

Date: 13 June 2000
 To: Bechtel Hanford, Inc. (technical representative)
 From: TechLaw, Inc.
 Project: 105-F/DR Phase III Below-grade Areas Sampling and Analysis - Water
 Subject: Radiochemistry - Data Package No. H0822-TRC

RECEIVED
 SEP 07 2000

INTRODUCTION

This memo presents the results of data validation on Summary Data Package No. H0822-TRC which were prepared by ThermoRetec (TRC). A list of samples validated along with the analyses reported and the requested analytes is provided in the following table.

Sample ID	Sample Date	Media	Validation	Analysis
BOYOF2	4/20/00	Water	C	See note 1

1- Gamma spectroscopy; alpha spectroscopy (isotopic plutonium and americium-241); total strontium; nickel-63; carbon-14; technetium-99.

Data validation was conducted in accordance with the BHI validation statement of work and the "Sample and Analysis Plan for 105F and 105DR Phase III Below Grade Structures and Underlying Soils" (DOE/RL-99-35). Appendices 1 through 5 provide the following information as indicated below:

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

DATA QUALITY OBJECTIVES

- **Holding Times**

Holding times are calculated from Chain-of-Custody forms to determine the validity of the results. The maximum holding time for radiochemical analysis is 6 months with liquid scintillation requiring analysis within 7 days of distillation.

All holding times were acceptable.

- **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 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"; sample results above the MDA and greater than five times the highest blank concentration are not qualified.

Due to laboratory blank contamination, the technetium-99 result was qualified as an estimate and flagged "J".

All other laboratory blank results were acceptable although the PQLs were exceeded for cesium-137 and europium-154.

Field Blank

One field blank was submitted for analysis (B0Y0F2). Technetium-99 and americium-241 were detected in the field blank. Under the BHI statement of work, no qualification is required.

- **Accuracy**

Accuracy is evaluated by analyzing distilled water or field samples spiked with known amounts of radionuclides. The sample activity as determined by analysis is compared to the known activity to assess accuracy. The acceptable laboratory control sample and matrix spike recovery is 70-130% (80-120% for gamma spectroscopy). In addition, samples may be spiked with a radiochemical tracer to assist in isolating the radioisotope of interest with the yield of the tracer being used in calculating sample activity. The acceptable range for tracer recovery is 20% to 105%. Spike sample results outside the above ranges result in associated sample results being qualified as estimates, rejected, or not qualified, depending on the activity of the individual sample.

All accuracy results were acceptable.

- **Precision**

Analytical precision is expressed by the RPD between the recoveries of duplicate matrix spike analyses performed on a sample. Precision may also be

assessed using unspiked duplicate sample analyses. If both sample and replicate activities are greater than five times the CRDL and the RPD is less than 30 percent, the results are acceptable. If either activities are less than five times the CRDL, a control limit of less than or equal to two times the CRDL is used for soil samples and less than or equal to the CRDL for water samples. If either the original or replicate value is below the CRDL, the applicable control limits are less than or equal to the CRDL for water samples and less than or equal to two times the CRDL for soil samples. If the RPD is outside the applicable control limit, associated results are qualified as estimated detects or estimated non-detects.

All duplicate results were acceptable.

- **Detection Levels**

Reported analytical detection levels are compared against the 105DR PQLs to ensure that laboratory detection levels meet the required criteria. The following analytes were reported above the CRDL: Cesium-137, europium-155 and europium-154. Under the BHI statement of work, no qualification is required. All other reported laboratory MDAs were at or below the CRDL.

- **Completeness**

Data Package No. H0822-QES (SDG No. H0822) was submitted for validation and verified for completeness. The completion rate was 100%.

MAJOR DEFICIENCIES

None found.

MINOR DEFICIENCIES

Due to laboratory blank contamination, the technetium-99 result was qualified as an estimate and flagged "J". Data flagged "J" is an estimate, but under the BHI validation SOW, the data may be usable for decision-making purposes. All other validated results are considered accurate within the standard error associated with the methods.

The following analytes were reported above the CRDL: Cesium-137, europium-155 and europium-154. Under the BHI statement of work, no qualification is required.

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REFERENCES

BHI, MRB-SBB-A23665, *Validation Statement of Work*, Bechtel Hanford Incorporated, September 5, 1997.

DOE/RL-99-35, *Sample and Analysis Plan for 105F and 105DR Phase III Below Grade Structures and Underlying Soils*.

Qualifiers which may be applied by data validators in compliance with the BHI statement of work 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 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 QC deficiency identified during the data validation, the associated concentration is an estimate, but the data are usable for decision-making purposes.
- R** - Indicates the compound or analyte was analyzed for, detected, and due to an identified 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 QC deficiency.

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Appendix 2
Summary of Data Qualification

000007

DATA QUALIFICATION SUMMARY

SDG: H0822	REVIEWER: TLI	DATE: 6/13/00	PAGE <u>1</u> OF <u>1</u>
COMMENTS:			
COMPOUND	QUALIFIER	SAMPLES AFFECTED	REASON
Technitium-99	J	All	Blank contamination

000008

Appendix 3

Qualified Data Summary and Annotated Laboratory Reports

000009

TMA / RICHMOND
SAMPLE DELIVERY GROUP H0822

R004162-01

BOYOF2

DATA SHEET

SDG <u>7395</u>	Client/Case no <u>Hanford</u>	SDG <u>H0822</u>
Contact <u>Melissa C. Mannion</u>	Contract <u>TRB-SBE-207925</u>	
Lab sample id <u>R004162-01</u>	Client sample id <u>BOYOF2</u>	
Dept sample id <u>7395-001</u>	Location/Matrix <u>105DR</u>	<u>WATER</u>
Received <u>04/25/00</u>	Collected <u>04/20/00 11:05</u>	
	Custody/SAF No <u>B00-014-09</u>	<u>B00-014</u>

