

0072033

VALIDATION SERVICES REQUEST

VSR No.: VSR06-012

Rev.: 0

Validator: EQM

Date Initiated: 7/10/2006

Project Coordinator(s): TRENT, SJ

QAPP Number:

Client(s): ROHAY, VJ

SAP Number:

Project(s): CPP 200 Area

Level of Validation (A, B, C, D, E): C

SAF Number(s): F03-018

Data Package(s): 222S20030369, 222S20030383 H2459

Validation Task Title: 216-Z-9 Trench Characterization Borehole - Soil

Validation Procedure/Revision
Number to be utilized in validation:

Chem:

Rad:

Comments:

RECEIVED
JAN 22 2007
EDMC

Requested Validation Start Date: 7/10/2006

Requested Validation Completion Date: 7/31/2006

**Project Hanford Management System
COMMENT RESOLUTION SHEET**

Sheet ¹ of ¹
JPG 8/13/06

Document Number: SDG H2459

Revision Number N/A

Date: Aug 3, 2006

Document Title:

Data Validation for ~~Strontium-90 Analysis 222520030369 & 2225200300383~~
Tritium and Technetium-99 JPG 8/13/06

Reviewer:

Bill Thackaberry

Reviewers, if other than original:

Project/Organization:

FH/GRP/QA

Responsible Manager:

Dana Farwick

COMMENT(S)

Initials (If other than listed reviewer)	Section/Step	Comments/Discrepancies	Basis	Recommendation	Resolution
	pg 1-8	Package lacks the data summary that has been provided in the past showing analyte, detection limit, result and qualifiers.	Provided in all packages reviewed in the last 4 years	Provide the table	<i>Accepted, although requested table is not required by the data validation procedure JPG 8/13/06</i>
	pgs 24 Sec 11	This section should not be N/A	it applies to level C	complete the individual lines (no and N/A answers)	<i>Accepted JPG 8/13/06</i>

Date: June 15, 2006
To: Fluor Hanford, Inc
From: Environmental Quality Management, Inc.
Project: 216-Z-9 Waste Site Vertical Borehole (Borehole C3426)
Subject: Data Validation for Tritium and Technetium-99 Analysis

INTRODUCTION

This memo presents the results of data validation on Data Package H2459, prepared by the Eberline Richmond laboratory. A list of samples validated along with the analyses reported and the method of analysis is provided in the following table.

Sample ID	Sample Date	Media	Validation Level	Analysis
B17N46-A	10/20/03	Soil	C	Technetium-99, Tritium
B17TM6-A	10/29/03	Soil	C	Technetium-99, Tritium

Data validation was conducted in accordance with HNF-20434, Rev. 0, *Data Validation Procedure for Radiochemical Analyses*, DOE/RL-2001-01, Rev. 0, Appendix B, *Plutonium/Organic-Rich Process Condensate/Process Waste Group Operable Unit Representative Sites Sampling and Analysis Plan*, and DOE/RL-2001-01, Rev. 0, Appendix E, *Sampling and Analysis Plan for Investigation of Dense, Nonaqueous-Phase Liquid Carbon Tetrachloride at the 216-Z-9 Trench*. Appendices 1 through 6 of this Data Validation Report provide additional information as indicated below:

- Appendix 1. Glossary of Data Reporting Qualifiers
- Appendix 2. Summary of Data Qualification
- Appendix 3. Annotated Laboratory Reports
- Appendix 4. Laboratory Narrative and Chain-of-Custody Documentation
- Appendix 5. Data Validation Supporting Documentation
- Appendix 6. Additional Data Requested by Client

DATA QUALITY PARAMETERS

Holding Times

Holding times may be calculated from Chain-of-Custody forms to determine the validity of the results. Maximum holding times for tritium and technetium-99 analyses are specified as 6 months in DOE/RL-2001-01, App. B.

All holding times were met.

Blanks

- Laboratory Blanks

Blank samples are analyzed to determine if positive results are due to laboratory reagent, sample container, or detector contamination. If blank analysis results indicate the presence of an analyte above the minimum detectable activity (MDA), the following qualifiers are applied: All positive sample results less than five times the highest blank concentration are qualified as estimates and flagged "J"; sample results below the MDA are qualified as undetected and flagged "U"; samples results above the MDA and greater than five times the highest blank concentration are not qualified.

All blank criteria were met. Neither tritium nor technetium-99 were detected in the blanks. The detection limits for the blanks were less than the MDA and less than the required detection limit.

- Field Blank

No field blanks were submitted for analysis.

Accuracy

Accuracy is evaluated from laboratory control sample (LCS) or blank spike sample (BSS) batch samples and matrix spiked (MS) samples in the analytical batch. Measured activities are compared to the known added amounts. The acceptable LCS or BSS recovery range is 65-135%. Recoveries outside the above ranges result in associated sample results being qualified as estimates. Results are rejected for LCS/BSS recoveries of less than 30%. Tracer or carrier recoveries are not required for the liquid scintillation methods used for technetium-99 and tritium analyses.

An LCS was analyzed for each method and satisfied the above criteria. Matrix spikes were not run. However, a tracer was used in the technetium-99 method for every sample, LCS, and blank, and acceptable recoveries were obtained. In the tritium method, water serves as a chemically identical carrier for the tritium, and 100% recovery is achieved. These practices are acceptable alternatives to running matrix spikes.

Precision

- Laboratory Duplicates

Analytical precision is expressed by the relative percent differences (RPD) between results for one of the samples in the batch and a duplicate determination of that sample. If both the activities measured for the sample and the duplicate are both greater than five times the required detection limit (RDL) and the RPD is less than 35%, no qualification is required. If either activity is less than five times the RDL,

the control limit is two times the RDL. If the RPD is outside the applicable control limit, associated results are qualified as estimated detects or estimated non-detects.

A duplicate was analyzed for each method, and the results were acceptable.

- Field Duplicate

No field duplicates were submitted for analysis.

Detection Levels

Reported analytical detection levels are compared against the RDLs in DOE/RL-2004-42 to ensure that laboratory detection levels meet the required criteria.

The MDA for the determination of technetium-99 in sample B17TM6-A was 16 pCi/g, slightly exceeding the RDL of 15 pCi/g. All other sample results were reported with MDAs equal to or less than the analyte-specific RDL. In accordance with the data validation instructions, no data was qualified.

Completeness

Data package H2459 was submitted for validation and verified for completeness. Completeness is based on the percentage of data requested by the client that were reported and determined to be valid (i.e., not rejected). The completion percentage was 100%.

MAJOR DEFICIENCIES

None

MINOR DEFICIENCIES

The MDA for the determination of technetium-99 in sample B17TM6-A slightly exceeded the RDL.

REFERENCES

HNF-20434, Rev. 0, *Data Validation Procedure for Radiochemical Analyses*, Fluor Hanford, Inc., Richland, Washington (2004).

DOE/RL-2001-01, Rev. 0, Appendix B, *Plutonium/Organic-Rich Process Condensate/Process Waste Group Operable Unit Representative Sites Sampling and Analysis Plan*, U.S. Department of Energy, Richland, Washington (2004).

DOE/RL-2001-01, Rev. 0, Appendix E, *Sampling and Analysis Plan for Investigation of Dense, Nonaqueous-Phase Liquid Carbon Tetrachloride at the 216-Z-9 Trench*, U.S. Department of Energy, Richland, Washington (2004).

Appendix 1
Glossary of Data Reporting Qualifiers

Qualifiers which may be applied by data validators in compliance with the data validation procedure are as follows:

- U - Indicates the compound or analyte was analyzed for and not detected above the minimum detectable activity (MDA) in the sample. The value reported is the sample result corrected for sample dilution and moisture content by the laboratory. The data is usable for decision making purposes.
- UJ - Indicates the compound or analyte was analyzed for and not detected at concentrations above the minimum detectable activity (MDA) in the sample. Due to a minor QC deficiency identified during the data validation, the associated quantitation limit is an estimate, but is usable for decision making purposes.
- J - Indicates the compound or analyte was analyzed for and detected. Due to a minor QC deficiency identified during the data validation, the associated concentration is an estimated, but the data are usable for decision-making purposes.
- R - Indicates the compound or analyte was analyzed for, detected, and due to an identified major QC deficiency, the data are unusable.
- UR - Indicates the compound or analyte was analyzed for and not detected in the sample. Additionally, the data is unusable due to an identified major QC deficiency.

Appendix 2
Summary of Data Qualification

DATA QUALIFICATION SUMMARY

SDG: H2459	REVIEWER: JRJ	DATE: 6/15/06	PAGE 1 OF 1
COMMENTS: No results were qualified.			
COMPOUND	QUALIFIER	SAMPLES AFFECTED	REASON

Appendix 3
Annotated Laboratory Reports

TECHNETIUM-99 AND TRITIUM ANALYSIS, SOIL (PCI/G)

Project: FLUOR HANFORD							
Laboratory: Eberline							
Case:		SDG: H2459					
Sample Number		B17N46-A			B17TM6-A		
Remarks							
Sample Date		10/20/03			10/29/03		
Analysis Date		01/12/04			01/12/04		
Radionuclides	RTQL	Result	Q	MDA	Result	Q	MDA
Technetium-99	15	18		14	15.8	U	16
Tritium	400	-1.1	U	26	2.55	U	41

RTQL = required target quantitation limit

Q = validation qualifier; laboratory-applied non-detect qualifiers "U" have been included for clarity.

