



EBERLINE SERVICES

EBERLINE ANALYTICAL CORPORATION
2030 Wright Avenue
Richmond, California 94804-3849
Phone (510) 235-2633 Fax (510) 235-0438
Toll Free (800) 841-5487
www.eberlineservices.com

May 7, 2008

Mr. Steve Trent
Fluor Hanford Inc.
1200 Jadwin Avenue
Richland, WA 99352



Reference: **P.O. #33677**
Eberline Services R8-04-014-7071, SDG H3675

Dear Mr. Trent:

Enclosed is the data report for one water sample designated under SAF No. F08-073 received at Eberline Services on April 3, 2008. The sample was analyzed according to the accompanying chain-of-custody document.

Please call if you have any questions concerning this report.

Sincerely,

Melissa C. Mannion
Senior Program Manager

MCM/njv

Enclosure: Data Package

00000001

1.0 GENERAL

Fluor Hanford Inc. (FH) Sample Delivery Group H3675 was composed of one water sample designated under SAF No. F08-073 with a Project Designation of: 200-TW-1 Characterization for Well 299-E33-342 – QC Sampling.

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

2.0 ANALYSIS NOTES

2.1 Carbon-14 Analysis

No problems were encountered during the course of the analyses.

2.2 Nickel-63 Analysis

No problems were encountered during the course of the analyses.

2.3 Iodine-129 Analysis

No problems were encountered during the course of the analyses.

2.4 Radium-226 Analysis

No problems were encountered during the course of the analyses.

2.5 Radium-228 Analysis

No problems were encountered during the course of the analyses.

2.6 Isotopic Thorium Analysis

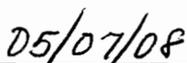
No problems were encountered during the course of the analyses.

3.0 Case Narrative Certification Statement

“I certify that this data package is in compliance with the SOW, both technically and for completeness, for other than the conditions detailed above. Release of the data obtained in this hard copy data package has been authorized by the Laboratory Manager or a designee, as verified by the following signature.”



Melissa C. Mannion
Senior Program Manager



Date

EBERLINE SERVICES / RICHMOND
SAMPLE DELIVERY GROUP H3675

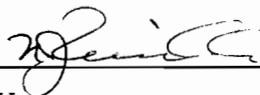
SDG 7071
Contact Melissa C. Mannion

Client Hanford
Contract No. 33677
Case no SDG_H3675

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

T A B L E O F C O N T E N T S

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Prepared by _____

Reviewed by _____

Lab id EBRLNE
Protocol Fluor
Version Ver 1.0
Form DVD-TOC
Version 3.06
Report date 05/07/08

EBERLINE SERVICES / RICHMOND

SAMPLE DELIVERY GROUP H3675

SDG 7071
Contact Melissa C. Mannion

REPORT GUIDE

Client Hanford
Contract No. 33677
Case no SDG_H3675

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
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SAMPLE DELIVERY GROUP H3675

SDG 7071
Contact Melissa C. Mannion

GUIDE, cont.

Client Hanford
Contract No. 33677
Case no SDG H3675

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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EBERLINE SERVICES/RICHMOND

SAMPLE DELIVERY GROUP H3675

LAB SAMPLE SUMMARY

SDG 7071
 Contact Melissa C. Mannion

Client Hanford
 Contract No. 33677
 Case no SDG H3675

LAB							CHAIN OF	
SAMPLE ID	CLIENT SAMPLE ID	LOCATION	MATRIX	LEVEL	SAF NO	CUSTODY	COLLECTED	
R804014-01	B1TNR1	C5857, EB-084	WATER		F08-073	F08-073-003	03/27/08 07:00	
R804014-02	Lab Control Sample		WATER		F08-073			
R804014-03	Method Blank		WATER		F08-073			
R804014-04	Duplicate (R804014-01)	C5857, EB-084	WATER		F08-073		03/27/08 07:00	
R804014-05	Spike (R804014-01)	C5857, EB-084	WATER		F08-073		03/27/08 07:00	