ANALYTE	CAS NO	RESULT pCi/L	2σ ERR (COUNT)	MDA pCi/L	RDL pCi/L	QUALI- FIERS	TEST
Carbon 14	14762-75-5	-12.5	15	26	200	U	C
Nickel 63	13981-37-8	-3.00	6.2	11	15	U	NI_L
Total Strontium	SR-RAD	0.437	1.3	1.8	2.0	U	SR...
Technetium 99	14133-76-7	30.3	4.5	9.3	15	U J	TC
Plutonium 238	13981-16-3	0	0.033	0.13	1.0	U	PU
Plutonium 239/240	PU-239/240	0.050	0.067	0.13	1.0	U	PU
Americium 241	14596-10-2	0.386	0.22	0.30	1.0	U	AM
Potassium 40	13966-00-2	U		350		U	GAM
Cobalt 60	10198-40-0	U		23	25	U	GAM
Barium 133	13981-41-4	U		19		U	GAM
Cesium 137	10045-97-3	U		<u>19</u>	15	U	GAM
Radium 226	13982-63-3	U		36		U	GAM
Radium 228	15262-20-1	U		83		U	GAM
Europium 152	14683-23-9	U		44	50	U	GAM
Europium 154	15585-10-1	U		<u>54</u>	50	U	GAM
Europium 155	14391-16-3	U		<u>57</u>	50	U	GAM
Thorium 228	14274-82-9	U		42		U	GAM
Thorium 232	TH-232	U		83		U	GAM
Uranium 235	15117-96-1	U		70		U	GAM
Uranium 238	U-238	U		2200		U	GAM
Americium 241	14596-10-2	U		130		U	GAM

105-F/DR Phase 3 Below-grade Areas..

Handwritten signature
6/13/00

Lab id <u>TMANC</u>
Protocol <u>Hanford</u>
Version <u>Ver 1.0</u>
Form <u>DVD-DS</u>
Version <u>3.06</u>
Report date <u>05/27/00</u>

000011

Appendix 4

Laboratory Narrative and Chain-of-Custody Documentation

000012

1.0 GENERAL

Bechtel Hanford Inc. (BHI) Sample Delivery Group H0822 was composed of one liquid (water) sample designated under SAF No. B00-014 with a Project Designation of: 105-F/DR Phase III Below-grade Areas Sampling and Analysis.

The sample was received as stated on the Chain-of-Custody documents. Any discrepancies are noted on the Thermo Retec Sample Receipt Checklist. The results were transmitted to BHI via e-Fax on May 12th and 27th, 2000.

ANALYSIS NOTES

2.1 Carbon-14 Analyses

No problems were encountered during the course of the analyses.

2.2 Nickel-63 Analyses

No problems were encountered during the course of the analyses.

2.3 Total Strontium Analyses

No problems were encountered during the course of the analyses.

2.4 Technetium-99 Analyses

Due to method blank contamination and a RPD of 144% between the sample B0Y0F2 and the duplicate sample the sample was reanalyzed with new QC samples. There was contamination in the method blank at 2.984 dpm/sample. The activity in the method blank is probably from a long-lived isotope in the tracer. The activity in the method blank when calculated to pCi/L using an aliquot of 0.05 L is 26.9 pCi/L, which is above the RDL (15 pCi/L) for Tc-99. The Tc LCS and duplicate sample passed. No other problems were encountered during the course of the reanalyses.

2.5 Isotopic Plutonium Analyses

No problems were encountered during the course of the analyses.

2.6 Americium-241 Analyses

No problems were encountered during the course of the analyses.

2.7 Gamma Spec Analyses

No problems were encountered during the course of the analyses.



000013

Collector Fahlberg	Company Contact J Adler	Telephone No. 373-4316	Project Coordinator TRENT, SJ	Price Code 7L	Data Turnaround 21 Days
Project Designation 10S-F/DR Phase III Below-grade Areas Sampling and Analy	Sampling Location 105DR	H0822 (7395)	SAF No. B00-014	Air Quality <input type="checkbox"/>	
Ice Chest No. ERC-96-072	Field Logbook No. EL 1381-3	COA R105D2280C	Method of Shipment Fed EX		
Shipped To TMA/RECRE	Offsite Property No. A000165		Bill of Lading/Air Bill No. 4235-7953-5372		

POSSIBLE SAMPLE HAZARDS/REMARKS NONE	Preservation	HNO3 to pH	HCl to pH <2	HNO3 to pH						
	Type of Container	P	P	P						
	No. of Container(s)	1	1	1						
	Volume	1000mL	1000mL	1000mL						

Special Handling and/or Storage 000012	SAMPLE ANALYSIS	ICP Multi-Element (Spectrometry)	Technetium-99	See Item (1) in Special Instructions.						
		Mercury 7470 (CV)								

Sample No.	Matrix *	Sample Date	Sample Time	HNO3 to pH	HCl to pH <2	HNO3 to pH						
✓ B0Y0F2	Water	4-20-00	1105	X	X	X						