MDA = minimum detectable activity

GEA = gamma energy analysis

AEA = alpha energy analysis

EBERLINE SERVICES / RICHMOND
SAMPLE DELIVERY GROUP H2459

7552-001

B17N46-A

DATA SHEET

SDG <u>7662</u>	Client/Case no <u>Hanford</u>	SDG <u>H2459</u>
Contact <u>Melissa C. Mannion</u>	Contract No. <u>630</u>	
Lab sample id <u>R312077-01</u>	Client sample id <u>B17N46-A</u>	
Dept sample id <u>7662-001</u>	Location/Matrix <u>Z-9 Trench, C3426</u>	<u>SOLID</u>
Received <u>12/10/03</u>	Collected/Weight <u>10/20/03 10:29</u>	<u>1.72 g</u>
* solids <u>100.0</u>	Custody/SAP No <u>P03-018-075</u>	<u>P03-018</u>

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Tritium	10028-17-8	-1.10	16	26	400	U	H
Carbon 14	14782-75-8	5.38	24	24	50	U	C
Nickel 63	13961-37-8	308	560	930	30	U	NI_L
Technetium 99	14133-76-7	18.0	5.2	14	15	U	TC
Iodine 129	15046-84-1	0.3993	9.4	21	2.0	U	I
Selenium 79	15758-45-9	-21.3	14	24	10	U	SE_L
Protactinium 231	PA-231	0	3.5	13	1.0	U	PA
Potassium 40	13966-00-2	U		300		U	GAM
Cobalt 60	10198-40-0	U		21	0.050	U	GAM
Cesium 137	10045-97-3	U		18	0.10	U	GAM
Radium 226	13982-63-3	U		43		U	GAM
Radium 228	15262-20-1	U		66		U	GAM
Europium 152	14683-23-9	U		38	0.10	U	GAM
Europium 154	15585-10-1	U		30	0.10	U	GAM
Europium 155	14391-16-3	U		70	0.10	U	GAM
Thorium 228	14274-82-9	U		32		U	GAM
Thorium 232	TH-232	U		66		U	GAM
Uranium 238	U-238	U		2100		U	GAM
Americium 241	14596-10-2	324000	900	370		U	GAM

219-Z-9 Trench Chara. Borehole-Soil

Note: Gamma data is in units of pCi/sample.

DATA SHEETS
 Page 1
 SUMMARY DATA SECTION
 Page 11

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>01/31/04</u>

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EBERLINE SERVICES/RICHMOND
SAMPLE DELIVERY GROUP E2459

7652-002

B17TM6-A

DATA SHEET

SDG <u>7652</u>	Client/Case no <u>Hanford</u>	SDG <u>E2459</u>
Contact <u>Melissa C. Mannion</u>	Contract No. <u>630</u>	
Lab sample id <u>R312077-02</u>	Client sample id <u>B17TM6-A</u>	
Dept sample id <u>7652-002</u>	Location/Matrix <u>Z-9 Trench, C3426</u>	<u>SOLID</u>
Received <u>12/10/03</u>	Collected/Weight <u>10/29/03 08:56</u>	<u>0.19 g</u>
* solids <u>100.0</u>	Custody/SAP No <u>F03-018-076</u>	<u>F03-018</u>

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALIFIERS	TEST
Tritium	10028-17-8	2.55	24	41	400	U	H
Carbon 14	14762-75-5	13.7	23	39	58	U	C
Nickel 63	15901-37-8	378	588	236	30	U	NI L
Technetium 99	14133-76-7	15.8	5.6	16	15	U	TC
Iodine 129	15646-84-1	7.26	19	43	2.0	U	I
Selenium 79	15758-45-9	-69.1	45	79	10	U	SE L
Protactinium 231	PA-231	12.9	9.7	12	1.0		PA
Potassium 40	13966-00-2	U		230		U	GAM
Cobalt 60	10198-40-0	U		15	0.050	U	GAM
Cesium 137	10045-97-3	U		11	0.10	U	GAM
Radium 226	13982-63-3	U		35		U	GAM
Radium 228	15262-20-1	U		58		U	GAM
Europium 152	14683-23-9	U		31	0.10	U	GAM
Europium 154	15585-10-1	U		40	0.10	U	GAM
Europium 155	14391-16-3	U		31	0.10	U	GAM
Thorium 228	14274-82-9	U		32		U	GAM
Thorium 232	TH-232	U		58		U	GAM
Uranium 238	U-238	U		1300		U	GAM
Americium 241	14596-10-2	3480	160	130			GAM

219-Z-9 Trench Chara. Borehole-Soil

Note: Gamma data is in units of pCi/sample.

OK
8/1/06

DATA SHEETS
Page 2
SUMMARY DATA SECTION
Page 12

Lab id <u>EBERLINE</u>
Protocol <u>Hanford</u>
Version <u>Ver 1.0</u>
Form <u>DVD-DS</u>
Version <u>3.05</u>
Report date <u>01/31/04</u>

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Appendix 4

Laboratory Narrative and Chain-of-Custody Documentation



RICHMOND, CA LABORATORY
SAMPLE RECEIPT CHECKLIST

Client: FLR Date/Time received 1000 12-10-03
CoC No. F03-018-075,076
Container I.D. No. SAWS 107 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
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 labels []
11. Samples are: In good condition [] Leaking [] Broken Container [] Missing []
12. Samples are: Preserved [] Not preserved [] pH _____ Preservative _____
13. Describe any anomalies: _____
14. Was P.M. notified of any anomalies? Yes [] No [] Date _____
15. Received by [Signature] Date: 12-10-03 Time: 1000

Customer Sample No.	cpm	mR/hr	wipe	Customer Sample No.	cpm	mR/hr	wipe
<u>B17N96-A</u>	<u><40</u>						
<u>B17T46-A</u>	<u><40</u>						

Ion Chamber Ser. No. _____ Calibration date _____
Alpha Meter Ser. No. _____ Calibration date _____
Beta/Gamma Meter Ser. No. 106261 Calibration date 2-14-03

1.0 GENERAL

Fluor Hanford Inc. (FH) Sample Delivery Group H2459 was composed of two soil samples designated under SAF No. F03-018 with a Project Designation of: 216-Z-9 Trench Characterization Borehole - Soil.

Due to limited sample volume and high alpha activity (from Am-241) in samples B17N48-A and B17TM6-A the sample aliquots taken were small and thus the analytical results have high MDAs.

The samples were received as stated on the Chain-of-Custody documents. Any discrepancies are noted on the Eberline Services Sample Receipt Checklist.

2.0 ANALYSIS NOTES

2.1 Tritium Analyses

The LCS and method blank were not scaled to the nominal aliquot. No problems were encountered during the course of the analyses.

2.2 Carbon-14 Analyses

The LCS and method blank were not scaled to the nominal aliquot. No problems were encountered during the course of the analyses.

2.3 Nickel-63 Analyses

The LCS and method blank were not scaled to the nominal aliquot. No problems were encountered during the course of the analyses.

2.4 Selenium-79 Analyses

The method blank was not scaled to the nominal aliquot. A LCS was not performed. The laboratory has no Se-79 activity available to perform an LCS. No other problems were encountered during the course of the analyses.

2.5 Iodine-129 Analyses

The LCS and method blank were not scaled to the nominal aliquot. No problems were encountered during the course of the analyses.

2.6 Technetium-99 Analyses

The LCS and method blank were not scaled to the nominal aliquot. No problems were encountered during the course of the analyses.

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2.7 Protactinium-231 Analyses

The LCS and method blank were not scaled to the nominal aliquot. No problems were encountered during the course of the analyses.

Please note Pa-231 has neither an assigned CAS No. or FEAD Reference for the electronic data deliverable.

2.8 Gamma Spectroscopy Analyses

Due to limited sample volume samples B17N46-A and B17TM6-A were counted as received (1.0 sample). The gamma spectroscopy data is reported in units of pCi/sample. A sample duplicate was not performed. No other problems were encountered during the course of the analyses.

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

000403

FLUOR Hanford Inc.		CENTRAL PLATEAU CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST				F03-018-076		Page 1 of 1														
Collector J.S. Pope		Company Contact Steve Trent		Telephone No. 373-5689		Project Coordinator TRENT, SJ		Price Code 8N Data Turnaround 45 Days														
Project Designation 216-29 Trench Characterization Borehole - Soil		Sampling Location Z-9 Trench		C3426 H2459 (7662)		SAF No. F03-018		Air Quality <input type="checkbox"/>														
Ice Chest No. SAWS-107		Field Logbook No.		COA 119152E910		Method of Shipment Federal Express																
Shipped To EBERLINE SERVICES (Formerly TMA)		Offsite Property No.				Bill of Lading/Air Bill No. 842 26547 0763																
POSSIBLE SAMPLE HAZARDS/REMARKS <i>High Alpha content/Free phase CCl4 detected</i>					Preservation	None																
Special Handling and/or Storage					Type of Container	G																
					No. of Container(s)	1																
					Volume	50mg																
SAMPLE ANALYSIS					See Item (1) in Special Instructions.																	
Sample No.	Matrix *	Sample Date	Sample Time																			
B17TMS-A	SOIL	10/29/03	0856	Y																		
CHAIN OF POSSESSION					Sign/Print Names					SPECIAL INSTRUCTIONS					Matrix *							
Relinquished By/Removed From		Date/Time		Received By/Stored In		Date/Time		(1) Gamma Spec - Radium (Radium-226, Radium-228); Carbon-14; Technetium-99; Iodine-129; Nickel-63; Selenium-79; Isotopic Protactinium (Protactinium-231); Tritium - H3					Matrix * S=Soil SS=Soil/sand SO=Soil R=Sludge W=Water O=Oil A=Air DP=Other Solids DL=Other Liquids T=Tissue W=Wipe L=Liquid V=Vegetation X=Other									
Relinquished By/Removed From		Date/Time		Received By/Stored In		Date/Time																
Relinquished By/Removed From		Date/Time		Received By/Stored In		Date/Time																
Relinquished By/Removed From		Date/Time		Received By/Stored In		Date/Time																
Relinquished By/Removed From		Date/Time		Received By/Stored In		Date/Time																
LABORATORY SECTION		Received By					Title					Date/Time										
FINAL SAMPLE DISPOSITION		Disposal Method					Disposed By					Date/Time										

A-8003-618(03/03)

