0060116

SAF-B03-024
118-C-4 Horizontal Rod Cave Soil Sampling - Verification
FINAL VALIDATION PACKAGE

COMPLETE COPY OF VALIDATION PACKAGE TO:

Jeanette Duncan — 6.19.03
INITIAL/DATE

Jill Thomson — 6.19.03
INITIAL/DATE

SDG **H2216** **SAF-B03-024**

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AUG 18 2003
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Date: 9 June 2003
To: Bechtel Hanford, Inc. (technical representative)
From: TechLaw, Inc.
Project: 118-C-4 Horizontal Rod Cave Sampling - Verification
Subject: Radiochemistry - Data Package No. H2216-EB (SDG No. H2216)

INTRODUCTION

This memo presents the results of data validation on Summary Data Package No. H2216-EB which was prepared by Eberline Services (EB). A list of samples validated along with the analyses reported and the requested analytes is provided in the following table.

Sample ID	Sample	Media	Validation	Analysis
J00P13	5/15/03	Soil	C	See note 1
J00NT5	5/15/03	Soil	C	See note 1
J00NT6	5/15/03	Soil	C	See note 1
J00NT7	5/15/03	Soil	C	See note 1
J00NT8	5/15/03	Soil	C	See note 1
J00NT9	5/15/03	Soil	C	See note 1

1- Gamma spectroscopy, alpha spectroscopy, total strontium.

Data validation was conducted in accordance with the BHI validation statement of work and the 118-C-4 Horizontal Rod Cave Characterization Plan (DOE/RL-97-33, Rev. 0). Appendices 1 through 5 provide the following information as indicated below:

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

One equipment blanks (J00P13) was submitted for analysis. Potassium-40, radium-226, radium-228, thorium-228 and thorium-232 were detected in the equipment blank. Under the BHI statement of work, no qualification is required.

- **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.

All duplicate results were acceptable.

Field Duplicate

One pair of field duplicate samples (samples J00NT5/J00NT9) were submitted to EB for analysis. The duplicate sample results were compared using the validation guidelines for determining the RPD between a sample and its duplicate. All field duplicate results were acceptable.

- **Analytical Detection Levels**

Reported analytical detection levels are compared against the 118-C-4 Horizontal Rod Cave Characterization Plan required detection limits (RDLs) to ensure that laboratory detection levels meet the required criteria. One analyte (europium-154 in sample J00NT7) was reported above the RDL. All other reported analytes met the RDL. Under BHI the BHI statement of work, no qualification is required.

- **Completeness**

Data package No. H2216 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

One analyte (europium-154 in sample J00NT7) was reported above the RDL. All other reported analytes met the RDL. Under BHI the BHI statement of work, no qualification is required.

REFERENCES

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

DOE/RL-97-33, Rev. 0, *118-C-4 Horizontal Rod Cave Characterization Plan*, August 1997 and CCN 101907 Addendum, 19 February 2003.

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

DATA QUALIFICATION SUMMARY

SDG: H2216	REVIEWER: TLI	DATE: 6/9/03	PAGE_1_OF_1_
COMMENTS: No qualifiers assigned.			

Appendix 3

Qualified Data Summary and Annotated Laboratory Reports

RADIOCHEMISTRY ANALYSIS, SOIL MATRIX, (PCi/G)

Project: BECHTEL-HANFORD															
Laboratory: EB															
Case	SDG: H2216														
Sample Number		J00P13		J00NT5		J00NT6		J00NT7		J00NT8		J00NT9			
Remarks		E. Blank										Duplicate			
Sample Date		5/15/03		5/15/03		5/15/03		5/15/03		5/15/03		5/15/03			
Radiochemistry	RDL	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Total Strontium	1	-0.107	U	-0.020	U	-0.046	U	0.004	U	-0.012	U	-0.031	U		
Uranium-233/234	1	0.029	U	0.275		0.571		0.472		0.495		0.388			
Uranium-235	1	0.035	U	0.028	U	0.038	U	0	U	0.054	U	0	U		
Uranium-238	1	0.116	U	0.321		0.603		0.517		0.562		0.526			
Plutonium-238	1	0	U	0	U	0.060	U	0	U	0	U	0	U		
Plutonium-239/240	1	0.157	U	0.040	U	0	U	0	U	0	U	0.032	U		
Americium-241		-0.038	U	0.126	U	0.038	U	0.030	U	0	U	-0.034	U		
Potassium-40		3.68		8.71		9.82		9.70		9.37		8.64			
Cobalt 60	0.05	U	U	U	U	U	U	U	U	U	U	U	U		
Cesium 137	0.1	U	U	U	U	U	U	U	U	U	U	U	U		
Radium-226		0.155		0.303		0.324		0.338		0.309		0.287			
Radium-228		0.116		0.386		0.620		0.536		0.526		0.446			
Europium 152	0.1	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		
Europium 155	0.1	U	U	U	U	U	U	U	U	U	U	U	U		
Thorium-228		0.221		0.370		0.424		0.433		0.416		0.354			
Thorium-232		0.116		0.386		0.620		0.536		0.526		0.446			
Uranium-235(gea)		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		
Americium-241(gea)		U	U	U	U	U	U	U	U	U	U	U	U		
NA = Not analyzed															

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* - RDL 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 H2216

7522-006 J00P13

DATA SHEET

SDG	7522	Client/Case no	Hanford	SDG H2216	
Contact	Melissa C. Mannion	Contract	No. 630		
Lab sample id	R305118-06	Client sample id	J00P13		
Dept sample id	7522-006	Location/Matrix	118-C-4 Rod Cave	SOLID	
Received	05/19/03	Collected/Weight	05/15/03 08:00	1394 g	
% solids	100.0	Custody/SAF No	B03-024-03	B03-024	

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI-FIERS	TEST
Total Strontium	SR-RAD	-0.107	0.12	0.18	1.0	U	SR
Uranium 233/234	U-233/234	0.029	0.058	0.22	1.0	U	U
Uranium 235	15117-96-1	0.035	0.071	0.27	1.0	U	U
Uranium 238	U-238	0.116	0.12	0.22	1.0	U	U
Plutonium 238	13981-16-3	0	0.10	0.40	1.0	U	PU
Plutonium 239/240	PU-239/240	0.157	0.21	0.40	1.0	U	PU
Americium 241	14596-10-2	-0.038	0.076	0.29	1.0	U	AM
Potassium 40	13966-00-2	3.68	0.36	0.21			GAM
Cobalt 60	10198-40-0	U		0.019	0.050	U	GAM
Cesium 137	10045-97-3	U		0.018	0.10	U	GAM
Radium 226	13982-63-3	0.155	0.032	0.031			GAM
Radium 228	15262-20-1	0.116	0.085	0.094			GAM
Europium 152	14683-23-9	U		0.044	0.10	U	GAM
Europium 154	15585-10-1	U		0.055	0.10	U	GAM
Europium 155	14391-16-3	U		0.059	0.10	U	GAM
Thorium 228	14274-82-9	0.221	0.032	0.034			GAM
Thorium 232	TH-232	0.116	0.085	0.094			GAM
Uranium 235	15117-96-1	U		0.083		U	GAM
Uranium 238	U-238	U		2.4		U	GAM
Americium 241	14596-10-2	U		0.18		U	GAM

118-C-4 Horiz. Rod Cave Soil Smpl.

R 6/7/03

Lab id	EBRLNE
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Version	3.06
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EBERLINE SERVICES/RICHMOND

SAMPLE DELIVERY GROUP H2216

7522-001 J00NT5

DATA SHEET

SDG	7522	Client/Case no	Hanford	SDG H2216	
Contact	Melissa C. Mannion	Contract	No. 630		
Lab sample id	R305118-01	Client sample id	J00NT5		
Dept sample id	7522-001	Location/Matrix	118-C-4 Rod Cave	SOLID	
Received	05/19/03	Collected/Weight	05/15/03 08:15	1687 g	
% solids	98.4	Custody/SAF No	B03-024-01	B03-024	

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI-FIERS	TEST
Total Strontium	SR-RAD	-0.020	0.12	0.17	1.0	U	SR
Uranium 233/234	U-233/234	0.275	0.18	0.18	1.0		U
Uranium 235	15117-96-1	0.028	0.056	0.21	1.0	U	U
Uranium 238	U-238	0.321	0.18	0.18	1.0		U
Plutonium 238	13981-16-3	0	0.080	0.31	1.0	U	PU
Plutonium 239/240	PU-239/240	0.040	0.080	0.31	1.0	U	PU
Americium 241	14596-10-2	0.126	0.19	0.24	1.0	U	AM
Potassium 40	13966-00-2	8.71	0.79	0.22			GAM
Cobalt 60	10198-40-0	U		0.024	0.050	U	GAM
Cesium 137	10045-97-3	U		0.021	0.10	U	GAM
Radium 226	13982-63-3	0.303	0.046	0.041			GAM
Radium 228	15262-20-1	0.386	0.096	0.095			GAM
Europium 152	14683-23-9	U		0.054	0.10	U	GAM
Europium 154	15585-10-1	U		0.078	0.10	U	GAM
Europium 155	14391-16-3	U		0.048	0.10	U	GAM
Thorium 228	14274-82-9	0.370	0.027	0.025			GAM
Thorium 232	TH-232	0.386	0.096	0.095			GAM
Uranium 235	15117-96-1	U		0.086		U	GAM
Uranium 238	U-238	U		2.7		U	GAM
Americium 241	14596-10-2	U		0.030		U	GAM

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EBERLINE SERVICES/RICHMOND

SAMPLE DELIVERY GROUP H2216

7522-002 J00NT6

DATA SHEET

SDG	7522	Client/Case no	Hanford	SDG H2216	
Contact	Melissa C. Mannion	Contract	No. 630		
Lab sample id	R305118-02	Client sample id	J00NT6		
Dept sample id	7522-002	Location/Matrix	118-C-4 Rod Cave	SOLID	
Received	05/19/03	Collected/Weight	05/15/03 08:30	1629 g	
% solids	97.8	Custody/SAF No	B03-024-01	B03-024	

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI-FIERS	TEST
Total Strontium	SR-RAD	-0.046	0.11	0.16	1.0	U	SR
Uranium 233/234	U-233/234	0.571	0.26	0.24	1.0		U
Uranium 235	15117-96-1	0.038	0.077	0.29	1.0	U	U
Uranium 238	U-238	0.603	0.26	0.24	1.0		U
Plutonium 238	13981-16-3	0.060	0.12	0.23	1.0	U	PU
Plutonium 239/240	PU-239/240	0	0.060	0.23	1.0	U	PU
Americium 241	14596-10-2	0.038	0.077	0.29	1.0	U	AM
Potassium 40	13966-00-2	9.82	0.48	0.19			GAM
Cobalt 60	10198-40-0	U		0.020	0.050	U	GAM
Cesium 137	10045-97-3	U		0.018	0.10	U	GAM
Radium 226	13982-63-3	0.324	0.048	0.038			GAM
Radium 228	15262-20-1	0.620	0.099	0.090			GAM
Europium 152	14683-23-9	U		0.045	0.10	U	GAM
Europium 154	15585-10-1	U		0.059	0.10	U	GAM
Europium 155	14391-16-3	U		0.068	0.10	U	GAM
Thorium 228	14274-82-9	0.424	0.024	0.022			GAM
Thorium 232	TH-232	0.620	0.099	0.090			GAM
Uranium 235	15117-96-1	U		0.079		U	GAM
Uranium 238	U-238	U		3.1		U	GAM
Americium 241	14596-10-2	U		0.12		U	GAM

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EBERLINE SERVICES/RICHMOND

SAMPLE DELIVERY GROUP H2216

7522-003 J00NT7

DATA SHEET

SDG	7522	Client/Case no	Hanford	SDG H2216	
Contact	Melissa C. Mannion	Contract	No. 630		
Lab sample id	R305118-03	Client sample id	J00NT7		
Dept sample id	7522-003	Location/Matrix	118-C-4 Rod Cave	SOLID	
Received	05/19/03	Collected/Weight	05/15/03 08:40	1604 g	
% solids	98.1	Custody/SAF No	B03-024-01	B03-024	

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI-FIERS	TEST
Total Strontium	SR-RAD	0.004	0.13	0.17	1.0	U	SR
Uranium 233/234	U-233/234	0.472	0.23	0.17	1.0		U
Uranium 235	15117-96-1	0	0.054	0.21	1.0	U	U
Uranium 238	U-238	0.517	0.23	0.17	1.0		U
Plutonium 238	13981-16-3	0	0.070	0.27	1.0	U	PU
Plutonium 239/240	PU-239/240	0	0.070	0.27	1.0	U	PU
Americium 241	14596-10-2	0.030	0.060	0.23	1.0	U	AM
Potassium 40	13966-00-2	9.70	0.72	0.37			GAM
Cobalt 60	10198-40-0	U		0.033	0.050	U	GAM
Cesium 137	10045-97-3	U		0.034	0.10	U	GAM
Radium 226	13982-63-3	0.338	0.063	0.067			GAM
Radium 228	15262-20-1	0.536	0.13	0.14			GAM
Europium 152	14683-23-9	U		0.076	0.10	U	GAM
Europium 154	15585-10-1	U		0.12	0.10	U	GAM
Europium 155	14391-16-3	U		0.095	0.10	U	GAM
Thorium 228	14274-82-9	0.433	0.036	0.038			GAM
Thorium 232	TH-232	0.536	0.13	0.14			GAM
Uranium 235	15117-96-1	U		0.13		U	GAM
Uranium 238	U-238	U		4.0		U	GAM
Americium 241	14596-10-2	U		0.11		U	GAM

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SAMPLE DELIVERY GROUP H2216

7522-004 J00NT8

DATA SHEET

SDG	7522	Client/Case no	Hanford SDG H2216
Contact	Melissa C. Mannion	Contract	No. 630
Lab sample id	R305118-04	Client sample id	J00NT8
Dept sample id	7522-004	Location/Matrix	118-C-4 Rod Cave SOLID
Received	05/19/03	Collected/Weight	05/15/03 08:50 1657 g
% solids	98.0	Custody/SAF No	B03-024-01 B03-024

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI-FIERS	TEST
Total Strontium	SR-RAD	-0.012	0.12	0.17	1.0	U	SR
Uranium 233/234	U-233/234	0.495	0.23	0.17	1.0		U
Uranium 235	15117-96-1	0.054	0.055	0.21	1.0	U	U
Uranium 238	U-238	0.562	0.23	0.17	1.0		U
Plutonium 238	13981-16-3	0	0.072	0.28	1.0	U	PU
Plutonium 239/240	PU-239/240	0	0.072	0.28	1.0	U	PU
Americium 241	14596-10-2	0	0.060	0.23	1.0	U	AM
Potassium 40	13966-00-2	9.37	0.42	0.16			GAM
Cobalt 60	10198-40-0	U		0.021	0.050	U	GAM
Cesium 137	10045-97-3	U		0.023	0.10	U	GAM
Radium 226	13982-63-3	0.309	0.036	0.035			GAM
Radium 228	15262-20-1	0.526	0.096	0.093			GAM
Europium 152	14683-23-9	U		0.044	0.10	U	GAM
Europium 154	15585-10-1	U		0.060	0.10	U	GAM
Europium 155	14391-16-3	U		0.083	0.10	U	GAM
Thorium 228	14274-82-9	0.416	0.023	0.019			GAM
Thorium 232	TH-232	0.526	0.096	0.093			GAM
Uranium 235	15117-96-1	U		0.080		U	GAM
Uranium 238	U-238	U		2.3		U	GAM
Americium 241	14596-10-2	U		0.068		U	GAM