CHAIN OF POSSESSION		Sign/Print Names		SPECIAL INSTRUCTIONS				Matrix *
Relinquished By R. Sp... R.F. 4/16/00	Date/Time 4-20-00	Received By R. Th... R. Th...	Date/Time 4-20-00/1430	(1) Gamma Spectroscopy (Water) (Cesium-137, Cobalt-60, Europium-152, Europium-154, Europium-155); Gamma Spec - Add-on (Barium-133); Isotopic Plutonium; Strontium-89,90 -- Total Sr; Americium-241; Carbon-14; Nickel-63 Sample originated in non RAD controlled area NO TA Required 4/25/00				S=Soil SE=Settlement SO=Solid S=Sludge W=Water O=Oil A=Air DS=Drum Solids DL=Drum Liquids T=Trace WI=Wipe L=Liquid V=Vegetation X=Other
Relinquished By R. Th... R. Th...	Date/Time 4-24-00/1430	Received By F. O. E. Y.	Date/Time 4-24-00					
Relinquished By F. O. E. Y.	Date/Time 4-25-00 7:30	Received By J. R. C. 4-25-00	Date/Time 4-25-00					
Relinquished By	Date/Time	Received By	Date/Time					
Relinquished By	Date/Time	Received By	Date/Time					

LABORATORY SECTION	Received By	Title	Date/Time
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

Appendix 5
Data Validation Supporting Documentation

000015

RADIOCHEMICAL DATA VALIDATION CHECKLIST

VALIDATION LEVEL:	A	B	<u>C</u>	D	E
PROJECT:	105-F/RR	water	DATA PACKAGE:	H0822	
VALIDATOR:	TLI	LAB:	TRC	DATE:	6/8/00
CASE:			SDG:	H0822	
ANALYSES PERFORMED					
<input type="checkbox"/> Gross Alpha/Beta	<input checked="" type="checkbox"/> Strontium-90	<input checked="" type="checkbox"/> Technetium-99	<input checked="" type="checkbox"/> Alpha Spectroscopy	<input checked="" type="checkbox"/> Gamma Spectroscopy	TU-63
<input type="checkbox"/> Total Uranium	<input type="checkbox"/> Radium-22	<input type="checkbox"/> Tritium	<input checked="" type="checkbox"/> CI4		
SAMPLES/MATRIX	BOYOF2				water

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

Comments: _____

2. Initial Calibration N/A
 Instruments/detectors calibrated within one year of sample analysis? Yes No N/A
 Initial calibration acceptable? Yes No N/A
 Standards NIST traceable? Yes No N/A
 Standards Expired? Yes No N/A

Comments: _____

3. Continuing Calibration N/A
- Calibration checked within one week of sample analysis? . . . Yes No N/A
- Calibration check acceptable? Yes No N/A
- Calibration check standards NIST traceable? Yes No N/A
- Calibration check standards expired? Yes No N/A

Comments: _____

4. Blanks N/A
- Method blank analyzed? 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? Yes No N/A

Comments: TC-99 I all

FD TC-99 - detected Am 241 detected

5. Matrix Spikes N/A
- Matrix spike analyzed? Yes No N/A
- Spike recoveries acceptable? Yes No N/A
- Spike source traceable? Yes No N/A
- Spike source expired? Yes No N/A
- Transcription/Calculation Errors? Yes No N/A

Comments: _____

AK 000017

6. Laboratory Control Samples N/A

LCS analyzed? Yes No N/A

LCS recoveries acceptable? Yes No N/A

LCS traceable? Yes No N/A

Transcription/Calculation Errors? Yes No N/A

Comments: _____

7. Chemical Recovery N/A

Chemical carrier added? Yes No N/A

Chemical recovery acceptable? Yes No N/A

Chemical carrier traceable? Yes No N/A

Chemical carrier expired? Yes No N/A

Transcription/Calculation errors? Yes No N/A

Comments: _____

8. Duplicates N/A

Duplicates Analyzed? Yes No N/A

RPD Values Acceptable? Yes No N/A

Transcription/Calculation Errors? Yes No N/A

Comments: _____

- 9. Field QC Samples N/A
- 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: _____

10. Holding Times

- Are sample holding times acceptable? Yes No N/A

Comments: _____

11. Results and Detection Limits (Levels D & E) N/A

- Results reported for all required sample analyses? Yes No N/A
- Results supported in raw data? Yes No N/A
- Results Acceptable? Yes No N/A
- Transcription/Calculation errors? Yes No N/A
- MDA's meet required detection limits? Yes No N/A
- Transcription/calculation errors? Yes No N/A

Comments: 154 + 155 ora + 137

TMA / RICHMOND
 SAMPLE DELIVERY GROUP H0822

R004162-03

Method Blank

METHOD BLANK

SDG <u>7395</u>	Client/Case no <u>Hanford</u>	SDG <u>H0822</u>
Contact <u>Melissa C. Mannion</u>	Contract <u>TRB-SBB-207925</u>	
Lab sample id <u>R004162-03</u>	Client sample id <u>Method Blank</u>	
Dept sample id <u>7395-003</u>	Material/Matrix <u>WATER</u>	
	SAF No <u>B00-014</u>	

ANALYTE	CAS NO	RESULT pCi/L	2σ ERR (COUNT)	MDA pCi/L	RDL pCi/L	QUALI- FIERS	TEST
Carbon 14	14762-75-5	-1.91	16	27	200	U	C
Nickel 63	13981-37-8	1.27	6.2	10	15	U	NI_L
Total Strontium	SR-RAD	-0.470	1.3	1.8	2.0	U	SR
Plutonium 238	13981-16-3	0.017	0.068	0.13	1.0	U	PU
Plutonium 239/240	PU-239/240	-0.034	0.068	0.21	1.0	U	PU
Americium 241	14596-10-2	0.035	0.10	0.19	1.0	U	AM
Potassium 40	13966-00-2	U		260		U	GAM
Cobalt 60	10198-40-0	U		23	25	U	GAM
Barium 133	13981-41-4	U		19		U	GAM
Cesium 137	10045-97-3	U		21	15	U	GAM
Radium 226	13982-63-3	U		37		U	GAM
Radium 228	15262-20-1	U		86		U	GAM
Europium 152	14683-23-9	U		46	50	U	GAM
Europium 154	15585-10-1	U		71	50	U	GAM
Europium 155	14391-16-3	U		28	50	U	GAM
Thorium 228	14274-82-9	U		33		U	GAM
Thorium 232	TH-232	U		86		U	GAM
Uranium 235	15117-96-1	U		50		U	GAM
Uranium 238	U-238	U		2700		U	GAM
Americium 241	14596-10-2	U		17		U	GAM

105-F/DR Phase 3 Below-grade Areas..

