0070964

SAF-RC-032
100-F Remaining Sites Burial Grounds - Soil Full Protocol
FINAL VALIDATION PACKAGE

COMPLETE COPY OF VALIDATION PACKAGE TO:

Jeanette Duncan (2) H9-02 DE/08/21/06
INITIAL/DATE

COMMENTS:

SDG K0411 **SAF-RC-032**

Waste Site: 118-F-7

RECEIVED
SEP 25 2006
EDMC

Date: 11 August 2006
To: Washington Closure Hanford Inc. (technical representative)
From: TechLaw, Inc.
Project: 100-F Remaining Sites Burial Ground – Soil Full Protocol - Waste Site 118-F-7
Subject: Radiochemistry - Data Package No. K0411-EB

INTRODUCTION

This memo presents the results of data validation on Data Package No. K0411 prepared by Eberline Services (EB). 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	Date
J12L32	6/5/06	Soil	C	See note 1
J12L33	6/5/06	Soil	C	See note 1
J12L34	6/5/06	Soil	C	See note 1
J12L35	6/5/06	Soil	C	See note 1
J12L36	6/5/06	Soil	C	See note 1
J12L37	6/6/06	Soil	C	See note 1
J12L38	6/6/06	Soil	C	See note 1
J12L39	6/6/06	Soil	C	See note 1
J12L40	6/6/06	Soil	C	See note 1
J12L41	6/6/06	Soil	C	See note 1
J12L42	6/6/06	Soil	C	See note 1
J12L43	6/6/06	Soil	C	See note 1
J12L44	6/6/06	Soil	C	See note 1
J12L45	6/6/06	Soil	C	See note 1
J12L46	6/6/06	Soil	C	See note 1
J12LY7	6/6/06	Soil	C	See note 1

1 – Gamma spectroscopy, nickel-63 and total strontium.

Data validation was conducted in accordance with the Washington Closure Hanford Incorporated (WCH) validation statement of work and the 100 Area Remedial Action Sampling and Analysis Plan (DOE/RL-96-22, February 2005). Appendices 1 through 6 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
Appendix 6. Additional Data Requested by Client

DATA QUALITY PARAMETERS

- **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.

All holding times were acceptable.

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

All blank results were acceptable.

Field (Equipment) Blank

No equipment blanks were submitted for analysis.

- **Accuracy**

Accuracy is evaluated from laboratory control sample (LCS) or blank spike sample (BSS) batch samples and spiked samples from the analytical batch. Measured activities are compared to the known added amounts. The acceptable LCS or BSS and matrix spike (MS) recovery range is 70-130%. 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, or not qualified, depending on the activity of the individual sample. Results are rejected for LCS/BSS recoveries of less than 30% and tracer recoveries of less than 20%, and tracer recoveries of greater than 115% for detected results.

All accuracy results were acceptable.

- **Laboratory Duplicates**

Analytical precision is expressed by the relative percent differences (RPD) between the recoveries of duplicate matrix spike analyses performed on a sample in the analytical batch. Precision may alternatively be assessed using unspiked duplicate analyses performed on a sample in the analytical batch. If both sample and replicate activities (concentrations) are greater than five times the contract required detection limit (CRDL) and the RPD is less than 30%, no qualification is required. If either activity (concentration) is less than five times the CRDL, the RPD control limit is less than or equal to two times the CRDL. If the RPD is outside the applicable control limit, associated results are qualified as estimated detects or estimated non-detects.

Due to an RPD outside QC limits (77%), all radium-226 results were qualified as estimates and flagged "J".

Due to an RPD outside QC limits (61%), all thorium-228 results were qualified as estimates and flagged "J".

All other duplicate results were acceptable.

Field Duplicates

Three sets of field duplicates (J12L33/J12L34 & J12L39/J12L40 & J12L45/J12L46) were submitted for analysis. Field duplicates are compared using the same criteria as for laboratory duplicates. The RPD for thorium-228 in sample duplicate pair J12L39/J12L40 was outside QC limits (33%). The RPD for potassium-40 in sample duplicate pair J12L45/J12L46 was outside QC limits (30.7%). Under the WCH statement of work, no qualification is required. All other field duplicate results were acceptable.

- **Detection Levels**

Reported analytical detection levels for undetected analytes are compared against the remaining waste sites RQLs to ensure that laboratory detection levels meet the required criteria. Seventy-three analytes exceeded the RQL. Under the WCH statement of work, no qualification is required.

- **Completeness**

Data package No. K0411 was submitted for validation and verified for completeness. Completeness is based on the percentage of data determined to be valid (i.e., not rejected). The completion percentage was 100%.

MAJOR DEFICIENCIES

None found.

MINOR DEFICIENCIES

The following minor deficiencies were noted:

- Due to an RPD outside QC limits (77%), all radium-226 results were qualified as estimates and flagged "J".
- Due to an RPD outside QC limits (61%), all thorium-228 results were qualified as estimates and flagged "J".

Data flagged "J" indicates that the associated concentration is an estimate, but under the WCH statement of work, the data may be usable for decision-making purposes. All other validated results are considered accurate within the standard error associated with the methods.

Seventy-three analytes exceeded the RQL. Under the WCH statement of work, no qualification is required.

REFERENCES

WCH, Contract #20266, *Validation Statement of Work*, Washington Closure Hanford Incorporated, July 7, 2003.

DOE/RL-96-22, Rev. 4, *100 Area Remedial Action Sampling and Analysis Plan*, U.S. Department of Energy, February 2005.

Appendix 1

Glossary of Data Reporting Qualifiers

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 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 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 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

RADIOCHEMISTRY DATA QUALIFICATION SUMMARY*

SDG: K0411	REVIEWER: TLI	Project: 118-F-7	PAGE 1 OF 1
COMMENTS:			
COMPOUND	QUALIFIER	SAMPLES AFFECTED	REASON
Radium-226 Thorium-228	J	All	RPD

* - The Qualified Data Summary Table includes laboratory applied "U" qualifiers not specifically identified here. The laboratory applied "U" qualifiers are included to minimize misinterpretation of results contained in the table.

Appendix 3

Qualified Data Summary and Annotated Laboratory Reports

Project: WASHINGTON CLOSURE HANFORD																			
Laboratory: EB																			
Case	SDG: K0411																		
Sample Number		J12L32		J12L33		J12L34		J12L35		J12L36		J12L37		J12L38		J12L39		J12L40	
Remarks						Duplicate												Duplicate	
Sample Date		6/5/06		6/5/06		6/5/06		6/5/06		6/5/06		6/6/06		6/6/06		6/6/06		6/6/06	
Radiochemistry	RQL	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Tritium	10	-0.603	U	0.988	U	-0.414	U	-0.347	U	-0.494	U	0.021	U	2.20	U	-0.347	U	-0.356	U
Total strontium	1	0.060	U	0.003	U	-0.007	U	-0.024	U	0.032	U	0.085	U	0.823		0.132	U	0.098	U
Potassium-40		14.3		14.4		11.9		14.3		12.4		9.01		13.6		11.8		10.8	
Cobalt 60	0.05	U	U*	U	U*	U	U*	U	U*	U	U*	U	U*	U	U*	U	U*	U	U*
Cesium 137	0.05	U	U*	U	U*	U	U*	U	U*	U	U*	0.114		U	U*	0.191		0.225	
Radium-226		0.414	J	0.276	J	0.428	J	0.323	J	0.188	J	0.232	J	0.204	J	0.371	J	0.327	J
Radium-228		0.512		0.676		0.520		0.688		0.812		0.510		0.802		0.671		U	U
Europium 152	0.1	U	U*	U	U*	U	U*	U	U*	U	U*	U	U*	U	U*	U	U*	U	U*
Europium 154	0.1	U	U*	U	U*	U	U*	U	U*	U	U*	U	U*	U	U*	U	U*	U	U*
Europium 155	0.1	U	U*	U	U*	U	U*	U	U*	U	U*	U	U*	U	U*	U	U*	U	U*
Thorium-228		0.394	J	0.357	J	0.442	J	0.364	J	0.354	J	0.348	J	0.299	J	0.514	J	0.367	J
Thorium-232		0.512		0.676		0.520		0.688		0.812		0.510		0.802		0.671		U	U
Uranium-235(gea)		U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U
Uranium-238(gea)		U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U
Americium-241(gea)		U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U
Silver-108m		U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U

000010

* - RQL exceeded

Laboratory applied non-detect qualifiers "U" have been included in this table to minimize potential miss-interpretation of results. All other qualifiers shown were applied during validation.

Project: WASHINGTON CLOSURE HANFORD																			
Laboratory: EB																			
Case	SDG: K0411																		
Sample Number		J12L41		J12L42		J12L43		J12L44		J12L45		J12L46		J12LY7					
Remarks												Duplicate							
Sample Date		6/6/06		6/6/06		6/6/06		6/6/06		6/6/06		6/6/06		6/6/06					
Radiochemistry	RQL	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Nickel-63		0.021	U	0.856	U	0.306	U	-0.166	U	-0.320	U	0	U	-0.519	U				
Total strontium	1	0.051	U	0.249		0.008	U	0.070	U	0.057	U	0.065	U	0.168	U				
Potassium-40		10.3		9.77		13.9		6.23		10.2		13.9		11.5					
Cobalt 60	0.05	U	U*	U	U*	U	U*	U	U*	U	U*	U	U*	U	U*				
Cesium 137	0.05	0.204		0.403		0.150		U	U*	U	U*	U	U*	U	U*				
Radium-226		0.328	J	0.390	J	0.402	J	0.198	J	0.411	J	0.468	J	0.451	J				
Radium-228		0.580		0.733		0.621		U	U	0.474		U	U	U	U				
Europium 152	0.1	0.388		U	U*	U	U*	U	U*	U	U*	U	U*	U	U*				
Europium 154	0.1	U	U*	U	U*	U	U*	U	U*	U	U*	U	U*	U	U*				
Europium 155	0.1	U	U*	U	U*	U	U*	U	U*	U	U*	U	U*	U	U*				
Thorium-228		0.428	J	0.211	J	0.635	J	0.693	J	0.405	J	0.368	J	0.351	J				
Thorium-232		0.580		0.733		0.621		U	U	0.474		U	U	U	U				
Uranium-235(gea)		U	U	U	U	U	U	U	U	U	U	U	U	U	U				
Uranium-238(gea)		U	U	U	U	U	U	U	U	U	U	U	U	U	U				
Americium-241(gea)		U	U	U	U	U	U	U	U	U	U	U	U	U	U				
Silver-108m		U	U	U	U	U	U	U	U	U	U	U	U	U	U				

000011

* - RQL exceeded

Laboratory applied non-detect qualifiers "U" have been included in this table to minimize potential miss-interpretation of results. All other qualifiers shown were applied during validation.

EBERLINE SERVICES/RICHMOND

SAMPLE DELIVERY GROUP K0411

7792-001 J12L32

DATA SHEET

SDG	7792	Client/Case no	Hanford	SDG K0411	
Contact	Melissa C. Mannion	Contract	No. 630		
Lab sample id	R606080-01	Client sample id	J12L32		
Dept sample id	7792-001	Location/Matrix	118-F-7 BCL Verification	SOLID	
Received	06/08/06	Collected/Weight	06/05/06 13:45	830 g	
% solids	94.7	Custody/SAF No	RC-032-036	RC-032	

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI-FIERS	TEST
Nickel 63	13981-37-8	-0.603	1.2	2.1	30	U	NI_L
Total Strontium	SR-RAD	0.060	0.085	0.16	1.0	U	SR
Potassium 40	13966-00-2	14.3	2.6	1.6			GAM
Cobalt 60	10198-40-0	U		0.19	0.050	U	GAM
Cesium 137	10045-97-3	U		0.11	0.10	U	GAM
Radium 226	13982-63-3	0.414	0.17	0.17	0.10	J	GAM
Radium 228	15262-20-1	0.512	0.40	0.45	0.20		GAM
Europium 152	14683-23-9	U		0.16	0.10	U	GAM
Europium 154	15585-10-1	U		0.55	0.10	U	GAM
Europium 155	14391-16-3	U		0.13	0.10	U	GAM
Thorium 228	14274-82-9	0.394	0.089	0.080		J	GAM
Thorium 232	TH-232	0.512	0.40	0.45			GAM
Uranium 235	15117-96-1	U		0.18		U	GAM
Uranium 238	U-238	U		17		U	GAM
Americium 241	14596-10-2	U		0.13		U	GAM
Silver 108m	14391-65-2	U		0.057		U	GAM

100-F Remain.SitesBurialGrnds-SoilFP

6/11/06

Lab id	EBRLNE
Protocol	Hanford
Version	Ver 1.0
Form	DVD-DS
Version	3.06
Report date	06/28/06

EBERLINE SERVICES/RICHMOND

SAMPLE DELIVERY GROUP K0411

7792-002 J12L33

DATA SHEET

SDG	7792	Client/Case no	Hanford SDG K0411
Contact	Melissa C. Mannion	Contract	No. 630
Lab sample id	R606080-02	Client sample id	J12L33
Dept sample id	7792-002	Location/Matrix	118-F-7 BCL Verification SOLID
Received	06/08/06	Collected/Weight	06/05/06 14:00 729 g
% solids	93.9	Custody/SAF No	RC-032-036 RC-032

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI-FIERS	TEST
Nickel 63	13981-37-8	0.988	1.3	2.2	30	U	NI_L
Total Strontium	SR-RAD	0.003	0.086	0.18	1.0	U	SR
Potassium 40	13966-00-2	14.4	2.5	1.8			GAM
Cobalt 60	10198-40-0	U		0.14	0.050	U	GAM
Cesium 137	10045-97-3	U		0.094	0.10	U	GAM
Radium 226	13982-63-3	0.276	0.15	0.17	0.10	J	GAM
Radium 228	15262-20-1	0.676	0.46	0.47	0.20		GAM
Europium 152	14683-23-9	U		0.13	0.10	U	GAM
Europium 154	15585-10-1	U		0.42	0.10	U	GAM
Europium 155	14391-16-3	U		0.11	0.10	U J	GAM
Thorium 228	14274-82-9	0.357	0.082	0.077			GAM
Thorium 232	TH-232	0.676	0.46	0.47			GAM
Uranium 235	15117-96-1	U		0.16		U	GAM
Uranium 238	U-238	U		15		U	GAM
Americium 241	14596-10-2	U		0.11		U	GAM
Silver 108m	14391-65-2	U		0.049		U	GAM

100-F Remain.SitesBurialGrnds-SoilFP

K 8/11/06

Lab id	EBRLNE
Protocol	Hanford
Version	Ver 1.0
Form	DVD-DS
Version	3.06
Report date	06/28/06

EBERLINE SERVICES/RICHMOND

SAMPLE DELIVERY GROUP K0411

7792-003 J12L34

DATA SHEET

SDG	7792	Client/Case no	Hanford	SDG K0411
Contact	Melissa C. Mannion	Contract	No. 630	
Lab sample id	R606080-03	Client sample id	J12L34	
Dept sample id	7792-003	Location/Matrix	118-F-7 BCL Verification	SOLID
Received	06/08/06	Collected/Weight	06/05/06 14:00	717 g
% solids	94.2	Custody/SAF No	RC-032-036	RC-032

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI-FIERS	TEST
Nickel 63	13981-37-8	-0.414	1.3	2.2	30	U	NI_L
Total Strontium	SR-RAD	-0.007	0.091	0.19	1.0	U	SR
Potassium 40	13966-00-2	11.9	2.5	0.75			GAM
Cobalt 60	10198-40-0	U		0.10	0.050	U	GAM
Cesium 137	10045-97-3	U		0.085	0.10	U	GAM
Radium 226	13982-63-3	0.428	0.17	0.17	0.10	J	GAM
Radium 228	15262-20-1	0.520	0.34	0.36	0.20		GAM
Europium 152	14683-23-9	U		0.20	0.10	U	GAM
Europium 154	15585-10-1	U		0.29	0.10	U	GAM
Europium 155	14391-16-3	U		0.21	0.10	U	GAM
Thorium 228	14274-82-9	0.442	0.095	0.096		J	GAM
Thorium 232	TH-232	0.520	0.34	0.36			GAM
Uranium 235	15117-96-1	U		0.28		U	GAM
Uranium 238	U-238	U		11		U	GAM
Americium 241	14596-10-2	U		0.31		U	GAM
Silver 108m	14391-65-2	U		0.059		U	GAM

100-F Remain.SitesBurialGrnds-SoilFP

8/11/06

Lab id	EBRLNE
Protocol	Hanford
Version	Ver 1.0
Form	DVD-DS
Version	3.06
Report date	06/28/06

EBERLINE SERVICES/RICHMOND

SAMPLE DELIVERY GROUP K0411

7792-004 J12L35

DATA SHEET

SDG	7792	Client/Case no	Hanford	SDG K0411
Contact	Melissa C. Mannion	Contract	No. 630	
Lab sample id	R606080-04	Client sample id	J12L35	
Dept sample id	7792-004	Location/Matrix	118-F-7 BCL Verification	SOLID
Received	06/08/06	Collected/Weight	06/05/06 14:15	801 g
% solids	95.8	Custody/SAF No	RC-032-036	RC-032

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI-FIERS	TEST
Nickel 63	13981-37-8	-0.347	1.3	2.3	30	U	NI_L
Total Strontium	SR-RAD	-0.024	0.089	0.19	1.0	U	SR
Potassium 40	13966-00-2	14.3	2.5	1.4			GAM
Cobalt 60	10198-40-0	U		0.18	0.050	U	GAM
Cesium 137	10045-97-3	U		0.12	0.10	U	GAM
Radium 226	13982-63-3	0.323	0.18	0.19	0.10	J	GAM
Radium 228	15262-20-1	0.688	0.52	0.53	0.20		GAM
Europium 152	14683-23-9	U		0.15	0.10	U	GAM
Europium 154	15585-10-1	U		0.56	0.10	U	GAM
Europium 155	14391-16-3	U		0.12	0.10	U	GAM
Thorium 228	14274-82-9	0.364	0.094	0.084		J	GAM
Thorium 232	TH-232	0.688	0.52	0.53			GAM
Uranium 235	15117-96-1	U		0.17		U	GAM
Uranium 238	U-238	U		18		U	GAM
Americium 241	14596-10-2	U		0.12		U	GAM
Silver 108m	14391-65-2	U		0.054		U	GAM