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EBERLINE SERVICES/RICHMOND

SAMPLE DELIVERY GROUP H2216

7522-005 J00NT9

DATA SHEET

SDG	7522	Client/Case no	Hanford	SDG H2216	
Contact	Melissa C. Mannion	Contract	No. 630		
Lab sample id	R305118-05	Client sample id	J00NT9		
Dept sample id	7522-005	Location/Matrix	118-C-4 Rod Cave	SOLID	
Received	05/19/03	Collected/Weight	05/15/03 08:15	1736 g	
% solids	98.4	Custody/SAF No	B03-024-01	B03-024	

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI-FIERS	TEST
Total Strontium	SR-RAD	-0.031	0.12	0.17	1.0	U	SR
Uranium 233/234	U-233/234	0.388	0.18	0.17	1.0		U
Uranium 235	15117-96-1	0	0.055	0.21	1.0	U	U
Uranium 238	U-238	0.526	0.23	0.17	1.0		U
Plutonium 238	13981-16-3	0	0.063	0.24	1.0	U	PU
Plutonium 239/240	PU-239/240	0.032	0.063	0.24	1.0	U	PU
Americium 241	14596-10-2	-0.034	0.068	0.26	1.0	U	AM
Potassium 40	13966-00-2	8.64	0.58	0.28			GAM
Cobalt 60	10198-40-0	U		0.030	0.050	U	GAM
Cesium 137	10045-97-3	U		0.024	0.10	U	GAM
Radium 226	13982-63-3	0.287	0.063	0.060			GAM
Radium 228	15262-20-1	0.446	0.13	0.13			GAM
Europium 152	14683-23-9	U		0.059	0.10	U	GAM
Europium 154	15585-10-1	U		0.087	0.10	U	GAM
Europium 155	14391-16-3	U		0.087	0.10	U	GAM
Thorium 228	14274-82-9	0.354	0.033	0.035			GAM
Thorium 232	TH-232	0.446	0.13	0.13			GAM
Uranium 235	15117-96-1	U		0.12		U	GAM
Uranium 238	U-238	U		3.4		U	GAM
Americium 241	14596-10-2	U		0.23		U	GAM

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6/7/03

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Appendix 4

Laboratory Narrative and Chain-of-Custody Documentation

1.0 GENERAL

Bechtel Hanford Inc. (BHI) Sample Delivery Group H2216 was composed of six solid (soil) samples designated under SAF No. B03-024 with a Project Designation of: 118-C-4 Horizontal Rod Cave Soil Sampling – Verification, 118-C-4 Rod Cave.

The samples were received as stated on the Chain-of-Custody documents. Any discrepancies are noted on the Eberline Services Sample Receipt Checklist. The results were transmitted to BHI via e-Fax on May 27, 2003. The electronic data deliverable (EDD) was transmitted to BHI via e-mail on May 27, 2003.

2.0 ANALYSIS NOTES

2.1 Total Strontium Analyses

No problems were encountered during the course of the analyses.

2.2 Isotopic Uranium Analyses

No problems were encountered during the course of the analyses.

2.3 Isotopic Plutonium Analyses

No problems were encountered during the course of the analyses.

2.4 Americium-241 Analyses

No problems were encountered during the course of the analyses.

2.5 Gamma Spectroscopy Analyses

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
Program Manager

May 29, 2003
Date

Bechtel Hanford Inc.	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	B03-024-01	Page 1 of 1

Collector Renee Nielson	Company Contact Rikki Thoren	Telephone No. 521-8003	Project Coordinator KESSNER, JH	Price Code 8J Air Quality ☐	Data Turnaround 7 Days
Project Designation 118-C-4 Horizontal Rod Cave Soil Sampling - Verification	Sampling Location 118-C-4 Rod Cave H2216 (7522)		SAF No. B03-024		
Ice Chest No. SML 495	Field Logbook No. EL-1516-2	COA R118CD200C	Method of Shipment Federal Express		
Shipped To TMA/RECRA TMA	Offsite Property No. A030260		Bill of Lading/Air Bill No. SEE OSPC		

POSSIBLE SAMPLE HAZARDS/REMARKS

Radioactive

Special Handling and/or Storage

000019

Preservation	None	Cool 4C	None	Cool 4C	Cool 4C	Cool 4C					
Type of Container	P	aG	aG	aG	aG	aG					
No. of Container(s)	1	1	1	1	1	1					
Volume	1000mL	120mL	120mL	250mL	250mL	250mL					
SAMPLE ANALYSIS	See item (1) in Special Instructions.	Chromium Hex - 7196	See item (2) in Special Instructions.	PCBs - 8082	VOA - 8260A (TCL)	Semi-VOA - 8270A (TCL)					
Sample No. / Matrix * / Sample Date / Sample Time											
J00NT5 / SOIL / 5-15-03 / 0815	X										
J00NT6 / SOIL / 5-15-03 / 0830	X										
J00NT7 / SOIL / 5-15-03 / 0840	X										
J00NT8 / SOIL / 5-15-03 / 0850	X										
J00NT9 / SOIL / 5-15-03 / 0815	X										

CHAIN OF POSSESSION	Sign/Print Names		
Relinquished By/Removed From Renee Nielson / R Nielson 5-15-03	Date/Time 1200	Received By/Stored In REF#3C 3728 5/15/03	Date/Time 1200
Relinquished By/Removed From REF#3C 3728	Date/Time 51603 1100	Received By/Stored In SJGALE 51603	Date/Time 1000
Relinquished By/Removed From SJGALE 51603	Date/Time 1000	Received By/Stored In FED EX	Date/Time
Relinquished By/Removed From FED EX	Date/Time	Received By/Stored In [illegible] 5-19-03	Date/Time 1000
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) Gamma Spectroscopy (TCL List) {Cesium-137, Cobalt-60, Europium-152, Europium-154, Europium-155}; Americium-241; Isotopic Plutonium; Strontium-89,90 -- Total Sr; Isotopic Uranium
(2) ICP Metals - 6010A (Add-on) {Arsenic, Barium, Cadmium, Chromium, Lead, Selenium, Silver}; Mercury - 7471 - (CV)

Personnel not available to relinquish samples from the 3728 Ref # 3C on 5/16/03

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 (03/01/2002)

Bechtel Hanford Inc.	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	B03-024-03	Page 1 of 1

Collector Renee Nielson	Company Contact Rikki Thoren	Telephone No. 521-8003	Project Coordinator KESSNER, JH	Price Code 8J Air Quality ☐	Data Turnaround 7 Days
Project Designation 118-C-4 Horizontal Rod Cave Soil Sampling - Verification	Sampling Location 118-C-4 Rod Cave H2216 (7522)		SAF No. B03-024		
Ice Chest No. SML 495	Field Logbook No. EL-1516-2	COA R118CD200C	Method of Shipment Federal Express		
Shipped To TMA/RECRA TMA	Offsite Property No. A03d 260		Bill of Lading/Air Bill No. SEE OSPC		

POSSIBLE SAMPLE HAZARDS/REMARKS

Special Handling and/or Storage

000020

Preservation	None	Cool 4C	None	Cool 4C	Cool 4C	Cool 4C					
Type of Container	aG	aG	aG	aG	aG	aG					
No. of Container(s)	1	1	1	1	1	1					
Volume	1000mL	60mL	60mL	250mL	60mL	120mL					
SAMPLE ANALYSIS	See item (1) in Special Instructions.	Chromium Hex - 7196	See item (2) in Special Instructions.	PCBs - 8082	VOA - 8260A (TCL)	Semi-VOA - 8270A (TCL)					
Sample No. / Matrix * / Sample Date / Sample Time											
J00P13 / SOIL / 5-15-03 / 0800	X										

CHAIN OF POSSESSION	Sign/Print Names		
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Renee Nielson R Nielson	5/15/03 1200	Ref # 3C 3728	5/15/03 1200
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Ref 3C 3728	51603 1000	[illegible]	51603 1000
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
[illegible]	51603 1000	FED EX	
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
FED EX		[illegible]	5-19-03 1000
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) Gamma Spectroscopy (TCL List) {Cesium-137, Cobalt-60, Europium-152, Europium-154, Europium-155}; Americium-241; Isotopic Plutonium; Strontium-89,90 -- Total Sr; Isotopic Uranium
(2) ICP Metals - 6010A (Add-on) {Arsenic, Barium, Cadmium, Chromium, Lead, Selenium, Silver}; Mercury - 7471 - (CV)

Personnel not available to relinquish samples from the 3728 Ref # 3C on 5/16/03

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 (03/01/2002)

Appendix 5

Data Validation Supporting Documentation

APPENDIX A

RADIOCHEMICAL DATA VALIDATION CHECKLIST

RADIOCHEMICAL DATA VALIDATION CHECKLIST

VALIDATION LEVEL:	A	B	C	D	E
PROJECT:	118-C-4		DATA PACKAGE:	H2216	
VALIDATOR:	TLI	LAB: EB		DATE: 6/6/03	
CASE:			SDG:	H2216	

ANALYSES PERFORMED				
Gross Alpha/Beta	Strontium-90	Technetium-99	Alpha Spectroscopy	Gamma Spectroscopy
Total Uranium	Radium-22	Tritium		

SAMPLES/MATRIX
J00P13 J00NT5 J00NT6 J00NT7
J00NT8 ~~J00NT9~~ J00NT9
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: In eb – K-40 ~~Th 228/228~~ Ra 226/228 Th 228/232

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

Appendix A – Radiochemical Data Validation Checklist

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: _____

10. Duplicates (Levels C, D, E) ☐ N/A

Duplicates Analyzed at required frequency? Yes No N/A

RPD Values Acceptable? Yes No N/A

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

Comments:

11. Field QC Samples (Levels C, D E) ☐ N/A

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 PAS

12. Holding Times (All levels)

Are sample holding times acceptable? Yes No N/A

Comments:

Appendix A – Radiochemical Data Validation Checklist

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: over

Appendix 6

Additional Documentation Requested by Client

EBERLINE SERVICES/RICHMOND

SAMPLE DELIVERY GROUP H2216

7522-008

Method Blank

METHOD BLANK

SDG	7522	Client/Case no	Hanford	SDG H2216
Contact	Melissa C. Mannion	Contract	No. 630	
Lab sample id	R305118-08	Client sample id	Method Blank	
Dept sample id	7522-008	Material/Matrix		SOLID
		SAF No	B03-024	

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI-FIERS	TEST
Total Strontium	SR-RAD	-0.065	0.14	0.20	1.0	U	SR
Uranium 233/234	U-233/234	0	0.069	0.26	1.0	U	U
Uranium 235	15117-96-1	0	0.083	0.32	1.0	U	U
Uranium 238	U-238	0.034	0.069	0.26	1.0	U	U
Plutonium 238	13981-16-3	0	0.068	0.26	1.0	U	PU
Plutonium 239/240	PU-239/240	0	0.068	0.26	1.0	U	PU
Americium 241	14596-10-2	0.074	0.15	0.28	1.0	U	AM
Potassium 40	13966-00-2	U		0.25		U	GAM
Cobalt 60	10198-40-0	U		0.013	0.050	U	GAM
Cesium 137	10045-97-3	U		0.015	0.10	U	GAM
Radium 226	13982-63-3	U		0.023		U	GAM
Radium 228	15262-20-1	U		0.043		U	GAM
Europium 152	14683-23-9	U		0.026	0.10	U	GAM
Europium 154	15585-10-1	U		0.026	0.10	U	GAM
Europium 155	14391-16-3	U		0.031	0.10	U	GAM
Thorium 228	14274-82-9	U		0.014		U	GAM
Thorium 232	TH-232	U		0.043		U	GAM
Uranium 235	15117-96-1	U		0.039		U	GAM
Uranium 238	U-238	U		1.2		U	GAM
Americium 241	14596-10-2	U		0.055		U	GAM

118-C-4 Horiz. Rod Cave Soil Smpl.

QC-BLANK #44743

Lab id	EBRLNE
Protocol	Hanford
Version	Ver 1.0
Form	DVD-DS
Version	3.06
Report date	05/27/03

EBERLINE SERVICES/RICHMOND

SAMPLE DELIVERY GROUP H2216

7522-007

Lab Control Sample

LAB CONTROL SAMPLE

SDG 7522
Contact Melissa C. Mannion

Client/Case no Hanford SDG H2216
Contract No. 630

Lab sample id R305118-07
Dept sample id 7522-007

Client sample id Lab Control Sample
Material/Matrix SOLID
SAF No B03-024

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
Total Strontium	22.0	0.56	0.21	1.0		SR	22.1	0.88	100	83-117	80-120
Uranium 233/234	21.4	2.4	1.1	1.0		U	19.3	0.77	111	79-121	80-120
Uranium 235	16.1	2.0	0.29	1.0		U	15.7	0.63	102	79-121	80-120
Uranium 238	21.6	2.4	1.0	1.0		U	21.0	0.84	103	80-120	80-120
Plutonium 238	23.6	2.5	0.23	1.0		PU	26.8	1.1	88	83-117	80-120
Plutonium 239/240	27.3	2.8	0.23	1.0		PU	29.0	1.2	94	83-117	80-120
Americium 241	19.9	2.1	0.28	1.0		AM	21.0	0.84	95	82-118	80-120
Cobalt 60	1.17	0.050	0.023	0.050		GAM	1.16	0.046	101	76-124	80-120
Cesium 137	1.16	0.042	0.028	0.10		GAM	1.13	0.045	103	76-124	80-120

118-C-4 Horiz. Rod Cave Soil Smpl.

QC-LCS #44742

Lab id EBRLNE
Protocol Hanford
Version Ver 1.0
Form DVD-LCS
Version 3.06
Report date 05/27/03

EBERLINE SERVICES/RICHMOND

SAMPLE DELIVERY GROUP H2216

7522-009 JOONT7

DUPLICATE

SDG	7522			Client/Case no	Hanford SDG H2216
Contact	Melissa C. Mannion			Contract	No. 630
	DUPLICATE		ORIGINAL		
Lab sample id	R305118-09	Lab sample id	R305118-03	Client sample id	JOONT7
Dept sample id	7522-009	Dept sample id	7522-003	Location/Matrix	118-C-4 Rod Cave SOLID
		Received	05/19/03	Collected/Weight	05/15/03 08:40 1604 g
% solids	98.1	% solids	98.1	Custody/SAF No	B03-024-01 B03-024

ANALYTE	DUPLICATE pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI-FIERS	TEST	ORIGINAL pCi/g	2σ ERR (COUNT)	MDA pCi/g	QUALI-FIERS	RPD %	3σ PROT TOT LIMIT
Total Strontium	-0.001	0.13	0.18	1.0	U	SR	0.004	0.13	0.17	U	-	
Uranium 233/234	0.605	0.26	0.24	1.0		U	0.472	0.23	0.17		25	97
Uranium 235	0	0.077	0.29	1.0	U	U	0	0.054	0.21	U	-	
Uranium 238	0.605	0.26	0.24	1.0		U	0.517	0.23	0.17		16	93
Plutonium 238	0	0.066	0.25	1.0	U	PU	0	0.070	0.27	U	-	
Plutonium 239/240	0	0.066	0.25	1.0	U	PU	0	0.070	0.27	U	-	
Americium 241	0	0.056	0.21	1.0	U	AM	0.030	0.060	0.23	U	-	
Potassium 40	9.65	0.45	0.18			GAM	9.70	0.72	0.37		1	34
Cobalt 60	U		0.020	0.050	U	GAM	U		0.033	U	-	
Cesium 137	U		0.019	0.10	U	GAM	U		0.034	U	-	
Radium 226	0.277	0.040	0.040			GAM	0.338	0.063	0.067		20	48
Radium 228	0.466	0.10	0.088			GAM	0.536	0.13	0.14		14	59
Europium 152	U		0.045	0.10	U	GAM	U		0.076	U	-	
Europium 154	U		0.062	0.10	U	GAM	U		0.12	U	-	
Europium 155	U		0.059	0.10	U	GAM	U		0.095	U	-	
Thorium 228	0.445	0.026	0.024			GAM	0.433	0.036	0.038		3	35
Thorium 232	0.466	0.10	0.088			GAM	0.536	0.13	0.14		14	59
Uranium 235	U		0.081		U	GAM	U		0.13	U	-	
Uranium 238	U		2.5		U	GAM	U		4.0	U	-	
Americium 241	U		0.072		U	GAM	U		0.11	U	-	

118-C-4 Horiz. Rod Cave Soil Smpl.