QC-BLANK 34257

Lab id <u>TMANC</u>
Protocol <u>Hanford</u>
Version <u>Ver 1.0</u>
Form <u>DVD-DS</u>
Version <u>3.06</u>
Report date <u>05/27/00</u>

000020

TMA / RICHMOND
SAMPLE DELIVERY GROUP H0822

R004162-07

Method Blank

METHOD BLANK

SDG <u>7395</u>	Client/Case no <u>Hanford</u>	SDG <u>H0822</u>
Contact <u>Melissa C. Mannion</u>	Contract <u>TRB-SBB-207925</u>	
Lab sample id <u>R004162-07</u>	Client sample id <u>Method Blank</u>	
Dept sample id <u>7395-007</u>	Material/Matrix <u>WATER</u>	
	SAF No <u>B00-014</u>	

ANALYTE	CAS NO	RESULT pCi/L	2 σ ERR (COUNT)	MDA pCi/L	RDL pCi/L	QUALI- FIERS	TRST
Technetium 99	14133-76-7	<u>26.9</u>	4.5	7.5	15		TC

105-F/DR Phase 3 Below-grade Areas..

QC-BLANK 34435

000021

Lab id <u>TMANC</u>
Protocol <u>Hanford</u>
Version <u>Ver 1.0</u>
Form <u>DVD-DS</u>
Version <u>3.06</u>
Report date <u>05/27/00</u>

TMA/RICHMOND
 SAMPLE DELIVERY GROUP H0822

R004162-02

Lab Control Sample

LAB CONTROL SAMPLE

SDG <u>7395</u>	Client/Case no <u>Hanford</u>	SDG <u>H0822</u>
Contact <u>Melissa C. Mannion</u>	Case no <u>TRB-SBB-207925</u>	
Lab sample id <u>R004162-02</u>	Client sample id <u>Lab Control Sample</u>	
Dept sample id <u>7395-002</u>	Material/Matrix <u>WATER</u>	
	SAF No <u>B00-014</u>	

ANALYTE	RESULT pCi/L	2σ ERR (COUNT)	MDA pCi/L	IDL pCi/L	QUALI- FIERS	TEST	ADDED pCi/L	2σ ERR pCi/L	REC %	3σ LMTS (TOTAL)	PROTOCOL LIMITS
Carbon 14	16900	170	51	200	C		17000	680	99	84-116	80-120
Nickel 63	693	18	11	15	NI_L		733	29	95	84-116	80-120
Total Strontium	115	6.3	<u>2.6</u>	2.0	SR		123	4.9	94	83-117	80-120
Plutonium 238	55.6	3.6	0.16	1.0	PU		62.4	2.5	89	88-112	80-120
Plutonium 239/240	60.2	3.8	0.11	1.0	PU		66.1	2.6	91	88-112	80-120
Americium 241	53.1	3.4	0.20	1.0	AM		57.4	2.3	93	87-113	70-130
Cobalt 60	521	46	23	25	GAM		486	19	107	71-129	80-120
Cesium 137	596	42	<u>27</u>	15	GAM		562	22	106	73-127	80-120

105-F/DR Phase 3 Below-grade Areas..

QC-LCS 34256

000022

Lab id <u>TMANC</u>
Protocol <u>Hanford</u>
Version <u>Ver 1.0</u>
Form <u>DVD-LCS</u>
Version <u>3.06</u>
Report date <u>05/27/00</u>

TMA/RICHMOND
 SAMPLE DELIVERY GROUP H0822

R004162-06

Lab Control Sample

LAB CONTROL SAMPLE

SDG <u>7395</u>	Client/Case no <u>Hanford</u>	SDG <u>H0822</u>
Contact <u>Melissa C. Mannion</u>	Case no <u>TRB-SBB-207925</u>	
Lab sample id <u>R004162-06</u>	Client sample id <u>Lab Control Sample</u>	
Dept sample id <u>7395-006</u>	Material/Matrix <u>WATER</u>	
	SAP No <u>B00-014</u>	

ANALYTE	RESULT pCi/L	2σ ERR (COUNT)	MDA pCi/L	RDL pCi/L	QUALI- FIERS	TEST	ADDED pCi/L	2σ ERR pCi/L	REC %	3σ LMTS (TOTAL)	PROTOCOL LIMITS
Technetium 99	1120	28	12	15	B	TC	1090	44	103	83-117	80-120

105-F/DR Phase 3 Below-grade Areas..

QC-LCS 34434

Lab id <u>TNANC</u>
Protocol <u>Hanford</u>
Version <u>Ver 1.0</u>
Form <u>DVD-LCS</u>
Version <u>3.06</u>
Report date <u>05/27/00</u>

000023

TMA/RICHMOND
SAMPLE DELIVERY GROUP H0822

R004162-04

BOY0F2

DUPLICATE

SDG <u>7395</u> Contact <u>Melissa C. Mannion</u> Duplicates Lab sample id <u>R004162-04</u> Dept sample id <u>7395-004</u>	Client/Case no <u>Hanford</u> <u>SDG H0822</u> Case no <u>TRB-SBB-207925</u> ORIGINAL Lab sample id <u>R004162-01</u> Dept sample id <u>7395-001</u> Received <u>04/25/00</u>
Client sample id <u>BOY0F2</u> Location/Matrix <u>105DR</u> <u>WATER</u> Collected <u>04/20/00 11:05</u> Custody/SAF No <u>B00-014-09</u> <u>B00-014</u>	