100-F Remain.SitesBurialGrnds-SoilFP

8/11/06

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Form	DVD-DS
Version	3.06
Report date	06/28/06

EBERLINE SERVICES/RICHMOND

SAMPLE DELIVERY GROUP K0411

7792-005 J12L36

DATA SHEET

SDG	7792	Client/Case no	Hanford	SDG_K0411
Contact	Melissa C. Mannion	Contract	No. 630	
Lab sample id	R606080-05	Client sample id	J12L36	
Dept sample id	7792-005	Location/Matrix	118-F-7 BCL Verification	SOLID
Received	06/08/06	Collected/Weight	06/05/06 14:30	808 g
% solids	95.3	Custody/SAF No	RC-032-036	RC-032

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI-FIERS	TEST
Nickel 63	13981-37-8	-0.494	1.3	2.3	30	U	NI_L
Total Strontium	SR-RAD	0.032	0.10	0.20	1.0	U	SR
Potassium 40	13966-00-2	12.4	3.0	2.3			GAM
Cobalt 60	10198-40-0	U		0.16	0.050	U	GAM
Cesium 137	10045-97-3	U		0.099	0.10	U	GAM
Radium 226	13982-63-3	0.188	0.18	0.20	0.10	U J	GAM
Radium 228	15262-20-1	0.812	0.64	0.61	0.20		GAM
Europium 152	14683-23-9	U		0.15	0.10	U	GAM
Europium 154	15585-10-1	U		0.48	0.10	U	GAM
Europium 155	14391-16-3	U		0.12	0.10	U	GAM
Thorium 228	14274-82-9	0.354	0.084	0.083		J	GAM
Thorium 232	TH-232	0.812	0.64	0.61			GAM
Uranium 235	15117-96-1	U		0.17		U	GAM
Uranium 238	U-238	U		15		U	GAM
Americium 241	14596-10-2	U		0.12		U	GAM
Silver 108m	14391-65-2	U		0.054		U	GAM

100-F Remain.SitesBurialGrnds-SoilFP

8/11/06

Lab id	EBRLNE
Protocol	Hanford
Version	Ver 1.0
Form	DVD-DS
Version	3.06
Report date	06/28/06

EBERLINE SERVICES/RICHMOND

SAMPLE DELIVERY GROUP K0411

7792-006 J12L37

DATA SHEET

SDG	7792	Client/Case no	Hanford SDG K0411
Contact	Melissa C. Mannion	Contract	No. 630
Lab sample id	R606080-06	Client sample id	J12L37
Dept sample id	7792-006	Location/Matrix	118-F-7 ACL Verification SOLID
Received	06/08/06	Collected/Weight	06/06/06 08:15 604 g
% solids	94.4	Custody/SAF No	RC-032-037 RC-032

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI-FIERS	TEST
Nickel 63	13981-37-8	0.021	1.4	2.4	30	U	NI_L
Total Strontium	SR-RAD	0.085	0.11	0.20	1.0	U	SR
Potassium 40	13966-00-2	9.01	2.7	0.86			GAM
Cobalt 60	10198-40-0	U		0.096	0.050	U	GAM
Cesium 137	10045-97-3	0.114	0.058	0.066	0.10		GAM
Radium 226	13982-63-3	0.232	0.18	0.19	0.10	J	GAM
Radium 228	15262-20-1	0.510	0.35	0.35	0.20		GAM
Europium 152	14683-23-9	U		0.20	0.10	U	GAM
Europium 154	15585-10-1	U		0.25	0.10	U	GAM
Europium 155	14391-16-3	U		0.21	0.10	U J	GAM
Thorium 228	14274-82-9	0.348	0.082	0.089			GAM
Thorium 232	TH-232	0.510	0.35	0.35			GAM
Uranium 235	15117-96-1	U		0.30		U	GAM
Uranium 238	U-238	U		8.9		U	GAM
Americium 241	14596-10-2	U		0.27		U	GAM
Silver 108m	14391-65-2	U		0.052		U	GAM

100-F Remain.SitesBurialGrnds-SoilFP

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

SAMPLE DELIVERY GROUP K0411

7792-007 J12L38

DATA SHEET

SDG	7792	Client/Case no	Hanford	SDG K0411
Contact	Melissa C. Mannion	Contract	No. 630	
Lab sample id	R606080-07	Client sample id	J12L38	
Dept sample id	7792-007	Location/Matrix	118-F-7 ACL Verification	SOLID
Received	06/08/06	Collected/Weight	06/06/06 08:30	697 g
% solids	95.4	Custody/SAF No	RC-032-037	RC-032

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI-FIERS	TEST
Nickel 63	13981-37-8	2.20	1.4	2.3	30	U	NI_L
Total Strontium	SR-RAD	0.823	0.18	0.21	1.0		SR
Potassium 40	13966-00-2	13.6	2.6	1.6			GAM
Cobalt 60	10198-40-0	U		0.15	0.050	U	GAM
Cesium 137	10045-97-3	U		0.13	0.10	U	GAM
Radium 226	13982-63-3	0.204	0.15	0.18	0.10	J	GAM
Radium 228	15262-20-1	0.802	0.55	0.57	0.20		GAM
Europium 152	14683-23-9	U		0.17	0.10	U	GAM
Europium 154	15585-10-1	U		0.50	0.10	U	GAM
Europium 155	14391-16-3	U		0.12	0.10	U	GAM
Thorium 228	14274-82-9	0.299	0.082	0.080		J	GAM
Thorium 232	TH-232	0.802	0.55	0.57			GAM
Uranium 235	15117-96-1	U		0.18		U	GAM
Uranium 238	U-238	U		19		U	GAM
Americium 241	14596-10-2	U		0.12		U	GAM
Silver 108m	14391-65-2	U		0.058		U	GAM

100-F Remain.SitesBurialGrnds-SoilFP

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Lab id	EBRLNE
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EBERLINE SERVICES/RICHMOND

SAMPLE DELIVERY GROUP K0411

7792-008 J12L39

DATA SHEET

SDG	7792	Client/Case no	Hanford	SDG K0411	
Contact	Melissa C. Mannion	Contract	No. 630		
Lab sample id	R606080-08	Client sample id	J12L39		
Dept sample id	7792-008	Location/Matrix	118-F-7 ACL Verification	SOLID	
Received	06/08/06	Collected/Weight	06/06/06 08:45	683 g	
% solids	95.0	Custody/SAF No	RC-032-037	RC-032	

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI-FIERS	TEST
Nickel 63	13981-37-8	-0.347	1.3	2.3	30	U	NI_L
Total Strontium	SR-RAD	0.132	0.13	0.23	1.0	U	SR
Potassium 40	13966-00-2	11.8	1.4	0.57			GAM
Cobalt 60	10198-40-0	U		0.075	0.050	U	GAM
Cesium 137	10045-97-3	0.191	0.061	0.070	0.10		GAM
Radium 226	13982-63-3	0.371	0.14	0.14	0.10	J	GAM
Radium 228	15262-20-1	0.671	0.25	0.27	0.20		GAM
Europium 152	14683-23-9	U		0.15	0.10	U	GAM
Europium 154	15585-10-1	U		0.25	0.10	U	GAM
Europium 155	14391-16-3	U		0.15	0.10	U	GAM
Thorium 228	14274-82-9	0.514	0.081	0.080		J	GAM
Thorium 232	TH-232	0.671	0.25	0.27			GAM
Uranium 235	15117-96-1	U		0.24		U	GAM
Uranium 238	U-238	U		8.5		U	GAM
Americium 241	14596-10-2	U		0.074		U	GAM
Silver 108m	14391-65-2	U		0.049		U	GAM

100-F Remain.SitesBurialGrnds-SoilFP

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Lab id	EBRLNE
Protocol	Hanford
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EBERLINE SERVICES/RICHMOND

SAMPLE DELIVERY GROUP K0411

7792-009 J12L40

DATA SHEET

SDG	7792	Client/Case no	Hanford	SDG_K0411
Contact	Melissa C. Mannion	Contract	No. 630	
Lab sample id	R606080-09	Client sample id	J12L40	
Dept sample id	7792-009	Location/Matrix	118-F-7 ACL Verification	SOLID
Received	06/08/06	Collected/Weight	06/06/06 08:45	666 g
% solids	95.1	Custody/SAF No	RC-032-037	RC-032

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI-FIERS	TEST
Nickel 63	13981-37-8	-0.356	1.4	2.3	30	U	NI_L
Total Strontium	SR-RAD	0.098	0.11	0.21	1.0	U	SR
Potassium 40	13966-00-2	10.8	2.7	0.61			GAM
Cobalt 60	10198-40-0	U		0.095	0.050	U	GAM
Cesium 137	10045-97-3	0.225	0.086	0.089	0.10		GAM
Radium 226	13982-63-3	0.327	0.14	0.13	0.10	J	GAM
Radium 228	15262-20-1	U		0.53	0.20	U	GAM
Europium 152	14683-23-9	U		0.20	0.10	U	GAM
Europium 154	15585-10-1	U		0.24	0.10	U	GAM
Europium 155	14391-16-3	U		0.22	0.10	U	GAM
Thorium 228	14274-82-9	0.367	0.079	0.088		J	GAM
Thorium 232	TH-232	U		0.53		U	GAM
Uranium 235	15117-96-1	U		0.31		U	GAM
Uranium 238	U-238	U		9.4		U	GAM
Americium 241	14596-10-2	U		0.27		U	GAM
Silver 108m	14391-65-2	U		0.059		U	GAM

100-F Remain.SitesBurialGrnds-SoilFP

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EBERLINE SERVICES/RICHMOND

SAMPLE DELIVERY GROUP K0411

7792-010 J12L41

DATA SHEET

SDG	7792	Client/Case no	Hanford	SDG K0411	
Contact	Melissa C. Mannion	Contract	No. 630		
Lab sample id	R606080-10	Client sample id	J12L41		
Dept sample id	7792-010	Location/Matrix	118-F-7 ACL Verification	SOLID	
Received	06/08/06	Collected/Weight	06/06/06 09:00	772 g	
% solids	94.8	Custody/SAF No	RC-032-037	RC-032	

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI-FIERS	TEST
Nickel 63	13981-37-8	0.021	1.4	2.3	30	U	NI_L
Total Strontium	SR-RAD	0.051	0.11	0.21	1.0	U	SR
Potassium 40	13966-00-2	10.3	2.6	0.75			GAM
Cobalt 60	10198-40-0	U		0.11	0.050	U	GAM
Cesium 137	10045-97-3	0.204	0.089	0.091	0.10		GAM
Radium 226	13982-63-3	0.328	0.14	0.13	0.10	J	GAM
Radium 228	15262-20-1	0.580	0.41	0.41	0.20		GAM
Europium 152	14683-23-9	0.388	0.14	0.20	0.10		GAM
Europium 154	15585-10-1	U		0.30	0.10	U	GAM
Europium 155	14391-16-3	U		0.24	0.10	U	GAM
Thorium 228	14274-82-9	0.428	0.15	0.17		J	GAM
Thorium 232	TH-232	0.580	0.41	0.41			GAM
Uranium 235	15117-96-1	U		0.33		U	GAM
Uranium 238	U-238	U		12		U	GAM
Americium 241	14596-10-2	U		0.34		U	GAM
Silver 108m	14391-65-2	U		0.061		U	GAM

100-F Remain.SitesBurialGrnds-SoilFP

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EBERLINE SERVICES/RICHMOND

SAMPLE DELIVERY GROUP K0411

7792-011 J12L42

DATA SHEET

SDG	7792	Client/Case no	Hanford	SDG K0411	
Contact	Melissa C. Mannion	Contract	No. 630		
Lab sample id	R606080-11	Client sample id	J12L42		
Dept sample id	7792-011	Location/Matrix	118-F-7 Shal.Zn.Verif.	SOLID	
Received	06/08/06	Collected/Weight	06/06/06 12:00	734 g	
% solids	97.9	Custody/SAF No	RC-032-038	RC-032	

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI-FIERS	TEST
Nickel 63	13981-37-8	0.856	1.4	2.3	30	U	NI_L
Total Strontium	SR-RAD	0.249	0.14	0.23	1.0		SR
Potassium 40	13966-00-2	9.77	2.5	2.1			GAM
Cobalt 60	10198-40-0	U		0.23	0.050	U	GAM
Cesium 137	10045-97-3	0.403	0.15	0.14	0.10		GAM
Radium 226	13982-63-3	0.390	0.17	0.17	0.10	J	GAM
Radium 228	15262-20-1	0.733	0.61	0.59	0.20		GAM
Europium 152	14683-23-9	U		0.18	0.10	U	GAM
Europium 154	15585-10-1	U		0.64	0.10	U	GAM
Europium 155	14391-16-3	U		0.13	0.10	U	GAM
Thorium 228	14274-82-9	0.211	0.084	0.090		J	GAM
Thorium 232	TH-232	0.733	0.61	0.59			GAM
Uranium 235	15117-96-1	U		0.18		U	GAM
Uranium 238	U-238	U		21		U	GAM
Americium 241	14596-10-2	U		0.13		U	GAM
Silver 108m	14391-65-2	U		0.059		U	GAM

100-F Remain.SitesBurialGrnds-SoilFP

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Lab id	EBRLNE
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EBERLINE SERVICES/RICHMOND

SAMPLE DELIVERY GROUP K0411

7792-012 J12L43

DATA SHEET

SDG	7792	Client/Case no	Hanford	SDG K0411	
Contact	Melissa C. Mannion	Contract	No. 630		
Lab sample id	R606080-12	Client sample id	J12L43		
Dept sample id	7792-012	Location/Matrix	118-F-7 Shal.Zn.Verif.	SOLID	
Received	06/08/06	Collected/Weight	06/06/06 12:15	739 g	
% solids	96.3	Custody/SAF No	RC-032-038	RC-032	

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI-FIERS	TEST
Nickel 63	13981-37-8	0.306	1.4	2.3	30	U	NI_L
Total Strontium	SR-RAD	0.008	0.11	0.22	1.0	U	SR
Potassium 40	13966-00-2	13.9	1.9	1.2			GAM
Cobalt 60	10198-40-0	U		0.12	0.050	U	GAM
Cesium 137	10045-97-3	0.150	0.11	0.11	0.10		GAM
Radium 226	13982-63-3	0.402	0.18	0.21	0.10	J	GAM
Radium 228	15262-20-1	0.621	0.49	0.56	0.20		GAM
Europium 152	14683-23-9	U		0.27	0.10	U	GAM
Europium 154	15585-10-1	U		0.31	0.10	U	GAM
Europium 155	14391-16-3	U		0.22	0.10	U	GAM
Thorium 228	14274-82-9	0.635	0.14	0.16		J	GAM
Thorium 232	TH-232	0.621	0.49	0.56			GAM
Uranium 235	15117-96-1	U		0.35		U	GAM
Uranium 238	U-238	U		13		U	GAM
Americium 241	14596-10-2	U		0.25		U	GAM
Silver 108m	14391-65-2	U		0.077		U	GAM

100-F Remain.SitesBurialGrnds-SoilFP

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Lab id	EBRLNE
Protocol	Hanford
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EBERLINE SERVICES/RICHMOND

SAMPLE DELIVERY GROUP K0411

7792-013 J12L44

DATA SHEET

SDG	7792	Client/Case no	Hanford	SDG K0411	
Contact	Melissa C. Mannion	Contract	No. 630		
Lab sample id	R606080-13	Client sample id	J12L44		
Dept sample id	7792-013	Location/Matrix	118-F-7 Shal.Zn.Verif.	SOLID	
Received	06/08/06	Collected/Weight	06/06/06 12:30	848 g	
% solids	97.7	Custody/SAF No	RC-032-038	RC-032	

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI-FIERS	TEST
Nickel 63	13981-37-8	-0.166	1.4	2.3	30	U	NI_L
Total Strontium	SR-RAD	0.070	0.14	0.26	1.0	U	SR
Potassium 40	13966-00-2	6.23	0.95	0.52			GAM
Cobalt 60	10198-40-0	U		0.063	0.050	U	GAM
Cesium 137	10045-97-3	U		0.10	0.10	U	GAM
Radium 226	13982-63-3	0.198	0.10	0.11	0.10	J	GAM
Radium 228	15262-20-1	U		0.36	0.20	U	GAM
Europium 152	14683-23-9	U		0.18	0.10	U	GAM
Europium 154	15585-10-1	U		0.23	0.10	U	GAM
Europium 155	14391-16-3	U		0.13	0.10	U	GAM
Thorium 228	14274-82-9	0.693	0.15	0.14		J	GAM
Thorium 232	TH-232	U		0.36		U	GAM
Uranium 235	15117-96-1	U		0.29		U	GAM
Uranium 238	U-238	U		8.3		U	GAM
Americium 241	14596-10-2	U		0.079		U	GAM
Silver 108m	14391-65-2	U		0.048		U	GAM

100-F Remain.SitesBurialGrnds-SoilFP

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Lab id	EBRLNE
Protocol	Hanford
Version	Ver 1.0
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Version	3.06
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EBERLINE SERVICES/RICHMOND

SAMPLE DELIVERY GROUP K0411

7792-014 J12L45

DATA SHEET

SDG	7792	Client/Case no	Hanford	SDG K0411	
Contact	Melissa C. Mannion	Contract	No. 630		
Lab sample id	R606080-14	Client sample id	J12L45		
Dept sample id	7792-014	Location/Matrix	118-F-7 Shal.Zn.Verif.	SOLID	
Received	06/08/06	Collected/Weight	06/06/06 12:45	691 g	
% solids	95.9	Custody/SAF No	RC-032-038	RC-032	