QC-DUP#3 44744

Lab id	EBRLNE
Protocol	Hanford
Version	Ver 1.0
Form	DVD-DUP
Version	3.06
Report date	05/27/03

Date: 9 June 2003
To: Bechtel Hanford Inc. (technical representative)
From: TechLaw, Inc.
Project: 118-C-4 Horizontal Rod Cave Sampling - Verification
Subject: Volatiles - Data Package No. H2216-LLI (SDG No. H2216)

INTRODUCTION

This memo presents the results of data validation on Summary Data Package No. H2216-LLI prepared by Lionville Laboratory Inc. (LLI). A list of the samples validated along with the analyses reported and the method of analysis is provided in the following table.

Sample ID	Sample	Media	Validation	Analysis
J00P13	5/15/03	Soil	C	Volatiles by EPA 8260B
J00NT5	5/15/03	Soil	C	Volatiles by EPA 8260B
J00NT6	5/15/03	Soil	C	Volatiles by EPA 8260B
J00NT7	5/15/03	Soil	C	Volatiles by EPA 8260B
J00NT8	5/15/03	Soil	C	Volatiles by EPA 8260B
J00NT9	5/15/03	Soil	C	Volatiles by EPA 8260B

Data validation was conducted in accordance with the BHI validation statement of work and the 118-C-4 Horizontal Rod Cave Characterization Plan (DOE/RL-97-33, Rev. 0). Appendices 1 through 5 provide the following information as indicated below:

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

DATA QUALITY OBJECTIVES

- **Holding Times**

  Analytical holding times are assessed to ascertain whether the holding time requirements were met by the laboratory. Samples must be analyzed within: 14

days of the date of sample collection for VOAs. If holding times are exceeded, but not by greater than twice the limit, all associated sample results are qualified as estimates and flagged "J" for detects and "UJ" for non-detects. If holding times are exceeded by greater than twice the limit, all associated detected sample results are qualified as estimates and flagged "J" and all non-detects are rejected and flagged "UR".

All holding times were met.

- **Blanks**

Method blank analyses are conducted to determine the extent of laboratory contamination introduced through sampling, sample preparation and analysis. At least one acceptable method blank analysis must be conducted for every 20 samples of a given matrix. No contaminants should be present in the method blank. Analytical results for analytes present in any sample at less than five times the concentration of that analyte found in the associated blank are qualified as non-detects and flagged "U". Common laboratory contaminants present in samples at less than ten times the concentration of that analyte found in the associated blank are qualified as non-detects. If a sample result is less than the required detection limit (RDL) and is less than five times (or less than ten times for laboratory contaminants) the highest associated blank result, the sample result value is raised to the RDL, qualified as undetected and flagged "U".

All method blank results were acceptable.

Field Blanks

One equipment blank (J00P13) was submitted for analysis. Methylene chloride and acetone were detected in the field blank. Under the BHI statement of work, no qualification is required.

- **Accuracy**

Matrix Spike/Matrix Spike Duplicate Recoveries

Matrix spike/matrix spike duplicate analyses are used to assess the analytical accuracy of the reported data and the effect of the matrix on the ability to accurately quantify sample concentrations. Matrix spike/matrix spike duplicate analyses are performed in duplicate using the target compounds for which percent recoveries must be within established laboratory quality control limits. If spike recoveries are outside control limits, detected sample results less than

five times the spike concentration are qualified as estimates and flagged "J". Undetected sample results with spike recoveries outside control limits are qualified as estimates and flagged "UJ". Sample results greater than five times the spike concentration require no qualification.

All MS/MSD results were acceptable.

Surrogate Recovery

The analysis of surrogate compounds provides a measure of system performance for individual samples. Matrix-specific surrogate compound recovery control windows have been established by the laboratory program. When a surrogate compound recovery is out of the control window, all positively identified target compounds associated with the unacceptable surrogate recoveries are qualified as estimates and flagged "J". Undetected compounds with surrogate recoveries less than the lower control limit are qualified as having an estimated detection limit and flagged "UJ". Samples with surrogate recoveries less than ten percent are qualified as estimates and flagged "J" for detects, and rejected and flagged "UR" for nondetects. Undetected compounds with surrogate recoveries greater than the upper control limit require no qualification. Surrogates are not required for formaldehyde analysis.

All surrogate recovery results were acceptable.

- **Precision**

Matrix Spike/Matrix Spike Duplicate Samples

Matrix spike/matrix spike duplicate results provide matrix-specific information on the precision of the method for specific target compound classes. Precision is expressed by the relative percent difference (RPD) between the recoveries of duplicate matrix spike analyses performed on a sample. For samples analyzed using SW-846 protocol, results must be within RPD limits of +/- 20% for water samples and +/- 35% for solid samples. If RPD values are out of specification and the sample concentration is less than five times the spike concentration, all associated sample results are qualified as estimates and flagged "J" for detects and "UJ" for non-detects. If RPD values are out of specification and the sample concentration is greater than five times the spike concentration, no qualification is required.

All MS/MSD RPD results were acceptable.

Field Duplicate Samples

One pair of field duplicate samples (samples J00NT5/J00NT9) were submitted to LLI for analysis. The duplicate sample results were compared using the validation guidelines for determining the RPD between a sample and its duplicate. All field duplicate results were acceptable.

- **Analytical Detection Levels**

Reported analytical detection levels are compared against the 118-C-4 Horizontal Rod Cave Characterization Plan required detection limits (RDLs) to ensure that laboratory detection levels meet the required criteria. No volatile organic RDLs were specified and thus no comparison could be made.

- **Completeness**

Data package No. H2216-LLI 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

None found.

REFERENCES

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

DOE/RL-97-33, Rev. 0, *118-C-4 Horizontal Rod Cave Characterization Plan*, August 1997 and CCN 101907 Addendum, 19 February 2003.

Appendix 1

Glossary of Data Reporting Qualifiers

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

U - Indicates the compound or analyte was analyzed for and not detected in the sample. The value reported is the sample quantitation limit corrected for 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 quantitation limit is an estimate.

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

DATA QUALIFICATION SUMMARY

SDG: H2216	REVIEWER: TLI	DATE: 6/9/03	PAGE_1_OF_1_
COMMENTS: No qualifiers assigned.			

Appendix 3

Qualified Data Summary and Annotated Laboratory Reports

VOLATILE ORGANIC , ALCOHOL AND FORMALDEHYDE ANALYSIS, WATER MATRIX, (UG/L)

Project: BECHTEL-HANFORD															
Laboratory: LLI															
Case:	SDG: H2216														
Sample Number		J00P13		J00NT5		J00NT6		J00NT7		J00NT8		J00NT9			
Remarks		E. Blank										Duplicate			
Sample Date		05/15/03		05/15/03		05/15/03		05/15/03		05/15/03		05/15/03			
Analysis Date		05/20/03		05/20/03		05/21/03		05/20/03		05/20/03		05/20/03			
VOA/Alcohols/Formaldehyde	RDL	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Chloromethane		10	U	11	U	10	U	10	U	10	U	11	U		
Bromomethane		10	U	11	U	10	U	10	U	10	U	11	U		
Vinyl Chloride		10	U	11	U	10	U	10	U	10	U	11	U		
Chloroethane		10	U	11	U	10	U	10	U	10	U	11	U		
Methylene Chloride		3		4		11		5		6		12			
Acetone		7		11	U	10	U	10	U	10	U	11	U		
Carbon Disulfide		5	U	6	U	5	U	5	U	5	U	6	U		
1,1-Dichloroethene		5	U	6	U	5	U	5	U	5	U	6	U		
1,1-Dichloroethane		5	U	6	U	5	U	5	U	5	U	6	U		
1,2-Dichloroethene (total)		5	U	6	U	5	U	5	U	5	U	6	U		
Chloroform		5	U	6	U	5	U	5	U	5	U	6	U		
1,2-Dichloroethane		5	U	6	U	5	U	5	U	5	U	6	U		
2-Butanone		10	U	11	U	10	U	10	U	10	U	11	U		
1,1,1-Trichloroethane		5	U	6	U	5	U	5	U	5	U	6	U		
Carbon Tetrachloride		5	U	6	U	5	U	5	U	5	U	6	U		
Bromodichloromethane		5	U	6	U	5	U	5	U	5	U	6	U		
1,2-Dichloropropane		5	U	6	U	5	U	5	U	5	U	6	U		
cis-1,3-Dichloropropene		5	U	6	U	5	U	5	U	5	U	6	U		
Trichloroethene		5	U	6	U	5	U	5	U	5	U	6	U		
Dibromochloromethane		5	U	6	U	5	U	5	U	5	U	6	U		
1,1,2-Trichloroethane		5	U	6	U	5	U	5	U	5	U	6	U		
Benzene		5	U	6	U	5	U	5	U	5	U	6	U		
trans-1,3-Dichloropropene		5	U	6	U	5	U	5	U	5	U	6	U		
Bromoform		5	U	6	U	5	U	5	U	5	U	6	U		
4-Methyl-2-pentanone		10	U	11	U	10	U	10	U	10	U	11	U		
2-Hexanone		10	U	11	U	10	U	10	U	10	U	11	U		
Tetrachloroethene		5	U	6	U	5	U	5	U	5	U	6	U		
1,1,2,2-Tetrachloroethane		5	U	6	U	5	U	5	U	5	U	6	U		
Toluene		5	U	6	U	5	U	1		2		6	U		
Chlorobenzene		5	U	6	U	5	U	5	U	5	U	6	U		
Ethylbenzene		5	U	6	U	5	U	5	U	5	U	6	U		
Styrene		5	U	6	U	5	U	5	U	5	U	6	U		
Xylene		5	U	6	U	5	U	5	U	5	U	6	U		

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

Lionville Laboratory, Inc.

Volatiles by GC/MS, HSL List

Report Date: 05/23/03 09:29

RFW Batch Number: 0305L434 Client: TNU-HANFORD B03-024, HZ216 Work Order: 11343606001 Page: 1a

	Cust ID:	J00P13		J00NT5		J00NT6		J00NT6		J00NT6		J00NT7	
Sample Information	RFW#:	001		002		003		003 MS		003 MSD		004	
	Matrix:	SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
	D.F.:	1.00		1.04		0.962		0.962		0.926		1.02	
	Units:	ug/Kg		ug/Kg		ug/Kg		ug/Kg		ug/Kg		ug/Kg	
Surrogate Recovery	Toluene-d8	108	%	100	%	116	%	103	%	104	%	103	%
	Bromofluorobenzene	95	%	88	%	102	%	90	%	89	%	90	%
	1,2-Dichloroethane-d4	95	%	92	%	107	%	96	%	96	%	92	%
			fl		fl		fl		fl		fl		fl
Chloromethane		10	U	11	U	10	U	10	U	9	U	10	U
Bromomethane		10	U	11	U	10	U	10	U	9	U	10	U
Vinyl Chloride		10	U	11	U	10	U	10	U	9	U	10	U
Chloroethane		10	U	11	U	10	U	10	U	9	U	10	U
Methylene Chloride		3	J	4	J	11		10		10		5	J
Acetone		7	J	11	U	10	U	10	U	9	U	10	U
Carbon Disulfide		5	U	6	U	5	U	5	U	5	U	5	U
1,1-Dichloroethene		5	U	6	U	5	U	99	%	89	%	5	U
1,1-Dichloroethane		5	U	6	U	5	U	5	U	5	U	5	U
1,2-Dichloroethene (total)		5	U	6	U	5	U	5	U	5	U	5	U
Chloroform		5	U	6	U	5	U	5	U	5	U	5	U
1,2-Dichloroethane		5	U	6	U	5	U	5	U	5	U	5	U
2-Butanone		10	U	11	U	10	U	10	U	9	U	10	U
1,1,1-Trichloroethane		5	U	6	U	5	U	5	U	5	U	5	U
Carbon Tetrachloride		5	U	6	U	5	U	5	U	5	U	5	U
Bromodichloromethane		5	U	6	U	5	U	5	U	5	U	5	U
1,2-Dichloropropane		5	U	6	U	5	U	5	U	5	U	5	U
cis-1,3-Dichloropropene		5	U	6	U	5	U	5	U	5	U	5	U
Trichloroethene		5	U	6	U	5	U	91	%	81	%	5	U
Dibromochloromethane		5	U	6	U	5	U	5	U	5	U	5	U
1,1,2-Trichloroethane		5	U	6	U	5	U	5	U	5	U	5	U
Benzene		5	U	6	U	5	U	115	%	102	%	5	U
Trans-1,3-Dichloropropene		5	U	6	U	5	U	5	U	5	U	5	U
Bromoform		5	U	6	U	5	U	5	U	5	U	5	U
4-Methyl-2-pentanone		10	U	11	U	10	U	10	U	9	U	10	U
2-Hexanone		10	U	11	U	10	U	10	U	9	U	10	U
Tetrachloroethene		5	U	6	U	5	U	5	U	5	U	5	U
1,1,2,2-Tetrachloroethane		5	U	6	U	5	U	5	U	5	U	5	U
Toluene		5	U	6	U	5	U	111	%	98	%	1	J

*= Outside of EPA CLP QC limits.

000011

6/7/03

RFW Batch Number: 0305L434 Client: TNU-HANFORD B03-024,#2216 Work Order: 11343606001 Page: 1b

Cust ID:	J00P13	J00NT5	J00NT6	J00NT6	J00NT6	J00NT7
RFW#:	001	002	003	003 MS	003 MSD	004
Chlorobenzene	5 U	6 U	5 U	101 %	90 %	5 U
Ethylbenzene	5 U	6 U	5 U	5 U	5 U	5 U
Styrene	5 U	6 U	5 U	5 U	5 U	5 U
Xylene (total)	5 U	6 U	5 U	5 U	5 U	5 U

*= Outside of EPA CLP QC limits.

000012

Lionville Laboratory, Inc.