ANALYTE	DUPLICATE		2σ ERR		MDA		RDL		QUALI-		ORIGINAL		2σ ERR		MDA		QUALI-		RPD		3σ PROT	
	pCi/L	(COUNT)	pCi/L	(COUNT)	pCi/L	(COUNT)	pCi/L	(COUNT)	FIERS	TEST	pCi/L	(COUNT)	pCi/L	(COUNT)	FIERS	TEST	%	TOT	LIMIT			
Carbon 14	4.34	16	27	200	U	C	-12.5	15	26	U	-											
Nickel 63	4.49	6.1	10	15	U	NI_L	-3.00	6.2	11	U	-											
Total Strontium	0.046	1.2	1.7	2.0	U	SR	0.437	1.3	1.8	U	-											
Plutonium 238	0	0.091	0.19	1.0	U	PU	0	0.033	0.13	U	-											
Plutonium 239/240	0.015	0.061	0.12	1.0	U	PU	0.050	0.067	0.13	U	-											
Americium 241	0.163	0.18	0.29	1.0	U	AM	0.386	0.22	0.30	J	81	156										
Potassium 40	U		330		U	GAM	U		350	U	-											
Cobalt 60	U		20	25	U	GAM	U		23	U	-											
Barium 133	U		19		U	GAM	U		19	U	-											
Cesium 137	U		16	15	U	GAM	U		19	U	-											
Radium 226	U		33		U	GAM	U		36	U	-											
Radium 228	U		76		U	GAM	U		83	U	-											
Europium 152	U		44	50	U	GAM	U		44	U	-											
Europium 154	U		50	50	U	GAM	U		54	U	-											
Europium 155	U		57	50	U	GAM	U		57	U	-											
Thorium 228	U		27		U	GAM	U		42	U	-											
Thorium 232	U		76		U	GAM	U		83	U	-											
Uranium 235	U		70		U	GAM	U		70	U	-											
Uranium 238	U		2000		U	GAM	U		2200	U	-											
Americium 241	U		140		U	GAM	U		130	U	-											

105-F/DR Phase 3 Below-grade Areas..

QC-DUP#1 34258

Lab id <u>TMNC</u>
Protocol <u>Hanford</u>
Version <u>Ver 1.0</u>
Form <u>DVD-DUP</u>
Version <u>3.06</u>
Report date <u>05/27/00</u>

DUPLICATES

Page 1

SUMMARY DATA SECTION

Page 12

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TMA/RICHMOND
 SAMPLE DELIVERY GROUP H0822

R004162-08

BOYOF2

DUPLICATE

SDG <u>7395</u>	Client/Case no <u>Hanford</u>	<u>SDG H0822</u>
Contact <u>Melissa C. Mannion</u>	Case no <u>TRB-SBB-207925</u>	
DUPLICATE	ORIGINAL	
Lab sample id <u>R004162-08</u>	Lab sample id <u>R004162-01</u>	Client sample id <u>BOYOF2</u>
Dept sample id <u>7395-008</u>	Dept sample id <u>7395-001</u>	Location/Matrix <u>105DR</u> <u>WATER</u>
	Received <u>04/25/00</u>	Collected <u>04/20/00 11:05</u>
		Custody/SAF No <u>B00-014-09</u> <u>B00-014</u>

ANALYTE	DUPLICATE pCi/L	2σ ERR (COUNT)	MDA pCi/L	RDL pCi/L	QUALI- FIERS	TEST	ORIGINAL pCi/L	2σ ERR (COUNT)	MDA pCi/L	QUALI- FIERS	RPD %	3σ PROT TOT LIMIT
Technetium 99	33.6	4.3	8.3	15	B	TC	30.3	4.5	9.3	B	10	36

105-F/DR Phase 3 Below-grade Areas..

QC-DUP#1 34436

Lab id <u>TMANC</u>
Protocol <u>Hanford</u>
Version <u>Ver 1.0</u>
Form <u>DVD-DOP</u>
Version <u>1.06</u>
Report date <u>05/27/00</u>

DUPLICATES

Page 2

SUMMARY DATA SECTION

Page 13

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TMA/RICHMOND

SAMPLE DELIVERY GROUP H0822

R004162-05

BOY0F2

MATRIX SPIKE

SDG <u>7395</u>	Client/Case no <u>Hanford</u>	<u>SDG H0822</u>
Contact <u>Melissa C. Mannion</u>	Case no <u>TRB-SBB-207925</u>	
MATRIX SPIKE	ORIGINAL	
Lab sample id <u>R004162-05</u>	Lab sample id <u>R004162-01</u>	Client sample id <u>BOY0F2</u>
Dept sample id <u>7395-005</u>	Dept sample id <u>7395-001</u>	Location/Matrix <u>105DR</u> <u>WATER</u>
	Received <u>04/25/00</u>	Collected <u>04/20/00 11:05</u>
		Custody/SAF No <u>B00-014-09</u> <u>B00-014</u>

ANALYTE	SPIKE pCi/L	2σ ERR (COUNT)	MDA pCi/L	RDL pCi/L	QUALI- FIERS TEST	ADDED pCi/L	2σ ERR pCi/L	ORIGINAL pCi/L	2σ ERR (COUNT)	REC 3σ % (TOTAL)	LMTS (TOTAL) LIMITS	PROTOCOL
Carbon 14	16200	170	50	200	C	17000	680	-12.5	15	95	84-116 60-140	

105-F/DR Phase 3 Below-grade Areas..