000040

FLUOR Hanford Inc.		CENTRAL PLATEAU CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST				F03-018-075	Page 1 of 1															
Collector <i>J.S. Pope</i>	Company Contact Steve Trant	Telephone No. 373-5689	Project Coordinator TRENT, SJ		Price Code 8N	Data Turnaround 45 Days																
Project Designation 216-Z-9 Trench Characterization Borehole - Soil		Sampling Location Z-9 Trench <i>C3426 43.5-46' H2459</i>	SAF No. F03-018		Air Quality <input type="checkbox"/>																	
Ice Chest No. <i>SAWS-107</i>	Field Logbook No.	COA 11847RES10	<i>(7062)</i>		Method of Shipment Federal Express																	
Shipped To EBERLINE SERVICES (Formerly TMA)		Offsite Property No.		Bill of Lading/Air Bill No. <i>8422654700763</i>																		
POSSIBLE SAMPLE HAZARDS/REMARKS <i>High Alpha content</i> Special Handling and/or Storage				Preservation	None																	
				Type of Container	0																	
				No. of Container(s)	1																	
				Volume	2g																	
SAMPLE ANALYSIS				See item (f) in Special Instructions																		
Sample No.	Matrix #	Sample Date	Sample Time																			
B17N46-A	SOIL	<i>10/20/03</i>	<i>1029</i>	<i>X</i>																		
CHAIN OF POSSESSION				SPECIAL INSTRUCTIONS				Matrix #														
Relinquished By/Removed From <i>R.C. Chambers</i>	Date/Time <i>12-8-03 1030</i>	Received By/Stored In <i>J.G. Hogan</i>	Date/Time <i>11-30</i>	(1) Gamma Spec - Radium (Radium-226, Radium-228); Carbon-14; Technetium-99; Iodine-129; Nickel-63; Selenium-79; Isotopic Protactinium (Protactinium-231); Tellurium - H3				S-Ball SE-Solid/4411 SD-Solid SI-Sludge W = Water O=Oil A=Air DS-Dryer Solids DL-Dryer Liquids T-Tissue N=Sludge L=Liquid V=Vegetation X=Other														
Relinquished By/Removed From <i>J.G. Hogan</i>	Date/Time <i>12-8-03</i>	Received By/Stored In <i>FED EX</i>	Date/Time																			
Relinquished By/Removed From <i>FED EX</i>	Date/Time	Received By/Stored In <i>R.C. Chambers</i>	Date/Time <i>12-10-03 1000</i>																			
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time																			
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time																			
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time																			
LABORATORY SECTION	Received By	Title				Date/Time																
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By				Date/Time																

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RICHMOND, CA LABORATORY
SAMPLE RECEIPT CHECKLIST

Client: FLR Date/Time received 1000 12-10-03
CoC No. F03-018-075,076
Container I.D. No. SAWS 107 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
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 [] Red labels [] Appropriate sample labels []
11. Samples are: In good condition [] Leaking [] Broken Container [] Missing []
12. Samples are: Preserved [] Not preserved [] pH _____ Preservative _____
13. Describe any anomalies: _____
14. Was P.M. notified of any anomalies? Yes [] No [] Date _____
15. Received by [Signature] Date: 12-10-03 Time: 1000

Customer Sample No.	cpm	mR/hr	wipe	Customer Sample No.	cpm	mR/hr	wipe
<u>B17046-A</u>	<u><40</u>						
<u>B17146-A</u>	<u><40</u>						

Ion Chamber Ser. No. _____ Calibration date _____
Alpha Meter Ser. No. _____ Calibration date _____
Beta/Gamma Meter Ser. No. 166261 Calibration date 2-14-03

Appendix 5

Data Validation Supporting Documentation

APPENDIX A

RADIOCHEMICAL DATA VALIDATION CHECKLIST

VALIDATION LEVEL:	A	B	C	D	E
PROJECT:	216-Z-9 Vertical Borehole		DATA PACKAGE: H2459		
VALIDATOR:	TR Jewett	LAB:	Eberline, Richmond	DATE:	6/15/06
SDG:					
ANALYSES PERFORMED					
Gamma Spectrometry	Neutron-22	Technetium-99	Alpha Spectrometry	Counting Spectrometry	
Total Uranium	Radon-22	Zirconium	Technetium	Technetium-99	Tritium
SAMPLES/MATRIX					
B17N46-A Soil					
B17TM6-A Soil					

1. Completeness N/A
 Technical verification forms present? Yes No N/A
 Comments: _____

2. Initial Calibration (Levels D, E) N/A
 Instruments/detectors calibrated? Yes No N/A
 Initial calibration acceptable? Yes No N/A
 Standards NIST traceable? Yes No N/A
 Standards Expired? Yes No N/A
 Calculation check acceptable? Yes No N/A
 Comments: _____

3. Continuing Calibration (Levels D, E) N/A

Calibration checked within required frequency? Yes No N/A

Calibration check acceptable? Yes No N/A

Calibration check standards traceable? Yes No N/A

Calibration check standards expired? Yes No N/A

Calculation check acceptable? Yes No N/A

Comments: _____

4. Background Counts (Levels D, E) N/A

Background Counts checked within required frequency? Yes No N/A

Background Counts acceptable? Yes No N/A

Calculation check acceptable? Yes No N/A

Comments: _____

5. Blanks (Levels B, C, D, E) N/A

Method blank analyzed within required frequency? Yes No N/A

Method blank results acceptable? Yes No N/A

Analytes detected in method blank? Yes No N/A

Field blank(s) analyzed? Yes No N/A

Field blank results acceptable? Yes No N/A

Analytes detected in field blank(s)? Yes No N/A

Transcription/Calculation Errors? (Levels D, E) Yes No N/A

Comments: _____

6. Laboratory Control Samples or Blank Spike Samples (Levels C, D, E) N/A

LCS/BSS analyzed within required frequency? Yes No N/A

LCS/BSS recoveries acceptable? Yes No N/A

LCS/BSS traceable? (Levels D,E) Yes No N/A

LCS/BSS expired? (Levels D,E) Yes No N/A

LCS/BSS levels correct? (Levels D,E) Yes No N/A

Transcription/Calculation Errors? (Levels D, E) Yes No N/A

Comments: _____

7. Chemical Carrier Recovery (Levels C, D, E) N/A

Chemical carrier added? Yes No N/A

Chemical recovery acceptable? Yes No N/A

Chemical carrier traceable? (Levels D, E) Yes No N/A

Handwritten signature and date: 6/15/06

A3

Chemical carrier expired? (Levels D, E) Yes No N/A
Transcription/Calculation errors? (Levels D, E) Yes No N/A

Comments: Water as carrier in tritium analysis.

8. Tracer Recovery (Levels C, D, E) N/A

Tracer added? Yes No N/A
Tracer recovery acceptable? Yes No N/A
Tracer traceable? (Levels D, E) Yes No N/A
Tracer expired? (Levels D, E) Yes No N/A
Transcription/Calculation errors? (Levels D, E) Yes No N/A

Comments: _____

9. Matrix Spikes (Levels C, D, E) N/A

Matrix spike analyzed? Yes No N/A
Spike recoveries acceptable? Yes No N/A
Spike source traceable? (Levels D, E) Yes No N/A
Spike source expired? Levels D, E) Yes No N/A
Transcription/Calculation Errors? (Levels D, E) Yes No N/A

Comments: For Tc-99, Tc-99m tracer was used instead of MS, and acceptable recoveries were obtained.

For 3H, H₂O works as carrier, and was used ~~not~~ instead of MS.

TJG
6/29/06

A-4

No flags required for any results.

10. Duplicates (Levels C, D, E) N/A

Duplicates Analyzed at required frequency? Yes No N/A

RPD Values Acceptable? Yes No N/A

Transcription/Calculation Errors? (Levels D, E) Yes No N/A

Comments: _____

11. Field QC Samples (Levels C, D E) ~~N/A~~ *8/17/06*

Field duplicate sample(s) analyzed? Yes No N/A

Field duplicate RPD values acceptable? Yes No N/A

Field split sample(s) analyzed? Yes No N/A

Field split RPD values acceptable? Yes No N/A

Performance audit sample(s) analyzed? Yes No N/A

Performance audit sample results acceptable? Yes No N/A

Comments: _____

12. Holding Times (All levels)

Are sample holding times acceptable? Yes No N/A

Comments: _____

13. Results and Detection Limits (All Levels) N/A

Results reported for all required sample analyses? Yes No N/A

Results supported in raw data? (Levels D, E) Yes No N/A

Results Acceptable? (Levels D, E) Yes No N/A

Transcription/Calculation errors? (Levels D, E) Yes No N/A

MDA's meet required detection limits? Yes No N/A

Transcription/calculation errors? (Levels D, E) Yes No N/A

Comments: MDA for Tc-99 in BITM6-A was 16 pCi/g vs 15 pCi/g RDL. 6/15/06
BITM6-A was 16 pCi/g vs 15 pCi/g RDL.

?

