



EBERLINE
SERVICES

0076794

October 12, 2007

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

Reference: **P.O. #630**
Eberline Services R7-08-096-7674, SDG H3558

Dear Mr. Trent:

Enclosed is the data report for one solid (soil) sample designated under SAF No. F07-043 received at Eberline Services on August 16, 2007. 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

Enclosure: Data Package



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Analytical Services
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1.0 GENERAL

Fluor Hanford Inc. (FH) Sample Delivery Group H3558 was composed of one solid (soil) sample designated under SAF No. F07-043 with a Project Designation of: 216-A-2 and 216-A-21 Characterization Sampling and Analysis - Soil.

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 Tritium Analysis

No problems were encountered during the course of the analyses.

2.2 Carbon-14 Analysis

No problems were encountered during the course of the analyses.

2.3 Nickel-63 Analysis

No problems were encountered during the course of the analyses.

2.4 Technetium-99 Analysis

No problems were encountered during the course of the analyses.

2.5 Iodine-129 Analysis

The I-129 LCS recovery was 76%, below the lower protocol limit of 80%. No other 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

10/12/17

Date

EBERLINE SERVICES / RICHMOND
SAMPLE DELIVERY GROUP H3558

SDG 7674
Contact Melissa C. Mannion

Client Hanford
Contract No. 630
Case no SDG_H3558

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

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Melissa Mannion
Prepared by

Melissa Mannion
Reviewed by

Lab id EBRLNE
Protocol Hanford
Version Ver 1.0
Form DVD-TOC
Version 3.06
Report date 10/12/07

00000002

EBERLINE SERVICES / RICHMOND

SAMPLE DELIVERY GROUP H3558

SDG 7674
Contact Melissa C. Mannion

REPORT GUIDE

Client Hanford
Contract No. 630
Case no SDG H3558

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 Hanford
Version Ver 1.0
Form DVD-RG
Version 3.06
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EBERLINE SERVICES / RICHMOND

SAMPLE DELIVERY GROUP H3558

SDG 7674
Contact Melissa C. Mannion

GUIDE, cont.

Client Hanford
Contract No. 630
Case no SDG H3558

ABOUT THE DATA SUMMARY SECTION

DUPLICATES

The Duplicate Reports, one for each Duplicate and Original sample pair relevant to the SDG, show all results, differences and primary supporting information for these QC samples.

MATRIX SPIKES

The Matrix Spike Reports, one for each Spiked and Original sample pair relevant to the SDG, show all results, recoveries and primary supporting information for these QC samples.

DATA SHEETS

The Data Sheet Reports, one for each client sample in the SDG, show all results and primary supporting information for these samples.

METHOD SUMMARIES

The Method Summary Reports, one for each test used in the SDG, show all results, QC and method performance data for one analyte on one or two pages. (A test is a short code for the method used to do certain work to the client's specification.)

REPORT GUIDES

The Report Guides, one for each of the above groups of reports, have documentation on how to read the associated reports.

REPORT GUIDES

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SUMMARY DATA SECTION

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Lab id EBRINE
Protocol Hanford
Version Ver 1.0
Form DVD-RG
Version 3.06
Report date 10/12/07

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EBERLINE SERVICES/RICHMOND

SAMPLE DELIVERY GROUP H3558

SDG 7674
 Contact Melissa C. Mannion

LAB SAMPLE SUMMARY

Client Hanford
 Contract No. 630
 Case no SDG H3558

LAB						CHAIN OF	
SAMPLE ID	CLIENT SAMPLE ID	LOCATION	MATRIX	LEVEL	SAF NO	CUSTODY	COLLECTED
R708096-01	B1NRH8	C5515, I-055	SOLID		F07-043	F07-043-049	08/07/07 09:08
R708096-02	Lab Control Sample		SOLID		F07-043		
R708096-03	Method Blank		SOLID		F07-043		
R708096-04	Duplicate (R708096-01)	C5515, I-055	SOLID		F07-043		08/07/07 09:08
R708096-05	Lab Control Sample		SOLID		F07-043		
R708096-06	Method Blank		SOLID		F07-043		
R708096-07	Duplicate (R708096-01)	C5515, I-055	SOLID		F07-043		08/07/07 09:08