QC-MS#1 34259

Lab id <u>TMNC</u>
Protocol <u>Hanford</u>
Version <u>Ver 1.0</u>
Form <u>DVD-MS</u>
Version <u>3.06</u>
Report date <u>05/27/00</u>

000026

Date: 13 June 2000
To: Bechtel Hanford Inc. (technical representative)
From: TechLaw, Inc.
Project: 105-F/DR Phase III Below-grade Areas Sampling and Analysis - Water
Subject: Inorganics - Data Package No. H0822-RLN (SDG No. H0822)

INTRODUCTION

This memo presents the results of data validation on Data Package No. H0822-RLN prepared by RECRA LabNet (RLN). 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	Analysis
BOY0F2	4/20/00	Water	C	Lead - 6010 Supertrace

Data validation was conducted in accordance with the BHI validation statement of work and "Sample and Analysis Plan for 105F and 105DR Phase III Below Grade Structures and Underlying Soils" (DOE/RL-99-35). Appendices 1 through 5 provide the following information as indicated below:

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

DATA QUALITY OBJECTIVES

- **Holding Times**

Analytical holding times for metals are assessed to ascertain whether the holding time requirements were met by the laboratory. The holding time requirements are as follows: Samples must be analyzed within six (6) months for ICP metals.

All holding times were acceptable.

- **Blanks**

Preparation Blanks

At least one preparation blank, consisting of deionized distilled water processed through each sample preparation and analysis procedure, must be prepared and

000001

analyzed with every sample delivery group. In the case of positive blank results, samples with digestate concentrations less than five times the preparation blank value have had their associated values qualified as non-detected and flagged "U". Samples with concentrations of greater than five times the highest blank concentration do not require qualification.

In the case of negative blank results, if the absolute value exceeds the Contract Required Detection Limit (CRDL), all nondetects are rejected and flagged "UR" and all detects that are less than ten times the absolute value of the associated preparation blank result are qualified as estimates and flagged "J". If the absolute value of the negative preparation blank is greater than the IDL and less than or equal to the CRDL, all nondetects are qualified as estimates and flagged "UJ" and all detects less than ten times the absolute value of the blank are qualified as estimates and flagged "J". If the sample results are greater than ten times the absolute value of the preparation blank, no qualification is necessary.

All preparation blank results were acceptable.

Equipment Blank

One equipment blank (BOYOF2) was submitted for analysis. No analytes were detected in the equipment blank.

- **Accuracy**

Matrix Spike

Matrix spike analyses are used to assess the analytical accuracy of the reported data and the effect of the matrix on the ability to accurately quantify sample concentrations. Matrix spike recoveries must fall within the range of 70% to 130%. Samples with a spike recovery of less than 30% and a sample result below the IDL are rejected and flagged "UR". Samples with a spike recovery of 30% to 69% and a sample result less than the IDL are qualified "UJ". Samples with a spike recovery of greater than 130% or less than 70% and a sample result greater than the IDL are qualified as estimates and flagged "J". Finally, for samples with a spike recovery greater than 130% and a sample result less than the IDL, no qualification is required.

All matrix spike results were acceptable.

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- **Precision**

Laboratory Duplicate Samples

Laboratory duplicate sample analyses are used to measure laboratory precision and sample homogeneity. Results must be within RPD limits of plus or minus 30%. If RPD values are out of specification and the sample concentration is greater than five times the CRDL, all associated sample results are qualified as estimated and flagged "J". If RPD values are plus or minus the CRDL and the sample concentration is less than five times the CRDL, all associated sample results are qualified as estimated and flagged "J/UJ".

All laboratory duplicate results were acceptable.

- **Analytical Detection Levels**

Reported analytical detection levels are compared against the CRDLs to ensure that laboratory detection levels meet the required criteria. All reported laboratory detection levels met the analyte specific CRDL.

- **Completeness**

Data package No. H0822-QES (SDG No. H0822) was submitted for validation and verified for completeness. The completion percentage was 100%.

MAJOR DEFICIENCIES

None found.

MINOR DEFICIENCIES

None found.

REFERENCES

BHI, MRB-SBB-A23665, *Validation Statement of Work*, Bechtel Hanford Incorporated, September 5, 1997.

DOE/RL-99-35, *Sample and Analysis Plan for 105F and 105DR Phase III Below Grade Structures and Underlying Soils*.

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Appendix 1

Glossary of Data Reporting Qualifiers

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

- U - Indicates the compound or analyte was analyzed for and not detected in the sample. The value reported is the sample quantitation limit corrected for sample dilution and moisture content by the laboratory.
- UJ - Indicates the compound or analyte was analyzed for and not detected in the sample. Due to a QC deficiency identified during the data validation, the associated quantitation limit is an estimate.
- J - Indicates the compound or analyte was analyzed for and detected. Due to a QC deficiency identified during the data validation, the associated concentration is an estimate, but the data are usable for decision-making purposes.
- BJ - Applied to inorganic analyses only. Indicates the analyte concentration was greater than the IDL but less than the CRDL and is considered an estimated value.
- R - Indicates the compound or analyte was analyzed for, detected, and due to an identified 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 QC deficiency.
- NJ - Indicates presumptive evidence of a compound at an estimated value. The data may not be valid for some specific applications (i.e., usable for decision-making purposes).
- N - Indicates presumptive evidence of a compound. The data may not be valid for some specific applications (i.e., usable for decision-making purposes).