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI-FIERS	TEST
Nickel 63	13981-37-8	-0.320	1.3	2.2	30	U	NI_L
Total Strontium	SR-RAD	0.057	0.096	0.18	1.0	U	SR
Potassium 40	13966-00-2	10.2	2.8	0.95			GAM
Cobalt 60	10198-40-0	U		0.11	0.050	U	GAM
Cesium 137	10045-97-3	U		0.098	0.10	U	GAM
Radium 226	13982-63-3	0.411	0.14	0.12	0.10	J	GAM
Radium 228	15262-20-1	0.474	0.30	0.30	0.20		GAM
Europium 152	14683-23-9	U		0.21	0.10	U	GAM
Europium 154	15585-10-1	U		0.25	0.10	U	GAM
Europium 155	14391-16-3	U		0.22	0.10	U	GAM
Thorium 228	14274-82-9	0.405	0.088	0.093		J	GAM
Thorium 232	TH-232	0.474	0.30	0.30			GAM
Uranium 235	15117-96-1	U		0.32		U	GAM
Uranium 238	U-238	U		9.7		U	GAM
Americium 241	14596-10-2	U		0.28		U	GAM
Silver 108m	14391-65-2	U		0.057		U	GAM

100-F Remain.SitesBurialGrnds-SoilFP

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Lab id	EBRLNE
Protocol	Hanford
Version	Ver 1.0
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Version	3.06
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EBERLINE SERVICES/RICHMOND

SAMPLE DELIVERY GROUP K0411

7792-015 J12L46

DATA SHEET

SDG	7792	Client/Case no	Hanford	SDG K0411	
Contact	Melissa C. Mannion	Contract	No. 630		
Lab sample id	R606080-15	Client sample id	J12L46		
Dept sample id	7792-015	Location/Matrix	118-F-7 Shal.Zn.Verif.	SOLID	
Received	06/08/06	Collected/Weight	06/06/06 12:45	667 g	
% solids	96.1	Custody/SAF No	RC-032-038	RC-032	

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI-FIERS	TEST
Nickel 63	13981-37-8	0	1.4	2.3	30	U	NI_L
Total Strontium	SR-RAD	0.065	0.11	0.22	1.0	U	SR
Potassium 40	13966-00-2	13.9	2.4	1.2			GAM
Cobalt 60	10198-40-0	U		0.20	0.050	U	GAM
Cesium 137	10045-97-3	U		0.14	0.10	U	GAM
Radium 226	13982-63-3	0.468	0.21	0.21	0.10	J	GAM
Radium 228	15262-20-1	U		1.2	0.20	U	GAM
Europium 152	14683-23-9	U		0.16	0.10	U	GAM
Europium 154	15585-10-1	U		0.54	0.10	U	GAM
Europium 155	14391-16-3	U		0.13	0.10	U	GAM
Thorium 228	14274-82-9	0.368	0.093	0.086		J	GAM
Thorium 232	TH-232	U		1.2		U	GAM
Uranium 235	15117-96-1	U		0.19		U	GAM
Uranium 238	U-238	U		19		U	GAM
Americium 241	14596-10-2	U		0.12		U	GAM
Silver 108m	14391-65-2	U		0.057		U	GAM

100-F Remain.SitesBurialGrnds-SoilFP

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

SAMPLE DELIVERY GROUP K0411

7792-016 J12LY7

DATA SHEET

SDG	7792	Client/Case no	Hanford	SDG K0411
Contact	Melissa C. Mannion	Contract	No. 630	
Lab sample id	R606080-16	Client sample id	J12LY7	
Dept sample id	7792-016	Location/Matrix	118-F-7 Shl.Zn.Ver.Focus	SOLID
Received	06/08/06	Collected/Weight	06/06/06 13:00	596 g
% solids	95.6	Custody/SAF No	RC-032-042	RC-032

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI-FIERS	TEST
Nickel 63	13981-37-8	-0.519	1.4	2.3	30	U	NI_L
Total Strontium	SR-RAD	0.168	0.13	0.23	1.0	U	SR
Potassium 40	13966-00-2	11.5	2.4	1.5			GAM
Cobalt 60	10198-40-0	U		0.18	0.050	U	GAM
Cesium 137	10045-97-3	U		0.11	0.10	U	GAM
Radium 226	13982-63-3	0.451	0.19	0.18	0.10	J	GAM
Radium 228	15262-20-1	U		0.90	0.20	U	GAM
Europium 152	14683-23-9	U		0.15	0.10	U	GAM
Europium 154	15585-10-1	U		0.48	0.10	U	GAM
Europium 155	14391-16-3	U		0.13	0.10	U	GAM
Thorium 228	14274-82-9	0.351	0.087	0.084		J	GAM
Thorium 232	TH-232	U		0.90		U	GAM
Uranium 235	15117-96-1	U		0.17		U	GAM
Uranium 238	U-238	U		16		U	GAM
Americium 241	14596-10-2	U		0.12		U	GAM
Silver 108m	14391-65-2	U		0.059		U	GAM

100-F Remain.SitesBurialGrnds-SoilFP

8/11/06

Lab id	EBRLNE
Protocol	Hanford
Version	Ver 1.0
Form	DVD-DS
Version	3.06
Report date	06/28/06

Appendix 4

Laboratory Narrative and Chain-of-Custody Documentation

1.0 GENERAL

Washington Closure Hanford (WCH) Sample Delivery Group K0411 was composed of sixteen solid (soil) samples designated under SAF No. RC-032 with a Project Designation of: 100-F Remaining Sites Burial Grounds – Soil Full Protocol.

The samples were received as stated on the Chain-of-Custody document. Any discrepancies are noted on the Eberline Services Sample Receipt Checklist. The results ere transmitted to WCH via e-mail on June 28, 2006.

2.0 ANALYSIS NOTES

2.1 Nickel-63 Analysis

No problems were encountered during the course of the analyses.

2.2 Total Strontium Analysis

No problems were encountered during the course of the analyses.

2.3 Gamma Spectroscopy

No 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 Mannion
Melissa C. Mannion
Senior Program Manager

6/29/6
Date

Washington Closure Hanford	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	RC-032-036	Page 1 of 1
Collector: Coffman	Company Contact: R.T. Coffman; Telephone No.: 528-6409	Project Coordinator: KESSNER, JH	Price Code / Data Turnaround
Project Designation: 100-F Remaining Sites Burial Grounds - Soil Full Protocol	Sampling Location: 118-F-7 BCL Verification K0411 (7792)	SAF No.: RC-032	Air Quality ☐ 15 DAYS
Ice Chest No.: AFS-04-004	Field Logbook No.: EFL-1174-1; COA: R118F72000	Method of Shipment: Fed Ex	
Shipped To: EBERLINE SERVICES BLIONVILLE	Offsite Property No.: ~~A060496~~ A060498 TRE 6-6-06	Bill of Lading/Air Bill No.: See OSPC	

POSSIBLE SAMPLE HAZARDS/REMARKS

NA

Special Handling and/or Storage

~~Cool 4 degrees C~~ TRE 6-6-06

N/A

000030

SAMPLE ANALYSIS													
Preservation				None	None	None							
Type of Container				P	P	P							
No. of Container(s)				1	1	1							
Volume				250g	500mL	60mL							
				See item (1) in Special Instructions.	See item (2) in Special Instructions.	Nickel-63; Strontium-89,90 -- Total Sr							
Sample No.	Matrix *	Sample Date	Sample Time										
J12L32	SOIL	6/5/06	1345	X	X	X							A1
J12L33	SOIL		1400	X	X	X							A2
J12L34	SOIL		1400	X	X	X							A2 D
J12L35	SOIL		1415	X	X	X							A3
J12L36	SOIL	6/5/06	1430	X	X	X							A4

CHAIN OF POSSESSION	Sign/Print Names	Date/Time
Relinquished By/Removed From: RT Coffman / RT Coffman	Received By/Stored In: Refer #2C, 3728	2030 6/5/06
Relinquished By/Removed From: 3728 #2C	Received By/Stored In: JR Edmundson	6-7-06 1045
Relinquished By/Removed From: JR Edmundson	Received By/Stored In: Fed Ex	6-7-06 1500
Relinquished By/Removed From: Fed Ex	Received By/Stored In: MFM	06/08/06 9:15
Relinquished By/Removed From	Received By/Stored In	
Relinquished By/Removed From	Received By/Stored In	

SPECIAL INSTRUCTIONS

(1) ICP Metals - 6010 (Client List) {Aluminum, Antimony, Arsenic, Barium, Beryllium, Boron, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Molybdenum, Nickel, Potassium, Selenium, Silicon, Silver, Sodium, Vanadium, Zinc}; Mercury - 7471 - (CV)
(2) Gamma Spectroscopy (TCL List) {Cesium-137, Cobalt-60, Europium-152, Europium-154, Europium-155}; Gamma Spec - Add-on {Silver-108 metastable}

Personnel not available to relinquish samples from 3728 Ref # 2C on 6/7/06

Matrix *

S=Soil
SE=Sediment
SO=Solid
SL=Sludge
W = Water
O=Oil
A=Air
DS=Drum Solids
DL=Drum Liquids
T=Tissue
WI=Wipe
L=Liquid
V=Vegetation
X=Other

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

BHI-EE-011 (08/29/2005)

Washington Closure Hanford	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	RC-032-037	Page 1 of 1

Collector: Coffman	Company Contact: R.T. Coffman	Telephone No.: 528-6409	Project Coordinator: KESSNER, JH
Price Code	Data Turnaround: 15 DAYS	Air Quality ☐	
Project Designation: 100-F Remaining Sites Burial Grounds - Soil Full Protocol	Sampling Location: 118-F-7 ACL Verification K0411 (7792)	SAF No.: RC-032	
Ice Chest No.: AFS-04-004	Field Logbook No.: EFL-1174-1	COA: R118F72000	Method of Shipment: Fed Ex
Shipped To: EBERLINE SERVICES, LIONVILLE	Offsite Property No.: A060498	Bill of Lading/Air Bill No.: See OSPC	

POSSIBLE SAMPLE HAZARDS/REMARKS

NA

Special Handling and/or Storage

~~Cool 4 degrees C~~ TRE 6-7-06

Preservation	None	None	None RTC 6/6/06								
Type of Container	P	P	~~P~~ VG								
No. of Container(s)	1	1	1								
Volume	250g	500mL	60mL								
SAMPLE ANALYSIS	See item (1) in Special Instructions.	See item (2) in Special Instructions	Nickel-63, Strontium-89,90 -- Total Sr								

000031

Sample No.	Matrix *	Sample Date	Sample Time										
J12L37	SOIL	6/6/06	0815	RTC 6/6/06	X	X							A1
J12L38	SOIL		0830		X	X							A2
J12L39	SOIL		0845		X	X							A3
J12L40	SOIL		0845		X	X							A3D
J12L41	SOIL	6/6/06	0900		X	X							A4

CHAIN OF POSSESSION — **Sign/Print Names**

Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
RTCOFFMAN/RTCoffman 6/6/06	1800	REFER #2C, 3728	1800 6/6/06
3728 #2C 6-7-06	1115	T.R. Edmundson JR Edmundson 6-7-06	1115
T.R. Edmundson WCH JR Edmundson 6-7-06	1500	Fed Ex	
FED EX		FW	06/08/06 9:15

SPECIAL INSTRUCTIONS

(1) ICP Metals - 6010 (Client List) {Aluminum, Antimony, Arsenic, Barium, Beryllium, Boron, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Molybdenum, Nickel, Potassium, Selenium, Silicon, Silver, Sodium, Vanadium, Zinc}; Mercury - 7471 - (CV)
(2) Gamma Spectroscopy (TCL List) {Cesium-137, Cobalt-60, Europium-152, Europium-154, Europium-155}; Gamma Spec - Add-on {Silver-108 metastable}

Personnel not available to relinquish samples from 3728 Ref #2C on 6/7/06

Matrix *

S=Soil
SE=Sediment
SO=Solid
Sl=Sludge
W = Water
O=Oil
A=Air
DS=Drum Solids
DL=Drum Liquids
T=Tissue
WI=Wipe
L=Liquid
V=Vegetation
X=Other

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

BHI-EE-011 (08/29/2005)

Washington Closure Hanford	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	RC-032-038	Page 1 of 1

Collector: Coffman	Company Contact: R.T. Coffman	Telephone No.: 528-6409	Project Coordinator: KESSNER, JH
Price Code	Data Turnaround: 15 DAYS		
Project Designation: 100-F Remaining Sites Burial Grounds - Soil Full Protocol	Sampling Location: 118-F-7 Shallow Zone Verification K0411 (7792)		SAF No.: RC-032
Air Quality ☐			
Ice Chest No.: AFS-04-004	Field Logbook No.: EFL-1174-1	COA: R118F72000	Method of Shipment: Fed Ex
Shipped To: EBERLINE SERVICES / LIONVILLE	Offsite Property No.: A060498		Bill of Lading/Air Bill No.: See OSPC

POSSIBLE SAMPLE HAZARDS/REMARKS

NA

Special Handling and/or Storage

Cool 4 degrees C TRE 6-7-06

000032

Preservation				None	None	None						
Type of Container				P	P	P						
No. of Container(s)				1	1	1						
Volume				250g	500mL	60mL						
SAMPLE ANALYSIS				See item (1) in Special Instructions	See item (2) in Special Instructions	Nickel-63; Strontium-89,90 -- Total Sr						
Sample No.	Matrix *	Sample Date	Sample Time									
J12L42	SOIL	6/6/06	1200		X	X						A1
J12L43	SOIL		1215		X	X						A2
J12L44	SOIL		1230		X	X						A3
J12L45	SOIL		1245		X	X						A4
J12L46	SOIL	6/6/06	1245		X	X						A4D

RTC 6/6/06

CHAIN OF POSSESSION — **Sign/Print Names**

Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
RT COFFMAN / RT Coffman	1805 6/6/06	REFER # 2C 3728	1800 6/6/06
3728 #2C	6-7-06 1115	RE Edmundson	6-7-06 1115
RE Edmundson WCH / JR Edmundson	6-7-06 1500	Fed Ex	
FED EX		MFM	06/08/06 9:15

SPECIAL INSTRUCTIONS

(1) ICP Metals - 6010 (Client List) {Aluminum, Antimony, Arsenic, Barium, Beryllium, Boron, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Molybdenum, Nickel, Potassium, Selenium, Silicon, Silver, Sodium, Vanadium, Zinc}; Mercury - 7471 - (CV)
(2) Gamma Spectroscopy (TCL List) {Cesium-137, Cobalt-60, Europium-152, Europium-154, Europium-155}; Gamma Spec - Add-on {Silver-108 metastable}

Personnel not available to Relinquish samples from 3728 Ref #2C on 6/7/06

Matrix *

S=Soil
SE=Sediment
SO=Solid
SI=Sludge
W = Water
O=Oil
A=Air
DS=Drum Solids
DL=Drum Liquids
T=Tissue
WI=Wipe
L=Liquid
V=Vegetation
X=Other

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

BHI-EE-011 (08/29/2005)

Washington Closure Hanford	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	RC-032-042	Page 1 of 1

Collector: Coffman	Company Contact: R.T. Coffman	Telephone No.: 528-6409	Project Coordinator: KESSNER, JH	Price Code	Data Turnaround
Project Designation: 100-F Remaining Sites Burial Grounds - Soil Full Protocol	Sampling Location: 118-F-7 Shallow Zone Verification Focus sample K0411 (7792)		SAF No.: RC-032	Air Quality ☐	15 DAYS
Ice Chest No.: APS-04-004	Field Logbook No.: EFL-1174-1	COA: R118F72000	Method of Shipment: Fed Ex		
Shipped To: EBERLINE SERVICES / LIONVILLE	Offsite Property No.: A060498		Bill of Lading/Air Bill No.: See OSPC		

POSSIBLE SAMPLE HAZARDS/REMARKS

NA

Special Handling and/or Storage

~~Cool 4 degrees C~~ TRC 6-7-06

000033

Preservation				None	None	None						
Type of Container				P	P	P						
No. of Container(s)				1	1	1						
Volume				250g	500mL	60mL						
SAMPLE ANALYSIS				See item (1) in Special Instructions.	See item (2) in Special Instructions.	Nickel-63; Strontium-89,90 -- Total Sr						
Sample No.	Matrix *	Sample Date	Sample Time									
J12LY7	SOIL	6/6/06	1300		X	X						

RTC 6/6/06

CHAIN OF POSSESSION	Sign/Print Names		
Relinquished By/Removed From: RT Coffman / RT Coffman 6/6/06	Date/Time: 1800	Received By/Stored In: REFER #2C, 3728 6/6/06	Date/Time: 1800
Relinquished By/Removed From: 3728 #2C 6-7-06	Date/Time: 1115	Received By/Stored In: TC Edmondson / TC Edmondson 6-7-06	Date/Time: 1115
Relinquished By/Removed From: TC Edmondson / TC Edmondson 6-7-06	Date/Time: 1500	Received By/Stored In: Fed Ex	Date/Time:
Relinquished By/Removed From: FED EX	Date/Time:	Received By/Stored In: FW	Date/Time: 06/08/06 9:15
Relinquished By/Removed From	Date/Time:	Received By/Stored In	Date/Time:
Relinquished By/Removed From	Date/Time:	Received By/Stored In	Date/Time:

SPECIAL INSTRUCTIONS

(1) ICP Metals - 6010 (Client List) {Aluminum, Antimony, Arsenic, Barium, Beryllium, Boron, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Molybdenum, Nickel, Potassium, Selenium, Silicon, Silver, Sodium, Vanadium, Zinc}; Mercury - 7471 - (CV)
(2) Gamma Spectroscopy (TCL List) {Cesium-137, Cobalt-60, Europium-152, Europium-154, Europium-155}; Gamma Spec - Add-on {Silver-108 metastable}

Personnel not available to Relinquish samples from 3728 Ref # 26 on 6/7/06

Matrix *

S=Soil
SE=Sediment
SO=Solid
SI=Sludge
W = Water
O=Oil
A=Air
DS=Drum Solids
DL=Drum Liquids
T=Tissue
WI=Wipe
L=Liquid
V=Vegetation
X=Other