Lab id EBERLINE
 Protocol Hanford
 Version Ver 1.0
 Form DVD-LS
 Version 3.06
 Report date 10/12/07

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EBERLINE SERVICES/RICHMOND

SAMPLE DELIVERY GROUP H3558

SDG 7674
 Contact Melissa C. Mannion

QC SUMMARY

Client Hanford
 Contract No. 630
 Case no SDG H3558

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
7674	F07-043-049	B1NRH8	SOLID	97.2	79.3 g		08/16/07	9	R708096-01	7674-001
		Method Blank	SOLID						R708096-03	7674-003
		Method Blank	SOLID						R708096-06	7674-006
		Lab Control Sample	SOLID						R708096-02	7674-002
		Lab Control Sample	SOLID						R708096-05	7674-005
		Duplicate (R708096-01)	SOLID	97.2	79.3 g		08/16/07	9	R708096-04	7674-004
		Duplicate (R708096-01)	SOLID	97.2	79.3 g		08/16/07	9	R708096-07	7674-007

QC SUMMARY

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SUMMARY DATA SECTION

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Lab id EBRLNE
 Protocol Hanford
 Version Ver 1.0
 Form DVD-QS
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EBERLINE SERVICES/RICHMOND

SAMPLE DELIVERY GROUP H3558

SDG 7674
 Contact Melissa C. Mannion

PREP BATCH SUMMARY

Client Hanford
 Contract No. 630
 Case no SDG H3558

TEST	MATRIX	METHOD	PREPARATION ERROR			PLANCHETS ANALYZED				QUALI-PIERS
			BATCH	2σ %	CLIENT MORE	RE	BLANK	LCS	DUP/ORIG MS/ORIG	
Beta Counting										
TC	SOLID	Technetium 99 in Solids	6121-068	10.0	1		1	1	1/1	
Gamma Spectroscopy										
I	SOLID	Iodine 129 in Solids	6121-068	10.0	1		1	1	1/1	
Liquid Scintillation Counting										
C	SOLID	Carbon 14 in Solids	6121-068	10.0	1		1	1	1/1	
H	SOLID	Tritium in Solids	6121-068	10.0	1		1	1	1/1	
NI_L	SOLID	Nickel 63 in Solids	6121-068	10.0	1		1	1	1/1	

Duplicates and Matrix Spikes are those with original (Client) sample in this Sample Delivery Group.
 Blank and LCS planchets are those in the same preparation batch as some Client, Duplicate or Spike sample.

Lab id EBRLNE
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EBERLINE SERVICES/RICHMOND