Volatiles by GC/MS, HSL List

RFW Batch Number: **0305L434** Client: **TNU-HANFORD B03-024** Work Order: 11343606001 Page: 2a

Report Date: 05/23/03 09:29

	Cust ID:	J00NT8	J00NT9	VBLKSF	VBLKSG	VBLKSG BS
Sample Information	RFW#:	005	006	03LVX152-MB1	03LVX154-MB1	03LVX154-MB1
	Matrix:	SOIL	SOIL	SOIL	SOIL	SOIL
	D.F.:	1.02	1.06	1.00	1.00	1.00
	Units:	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg
Surrogate Recovery	Toluene-d8	104 %	105 %	107 %	102 %	103 %
	Bromofluorobenzene	88 %	89 %	92 %	93 %	95 %
	1,2-Dichloroethane-d4	92 %	92 %	90 %	94 %	102 %
Chloromethane		10 U	11 U	10 U	10 U	64
Bromomethane		10 U	11 U	10 U	10 U	62
Vinyl Chloride		10 U	11 U	10 U	10 U	64
Chloroethane		10 U	11 U	10 U	10 U	84
Methylene Chloride		6	12	5 U	5 U	74
Acetone		10 U	11 U	10 U	10 U	93
Carbon Disulfide		5 U	6 U	5 U	5 U	62
1,1-Dichloroethene		5 U	6 U	5 U	5 U	115 %
1,1-Dichloroethane		5 U	6 U	5 U	5 U	66
1,2-Dichloroethene (total)		5 U	6 U	5 U	5 U	110
Chloroform		5 U	6 U	5 U	5 U	54
1,2-Dichloroethane		5 U	6 U	5 U	5 U	54
2-Butanone		10 U	11 U	10 U	10 U	79
1,1,1-Trichloroethane		5 U	6 U	5 U	5 U	47
Carbon Tetrachloride		5 U	6 U	5 U	5 U	45
Bromodichloromethane		5 U	6 U	5 U	5 U	52
1,2-Dichloropropane		5 U	6 U	5 U	5 U	66
cis-1,3-Dichloropropene		5 U	6 U	5 U	5 U	58
Trichloroethene		5 U	6 U	5 U	5 U	97 %
Dibromochloromethane		5 U	6 U	5 U	5 U	45
1,1,2-Trichloroethane		5 U	6 U	5 U	5 U	53
Benzene		5 U	6 U	5 U	5 U	122 %
Trans-1,3-Dichloropropene		5 U	6 U	5 U	5 U	57
Bromoform		5 U	6 U	5 U	5 U	39
4-Methyl-2-pentanone		10 U	11 U	10 U	10 U	63
2-Hexanone		10 U	11 U	10 U	10 U	64
Tetrachloroethene		5 U	6 U	5 U	5 U	43
1,1,2,2-Tetrachloroethane		5 U	6 U	5 U	5 U	55
Toluene		2 J	6 U	5 U	5 U	109 %

*= Outside of EPA CLP QC limits.

000013

RFW Batch Number: **0305L434** Client: **TNU-HANFORD B03-024,#2216** Work Order: 11343606001 Page: 2b

Cust ID:	J00NT8	J00NT9	VBLKSF	VBLKSG	VBLKSG BS
RFW#:	005	006	03LVX152-MB1	03LVX154-MB1	03LVX154-MB1
Chlorobenzene	5 U	6 U	5 U	5 U	103 %
Ethylbenzene	5 U	6 U	5 U	5 U	49
Styrene	5 U	6 U	5 U	5 U	52
Xylene (total)	5 U	6 U	5 U	5 U	150

*= Outside of EPA CLP QC limits.

000014

Appendix 4

Laboratory Narrative and Chain-of-Custody Documentation

LIONVILLE LABORATORY INC.

Client: TNU-HANFORD B03-024
LVL #: 0305L434
SDG/SAF # H2216/B03-024

W.O. #: 11343-606-001-9999-00
Date Received: 05-17-2003

GC/MS VOLATILE

Six (6) soil samples were collected on 05-15-2003.

The samples and their associated QC samples were analyzed according to criteria set forth in Lionville Laboratory OPs based on SW 846 Method 8260B for TCL volatile target compounds on 05-20,21-2003.

The following is a summary of the QC results accompanying these sample results and a description of any problems encountered during their analyses:

1. All results presented in this report are derived from samples that met LvLI's sample acceptance policy.

2. The samples were analyzed within holding time.

3. Non-target compounds were not detected in the samples.

4. All surrogate recoveries were within EPA QC limits.

5. All matrix spike recoveries were within EPA QC limits.

6. All blank spike recoveries were within EPA QC limits. The blank spike sample was inadvertently spiked with full list spiking compounds instead of CLP spiking compounds. A copy of the Sample Discrepancy Report (SDR) has been enclosed.

7. Internal standard area and retention time criteria were met.

8. "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."

J. Michael Taylor
President
Lionville Laboratory Incorporated

05-27-03
Date

som\group\data\voa\tnu-hanford\0304-434.doc

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 1 4 pages.

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

Bechtel Hanford Inc.	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST		B03-024-03	Page 1 of 1
Collector: Renee Nielson	Company Contact: Rikki Thoren	Telephone No.: 521-8003	Project Coordinator: KESSNER, JH	Price Code: 8J
Project Designation: 118-C-4 Horizontal Rod Cave Soil Sampling - Verification	Sampling Location: 118-C-4 Rod Cave		SAF No.: B03-024	Air Quality ☐
Ice Chest No.: ERC 96 019	Field Logbook No.: EL-1516-2	COA: R118CD200C	Method of Shipment: Federal Express	
Shipped To: TMA/RECRA REERA	Offsite Property No.: A030231		Bill of Lading/Air Bill No.: SOE OPC	

Data Turnaround: 7 Days

POSSIBLE SAMPLE HAZARDS/REMARKS

Special Handling and/or Storage

Preservation	None	Cool 4C	None	Cool 4C	Cool 4C	Cool 4C				
Type of Container	aG	aG	aG	aG	aG	aG				
No. of Container(s)	1	1	1	1	1	1				
Volume	1000mL	60mL	60mL	250mL	60mL	120mL				
SAMPLE ANALYSIS	See item (1) in Special Instructions.	Chromium Hex - 7196	See item (2) in Special Instructions.	PCBs - 8082	VOA - 8260A (TCL)	Semi-VOA - 8270A (TCL)				

000017

Sample No.	Matrix *	Sample Date	Sample Time										
J00P13	SOIL	5-15-03	0800		X	X	X	X	X				

CHAIN OF POSSESSION — Sign/Print Names

Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
R Nielson	5/15/03 1200	Ref #3C 3728	5/15/03 1200
Ref 3C 3728	5 16 03 1000	SJGALE	51603 1000
SJGALE	51603 1000	FED EX	
Fed Ex	5.17.03 1155		5.17.03 1155
~~Fed Ex~~	~~5.17.03~~ 5.17.03		
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time

SPECIAL INSTRUCTIONS

(1) Gamma Spectroscopy (TCL List) {Cesium-137, Cobalt-60, Europium-152, Europium-154, Europium-155}; Americium-241; Isotopic Plutonium; Strontium-89,90 -- Total Sr; Isotopic Uranium
(2) ICP Metals - 6010A (Add-on) {Arsenic, Barium, Cadmium, Chromium, Lead, Selenium, Silver}; Mercury - 7471 - (CV)

Personnel not available to relinquish samples from the 3728 Ref # 3C on 5/16/03

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
Ve=Vegetation
X=Other

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

BHI-EE-011 (03/01/2002)

Bechtel Hanford Inc.	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	B03-024-01	Page 1 of 1

Collector: Renee Nielson	Company Contact: Rikki Thoren	Telephone No.: 521-8003	Project Coordinator: KESSNER, JH
Price Code: 8J	Data Turnaround: 7 Days	Air Quality ☐	SAF No.: B03-024
Project Designation: 118-C-4 Horizontal Rod Cave Soil Sampling - Verification	Sampling Location: 118-C-4 Rod Cave		
Ice Chest No.: ERC 96 019	Field Logbook No.: EL-1516-2	COA: R118CD200C	Method of Shipment: Federal Express
Shipped To: TMA/RECRA RERA	Offsite Property No.: A030231		Bill of Lading/Air Bill No.: SEE OSPC

POSSIBLE SAMPLE HAZARDS/REMARKS

Radioactive

Special Handling and/or Storage

Preservation	None	Cool 4C	None	Cool 4C	Cool 4C	Cool 4C				
Type of Container	P	aG	aG	aG	aG	aG				
No. of Container(s)	1	1	1	1	1	1				
Volume	1000mL	120mL	120mL	250mL	250mL	250mL				
SAMPLE ANALYSIS	See item (1) in Special Instructions.	Chromium Hex - 7196	See item (2) in Special Instructions.	PCBs - 8082	VOA - 8260A (TCL)	Semi-VOA - 8270A (TCL)				

Sample No.	Matrix *	Sample Date	Sample Time									
J00NT5	SOIL	5-15-03	0815		X	X	X	X	X			
J00NT6	SOIL	5-15-03	0830		X	X	X	X	X			
J00NT7	SOIL	5-15-03	0840		X	X	X	X	X			
J00NT8	SOIL	5-15-03	0850		X	X	X	X	X			
J00NT9	SOIL	5-15-03	0815		X	X	X	X	X			

000018

CHAIN OF POSSESSION — Sign/Print Names

Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Renee Nielson / R Nielson	5-15-03 1200	REF# 3C 3728	5/15/03 1200
REF3C 3728	51603 1000	S J GALE	51603 1000
S J GALE	51603 1000	FED EX	
FED EX	5.17.03 1155	D. Smith	5.17.03 1155

SPECIAL INSTRUCTIONS

(1) Gamma Spectroscopy (TCL List) {Cesium-137, Cobalt-60, Europium-152, Europium-154, Europium-155}; Americium-241; Isotopic Plutonium; Strontium-89,90 -- Total Sr; Isotopic Uranium
(2) ICP Metals - 6010A (Add-on) {Arsenic, Barium, Cadmium, Chromium, Lead, Selenium, Silver}; Mercury - 7471 - (CV)

Personnel not available to relinquish samples from the 3728 Ref # 3C on 5/16/03

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 (03/01/2002)

Appendix 5

Data Validation Supporting Documentation

GC/MS ORGANIC DATA VALIDATION CHECKLIST

VALIDATION LEVEL:	A	B	C	D	E
PROJECT: 118-C-4			DATA PACKAGE: H2216		
VALIDATOR: TLI		LAB: LLT		DATE: 6/6/03	
CASE:			SDG: H2216		
ANALYSES PERFORMED					
SW-846 8260		SW-846 8260 (TCLP)	SW-846 8270		SW-846 8270 (TCLP)
SAMPLES/MATRIX					
J00P13 J00NT5 J00NT6 J00NT7					
J00NT8 J00NT9					
Soil					

1. DATA PACKAGE COMPLETENESS AND CASE NARRATIVE

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

Comments:

2. INSTRUMENT TUNING AND CALIBRATION (Levels D and E)

GC/MS tuning/performance check acceptable? ..... Yes No N/A

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

Continuing calibrations 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:

GC/MS ORGANIC DATA VALIDATION CHECKLIST

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

Calibration blanks analyzed? (Levels D, E) ..... Yes No N/A
Calibration blank 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/trip blanks analyzed? (Levels C, D, E) ..... Yes No N/A
Field/trip blank results acceptable? (Levels C, D, E) ..... Yes No N/A
Transcription/calculation errors? (Levels D, E) ..... Yes No N/A

Comments: methylen chloride + acetone in lab

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

Surrogates/system monitoring compounds analyzed? ..... Yes No N/A
Surrogate/system monitoring compound recoveries acceptable? ..... Yes No N/A
Surrogates traceable? (Levels D, E) ..... Yes No N/A
Surrogates expired? (Levels D, E) ..... Yes No N/A
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? (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: NO PAS

GC/MS ORGANIC DATA VALIDATION CHECKLIST

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

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

MS/MSD RPD values 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: _____

6. SYSTEM PERFORMANCE (Levels D and E)

Internal standards analyzed? ..... Yes No N/A

Internal standard areas acceptable? ..... Yes No N/A

Internal standard retention times 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: _____

7. HOLDING TIMES (all levels)

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

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

Comments: _____

GC/MS ORGANIC DATA VALIDATION CHECKLIST

8. COMPOUND IDENTIFICATION, QUANTITATION, AND DETECTION LIMITS (all levels)

Compound identification acceptable? (Levels D, E) ..... Yes No N/A
Compound quantitation acceptable? (Levels D, E) ..... Yes No N/A
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
Laboratory properly identified and coded all TIC? (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: No RDL specified

9. SAMPLE CLEANUP (Levels D and E)

GPC cleanup performed? ..... Yes No N/A
GPC check performed? ..... Yes No N/A
GPC check recoveries aceptable? ..... Yes No N/A
GPC calibration performed? ..... Yes No N/A
GPC calibration check performed? ..... Yes No N/A
GPC calibration check retention times acceptable? ..... Yes No N/A
Check/calibration materials traceable? ..... Yes No N/A
Check/calibration materials Expired? ..... Yes No N/A
Analytical batch QC given similar cleanup? ..... Yes No N/A
Transcription/Calculation Errors? ..... Yes No N/A

Comments:

Lionville Laboratory Sample Discrepancy Report (SDR)

SDR #: 03NT234

Initiator: B. Rubino
Date: 5/23/03
Client: TNU-Hanford B03-024

Batch: 0305L43A
Samples: BS
Method: SW846/MCAWW/CLP/

Parameter: MSVOA
Matrix: SOIL
Prep Batch:

1. Reason for SDR

a. COC Discrepancy __ Tech Profile Error __ Client Request __ Sampler Error on C-O-C __ Transcription Error __ Wrong Test Code __ Other

b. General Discrepancy

__ Missing Sample/Extract* __ Container Broken __ Wrong Sample Pulled __ Label ID's Illegible
__ Hold Time Exceeded __ Insufficient Sample* __ Preservation Wrong __ Received Past Hold
__ Improper Bottle Type __ Not Amenable to Analysis

Note*: Verified by [Log-In] or [Prep Group] (circle)...signature/date:

c. Problem (Include all relevant specific results; attach data if necessary)

The blank spike was spiked with full list spike instead of CLP spike solution.

2. Known or Probable Causes(s)

3. Discussion and Proposed Action

Other Description: Report & narrate

__ Re-log
__ Entire Batch
__ Following Samples:
__ Re-leach
__ Re-extract
__ Re-digest
__ Revise EDD
__ Change Test Code to
__ Place On/Take Off Hold (circle)

4. Project Manager Instructions...signature/date: 5/23/03

✓ Concur with Proposed Action
__ Disagree with Proposed Action; See Instruction
__ Include in Case Narrative
__ Client Contacted:
Date/Person
__ Add
__ Cancel

5. Final Action...signature/date: 5/23/03

Other Explanation:

__ Verified re-[log][leach][extract][digest][analysis] (circle)
X Included in Case Narrative
__ Hard Copy COC Revised
__ Electronic COC Revised
__ EDD Corrections Completed

When Final Action has been recorded, forward original to QA Specialist for distribution and filing.

Route	Distribution of Completed SDR	Route	Distribution of Completed SDR
2	X Initiator Rubino	__	__ Metals: Beegle
	X Lab General Manager: M. Taylor	__	__ Inorganic: Perrone
I	X Project Mgr: Stone/Johnson/Haslett	__	__ GC/LC: Kiger
	X Technical Mgr: Wesson/Daniels	__	__ MS: Rychlak/Layman
__	X QA (file)	__	__ Log-in: Melnic
__	__ Data Management: Feldman	__	__ Admin: Soos
__	__ Sample Prep: Beegle/Kiger	__	__ Other:

QA-105-A-0801

Date: 9 June 2003
To: Bechtel Hanford Inc. (technical representative)
From: TechLaw, Inc.
Project: 118-C-4 Horizontal Rod Cave Sampling - Verification
Subject: Inorganics - Data Package No. H2216-LLI (SDG No. H2216)

INTRODUCTION

This memo presents the results of data validation on Summary Data Package No. H2216-LLI prepared by Lionville Laboratory Inc. (LLI). A list of the samples validated along with the analyses reported and the method of analysis is provided in the following table.