Appendix 6

Additional Documentation Requested (Quality Control Data)

EBERLINE SERVICES/RICHMOND
SAMPLE DELIVERY GROUP H2459

7662-004

Method Blank

METHOD BLANK

SDG <u>7662</u>	Client/Case no <u>Hanford</u>	SDG <u>H2459</u>
Contact <u>Melissa C. Mannion</u>	Contract No. <u>630</u>	
Lab sample id <u>R312077-04</u>	Client sample id <u>Method Blank</u>	
Dept sample id <u>7662-004</u>	Material/Matrix <u>SOLID</u>	
	SAF No <u>F03-018</u>	

ANALYTE	CAS NO	RESULT pci/g	2σ ERR (COUNT)	MDA pci/g	RDL pci/g	QUALI- FIERS	TEST
Tritium	10028-17-8	0.173	0.62	1.0	400	U	H
Carbon 14	14762-75-5	-0.331	0.59	1.0	50	U	C
Nickel 63	13981-37-8	-0.018	0.52	0.88	30	U	NI_L
Technetium 99	14133-76-7	<u>-0.236</u>	0.18	0.69	15	U	TC
Iodine 129	15046-84-1	-0.001	0.25	0.57	2.0	U	I
Selenium 79	15758-45-9	<u>-0.861</u>	0.85	1.5	10	U	SE_L
Protactinium 231	PA-231	-0.002	0.007	0.016	1.0	U	PA
Potassium 40	13966-00-2	U		28		U	GAM
Cobalt 60	10198-40-0	U		2.3	0.050	U	GAM
Cesium 137	10045-97-3	U		1.9	0.10	U	GAM
Radium 226	13982-63-3	U		4.1		U	GAM
Radium 228	15262-20-1	U		9.6		U	GAM
Europium 152	14683-23-9	U		5.4	0.10	U	GAM
Europium 154	15585-10-1	U		6.9	0.10	U	GAM
Europium 155	14391-16-3	U		4.0	0.10	U	GAM
Thorium 228	14274-82-9	U		5.2		U	GAM
Thorium 232	TH-232	U		9.6		U	GAM
Uranium 235	15117-96-1	U		6.4		U	GAM
Uranium 238	U-238	U		270		U	GAM
Americium 241	14596-10-2	U		4.4		U	GAM

219-2-9 Trench Chara. Borehole-Soil

QC-BLANK #46352

METHOD BLANKS
 Page 1
 SUMMARY DATA SECTION
 Page 8

Lab id EBERLINE
 Protocol Hanford
 Version Ver 1.0
 Form DVD-DS
 Version 3.06
 Report date 01/31/04

000012

EBERLINE SERVICES/RICHMOND
SAMPLE DELIVERY GROUP H2459

7662-003

Lab Control Sample

LAB CONTROL SAMPLE

SDG <u>7662</u>	Client/Case no <u>Manford</u>	SDG <u>H2459</u>
Contact: <u>Nelissa C. Hannon</u>	Contract No. <u>630</u>	
Lab sample id <u>8312077-03</u>	Client sample id <u>Lab Control Sample</u>	
Dept sample id <u>7662-003</u>	Material/Matrix <u>SOLID</u>	
	SAF No <u>F03-018</u>	

ANALYTE	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	DUALI- FIERS	TEST	ADDED pCi/g	2σ ERR pCi/g	REC %	3σ LMTS (TOTAL)	PROTOCOL LIMITS
Tritium	230	3.3	1.1	400		R	251	10	92	85-115	80-120
Carbon 14	616	12	3.1	50		C	638	26	97	84-116	80-120
Nickel 63	130	2.3	0.92	30		NI_L	136	5.4	96	84-116	80-120
Technetium 99	120	2.8	0.54	15		TC	120	4.8	100	83-117	80-120
Iodine 129	135	1.3	1.6	2.0		I	127	5.1	106	83-117	80-120
Protactinium 231	8.69	0.44	0.017	1.0		PA	9.98	0.40	87	89-111	80-120
Cobalt 60	240	13	8.7	0.050		GAM	262	10	92	77-123	80-120
Cesium 137	258	12	9.5	0.10		GAM	274	11	94	77-123	80-120

219-Z-9 Trench Chara. Borehole-Sofl

DC-608-00051

LAB CONTROL SAMPLES
Page 1
SUMMARY DATA SECTION
Page 9

Lab id <u>EBRLNE</u>
Protocol <u>Manford</u>
Version <u>Ver 1.0</u>
Form <u>DVD-LCS</u>
Version <u>3.06</u>
Report date <u>01/31/04</u>

000013

EBERLINE SERVICES/RICHMOND
SAMPLE DELIVERY GROUP H2459

7662-005

B17N46-A

DUPLICATE

SDG <u>7662</u>	Client/Case no <u>Hanford</u>	SDG <u>H2459</u>
Contact <u>Melissa C. Hannon</u>	Contract No. <u>630</u>	
DUPLICATE	ORIGINAL	
Lab sample id <u>R312077-05</u>	Lab sample id <u>R312077-01</u>	Client sample id <u>B17N46-A</u>
Dept sample id <u>7662-005</u>	Dept sample id <u>7662-001</u>	Location/Matrix <u>Z-9 Trench, C3426</u> <u>SOLID</u>
	Received <u>12/10/03</u>	Collected/Weight <u>10/20/03 10:29</u> <u>1.72 g</u>
X solids <u>100.0</u>	X solids <u>100.0</u>	Custody/SAF No <u>F03-018-075</u> <u>F03-018</u>

ANALYTE	DUPLICATE pCi/g	2σ ERR (COUNT)	MDA pCi/g	IDL pCi/g	QUALI- FIERS	TEST	ORIGINAL pCi/g	2σ ERR (COUNT)	MDA pCi/g	QUALI- FIERS	RPD %	3σ PROT TOT LIMIT
Tritium	12.6	14	23	400	U	B	-1.10	16	26	U	-	-
Carbon 14	-1.62	13	22	50	U	C	-3.38	14	24	U	-	-
Nickel 63	425	530	870	30	U	NI L	308	560	930	U	-	-
Technetium 99	23.2	6.1	16	15	U	TC	18.0	5.2	14	U	25	62
Iodine 129	0.562	7.4	17	2.0	U	I	-0.393	9.4	21	U	-	-
Selenium 79	-19.6	13	22	10	U	SE L	-21.3	14	24	U	-	-
Protactinium 231	0	10	21	1.0	U	PA	0	3.5	13	U	-	-

219-Z-9 Trench Chara. Borehole-Soil

QC-DUPNT 44333

Note: Gamma data is in units of pCi/sample.

DUPLICATES
Page 1
SUMMARY DATA SECTION
Page 10

Lab id <u>EBRLNE</u>
Protocol <u>Hanford</u>
Version <u>Ver 1.0</u>
Form <u>DVD-DUP</u>
Version <u>3.06</u>
Report date <u>01/31/04</u>

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EBERLINE SERVICES/RICHMOND

SAMPLE DELIVERY GROUP H2459

Test IC Matrix SOIL
 SDG 7662
 Contact Melissa C. Mannion

LAB METHOD SUMMARY

TECHNETIUM 99 IN SOIL

BETA COUNTING

Client Hanford
 Contract No. 430
 Contract SDG H2459

RESULTS

LAB	RAW	SUF-			Technetium
SAMPLE ID	TEST FIX	PLANCHET	CLIENT SAMPLE ID		99
Preparation batch 7080-164					
R312077-01		7662-001	B17N46-A		18.0
R312077-02		7662-002	B17TN6-A		15.8 U
R312077-03		7662-003	LCS (QC ID=46351)		ok
R312077-04		7662-004	BLK (QC ID=46352)		U
R312077-05		7662-005	Duplicate (R312077-01)		ok
Nominal values and limits from method					
			NDLs (pCi/g)		15
219-Z-9 Trench Char. Borehole-Soil					

METHOD PERFORMANCE

LAB	RAW	SUF-	MDA	ALIQ	PREP	DILU-	YIELD	EFF	COUNT	FM/IN	DRIFT	DAYS	ANAL-		
SAMPLE ID	TEST FIX	CLIENT SAMPLE ID	pCi/g	g	FAC	TION	%	%	min	keV	KeV	HELD	PREPARED	YZED	DETECTOR
Preparation batch 7080-164 2σ prep error 10.0 % Reference Lab Notebook 7080 pg. 164															
R312077-01		B17N46-A	14	0.0455			79		50			91	01/15/04	01/19	GRB-203
R312077-02		B17TN6-A	16	0.0325			94		50			83	01/15/04	01/20	GRB-222
R312077-03		LCS (QC ID=46351)	0.54	1.00			94		50				01/15/04	01/19	GRB-230
R312077-04		BLK (QC ID=46352)	0.69	1.00			76		50				01/15/04	01/20	GRB-223
R312077-05		Duplicate (R312077-01)	16	0.0428			76		50			92	01/15/04	01/20	GRB-224
(QC ID=46353)															
Nominal values and limits from method															
			15	1.00			20-105		50			180			

PROCEDURES	REFERENCE	TC99 TR SEP LSC
CP-021		Preparation of Tc-99m Tracer, rev 2
CP-002		G.C. Preparation, rev 4
CP-003		Addition of Carriers and Tracers, rev 5
CP-431		Technetium-99 Purification of Soil or Resin by Extraction Chromatography, rev 0
CP-008		Heavy Element Electroplating, rev 7

AVERAGES ± 2 SD	MDA <u>9.4</u> ± <u>16</u>
FOR 5 SAMPLES	YIELD <u>84</u> ± <u>19</u>

METHOD SUMMARIES
 Page 2
 SUMMARY DATA SECTION
 Page 14

Lab id EBERLINE
 Protocol Hanford
 Version Ver 1.0
 Form DVD-LMS
 Version 3.06
 Report date 01/31/04

000018

EBERLINE SERVICES/RICHMOND
SAMPLE DELIVERY GROUP #2459

Test # Matrix SOLID
SDG 7662
Contact Melissa C. Mannion

LAB METHOD SUMMARY
TRITIUM IN SOIL
LIQUID SCINTILLATION COUNTING

Client Benford
Contract No. 630
Contract SOG #2639

RESULTS

LAB	RAW	SUF-		
SAMPLE ID	TEST FIX	PLANCHET	CLIENT SAMPLE ID	Tritium
Preparation batch 7080-164				
R312077-01		7662-001	817N46-A	U
R312077-02		7662-002	817TN6-A	U
R312077-03		7662-003	LCS (QC ID=46351)	ok
R312077-04		7662-004	BLK (QC ID=46352)	U
R312077-05		7662-005	Duplicate (R312077-01)	- U
Nominal values and limits from method				
219-Z-9 Trench Chara. Borehole-Soil			MDLs (pCi/g)	400