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

BHI-EE-011 (08/29/2005)

Appendix 5

Data Validation Supporting Documentation

APPENDIX A

RADIOCHEMICAL DATA VALIDATION CHECKLIST

VALIDATION LEVEL:	A	B	C	D	E
PROJECT:	100-F 118-F-7		DATA PACKAGE:	K0411	
VALIDATOR:	TLJ	LAB: EB		DATE: 8/7/06	
			SDG:	K0411	
ANALYSES PERFORMED					
Gross Alpha/Beta	Strontium-90	Technetium-99	Alpha Spectroscopy	Gamma Spectroscopy	
Total Uranium	Radium-22	Tritium	Ni-63		
SAMPLES/MATRIX					
J12L32	J12L33	J12L34	J12L35	J12L36	J12L37
J12L38	J12L39	J12L40	J12L41	J12L42	J12L43
J12L44	J12L45	J12L46	J12L47		
					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: no FB

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

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:

radium-226 77% - J all

thorium-228 61% - J all

11. Field QC Samples (Levels C, D E) ..... ☐ 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: no FS or PA

39/40 th-228 - 33%

45/46 K-40 - 31%

12. Holding Times (All levels)

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

Comments:

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

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

Comments: _____

_____

_____

_____

_____

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: _____

_____

_____

_____

_____

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: 73 over

Appendix 6

Additional Documentation Requested by Client

EBERLINE SERVICES/RICHMOND

SAMPLE DELIVERY GROUP K0411

7792-018 Method Blank

METHOD BLANK

SDG	7792	Client/Case no	Hanford	SDG K0411	
Contact	Melissa C. Mannion	Contract	No. 630		
Lab sample id	R606080-18	Client sample id	Method Blank		
Dept sample id	7792-018	Material/Matrix		SOLID	
		SAF No	RC-032		

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI-FIERS	TEST
Nickel 63	13981-37-8	-0.464	1.2	2.1	30	U	NI_L
Total Strontium	SR-RAD	0.042	0.10	0.19	1.0	U	SR
Potassium 40	13966-00-2	U		1.5		U	GAM
Cobalt 60	10198-40-0	U		0.071	0.050	U	GAM
Cesium 137	10045-97-3	U		0.082	0.10	U	GAM
Radium 226	13982-63-3	U		0.15	0.10	U	GAM
Radium 228	15262-20-1	U		0.34	0.20	U	GAM
Europium 152	14683-23-9	U		0.19	0.10	U	GAM
Europium 154	15585-10-1	U		0.22	0.10	U	GAM
Europium 155	14391-16-3	U		0.17	0.10	U	GAM
Thorium 228	14274-82-9	U		0.10		U	GAM
Thorium 232	TH-232	U		0.34		U	GAM
Uranium 235	15117-96-1	U		0.26		U	GAM
Uranium 238	U-238	U		11		U	GAM
Americium 241	14596-10-2	U		0.17		U	GAM
Silver 108m	14391-65-2	U		0.059		U	GAM

100-F Remain.SitesBurialGrnds-SoilFP

QC-BLANK #57425

Lab id	EBRLNE
Protocol	Hanford
Version	Ver 1.0
Form	DVD-DS
Version	3.06
Report date	06/28/06

EBERLINE SERVICES/RICHMOND

SAMPLE DELIVERY GROUP K0411

7792-017

Lab Control Sample

LAB CONTROL SAMPLE

SDG 7792

Contact Melissa C. Mannion

Client/Case no Hanford SDG K0411

Contract No. 630

Lab sample id R606080-17

Dept sample id 7792-017

Client sample id Lab Control Sample

Material/Matrix SOLID

SAF No RC-032

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
Nickel 63	263	4.6	2.1	30		NI_L	268	11	98	84-116	80-120
Total Strontium	11.4	0.63	0.23	1.0		SR	10.7	0.43	106	81-119	80-120
Cobalt 60	3.14	0.23	0.082	0.050		GAM	3.12	0.12	101	74-126	80-120
Cesium 137	3.54	0.21	0.14	0.10		GAM	3.28	0.13	108	73-127	80-120

100-F Remain.SitesBurialGrnds-SoilFP

QC-LCS #57424

Lab id EBRLNE
Protocol Hanford
Version Ver 1.0
Form DVD-LCS
Version 3.06
Report date 06/28/06

EBERLINE SERVICES/RICHMOND

SAMPLE DELIVERY GROUP K0411

7792-019 J12L38

DUPLICATE

SDG	7792			Client/Case no	Hanford SDG K0411
Contact	Melissa C. Mannion			Contract	No. 630
	DUPLICATE		ORIGINAL		
Lab sample id	R606080-19	Lab sample id	R606080-07	Client sample id	J12L38
Dept sample id	7792-019	Dept sample id	7792-007	Location/Matrix	118-F-7 ACL Verification SOLID
		Received	06/08/06	Collected/Weight	06/06/06 08:30 697 g
% solids	95.4	% solids	95.4	Custody/SAF No	RC-032-037 RC-032

ANALYTE	DUPLICATE pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI-FIERS	TEST	ORIGINAL pCi/g	2σ ERR (COUNT)	MDA pCi/g	QUALI-FIERS	RPD %	3σ TOT	DER σ
Nickel 63	0.794	1.4	2.3	30	U	NI_L	2.20	1.4	2.3	U	-		1.4
Total Strontium	0.787	0.16	0.18	1.0		SR	0.823	0.18	0.21		4	50	0.3
Potassium 40	11.4	1.6	0.96			GAM	13.6	2.6	1.6		18	49	1.1
Cobalt 60	U		0.11	0.050	U	GAM	U		0.15	U	-		0.4
Cesium 137	U		0.10	0.10	U	GAM	U		0.13	U	-		0.4
Radium 226	0.461	0.17	0.17	0.10		GAM	0.204	0.15	0.18		77	108	2.2
Radium 228	0.794	0.43	0.39	0.20		GAM	0.802	0.55	0.57		1	135	0
Europium 152	U		0.23	0.10	U	GAM	U		0.17	U	-		0.4
Europium 154	U		0.27	0.10	U	GAM	U		0.50	U	-		0.8
Europium 155	U		0.21	0.10	U	GAM	U		0.12	U	-		0.7
Thorium 228	0.561	0.095	0.11			GAM	0.299	0.082	0.080		61	55	3.3
Thorium 232	0.794	0.43	0.39			GAM	0.802	0.55	0.57		1	135	0
Uranium 235	U		0.32		U	GAM	U		0.18	U	-		0.8
Uranium 238	U		9.5		U	GAM	U		19	U	-		0.9
Americium 241	U		0.39		U	GAM	U		0.12	U	-		1.3
Silver 108m	U		0.060		U	GAM	U		0.058	U	-		0

100-F Remain.SitesBurialGrnds-SoilFP

QC-DUP#7 57426

Lab id	EBRLNE
Protocol	Hanford
Version	Ver 1.0
Form	DVD-DUP
Version	3.06
Report date	06/28/06

Date: 11 August 2006
To: Washington Closure Hanford Inc. (technical representative)
From: TechLaw, Inc.
Project: 100-F Remaining Sites Burial Ground – Soil Full Protocol - Waste Site 100-F-7
Subject: Inorganics - Data Package No. K0411-LLI

INTRODUCTION

This memo presents the results of data validation on Data Package No. K0411 prepared by Lionville Laboratory Inc. (LLI). 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	Date
J12L32	6/5/06	Soil	C	See note 1
J12L33	6/5/06	Soil	C	See note 1
J12L34	6/5/06	Soil	C	See note 1
J12L35	6/5/06	Soil	C	See note 1
J12L36	6/5/06	Soil	C	See note 1
J12L37	6/6/06	Soil	C	See note 1
J12L38	6/6/06	Soil	C	See note 1
J12L39	6/6/06	Soil	C	See note 1
J12L40	6/6/06	Soil	C	See note 1
J12L41	6/6/06	Soil	C	See note 1
J12L42	6/6/06	Soil	C	See note 1
J12L43	6/6/06	Soil	C	See note 1
J12L44	6/6/06	Soil	C	See note 1
J12L45	6/6/06	Soil	C	See note 1
J12L46	6/6/06	Soil	C	See note 1
J12LY7	6/6/06	Soil	C	See note 1

1- ICP metals (6010B) and mercury (7471A).

Data validation was conducted in accordance with the Washington Closure Hanford (WCH) validation statement of work and the 100 Area Remedial Action Sampling and Analysis Plan (DOE/RL-96-22, February 2005). Appendices 1 through 6 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
Appendix 6. Additional Documentation Requested by Client

DATA QUALITY PARAMETERS

- **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: Soil samples must be analyzed within 28 days for mercury and 6 months for ICP metals.

All holding times were acceptable.

- **Preparation (Method) 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 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 instrument detection limit (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.

Field (Equipment) Blank

No field blanks were submitted for analysis.

- **Accuracy**

Matrix Spike and Laboratory Control Sample

Matrix spike (MS) and laboratory control sample (LCS) analyses are used to assess the analytical accuracy of the reported data. The matrix spike is used to assess the effect of the matrix on the ability to accurately quantify sample concentrations. Recoveries must fall within the range of 70% to 130%. Samples with a recovery of less than 30% and a sample result below the IDL are rejected and flagged "UR". Samples with a recovery of 30% to 69% and a sample result less than the IDL are qualified "UJ". Samples with a 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 recovery greater than 130% and a sample result less than the IDL, no qualification is required.

Due to LCS recoveries outside QC limits (62.9% & 62.9%), all silicon results were qualified as estimates and flagged "J".

Due to matrix spike recoveries outside QC limits (54.4% & 59%), all antimony results were qualified as estimates and flagged "J".

All other accuracy results were acceptable.

- **Precision**

Laboratory Duplicate Samples

Analytical precision is expressed by the relative percent differences (RPD) between the recoveries of matrix spike duplicate (MSD) analyses performed on a sample in the analytical batch. Precision may alternatively be assessed using unspiked duplicate analyses performed on a sample in the analytical batch. If both sample and replicate activities (concentrations) are greater than five times the CRDL and the RPD is less than 30%, no qualification is required. If either activity (concentration) is less than five times the CRDL, the RPD control limit is less than or equal to two times the CRDL. If the RPD is outside the applicable control limit, associated results are qualified as estimated detects or estimated non-detects.

Due to an RPD outside QC limits, the calcium result in samples J12L37, J12L38, J12L39, J12L40, J12L41, J12L42, J12L43, J12L44, J12L45, J12L46 and J12LY7 were qualified as estimates and flagged "J".

All other laboratory duplicate results were acceptable.

Field Duplicate

Three sets of field duplicates (J12L33/J12L34 & J12L39/J12L40 & J12L45/J12L46) were submitted for analysis. Field duplicates are compared using the same criteria as for laboratory duplicates. The RPD for chromium (in sample duplicate pair J12L39/J12L40) was outside QC limits (66%). The RPD for lead (in sample duplicate pair J12L45/J12L46) was outside QC limits (75%). Under the WCH statement of work, no qualification is required. All other field duplicate results were acceptable.

- **Analytical Detection Levels**

Reported analytical detection levels are compared against the 100 Area RQLs to ensure that laboratory detection levels meet the required criteria. Ten silver, ten cadmium and all selenium results exceeded the RQL. Under the WCH statement of work, no qualification is required. All other results met the RQL.

- **Completeness**

Data package No. K0411 was submitted for validation and verified for completeness. Completeness is based on the percentage of data determined to be valid (i.e., not rejected). The completion percentage was 100%.

MAJOR DEFICIENCIES

None found.

MINOR DEFICIENCIES

The following minor deficiencies were noted:

- Due to LCS recoveries outside QC limits (62.9% & 62.9%), all silicon results were qualified as estimates and flagged "J".

- Due to matrix spike recoveries outside QC limits (54.4% & 59%), all antimony results were qualified as estimates and flagged "J".

- Due to an RPD outside QC limits, the calcium result in samples J12L37, J12L38, J12L39, J12L40, J12L41, J12L42, J12L43, J12L44, J12L45, J12L46 and J12LY7 were qualified as estimates and flagged "J".

Data flagged "J" indicates that the associated concentration is an estimate, but under the WCH statement of work, the data may be usable for decision-making purposes. All other validated results are considered accurate within the standard error associated with the methods.

Ten silver, ten cadmium and all selenium results exceeded the RQL. Under the WCH statement of work, no qualification is required.

REFERENCES

WCH, Contract #20266, *Validation Statement of Work*, Washington Closure Hanford Incorporated, July 7, 2003.

DOE/RL-96-22, Rev. 4, *100 Area Remedial Action Sampling and Analysis Plan*, U.S. Department of Energy, February 2005.

Appendix 1

Glossary of Data Reporting Qualifiers

Qualifiers which may be applied by data validators in compliance with WCH 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 minor 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 minor 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 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.

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).

Appendix 2

Summary of Data Qualification

METALS DATA QUALIFICATION SUMMARY*

SDG: K0411	REVIEWER: TLI	Project: 118-F-7	PAGE 1 OF 1
COMMENTS:			
COMPOUND	QUALIFIER	SAMPLES AFFECTED	REASON
Calcium	J	J12L37, J12L38 J12L39, J12L40 J12L41, J12L42 J12L43, J12L44 J12L45, J12L46 J12LY7	RPD
Antimony	J	All	MS recovery
Silicon	J	All	LCS recovery

* - The Qualified Data Summary Table includes laboratory applied "U" qualifiers not specifically identified here. The laboratory applied "U" qualifiers are included to minimize misinterpretation of results contained in the table.

Appendix 3

Qualified Data Summary and Annotated Laboratory Reports

Project: WASHINGTON CLOSURE HANFORD																			
Lab: LLI	SDG: K0411																		
Sample Number		J12L32		J12L33		J12L34		J12L35		J12L36		J12L37		J12L38		J12L39		J12L40	
Remarks						Duplicate												Duplicate	
Sample Date		6/5/06		6/5/06		6/5/06		6/5/06		6/5/06		6/6/06		6/6/06		6/6/06		6/6/06	
Inorganics	RQL	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Silver	0.2	0.21	U	0.21	U	0.21	U	0.20	U	0.21	U	0.21	U	0.20	U	0.21	U	0.21	U
Aluminum		4560		4280		4380		3990		4380		4710		4640		4350		4550	
Arsenic	10	2.5		1.8	U	2.0		1.8		2.6		3.4		3.2		1.8		1.8	U
Boron		1.4		1.2		0.92		1.4		0.70	U	2.5		2.8		3.9		3.6	
Barium	2	49.4		46.0		44.2		40.9		48.0		70.3		71.5		78.3		83.2	
Beryllium		0.54		0.51		0.54		0.50		0.55		0.68		0.70		0.78		0.81	
Calcium		4690		5080		4870		4680		5120		4970	J	5230	J	3970	J	3980	J
Cadmium	0.2	0.21	U	0.21	U	0.21	U	0.20	U	0.21	U	0.21	U	0.20	U	0.21	U	0.21	U
Cobalt		4.8		4.6		4.7		4.4		4.9		6.2		5.7		6.0		6.1	
Chromium	1	7.4		7.6		9.6		7.3		7.3		8.5		6.8		13.7		6.9	
Copper		10.4		11.5		10.5		10.4		10.7		12.2		11.0		11.3		10.9	
Iron		13000		12000		12700		11800		12800		16000		15800		16700		17200	
Mercury	0.2	0.02	U	0.02	U	0.02	U	0.02	U	0.01	U	0.02	U	0.02	U	0.01	U	0.01	
Potassium		930		786		744		707		848		1130		1070		1040		1100	
Magnesium		3200		3160		3250		3000		3100		3420		3630		3480		3500	
Manganese		245		244		250		230		256		279		264		270		276	
Molybdenum		0.87	U	0.86	U	0.86	U	0.84	U	0.85	U	0.86	U	0.85	U	1.1		0.85	U
Sodium		86.0		84.0		86.7		77.5		83.0		117		110		105		119	
Nickel		8.4		9.6		9.4		9.0		8.8		8.9		10.1		13.2		9.0	
Lead	5	5.3		3.7		3.8		4.8		4.4		17.4		12.2		7.4		7.6	
Antimony		1.3	UJ	1.3	UJ	1.3	UJ	1.3	UJ	1.3	UJ	1.3	UJ	1.3	UJ	1.3	UJ	1.3	UJ
Selenium	1	1.4	U	1.4	U	1.4	U	1.4	U	1.4	U	1.4	U	1.4	U	1.4	U	1.4	U
Silicon		472	J	400	J	450	J	444	J	539	J	475	J	448	J	382	J	416	J
Vanadium		31.4		28.3		30.6		27.9		30.3		38.2		39.9		43.4		45.1	
Zinc	1	32.0		28.9		29.0		28.6		30.6		39.8		38.6		43.5		40.4	

000011

Laboratory applied non-detect qualifiers "U" have been included in this table to minimize miss-interpretation of results. All other qualifiers shown were applied during validation.