LAB SUMMARY

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 Protocol Fluor
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EBERLINE SERVICES/RICHMOND

SAMPLE DELIVERY GROUP H3675

SDG 7071
 Contact Melissa C. Mannion

QC SUMMARY

Client Hanford
 Contract No. 33677
 Case no SDG H3675

QC BATCH	CHAIN OF CUSTODY	CLIENT SAMPLE ID	MATRIX	% SOLIDS	SAMPLE AMOUNT	BASIS AMOUNT	DAYS SINCE RECEIVED	LAB COLL	DEPARTMENT SAMPLE ID
7071	F08-073-003	B1TNR1	WATER		8.90 L		04/03/08 7	R804014-01	7071-001
		Method Blank	WATER					R804014-03	7071-003
		Lab Control Sample	WATER					R804014-02	7071-002
		Duplicate (R804014-01)	WATER		8.90 L		04/03/08 7	R804014-04	7071-004
		Spike (R804014-01)	WATER		8.90 L		04/03/08 7	R804014-05	7071-005

Lab id EBRLNE
 Protocol Fluor
 Version Ver 1.0
 Form DVD-QS
 Version 3.06
 Report date 05/07/08

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EBERLINE SERVICES/RICHMOND

SAMPLE DELIVERY GROUP H3675

SDG 7071
 Contact Melissa C. Mannion

PREP BATCH SUMMARY

Client Hanford
 Contract No. 33677
 Case no SDG H3675

TEST	MATRIX	METHOD	PREPARATION ERROR		PLANCHETS ANALYZED				QUALI-	
			BATCH	2σ %	CLIENT	MORE	RE	BLANK		LCS
Alpha Spectroscopy										
TH	WATER	Thorium, Isotopic in Water	6145-190	8.0	1			1	1	1/1
Beta Counting										
AC	WATER	Radium 228 in Water	6145-190	10.4	1			1	1	1/1
Gamma Spectroscopy										
I	WATER	Iodine 129 in Water	6145-190	19.4	1			1	1	1/1
Liquid Scintillation Counting										
C	WATER	Carbon 14 in Water	6145-190	10.0	1			1	1	1/1 1/1 X
NI_L	WATER	Nickel-63 in Liquid	6145-190	11.2	1			1	1	1/1
Radon Counting										
RA	WATER	Radium 226 in Water	6145-190	16.4	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.