METHOD PERFORMANCE

LAB	RAW	SUF-	NDA	ALIQ	PREP	DILU-	YIELD	EFF	COUNT	FWRH	DRIFT	DAYS	ANAL-		
SAMPLE ID	TEST FIX	CLIENT SAMPLE ID	pCi/g	g	FAC	TION	%	%	min	keV	KeV	HELD	PREPARED	YZED	DETECTOR
Preparation batch 7080-164 2σ prep error 10.0 % Reference Lab Notebook 7080 pg. 164															
R312077-01		817N46-A	26	0.0411			100		120			82	01/09/04	01/10	LSC-004
R312077-02		817TN6-A	41	0.0255			100		120			73	01/09/04	01/10	LSC-004
R312077-03		LCS (QC ID=46351)	1.1	1.00			100		120				01/09/04	01/10	LSC-004
R312077-04		BLK (QC ID=46352)	1.0	1.00			100		120				01/09/04	01/09	LSC-004
R312077-05		Duplicate (R312077-01)	23	0.0450			100		120			82	01/09/04	01/10	LSC-004
			(QC ID=46353)												
Nominal values and limits from method															
			400	1.00						25	180				

PROCEDURES REFERENCE TRITIUM_DOK_LSC
CP-251 Tritium/Carbon-14 Oxidation, rev 5

AVERAGES ± 2 SD NDA 31 ± 35
FOR 5 SAMPLES YIELD 100 ± 0

METHOD SUMMARIES
Page 6
SUMMARY DATA SECTION
Page 18

Lab id EBERLINE
Protocol Benford
Version Var 1.0
Form DVD-LHS
Version 3.06
Report date 01/31/04

000023

**Project Hanford Management System
COMMENT RESOLUTION SHEET**

Sheet 1 of 1
JPG 8/7/06

Document Number: SDG H2459 Revision Number: N/A Date: Aug 3, 2006

Document Title:
Data Validation for ~~Strontium-90 Analysis 222520030369 & 222520030383~~
Tritium and Technetium-99 *JPG 8/7/06*

Reviewer:
Bill Thackaberry
Reviewers, if other than original:

Project/Organization:
FH/GRP/OA
Responsible Manager:
Dana Farwick

COMMENT(S)

Initials (if other than listed reviewer)	Section/Step	Comments/Discrepancies	Basis	Recommendation	Resolution
	pg 1-8	Package lacks the data summary that has been provided in the past showing analyte, detection limit, result and qualifiers.	Provided in all packages reviewed in the last 4 years	Provide the table	<i>Rejected. Requested table is not required by the data validation procedure.</i> <i>JPG 8/7/06</i>
	pgs 24 Sec 11	This section should not be N/A	it applies to level C	complete the individual lines (no and N/A answers)	<i>Accepted</i> <i>JPG 8/7/06</i>
			<i>* All info in the requested table is already in Appendices 2 and 3 of the data validation report as written.</i>		<i>JPG 8/7/06</i>



Date: June 15, 2006
 To: Fluor Hanford, Inc
 From: Environmental Quality Management, Inc.
 Project: 216-Z-9 Waste Site Vertical Borehole (Borehole C3426)
 Subject: Data Validation for Tritium and Technetium-99 Analysis

INTRODUCTION

This memo presents the results of data validation on Data Package H2459, prepared by the Eberline Richmond laboratory. A list of samples validated along with the analyses reported and the method of analysis is provided in the following table.

Sample ID	Sample Date	Media	Validation Level	Analysis
B17N46-A	10/20/03	Soil	C	Technetium-99, Tritium
B17TM6-A	10/29/03	Soil	C	Technetium-99, Tritium

Data validation was conducted in accordance with HNF-20434, Rev. 0, *Data Validation Procedure for Radiochemical Analyses*, DOE/RL-2001-01, Rev. 0, Appendix B, *Plutonium/Organic-Rich Process Condensate/Process Waste Group Operable Unit Representative Sites Sampling and Analysis Plan*, and DOE/RL-2001-01, Rev. 0, Appendix E, *Sampling and Analysis Plan for Investigation of Dense, Nonaqueous-Phase Liquid Carbon Tetrachloride at the 216-Z-9 Trench*. Appendices 1 through 6 of this Data Validation Report provide additional information as indicated below:

- Appendix 1. Glossary of Data Reporting Qualifiers
- Appendix 2. Summary of Data Qualification
- Appendix 3. Annotated Laboratory Reports
- Appendix 4. Laboratory Narrative and Chain-of-Custody Documentation
- Appendix 5. Data Validation Supporting Documentation
- Appendix 6. Additional Data Requested by Client



DATA QUALITY PARAMETERS

Holding Times

Holding times may be calculated from Chain-of-Custody forms to determine the validity of the results. Maximum holding times for tritium and technetium-99 analyses are specified as 6 months in DOE/RL-2001-01, App. B.

All holding times were met.

Blanks

- Laboratory Blanks

Blank samples are analyzed to determine if positive results are due to laboratory reagent, sample container, or detector contamination. If blank analysis results indicate the presence of an analyte above the minimum detectable activity (MDA), the following qualifiers are applied: All positive sample results less than five times the highest blank concentration are qualified as estimates and flagged "J"; sample results below the MDA are qualified as undetected and flagged "U"; samples results above the MDA and greater than five times the highest blank concentration are not qualified.

All blank criteria were met. Neither tritium nor technetium-99 were detected in the blanks. The detection limits for the blanks were less than the MDA and less than the required detection limit.

- Field Blank

No field blanks were submitted for analysis.

Accuracy

Accuracy is evaluated from laboratory control sample (LCS) or blank spike sample (BSS) batch samples and matrix spiked (MS) samples in the analytical batch. Measured activities are compared to the known added amounts. The acceptable LCS or BSS recovery range is 65-135%. Recoveries outside the above ranges result in associated sample results being qualified as estimates. Results are rejected for LCS/BSS recoveries of less than 30%. Tracer or carrier recoveries are not required for the liquid scintillation methods used for technetium-99 and tritium analyses.

An LCS was analyzed for each method and satisfied the above criteria. Matrix spikes were not run. However, a tracer was used in the technetium-99 method for every sample, LCS, and blank, and acceptable recoveries were obtained. In the tritium method, water serves as a chemically identical carrier for the tritium, and 100% recovery is achieved. These practices are acceptable alternatives to running matrix spikes.

Precision

- Laboratory Duplicates

Analytical precision is expressed by the relative percent differences (RPD) between results for one of the samples in the batch and a duplicate determination of that sample. If both the activities measured for the sample and the duplicate are both greater than five times the required detection limit (RDL) and the RPD is less than 35%, no qualification is required. If either activity is less than five times the RDL,

the control limit is two times the RDL. If the RPD is outside the applicable control limit, associated results are qualified as estimated detects or estimated non-detects.

A duplicate was analyzed for each method, and the results were acceptable.

- Field Duplicate

No field duplicates were submitted for analysis.

Detection Levels

Reported analytical detection levels are compared against the RDLs in DOE/RL-2004-42 to ensure that laboratory detection levels meet the required criteria.

The MDA for the determination of technetium-99 in sample B17TM6-A was 16 pCi/g, slightly exceeding the RDL of 15 pCi/g. All other sample results were reported with MDAs equal to or less than the analyte-specific RDL. In accordance with the data validation instructions, no data was qualified.

Completeness

Data package H2459 was submitted for validation and verified for completeness. Completeness is based on the percentage of data requested by the client that were reported and determined to be valid (i.e., not rejected). The completion percentage was 100%.

MAJOR DEFICIENCIES

None

MINOR DEFICIENCIES

The MDA for the determination of technetium-99 in sample B17TM6-A slightly exceeded the RDL.

REFERENCES

HNF-20434, Rev. 0, *Data Validation Procedure for Radiochemical Analyses*, Fluor Hanford, Inc., Richland, Washington (2004).

DOE/RL-2001-01, Rev. 0, Appendix B, *Plutonium/Organic-Rich Process Condensate/Process Waste Group Operable Unit Representative Sites Sampling and Analysis Plan*, U.S. Department of Energy, Richland, Washington (2004).

DOE/RL-2001-01, Rev. 0, Appendix E, *Sampling and Analysis Plan for Investigation of Dense, Nonaqueous-Phase Liquid Carbon Tetrachloride at the 216-Z-9 Trench, U.S.*
Department of Energy, Richland, Washington (2004).

Appendix 1
Glossary of Data Reporting Qualifiers

Qualifiers which may be applied by data validators in compliance with the data validation procedure are as follows:

- U - Indicates the compound or analyte was analyzed for and not detected above the minimum detectable activity (MDA) in the sample. The value reported is the sample result corrected for sample dilution and moisture content by the laboratory. The data is usable for decision making purposes.
- UJ - Indicates the compound or analyte was analyzed for and not detected at concentrations above the minimum detectable activity (MDA) in the sample. Due to a minor QC deficiency identified during the data validation, the associated quantitation limit is an estimate, but is usable for decision making purposes.
- J - Indicates the compound or analyte was analyzed for and detected. Due to a minor QC deficiency identified during the data validation, the associated concentration is an estimated, but the data are usable for decision-making purposes.
- R - Indicates the compound or analyte was analyzed for, detected, and due to an identified major QC deficiency, the date are unusable.
- UR - Indicates the compound or analyte was analyzed for and not detected in the sample. Additionally, the data is unusable due to an identified major QC deficiency.