SAMPLE DELIVERY GROUP H3558

SDG 7674
 Contact Melissa C. Mannion

LAB WORK SUMMARY

Client Hanford
 Contract No. 630
 Case no SDG H3558

LAB SAMPLE	CLIENT SAMPLE ID		MATRIX		SUF-						
COLLECTED	LOCATION			PLANCHET	TEST	FIX	ANALYZED	REVIEWED	BY	METHOD	
RECEIVED	CUSTODY	SAF No									
R708096-01	E1NRH8			7674-001	C	A1	10/06/07	10/09/07	BW	Carbon 14 in Solids	
08/07/07	C5515, I-055		SOLID	7674-001	H		09/25/07	09/27/07	BW	Tritium in Solids	
08/16/07	F07-043-049	F07-043		7674-001	I		09/21/07	09/24/07	BW	Iodine 129 in Solids	
				7674-001	NI_L		09/24/07	09/26/07	BW	Nickel 63 in Solids	
				7674-001	TC		09/12/07	09/13/07	BW	Technetium 99 in Solids	
R708096-02	Lab Control Sample			7674-002	H		09/25/07	09/27/07	BW	Tritium in Solids	
			SOLID	7674-002	I		09/21/07	09/24/07	BW	Iodine 129 in Solids	
		F07-043		7674-002	NI_L		09/24/07	09/26/07	BW	Nickel 63 in Solids	
				7674-002	TC		09/08/07	09/14/07	BW	Technetium 99 in Solids	
R708096-03	Method Blank			7674-003	H		09/25/07	09/27/07	BW	Tritium in Solids	
			SOLID	7674-003	I		09/24/07	09/24/07	BW	Iodine 129 in Solids	
		F07-043		7674-003	NI_L		09/24/07	09/26/07	BW	Nickel 63 in Solids	
				7674-003	TC		09/08/07	09/14/07	BW	Technetium 99 in Solids	
R708096-04	Duplicate (R708096-01)			7674-004	H		09/25/07	09/27/07	BW	Tritium in Solids	
08/07/07	C5515, I-055		SOLID	7674-004	I		09/24/07	09/24/07	BW	Iodine 129 in Solids	
08/16/07		F07-043		7674-004	NI_L		09/24/07	09/26/07	BW	Nickel 63 in Solids	
				7674-004	TC		09/08/07	09/14/07	BW	Technetium 99 in Solids	
R708096-05	Lab Control Sample			7674-005	C		10/06/07	10/09/07	BW	Carbon 14 in Solids	
			SOLID								
		F07-043									
R708096-06	Method Blank			7674-006	C		10/06/07	10/09/07	BW	Carbon 14 in Solids	
			SOLID								
		F07-043									
R708096-07	Duplicate (R708096-01)			7674-007	C		10/06/07	10/09/07	BW	Carbon 14 in Solids	
08/07/07	C5515, I-055		SOLID								
08/16/07		F07-043									

WORK SUMMARY

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SUMMARY DATA SECTION

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Lab id EBERLINE
 Protocol Hanford
 Version Ver 1.0
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EBERLINE SERVICES/RICHMOND

SAMPLE DELIVERY GROUP H3558

SDG 7674
 Contact Melissa C. Mannion

WORK SUMMARY, cont.

Client Hanford
 Contract No. 630
 Case no SDG H3558

COUNTS OF TESTS BY SAMPLE TYPE

TEST	SAF No	METHOD	REFERENCE	CLIENT	MORE	RE	BLANK	LCS	DUP	SPIKE	TOTAL
C	F07-043	Carbon 14 in Solids	C14_COX_LSC	1			1	1	1		4
H	F07-043	Tritium in Solids	TRITIUM_COX_LSC	1			1	1	1		4
I	F07-043	Iodine 129 in Solids	I129_SEP_LEPS_GS	1			1	1	1		4
NI_L	F07-043	Nickel 63 in Solids	NI63_LSC	1			1	1	1		4
TC	F07-043	Technetium 99 in Solids	TC99_TR_SEP_GPC	1			1	1	1		4
TOTALS				5			5	5	5		20

WORK SUMMARY

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EBERLINE SERVICES / RICHMOND

SAMPLE DELIVERY GROUP H3558

7674-003

Method Blank

METHOD BLANK

SDG <u>7674</u>	Client/Case no <u>Hanford</u>	<u>SDG H3558</u>
Contact <u>Melissa C. Mannion</u>	Contract No. <u>630</u>	
Lab sample id <u>R708096-03</u>	Client sample id <u>Method Blank</u>	
Dept sample id <u>7674-003</u>	Material/Matrix <u>SOLID</u>	
	SAF No <u>F07-043</u>	

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Tritium	10028-17-8	0	2.6	4.43	400	U	H
Nickel 63	13981-37-8	-1.03	1.8	3.06	30.0	U	NI_L
Technetium 99	14133-76-7	0.180	0.26	0.528	15.0	U	TC
Iodine 129	15046-84-1	-0.015	0.43	0.981	2.00	U	I

216-A-2 & 216-A-21 Characterization

QC-BLANK #62511

Lab id <u>EBRLNE</u>
Protocol <u>Hanford</u>
Version <u>Ver 1.0</u>
Form <u>DVD-DS</u>
Version <u>3.06</u>
Report date <u>10/12/07</u>