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EBERLINE SERVICES/RICHMOND

SAMPLE DELIVERY GROUP H3675

SDG 7071
 Contact Melissa C. Mannion

LAB WORK SUMMARY

Client Hanford
 Contract No. 33677
 Case no SDG H3675

LAB SAMPLE	CLIENT SAMPLE ID									
COLLECTED	LOCATION	MATRIX	SUF-							
RECEIVED	CUSTODY	SAF No	PLANCHET	TEST	FIX	ANALYZED	REVIEWED	BY	METHOD	
R804014-01	B1TNR1		7071-001	AC		04/28/08	04/29/08	BW	Radium 228 in Water	
03/27/08	C5857, EB-084	WATER	7071-001	C		04/25/08	04/29/08	BW	Carbon 14 in Water	
04/03/08	F08-073-003	F08-073	7071-001	I		05/01/08	05/05/08	BW	Iodine 129 in Water	
			7071-001	NI_L		04/24/08	04/28/08	BW	Nickel-63 in Liquid	
			7071-001	RA		04/22/08	04/22/08	BW	Radium 226 in Water	
			7071-001	TH		05/02/08	05/02/08	BW	Thorium, Isotopic in Water	
R804014-02	Lab Control Sample		7071-002	AC		04/28/08	04/29/08	BW	Radium 228 in Water	
		WATER	7071-002	C		04/25/08	04/29/08	BW	Carbon 14 in Water	
		F08-073	7071-002	I		05/01/08	05/05/08	BW	Iodine 129 in Water	
			7071-002	NI_L		04/24/08	04/28/08	BW	Nickel-63 in Liquid	
			7071-002	RA		04/22/08	04/22/08	BW	Radium 226 in Water	
			7071-002	TH		05/02/08	05/02/08	BW	Thorium, Isotopic in Water	
R804014-03	Method Blank		7071-003	AC		04/28/08	04/29/08	BW	Radium 228 in Water	
		WATER	7071-003	C		04/25/08	04/29/08	BW	Carbon 14 in Water	
		F08-073	7071-003	I		05/02/08	05/05/08	BW	Iodine 129 in Water	
			7071-003	NI_L		04/24/08	04/28/08	BW	Nickel-63 in Liquid	
			7071-003	RA		04/22/08	04/22/08	BW	Radium 226 in Water	
			7071-003	TH		05/02/08	05/02/08	BW	Thorium, Isotopic in Water	
R804014-04	Duplicate (R804014-01)		7071-004	AC		04/28/08	04/29/08	BW	Radium 228 in Water	
03/27/08	C5857, EB-084	WATER	7071-004	C		04/25/08	04/29/08	BW	Carbon 14 in Water	
04/03/08		F08-073	7071-004	I		05/02/08	05/05/08	BW	Iodine 129 in Water	
			7071-004	NI_L		04/24/08	04/28/08	BW	Nickel-63 in Liquid	
			7071-004	RA		04/22/08	04/22/08	BW	Radium 226 in Water	
			7071-004	TH		05/02/08	05/02/08	BW	Thorium, Isotopic in Water	
R804014-05	Spike (R804014-01)		7071-005	C		04/25/08	04/29/08	BW	Carbon 14 in Water	
03/27/08	C5857, EB-084	WATER								
04/03/08		F08-073								

WORK SUMMARY

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SAMPLE DELIVERY GROUP H3675

SDG 7071
 Contact Melissa C. Mannion

WORK SUMMARY, cont.

Client Hanford
 Contract No. 33677
 Case no SDG H3675

COUNTS OF TESTS BY SAMPLE TYPE

TEST	SAF No	METHOD	REFERENCE	CLIENT	MORE	RE	BLANK	LCS	DUP SPIKE	TOTAL	
AC	F08-073	Radium 228 in Water	RAISO_SEP_GPC	1			1	1	1	4	
C	F08-073	Carbon 14 in Water	C14_CHEM_LSC	1			1	1	1	5	
I	F08-073	Iodine 129 in Water	I129_SEP_LEPS_GS	1			1	1	1	4	
NI_L	F08-073	Nickel-63 in Liquid	NI63_LSC	1			1	1	1	4	
RA	F08-073	Radium 226 in Water	903.1_RA226_LUC	1			1	1	1	4	
TH	F08-073	Thorium, Isotopic in Water	THISO_IE_PLATE_AEA	1			1	1	1	4	
TOTALS				6			6	6	6	1	25

WORK SUMMARY

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EBERLINE SERVICES / RICHMOND
SAMPLE DELIVERY GROUP H3675

7071-003

Method Blank

METHOD BLANK

SDG <u>7071</u>	Client/Case no <u>Hanford</u>	SDG <u>H3675</u>
Contact <u>Melissa C. Mannion</u>	Contract No. <u>33677</u>	
Lab sample id <u>R804014-03</u>	Client sample id <u>Method Blank</u>	
Dept sample id <u>7071-003</u>	Material/Matrix <u>WATER</u>	
	SAF No <u>F08-073</u>	