Appendix 2
Summary of Data Qualification

DATA QUALIFICATION SUMMARY

SDG: H2459	REVIEWER: JRJ	DATE: 6/15/06	PAGE 1 OF 1
COMMENTS: No results were qualified.			
COMPOUND	QUALIFIER	SAMPLES AFFECTED	REASON

Appendix 3
Annotated Laboratory Reports

EBERLINE SERVICES / RICHMOND
SAMPLE DELIVERY GROUP H2459

7662-001

B17N46-A

DATA SHEET

SDG <u>7662</u>	Client/Case no <u>Hanford</u>	SDG <u>H2459</u>
Contact <u>Melissa C. Mannion</u>	Contract No. <u>630</u>	
Lab sample id <u>R312077-01</u>	Client sample id <u>B17N46-A</u>	
Dept sample id <u>7662-001</u>	Location/Matrix <u>Z-9 Trench, C3426</u>	<u>SOLID</u>
Received <u>12/10/03</u>	Collected/Weight <u>10/20/03 10:29</u>	<u>1.72 g</u>
% solids <u>100.0</u>	Custody/SAF No <u>F03-018-075</u>	<u>F03-018</u>

Handwritten notes:
 8/17/06
 8/17/06
 8/17/06

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Tritium	10028-17-8	-1.10	16	26	400	U	H
Carbon 14	14762-75-5	5.38	14	24	50	U	C
Nickel 63	13981-37-8	308	560	930	30	U	NI_L
Technetium 99	14133-76-7	18.0	5.2	14	15	U	TC
Iodine 129	15046-84-1	0.393	9.4	21	2.0	U	I
Selenium 79	15758-45-9	-21.3	14	24	10	U	SE_L
Protactinium 231	PA-231	0	3.5	13	1.0	U	PA
Potassium 40	13966-00-2	U		300		U	GAM
Cobalt 60	10198-40-0	U		21	0.050	U	GAM
Cesium 137	10045-97-3	U		18	0.10	U	GAM
Radium 226	13982-63-3	U		43		U	GAM
Radium 228	15262-20-1	U		66		U	GAM
Europium 152	14683-23-9	U		38	0.10	U	GAM
Europium 154	15585-10-1	U		50	0.10	U	GAM
Europium 155	14391-26-3	U		70	0.10	U	GAM
Thorium 228	14274-82-9	U		32		U	GAM
Thorium 232	TH-232	U		66		U	GAM
Uranium 238	U-238	U		2100		U	GAM
Americium 241	14596-10-2	324000	900	4370		U	GAM

219-Z-9 Trench Chara. Borehole-Soil

Note: Gamma data is in units of pCi/sample.

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>01/31/04</u>

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EBERLINE SERVICES / RICHMOND
SAMPLE DELIVERY GROUP H2459

7662-002

B17TM6-A

DATA SHEET

SDG <u>7662</u>	Client/Case no <u>Hanford</u>	SDG <u>H2459</u>
Contact <u>Melissa C. Mannion</u>	Contract No. <u>630</u>	
Lab sample id <u>R312077-02</u>	Client sample id <u>B17TM6-A</u>	
Dept sample id <u>7662-002</u>	Location/Matrix <u>Z-9 Trench, C3426</u>	<u>SOLID</u>
Received <u>12/10/03</u>	Collected/Weight <u>10/29/03 08:56</u>	<u>0.19 g</u>
% solids <u>100.0</u>	Custody/SAF No <u>F03-018-076</u>	<u>F03-018</u>

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST
Tritium	10028-17-8	2.55	24	41	400	U	H
Carbon 14	14762-75-5	13.7	23	39	50	U	C
Nickel 63	13981-37-8	370	560	230	30	U	NI L
Technetium 99	14133-76-7	15.8	5.6	16	15	U	TC
Iodine 129	15046-04-1	7.26	19	43	2.0	U	I
Selenium 79	15758-45-9	-69.1	45	79	10	U	SE L
Protactinium 231	FA-231	12.9	9.7	12	1.0	U	PA
Potassium 40	13966-00-2	U		230		U	GAM
Cobalt 60	10198-40-0	U		15	0.050	U	GAM
Cesium 137	10045-97-3	U		11	0.10	U	GAM
Radium 226	13982-63-3	U		35		U	GAM
Radium 228	15262-20-1	U		58		U	GAM
Europium 152	14683-23-9	U		31	0.10	U	GAM
Europium 154	15585-10-1	U		40	0.10	U	GAM
Europium 155	14391-16-3	U		31	0.10	U	GAM
Thorium 228	14274-82-9	U		32		U	GAM
Thorium 232	TH-232	U		58		U	GAM
Uranium 238	U-238	U		1300		U	GAM
Americium 241	14596-10-2	3480	160	130		U	GAM

219-Z-9 Trench Chara. Borehole-Soil

Note: Gamma data is in units of pCi/sample.

OK [Signature] 8/7/06

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Lab id	<u>EBERLINE</u>
Protocol	<u>Hanford</u>
Version	<u>Ver 1.0</u>
Form	<u>DVD-DS</u>
Version	<u>3.06</u>
Report date	<u>01/31/04</u>

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Appendix 4

Laboratory Narrative and Chain-of-Custody Documentation



RICHMOND, CA LABORATORY
SAMPLE RECEIPT CHECKLIST

Client: FLR Date/Time received: 1000 12-10-03
 CoC No. F03-018-075,076
 Container I.D. No. SAWS 107 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
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: Taps [] Hazard labels [] Rad labels [] Appropriate sample labels []
11. Samples are: In good condition [] Leaking [] Broken Container [] Missing []
12. Samples are: Preserved [] Not preserved [] pH _____ Preservative _____
13. Describe any anomalies: _____
14. Was P.M. notified of any anomalies? Yes [] No [] Date _____
15. Received by [Signature] Date: 12-10-03 Time: 1000

Customer Sample No.	cpm	mR/hr	wipe	Customer Sample No.	cpm	mR/hr	wipe
<u>B17N46-A</u>	<u><40</u>						
<u>B17T46-A</u>	<u><40</u>						

Ion Chamber Ser. No. _____ Calibration date _____
 Alpha Meter Ser. No. _____ Calibration date _____
 Beta/Gamma Meter Ser. No. 166221 Calibration date 2-14-03

1.0 GENERAL

Fluor Hanford Inc. (FH) Sample Delivery Group H2459 was composed of two soil samples designated under SAF No. F03-018 with a Project Designation of: 216-Z-9 Trench Characterization Borehole – Soil.

Due to limited sample volume and high alpha activity (from Am-241) in samples B17N46-A and B17TM6-A the sample aliquots taken were small and thus the analytical results have high MDAs.

The samples were received as stated on the Chain-of-Custody documents. Any discrepancies are noted on the Eberline Services Sample Receipt Checklist.

2.0 ANALYSIS NOTES

2.1 Tritium Analyses

The LCS and method blank were not scaled to the nominal aliquot. No problems were encountered during the course of the analyses.

2.2 Carbon-14 Analyses

The LCS and method blank were not scaled to the nominal aliquot. No problems were encountered during the course of the analyses.

2.3 Nickel-63 Analyses

The LCS and method blank were not scaled to the nominal aliquot. No problems were encountered during the course of the analyses.

2.4 Selenium-79 Analyses

The method blank was not scaled to the nominal aliquot. A LCS was not performed. The laboratory has no Se-79 activity available to perform an LCS. No other problems were encountered during the course of the analyses.

2.5 Iodine-129 Analyses

The LCS and method blank were not scaled to the nominal aliquot. No problems were encountered during the course of the analyses.

2.6 Technetium-99 Analyses

The LCS and method blank were not scaled to the nominal aliquot. No problems were encountered during the course of the analyses.

000002

2.7 Protactinium-231 Analyses

The LCS and method blank were not scaled to the nominal aliquot. No problems were encountered during the course of the analyses.

Please note Pa-231 has neither an assigned CAS No. or FEAD Reference for the electronic data deliverable.

2.8 Gamma Spectroscopy Analyses

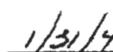
Due to limited sample volume samples B17N46-A and B17TM6-A were counted as received (1.0 sample). The gamma spectroscopy data is reported in units of pCi/sample. A sample duplicate was not performed. No other problems were encountered during the course of the analyses.

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

006403

FLUOR Hanford Inc.		CENTRAL PLATEAU CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST				F03-018-076		Page 1 of 1															
Collector <i>J.S. Pope</i>		Company Contact Steve Trent		Telephone No. 373-5689		Project Coordinator TRENT, SJ		Price Code 8N															
Project Designation 216-Z-9 Trench Characterization Borehole - Soil		Sampling Location Z-9 Trench		<i>C3426 H2459 (7662)</i>		SAF No. F03-018		Data Turnaround 45 Days															
Ice Chest No. <i>SAWS-107</i>		Field Logbook No.		COA 119152ES10		Method of Shipment Federal Express																	
Shipped To EBERLINE SERVICES (Formerly TMA)		Offsite Property No.		Bill of Lading/Air Bill No. <i>842 26547 0763</i>																			
POSSIBLE SAMPLE HAZARDS/REMARKS <i>High Alpha content/Free phase CCl4 detected</i> Special Handling and/or Storage				Preservation	None																		
				Type of Container	G																		
				No. of Container(s)	1																		
				Volume	50mg																		
SAMPLE ANALYSIS				See item (1) in Special Instructions																			
Sample No.	Matrix *	Sample Date	Sample Time																				
B17TMS-A	SOIL	<i>10/29/03</i>	<i>0856</i>	<i>Y</i>																			
CHAIN OF POSSESSION				Sign/Print Names				SPECIAL INSTRUCTIONS								Matrix *							
Relinquished By/Removed From		Date/Time		Received By/Stored In		Date/Time		(1) Gamma Spec - Radium (Radium-226, Radium-228); Carbon-14; Technetium-99; Iodine-129; Nickel-63; Selenium-79; Isotopic Protactinium (Protactinium-231); Tritium - H3								S=Soil SE=Soil Exc. SO=Soil Int. B=Sludge W=Water O=Oil A=Air OS=Organic Solids DL=Organic Liquids T=Timber W=Wipes L=Liquid V=Vegetation X=Other							
<i>RLC</i>		<i>12-8-03 10:20</i>		<i>JG Hogan</i>		<i>12-5-03</i>																	
<i>JG Hogan</i>		<i>12-8-03</i>		<i>FED EX</i>																			
<i>FED EX</i>				<i>Ken G</i>		<i>12-10-03 1000</i>																	
Relinquished By/Removed From		Date/Time		Received By/Stored In		Date/Time																	
Relinquished By/Removed From		Date/Time		Received By/Stored In		Date/Time																	
Relinquished By/Removed From		Date/Time		Received By/Stored In		Date/Time																	
LABORATORY SECTION		Received By		Title				Date/Time															
FINAL SAMPLE DISPOSITION		Disposal Method		Disposed By				Date/Time															

A-6003-618(03/03)