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EBERLINE SERVICES / RICHMOND

SAMPLE DELIVERY GROUP H3558

7674-006

Method Blank

METHOD BLANK

SDG <u>7674</u>	Client/Case no <u>Hanford</u>	<u>SDG H3558</u>
Contact <u>Melissa C. Mannion</u>	Contract No. <u>630</u>	
Lab sample id <u>R708096-06</u>	Client sample id <u>Method Blank</u>	
Dept sample id <u>7674-006</u>	Material/Matrix _____	<u>SOLID</u>
	SAF No <u>F07-043</u>	

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Carbon 14	14762-75-5	-0.526	2.2	3.80	50.0	U	C

216-A-2 & 216-A-21 Characterization

QC-BLANK #63055

Lab id <u>EBRLNE</u>
Protocol <u>Hanford</u>
Version <u>Ver 1.0</u>
Form <u>DVD-DS</u>
Version <u>3.06</u>
Report date <u>10/12/07</u>

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EBERLINE SERVICES/RICHMOND

SAMPLE DELIVERY GROUP H3558

7674-002

Lab Control Sample

LAB CONTROL SAMPLE

SDG <u>7674</u> Contact <u>Melissa C. Mannion</u>	Client/Case no <u>Hanford</u> SDG <u>H3558</u> Contract No. <u>630</u>
Lab sample id <u>R708096-02</u> Dept sample id <u>7674-002</u>	Client sample id <u>Lab Control Sample</u> Material/Matrix <u>SOLID</u> SAF No <u>F07-043</u>

ANALYTE	RESULT	2σ ERR	MDA	RDL	QUALI-	ADDED	2σ ERR	REC	3σ IMTS	PROTOCOL
	pCi/g	(COUNT)	pCi/g	pCi/g	FIBRS TEST	pCi/g	pCi/g	%	(TOTAL)	LIMITS
Tritium	599	12	4.30	400	H	638	26	94	84-116	80-120
Nickel 63	214	5.7	3.06	30.0	NI_L	222	8.9	96	84-116	80-120
Technetium 99	99.6	2.4	0.684	15.0	TC	109	4.4	91	85-115	80-120
Iodine 129	88.4	1.2	1.71	2.00	I	116	4.6	76	87-113	80-120

216-A-2 & 216-A-21 Characterization

QC-LCS #62510

Lab id EBRLNE
 Protocol Hanford
 Version Ver 1.0
 Form DVD-LCS
 Version 3.06
 Report date 10/12/07

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EBERLINE SERVICES/RICHMOND

SAMPLE DELIVERY GROUP H3558

7674-005

Lab Control Sample

LAB CONTROL SAMPLE

SDG <u>7674</u>	Client/Case no <u>Hanford</u>	SDG <u>H3558</u>
Contact <u>Melissa C. Mannion</u>	Contract No. <u>630</u>	
Lab sample id <u>R708096-05</u>	Client sample id <u>Lab Control Sample</u>	
Dept sample id <u>7674-005</u>	Material/Matrix _____	<u>SOLID</u>
	SAF No <u>F07-043</u>	

ANALYTE	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS TEST	ADDED pCi/g	2σ ERR pCi/g	REC %	3σ LMTS (TOTAL)	PROTOCOL LIMITS
Carbon 14	1560	32	7.67	50.0	C	1600	64	98	84-116	80-120

216-A-2 & 216-A-21 Characterization

QC-LCS #63054

Lab id <u>EBRLNE</u>
Protocol <u>Hanford</u>
Version <u>Ver 1.0</u>
Form <u>DVD-LCS</u>
Version <u>3.06</u>
Report date <u>10/12/07</u>