ANALYTE	CAS NO	RESULT pCi/L	2σ ERR (COUNT)	MDA pCi/L	RDL pCi/L	QUALIFIERS	TEST
Carbon 14	14762-75-5	-0.461	34	57.9	200	U	C
Nickel 63	13981-37-8	-0.861	1.7	3.00	15.0	U	NI_L
Thorium 228	14274-82-9	0.017	0.10	0.213		U	TH
Thorium 230	14269-63-7	0.034	0.10	0.132	1.00	U	TH
Thorium 232	TH-232	-0.017	0.034	0.132	1.00	U	TH
Iodine 129	15046-84-1	-0.362	0.86	1.95	5.00	U	I
Radium 226	13982-63-3	0.292	0.39	0.659	1.00	U	RA
Radium 228	15262-20-1	-0.402	0.51	1.45	3.00	U	AC

200TW1 CharatrznWell 299E33342QCsamp

QC-BLANK #65311

Lab id <u>EBRLNE</u>
Protocol <u>Fluor</u>
Version <u>Ver 1.0</u>
Form <u>DVD-DS</u>
Version <u>3.06</u>
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EBERLINE SERVICES/RICHMOND

SAMPLE DELIVERY GROUP H3675

7071-004

B1TNR1

DUPLICATE

SDG <u>7071</u> Contact <u>Melissa C. Mannion</u> DUPLICATE Lab sample id <u>R804014-04</u> Dept sample id <u>7071-004</u>	ORIGINAL Lab sample id <u>R804014-01</u> Dept sample id <u>7071-001</u> Received <u>04/03/08</u>	Client/Case no <u>Hanford</u> SDG <u>H3675</u> Contract <u>No. 33677</u> Client sample id <u>B1TNR1</u> Location/Matrix <u>C5857, EB-084</u> <u>WATER</u> Collected/Volume <u>03/27/08 07:00</u> <u>8.90 L</u> Custody/SAF No <u>F08-073-003</u> <u>F08-073</u>
--	---	--

ANALYTE	DUPLICATE		MDA		RDL		QUALI-		ORIGINAL		MDA		QUALI- RPD		3σ DER	
	pCi/L	2σ ERR (COUNT)	pCi/L	pCi/L	pCi/L	FIERS	TEST	pCi/L	2σ ERR (COUNT)	pCi/L	FIERS	%	TOT	σ		
Carbon 14	7.33	34	57.6	200	U	C	0.918	34	57.7	U	-	-	0.3			
Nickel 63	-0.300	1.7	2.90	15.0	U	NI_L	-1.02	1.7	2.96	U	-	-	0.6			
Thorium 228	-0.062	0.092	0.206		U	TH	-0.018	0.11	0.248	U	-	-	0.6			
Thorium 230	0.183	0.12	0.117	1.00		TH	0.037	0.11	0.140	U	133	223	1.8			
Thorium 232	-0.015	0.031	0.117	1.00	U	TH	-0.018	0.037	0.140	U	-	-	0.1			
Iodine 129	0.794	0.92	2.07	5.00	U	I	-1.20	1.0	2.34	U	-	-	2.9			
Radium 226	-0.120	0.34	0.726	1.00	U	RA	0.193	0.47	0.840	U	-	-	1.1			
Radium 228	-0.365	0.50	1.44	3.00	U	AC	-0.088	0.54	1.49	U	-	-	0.8			

200TW1 CharatrznWell 299E33342QCsamp

QC-DUP#1 65312

Lab id <u>EBRLNE</u>
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EBERLINE SERVICES/RICHMOND

SAMPLE DELIVERY GROUP H3675

7071-005

B1TNR1

MATRIX SPIKE

SDG <u>7071</u>		Client/Case no <u>Hanford</u> SDG <u>H3675</u>
Contact <u>Melissa C. Mannion</u>		Contract No. <u>33677</u>
MATRIX SPIKE	ORIGINAL	
Lab sample id <u>R804014-05</u>	Lab sample id <u>R804014-01</u>	Client sample id <u>B1TNR1</u>
Dept sample id <u>7071-005</u>	Dept sample id <u>7071-001</u>	Location/Matrix <u>C5857, EB-084</u> <u>WATER</u>
	Received <u>04/03/08</u>	Collected/Volume <u>03/27/08 07:00</u> <u>8.90 L</u>
		Custody/SAF No <u>F08-073-003</u> <u>F08-073</u>