Sample ID	Sample	Media	Validation	Analysis
J00P13	5/15/03	Soil	C	See note 1
J00NT5	5/15/03	Soil	C	See note 1
J00NT6	5/15/03	Soil	C	See note 1
J00NT7	5/15/03	Soil	C	See note 1
J00NT8	5/15/03	Soil	C	See note 1
J00NT9	5/15/03	Soil	C	See note 1

1 - Metals by 6010B and mercury by 7471A.

Data validation was conducted in accordance with the BHI validation statement of work and the 118-C-4 Horizontal Rod Cave Characterization Plan (DOE/RL-97-33, Rev. 0). Appendices 1 through 5 provide the following information as indicated below:

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

One equipment blank (J00P13) was submitted for analysis. Arsenic, barium and lead were detected in the field blank. Under the BHI statement of work, no qualification is required.

- **Accuracy**

Matrix Spike

Matrix spike (MS) analyses are used to assess the analytical accuracy of the reported data and the effect of the matrix on the ability to accurately quantify sample concentrations. Matrix spike recoveries must fall within the range of 70% to 130%. Samples with a spike recovery of less than 30% and a sample result below the IDL are rejected and flagged "UR". Samples with a spike recovery of 30% to 69% and a sample result less than the IDL are qualified

"UJ". Samples with a spike recovery of greater than 130% or less than 70% and a sample result greater than the IDL are qualified as estimates and flagged "J". Finally, for samples with a spike recovery greater than 130% and a sample result less than the IDL, no qualification is required.

All matrix spike recovery 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.

All laboratory duplicate results were acceptable.

Field Duplicate

One pair of field duplicate samples (samples J00NT5/J00NT9) were submitted to LLI for analysis. The duplicate sample results were compared using the validation guidelines for determining the RPD between a sample and its duplicate. The RPD for lead was outside QC limits (162%). Under the BHI 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 118-C-4 Horizontal Rod Cave Characterization Plan required detection limits (RDLs) to ensure that laboratory detection levels meet the required criteria. All reported analytes met the RDL.

- **Completeness**

Data package No. H2216-LLI 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

None found

REFERENCES

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

DOE/RL-97-33, Rev. 0, *118-C-4 Horizontal Rod Cave Characterization Plan*, August 1997 and CCN 101907 Addendum, 19 February 2003.

Appendix 1

Glossary of Data Reporting Qualifiers

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

U - Indicates the compound or analyte was analyzed for and not detected in the sample. The value reported is the sample quantitation limit corrected for sample dilution and moisture content by the laboratory.

UJ - Indicates the compound or analyte was analyzed for and not detected in the sample. Due to a 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

DATA QUALIFICATION SUMMARY

SDG: H2216	REVIEWER: TLI	DATE: 6/9/03	PAGE_1_OF_1_
COMMENTS: No qualifiers assigned.			

Appendix 3

Qualified Data Summary and Annotated Laboratory Reports

INORGANIC ANALYSIS, SOIL MATRIX, MG/KG

Project: BECHTEL-HANFORD													
Laboratory: LLI													
Case	SDG: H2216												
Sample Number		J00P13		J00NT5		J00NT6		J00NT7		J00NT8		J00NT9	
Remarks		E. Blank										Duplicate	
Sample Date		5/15/03		5/15/03		5/15/03		5/15/03		5/15/03		5/15/03	
Inorganics	RDL	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Silver	5	0.12	U	0.12	U	0.12	U	0.12	U	0.12	U	0.12	U
Arsenic	5	0.65		2.3		2.1		2.5		2.4		2.5	
Barium	100	1.1		35.2		37.7		42.7		44.3		44.8	
Cadmium	1	0.04	U	0.04	U	0.04	U	0.04	U	0.04	U	0.04	U
Chromium (total)	5	0.77	U	6.1		7.2		6.5		7.8		6.2	
Mercury	0.2	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U
Lead	5	0.46		2.1		2.8		3.9		19.7		20.1	
Selenium	1	0.41	U	0.41	U	0.41	U	0.42	U	0.41	U	0.42	U

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.

000010

Lionville Laboratory, Inc.

INORGANICS DATA SUMMARY REPORT 05/27/03

CLIENT: TNUHANFORD B03-024 H2216

LVL LOT #: 0305L434

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

SAMPLE	SITE ID	ANALYTE	RESULT	UNITS	REPORTING LIMIT	DILUTION FACTOR
-001	J00P13	Silver, Total	0.12 u	MG/KG	0.12	1.0
		Arsenic, Total	0.65	MG/KG	0.32	1.0
		Barium, Total	1.1	MG/KG	0.02	1.0
		Cadmium, Total	0.04 u	MG/KG	0.04	1.0
		Chromium, Total	0.77 u	MG/KG	0.77	1.0
		Mercury, Total	0.02 u	MG/KG	0.02	1.0
		Lead, Total	0.46	MG/KG	0.23	1.0
		Selenium, Total	0.41 u	MG/KG	0.41	1.0
-002	J00NT5	Silver, Total	0.12 u	MG/KG	0.12	1.0
		Arsenic, Total	2.3	MG/KG	0.32	1.0
		Barium, Total	35.2	MG/KG	0.02	1.0
		Cadmium, Total	0.04 u	MG/KG	0.04	1.0
		Chromium, Total	6.1	MG/KG	0.77	1.0
		Mercury, Total	0.02 u	MG/KG	0.02	1.0
		Lead, Total	2.1	MG/KG	0.23	1.0
		Selenium, Total	0.41 u	MG/KG	0.41	1.0
-003	J00NT6	Silver, Total	0.12 u	MG/KG	0.12	1.0
		Arsenic, Total	2.1	MG/KG	0.33	1.0
		Barium, Total	37.7	MG/KG	0.02	1.0
		Cadmium, Total	0.04 u	MG/KG	0.04	1.0
		Chromium, Total	7.2	MG/KG	0.78	1.0
		Mercury, Total	0.02 u	MG/KG	0.02	1.0
		Lead, Total	2.8	MG/KG	0.23	1.0
		Selenium, Total	0.41 u	MG/KG	0.41	1.0
-004	J00NT7	Silver, Total	0.12 u	MG/KG	0.12	1.0
		Arsenic, Total	2.5	MG/KG	0.33	1.0
		Barium, Total	42.7	MG/KG	0.02	1.0
		Cadmium, Total	0.04 u	MG/KG	0.04	1.0
		Chromium, Total	6.5	MG/KG	0.78	1.0
		Mercury, Total	0.02 u	MG/KG	0.02	1.0
		Lead, Total	3.9	MG/KG	0.23	1.0
		Selenium, Total	0.42 u	MG/KG	0.42	1.0

6/7/03

Lionville Laboratory, Inc.

INORGANICS DATA SUMMARY REPORT 05/27/03

CLIENT: TNUHANFORD B03-024 H2216

LVL LOT #: 0305L434

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

SAMPLE	SITE ID	ANALYTE	RESULT	UNITS	REPORTING LIMIT	DILUTION FACTOR
-005	J00NT8	Silver, Total	0.12 u	MG/KG	0.12	1.0
		Arsenic, Total	2.4	MG/KG	0.33	1.0
		Barium, Total	44.3	MG/KG	0.02	1.0
		Cadmium, Total	0.04 u	MG/KG	0.04	1.0
		Chromium, Total	7.8	MG/KG	0.78	1.0
		Mercury, Total	0.02 u	MG/KG	0.02	1.0
		Lead, Total	19.7	MG/KG	0.23	1.0
		Selenium, Total	0.41 u	MG/KG	0.41	1.0
-006	J00NT9	Silver, Total	0.12 u	MG/KG	0.12	1.0
		Arsenic, Total	2.5	MG/KG	0.33	1.0
		Barium, Total	44.8	MG/KG	0.02	1.0
		Cadmium, Total	0.04 u	MG/KG	0.04	1.0
		Chromium, Total	6.2	MG/KG	0.78	1.0
		Mercury, Total	0.02 u	MG/KG	0.02	1.0
		Lead, Total	20.1	MG/KG	0.23	1.0
		Selenium, Total	0.42 u	MG/KG	0.42	1.0

6/7/03

Appendix 4

Laboratory Narrative and Chain-of-Custody Documentation

LIONVILLE LABORATORY INC.

Analytical Report

Client: TNU-HANFORD B03-024
LVL#: 0305L434
SDG/SAF#: H2216/B03-024

W.O.#: 11343-606-001-9999-00
Date Received: 05-17-03

METALS CASE NARRATIVE

1. This narrative covers the analyses of 6 soil samples.

2. The samples were prepared and analyzed in accordance with methods checked on the attached glossary.

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

4. All results presented in this report are derived from samples that met LvLI's sample acceptance policy.

5. All Initial and Continuing Calibration Verifications (ICV/CCVs) were within the 90-110% control limits with the exception of the ending CCVs for Cadmium and Chromium in file TA0521B. All samples were less than the IDL for Cadmium. All samples were rerun for Chromium in file PS0522A.

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

7. All preparation/method blanks (MB) were within method criteria {less than the Practical Quantitation Limit (3X the IDL), MB value less than 5% of the RCRA limit, or samples greater than 20X MB value}. Refer to the Inorganics Method Blank Data Summary.

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

9. All laboratory control samples (LCS) were within the 80-120% control limits. Refer to the Inorganics Laboratory Control Standards Report.

10. All matrix spike (MS) recoveries were within the 75-125% control limits. Refer to the Inorganics Accuracy Report.

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

The results presented in this report relate only to the analytical testing and conditions of the samples at receipt and during storage. All pages of this report are integral parts of the analytical data. Therefore, this report should only be reproduced in its entirety of 17 pages.

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

13. 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.

Iain Daniels
Laboratory Manager
Lionville Laboratory Incorporated

05-28-03
Date

gmb/m05-434

LVLI
LIONVILLE LABORATORY INC.

Bechtel Hanford Inc.	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST		B03-024-03
Collector: Renee Nielson	Company Contact: Rikki Thoren	Telephone No.: 521-8003	Project Coordinator: KESSNER, JH
Price Code: 8J	Data Turnaround: 7 Days	Air Quality ☐	
Project Designation: 118-C-4 Horizontal Rod Cave Soil Sampling - Verification	Sampling Location: 118-C-4 Rod Cave	SAF No.: B03-024	
Ice Chest No.: ERC 96 019	Field Logbook No.: EL-1516-2	COA: R118CD200C	Method of Shipment: Federal Express
Shipped To: TMA/RECRA RECRA	Offsite Property No.: A030231		Bill of Lading/Air Bill No.: SOE OBPC

POSSIBLE SAMPLE HAZARDS/REMARKS

Special Handling and/or Storage

Preservation	None	Cool 4C	None	Cool 4C	Cool 4C	Cool 4C					
Type of Container	aG	aG	aG	aG	aG	aG					
No. of Container(s)	1	1	1	1	1	1					
Volume	1000mL	60mL	60mL	250mL	60mL	120mL					
SAMPLE ANALYSIS	See item (1) in Special Instructions.	Chromium Hex - 7196	See item (2) in Special Instructions.	PCBs - 8082	VOA - 8260A (TCL)	Semi-VOA - 8270A (TCL)					
Sample No.	Matrix *	Sample Date	Sample Time								
J00P13	SOIL	5-15-03	0900		X	X	X	X	X		

J00016

CHAIN OF POSSESSION — Sign/Print Names

Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
R Nielson	5/15/03 1200	Ref #3C 3728	5/15/03 1200
Ref 3C 3728	5 16 03 1000	SJGALE	51603 1000
SJGALE	51603 1000	FED EX	
FED EX	5.17.03 1155		5.17.03 1155
~~FED EX~~	~~5.17.03~~ 5.17.03		

SPECIAL INSTRUCTIONS

(1) Gamma Spectroscopy (TCL List) (Cesium-137, Cobalt-60, Europium-152, Europium-154, Europium-155); Americium-241; Isotopic Plutonium; Strontium-89,90 -- Total Sr; Isotopic Uranium
(2) ICP Metals - 6010A (Add-on) (Arsenic, Barium, Cadmium, Chromium, Lead, Selenium, Silver); Mercury - 7471 - (CV)

Personnel not available to relinquish samples from the 3728 Ref # 3C on 5/16/03

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
Va=Vegetation
X=Other

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

BHI-EE-011 (03/01/2002)

Bechtel Hanford Inc.	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	B03-024-01	Page 1 of 1

Collector: Renee Nielson	Company Contact: Rikki Thoren	Telephone No.: 521-8003	Project Coordinator: KESSNER, JH
Price Code: 8J	Data Turnaround: 7 Days	Air Quality ☐	
Project Designation: 118-C-4 Horizontal Rod Cave Soil Sampling - Verification	Sampling Location: 118-C-4 Rod Cave	SAF No.: B03-024	
Ice Chest No. ERC 96 019	Field Logbook No.: EL-1516-2	COA: R118CD200C	Method of Shipment: Federal Express
Shipped To: TMA/RECRA RERA	Offsite Property No. A030231		Bill of Lading/Air Bill No. SEE OSPC

POSSIBLE SAMPLE HAZARDS/REMARKS

Radioactive

Special Handling and/or Storage

000017

Preservation	None	Cool 4C	None	Cool 4C	Cool 4C	Cool 4C					
Type of Container	P	aG	aG	aG	aG	aG					
No. of Container(s)	1	1	1	1	1	1					
Volume	1000mL	120mL	120mL	250mL	250mL	250mL					
SAMPLE ANALYSIS	See item (1) in Special Instructions.	Chromium Hex - 7196	See item (2) in Special Instructions.	PCBs - 8082	VOA - 8260A (TCL)	Semi-VOA - 8270A (TCL)					
Sample No. / Matrix * / Sample Date / Sample Time											
J00NT5 / SOIL / 5-15-03 / 0815		X	X	X	X	X					
J00NT6 / SOIL / 5-15-03 / 0830		X	X	X	X	X					
J00NT7 / SOIL / 5-15-03 / 0840		X	X	X	X	X					
J00NT8 / SOIL / 5-15-03 / 0850		X	X	X	X	X					
J00NT9 / SOIL / 5-15-03 / 0815		X	X	X	X	X					

CHAIN OF POSSESSION — Sign/Print Names

Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
RNielson / R Nielson 51503	1200	REF# 3C 3728	5/15/03 1200
REF3C 3728 51603	1000	SJGALEWski 51603	1000
SJGALEWski 51603	1000	FED EX	
Fed Ex 5.17.03	1155	J Smith 5.17.03	1155

SPECIAL INSTRUCTIONS

(1) Gamma Spectroscopy (TCL List) {Cesium-137, Cobalt-60, Europium-152, Europium-154, Europium-155}; Americium-241; Isotopic Plutonium; Strontium-89,90 -- Total Sr; Isotopic Uranium
(2) ICP Metals - 6010A (Add-on) {Arsenic, Barium, Cadmium, Chromium, Lead, Selenium, Silver}; Mercury - 7471 - (CV)

Personnel not available to relinquish samples from the 3728 Ref # 3C on 5/16/03

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

Appendix 5

Data Validation Supporting Documentation

INORGANIC ANALYSIS DATA VALIDATION CHECKLIST

ALIDATION LEVEL:	A	B	C	D	E
PROJECT:	119-C-4		DATA PACKAGE:	H2216	
VALIDATOR:	TLI	LAB: LLI		DATE: 6/6/03	
CASE:			SDG:	H2216	

ANALYSES PERFORMED					
SW-846/ICP	SW-846/GFAA	SW-846/Hg	SW-846 Cyanide		

SAMPLES/MATRIX
J00P13 J00NT5 J00NT6 J00NT7 J00NT8
J00NT9
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: Barium, arsenic + lead in eb

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: NO PAS

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: lead 162% in FD

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

Rresults 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:

Appendix 6

Additional Documentation Requested by Client

Lionville Laboratory, Inc.