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EBERLINE SERVICES/RICHMOND

SAMPLE DELIVERY GROUP H3558

7674-004

B1NRH8

DUPLICATE

SDG <u>7674</u>	Client/Case no <u>Hanford</u>	SDG <u>H3558</u>
Contact <u>Melissa C. Mannion</u>	Contract No. <u>630</u>	
DUPLICATE	ORIGINAL	
Lab sample id <u>R708096-04</u>	Lab sample id <u>R708096-01</u>	Client sample id <u>B1NRH8</u>
Dept sample id <u>7674-004</u>	Dept sample id <u>7674-001</u>	Location/Matrix <u>C5515, I-055</u> <u>SOLID</u>
	Received <u>08/16/07</u>	Collected/Weight <u>08/07/07 09:08</u> <u>79.3 g</u>
% solids <u>97.2</u>	% solids <u>97.2</u>	Custody/SAF No <u>F07-043-049</u> <u>F07-043</u>

ANALYTE	DUPLICATE	2σ ERR	MDA	RDL	QUALI-	ORIGINAL	2σ ERR	MDA	QUALI-	RPD	3σ	DER
	pCi/g	(COUNT)	pCi/g	pCi/g	FIERS TEST		pCi/g	(COUNT)	pCi/g	FIERS	%	TOT
Tritium	8.92	2.7	3.96	400	H	14.4	2.9	3.94		47	55	2.5
Nickel 63	-1.72	2.4	4.26	30.0	U	NI_L	-0.568	3.3	5.64	U	-	0.6
Technetium 99	0.032	0.30	0.541	15.0	U	TC	0.033	0.18	0.516	U	-	0
Iodine 129	-0.076	0.78	1.77	2.00	U	I	0.362	0.45	1.00	U	-	1.0

216-A-2 & 216-A-21 Characterization

QC-DUP#1 62512

Lab id <u>EBERLINE</u>
Protocol <u>Hanford</u>
Version <u>Ver 1.0</u>
Form <u>DVD-DUP</u>
Version <u>3.06</u>
Report date <u>10/12/07</u>

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EBERLINE SERVICES/RICHMOND

SAMPLE DELIVERY GROUP H3558

7674-007

B1NRH8

DUPLICATE

SDG <u>7674</u>	Client/Case no <u>Hanford</u>	SDG <u>H3558</u>
Contact <u>Melissa C. Mannion</u>	Contract No. <u>630</u>	
DUPLICATE	ORIGINAL	
Lab sample id <u>R708096-07</u>	Lab sample id <u>R708096-01</u>	Client sample id <u>B1NRH8</u>
Dept sample id <u>7674-007</u>	Dept sample id <u>7674-001</u>	Location/Matrix <u>C5515, I-055</u> SOLID
	Received <u>08/16/07</u>	Collected/Weight <u>08/07/07 09:08</u> <u>79.3 g</u>
% solids <u>97.2</u>	% solids <u>97.2</u>	Custody/SAF No <u>F07-043-049</u> <u>F07-043</u>

ANALYTE	DUPLICATE pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST	ORIGINAL pCi/g	2σ ERR (COUNT)	MDA pCi/g	QUALI- FIERS	RPD %	3σ TOT	DER σ
Carbon 14	-0.125	2.0	3.39	50.0	U	C	-0.400	2.1	3.62	U	-		0.2

216-A-2 & 216-A-21 Characterization

Lab id <u>EBRLNE</u>
Protocol <u>Hanford</u>
Version <u>Ver 1.0</u>
Form <u>DVD-DOP</u>
Version <u>3.06</u>
Report date <u>10/12/07</u>

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EBERLINE SERVICES / RICHMOND

SAMPLE DELIVERY GROUP H3558

7674-001

B1NRH8

DATA SHEET

SDG <u>7674</u>	Client/Case no <u>Hanford</u>	SDG <u>H3558</u>
Contact <u>Melissa C. Mannion</u>	Contract No. <u>630</u>	
Lab sample id <u>R708096-01</u>	Client sample id <u>B1NRH8</u>	
Dept sample id <u>7674-001</u>	Location/Matrix <u>C5515, I-055</u>	<u>SOLID</u>
Received <u>08/16/07</u>	Collected/Weight <u>08/07/07 09:08</u>	<u>79.3 g</u>
% solids <u>97.2</u>	Custody/SAF No <u>F07-043-049</u>	<u>F07-043</u>

