meter Ser. No. \_\_\_\_\_ Calibration date \_\_\_\_\_  
 Beta/Gamma Meter Ser. No. 102452 Calibration date 24 SEP 10