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Appendix 2
Summary of Data Qualification

000007

DATA QUALIFICATION SUMMARY

SDG: H0822	REVIEWER: TLI	DATE: 6/13/00	PAGE <u>1</u> OF <u>1</u>
COMMENTS: No qualifiers assigned			
COMPOUND	QUALIFIER	SAMPLES AFFECTED	REASON

000008

Appendix 3

Qualified Data Summary and Annotated Laboratory Reports

000009

Recre LabNet - Lionville

INORGANICS DATA SUMMARY REPORT 05/10/00

CLIENT: TWU-MANFORD B00-014
WORK ORDER: 10985-001-001-9999-00

RECRE LOT #: 0004L061

SAMPLE	SITE ID	ANALYTE	RESULT	UNITS	REPORTING LIMIT	DILUTION FACTOR
-001	BOYGF2	Lead, Total	2.3	u UG/L	2.3	1.0

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6/12/00

000011

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Appendix 4

Laboratory Narrative and Chain-of-Custody Documentation

000012



**Recra LabNet Philadelphia
Analytical Report**

Client : TNU-HANFORD B00-014
RFW# : 0004L061
SDG/SAF# : H0822/B00-014

W.O.# : 10985-001-001-9999-00
Date Received: 04-25-00

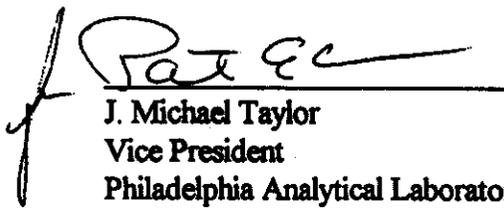
METALS CASE NARRATIVE

1. This narrative covers the analyses of 1 water sample.
2. The sample was prepared and analyzed in accordance with methods checked on the attached glossary.
3. All analyses were performed within the required holding times.
4. The cooler temperature has been recorded on the Chain of Custody.
5. All Initial and Continuing Calibration Verifications (ICV/CCVs) were within the 90-110% control limits (80-120% for Mercury).
6. All Initial and Continuing Calibration Blanks (ICB/CCBs) were within control limits (less than the PQL).
7. The preparation/method blank (MB) was within method criteria {less than the Practical Quantitation Limit (3X the IDL) or samples greater than 20X MB value}. Refer to the Inorganics Method Blank Data Summary.
8. All ICP Interference Check Standards were within control limits.
9. The laboratory control sample (LCS) was within the laboratory control limits. Refer to the Inorganics Laboratory Control Standards Report.
10. The matrix spike (MS) recovery was within the 75-125% control limits. Refer to the Inorganics Accuracy Report.
11. The duplicate analysis was within the 20% Relative Percent Difference (RPD) control limits. Refer to the Inorganics Precision Report.

The results presented in this report relate only to the analytical testing and conditions of the samples at receipt and during storage. All pages of this report are integral parts of the analytical data. Therefore, this report should only be reproduced in its entirety of 12 pages. 000013

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12. For the purposes of this report, the data has been reported to the Instrument Detection Limit (IDL). Values between the IDL and the Practical Quantitation Limit (PQL) are acquired in a region of less-certain quantification.

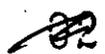

J. Michael Taylor
Vice President
Philadelphia Analytical Laboratory

5-10-03
Date

mid/m04-061



000014



Collector Fahlberg	Company Contact J Adler	Telephone No. 373-4316	Project Coordinator TRENT, SJ	Price Code 7L	Data Turnaround 21 Days
Project Designation 105-F DR Phase III Below-grade Areas Sampling and Analy'		Sampling Location 105DR	SAF No. B00-014	Air Quality <input type="checkbox"/>	
Ice Chest No. RC-99-070	Field Logbook No. EL 1381-3	COA R105D2280C	Method of Shipment Fed EX		
Shipped To TMA-RECRA Recra		Offsite Property No. A000170	Bill of Lading/Air Bill No. 42357953 5383		

POSSIBLE SAMPLE HAZARDS/REMARKS NONE	Preservation	HNO3 to pH 2	HCl to pH 2	HNO2 to pH 2										
	Type of Container	P												
	No. of Container(s)	1												
	Volume	300ml.												

SPECIAL HANDLING and/or Storage	ICP Metals - 6010A (Supratrace) (Lead); Mercury; Manganese (420-424)	Technique RA-4.50.00	Sample Size RA-4.50.00											
	4.20.00 RA													

Sample No.	Matrix *	Sample Date	Sample Time											
BQYDF2	Water	4.20.00	1105	X										
00015														

CHAIN OF POSSESSION				SPECIAL INSTRUCTIONS				Matrix * S=Soil SE=Soil/Insect SO=Solid S=Sludge W=Water O=Oil A=Air DS=Drum Solids DL=Drum Liquids T=Tissue WJ=Wipe L=Liquid V=Vegetation X=Other
Relinquished By R. Green / R. Fahlberg	Date/Time 4.20.00	Received By R. Thoman	Date/Time 4.20.00/1420	(1) Gamma Spectroscopy (Water) (Cesium-137, Cobalt-60, Europium-152, Europium-154, Europium-155); Gamma Spec - Add-on (Barium-133); Isotopic Plutonium; Strontium-89,90 -- Total Sr; Americium-241; Carbon-14; Nickel-63 NOTE: ICP METALS - VOID ONLY The mercury 7470 (C) analysis sample originated in non-Rad controlled area. < 2000 pCi/g NO TA Required (22)				
Relinquished By R. Thoman	Date/Time 4.24.00/1420	Received By Fed EX	Date/Time					
Relinquished By Fed EX	Date/Time 4.25.00 0915	Received By TRoppel	Date/Time 4.25.00 0915					
Relinquished By	Date/Time	Received By	Date/Time					
Relinquished By	Date/Time	Received By	Date/Time					
Relinquished By	Date/Time	Received By	Date/Time					

LABORATORY SECTION	Received By	Title	Date/Time
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