Project: WASHINGTON CLOSURE HANFORD																			
Lab: LLI	SDG: K0411																		
Sample Number		J12L41		J12L42		J12L43		J12L44		J12L45		J12L46		J12LY7					
Remarks												Duplicate							
Sample Date		6/6/06		6/6/06		6/6/06		6/6/06		6/6/06		6/6/06		6/6/06					
Inorganics	RQL	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Silver	0.2	0.21	U	0.20	U	0.20	U	0.20	U	0.20	U	0.21	U	0.21	U				
Aluminum		4030		4230		5150		4070		4240		4440		4250					
Arsenic	10	8.6		1.9		2.5		1.9		2.4		3.9		10.2					
Boron		2.6		4.8		2.8		2.9		1.6		1.7		1.9					
Barium	2	71.0		65.0		58.0		64.0		53.3		55.6		58.0					
Beryllium		0.62		0.33		0.37		0.37		0.39		0.39		0.35					
Calcium		4100	J	5640	J	5320	J	5620	J	4950	J	5000	J	5560	J				
Cadmium	0.2	0.21	U	0.20	U	0.20	U	0.20	U	0.20	U	0.21	U	0.21	U				
Cobalt		5.2		5.0		5.4		5.0		5.0		4.9		5.0					
Chromium	1	6.2		7.2		8.3		6.8		7.0		7.4		7.3					
Copper		552		11.5		12.5		11.6		11.0		11.1		11.3					
Iron		13000		12800		15000		12200		12900		12200		12000					
Mercury	0.2	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.01	U				
Potassium		1140		725		976		858		832		880		958					
Magnesium		3040		3150		3610		3040		2990		2950		3110					
Manganese		254		226		259		242		239		240		254					
Molybdenum		0.87	U	0.84	U	2.4		0.82	U	0.84	U	0.87	U	0.86	U				
Sodium		87.7		115		101		81.1		85.2		88.3		103					
Nickel		7.5		8.4		9.5		8.4		7.7		8.3		8.5					
Lead	5	31.1		5.1		5.3		6.1		8.5		18.8		63.8					
Antimony		1.3	UJ	1.3	UJ	1.3	UJ	1.2	UJ	1.3	UJ	1.3	UJ	1.3	UJ				
Selenium	1	1.4	U	1.4	U	1.4	U	1.3	U	1.4	U	1.4	U	1.4	U				
Silicon		473	J	420	J	410	J	460	J	418	J	561	J	524	J				
Vanadium		30.9		32.8		34.8		28.6		32.3		28.7		27.3					
Zinc	1	39.2		32.9		33.0		35.0		33.2		36.3		35.4					

Laboratory applied non-detect qualifiers "U" have been included in this table to minimize miss-interpretation of results. All other qualifiers shown were applied during validation.

000012

Lionville Laboratory, Inc.

INORGANICS DATA SUMMARY REPORT 06/23/06

CLIENT: TNUHANFORD RC-032 K041

LVL LOT #: 0606L224

WORK ORDER: 11343-606-001-9999-00

SAMPLE	SITE ID	ANALYTE	RESULT	UNITS	REPORTING LIMIT	DILUTION FACTOR
-001	J12L32	Silver, Total	0.21 u	MG/KG	0.21	3.0
		Aluminum, Total	4560	MG/KG	8.6	3.0
		Arsenic, Total	2.5	MG/KG	1.8	3.0
		Boron, Total	1.4	MG/KG	0.72	3.0
		Barium, Total	49.4	MG/KG	0.06	3.0
		Beryllium, Total	0.54	MG/KG	0.06	3.0
		Calcium, Total	4690	MG/KG	4.9	3.0
		Cadmium, Total	0.21 u	MG/KG	0.21	3.0
		Cobalt, Total	4.8	MG/KG	0.42	3.0
		Chromium, Total	7.4	MG/KG	0.39	3.0
		Copper, Total	10.4	MG/KG	0.36	3.0
		Iron, Total	13000	MG/KG	10.4	3.0
		Mercury, Total	0.02 u	MG/KG	0.02	1.0
		Potassium, Total	930	MG/KG	6.8	3.0
		Magnesium, Total	3200	MG/KG	2.9	3.0
		Manganese, Total	245	MG/KG	0.09	3.0
		Molybdenum, Total	0.87 u	MG/KG	0.87	3.0
		Sodium, Total	86.0	MG/KG	2.3	3.0
		Nickel, Total	8.4	MG/KG	0.72	3.0
		Lead, Total	5.3	MG/KG	0.93	3.0
		Antimony, Total	1.3 u J	MG/KG	1.3	3.0
		Selenium, Total	1.4 u	MG/KG	1.4	3.0
		Silicon, Total	472 J	MG/KG	6.8	3.0
		Vanadium, Total	31.4	MG/KG	0.27	3.0
		Zinc, Total	32.0	MG/KG	0.48	3.0

8/11/06

Lionville Laboratory, Inc.

INORGANICS DATA SUMMARY REPORT 06/23/06

CLIENT: TNUHANFORD RC-032 K041

LVL LOT #: 0606L224

WORK ORDER: 11343-606-001-9999-00

SAMPLE	SITE ID	ANALYTE	RESULT	UNITS	REPORTING LIMIT	DILUTION FACTOR
-002	J12L33	Silver, Total	0.21 u	MG/KG	0.21	3.0
		Aluminum, Total	4280	MG/KG	8.5	3.0
		Arsenic, Total	1.8 u	MG/KG	1.8	3.0
		Boron, Total	1.2	MG/KG	0.71	3.0
		Barium, Total	46.0	MG/KG	0.06	3.0
		Beryllium, Total	0.51	MG/KG	0.06	3.0
		Calcium, Total	5080	MG/KG	4.8	3.0
		Cadmium, Total	0.21 u	MG/KG	0.21	3.0
		Cobalt, Total	4.6	MG/KG	0.41	3.0
		Chromium, Total	7.6	MG/KG	0.38	3.0
		Copper, Total	11.5	MG/KG	0.35	3.0
		Iron, Total	12000	MG/KG	10.3	3.0
		Mercury, Total	0.02 u	MG/KG	0.02	1.0
		Potassium, Total	786	MG/KG	6.7	3.0
		Magnesium, Total	3160	MG/KG	2.9	3.0
		Manganese, Total	244	MG/KG	0.09	3.0
		Molybdenum, Total	0.86 u	MG/KG	0.86	3.0
		Sodium, Total	84.0	MG/KG	2.2	3.0
		Nickel, Total	9.6	MG/KG	0.71	3.0
		Lead, Total	3.7	MG/KG	0.92	3.0
		Antimony, Total	1.3 u J	MG/KG	1.3	3.0
		Selenium, Total	1.4 u	MG/KG	1.4	3.0
		Silicon, Total	400 J	MG/KG	6.7	3.0
		Vanadium, Total	28.3	MG/KG	0.27	3.0
		Zinc, Total	28.9	MG/KG	0.47	3.0

6/11/06

Lionville Laboratory, Inc.

INORGANICS DATA SUMMARY REPORT 06/23/06

CLIENT: TNUHANFORD RC-032 K041
WORK ORDER: 11343-606-001-9999-00

LVL LOT #: 0606L224

SAMPLE	SITE ID	ANALYTE	RESULT	UNITS	REPORTING LIMIT	DILUTION FACTOR
-003	J12L34	Silver, Total	0.21 u	MG/KG	0.21	3.0
		Aluminum, Total	4380	MG/KG	8.5	3.0
		Arsenic, Total	2.0	MG/KG	1.8	3.0
		Boron, Total	0.92	MG/KG	0.71	3.0
		Barium, Total	44.2	MG/KG	0.06	3.0
		Beryllium, Total	0.54	MG/KG	0.06	3.0
		Calcium, Total	4870	MG/KG	4.8	3.0
		Cadmium, Total	0.21 u	MG/KG	0.21	3.0
		Cobalt, Total	4.7	MG/KG	0.41	3.0
		Chromium, Total	9.6	MG/KG	0.38	3.0
		Copper, Total	10.5	MG/KG	0.35	3.0
		Iron, Total	12700	MG/KG	10.3	3.0
		Mercury, Total	0.02 u	MG/KG	0.02	1.0
		Potassium, Total	744	MG/KG	6.7	3.0
		Magnesium, Total	3250	MG/KG	2.9	3.0
		Manganese, Total	250	MG/KG	0.09	3.0
		Molybdenum, Total	0.86 u	MG/KG	0.86	3.0
		Sodium, Total	86.7	MG/KG	2.2	3.0
		Nickel, Total	9.4	MG/KG	0.71	3.0
		Lead, Total	3.8	MG/KG	0.91	3.0
		Antimony, Total	1.3 uJ	MG/KG	1.3	3.0
		Selenium, Total	1.4 u	MG/KG	1.4	3.0
		Silicon, Total	450 J	MG/KG	6.7	3.0
		Vanadium, Total	30.6	MG/KG	0.27	3.0
		Zinc, Total	29.0	MG/KG	0.47	3.0

6/11/06

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Lionville Laboratory, Inc.

INORGANICS DATA SUMMARY REPORT 06/23/06

CLIENT: TNUHANFORD RC-032 K041b

WORK ORDER: 11343-606-001-9999-00

LVL LOT #: 0606L224

SAMPLE	SITE ID	ANALYTE	RESULT	UNITS	REPORTING LIMIT	DILUTION FACTOR
-004	J12L35	Silver, Total	0.20 u	MG/KG	0.20	3.0
		Aluminum, Total	3990	MG/KG	8.4	3.0
		Arsenic, Total	1.8	MG/KG	1.8	3.0
		Boron, Total	1.4	MG/KG	0.70	3.0
		Barium, Total	40.9	MG/KG	0.06	3.0
		Beryllium, Total	0.50	MG/KG	0.06	3.0
		Calcium, Total	4680	MG/KG	4.8	3.0
		Cadmium, Total	0.20 u	MG/KG	0.20	3.0
		Cobalt, Total	4.4	MG/KG	0.41	3.0
		Chromium, Total	7.3	MG/KG	0.38	3.0
		Copper, Total	10.4	MG/KG	0.35	3.0
		Iron, Total	11800	MG/KG	10.2	3.0
		Mercury, Total	0.02 u	MG/KG	0.02	1.0
		Potassium, Total	707	MG/KG	6.6	3.0
		Magnesium, Total	3000	MG/KG	2.8	3.0
		Manganese, Total	230	MG/KG	0.09	3.0
		Molybdenum, Total	0.84 u	MG/KG	0.84	3.0
		Sodium, Total	77.5	MG/KG	2.2	3.0
		Nickel, Total	9.0	MG/KG	0.70	3.0
		Lead, Total	4.8	MG/KG	0.90	3.0
		Antimony, Total	1.3 u J	MG/KG	1.3	3.0
		Selenium, Total	1.4 u	MG/KG	1.4	3.0
		Silicon, Total	444 J	MG/KG	6.6	3.0
		Vanadium, Total	27.9	MG/KG	0.26	3.0
		Zinc, Total	28.6	MG/KG	0.47	3.0

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Lionville Laboratory, Inc.

INORGANICS DATA SUMMARY REPORT 06/23/06

CLIENT: TNUHANFORD RC-032 K041

WORK ORDER: 11343-606-001-9999-00

LVL LOT #: 0606L224

SAMPLE	SITE ID	ANALYTE	RESULT	UNITS	REPORTING LIMIT	DILUTION FACTOR
-005	J12L36	Silver, Total	0.21 u	MG/KG	0.21	3.0
		Aluminum, Total	4380	MG/KG	8.4	3.0
		Arsenic, Total	2.6	MG/KG	1.8	3.0
		Boron, Total	0.70 u	MG/KG	0.70	3.0
		Barium, Total	48.0	MG/KG	0.06	3.0
		Beryllium, Total	0.55	MG/KG	0.06	3.0
		Calcium, Total	5120	MG/KG	4.8	3.0
		Cadmium, Total	0.21 u	MG/KG	0.21	3.0
		Cobalt, Total	4.9	MG/KG	0.41	3.0
		Chromium, Total	7.3	MG/KG	0.38	3.0
		Copper, Total	10.7	MG/KG	0.35	3.0
		Iron, Total	12800	MG/KG	10.2	3.0
		Mercury, Total	0.01 u	MG/KG	0.01	1.0
		Potassium, Total	848	MG/KG	6.7	3.0
		Magnesium, Total	3100	MG/KG	2.8	3.0
		Manganese, Total	256	MG/KG	0.09	3.0
		Molybdenum, Total	0.85 u	MG/KG	0.85	3.0
		Sodium, Total	83.0	MG/KG	2.2	3.0
		Nickel, Total	8.8	MG/KG	0.70	3.0
		Lead, Total	4.4	MG/KG	0.91	3.0
		Antimony, Total	1.3 u J	MG/KG	1.3	3.0
		Selenium, Total	1.4 u	MG/KG	1.4	3.0
		Silicon, Total	539 J	MG/KG	6.7	3.0
		Vanadium, Total	30.3	MG/KG	0.26	3.0
		Zinc, Total	30.6	MG/KG	0.47	3.0

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Lionville Laboratory, Inc.

INORGANICS DATA SUMMARY REPORT 06/23/06

CLIENT: TNUHANFORD RC-032 K0411 LVL LOT #: 0606L232

WORK ORDER: 11343-606-001-9999-00

SAMPLE	SITE ID	ANALYTE	RESULT	UNITS	REPORTING LIMIT	DILUTION FACTOR
-002	J12L37	Silver, Total	0.21 u	MG/KG	0.21	3.0
		Aluminum, Total	4710	MG/KG	8.5	3.0
		Arsenic, Total	3.4	MG/KG	1.8	3.0
		Boron, Total	2.5	MG/KG	0.71	3.0
		Barium, Total	70.3	MG/KG	0.06	3.0
		Beryllium, Total	0.68	MG/KG	0.06	3.0
		Calcium, Total	4970 J	MG/KG	4.8	3.0
		Cadmium, Total	0.21 u	MG/KG	0.21	3.0
		Cobalt, Total	6.2	MG/KG	0.41	3.0
		Chromium, Total	8.5	MG/KG	0.38	3.0
		Copper, Total	12.2	MG/KG	0.35	3.0
		Iron, Total	16000	MG/KG	10.3	3.0
		Mercury, Total	0.02 u	MG/KG	0.02	1.0
		Potassium, Total	1130	MG/KG	6.7	3.0
		Magnesium, Total	3420	MG/KG	2.9	3.0
		Manganese, Total	279	MG/KG	0.09	3.0
		Molybdenum, Total	0.86 u	MG/KG	0.86	3.0
		Sodium, Total	117	MG/KG	2.2	3.0
		Nickel, Total	8.9	MG/KG	0.71	3.0
		Lead, Total	17.4	MG/KG	0.92	3.0
		Antimony, Total	1.3 u J	MG/KG	1.3	3.0
		Selenium, Total	1.4 u	MG/KG	1.4	3.0
		Silicon, Total	475 J	MG/KG	6.7	3.0
		Vanadium, Total	38.2	MG/KG	0.27	3.0
		Zinc, Total	39.8	MG/KG	0.47	3.0

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Lionville Laboratory, Inc.

INORGANICS DATA SUMMARY REPORT 06/23/06

CLIENT: TNUHANFORD RC-032 K0411

WORK ORDER: 11343-606-001-9999-00

LVL LOT #: 0606L232

SAMPLE	SITE ID	ANALYTE	RESULT	UNITS	REPORTING LIMIT	DILUTION FACTOR
-003	J12L38	Silver, Total	0.20 u	MG/KG	0.20	3.0
		Aluminum, Total	4640	MG/KG	8.4	3.0
		Arsenic, Total	3.2	MG/KG	1.8	3.0
		Boron, Total	2.8	MG/KG	0.70	3.0
		Barium, Total	71.5	MG/KG	0.06	3.0
		Beryllium, Total	0.70	MG/KG	0.06	3.0
		Calcium, Total	5230 J	MG/KG	4.8	3.0
		Cadmium, Total	0.20 u	MG/KG	0.20	3.0
		Cobalt, Total	5.7	MG/KG	0.41	3.0
		Chromium, Total	6.8	MG/KG	0.38	3.0
		Copper, Total	11.0	MG/KG	0.35	3.0
		Iron, Total	15800	MG/KG	10.2	3.0
		Mercury, Total	0.02 u	MG/KG	0.02	1.0
		Potassium, Total	1070	MG/KG	6.6	3.0
		Magnesium, Total	3630	MG/KG	2.8	3.0
		Manganese, Total	264	MG/KG	0.09	3.0
		Molybdenum, Total	0.85 u	MG/KG	0.85	3.0
		Sodium, Total	110	MG/KG	2.2	3.0
		Nickel, Total	10.1	MG/KG	0.70	3.0
		Lead, Total	12.2	MG/KG	0.91	3.0
		Antimony, Total	1.3 u J	MG/KG	1.3	3.0
		Selenium, Total	1.4 u	MG/KG	1.4	3.0
		Silicon, Total	448 J	MG/KG	6.6	3.0
		Vanadium, Total	39.9	MG/KG	0.26	3.0
		Zinc, Total	38.6	MG/KG	0.47	3.0

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Lionville Laboratory, Inc.

INORGANICS DATA SUMMARY REPORT 06/23/06

CLIENT: TNUHANFORD RC-032 K0411 LVL LOT #: 0606L232

WORK ORDER: 11343-606-001-9999-00

SAMPLE	SITE ID	ANALYTE	RESULT	UNITS	REPORTING LIMIT	DILUTION FACTOR
-004	J12L39	Silver, Total	0.21 u	MG/KG	0.21	3.0
		Aluminum, Total	4350	MG/KG	8.6	3.0
		Arsenic, Total	1.8 u	MG/KG	1.8	3.0
		Boron, Total	3.9	MG/KG	0.71	3.0
		Barium, Total	78.3	MG/KG	0.06	3.0
		Beryllium, Total	0.78	MG/KG	0.06	3.0
		Calcium, Total	3970 J	MG/KG	4.9	3.0
		Cadmium, Total	0.21 u	MG/KG	0.21	3.0
		Cobalt, Total	6.0	MG/KG	0.42	3.0
		Chromium, Total	13.7	MG/KG	0.39	3.0
		Copper, Total	11.3	MG/KG	0.36	3.0
		Iron, Total	16700	MG/KG	10.4	3.0
		Mercury, Total	0.01 u	MG/KG	0.01	1.0
		Potassium, Total	1040	MG/KG	6.7	3.0
		Magnesium, Total	3480	MG/KG	2.9	3.0
		Manganese, Total	270	MG/KG	0.09	3.0
		Molybdenum, Total	1.1	MG/KG	0.86	3.0
		Sodium, Total	105	MG/KG	2.3	3.0
		Nickel, Total	13.2	MG/KG	0.71	3.0
		Lead, Total	7.4	MG/KG	0.92	3.0
		Antimony, Total	1.3 uJ	MG/KG	1.3	3.0
		Selenium, Total	1.4 u	MG/KG	1.4	3.0
		Silicon, Total	382 J	MG/KG	6.7	3.0
		Vanadium, Total	43.4	MG/KG	0.27	3.0
		Zinc, Total	43.5	MG/KG	0.48	3.0

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Lionville Laboratory, Inc.