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Tritium	10028-17-8	14.4	2.9	3.94	400		H
Carbon 14	14762-75-5	-0.400	2.1	3.62	50.0	U	C
Nickel 63	13981-37-8	-0.568	3.3	5.64	30.0	U	NI_L
Technetium 99	14133-76-7	0.033	0.18	0.516	15.0	U	TC
Iodine 129	15046-84-1	0.362	0.45	1.00	2.00	U	I

216-A-2 & 216-A-21 Characterization

DATA SHEETS

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SUMMARY DATA SECTION

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Lab id <u>EBERLINE</u>
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Report date <u>10/12/07</u>

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EBERLINE SERVICES/RICHMOND

SAMPLE DELIVERY GROUP H3558

Test TC Matrix SOLID
 SDG 7674
 Contact Melissa C. Mannion

LAB METHOD SUMMARY

TECHNETIUM 99 IN SOLIDS

BETA COUNTING

Client Hanford
 Contract No. 630
 Contract SDG H3558

RESULTS

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

Preparation batch 6121-068

R708096-01	7674-001	E1NRH8	U
R708096-02	7674-002	LCS (QC ID=62510)	ok
R708096-03	7674-003	BLK (QC ID=62511)	U
R708096-04	7674-004	Duplicate (R708096-01)	- U

Nominal values and limits from method RDLs (pCi/g) 15.0
 216-A-2 & 216-A-21 Characterization

METHOD PERFORMANCE

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

Preparation batch 6121-068 2σ prep error 10.0 % Reference Lab Notebook #6121, pg. 68

R708096-01	E1NRH8	0.516	1.00	100	50	36	09/05/07	09/12	GRB-224
R708096-02	LCS (QC ID=62510)	0.684	1.00	104	50		09/05/07	09/08	GRB-226
R708096-03	BLK (QC ID=62511)	0.528	1.00	100	50		09/05/07	09/08	GRB-227
R708096-04	Duplicate (R708096-01) (QC ID=62512)	0.541	1.00	95	50	32	09/05/07	09/08	GRB-228

Nominal values and limits from method 15.0 1.00 20-105 50 180

PROCEDURES	REFERENCE	TC99_TR_SEP_GPC
	SPP-062	Sample Aliquoting, rev 0
	CP-431	Technetium-99 Purification of Soil or Resin by Extraction Chromatography, rev 2
	CP-008	Heavy Element Electroplating, rev 9

AVERAGES ± 2 SD	MDA	0.567 ± 0.157
FOR 4 SAMPLES	YIELD	100 ± 7

METHOD SUMMARIES

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SUMMARY DATA SECTION

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Lab id	<u>EBERLINE</u>
Protocol	<u>Hanford</u>
Version	<u>Ver 1.0</u>
Form	<u>DVD-LMS</u>
Version	<u>3.06</u>
Report date	<u>10/12/07</u>

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EBERLINE SERVICES/RICHMOND

SAMPLE DELIVERY GROUP H3558

Test C Matrix SOLID
 SDG 7674
 Contact Melissa C. Mannion

LAB METHOD SUMMARY

CARBON 14 IN SOLIDS
 LIQUID SCINTILLATION COUNTING

Client Hanford
 Contract No. 630
 Contract SDG H3558

RESULTS

LAB	RAW	SUF-		
SAMPLE ID	TEST FIX	PLANCHET	CLIENT SAMPLE ID	Carbon 14
Preparation batch 612I-068				
R708096-01	A1	7674-001	B1NRH8	U
R708096-05		7674-005	LCS (QC ID=63054)	ok
R708096-06		7674-006	BLK (QC ID=63055)	U
R708096-07		7674-007	Duplicate (R708096-01)	- U
Nominal values and limits from method RDLs (pCi/g) 50.0				
216-A-2 & 216-A-21 Characterization				