INORGANICS METHOD BLANK DATA SUMMARY PAGE 05/27/03

CLIENT: TNUHANFORD B03-024 H2216 LVL LOT #: 0305L434

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

SAMPLE	SITE ID	ANALYTE	RESULT	UNITS	REPORTING LIMIT	DILUTION FACTOR
BLANK1	03L0271-MB1	Silver, Total	0.12 u	MG/KG	0.12	1.0
		Arsenic, Total	0.33 u	MG/KG	0.33	1.0
		Barium, Total	0.02 u	MG/KG	0.02	1.0
		Cadmium, Total	0.04 u	MG/KG	0.04	1.0
		Chromium, Total	0.79 u	MG/KG	0.79	1.0
		Lead, Total	0.23 u	MG/KG	0.23	1.0
		Selenium, Total	0.42 u	MG/KG	0.42	1.0
BLANK1	03C0121-MB1	Mercury, Total	0.02 u	MG/KG	0.02	1.0

Lionville Laboratory, Inc.

INORGANICS ACCURACY REPORT 05/27/03

CLIENT: TNUHANFORD B03-024 H2216 LVL LOT #: 0305L434

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

SAMPLE	SITE ID	ANALYTE	SPIKED SAMPLE	INITIAL RESULT	SPIKED AMOUNT	%RECOV	DILUTION FACTOR(SPK)
-002	J00NT5	Mercury, Total	0.17	0.02u	0.16	110.1	1.0
-003	J00NT6	Silver, Total	4.6	0.12u	4.9	93.9	1.0
		Arsenic, Total	188	2.1	196	94.8	1.0
		Barium, Total	233	37.7	196	99.7	1.0
		Cadmium, Total	4.8	0.04u	4.9	98.0	1.0
		Chromium, Total	27.7	7.2	19.6	104.6	1.0
		Lead, Total	51.1	2.8	48.9	98.8	1.0
		Selenium, Total	168	0.41u	196	85.9	1.0

Lionville Laboratory, Inc.

INORGANICS PRECISION REPORT 05/27/03

CLIENT: TNUHANFORD B03-024 H2216 LVL LOT #: 0305L434

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

SAMPLE	SITE ID	ANALYTE	INITIAL RESULT	REPLICATE	RPD	DILUTION FACTOR(REP)
-002REP	J00NT5	Mercury, Total	0.02u	0.02u	NC	1.0
-003REP	J00NT6	Silver, Total	0.12u	0.12u	NC	1.0
		Arsenic, Total	2.1	2.4	13.3	1.0
		Barium, Total	37.7	42.8	12.7	1.0
		Cadmium, Total	0.04u	0.04u	NC	1.0
		Chromium, Total	7.2	8.5	16.6	1.0
		Lead, Total	2.8	3.3	16.4	1.0
		Selenium, Total	0.41u	0.41u	NC	1.0

Date: 9 June 2003
To: Bechtel Hanford Inc. (technical representative)
From: TechLaw, Inc.
Project: 118-C-4 Horizontal Rod Cave Sampling - Verification
Subject: PCBs - Data Package No. H2216-LLI (SDG No. H2216)

INTRODUCTION

This memo presents the results of data validation on Summary Data Package No. H2216-LLI prepared by Lionville Laboratory Incorporated (LLI). A list of the samples validated along with the analyses reported and the method of analysis is provided in the following table.

Sample ID	Sample	Media	Validation	Analysis
J00P13	5/15/03	Soil	C	PCBS by 8082
J00NT5	5/15/03	Soil	C	PCBS by 8082
J00NT6	5/15/03	Soil	C	PCBS by 8082
J00NT7	5/15/03	Soil	C	PCBS by 8082
J00NT8	5/15/03	Soil	C	PCBS by 8082
J00NT9	5/15/03	Soil	C	PCBS by 8082

Data validation was conducted in accordance with the BHI validation statement of work and the 118-C-4 Horizontal Rod Cave Characterization Plan (DOE/RL-97-33, Rev. 0). Appendices 1 through 5 provide the following information as indicated below:

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

DATA QUALITY OBJECTIVES

- **Holding Times**

  Sample data were assessed to ascertain whether the holding time requirements were met by the laboratory. The holding time requirements are as follows: Soil

samples must be extracted within 14 days of the date of sample collection and analyzed within 40 days from the date of extraction.

If holding times are exceeded by less than two times the limit, all associated sample results are qualified as estimates and flagged "J" for detects and "UJ" for non-detects. If holding times are exceeded by greater than two times the limit, all associated detected sample results are qualified as estimates and flagged "J" and all non-detects are rejected and flagged "UR".

All holding times were acceptable.

- **Method Blank**

Method blank analyses are performed to determine the extent of laboratory contamination introduced through sampling, sample preparation or analysis. At least one method blank analysis must be conducted for every 20 samples. Method blanks should not contain target compounds at a concentration greater than required quantitation limit (RQL). If target compounds are present, sample results less than five times the blank concentration are qualified as undetected and flagged "U". If the sample result is less than five times the blank concentration and less than RQL, the result is qualified as undetected and elevated to the RQL.

All method blank target compound results were acceptable.

Field Blanks

One equipment blank (J00P13) was submitted for analysis. No PCBs were detected in the field blank.

- **Accuracy**

Matrix Spike

Matrix spike analyses are used to assess the analytical accuracy of the reported data and the effect of the matrix on the ability to accurately quantify sample concentrations. Matrix spike analyses are performed in duplicate and must be within control limits of 70% to 130%. If spike recoveries are outside control limits, detected sample results less than five times the spike concentration are qualified as estimates and flagged "J". Non-detected sample results with spike recoveries outside control limits are qualified as estimates and flagged "UJ". Sample results greater than five times the spike concentration require no qualification.

Due to the matrix spike and matrix spike duplicate being diluted out, all PCB results were qualified as estimates and flagged "J".

Surrogate Recovery

The analysis of surrogate compounds provides a measure of performance for individual samples. Matrix-specific surrogate compound recovery control windows have been established by the laboratory. When a surrogate compound recovery is outside the control window, all positively identified target compounds associated with the unacceptable surrogate recoveries are qualified as estimates and flagged "J". Non-detected compounds with surrogate recoveries less than the lower control limit are qualified as having an estimated detection limit and flagged "UJ". Non-detected compounds with surrogate recoveries above the upper control limit require no qualification.

Due to the surrogates being diluted out, all PCB results were qualified as estimates and flagged "J".

- **Precision**

Matrix Spike/Matrix Spike Duplicate Samples

Matrix spike/matrix spike duplicate results provide matrix-specific information on the precision of the method for specific target compound classes. Precision is expressed as the relative percent difference (RPD) between the recoveries of duplicate matrix spike analyses performed on a sample. For soil samples, results must be within RPD limits of plus/minus 30%. If RPD values are out of specification and the sample concentration is less than five times the spike concentration, all associated detected sample results are qualified as estimates and flagged "J". If RPD values are out of specification and the sample concentration is greater than five times the spike concentration, no qualification is required.

Due to the matrix spike and matrix spike duplicate being diluted out, all PCB results were qualified as estimates and flagged "J".

Field Duplicate Samples

One pair of field duplicate samples (samples J00NT5/J00NT9) were submitted to LLI for analysis. The duplicate sample results were compared using the validation guidelines for determining the RPD between a sample and its duplicate. All field duplicate results were acceptable.

- **Analytical Detection Levels**

  Reported analytical detection levels are compared against the required detection limits (RDL's) to ensure that laboratory detection levels meet the required criteria. No RDLs were specified and thus no comparison could be made.

- **Completeness**

  Data Package No. H2216-LLI 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

Due to the matrix spike and matrix spike duplicate being diluted out, all PCB results were qualified as estimates and flagged "J". Due to the surrogates being diluted out, all PCB results were qualified as estimates and flagged "J". Data flagged "J" indicates that the associated concentration is an estimate, but under the BHI 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.

REFERENCES

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

DOE/RL-97-33, Rev. 0, *118-C-4 Horizontal Rod Cave Characterization Plan*, August 1997 and CCN 101907 Addendum, 19 February 2003.

Appendix 1

Glossary of Data Reporting Qualifiers

Qualifiers which may be applied by data validators in compliance with the procedures herein 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 quantitation limit is an estimate.

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

DATA QUALIFICATION SUMMARY

SDG: H2216	REVIEWER: TLI	DATE: 6/9/03	PAGE_1_OF_1_
COMMENTS:			
COMPOUND	QUALIFIER	SAMPLES AFFECTED	REASON
PCBs	J	All	MS/MSD diluted out
PCBs	J	All	Surrogate diluted out

Appendix 3

Qualified Data Summary and Annotated Laboratory Reports

PCB ANALYSIS, SOIL MATRIX, (UG/KG)

Project: BECHTEL-HANFORD															
Laboratory: Lionville Laboratory Inc.															
Case:	SDG: H2216														
Sample Number		J00P13		J00NT5		J00NT6		J00NT7		J00NT8		J00NT9			
Remarks		E. Blank										Duplicate			
Sample Date		5/15/03		5/15/03		5/15/03		5/15/03		5/15/03		5/15/03			
Extraction Date		5/19/03		5/19/03		5/19/03		5/19/03		5/19/03		5/19/03			
Analysis Date		5/24/03		5/24/03		5/24/03		5/24/03		5/24/03		5/24/03			
PCB	RDL	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Aroclor-1016		750	UJ	760	UJ	760	UJ	760	UJ	760	UJ	760	UJ		
Aroclor-1221		750	UJ	760	UJ	760	UJ	760	UJ	760	UJ	760	UJ		
Aroclor-1232		750	UJ	760	UJ	760	UJ	760	UJ	760	UJ	760	UJ		
Aroclor-1242		750	UJ	760	UJ	760	UJ	760	UJ	760	UJ	760	UJ		
Aroclor-1248		750	UJ	760	UJ	760	UJ	760	UJ	760	UJ	760	UJ		
Aroclor-1254		750	UJ	760	UJ	760	UJ	760	UJ	760	UJ	760	UJ		
Aroclor-1260		750	UJ	760	UJ	760	UJ	760	UJ	760	UJ	760	UJ		

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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.

NA - Not analyzed

Lionville Laboratory, Inc.

PCBs by GC

Report Date: 05/27/03 13:57

RFW Batch Number: **0305L434** Client: **TNUHANFORD B03-024 H2216** Work Order: 11343606001 Page: 1

	Cust ID:	J00P13	J00NT5	J00NT6	J00NT6	J00NT6	J00NT7
Sample Information	RFW#:	001	002	003	003 MS	003 MSD	004
	Matrix:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
	D.F.:	50.0	50.0	50.0	50.0	50.0	50.0
	Units:	UG/KG	UG/KG	UG/KG	UG/KG	UG/KG	UG/KG
Surrogate:	Decachlorobiphenyl	D %	D %	D %	D %	D %	D %
	Tetrachloro-m-xylene	D %	D %	D %	D %	D %	D %
		fl	fl	fl	fl	fl	fl
Aroclor-1016		750 U J	760 U J	760 U J	D %	D %	760 U J
Aroclor-1221		750 U	760 U	760 U	760 U	760 U	760 U
Aroclor-1232		750 U	760 U	760 U	760 U	760 U	760 U
Aroclor-1242		750 U	760 U	760 U	760 U	760 U	760 U
Aroclor-1248		750 U	760 U	760 U	760 U	760 U	760 U
Aroclor-1254		750 U	760 U	760 U	760 U	760 U	760 U
Aroclor-1260		750 U	760 U	760 U	D %	D %	760 U

	Cust ID:	J00NT8	J00NT9	PBLKUI	PBLKUI BS
Sample Information	RFW#:	005	006	03LE0598-MB1	03LE0598-MB1
	Matrix:	SOIL	SOIL	SOIL	SOIL
	D.F.:	50.0	50.0	1.00	1.00
	Units:	UG/KG	UG/KG	UG/KG	UG/KG
Surrogate:	Decachlorobiphenyl	D %	D %	205 * %	130 * %
	Tetrachloro-m-xylene	D %	D %	175 * %	95 %
		fl	fl	fl	fl
Aroclor-1016		760 U J	760 U J	15 U	91 %
Aroclor-1221		760 U	760 U	15 U	15 U
Aroclor-1232		760 U	760 U	15 U	15 U
Aroclor-1242		760 U	760 U	15 U	15 U
Aroclor-1248		760 U	760 U	15 U	15 U
Aroclor-1254		760 U	760 U	15 U	15 U
Aroclor-1260		760 U	760 U	15 U	101 %

6/7/03

7/25/2003

U= Analyzed, not detected. J= Present below detection limit. B= Present in blank. NR= Not reported. NS= Not spiked.
%= Percent recovery. D= Diluted out. I= Interference. NA= Not Applicable. *= Outside of EPA CLP QC

000011

Appendix 4

Laboratory Narrative and Chain-of-Custody Documentation

LIONVILLE LABORATORY INC.

Analytical Report

Client: TNU-HANFORD B03-024
LVL #: 0305L434
SDG/SAF #: H2216/B03-024

W.O. #: 11343-606-001-9999-00
Date Received: 05-17-03

PCB

The set of samples consisted of six (6) soil samples collected on 05-15-03.

The samples and their associated QC samples were extracted on 05-19-03 and analyzed according to Lionville Laboratory OPs based on SW846, 3rd Edition procedures on 05-24-03. The extraction procedure was based on method 3540 and the extracts were analyzed based on method 8082.

The following is a summary of the QC results accompanying the sample results and a description of any problems encountered during their analyses:

1. All results presented in this report are derived from samples that met LvLI's sample acceptance policy.

2. All required holding times for extraction and analysis have been met.

3. All samples and their associated QC samples received Florisil, Sulfuric Acid, and Sulfur cleanups.

4. The method blank was below the reporting limits for all target compounds.

5. Three (3) of four (4) obtainable surrogate were outside acceptance criteria. A copy of the Sample Discrepancy Report (SDR) has been enclosed.

6. All blank spike recoveries were within acceptance criteria.

7. Matrix spike recoveries were unobtainable due to the dilution required for analysis.

8. All samples required 50-fold instrument dilutions due to the high concentrations of non-target analytes. Reporting limits have been adjusted to reflect the necessary dilutions.

9. All initial calibrations associated with this data set were within acceptance criteria.

10. All continuing calibration standards analyzed prior to sample extracts were within acceptance criteria.

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 11 pages.

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

11. 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.

Iain Daniels
Laboratory Manager
Lionville Laboratory Incorporated

5/28/03
Date

pef\r:\group\data\pest\tnu hanford\05L-434.pcb

LIONVILLE LABORATORY INC.

Bechtel Hanford Inc.