ANALYTE	SPIKE pCi/L	2σ ERR (COUNT)	MDA pCi/L	RDL pCi/L	QUALI- FIERS TEST	ADDED pCi/L	2σ ERR pCi/L	ORIGINAL pCi/L	2σ ERR (COUNT)	REC % (TOTAL)	3σ LMTS	PROTOCOL LIMITS
Carbon 14	28500	950	<u>305</u>	200	X C	28700	1100	0.918	34	99	83-117	60-140

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QC-MS#1 65313

MATRIX SPIKES

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EBERLINE SERVICES / RICHMOND
SAMPLE DELIVERY GROUP H3675

7071-001

B1TNR1

DATA SHEET

SDG <u>7071</u>	Client/Case no <u>Hanford</u>	SDG <u>H3675</u>
Contact <u>Melissa C. Mannion</u>	Contract <u>No. 33677</u>	
Lab sample id <u>R804014-01</u>	Client sample id <u>B1TNR1</u>	
Dept sample id <u>7071-001</u>	Location/Matrix <u>C5857, EB-084</u>	<u>WATER</u>
Received <u>04/03/08</u>	Collected/Volume <u>03/27/08 07:00</u>	<u>8.90 L</u>
	Custody/SAF No <u>F08-073-003</u>	<u>F08-073</u>

ANALYTE	CAS NO	RESULT pCi/L	2σ ERR (COUNT)	MDA pCi/L	RDL pCi/L	QUALI- FIERS	TEST
Carbon 14	14762-75-5	0.918	34	57.7	200	U	C
Nickel 63	13981-37-8	-1.02	1.7	2.96	15.0	U	NI_L
Thorium 228	14274-82-9	-0.018	0.11	0.248		U	TH
Thorium 230	14269-63-7	0.037	0.11	0.140	1.00	U	TH
Thorium 232	TH-232	-0.018	0.037	0.140	1.00	U	TH
Iodine 129	15046-84-1	-1.20	1.0	2.34	5.00	U	I
Radium 226	13982-63-3	0.193	0.47	0.840	1.00	U	RA
Radium 228	15262-20-1	-0.088	0.54	1.49	3.00	U	AC

200TW1 CharatrznWell 299E33342QCsamp

DATA SHEETS

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EBERLINE SERVICES/RICHMOND

SAMPLE DELIVERY GROUP H3675

LAB METHOD SUMMARY

THORIUM, ISOTOPIC IN WATER
ALPHA SPECTROSCOPY

Test TH Matrix WATER
SDG 7071
Contact Melissa C. Mannion

Client Hanford
Contract No. 33677
Contract SDG H3675

RESULTS

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

Preparation batch 6145-190

R804014-01	7071-001	B1TNR1	U
R804014-02	7071-002	Lab Control Sample	ok
R804014-03	7071-003	Method Blank	U
R804014-04	7071-004	Duplicate (R804014-01)	ok

Nominal values and limits from method RDLs (pCi/L) 1.00
200TW1 CharatrzrnWell 299E33342QCsamp

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/L L FAC TION % % min keV KeV HELD PREPARED YZED DETECTOR

Preparation batch 6145-190 2σ prep error 8.0 % Reference Lab Notebook #6145, pg. 190

R804014-01	B1TNR1	0.140	0.500	80	158	36	05/01/08	05/02	SS-036
R804014-02	Lab Control Sample	0.145	0.500	77	158		05/01/08	05/02	SS-037
R804014-03	Method Blank	0.132	0.500	91	158		05/01/08	05/02	SS-038
R804014-04	Duplicate (R804014-01)	0.117	0.500	91	163	36	05/01/08	05/02	SS-055