003140

FLUOR Hanford Inc.		CENTRAL PLATEAU CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST				F03-018-075	Page 1 of 1
Collector <i>J.S. Pope</i>	Company Contact Steve Trent	Telephone No. 373-5689	Project Coordinator TRENT, SJ		Price Code 8N	Data Turnaround 45 Days	
Project Designation 216-Z-9 Trench Characterization Borehole - Soil		Sampling Location Z-9 Trench <i>C3426 43.5-46' H2459</i>		SAF No. F03-018	Air Quality <input type="checkbox"/>		
Ice Chest No. <i>SAWS-107</i>	Field Logbook No.	COA 118478ES10	<i>(7662)</i>		Method of Shipment Federal Express		
Shipped To EBERLINE SERVICES (Formerly TMA)		Offsite Property No.		BIN of Lading/Air Bill No. <i>8422654700763</i>			
POSSIBLE SAMPLE HAZARDS/REMARKS <i>High Alpha content</i>				Preservation	Name		
Special Handling and/or Storage				Type of Container	0		
				No. of Container(s)	1		
				Volume	2g		
SAMPLE ANALYSIS				See item (1) in Special Instructions			
Sample No.	Matrix *	Sample Date	Sample Time				
B17N46-A	SOIL	<i>10/20/03</i>	<i>1029</i>	<i>X</i>			
CHAIN OF POSSESSION				Sign/Print Names		SPECIAL INSTRUCTIONS	
Relinquished By/Removed From <i>R. Chambers</i>	Date/Time <i>12-8-03 1030</i>	Received By/Stored In <i>J.G. Adams</i>	Date/Time <i>12-8-03</i>	(1) Gamma Spec - Radium (Radium-226, Radium-228), Carbon-14; Technetium-99; Iodine-129; Nickel-63; Selenium-79; Isotopic Protactinium (Protactinium-231); Tritium - H3		Matrix * S=Soil SE=Soil/rock SO=Solid SL=Sludge W=Water D=Oil A=Air DS=Dry Solid DL=Dry Liquid T=Trace WV=Wipe L=Liquid V=Vegetative X=Other	
Relinquished By/Removed From <i>J.G. Adams</i>	Date/Time <i>12-8-03</i>	Received By/Stored In <i>FED EX</i>	Date/Time				
Relinquished By/Removed From <i>FED EX</i>	Date/Time	Received By/Stored In <i>R. G.</i>	Date/Time <i>12-10-03 1000</i>				
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time				
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time				
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time				
LABORATORY SECTION	Received By	Title				Date/Time	
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By				Date/Time	

001141

A-6003-618(03/03)



RICHMOND, CA LABORATORY
SAMPLE RECEIPT CHECKLIST

Client: FLR Date/Time received 1000 12-10-03
CoC No. F03-018-075,076
Container I.D. No. SAWS 107 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
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 labels []
11. Samples are: In good condition [] Leaking [] Broken Container [] Missing []
12. Samples are: Preserved [] Not preserved [] pH _____ Preservative _____
13. Describe any anomalies: _____
14. Was P.M. notified of any anomalies? Yes [] No [] Date _____
15. Received by [Signature] Date: 12-10-03 Time: 1000

Customer Sample No.	cpm	mR/hr	wipe	Customer Sample No.	cpm	mR/hr	wipe
<u>B17046-A</u>	<u><40</u>						
<u>B17046-A</u>	<u>40</u>						

Ion Chamber Ser. No. _____ Calibration date _____
Alpha Meter Ser. No. _____ Calibration date _____
Beta/Gamma Meter Ser. No. 106261 Calibration date 2-14-03

000042

Appendix 5

Data Validation Supporting Documentation

APPENDIX A
RADIOCHEMICAL DATA VALIDATION CHECKLIST

VALIDATION LEVEL:	A	B	C	D	E
PROJECT:	216-Z-9 Vertical Borehole		DATA PACKAGE: H2459		
VALIDATOR:	JA Jewett	LAB: Eberline, Richmond	DATE: 6/15/06		
SDG:					
ANALYSES PERFORMED					
Count Alpha/Beta	Electron-Shell	Technetium-99	Alpha Spectrometry	Gamma Spectrometry	
Total Uranium	Radium-22	Uranium	Technetium	Technetium-99, Tritium	
SAMPLES/MATRIX					
B17N46-A Soil					
B17TM6-A Soil					

1. Completeness N/A
 Technical verification forms present? Yes No N/A
 Comments: _____

2. Initial Calibration (Levels D, E) N/A
 Instruments/detectors calibrated? Yes No N/A
 Initial calibration acceptable? Yes No N/A
 Standards NIST traceable? Yes No N/A
 Standards Expired? Yes No N/A
 Calculation check acceptable? Yes No N/A
 Comments: _____

3. Continuing Calibration (Levels D, E)..... N/A

Calibration checked within required frequency? Yes No N/A

Calibration check acceptable?..... Yes No N/A

Calibration check standards traceable?..... Yes No N/A

Calibration check standards expired? Yes No N/A

Calculation check acceptable? Yes No N/A

Comments: _____

4. Background Counts (Levels D, E)..... N/A

Background Counts checked within required frequency? Yes No N/A

Background Counts acceptable?..... Yes No N/A

Calculation check acceptable? Yes No N/A

Comments: _____

5. Blanks (Levels B, C, D, E) N/A

Method blank analyzed within required frequency? Yes No N/A

Method blank results acceptable? Yes No N/A

Analytes detected in method blank? Yes No N/A

Field blank(s) analyzed? Yes No N/A

Field blank results acceptable? Yes No N/A

Analytes detected in field blank(s)? Yes No N/A

Transcription/Calculation Errors? (Levels D, E) Yes No N/A

Comments: _____

6. Laboratory Control Samples or Blank Spike Samples (Levels C, D, E) N/A

LCS /BSS analyzed within required frequency? Yes No N/A

LCS/BSS recoveries acceptable? Yes No N/A

LCS/BSS traceable? (Levels D,E) Yes No N/A

LCS/BSS expired? (Levels D,E) Yes No N/A

LCS/BSS levels correct? (Levels D,E) Yes No N/A

Transcription/Calculation Errors? (Levels D, E) Yes No N/A

Comments: _____

7. Chemical Carrier Recovery (Levels C, D, E) N/A *6/15/06*

Chemical carrier added? Yes No N/A

Chemical recovery acceptable? Yes No N/A

Chemical carrier traceable? (Levels D, E) Yes No N/A

Chemical carrier expired? (Levels D, E) Yes No N/A
Transcription/Calculation errors? (Levels D, E).....Yes No N/A

Comments: Water as carrier in tritium analysis.

8. Tracer Recovery (Levels C, D, E) N/A

Tracer added? Yes No N/A
Tracer recovery acceptable? Yes No N/A
Tracer traceable? (Levels D, E) Yes No N/A
Tracer expired? (Levels D, E)..... Yes No N/A
Transcription/Calculation errors? (Levels D, E)..... Yes No N/A

Comments: _____

9. Matrix Spikes (Levels C, D, E)..... N/A

Matrix spike analyzed? Yes No N/A
Spike recoveries acceptable? Yes No N/A
Spike source traceable? (Levels D, E)..... Yes No N/A
Spike source expired? Levels D, E)..... Yes No N/A
Transcription/Calculation Errors? (Levels D, E)..... Yes No N/A

Comments: For Tc-99, Tc-99m tracer was used instead of MS, and acceptable recoveries were obtained.
For 3H, H₂O works as carrier, and was used instead of MS.

TPA
6/29/06

A4

No flags required for any results.

10. Duplicates (Levels C, D, E) N/A

Duplicates Analyzed at required frequency? Yes No N/A

RPD Values Acceptable? Yes No N/A

Transcription/Calculation Errors? (Levels D, E) Yes No N/A

Comments: _____

11. Field QC Samples (Levels C, D E) ~~N/A~~ *MPJ 8/7/06*

Field duplicate sample(s) analyzed? Yes No N/A

Field duplicate RPD values acceptable? Yes No N/A

Field split sample(s) analyzed? Yes No N/A *MPJ 8/7/06*

Field split RPD values acceptable? Yes No N/A

Performance audit sample(s) analyzed? Yes No N/A

Performance audit sample results acceptable? Yes No N/A

Comments: _____

12. Holding Times (All levels)

Are sample holding times acceptable? Yes No N/A

Comments: _____

13. Results and Detection Limits (All Levels) N/A

Results reported for all required sample analyses? Yes No N/A

Results supported in raw data? (Levels D, E) Yes No N/A

Results Acceptable? (Levels D, E) Yes No N/A

Transcription/Calculation errors? (Levels D, E) Yes No N/A

MDA's meet required detection limits? Yes No N/A

Transcription/calculation errors? (Levels D, E) Yes No N/A

Comments: MDA for Tc-99 in BITM6-A was 18 pCi/g 6/15/00
BITM6-A was 16 pCi/g vs 15 pCi/g RDL.