INORGANICS DATA SUMMARY REPORT 06/23/06

CLIENT: TNUHANFORD RC-032 K0411

WORK ORDER: 11343-606-001-9999-00

LVL LOT #: 0606L232

SAMPLE	SITE ID	ANALYTE	RESULT	UNITS	REPORTING LIMIT	DILUTION FACTOR
-005	J12L40	Silver, Total	0.21 u	MG/KG	0.21	3.0
		Aluminum, Total	4550	MG/KG	8.5	3.0
		Arsenic, Total	1.8 u	MG/KG	1.8	3.0
		Boron, Total	3.6	MG/KG	0.71	3.0
		Barium, Total	83.2	MG/KG	0.06	3.0
		Beryllium, Total	0.81	MG/KG	0.06	3.0
		Calcium, Total	3980 J	MG/KG	4.8	3.0
		Cadmium, Total	0.21 u	MG/KG	0.21	3.0
		Cobalt, Total	6.1	MG/KG	0.41	3.0
		Chromium, Total	6.9	MG/KG	0.38	3.0
		Copper, Total	10.9	MG/KG	0.35	3.0
		Iron, Total	17200	MG/KG	10.3	3.0
		Mercury, Total	0.01	MG/KG	0.01	1.0
		Potassium, Total	1100	MG/KG	6.7	3.0
		Magnesium, Total	3500	MG/KG	2.9	3.0
		Manganese, Total	276	MG/KG	0.09	3.0
		Molybdenum, Total	0.85 u	MG/KG	0.85	3.0
		Sodium, Total	119	MG/KG	2.2	3.0
		Nickel, Total	9.0	MG/KG	0.71	3.0
		Lead, Total	7.6	MG/KG	0.91	3.0
		Antimony, Total	1.3 u J	MG/KG	1.3	3.0
		Selenium, Total	1.4 u	MG/KG	1.4	3.0
		Silicon, Total	416 J	MG/KG	6.7	3.0
		Vanadium, Total	45.1	MG/KG	0.27	3.0
		Zinc, Total	40.4	MG/KG	0.47	3.0

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Lionville Laboratory, Inc.

INORGANICS DATA SUMMARY REPORT 06/23/06

CLIENT: TNUHANFORD RC-032 K0411 LVL LOT #: 0606L232

WORK ORDER: 11343-606-001-9999-00

SAMPLE	SITE ID	ANALYTE	RESULT	UNITS	REPORTING LIMIT	DILUTION FACTOR
-006	J12L41	Silver, Total	0.21 u	MG/KG	0.21	3.0
		Aluminum, Total	4030	MG/KG	8.6	3.0
		Arsenic, Total	8.6	MG/KG	1.8	3.0
		Boron, Total	2.6	MG/KG	0.72	3.0
		Barium, Total	71.0	MG/KG	0.06	3.0
		Beryllium, Total	0.62	MG/KG	0.06	3.0
		Calcium, Total	4100 J	MG/KG	4.9	3.0
		Cadmium, Total	0.21 u	MG/KG	0.21	3.0
		Cobalt, Total	5.2	MG/KG	0.42	3.0
		Chromium, Total	6.2	MG/KG	0.39	3.0
		Copper, Total	552	MG/KG	0.36	3.0
		Iron, Total	13000	MG/KG	10.4	3.0
		Mercury, Total	0.02 u	MG/KG	0.02	1.0
		Potassium, Total	1140	MG/KG	6.8	3.0
		Magnesium, Total	3040	MG/KG	2.9	3.0
		Manganese, Total	254	MG/KG	0.09	3.0
		Molybdenum, Total	0.87 u	MG/KG	0.87	3.0
		Sodium, Total	87.7	MG/KG	2.3	3.0
		Nickel, Total	7.5	MG/KG	0.72	3.0
		Lead, Total	31.1	MG/KG	0.93	3.0
		Antimony, Total	1.3 u J	MG/KG	1.3	3.0
		Selenium, Total	1.4 u	MG/KG	1.4	3.0
		Silicon, Total	473 J	MG/KG	6.8	3.0
		Vanadium, Total	30.9	MG/KG	0.27	3.0
		Zinc, Total	39.2	MG/KG	0.48	3.0

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Lionville Laboratory, Inc.

INORGANICS DATA SUMMARY REPORT 06/23/06

CLIENT: TNUHANFORD RC-032 K0411

WORK ORDER: 11343-606-001-9999-00

LVL LOT #: 0606L232

SAMPLE	SITE ID	ANALYTE	RESULT	UNITS	REPORTING LIMIT	DILUTION FACTOR
-007	J12L42	Silver, Total	0.20 u	MG/KG	0.20	3.0
		Aluminum, Total	4230	MG/KG	8.3	3.0
		Arsenic, Total	1.9	MG/KG	1.8	3.0
		Boron, Total	4.8	MG/KG	0.69	3.0
		Barium, Total	65.0	MG/KG	0.06	3.0
		Beryllium, Total	0.33	MG/KG	0.06	3.0
		Calcium, Total	5640 J	MG/KG	4.7	3.0
		Cadmium, Total	0.20 u	MG/KG	0.20	3.0
		Cobalt, Total	5.0	MG/KG	0.40	3.0
		Chromium, Total	7.2	MG/KG	0.37	3.0
		Copper, Total	11.5	MG/KG	0.35	3.0
		Iron, Total	12800	MG/KG	10.1	3.0
		Mercury, Total	0.02 u	MG/KG	0.02	1.0
		Potassium, Total	725	MG/KG	6.5	3.0
		Magnesium, Total	3150	MG/KG	2.8	3.0
		Manganese, Total	226	MG/KG	0.09	3.0
		Molybdenum, Total	0.84 u	MG/KG	0.84	3.0
		Sodium, Total	115	MG/KG	2.2	3.0
		Nickel, Total	8.4	MG/KG	0.69	3.0
		Lead, Total	5.1	MG/KG	0.89	3.0
		Antimony, Total	1.3 u J	MG/KG	1.3	3.0
		Selenium, Total	1.4 u	MG/KG	1.4	3.0
		Silicon, Total	420 J	MG/KG	6.5	3.0
		Vanadium, Total	32.8	MG/KG	0.26	3.0
		Zinc, Total	32.9	MG/KG	0.46	3.0

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Lionville Laboratory, Inc.

INORGANICS DATA SUMMARY REPORT 06/23/06

CLIENT: TNUHANFORD RC-032 K0411

WORK ORDER: 11343-606-001-9999-00

LVL LOT #: 0606L232

SAMPLE	SITE ID	ANALYTE	RESULT	UNITS	REPORTING LIMIT	DILUTION FACTOR
-008	J12L43	Silver, Total	0.20 u	MG/KG	0.20	3.0
		Aluminum, Total	5150	MG/KG	8.4	3.0
		Arsenic, Total	2.5	MG/KG	1.8	3.0
		Boron, Total	2.8	MG/KG	0.70	3.0
		Barium, Total	58.0	MG/KG	0.06	3.0
		Beryllium, Total	0.37	MG/KG	0.06	3.0
		Calcium, Total	5320 J	MG/KG	4.8	3.0
		Cadmium, Total	0.20 u	MG/KG	0.20	3.0
		Cobalt, Total	5.4	MG/KG	0.41	3.0
		Chromium, Total	8.3	MG/KG	0.38	3.0
		Copper, Total	12.5	MG/KG	0.35	3.0
		Iron, Total	15000	MG/KG	10.2	3.0
		Mercury, Total	0.02 u	MG/KG	0.02	1.0
		Potassium, Total	976	MG/KG	6.6	3.0
		Magnesium, Total	3610	MG/KG	2.8	3.0
		Manganese, Total	259	MG/KG	0.09	3.0
		Molybdenum, Total	2.4	MG/KG	0.85	3.0
		Sodium, Total	101	MG/KG	2.2	3.0
		Nickel, Total	9.5	MG/KG	0.70	3.0
		Lead, Total	5.3	MG/KG	0.91	3.0
		Antimony, Total	1.3 uJ	MG/KG	1.3	3.0
		Selenium, Total	1.4 u	MG/KG	1.4	3.0
		Silicon, Total	410 J	MG/KG	6.6	3.0
		Vanadium, Total	34.8	MG/KG	0.26	3.0
		Zinc, Total	33.0	MG/KG	0.47	3.0

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Lionville Laboratory, Inc.

INORGANICS DATA SUMMARY REPORT 06/23/06

CLIENT: TNUHANFORD RC-032 K0411 LVL LOT #: 0606L232

WORK ORDER: 11343-606-001-9999-00

SAMPLE	SITE ID	ANALYTE	RESULT	UNITS	REPORTING LIMIT	DILUTION FACTOR
-009	J12L44	Silver, Total	0.20 u	MG/KG	0.20	3.0
		Aluminum, Total	4070	MG/KG	8.1	3.0
		Arsenic, Total	1.9	MG/KG	1.7	3.0
		Boron, Total	2.9	MG/KG	0.68	3.0
		Barium, Total	64.0	MG/KG	0.06	3.0
		Beryllium, Total	0.37	MG/KG	0.06	3.0
		Calcium, Total	5620 J	MG/KG	4.6	3.0
		Cadmium, Total	0.20 u	MG/KG	0.20	3.0
		Cobalt, Total	5.0	MG/KG	0.40	3.0
		Chromium, Total	6.8	MG/KG	0.37	3.0
		Copper, Total	11.6	MG/KG	0.34	3.0
		Iron, Total	12200	MG/KG	9.9	3.0
		Mercury, Total	0.02 u	MG/KG	0.02	1.0
		Potassium, Total	858	MG/KG	6.4	3.0
		Magnesium, Total	3040	MG/KG	2.7	3.0
		Manganese, Total	242	MG/KG	0.08	3.0
		Molybdenum, Total	0.82 u	MG/KG	0.82	3.0
		Sodium, Total	81.1	MG/KG	2.1	3.0
		Nickel, Total	8.4	MG/KG	0.68	3.0
		Lead, Total	6.1	MG/KG	0.88	3.0
		Antimony, Total	1.2 u J	MG/KG	1.2	3.0
		Selenium, Total	1.3 u	MG/KG	1.3	3.0
		Silicon, Total	460 J	MG/KG	6.4	3.0
		Vanadium, Total	28.6	MG/KG	0.25	3.0
		Zinc, Total	35.0	MG/KG	0.45	3.0

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Lionville Laboratory, Inc.

INORGANICS DATA SUMMARY REPORT 06/23/06

CLIENT: TNUHANFORD RC-032 K0411 LVL LOT #: 0606L232

WORK ORDER: 11343-606-001-9999-00

SAMPLE	SITE ID	ANALYTE	RESULT	UNITS	REPORTING LIMIT	DILUTION FACTOR
-010	J12L45	Silver, Total	0.20 u	MG/KG	0.20	3.0
		Aluminum, Total	4240	MG/KG	8.3	3.0
		Arsenic, Total	2.4	MG/KG	1.8	3.0
		Boron, Total	1.6	MG/KG	0.69	3.0
		Barium, Total	53.3	MG/KG	0.06	3.0
		Beryllium, Total	0.39	MG/KG	0.06	3.0
		Calcium, Total	4950 J	MG/KG	4.7	3.0
		Cadmium, Total	0.20 u	MG/KG	0.20	3.0
		Cobalt, Total	5.0	MG/KG	0.40	3.0
		Chromium, Total	7.0	MG/KG	0.37	3.0
		Copper, Total	11.0	MG/KG	0.35	3.0
		Iron, Total	12900	MG/KG	10.1	3.0
		Mercury, Total	0.02 u	MG/KG	0.02	1.0
		Potassium, Total	832	MG/KG	6.5	3.0
		Magnesium, Total	2990	MG/KG	2.8	3.0
		Manganese, Total	239	MG/KG	0.09	3.0
		Molybdenum, Total	0.84 u	MG/KG	0.84	3.0
		Sodium, Total	85.2	MG/KG	2.2	3.0
		Nickel, Total	7.7	MG/KG	0.69	3.0
		Lead, Total	8.5	MG/KG	0.89	3.0
		Antimony, Total	1.3 u J	MG/KG	1.3	3.0
		Selenium, Total	1.4 u	MG/KG	1.4	3.0
		Silicon, Total	418 J	MG/KG	6.5	3.0
		Vanadium, Total	32.3	MG/KG	0.26	3.0
		Zinc, Total	33.2	MG/KG	0.46	3.0

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Lionville Laboratory, Inc.

INORGANICS DATA SUMMARY REPORT 06/23/06

CLIENT: TNUHANFORD RC-032 K0411

LVL LOT #: 0606L232

WORK ORDER: 11343-606-001-9999-00

SAMPLE	SITE ID	ANALYTE	RESULT	UNITS	REPORTING LIMIT	DILUTION FACTOR
-011	J12L46	Silver, Total	0.21 u	MG/KG	0.21	3.0
		Aluminum, Total	4440	MG/KG	8.6	3.0
		Arsenic, Total	3.9	MG/KG	1.8	3.0
		Boron, Total	1.7	MG/KG	0.72	3.0
		Barium, Total	55.6	MG/KG	0.06	3.0
		Beryllium, Total	0.39	MG/KG	0.06	3.0
		Calcium, Total	5000 J	MG/KG	4.9	3.0
		Cadmium, Total	0.21 u	MG/KG	0.21	3.0
		Cobalt, Total	4.9	MG/KG	0.42	3.0
		Chromium, Total	7.4	MG/KG	0.39	3.0
		Copper, Total	11.1	MG/KG	0.36	3.0
		Iron, Total	12200	MG/KG	10.4	3.0
		Mercury, Total	0.02 u	MG/KG	0.02	1.0
		Potassium, Total	880	MG/KG	6.8	3.0
		Magnesium, Total	2950	MG/KG	2.9	3.0
		Manganese, Total	240	MG/KG	0.09	3.0
		Molybdenum, Total	0.87 u	MG/KG	0.87	3.0
		Sodium, Total	88.3	MG/KG	2.3	3.0
		Nickel, Total	8.3	MG/KG	0.72	3.0
		Lead, Total	18.8	MG/KG	0.93	3.0
		Antimony, Total	1.3 u J	MG/KG	1.3	3.0
		Selenium, Total	1.4 u	MG/KG	1.4	3.0
		Silicon, Total	561 J	MG/KG	6.8	3.0
		Vanadium, Total	28.7	MG/KG	0.27	3.0
		Zinc, Total	36.3	MG/KG	0.48	3.0

8/11/06

Lionville Laboratory, Inc.

INORGANICS DATA SUMMARY REPORT 06/23/06

CLIENT: TNUHANFORD RC-032 K0411 LVL LOT #: 0606L232

WORK ORDER: 11343-606-001-9999-00

SAMPLE	SITE ID	ANALYTE	RESULT	UNITS	REPORTING LIMIT	DILUTION FACTOR
-001	J12LY7	Silver, Total	0.21 u	MG/KG	0.21	3.0
		Aluminum, Total	4250	MG/KG	8.5	3.0
		Arsenic, Total	10.2	MG/KG	1.8	3.0
		Boron, Total	1.9	MG/KG	0.71	3.0
		Barium, Total	58.0	MG/KG	0.06	3.0
		Beryllium, Total	0.35	MG/KG	0.06	3.0
		Calcium, Total	5560 J	MG/KG	4.8	3.0
		Cadmium, Total	0.21 u	MG/KG	0.21	3.0
		Cobalt, Total	5.0	MG/KG	0.41	3.0
		Chromium, Total	7.3	MG/KG	0.38	3.0
		Copper, Total	11.3	MG/KG	0.35	3.0
		Iron, Total	12000	MG/KG	10.3	3.0
		Mercury, Total	0.01 u	MG/KG	0.01	1.0
		Potassium, Total	958	MG/KG	6.7	3.0
		Magnesium, Total	3110	MG/KG	2.9	3.0
		Manganese, Total	254	MG/KG	0.09	3.0
		Molybdenum, Total	0.86 u	MG/KG	0.86	3.0
		Sodium, Total	103	MG/KG	2.2	3.0
		Nickel, Total	8.5	MG/KG	0.71	3.0
		Lead, Total	63.8	MG/KG	0.92	3.0
		Antimony, Total	1.3 u J	MG/KG	1.3	3.0
		Selenium, Total	1.4 u	MG/KG	1.4	3.0
		Silicon, Total	524 J	MG/KG	6.7	3.0
		Vanadium, Total	27.1	MG/KG	0.27	3.0
		Zinc, Total	35.4	MG/KG	0.47	3.0

8/11/06

Appendix 4

Laboratory Narrative and Chain-of-Custody Documentation

37-47

LIONVILLE LABORATORY INC.

Analytical Report

Client: TNU-HANFORD RC-032
LVL#: 0606L232
SDG/SAF#: K0411/RC-032

W.O.#: 11343-606-001-9999-00
Date Received: 06-08-06

METALS CASE NARRATIVE

The following is a summary of the QC results accompanying the sample results. Lionville Laboratory (LvLI) certifies that all test results meet the requirements of NELAC except as noted below.

All soil samples are reported on a dry weight basis unless requested by the client, required by the method, or noted otherwise.

1. This narrative covers the analyses of 11 soil samples.

2. The samples were prepared and analyzed in accordance with methods checked on the attached glossary. All samples were reported with 3-fold dilutions for ICP metals due to sample matrix.

3. All analyses were performed within the required holding times.

4. All Initial and Continuing Calibration Verifications (ICV/CCVs) were within the 90-110% control limits (80-120% for Mercury).

5. All Initial and Continuing Calibration Blanks (ICB/CCBs) were within control limits (less than the PQL).

6. All preparation/method blanks (MB) were 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.

7. All ICP Interference Check Standards were within control limits.

8. All laboratory control samples (LCS) were within the 80-120% control limits with the exception of Silicon at 62.9%. Refer to the Inorganics Laboratory Control Standards Report. Associated sample results may be biased low.