METHOD PERFORMANCE

LAB	RAW	SUF-	MDA	ALIQ	PREP	DILU-	YIELD	EFF	COUNT	FWHM	DRIFT	DAYS	ANAL-		
SAMPLE ID	TEST FIX	CLIENT SAMPLE ID	pCi/g	g	FAC	TION	%	%	min	keV	KeV	HELD	PREPARED	YZIED	DETECTOR
Preparation batch 612I-068 2σ prep error 10.0 % Reference Lab Notebook #6121, pg. 68															
R708096-01	A1	B1NRH8	3.62	0.422			100		50			60	10/03/07	10/06	LSC-004
R708096-05		LCS (QC ID=63054)	7.67	0.400			100		11				10/03/07	10/06	LSC-004
R708096-06		BLK (QC ID=63055)	3.80	0.400			100		50				10/03/07	10/06	LSC-004
R708096-07		Duplicate (R708096-01) (QC ID=63056)	3.39	0.446			100		50			60	10/03/07	10/06	LSC-004
Nominal values and limits from method 50.0 0.400 10 180															

PROCEDURES REFERENCE C14_COX_LSC
 CP-251 Tritium/Carbon-14 Oxidation, rev 8

AVERAGES ± 2 SD MDA 4.62 ± 4.08
 FOR 4 SAMPLES YIELD 100 ± 0

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 Protocol Hanford
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 Version 3.06
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EBERLINE SERVICES/RICHMOND

SAMPLE DELIVERY GROUP H3558

Test H Matrix SOLID
 SDG 7674
 Contact Melissa C. Marnion

Client Hanford
 Contract No. 630
 Contract SDG H3558

LAB METHOD SUMMARY

TRITIUM IN SOLIDS
 LIQUID SCINTILLATION COUNTING

RESULTS

LAB	RAW	SUF-			
SAMPLE ID	TEST FIX	PLANCHET	CLIENT SAMPLE ID		Tritium
Preparation batch 6121-068					
R708096-01		7674-001	B1NRH8		14.4
R708096-02		7674-002	LCS (QC ID=62510)		ok
R708096-03		7674-003	BLK (QC ID=62511)		U
R708096-04		7674-004	Duplicate (R708096-01)		ok
Nominal values and limits from method					
			RDLs (pCi/g)		400
216-A-2 & 216-A-21 Characterization					

METHOD PERFORMANCE

LAB	RAW	SUF-	MDA	ALIQ	PRRP	DILU-	YIELD	EFF	COUNT	FWHM	DRIFT	DAYS	ANAL-		
SAMPLE ID	TEST FIX	CLIENT SAMPLE ID	pCi/g	g	FAC	TION	%	%	min	keV	KeV	HLTD	PREPARED	YZED	DETECTOR
Preparation batch 6121-068			2σ prep error 10.0 % Reference Lab Notebook #6121, pg. 68												
R708096-01		B1NRH8	3.94	0.448			100		50			49	09/18/07	09/25	LSC-004
R708096-02		LCS (QC ID=62510)	4.30	0.400			100		50				09/18/07	09/25	LSC-004
R708096-03		BLK (QC ID=62511)	4.43	0.400			100		50				09/18/07	09/25	LSC-004
R708096-04		Duplicate (R708096-01)	3.96	0.451			100		50			49	09/18/07	09/25	LSC-004
			(QC ID=62512)												
Nominal values and limits from method			400	0.400				25	180						

PROCEDURES REFERENCE TRITIUM_COX_LSC
 CP-251 Tritium/Carbon-14 Oxidation, rev 8

AVERAGES ± 2 SD MDA 4.16 ± 0.491
 FOR 4 SAMPLES YIELD 100 ± 0

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SAMPLE DELIVERY GROUP H3558

SDG 7674
Contact Melissa C. Mannion

REPORT GUIDE

Client Hanford
Contract No. 630
Case no SDG H3558

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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SUMMARY DATA SECTION

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SAMPLE DELIVERY GROUP H3558

SDG 7674
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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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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.