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

Collector: Renee Nielson	Company Contact: Rikki Thoren	Telephone No.: 521-8003	Project Coordinator: KESSNER, JH
Price Code: 8J	Data Turnaround: 7 Days	Air Quality ☐	SAF No.: B03-024
Project Designation: 118-C-4 Horizontal Rod Cave Soil Sampling - Verification	Sampling Location: 118-C-4 Rod Cave		
Ice Chest No.: ERC 96 019	Field Logbook No.: EL-1516-2	COA: R118CD200C	Method of Shipment: Federal Express
Shipped To: TMA/RECRA REERA	Offsite Property No.: A030231		Bill of Lading/Air Bill No.: SEE OPC

POSSIBLE SAMPLE HAZARDS/REMARKS

Special Handling and/or Storage

Preservation	None	Cool 4C	None	Cool 4C	Cool 4C	Cool 4C				
Type of Container	aG	aG	aG	aG	aG	aG				
No. of Container(s)	1	1	1	1	1	1				
Volume	1000mL	60mL	60mL	250mL	60mL	120mL				
SAMPLE ANALYSIS	See item (1) in Special Instructions.	Chromium Hex - 7196	See item (2) in Special Instructions.	PCBs - 8082	VOA - 8260A (TCL)	Semi-VOA - 8270A (TCL)				
Sample No. / Matrix * / Sample Date / Sample Time										
J00P13 / SOIL / 51503 / 0800		X	X	X	X	X				

CHAIN OF POSSESSION — Sign/Print Names

Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
R Nielson	5/15/03 1200	Ref #3C 3728	5/15/03 1200
Ref 3C 3728	5 16 03 1000	SUGALE	51603 1000
SUGALE	51603 1000	FED EX	
Fed Ex	5.17.03 1155		5.17.03 1155
Fed Ex	5.17.03		

SPECIAL INSTRUCTIONS

(1) Gamma Spectroscopy (TCL List) [Cesium-137, Cobalt-60, Europium-152, Europium-154, Europium-155]; Americium-241; Isotopic Plutonium; Strontium-89,90 -- Total Sr; Isotopic Uranium
(2) ICP Metals - 6010A (Add-on) [Arsenic, Barium, Cadmium, Chromium, Lead, Selenium, Silver]; Mercury - 7471 - (CV)

Personnel not available to relinquish samples from the 3728 Ref # 3C on 5/16/03

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 (03/01/2002)

* Bechtel Hanford Inc.	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	B03-024-01	Page 1 of 1

Collector Renee Nielson	Company Contact Rikki Thoren	Telephone No. 521-8003	Project Coordinator KESSNER, JH
Price Code 8J	Data Turnaround 7 Days		
Project Designation 118-C-4 Horizontal Rod Cave Soil Sampling - Verification	Sampling Location 118-C-4 Rod Cave		SAF No. B03-024
Air Quality ☐			
Ice Chest No. ERC 96 019	Field Logbook No. EL-1516-2	COA R118CD200C	Method of Shipment Federal Express
Shipped To TMA/RECRA RERA	Offsite Property No. A030231		Bill of Lading/Air Bill No. SEE OSPC

POSSIBLE SAMPLE HAZARDS/REMARKS

Radioactive

Special Handling and/or Storage

Preservation	None	Cool 4C	None	Cool 4C	Cool 4C	Cool 4C				
Type of Container	P	aG	aG	aG	aG	aG				
No. of Container(s)	1	1	1	1	1	1				
Volume	1000mL	120mL	120mL	250mL	250mL	250mL				
SAMPLE ANALYSIS	See item (1) in Special Instructions.	Chromium Hex - 7196	See item (2) in Special Instructions.	PCBs - 8082	VOA - 8260A (TCL)	Semi-VOA - 8270A (TCL)				
Sample No. / Matrix * / Sample Date / Sample Time										
J00NT5 / SOIL / 5-15-03 / 0815		X	X	X	X	X				
J00NT6 / SOIL / 5-15-03 / 0830		X	X	X	X	X				
J00NT7 / SOIL / 5-15-03 / 0840		X	X	X	X	X				
J00NT8 / SOIL / 5-15-03 / 0850		X	X	X	X	X				
J00NT9 / SOIL / 5-15-03 / 0815		X	X	X	X	X				

000016

CHAIN OF POSSESSION	Sign/Print Names	Date/Time
Relinquished By/Removed From	Received By/Stored In	
Relinquished By/Removed From: Renee Nielson / R Nielson 5-15-03	Received By/Stored In: REF# 3C 3728 5/15/03	Date/Time 1200
Relinquished By/Removed From: REF3C 3728 5/16/03 1000	Received By/Stored In: SJGALE 5/16/03 1000	
Relinquished By/Removed From: SJGALE 5/16/03 1000	Received By/Stored In: FED EX	
Relinquished By/Removed From: Fed Ex 5/17/03 1155	Received By/Stored In: [illegible] 5/17/03 1155	
Relinquished By/Removed From	Received By/Stored In	
Relinquished By/Removed From	Received By/Stored In	

SPECIAL INSTRUCTIONS

(1) Gamma Spectroscopy (TCL List) {Cesium-137, Cobalt-60, Europium-152, Europium-154, Europium-155}; Americium-241; Isotopic Plutonium; Strontium-89,90 -- Total Sr; Isotopic Uranium
(2) ICP Metals - 6010A (Add-on) {Arsenic, Barium, Cadmium, Chromium, Lead, Selenium, Silver}; Mercury - 7471 - (CV)

Personnel not available to relinquish samples from the 3728 Ref # 3C on 5/16/03

Matrix *
S=Soil
SE=Sediment
SO=Solid
SI=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 (03/01/2002)

Appendix 5

Data Validation Supporting Documentation

PESTICIDE/PCB DATA VALIDATION CHECKLIST

VALIDATION LEVEL:	A	B	C	D	E
PROJECT: 118-C-4			DATA PACKAGE: H2216		
VALIDATOR: TCI		LAB: LLI		DATE: 6/6/06	
CASE:			SDG: H2216		
ANALYSES PERFORMED					
SW-846 8081	SW-846 8081 (TCLP)	SW-846 8082	SW-846 8081 (TCLP)		
SAMPLES/MATRIX					
J00P13 J00NT5 J00NT6 J00NT7					
J00NT8 J00NT9					
					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 acceptable? ..... Yes No N/A

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

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

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

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

DDT and endrin breakdowns acceptable? ..... Yes No N/A

Comments:

GENERAL CHEMISTRY DATA VALIDATION CHECKLISTS

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: _____

6. HOLDING TIMES (all levels)

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

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

Comments: _____

GENERAL CHEMISTRY DATA VALIDATION CHECKLISTS

7. RESULT QUANTITATION AND DETECTION LIMITS (all levels)

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

Rresults 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: ~~Not~~ Cdlbe NO RDL specified.

Appendix 6

Additional Documentation Requested by Client

Lionville Laboratory, Inc.

INORGANICS METHOD BLANK DATA SUMMARY PAGE 05/27/03

CLIENT: TNUHANFORD B03-024 H2216

LVL LOT #: 0305L434

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

SAMPLE	SITE ID	ANALYTE	RESULT	UNITS	REPORTING LIMIT	DILUTION FACTOR
BLANK10	03LVI044-MB1	Chromium VI	0.40 u	MG/KG	0.40	1.0
BLANK10	03LVI045-MB1	Chromium VI	0.40 u	MG/KG	0.40	1.0

Lionville Laboratory, Inc.

INORGANICS PRECISION REPORT 05/27/03

CLIENT: TNUHANFORD B03-024 H2216

LVL LOT #: 0305L434

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

SAMPLE	SITE ID	ANALYTE	INITIAL RESULT	REPLICATE	RPD	DILUTION FACTOR(REP)
-001REP	J00P13	% Solids	99.9	99.9	0.010	1.0
		Chromium VI	0.40u	0.40u	NC	1.0

Lionville Laboratory, Inc.

INORGANICS ACCURACY REPORT 05/27/03

CLIENT: TNUHANFORD B03-024 H2216 LVL LOT #: 0305L434

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

SAMPLE	SITE ID	ANALYTE	SPIKED SAMPLE	INITIAL RESULT	SPIKED AMOUNT	%RECOV	DILUTION FACTOR(SPK)
-001	J00P13	Soluble Chromium VI	3.6	0.40u	4.0	93.8	1.0
		Insoluble Chromium VI	1240	0.40u	1150	107.2	100
BLANK10	03LVI044-MB1	Soluble Chromium VI	4.2	0.40u	4.0	104.7	1.0
		Insoluble Chromium VI	1150	0.40u	1120	102.5	100
BLANK10	03LVI045-MB1	Soluble Chromium VI	4.0	0.40u	4.0	100.7	1.0
		Insoluble Chromium VI	1210	0.40u	1170	103.4	100

Date: 9 June 2003
To: Bechtel Hanford Inc. (technical representative)
From: TechLaw, Inc.
Project: 118-C-4 Horizontal Rod Cave Soil Sampling - Verification
Subject: Semivolatile - Data Package No. H2216-LLI (SDG No. H2216)

INTRODUCTION

This memo presents the results of data validation on Data Package No. H2216-LLI prepared by Lionville Laboratory Incorporated (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	Media	Validation	Analysis
J00P13	5/15/03	Soil	C	See note 1
J00NT5	5/15/03	Soil	C	See note 1
J00NT6	5/15/03	Soil	C	See note 1
J00NT7	5/15/03	Soil	C	See note 1
J00NT8	5/15/03	Soil	C	See note 1
J00NT9	5/15/03	Soil	C	See note 1

1 - Semivolatiles by 8270C

Data validation was conducted in accordance with the BHI validation statement of work and the 118-C-4 Horizontal Rod Cave Characterization Plan (DOE/RL-97-33, Rev. 0). Appendices 1 through 5 provide the following information as indicated below:

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

DATA QUALITY OBJECTIVES

- **Holding Times**

Analytical holding times were assessed to ascertain whether the holding time requirements were met by the laboratory. The holding time requirements are as

follows: Samples must be extracted within 7 days of the date of sample collection and analyzed within 40 days from the date of extraction.

If holding times are exceeded, but not by greater than two times the limit, all associated sample results are qualified as estimates and flagged "J" for detects and "UJ" for non-detects. If holding times are exceeded by greater than two times the limit, all associated detectable sample results are qualified as estimates and flagged "J" and all non-detects are rejected and flagged "UR".

All holding times were met.

- **Method Blanks**

Method blank analyses are conducted to determine the extent of laboratory contamination introduced through sampling, sample preparation and analysis. At least one acceptable method blank analysis must be conducted for every 20 samples. No contaminants should be present in the method blank. Analytical results for analytes present in any sample at less than five times the concentration of that analyte found in the associated blank are qualified as non-detects and flagged "U". Common laboratory contaminants present in samples at less than ten times the concentration of that analyte found in the associated blank are qualified as non-detects. If a sample result is less than the CRQL and is less than five times (or less than ten times for lab contaminants) the highest associated blank result, the sample result value is raised to the CRQL level and qualified as undetected "U".

Due to method blank contamination, all undetected di-n-butylphthalate and bis(2-ethylhexyl)phthalate results were raised to the CRDL and flagged "U".

All other method blank results were acceptable.

Field Blanks

One equipment blank (J00P13) was submitted for analysis. Din-n-butylphthalate and bis(2-ethylhexyl)phthalate were detected in the field blank. Under the BHI statement of work, no qualification is required.

- **Accuracy**

Matrix Spike/Matrix Spike Duplicate Recoveries

Matrix spike/matrix spike duplicate analyses are used to assess the analytical accuracy of the reported data and the effect of the matrix on the ability to accurately quantify sample concentrations. Matrix spike/matrix spike duplicate analyses are performed in duplicate using five compounds for which percent recoveries must be within a range of 50-150% or within laboratory control limits. If spike recoveries are outside control limits, detected sample results less than five times the spike concentration are qualified as estimates and flagged "J". Undetected sample results with spike recoveries outside control limits are qualified as estimates and flagged "UJ". Sample results greater than five times the spike concentration require no qualification.

All matrix spike/matrix spike duplicate results were acceptable.

Surrogate Recovery

The analyses of surrogate compounds provide a measure of performance for individual samples. Matrix-specific surrogate compound recovery control windows have been established by the EPA CLP program. If two surrogates of the same class of compounds (base/neutral or acid) are out of control limits, all associated sample results greater than the contract required quantitation limit (CRQL) are qualified as estimates and flagged "J". Sample results less than the CRQL and below the lower control limit are qualified as estimates and flagged "UJ". Sample results less than the CRQL with recoveries above the upper control limit require no qualification. If a surrogate recovery is less than 10%, detects are qualified as estimates and flagged "J" and nondetects are rejected and flagged "UR".

All surrogate results were acceptable.

- **Precision**

Matrix Spike/Matrix Spike Duplicate Samples

Matrix spike (MS)/matrix spike duplicate (MSD) results provide matrix-specific information on the precision of the method for specific target compound classes. Precision is expressed by the relative percent difference (RPD) between the recoveries of duplicate matrix spike analyses performed on a sample.

Samples results must be within RPD limits of +/-30%. If RPD values are out of specification and the sample concentration is less than five times the spike

concentration, all associated detected sample results are qualified as estimates and flagged "J". If RPD values are out of specification and the sample concentration is greater than five times the spike concentration, no qualification is required.

All MS/MSD RPD results were acceptable.

Field Duplicate Samples

One pair of field duplicate samples (samples J00NT5/J00NT9) were submitted to LLI for analysis. The duplicate sample results were compared using the validation guidelines for determining the RPD between a sample and its duplicate. All field duplicate results were acceptable.

- **Analytical Detection Levels**

Reported analytical detection levels are compared against the required detection limits (RDL's) to ensure that laboratory detection levels meet the required criteria. No semi-volatile organic RDLs were specified and thus no comparison could be made.

- **Completeness**

Data package No. H2216-LLI 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

Due to method blank contamination, all undetected di-n-butylphthalate and bis(2-ethylhexyl)phthalate results were raised to the CRDL and flagged "U".

REFERENCES

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

DOE/RL-97-33, Rev. 0, *118-C-4 Horizontal Rod Cave Characterization Plan*, August 1997 and CCN 101907 Addendum, 19 February 2003.

Appendix 1

Glossary of Data Reporting Qualifiers

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

U - Indicates the compound or analyte was analyzed for and not detected in the sample. The value reported is the same 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 quantitation limit is an estimate.

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 usable for decision-making purposes).

Appendix 2

Summary of Data Qualification

DATA QUALIFICATION SUMMARY

SDG: H2216	REVIEWER: TLI	DATE: 6/9/03	PAGE_1_OF_1_
COMMENTS:			
COMPOUND	QUALIFIER	SAMPLES AFFECTED	REASON
Di-n-butylphthalate bis(2-ethylhexylphthalate	U	All detected analytes	Method blank contamination.