9. The matrix spike (MS) recoveries for 5 analytes were outside the 75-125% control limits. Refer to the Inorganics Accuracy 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 39 pages.

208 Welsh Pool Road • Exton, PA 19341- 1313 • (610) 280-3000 • Fax (610) 280-3041

10. For analytes where the ICP MS is out-of-control, a post-digestion MS (PDS) and serial dilution are performed. A PDS was prepared at meaningful concentration level for the following analytes:

Sample ID	Element	PDS Concentration (ppb)	PDS % Recovery
J12LY7	Aluminum	30,000	102.7
	Iron	30,000	107.7
	Manganese	3,000	108.8
	Antimony	300	102.9
	Silicon	3,300	105.8

11. The duplicate analyses for 6 analytes were outside the 20% Relative Percent Difference (RPD) control limits. Refer to the Inorganics Precision Report.

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.

13. LvLI is NELAP accredited by the state of Pennsylvania and holds over 20 additional state accreditations. For a complete listing of accrediting authorities and the corresponding analytes/methods, please contact your Project Manager.

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

for Iain Daniels
Laboratory Manager
Lionville Laboratory Incorporated

6/25/06
Date

jjw/m06-232

LvLI
LIONVILLE LABORATORY INC.

LIONVILLE LABORATORY INC.

Analytical Report

Client: TNU-HANFORD RC-032
LVL#: 0606L224
SDG/SAF#: K041◊/RC-032

W.O.#: 11343-606-001-9999-00
Date Received: 06-07-06

METALS CASE NARRATIVE

The following is a summary of the QC results accompanying the sample results. Lionville Laboratory (LvLI) certifies that all test results meet the requirements of NELAC except as noted below.

All soil samples are reported on a dry weight basis unless requested by the client, required by the method, or noted otherwise.

1. This narrative covers the analyses of 5 soil samples.

2. The samples were prepared and analyzed in accordance with methods checked on the attached glossary. The samples were reported with 3-fold dilutions for ICP metals due to sample matrix.

3. All analyses were performed within the required holding times.

4. All Initial and Continuing Calibration Verifications (ICV/CCVs) were within the 90-110% control limits (80-120% for Mercury).

5. All Initial and Continuing Calibration Blanks (ICB/CCBs) were within control limits (less than the PQL).

6. All preparation/method blanks (MB) were 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.

7. All ICP Interference Check Standards were within control limits.

8. All laboratory control samples (LCS) were within the 80-120% control limits with the exception of Silicon at 62.9%. Refer to the Inorganics Laboratory Control Standards Report. Associated sample results may be biased low.

9. The matrix spike (MS) recoveries for 4 analytes were outside the 75-125% control limits. Refer to the Inorganics Accuracy 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 28 pages.

208 Welsh Pool Road • Exton, PA 19341- 1313 • (610) 280-3000 • Fax (610) 280-3041

10. For analytes where the ICP MS is out-of-control, a post-digestion MS (PDS) and serial dilution are performed. A PDS was prepared at meaningful concentration level for the following analytes:

Sample ID	Element	PDS Concentration (ppb)	PDS % Recovery
J12L32	Aluminum	66,000	98.8
	Iron	66,000	107.7
	Antimony	300	103.6
	Silicon	6,300	102.0

11. All duplicate analyses were within the 20% Relative Percent Difference (RPD) control limits. Refer to the Inorganics Precision Report.

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.

13. LvLI is NELAP accredited by the state of Pennsylvania and holds over 20 additional state accreditations. For a complete listing of accrediting authorities and the corresponding analytes/methods, please contact your Project Manager.

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

for Iain Daniels
Laboratory Manager
Lionville Laboratory Incorporated

6/25/06
Date

jjw/m06-224

Washington Closure Hanford	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	RC-032-036	Page 1 of 1

Collector: Coffman	Company Contact: R.T. Coffman	Telephone No.: 528-6409	Project Coordinator: KESSNER, JH
Price Code	Data Turnaround: 15 DAYS		
Project Designation: 100-F Remaining Sites Burial Grounds - Soil Full Protocol	Sampling Location: 118-F-7 BCL Verification	SAF No.: RC-032	Air Quality ☐
Ice Chest No.: AFS-04-039	Field Logbook No.: EFL-1174-1	COA: R118F72000	Method of Shipment: Fed Ex
Shipped To: EBERLINE SERVICES / LIONVILLE	Offsite Property No.: A060502	Bill of Lading/Air Bill No.: See OSPC	

POSSIBLE SAMPLE HAZARDS/REMARKS

NA

Special Handling and/or Storage

~~Cool 4 degrees C~~ TRE 6-6-06

Preservation	None	None	None								
Type of Container	P	P	P								
No. of Container(s)	1	1	1								
Volume	250g	500mL	60mL								
SAMPLE ANALYSIS	See item (1) in Special Instructions.	See item (2) in Special Instructions.	Nickel-63; Strontium-89,90 -- Total Sr								
Sample No. / Matrix * / Sample Date / Sample Time											
J12L32 / SOIL / 6/5/06 / 1345	X										A1
J12L33 / SOIL / " / 1400	X										A2
J12L34 / SOIL / " / 1400	X										A2D
J12L35 / SOIL / " / 1415	X										A3
J12L36 / SOIL / 6/5/06 / 1430	X										A4

CHAIN OF POSSESSION

Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
RT COFFMAN / RT Coffman	2030 6/5/06	REFER #2C, 3728	2030 6/5/06
3728 #2C	6-6-06 1015	JR Edmundson	6-6-06 1015
JR Edmundson	6-6-06 1500	Fed Ex	
Fed Ex	6-7-06 0925	V Hernandez	6-7-06 0925

SPECIAL INSTRUCTIONS

(1) ICP Metals - 6010 (Client List) (Aluminum, Antimony, Arsenic, Barium, Beryllium, Boron, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Molybdenum, Nickel, Potassium, Selenium, Silicon, Silver, Sodium, Vanadium, Zinc); Mercury - 7471 - (CV)
(2) Gamma Spectroscopy (TCL List) (Cesium-137, Cobalt-60, Europium-152, Europium-154, Europium-155); Gamma Spec - Add-on (Silver-108 metastable)

Personnel not available to Relinquish samples from 3728 Ref # 2C on 6/6/06

Matrix *

S=Soil
SE=Sediment
SO=Solid
SL=Sludge
W=Water
O=Oil
A=Air
DS=Drum Solids
DL=Drum Liquid
T=Tissue
WI=Wipe
L=Liquid
V=Vegetation
X=Other

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

BHI-EE-011 (08/29/2005)

00034

29

Washington Closure Hanford	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	RC-032-042	Page 1 of 1

Collector: Coffman	Company Contact: R.T. Coffman	Telephone No.: 528-6409	Project Coordinator: KESSNER, JH	Price Code	Data Turnaround
Project Designation: 100-F Remaining Sites Burial Grounds - Soil Full Protocol	Sampling Location: 118-F-7 Shallow Zone Verification Focus sample		SAF No.: RC-032	Air Quality ☐	15 DAYS
Ice Chest No.: AFS-04-034	Field Logbook No.: EFL-1174-1	COA: R118F72000	Method of Shipment: Fed Ex		
Shipped To: EBERLINE SERVICES / LIONVILLE	Offsite Property No.: A060503		Bill of Lading/Air Bill No.: See OSPC		

POSSIBLE SAMPLE HAZARDS/REMARKS

NA

Special Handling and/or Storage

~~Cool 4 degrees C~~ TRC 6-7-06

000035

SAMPLE ANALYSIS													
Preservation				None	None	None							
Type of Container				P	P	P							
No. of Container(s)				1	1	1							
Volume				250g	500mL	60mL							
				See item (1) in Special Instructions.	See item (2) in Special Instructions.	Nickel-63; Strontium-89,90 -- Total Sr							
Sample No.	Matrix *	Sample Date	Sample Time										
J12LY7	SOIL	6/6/06	1300	X									

RTC 6/6/06

CHAIN OF POSSESSION		Sign/Print Names	
Relinquished By/Removed From: RT COFFMAN / RT Coffman	Date/Time: 6/6/06 1800	Received By/Stored In: REEE #2C 3728	Date/Time: 6/6/06 1800
Relinquished By/Removed From: 3728 #2C	Date/Time: 6-7-06 1200	Received By/Stored In: JR Edmondson	Date/Time: 6-7-06 1200
Relinquished By/Removed From: JR Edmondson	Date/Time: 6-7-06 1500	Received By/Stored In: Fed Ex	Date/Time:
Relinquished By/Removed From: Fed Ex	Date/Time: 6-8-06 0935	Received By/Stored In: [illegible]	Date/Time: 6-8-06 0935
Relinquished By/Removed From:	Date/Time:	Received By/Stored In:	Date/Time:
Relinquished By/Removed From:	Date/Time:	Received By/Stored In:	Date/Time:

SPECIAL INSTRUCTIONS

(1) ICP Metals - 6010 (Client List) {Aluminum, Antimony, Arsenic, Barium, Beryllium, Boron, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Molybdenum, Nickel, Potassium, Selenium, Silicon, Silver, Sodium, Vanadium, Zinc}; Mercury - 7471 - (CV)
(2) Gamma Spectroscopy (TCL List) {Cesium-137, Cobalt-60, Europium-152, Europium-154, Europium-155}; Gamma Spec - Add-on {Silver-108 metastable}

Personnel not available to relinquish samples from 3728 Ref #2C on 6/7/06

Matrix *
S=Soil
SE=Sediment
SO=Solid
SL=Sludge
W = Water
O=Oil
A=Air
DS=Drum Solids
DL=Drum Liquids
T=Tissue
WI=Wipe
L=Liquid
V=Vegetation
X=Other

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

BHI-EE-011 (08/29/2005)

Washington Closure Hanford	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	RC-032-037	Page 1 of 1

Collector: Coffman	Company Contact: R.T. Coffman	Telephone No.: 528-6409	Project Coordinator: KESSNER, JH	Price Code	Data Turnaround: 15 Days
Project Designation: 100-F Remaining Sites Burial Grounds - Soil Full Protocol	Sampling Location: 118-F-7 ACL Verification		SAF No.: RC-032	Air Quality ☐	
Ice Chest No.: AFS-04-034	Field Logbook No.: EFL-1174-1	COA: R118F72000	Method of Shipment: Fed Ex		
Shipped To: EBERLINE SERVICES / LIONVILLE	Offsite Property No.: ~~A0600~~ A060503		Bill of Lading/Air Bill No.: See OSPC		

POSSIBLE SAMPLE HAZARDS/REMARKS

NA

Special Handling and/or Storage

Cool 4 degrees C

Preservation	None	None	None RTC 6/6/06									
Type of Container	P	P	~~P~~ AG									
No. of Container(s)	1	1	1									
Volume	250g	500mL	60mL									
SAMPLE ANALYSIS	See item (1) in Special Instructions.	See item (2) in Special Instructions.	Nickel-63, Strontium-89,90 -- Total Sr									
Sample No.	Matrix *	Sample Date	Sample Time									
J12L37	SOIL	6/6/06	0815	X								A1
J12L38	SOIL		0830	X								A2
J12L39	SOIL		0845	X								A3
J12L40	SOIL		0845	X								A3D
J12L41	SOIL	6/6/06	0900	X								A4

000036

CHAIN OF POSSESSION — **Sign/Print Names**

Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
RT Coffman / RT Coffman 6/6/06	1800	Refer #2C, 3728	1800 6/6/06
3728#2C 6-7-06	1200	T.R. Edmondson / TR Edmondson 6-7-06	1200
T.R. Edmondson / TR Edmondson 6-7-06	1500	Fed Ex	
Fed Ex	6.8.06 0935	[illegible]	6.8.06 0935

SPECIAL INSTRUCTIONS

(1) ICP Metals - 6010 (Client List) {Aluminum, Antimony, Arsenic, Barium, Beryllium, Boron, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Molybdenum, Nickel, Potassium, Selenium, Silicon, Silver, Sodium, Vanadium, Zinc}; Mercury - 7471 - (CV)
(2) Gamma Spectroscopy (TCL List) {Cesium-137, Cobalt-60, Europium-152, Europium-154, Europium-155}; Gamma Spec - Add-on {Silver-108 metastable}

Personnel not available to relinquish samples from 3728 Ref #2C on 6/7/06

Matrix *

S=Soil
SE=Sediment
SO=Solid
SL=Sludge
W = Water
O=Oil
A=Air
DS=Drum Solids
DL=Drum Liquids
T=Tissue
WI=Wipe
L=Liquid
V=Vegetation
X=Other

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

BHI-EE-011 (08/29/2005)

Washington Closure Hanford	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	RC-032-038	Page 1 of 1

Collector: Coffman	Company Contact: R.T. Coffman	Telephone No.: 528-6409	Project Coordinator: KESSNER, JH
Price Code	Data Turnaround: 15 DAYS	Air Quality ☐	
Project Designation: 100-F Remaining Sites Burial Grounds - Soil Full Protocol	Sampling Location: 118-F-7 Shallow Zone Verification	SAF No.: RC-032	
Ice Chest No.: AFS-04-034	Field Logbook No.: EFL-1174-1	COA: R118F72000	Method of Shipment: Fed Ex
Shipped To: EBERLINE SERVICES / LIONVILLE	Offsite Property No.: A060503	Bill of Lading/Air Bill No.: See OSPC	

POSSIBLE SAMPLE HAZARDS/REMARKS

NA

Special Handling and/or Storage

~~Cool 4 degrees C~~ TRB 6-7-06

000037

Preservation	None	None	None									
Type of Container	P	P	P									
No. of Container(s)	1	1	1									
Volume	250g	500mL	60mL									
SAMPLE ANALYSIS	See item (1) in Special Instructions.	See item (2) in Special Instructions.	Nickel-63, Strontium-89,90 – Total Sr									

6/6/06 RTC

Sample No.	Matrix *	Sample Date	Sample Time										
J12L42	SOIL	6/6/06	1200	X									A1
J12L43	SOIL		1215	X									A2
J12L44	SOIL		1230	X									A3
J12L45	SOIL		1245	X									A4
J12L46	SOIL	6/6/06	1245	X									A4D

CHAIN OF POSSESSION — Sign/Print Names

Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
RT COFFMAN / RT Coffman	6/6/06 1800	REFER #2C 3728	6/6/06 1800
3728 #2C	6-7-06 1200	TR Edmundson / JR Edmundson	6-7-06 1200
TR Edmundson / JR Edmundson	6-7-06 1500	Fed Ex	
Fed Ex	6-8-06 0935	D J Mills	6-8-06 0935

SPECIAL INSTRUCTIONS

(1) ICP Metals - 6010 (Client List) (Aluminum, Antimony, Arsenic, Barium, Beryllium, Boron, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Molybdenum, Nickel, Potassium, Selenium, Silicon, Silver, Sodium, Vanadium, Zinc); Mercury - 7471 - (CV)
(2) Gamma Spectroscopy (TCL List) (Cesium-137, Cobalt-60, Europium-152, Europium-154, Europium-155); Gamma Spec - Add-on (Silver-108 metastable)

Personnel not available to relinquish samples from 3728
Ref #2C on 6/7/06

Matrix *
S=Soil
SD=Sediment
SO=Solid
SL=Sludge
W = Water
O=Oil
A=Air
DS=Drum Solids
DL=Drum Liquids
T=Tissue
WI=Wipe
L=Liquid
V=Vegetation
X=Other

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

BHI-EE-011 (08/29/2005)

Appendix 5

Data Validation Supporting Documentation

INORGANIC ANALYSIS DATA VALIDATION CHECKLIST

VALIDATION LEVEL:	A	B	C	D	E
PROJECT: 100-F	118-F-7		DATA PACKAGE: K0411		
VALIDATOR: TLI		LAB: LLI		DATE: 8/7/06	
			SDG: K0411		
ANALYSES PERFORMED					
SW-846/ICP	SW-846/GFAA	SW-846/Hg	SW-846 Cyanide		
SAMPLES/MATRIX					
J12L32	J12L33	J12L34	J12L35	J12L36	J12L37
J12L38	J12L39	J12L40	J12L41	J12L42	J12L43
J12L44	J12L45	J12L46	J12L47		
					Soil

1. DATA PACKAGE COMPLETENESS AND CASE NARRATIVE

Technical verification documentation present? ..... Yes No N/A

Comments:

2. INSTRUMENT PERFORMANCE AND CALIBRATIONS (Levels D and E)

Initial calibrations performed on all instruments? ..... Yes No N/A

Initial calibrations acceptable? ..... Yes No N/A

ICP interference checks acceptable? ..... Yes No N/A

ICV and CCV checks performed on all instruments? ..... Yes No N/A

ICV and CCV checks acceptable? ..... Yes No N/A

Standards traceable? ..... Yes No N/A

Standards expired? ..... Yes No N/A

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

Comments:

INORGANIC ANALYSIS DATA VALIDATION CHECKLIST

3. BLANKS (Levels B, C, D, and E)

ICB and CCB checks performed for all applicable analyses? (Levels D, E) ..... Yes No N/A

ICB and CCB results acceptable? (Levels D, E) ..... Yes No N/A

Laboratory blanks analyzed? ..... Yes No N/A

Laboratory blank results acceptable? ..... Yes No N/A

Field blanks analyzed? (Levels C, D, E) ..... Yes No N/A

Field blank results acceptable? (Levels C, D, E) ..... Yes No N/A

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

Comments: no FS

4. ACCURACY (Levels C, D, and E)

MS/MSD samples analyzed? ..... Yes No N/A

MS/MSD results acceptable? ..... Yes No N/A

MS/MSD standards NIST traceable? (Levels D, E) ..... Yes No N/A

MS/MSD standards expired? (Levels D, E) ..... Yes No N/A

LCS/BSS samples analyzed? ..... Yes No N/A

LCS/BSS results acceptable? ..... Yes No N/A

Standards traceable? (Levels D, E) ..... Yes No N/A

Standards expired? (Levels D, E) ..... Yes No N/A

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

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

Performance audit sample results acceptable? ..... Yes No N/A

Comments: MS - antimony - 54.4 + 59% - J all

no PAS

LCS - Silicon 62.9% + 62.9% - J all

INORGANIC ANALYSIS DATA VALIDATION CHECKLIST

5. PRECISION (Levels C, D, and E)

Duplicate RPD values acceptable? ..... Yes No N/A

Duplicate results acceptable? ..... Yes No N/A

MS/MSD standards NIST traceable? (Levels D, E) ..... Yes No N/A

MS/MSD standards expired? (Levels D, E) ..... Yes No N/A

Field duplicate RPD values acceptable? ..... Yes No N/A

Field split RPD values acceptable? ..... Yes No N/A

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

Comments: Calcium 31.6% 37-44 + LY7 - J

FD 39/40 - chromium 66% ~~[illegible]~~ [illegible]

45/46 - lead 75%

6. ICP QUALITY CONTROL (Levels D and E)

ICP serial dilution samples analyzed? ..... Yes No N/A

ICP serial dilution %D values acceptable? ..... Yes No N/A

ICP post digestion spike required? ..... Yes No N/A

ICP post digestion spike values acceptable? ..... Yes No N/A

Standards traceable? ..... Yes No N/A

Standards expired? ..... Yes No N/A

Transcription/calculation errors? ..... Yes No N/A

Comments:

INORGANIC ANALYSIS DATA VALIDATION CHECKLIST

7. FURNACE AA QUALITY CONTROL (Levels D and E)

Duplicate injections performed as required? ..... Yes No N/A

Duplicate injection %RSD values acceptable? ..... Yes No N/A

Analytical spikes performed as required? ..... Yes No N/A

Analytical spike recoveries acceptable? ..... Yes No N/A

Standards traceable? ..... Yes No N/A

Standards expired? ..... Yes No N/A

MSA performed as required? ..... Yes No N/A

MSA results acceptable? ..... Yes No N/A

Transcription/calculation errors? ..... Yes No N/A

Comments:

8. HOLDING TIMES (all levels)

Samples properly preserved? ..... Yes No N/A

Sample holding times acceptable? ..... Yes No N/A

Comments:

INORGANIC ANALYSIS DATA VALIDATION CHECKLIST

9. RESULT QUANTITATION AND DETECTION LIMITS (all levels)

Results reported for all requested analyses? ..... Yes No N/A

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

Samples properly prepared? (Levels D, E) ..... Yes No N/A

Detection limits meet RDL? ..... Yes No N/A

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

Comments: Silver - 32, 33, 34, 36, 37, 38, 39, 40, 41, 46
cadmium - 32, 33, 34, 36, 37, 39, 40, 41, 46, 47
Selenium - all over

Appendix 6

Additional Documentation Requested by Client

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Lionville Laboratory, Inc.