Appendix 5
Data Validation Supporting Documentation

000016

INORGANIC ANALYSIS DATA VALIDATION CHECKLIST

VALIDATION LEVEL:	A	B	C	D	E
PROJECT: 105 DR water			DATA PACKAGE: H0822		
VALIDATOR: TLI		LAB: REURA		DATE: 6/8/00	
CASE:			SDG: H0822		
ANALYSES PERFORMED					
<input type="checkbox"/> CLP/CP	<input type="checkbox"/> CLP/GFAA	<input type="checkbox"/> CLP/Hg	<input type="checkbox"/> CLP/Cyanide	<input type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/> SW-846/CP	<input type="checkbox"/> SW-846/GFAA	<input type="checkbox"/> SW-846/Hg	<input type="checkbox"/> SW-846 Cyanide	<input type="checkbox"/>	<input type="checkbox"/>
SAMPLES/MATRIX			B0Y0F2 water		

1. DATA PACKAGE COMPLETENESS AND CASE NARRATIVE

Is technical verification documentation present? Yes No **N/A**

Is a case narrative present? **Yes** No N/A

Comments: _____

2. HOLDING TIMES

Are sample holding times acceptable? **Yes** No N/A

Comments: _____

INORGANIC ANALYSIS DATA VALIDATION CHECKLIST

3. INSTRUMENT PERFORMANCE AND CALIBRATIONS

Were initial calibrations performed on all instruments?	Yes	No	N/A
Are initial calibrations acceptable?	Yes	No	N/A
Are ICP interference checks acceptable?	Yes	No	N/A
Were ICV and CCV checks performed on all instruments?	Yes	No	N/A
Are ICV and CCV checks acceptable?	Yes	No	N/A

Comments: _____

4. BLANKS

Were ICB and CCB checks performed for all applicable analyses?	Yes	No	N/A
Are ICB and CCB results acceptable?	Yes	No	N/A
Were preparation blanks analyzed?	Yes	No	N/A
Are preparation blank results acceptable?	Yes	No	N/A
Were field/trip blanks analyzed?	Yes	No	N/A
Are field/trip blank results acceptable?	Yes	No	N/A

Comments: _____

5. ACCURACY

Were spike samples analyzed?	Yes	No	N/A
Are spike sample recoveries acceptable?	Yes	No	N/A
Were laboratory control samples (LCS) analyzed?	Yes	No	N/A
Are LCS recoveries acceptable?	Yes	No	N/A

Comments: _____

INORGANIC ANALYSIS DATA VALIDATION CHECKLIST

6. PRECISION

- Were laboratory duplicates analyzed? Yes No N/A
- Are laboratory duplicate samples RPD values acceptable? Yes No N/A
- Were ICP serial dilution samples analyzed? Yes No N/A
- Are ICP serial dilution %D values acceptable? Yes No N/A
- Are field duplicate RPD values acceptable? Yes No N/A Ja
- Are field split RPD values acceptable? Yes No N/A

Comments: _____

7. FURNACE AA QUALITY CONTROL

- Were duplicate injections performed as required? Yes No N/A
- Are duplicate injection %RSD values acceptable? Yes No N/A
- Were analytical spikes performed as required? Yes No N/A
- Are analytical spike recoveries acceptable? Yes No N/A
- Was MSA performed as required? Yes No N/A
- Are MSA results acceptable? Yes No N/A

Comments: _____

8. REPORTED RESULTS AND DETECTION LIMITS

- Are results reported for all requested analyses? Yes No N/A
- Are all results supported in the raw data? Yes No N/A
- Are results calculated properly? Yes No N/A
- Do results meet the CRDLs? Yes No N/A

Comments: _____

Recre LabNet - Lionville

INORGANICS METHOD BLANK DATA SUMMARY PAGE 05/10/00

CLIENT: TRU-MANFORD 800-014

RECRA LOT #: 0004L061

WORK ORDER: 10985-001-001-9999-00

SAMPLE	SITE ID	ANALYTE	RESULT	UNITS	REPORTING LIMIT	DILUTION FACTOR
BLANK1	99L1190-MB1	Lead, Total	2.3	u ug/L	2.3	1.0

000020

08

22

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SAMPLE ID	SITE ID	ANALYTE	SAMPLE RESULT	INITIAL	SPIKED	AMOUNT	RECOVER	FACTOR (SPK)	DILUTION
001	BOYDZ	Lead, Total	509	2.3	500	101.8			1.0

CLIENT: TWO-HANFORD 800-014
 WORK ORDER: 10985-001-001-9999-00

REC'D LOT #: 00041061

REGRA LABS - LENOXVILLE
 INORGANICS ACCURACY REPORT 05/10/00

Recre LabNet - Lincville

INORGANICS PRECISION REPORT 05/10/00

CLIENT: TNU-WANFORD B00-014

WORK ORDER: 10985-001-001-9999-00

RECRA LOT #: 0004L061

SAMPLE	SITE ID	ANALYTE	INITIAL	RESULT	REPLICATE RPD	DILUTION
-001REP	B0Y072	Lead, Total		2.3 u	2.3 u MC	1.0

000022

22

Duncan, Jeanette M

From: Weiss, Richard L
Sent: Thursday, June 15, 2000 7:15 AM
To: Duncan, Jeanette M
Subject: Validaton review for SDG H0822

No Comments

Rich

Duncan, Jeanette M

From: Shea, David W
Sent: Friday, June 23, 2000 9:24 AM
To: Weiss, Richard L; Duncan, Jeanette M
Subject: Data review SDG # H0822

All,

Please see below:

Thanks,

Dave

Data validation results:

Validator: DWS
Date: 6/23/2000
Projects: 105-F/DR Phase III Below grade areas sampling and analysis - water
SAFs: B00-014
SDGs: H0822

data package	analysis	page	comment
	Rad		no comments
	Inorganic (Pb)		no comments