Nominal values and limits from method 1.00 0.500 20-110 150 100 180

PROCEDURES REFERENCE THISO_IE_PLATE_AEA
SPP-062 Sample Aliquoting, rev 0
SPP-040 Environmetnal Water Dissolution, rev 0
CP-900 Thorium in Water and Dissolved Solid Samples by
Extraction Chromatography, rev 1
CP-008 Heavy Element Electroplating, rev 9

AVERAGES ± 2 SD MDA 0.134 ± 0.024
FOR 4 SAMPLES YIELD 85 ± 15

METHOD SUMMARIES

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EBERLINE SERVICES/RICHMOND

SAMPLE DELIVERY GROUP H3675

LAB METHOD SUMMARY

RADIUM 228 IN WATER

BETA COUNTING

Test AC Matrix WATER
 SDG 7071
 Contact Melissa C. Mannion

Client Hanford
 Contract No. 33677
 Contract SDG H3675

RESULTS

LAB RAW SUF-
 SAMPLE ID TEST FIX PLANCHET CLIENT SAMPLE ID Radium 228

Preparation batch 6145-190

R804014-01	7071-001	B1TNR1	U
R804014-02	7071-002	Lab Control Sample	ok
R804014-03	7071-003	Method Blank	U
R804014-04	7071-004	Duplicate (R804014-01)	- U

Nominal values and limits from method RDLs (pCi/L) 3.00
 200TW1 CharatrzrnWell 299E33342QCsamp

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 6145-190 2σ prep error 10.4 % Reference Lab Notebook #6145, pg. 190

R804014-01	B1TNR1	1.49	0.500	70	150	32	04/28/08	04/28	GRB-221
R804014-02	Lab Control Sample	1.42	0.500	70	150		04/28/08	04/28	GRB-222
R804014-03	Method Blank	1.45	0.500	70	150		04/28/08	04/28	GRB-223
R804014-04	Duplicate (R804014-01)	1.44	0.500	70	150	32	04/28/08	04/28	GRB-224

Nominal values and limits from method 3.00 0.500 100 180

PROCEDURES REFERENCE RAISO_SEP_GPC
 SPP-062 Sample Aliquoting, rev 0
 DWP-894 Sequential Separation of Actinium-228 and Radium-226 in Drinking Water (>1 Liter Aliquot), rev 0

AVERAGES ± 2 SD MDA 1.45 ± 0.059
 FOR 4 SAMPLES YIELD 70 ± 0

METHOD SUMMARIES

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SUMMARY DATA SECTION

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 Protocol Fluor
 Version Ver 1.0
 Form DVD-LMS
 Version 3.06
 Report date 05/07/08

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EBERLINE SERVICES/RICHMOND

SAMPLE DELIVERY GROUP H3675

LAB METHOD SUMMARY

IODINE 129 IN WATER
GAMMA SPECTROSCOPY

Test I Matrix WATER
SDG 7071
Contact Melissa C. Mannion

Client Hanford
Contract No. 33677
Contract SDG H3675

RESULTS

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

Preparation batch 6145-190

R804014-01	7071-001	B1TNR1	U
R804014-02	7071-002	Lab Control Sample	ok
R804014-03	7071-003	Method Blank	U
R804014-04	7071-004	Duplicate (R804014-01)	- U

Nominal values and limits from method RDLs (pCi/L) 5.00
200TW1 CharatrznWell 299E33342QCsamp

METHOD PERFORMANCE

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

Preparation batch 6145-190 2σ prep error 19.4 % Reference Lab Notebook #6145, pg. 190

R804014-01	B1TNR1	2.34	0.500	76	809	35	05/01/08	05/01	XSPEC-004
R804014-02	Lab Control Sample	4.10	0.500	84	809		05/01/08	05/01	XSPEC-002
R804014-03	Method Blank	1.95	0.500	86	604		05/01/08	05/02	XSPEC-004
R804014-04	Duplicate (R804014-01)	2.07	0.500	78	603	36	05/01/08	05/02	XSPEC-002