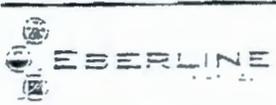
For total elemental uranium or thorium results, there may be a column showing the total weight computed from associated isotopic results. Ignoring results less than their MDAs, this is a weighted sum of the isotopic results. The weights depend on the molecular weight and half-life of each isotope so 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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Fluor Hanford Inc.		CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST				F07-043-049	PAGE 1	OF 1
COLLECTOR Pope, Pfister/Mokler		COMPANY CONTACT Trent, SJ		TELEPHONE NO. 373-5869		PROJECT COORDINATOR TRENT, SJ		PRICE CODE BN
SAMPLING LOCATION C5515, I-055		PROJECT DESIGNATION 216-A-2 and 216-A-21 Characterization Sampling and Analysis - Soil		H3558 (7674)		SAF NO. F07-043		DATA TURNAROUND 45 Days / 45 Days
ICE CHEST NO. GHP-06-004		FIELD LOGBOOK NO.		COA 122868 ES3		METHOD OF SHIPMENT FEDERAL EXPRESS		
SHIPPED TO Eberline Services		OFFSITE PROPERTY NO. See PTR 20092		BILL OF LADING/AIR BILL NO. See PTR 20092				
MATRX* A=Air DL=Drum L=Liquid DS=Drum S=Solid 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 are not regulated for transportation per 49 CFR but are not releasable per DOE Order 5400.5 (1990/1993)		PRESERVATION	None				
	SPECIAL HANDLING AND/OR STORAGE Rad to BINRCI		TYPE OF CONTAINER	G/P				
			NO. OF CONTAINER(S)	1				
			VOLUME	60mL				
		SAMPLE ANALYSIS	SEE ITEM (1) IN SPECIAL INSTRUCTIONS					
SAMPLE NO.	MATRIX*	SAMPLE DATE	SAMPLE TIME					
B1NRH8	SOIL	8-7-7	0908	✓				
CHAIN OF POSSESSION		SIGN / PRINT NAMES			SPECIAL INSTRUCTIONS			
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME	(1) Tritium - H3; Carbon-14; Iodine-129; Nickel-63; Technetium-99 (Technetium-99)				
R. PFISTER/Mokler	8/7/07 1020	A2 SITE FRIG	8/7/07 1620					
A2 SITE FRIG	8/9/07 1130	R. PFISTER/Mokler	8/9/07 1130					
M.A. Baechler	AUG 15 2007 0840	M.A. Baechler	AUG 15 2007 0840					
M.A. Baechler	AUG 15 2007 0840	Fed Ex						
Fed Ex		Fed Ex	08/16/07 9:15					
LABORATORY SECTION	RECEIVED BY	TITLE		DATE/TIME				
FINAL SAMPLE DISPOSITION	DISPOSAL METHOD	DISPOSED BY		DATE/TIME				



RICHMOND, CA LABORATORY

SAMPLE RECEIPT CHECKLIST

JK 8/16/07

Client: F. HANFORD City: MIDLAND State: WA
 Date/Time received: 08/16/07 9:15 CoC No. F07-043-049
 Container i.D. No. GM-06-004 Requested TAT (Days) 45 P.C. 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: S
- 7 Number of containers per sample: 1 (Or see CoC _____)
- 8 Samples are in correct container? Yes No []
- 9 Paperwork agrees with samples? Yes No []
- 10 Samples have Tape [] Hazard labels [] Rad labels [] Appropriate sample label is
- 11 Samples are in good condition Leaking [] Broken Container [] Missing []
- 12 Samples are Preserved [] Not preserved [] pH _____ Preservative _____
- 13 Describe any anomalies.

14 Was P.M. notified of any anomalies? Yes [] No [] Date _____
 15 Inspected by: [Signature] Date 08/16/07 Time 10:45

Customer Sample No	com	mR/hr	Wide	Customer Sample No	com	mR/hr	Wide

Ion Chamber Ser. No. _____ Calibration date _____
 Alpha Meter Ser. No. _____ Calibration date _____
 Beta/Gamma Meter Ser. No. _____ Calibration date _____

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