Appendix 6

**Additional Documentation Requested
(Quality Control Data)**

EBERLINE SERVICES / RICHMOND
 SAMPLE DELIVERY GROUP H2459

7662-004

Method Blank

METHOD BLANK

SDG <u>7662</u>	Client/Case no <u>Hanford</u>	SDG <u>H2459</u>
Contact <u>Melissa C. Mannion</u>	Contract No. <u>630</u>	
Lab sample id <u>2312077-04</u>	Client sample id <u>Method Blank</u>	
Dept sample id <u>7662-004</u>	Material/Matrix <u>SOLID</u>	
	SAF No <u>F03-018</u>	

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALIFIERS	TEST
Tritium	10028-17-8	0.173	0.62	1.0	400	U	H
Carbon 14	14762-75-5	-0.331	0.59	1.0	50	U	C
Nickel 63	13981-37-8	-0.018	0.52	0.88	30	U	NI_L
Technetium 99	14133-76-7	<u>-0.236</u>	0.18	0.69	15	U	TC
Iodine 129	15046-84-1	-0.001	0.25	0.57	2.0	U	I
Selenium 79	15758-45-9	<u>-0.861</u>	0.85	1.5	10	U	SE_L
Protactinium 231	PA-231	-0.002	0.007	0.016	1.0	U	PA
Potassium 40	13966-00-2	U		28		U	GAM
Cobalt 60	10198-40-0	U		2.3	0.050	U	GAM
Cesium 137	10045-97-3	U		1.9	0.10	U	GAM
Radium 226	13982-63-3	U		4.1		U	GAM
Radium 228	15262-20-1	U		9.6		U	GAM
Europium 152	14683-23-9	U		5.4	0.10	U	GAM
Europium 154	15585-10-1	U		6.9	0.10	U	GAM
Europium 155	14391-16-3	U		4.0	0.10	U	GAM
Thorium 228	14274-82-9	U		5.2		U	GAM
Thorium 232	TH-232	U		9.6		U	GAM
Uranium 235	15117-96-1	U		6.4		U	GAM
Uranium 238	U-238	U		270		U	GAM
Americium 241	14596-10-2	U		4.4		U	GAM

219-Z-9 Trench Chara. Borehole-Soil

QC-BLANK #46352

METHOD BLANKS
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Lab id <u>EBERLINE</u>
Protocol <u>Hanford</u>
Version <u>Ver 1.0</u>
Form <u>DVD-DS</u>
Version <u>3.06</u>
Report date <u>01/31/04</u>

000012

EBERLINE SERVICES/RICHMOND
 SAMPLE DELIVERY GROUP H2459

7662-003

Lab Control Sample

LAB CONTROL SAMPLE

SDG <u>7662</u>	Client/Case no <u>Hanford</u>	<u>SDG H2459</u>
Contact <u>Melissa C. Marnion</u>	Contract No. <u>630</u>	
Lab sample id <u>8312077-03</u>	Client sample id <u>Lab Control Sample</u>	
Dept sample id <u>7662-003</u>	Material/Matrix <u>SOLID</u>	
	SAF No <u>FD3-010</u>	

ANALYTE	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI- FIERS	TEST	ADDED pCi/g	2σ ERR pCi/g	REC %	3σ LMTS (TOTAL)	PROTOCOL LIMITS
Tritium	230	3.3	1.1	400	H		251	10	92	85-115	80-120
Carbon 14	616	12	3.1	50	C		638	26	97	84-116	80-120
Nickel 63	130	2.3	0.92	30	NI_L		136	5.4	96	84-116	80-120
Technetium 99	120	2.8	0.54	15	TC		120	4.8	100	83-117	80-120
Iodine 129	135	1.3	1.6	2.0	I		127	5.1	106	83-117	80-120
Protactinium 231	8.69	0.44	0.017	1.0	PA		9.98	0.40	87	89-111	80-120
Cobalt 60	240	13	8.7	0.050	GAM		262	10	92	77-123	80-120
Cesium 137	258	12	9.5	0.10	GAM		274	11	94	77-123	80-120

219-2-9 Trench Chara. Borehole-Soil

QC-LCS #46351

LAB CONTROL SAMPLES
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 SUMMARY DATA SECTION
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Lab id EBRLNE
 Protocol Hanford
 Version Ver 1.0
 Form DVD-LCS
 Version 3.06
 Report date 01/24/04

000013

EBERLINE SERVICES/RICHMOND

SAMPLE DELIVERY GROUP H2459

7662-005

B17N46-A

DUPLICATE

SDG <u>7662</u>	Client/Case no <u>Hanford</u>	SDG <u>H2459</u>
Contact <u>Melissa C. Mannion</u>	Contract No. <u>630</u>	
DUPLICATE	ORIGINAL	
Lab sample id <u>R312077-05</u>	Lab sample id <u>R312077-01</u>	Client sample id <u>B17N46-A</u>
Dept sample id <u>7662-005</u>	Dept sample id <u>7662-001</u>	Location/Matrix <u>Z-9 Trench, C3426</u> <u>SOLID</u>
	Received <u>12/10/03</u>	Collected/Weight <u>10/20/03 10:29</u> <u>1.72 g</u>
% solids <u>100.0</u>	% solids <u>100.0</u>	Custody/SAF No <u>F03-018-075</u> <u>F03-018</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 PROT TOT LIMIT
Tritium	12.6	14	23	400	U	H	-1.10	16	26	U	-	
Carbon 14	-1.62	13	22	50	U	C	5.38	14	24	U	-	
Nickel 63	425	530	870	30	U	NI_L	308	560	930	U	-	
Technetium 99	23.2	6.1	16	15		TC	18.0	5.2	14		25	62
Iodine 129	0.562	7.4	17	2.0	U	I	-0.393	9.4	21	U	-	
Selenium 79	-19.6	13	22	10	U	SE_L	-21.3	14	24	U	-	
Protactinium 231	0	10	21	1.0	U	PA	0	3.5	13	U	-	

219-Z-9 Trench Chara. Borehole-Soil

QC-DUP#1 46353

Note: Gamma data is in units of pCi/sample.

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Lab id <u>EBRLNE</u>
Protocol <u>Hanford</u>
Version <u>Ver 1.0</u>
Form <u>DVD-202</u>
Version <u>3.06</u>
Report date <u>01/31/04</u>

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EBERLINE SERVICES/RICHMOND

SAMPLE DELIVERY GROUP H2459

Test IC Matrix SOLID
 SDG 7662
 Contact Melissa C. Mannion

LAB METHOD SUMMARY

TECHNETIUM 99 IN SOIL
 BETA COUNTING

Client Hanford
 Contract No. 630
 Contract SDG H2459

RESULTS

LAB	RAW	SUF-		Technetium
SAMPLE ID	TEST FIX	PLANCHET	CLIENT SAMPLE ID	99
Preparation batch 7080-164				
R312077-01		7662-001	B17N46-A	18.0
R312077-02		7662-002	B17TN6-A	15.8 U
R312077-03		7662-003	LCS (QC ID=46351)	ok
R312077-04		7662-004	BLK (QC ID=46352)	U
R312077-05		7662-005	Duplicate (R312077-01)	ok

Nominal values and limits from method RDLs (pCi/g) 15
 219-2-9 Trench Chara. Borehole-Soil

METHOD PERFORMANCE

LAB	RAW	SUF-	MDA	ALIG	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 7080-164 2σ prep error 10.0 % Reference Lab Notebook 7080 pg. 164															
R312077-01		B17N46-A	14	0.0455			79		50			91	01/15/04	01/19	GRB-203
R312077-02		B17TN6-A	16	0.0325			94		50			83	01/15/04	01/20	GRB-222
R312077-03		LCS (QC ID=46351)	0.54	1.00			94		50				01/15/04	01/19	GRB-230
R312077-04		BLK (QC ID=46352)	0.69	1.00			76		50				01/15/04	01/20	GRB-223
R312077-05		Duplicate (R312077-01) (QC ID=46353)	16	0.0428			76		50			92	01/15/04	01/20	GRB-224

Nominal values and limits from method 15 1.00 20-105 50 180

PROCEDURES	REFERENCE	TC99_TR_SEP_LSC
CP-021		Preparation of Tc-99m Tracer, rev 2
CP-002		Q.C. Preparation, rev 4
CP-003		Addition of Carriers and Tracers, rev 5
CP-431		Technetium-99 Purification of Soil or Resin by Extraction Chromatography, rev 0
CP-008		Heavy Element Electroplating, rev 7

AVERAGES ± 2 SD	MDA <u>9.4 ± 16</u>
FOR 5 SAMPLES	YIELD <u>84 ± 19</u>

METHOD SUMMARIES
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Lab id EBRLNE
 Protocol Hanford
 Version Ver 1.0
 Form DVD-LMS
 Version 3.06
 Report date 01/31/04

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EBERLINE SERVICES/RICHMOND
SAMPLE DELIVERY GROUP N2459

Test H Matrix SOLID
SDG 7662
Contact Melissa C. Hannigan

LAB METHOD SUMMARY
TRITIUM IN SOIL
LIQUID SCINTILLATION COUNTING

Client Hanford
Contract No. 630
Contract SDG N2459

RESULTS

LAB	RAW	SUF-		
SAMPLE ID	TEST FIX	PLANCHET	CLIENT SAMPLE ID	Tritium
Preparation batch 7080-164				
R312077-01		7662-001	817N46-A	U
R312077-02		7662-002	817M6-A	U
R312077-03		7662-003	LCS (QC ID=46351)	ok
R312077-04		7662-004	BLK (QC ID=46352)	U
R312077-05		7662-005	Duplicate (R312077-01)	- U

Nominal values and limits from method RDLs (pCi/g) 400
219-Z-9 Trench Chara. Borehole-Soil

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	MELD	PREPARED	YZED	DETECTOR
Preparation batch 7080-164 2σ prep error 10.0 % Reference Lab Notebook 7080 pg. 164															
R312077-01		817N46-A	26	<u>0.0411</u>			100		120			82	01/09/04	01/10	LSC-004
R312077-02		817M6-A	41	<u>0.0255</u>			100		120			73	01/09/04	01/10	LSC-004
R312077-03		LCS (QC ID=46351)	1.1	1.00			100		120				01/09/04	01/10	LSC-004
R312077-04		BLK (QC ID=46352)	1.0	1.00			100		120				01/09/04	01/09	LSC-004
R312077-05		Duplicate (R312077-01) (QC ID=46353)	23	<u>0.0450</u>			100		120			82	01/09/04	01/10	LSC-004

Nominal values and limits from method 400 1.00 25 180

PROCEDURES REFERENCE TRITIUM_COX_LSC
CP-251 Tritium/Carbon-14 Oxidation, rev 5

AVERAGES ± 2 SD MDA 18 ± 35
FOR 5 SAMPLES YIELD 100 ± 0

METHOD SUMMARIES
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Lab id EBRLINE
Protocol Hanford
Version Ver 1.0
Form DVD-LMS
Version 3.06
Report date 01/31/04

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