INORGANICS METHOD BLANK DATA SUMMARY PAGE 06/23/06

CLIENT: TNUHANFORD RC-032 K0411

LVL LOT #: 0606L232

WORK ORDER: 11343-606-001-9999-00

SAMPLE	SITE ID	ANALYTE	RESULT	UNITS	REPORTING LIMIT	DILUTION FACTOR
BLANK1	06L0378-MB1	Silver, Total	0.07 u	MG/KG	0.07	1.0
		Aluminum, Total	2.9 u	MG/KG	2.9	1.0
		Arsenic, Total	0.61 u	MG/KG	0.61	1.0
		Boron, Total	0.24 u	MG/KG	0.24	1.0
		Barium, Total	0.02 u	MG/KG	0.02	1.0
		Beryllium, Total	0.02 u	MG/KG	0.02	1.0
		Calcium, Total	2.1	MG/KG	1.6	1.0
		Cadmium, Total	0.07 u	MG/KG	0.07	1.0
		Cobalt, Total	0.14 u	MG/KG	0.14	1.0
		Chromium, Total	0.13 u	MG/KG	0.13	1.0
		Copper, Total	0.12 u	MG/KG	0.12	1.0
		Iron, Total	3.5 u	MG/KG	3.5	1.0
		Potassium, Total	2.3 u	MG/KG	2.3	1.0
		Magnesium, Total	0.97 u	MG/KG	0.97	1.0
		Manganese, Total	0.03 u	MG/KG	0.03	1.0
		Molybdenum, Total	0.29 u	MG/KG	0.29	1.0
		Sodium, Total	0.76 u	MG/KG	0.76	1.0
		Nickel, Total	0.24 u	MG/KG	0.24	1.0
		Lead, Total	0.31 u	MG/KG	0.31	1.0
		Antimony, Total	0.44 u	MG/KG	0.44	1.0
		Selenium, Total	0.47 u	MG/KG	0.47	1.0
		Silicon, Total	2.3 u	MG/KG	2.3	1.0
		Vanadium, Total	0.09 u	MG/KG	0.09	1.0
		Zinc, Total	0.16 u	MG/KG	0.16	1.0
BLANK1	06C0118-MB1	Mercury, Total	0.02 u	MG/KG	0.02	1.0

Lionville Laboratory, Inc.

INORGANICS ACCURACY REPORT 06/23/06

CLIENT: TNUHANFORD RC-032 K0411 LVL LOT #: 0606L232

WORK ORDER: 11343-606-001-9999-00

SAMPLE	SITE ID	ANALYTE	SPIKED SAMPLE	INITIAL RESULT	SPIKED AMOUNT	%RECOV	DILUTION FACTOR(SPK)
-001	J12LY7	Silver, Total	4.5	0.21u	4.9	91.8	3.0
		Aluminum, Total	5630	4250	197	697.3*	3.0
		Arsenic, Total	195	10.2	197	93.9	3.0
		Boron, Total	90.9	1.9	98.5	90.4	3.0
		Barium, Total	254	58.0	197	99.4	3.0
		Beryllium, Total	5.2	0.35	4.9	98.9	3.0
		Calcium, Total	8240	5560	2460	109.1	3.0
		Cadmium, Total	4.8	0.21u	4.9	98.0	3.0
		Cobalt, Total	51.3	5.0	49.3	93.9	3.0
		Chromium, Total	27.3	7.3	19.7	101.5	3.0
		Copper, Total	35.2	11.3	24.6	97.2	3.0
		Iron, Total	13700	12000	98.5	1778 *	3.0
		Mercury, Total	0.17	0.01u	0.14	117.2	1.0
		Potassium, Total	3320	958	2460	95.9	3.0
		Magnesium, Total	6050	3110	2460	119.4	3.0
		Manganese, Total	321	254	49.3	136.5*	3.0
		Molybdenum, Total	91.0	0.86u	98.5	92.4	3.0
		Sodium, Total	2370	103	2460	92.2	3.0
		Nickel, Total	56.5	8.5	49.3	97.4	3.0
		Lead, Total	123	63.8	49.3	120.3	3.0
		Antimony, Total	26.8	1.3 u	49.3	54.4	3.0
		Selenium, Total	183	1.4 u	197	92.9	3.0
		Silicon, Total	652	524	98.5	130.7*	3.0
		Vanadium, Total	78.7	27.1	49.3	104.7	3.0
		Zinc, Total	84.3	35.4	49.3	99.2	3.0

Lionville Laboratory, Inc.

INORGANICS PRECISION REPORT 06/23/06

CLIENT: TNUHANFORD RC-032 K0411 LVL LOT #: 0606L232

WORK ORDER: 11343-606-001-9999-00

SAMPLE	SITE ID	ANALYTE	INITIAL RESULT	REPLICATE	RPD	DILUTION FACTOR(REP)
-001REP	J12LY7	Silver, Total	0.21u	0.21u	NC	3.0
		Aluminum, Total	4250	4960	15.3	3.0
		Arsenic, Total	10.2	10.4	1.9	3.0
		Boron, Total	1.9	2.5	27.3	3.0
		Barium, Total	58.0	73.1	23.0	3.0
		Beryllium, Total	0.35	0.43	20.2	3.0
		Calcium, Total	5560	7640	31.6	3.0
		Cadmium, Total	0.21u	0.21u	NC	3.0
		Cobalt, Total	5.0	5.5	9.5	3.0
		Chromium, Total	7.3	8.1	10.4	3.0
		Copper, Total	11.3	11.5	1.8	3.0
		Iron, Total	12000	13400	11.3	3.0
		Mercury, Total	0.01u	0.02u	NC	1.0
		Potassium, Total	958	1070	10.8	3.0
		Magnesium, Total	3110	3540	12.8	3.0
		Manganese, Total	254	318	22.3	3.0
		Molybdenum, Total	0.86u	0.86u	NC	3.0
		Sodium, Total	103	118	13.1	3.0
		Nickel, Total	8.5	9.8	14.2	3.0
		Lead, Total	63.8	67.1	5.0	3.0
		Antimony, Total	1.3 u	1.3 u	NC	3.0
		Selenium, Total	1.4 u	1.4 u	NC	3.0
		Silicon, Total	524	398	27.2	3.0
		Vanadium, Total	27.1	32.0	16.6	3.0
		Zinc, Total	35.4	40.0	12.2	3.0

Lionville Laboratory, Inc.

INORGANICS LABORATORY CONTROL STANDARDS REPORT 06/23/06

CLIENT: TNUHANFORD RC-032 K0411 LVL LOT #: 0606L232

WORK ORDER: 11343-606-001-9999-00

SAMPLE	SITE ID	ANALYTE	SPIKED SAMPLE	SPIKED AMOUNT	UNITS	%RECOV
LCS1	06L0378-LC1	Silver, LCS	47.5	50.0	MG/KG	95.0
		Aluminum, LCS	475	500	MG/KG	95.0
		Arsenic, LCS	937	1000	MG/KG	93.7
		Boron, LCS	472	500	MG/KG	94.3
		Barium, LCS	483	500	MG/KG	96.6
		Beryllium, LCS	24.3	25.0	MG/KG	97.2
		Calcium, LCS	2490	2500	MG/KG	99.6
		Cadmium, LCS	24.3	25.0	MG/KG	97.2
		Cobalt, LCS	240	250	MG/KG	96.1
		Chromium, LCS	48.8	50.0	MG/KG	97.6
		Copper, LCS	121	125	MG/KG	96.9
		Iron, LCS	483	500	MG/KG	96.6
		Potassium, LCS	2310	2500	MG/KG	92.4
		Magnesium, LCS	2410	2500	MG/KG	96.3
		Manganese, LCS	75.1	75.0	MG/KG	100.1
		Molybdenum, LCS	484	500	MG/KG	96.8
		Sodium, LCS	2310	2500	MG/KG	92.4
		Nickel, LCS	195	200	MG/KG	97.7
		Lead, LCS	242	250	MG/KG	97.0
		Antimony, LCS	282	300	MG/KG	93.9
		Selenium, LCS	888	1000	MG/KG	88.8
		Silicon, LCS	314	500	MG/KG	62.9
		Vanadium, LCS	245	250	MG/KG	98.1
		Zinc, LCS	95.0	100	MG/KG	95.0
LCS1	06C0118-LC1	Mercury, LCS	6.9	6.2	MG/KG	111.5

Lionville Laboratory, Inc.

INORGANICS METHOD BLANK DATA SUMMARY PAGE 06/23/06

CLIENT: TNUHANFORD RC-032 K041 LVL LOT #: 0606L224

WORK ORDER: 11343-606-001-9999-00

SAMPLE	SITE ID	ANALYTE	RESULT	UNITS	REPORTING LIMIT	DILUTION FACTOR
BLANK1	06L0378-MB1	Silver, Total	0.07 u	MG/KG	0.07	1.0
		Aluminum, Total	2.9 u	MG/KG	2.9	1.0
		Arsenic, Total	0.61 u	MG/KG	0.61	1.0
		Boron, Total	0.24 u	MG/KG	0.24	1.0
		Barium, Total	0.02 u	MG/KG	0.02	1.0
		Beryllium, Total	0.02 u	MG/KG	0.02	1.0
		Calcium, Total	2.1	MG/KG	1.6	1.0
		Cadmium, Total	0.07 u	MG/KG	0.07	1.0
		Cobalt, Total	0.14 u	MG/KG	0.14	1.0
		Chromium, Total	0.13 u	MG/KG	0.13	1.0
		Copper, Total	0.12 u	MG/KG	0.12	1.0
		Iron, Total	3.5 u	MG/KG	3.5	1.0
		Potassium, Total	2.3 u	MG/KG	2.3	1.0
		Magnesium, Total	0.97 u	MG/KG	0.97	1.0
		Manganese, Total	0.03 u	MG/KG	0.03	1.0
		Molybdenum, Total	0.29 u	MG/KG	0.29	1.0
		Sodium, Total	0.76 u	MG/KG	0.76	1.0
		Nickel, Total	0.24 u	MG/KG	0.24	1.0
		Lead, Total	0.31 u	MG/KG	0.31	1.0
		Antimony, Total	0.44 u	MG/KG	0.44	1.0
		Selenium, Total	0.47 u	MG/KG	0.47	1.0
		Silicon, Total	2.3 u	MG/KG	2.3	1.0
		Vanadium, Total	0.09 u	MG/KG	0.09	1.0
		Zinc, Total	0.16 u	MG/KG	0.16	1.0
BLANK1	06C0118-MB1	Mercury, Total	0.02 u	MG/KG	0.02	1.0

Lionville Laboratory, Inc.

INORGANICS ACCURACY REPORT 06/23/06

CLIENT: TNUHANFORD RC-032 K041

WORK ORDER: 11343-606-001-9999-00

LVL LOT #: 0606L224

SAMPLE	SITE ID	ANALYTE	SPIKED SAMPLE	INITIAL RESULT	SPIKED AMOUNT	%RECOV	DILUTION FACTOR(SPK)
-001	J12L32	Silver, Total	4.3	0.21u	5.0	86.0	3.0
		Aluminum, Total	5260	4560	199	352.2*	3.0
		Arsenic, Total	193	2.5	199	95.6	3.0
		Boron, Total	91.9	1.4	99.5	91.0	3.0
		Barium, Total	240	49.4	199	95.9	3.0
		Beryllium, Total	5.3	0.54	5.0	95.1	3.0
		Calcium, Total	7410	4690	2490	109.3	3.0
		Cadmium, Total	4.8	0.21u	5.0	96.0	3.0
		Cobalt, Total	51.1	4.8	49.8	93.0	3.0
		Chromium, Total	26.3	7.4	19.9	95.0	3.0
		Copper, Total	34.6	10.4	24.9	97.2	3.0
		Iron, Total	13200	13000	99.5	180.9*	3.0
		Potassium, Total	3160	930	2490	89.6	3.0
		Magnesium, Total	5560	3200	2490	94.8	3.0
		Manganese, Total	299	245	49.8	107.2*	3.0
		Molybdenum, Total	91.5	0.87u	99.5	92.0	3.0
		Sodium, Total	2410	86.0	2490	93.4	3.0
		Nickel, Total	56.5	8.4	49.8	96.6	3.0
		Lead, Total	52.8	5.3	49.8	95.4	3.0
		Antimony, Total	29.4	1.3 u	49.8	59.0	3.0
		Selenium, Total	186	1.4 u	199	93.7	3.0
		Silicon, Total	711	472	99.5	240.3*	3.0
		Vanadium, Total	77.8	31.4	49.8	93.2	3.0
		Zinc, Total	79.2	32.0	49.8	94.8	3.0

Lionville Laboratory, Inc.

INORGANICS ACCURACY REPORT 06/23/06

CLIENT: TNUHANFORD RC-032 K041

WORK ORDER: 11343-606-001-9999-00

LVL LOT #: 0606L224

SAMPLE	SITE ID	ANALYTE	SPIKED SAMPLE	INITIAL RESULT	SPIKED AMOUNT	%RECOV	DILUTION FACTOR (SPK)
-002	J12L33	Mercury, Total	0.17	0.02u	0.15	114.5	1.0

Lionville Laboratory, Inc.

INORGANICS PRECISION REPORT 06/23/06

CLIENT: TNUHANFORD RC-032 K041

WORK ORDER: 11343-606-001-9999-00

LVL LOT #: 0606L224

SAMPLE	SITE ID	ANALYTE	INITIAL RESULT	REPLICATE	RPD	DILUTION FACTOR(REP)
-001REP	J12L32	Silver, Total	0.21u	0.21u	NC	3.0
		Aluminum, Total	4560	4170	8.8	3.0
		Arsenic, Total	2.5	2.5	0.00	3.0
		Boron, Total	1.4	1.2	15.4	3.0
		Barium, Total	49.4	51.7	4.5	3.0
		Beryllium, Total	0.54	0.51	5.7	3.0
		Calcium, Total	4690	4710	0.52	3.0
		Cadmium, Total	0.21u	0.21u	NC	3.0
		Cobalt, Total	4.8	5.1	6.1	3.0
		Chromium, Total	7.4	7.1	4.1	3.0
		Copper, Total	10.4	12.0	14.3	3.0
		Iron, Total	13000	11900	9.0	3.0
		Potassium, Total	930	826	11.8	3.0
		Magnesium, Total	3200	3080	3.9	3.0
		Manganese, Total	245	277	12.2	3.0
		Molybdenum, Total	0.87u	0.87u	NC	3.0
		Sodium, Total	86.0	74.8	13.9	3.0
		Nickel, Total	8.4	10.2	19.4	3.0
		Lead, Total	5.3	5.5	3.7	3.0
		Antimony, Total	1.3 u	1.3 u	NC	3.0
		Selenium, Total	1.4 u	1.4 u	NC	3.0
		Silicon, Total	472	470	0.36	3.0
		Vanadium, Total	31.4	28.4	10.0	3.0
		Zinc, Total	32.0	32.7	2.2	3.0

Lionville Laboratory, Inc.

INORGANICS PRECISION REPORT 06/23/06

CLIENT: TNUHANFORD RC-032 K041

WORK ORDER: 11343-606-001-9999-00

LVL LOT #: 0606L224

SAMPLE	SITE ID	ANALYTE	INITIAL RESULT	REPLICATE	RPD	DILUTION FACTOR(REP)
-002REP	J12L33	Mercury, Total	0.02u	0.02u	NC	1.0