Nominal values and limits from method 5.00 0.500 20-105 300 100 180

PROCEDURES REFERENCE I129_SEP_LEPS_GS
SPP-062 Sample Aliquoting, rev 0
CP-530 Iodine-129 Purification, rev 1

AVERAGES ± 2 SD MDA 2.62 ± 2.01
FOR 4 SAMPLES YIELD 81 ± 10

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SAMPLE DELIVERY GROUP H3675

LAB METHOD SUMMARY

CARBON 14 IN WATER

LIQUID SCINTILLATION COUNTING

Test C Matrix WATER
 SDG 7071
 Contact Melissa C. Mannion

Client Hanford
 Contract No. 33677
 Contract SDG_H3675

RESULTS

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

Preparation batch 6145-190

R804014-01	7071-001	B1TNR1	U
R804014-02	7071-002	Lab Control Sample	ok
R804014-03	7071-003	Method Blank	U
R804014-04	7071-004	Duplicate (R804014-01)	- U
R804014-05	7071-005	Spike (R804014-01)	ok X

Nominal values and limits from method RDLs (pCi/L) 200
 200TW1 CharatrznWell 299E33342QCsamp

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 6145-190 2σ prep error 10.0 % Reference Lab Notebook #6145, pg. 190

R804014-01	B1TNR1	57.7	0.0300	100	50	29	04/25/08	04/25	LSC-004
R804014-02	Lab Control Sample	137	0.0300	100	<u>9</u>		04/25/08	04/25	LSC-004
R804014-03	Method Blank	57.9	0.0300	100	50		04/25/08	04/25	LSC-004
R804014-04	Duplicate (R804014-01)	57.6	0.0300	100	50	29	04/25/08	04/25	LSC-004
R804014-05	Spike (R804014-01)	<u>305</u>	<u>0.0200</u>	100	<u>4</u>	29	04/25/08	04/25	LSC-004

Nominal values and limits from method 200 0.0300 50 180

PROCEDURES REFERENCE C14_CHEM_LSC
 CP-241 Carbon-14 in Aqueous Samples, rev 6

AVERAGES ± 2 SD MDA 123 ± 215
 FOR 5 SAMPLES YIELD 100 ± 0

METHOD SUMMARIES

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SAMPLE DELIVERY GROUP H3675

SDG 7071
Contact Melissa C. Mannion

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Client Hanford
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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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SAMPLE DELIVERY GROUP H3675

SDG 7071
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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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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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SDG 7071
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METHOD SUMMARY

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

The following notes apply to this report:

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

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

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

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

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

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

- * Non-U results for Method Blanks are underlined to indicate possible contamination of other samples in the preparation batch. The Method Blank Report has supporting data.

- * Lab Control Sample and Matrix Spike results are shown as: ok, No data, LOW or HIGH, with the last two underlined. 'No data'

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

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

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

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

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

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

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

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

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

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

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

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

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RICHMOND, CA LABORATORY

SAMPLE RECEIPT CHECKLIST

JK 4/3/08

Client: F. HANFORD City RICHLAND State WA

Date/Time received 04/03/08 09:15 CoC No. F08-073-003

Container ID No. GRP-03-025 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: 1 Sample Matrix W
7. Number of containers per sample: 10 (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 1/7 Preservative #203
13. Describe any anomalies:

14. Was P.M. notified of any anomalies? Yes [] No [] Date _____

15. Inspected by MFW Date: 04/03/08 Time: 10:30

Customer Sample No.	Beta/Gamma cpm	Ion Chamber mR/hr	Wipe	Customer Sample No.	Beta/Gamma cpm	Ion Chamber mR/hr	wipe
<u>B1 TNRI</u>	<u><60</u>						

Ion Chamber Ser. No. _____ Calibration date _____
 Alpha Meter Ser. No. _____ Calibration date _____
 Beta/Gamma Meter Ser. No. 150482 Calibration date 09 MAY 07