Appendix 3

Qualified Data Summary and Annotated Laboratory Reports

SEMIVOLATILE/PAH ANALYSIS, WATER MATRIX, (UG/L)

Project: BECHTEL-HANFORD																			
Laboratory: LLI																			
Case:	SDG: H2216																		
Sample Number		J00P13		J00NT5		J00NT6		J00NT7		J00NT8		J00NT9							
Remarks		E. Blank										Duplicate							
Sample Date		5/15/03		5/15/03		5/15/03		5/15/03		5/15/03		5/15/03							
Extraction Date		5/23/03		5/23/03		5/23/03		5/23/03		5/23/03		5/23/03							
Analysis Date		5/27/03		5/27/03		5/27/03		5/27/03		5/27/03		5/27/03							
Semivolatile (8270C)	RDL	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Phenol		330	U	340	U	340	U	340	U	340	U	340	U						
bis(2-Chloroethyl)ether		330	U	340	U	340	U	340	U	340	U	340	U						
2-Chlorophenol		330	U	340	U	340	U	340	U	340	U	340	U						
1,3-Dichlorobenzene		330	U	340	U	340	U	340	U	340	U	340	U						
1,4-Dichlorobenzene		330	U	340	U	340	U	340	U	340	U	340	U						
1,2-Dichlorobenzene		330	U	340	U	340	U	340	U	340	U	340	U						
2-Methylphenol		330	U	340	U	340	U	340	U	340	U	340	U						
2,2'-oxybis(1-chloropropane)		330	U	340	U	340	U	340	U	340	U	340	U						
3 and/or 4-Methylphenol		330	U	340	U	340	U	340	U	340	U	340	U						
N-Nitroso-di-n-propylamine		330	U	340	U	340	U	340	U	340	U	340	U						
Hexachloroethane		330	U	340	U	340	U	340	U	340	U	340	U						
Nitrobenzene		330	U	340	U	340	U	340	U	340	U	340	U						
Isophorone		330	U	340	U	340	U	340	U	340	U	340	U						
2-Nitrophenol		330	U	340	U	340	U	340	U	340	U	340	U						
2,4-Dimethylphenol		330	U	340	U	340	U	340	U	340	U	340	U						
bis(2-Chloroethoxy)methane		330	U	340	U	340	U	340	U	340	U	340	U						
2,4-Dichlorophenol		330	U	340	U	340	U	340	U	340	U	340	U						
1,2,4-Trichlorobenzene		330	U	340	U	340	U	340	U	340	U	340	U						
Naphthalene		330	U	340	U	340	U	340	U	340	U	340	U						
4-Chloroaniline		330	U	340	U	340	U	340	U	340	U	340	U						
Hexachlorobutadiene		330	U	340	U	340	U	340	U	340	U	340	U						
4-Chloro-3-methylphenol		330	U	340	U	340	U	340	U	340	U	340	U						
2-Methylnaphthalene		330	U	340	U	340	U	340	U	340	U	340	U						
Hexachlorocyclopentadiene		330	U	340	U	340	U	340	U	340	U	340	U						
2,4,6-Trichlorophenol		330	U	330	U	330	U	330	U	330	U	330	U						
2,4,5-Trichlorophenol		840	U	840	U	840	U	840	U	840	U	840	U						
2-Chloronaphthalene		330	U	340	U	340	U	340	U	340	U	340	U						
2-Nitroaniline		840	U	840	U	840	U	840	U	840	U	840	U						
Dimethylphthalate		330	U	340	U	340	U	340	U	340	U	340	U						
Acenaphthylene		330	U	340	U	340	U	340	U	340	U	340	U						
2,6-Dinitrotoluene		330	U	340	U	340	U	340	U	340	U	340	U						
Project: BECHTEL-HANFORD																			

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.

SEMIVOLATILE/PAH ANALYSIS, WATER MATRIX, (UG/L)

Laboratory: LLI																			
Case:	SDG: H2216																		
Sample Number		J00P13		J00NT5		J00NT6		J00NT7		J00NT8		J00NT9							
Remarks		E. Blank										Duplicate							
Sample Date		5/15/03		5/15/03		5/15/03		5/15/03		5/15/03		5/15/03							
Extraction Date		5/23/03		5/23/03		5/23/03		5/23/03		5/23/03		5/23/03							
Analysis Date		5/27/03		5/27/03		5/27/03		5/27/03		5/27/03		5/27/03							
Semivolatile (8270C)	RDL	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
3-Nitroaniline		840	U	840	U	840	U	840	U	840	U	840	U						
Acenaphthene		330	U	340	U	340	U	340	U	340	U	340	U						
2,4-Dinitrophenol		840	U	840	U	840	U	840	U	840	U	840	U						
4-Nitrophenol		330	U	840	U	840	U	840	U	840	U	840	U						
Dibenzofuran		330	U	340	U	340	U	340	U	340	U	340	U						
2,4-Dinitrotoluene		330	U	340	U	340	U	340	U	340	U	340	U						
Diethylphthalate		330	U	340	U	340	U	340	U	340	U	340	U						
4-Chlorophenyl-phenyl ether		330	U	340	U	340	U	340	U	340	U	340	U						
Fluorene		330	U	340	U	340	U	340	U	340	U	340	U						
4-Nitroaniline		840	U	840	U	840	U	840	U	840	U	840	U						
4,6-Dinitro-2-methylphenol		840	U	840	U	840	U	840	U	840	U	840	U						
N-Nitrosodiphenylamine		330	U	340	U	340	U	340	U	340	U	340	U						
4-Bromophenyl-phenyl ether		330	U	340	U	340	U	340	U	340	U	340	U						
Hexachlorobenzene		330	U	340	U	340	U	340	U	340	U	340	U						
Pentachlorophenol		840	U	840	U	840	U	840	U	840	U	840	U						
Phenanthrene		330	U	340	U	340	U	340	U	23		340	U						
Anthracene		330	U	340	U	340	U	340	U	340	U	340	U						
Carbazole		330	U	340	U	340	U	340	U	340	U	340	U						
Di-n-butylphthalate		330	U	330	U	330	U	330	U	330	U	330	U						
Fluoranthene		330	U	340	U	340	U	340	U	74		340	U						
Pyrene		330	U	340	U	340	U	340	U	100		340	U						
Butylbenzylphthalate		330	U	340	U	340	U	340	U	340	U	340	U						
3,3'-Dichlorobenzidine		330	U	340	U	340	U	340	U	340	U	340	U						
Benzo(a)anthracene		330	U	340	U	340	U	340	U	41		340	U						
Chrysene		330	U	340	U	340	U	340	U	44		340	U						
bis(2-Ethylhexyl)phthalate		330	U	340	U	330	U	330	U	330	U	330	U						
Di-n-octylphthalate		330	U	340	U	340	U	340	U	340	U	340	U						
Benzo(b)fluoranthene		330	U	340	U	340	U	340	U	46		340	U						
Benzo(k)fluoranthene		330	U	340	U	340	U	340	U	45		340	U						
Benzo(a)pyrene		330	U	340	U	340	U	340	U	44		340	U						
Indeno(1,2,3-cd)pyrene		330	U	340	U	340	U	340	U	19		340	U						
Dibenz(a,h)anthracene		330	U	340	U	340	U	340	U	340	U	340	U						
Benzo(g,h,i)perylene		330	U	340	U	340	U	340	U	22		340	U						

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.

Lionville Laboratory, Inc.

Semivolatiles by GC/MS, HSL List — Report Date: 05/28/03 15:18

RFW Batch Number: 0305L434 — Client: TNUHANFORD B03-024 H2216 — Work Order: 11343606001 — Page: 1a

	Cust ID:	J00P13		J00NT5		J00NT6		J00NT7		J00NT7		J00NT7	
Sample Information	RFW#:	001		002		003		004		004 MS		004 MSD	
	Matrix:	SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
	D.F.:	1.00		1.00		1.00		1.00		1.00		1.00	
	Units:	ug/Kg		ug/Kg		ug/Kg		ug/Kg		ug/Kg		ug/Kg	
Surrogate Recovery	Nitrobenzene-d5	64	%	78	%	83	%	75	%	62	%	71	%
	2-Fluorobiphenyl	62	%	73	%	82	%	70	%	65	%	73	%
	Terphenyl-d14	98	%	95	%	112	%	100	%	94	%	103	%
	Phenol-d5	61	%	71	%	79	%	70	%	58	%	65	%
	2-Fluorophenol	59	%	72	%	76	%	69	%	57	%	64	%
	2,4,6-Tribromophenol	74	%	77	%	91	%	80	%	80	%	88	%
			fl		fl		fl		fl		fl		fl
Phenol		330	U	340	U	340	U	340	U	56	%	61	%
bis(2-Chloroethyl)ether		330	U	340	U	340	U	340	U	340	U	340	U
2-Chlorophenol		330	U	340	U	340	U	340	U	55	%	60	%
1,3-Dichlorobenzene		330	U	340	U	340	U	340	U	340	U	340	U
1,4-Dichlorobenzene		330	U	340	U	340	U	340	U	55	%	62	%
1,2-Dichlorobenzene		330	U	340	U	340	U	340	U	340	U	340	U
2-Methylphenol		330	U	340	U	340	U	340	U	340	U	340	U
2,2'-oxybis(1-Chloropropane)		330	U	340	U	340	U	340	U	340	U	340	U
3- and/or 4-Methylphenol		330	U	340	U	340	U	340	U	340	U	340	U
N-Nitroso-di-n-propylamine		330	U	340	U	340	U	340	U	58	%	69	%
Hexachloroethane		330	U	340	U	340	U	340	U	340	U	340	U
Nitrobenzene		330	U	340	U	340	U	340	U	340	U	340	U
Isophorone		330	U	340	U	340	U	340	U	340	U	340	U
2-Nitrophenol		330	U	340	U	340	U	340	U	340	U	340	U
2,4-Dimethylphenol		330	U	340	U	340	U	340	U	340	U	340	U
bis(2-Chloroethoxy)methane		330	U	340	U	340	U	340	U	340	U	340	U
2,4-Dichlorophenol		330	U	340	U	340	U	340	U	340	U	340	U
1,2,4-Trichlorobenzene		330	U	340	U	340	U	340	U	58	%	65	%
Naphthalene		330	U	340	U	340	U	340	U	340	U	340	U
4-Chloroaniline		330	U	340	U	340	U	340	U	340	U	340	U
Hexachlorobutadiene		330	U	340	U	340	U	340	U	340	U	340	U
4-Chloro-3-methylphenol		330	U	340	U	340	U	340	U	71	%	78	%
2-Methylnaphthalene		330	U	340	U	340	U	340	U	340	U	340	U
Hexachlorocyclopentadiene		330	U	340	U	340	U	340	U	340	U	340	U
2,4,6-Trichlorophenol		330	U	340	U	340	U	340	U	340	U	340	U
2,4,5-Trichlorophenol		840	U	840	U	840	U	840	U	840	U	840	U

*= Outside of EPA CLP QC limits.

000013

fle 6/7/03

RFW Batch Number: 0305L434 Client: TNUHANFORD B03-024 H2216 Work Order: 11343606001 Page: 1b

Cust ID:	J00P13		J00NT5		J00NT6		J00NT7		J00NT7		J00NT7	
RFW#:	001		002		003		004		004 MS		004 MSD	
2-Chloronaphthalene	330	U	340	U	340	U	340	U	340	U	340	U
2-Nitroaniline	840	U	840	U	840	U	840	U	840	U	840	U
Dimethylphthalate	330	U	340	U	340	U	340	U	340	U	340	U
Acenaphthylene	330	U	340	U	340	U	340	U	340	U	340	U
2,6-Dinitrotoluene	330	U	340	U	340	U	340	U	340	U	340	U
3-Nitroaniline	840	U	840	U	840	U	840	U	840	U	840	U
Acenaphthene	330	U	340	U	340	U	340	U	70	%	78	%
2,4-Dinitrophenol	840	U	840	U	840	U	840	U	840	U	840	U
4-Nitrophenol	840	U	840	U	840	U	840	U	71	%	82	%
Dibenzofuran	330	U	340	U	340	U	340	U	340	U	340	U
2,4-Dinitrotoluene	330	U	340	U	340	U	340	U	79	%	91 *	%
Diethylphthalate	330	U	340	U	340	U	340	U	340	U	340	U
4-Chlorophenyl-phenylether	330	U	340	U	340	U	340	U	340	U	340	U
Fluorene	330	U	340	U	340	U	340	U	340	U	340	U
4-Nitroaniline	840	U	840	U	840	U	840	U	840	U	840	U
4,6-Dinitro-2-methylphenol	840	U	840	U	840	U	840	U	840	U	840	U
N-Nitrosodiphenylamine (1)	330	U	340	U	340	U	340	U	340	U	340	U
4-Bromophenyl-phenylether	330	U	340	U	340	U	340	U	340	U	340	U
Hexachlorobenzene	330	U	340	U	340	U	340	U	340	U	340	U
Pentachlorophenol	840	U	840	U	840	U	840	U	62	%	69	%
Phenanthrene	330	U	340	U	340	U	340	U	340	U	340	U
Anthracene	330	U	340	U	340	U	340	U	340	U	340	U
Carbazole	330	U	340	U	340	U	340	U	340	U	340	U
Di-n-butylphthalate	330 ~~40~~ JB	U	330 ~~37~~ JB	U	330 ~~34~~ JB	U	330 ~~26~~ JB	U	19	JB	24	JB
Fluoranthene	330	U	340	U	340	U	340	U	340	U	340	U
Pyrene	330	U	340	U	340	U	340	U	88	%	94	%
Butylbenzylphthalate	330	U	340	U	340	U	340	U	340	U	340	U
3,3'-Dichlorobenzidine	330	U	340	U	340	U	340	U	340	U	340	U
Benzo(a)anthracene	330	U	340	U	340	U	340	U	340	U	340	U
Chrysene	330	U	340	U	340	U	340	U	340	U	340	U
bis(2-Ethylhexyl)phthalate	330 ~~21~~ JB	U	340	U	330 ~~130~~ JB	U	330 ~~20~~ JB	U	54	JB	38	JB
Di-n-octyl phthalate	330	U	340	U	340	U	340	U	340	U	340	U
Benzo(b)fluoranthene	330	U	340	U	340	U	340	U	340	U	340	U
Benzo(k)fluoranthene	330	U	340	U	340	U	340	U	340	U	340	U
Benzo(a)pyrene	330	U	340	U	340	U	340	U	340	U	340	U
Indeno(1,2,3-cd)pyrene	330	U	340	U	340	U	340	U	340	U	340	U
Dibenz(a,h)anthracene	330	U	340	U	340	U	340	U	340	U	340	U
Benzo(g,h,i)perylene	330	U	340	U	340	U	340	U	340	U	340	U

(1) - Cannot be separated from Diphenylamine. *= Outside of EPA CLP QC limits.

000014

Lionville Laboratory, Inc.

Semivolatiles by GC/MS, HSL List

Report Date: 05/28/03 15:18

RFW Batch Number: **0305L434** Client: **TNUHANFORD B03-024 H2216** Work Order: 11343606001 Page: 2a

	Cust ID:	J00NT8	J00NT9	SBLKUB	SBLKUB BS
Sample Information	RFW#:	005	006	03LE0624-MB1	03LE0624-MB1
	Matrix:	SOIL	SOIL	SOIL	SOIL
	D.F.:	1.00	1.00	1.00	1.00
	Units:	ug/Kg	ug/Kg	ug/Kg	ug/Kg
Surrogate Recovery	Nitrobenzene-d5	68 %	54 %	75 %	74 %
	2-Fluorobiphenyl	68 %	55 %	70 %	69 %
	Terphenyl-d14	95 %	86 %	94 %	89 %
	Phenol-d5	66 %	53 %	69 %	67 %
	2-Fluorophenol	63 %	50 %	68 %	68 %
	2,4,6-Tribromophenol	75 %	67 %	74 %	72 %
Phenol		340 U	340 U	330 U	66 %
bis(2-Chloroethyl)ether		340 U	340 U	330 U	330 U
2-Chlorophenol		340 U	340 U	330 U	66 %
1,3-Dichlorobenzene		340 U	340 U	330 U	330 U
1,4-Dichlorobenzene		340 U	340 U	330 U	68 %
1,2-Dichlorobenzene		340 U	340 U	330 U	330 U
2-Methylphenol		340 U	340 U	330 U	330 U
2,2'-oxybis(1-Chloropropane)		340 U	340 U	330 U	330 U
3- and/or 4-Methylphenol		340 U	340 U	330 U	330 U
N-Nitroso-di-n-propylamine		340 U	340 U	330 U	71 %
Hexachloroethane		340 U	340 U	330 U	330 U
Nitrobenzene		340 U	340 U	330 U	330 U
Isophorone		340 U	340 U	330 U	330 U
2-Nitrophenol		340 U	340 U	330 U	330 U
2,4-Dimethylphenol		340 U	340 U	330 U	330 U
bis(2-Chloroethoxy)methane		340 U	340 U	330 U	330 U
2,4-Dichlorophenol		340 U	340 U	330 U	330 U
1,2,4-Trichlorobenzene		340 U	340 U	330 U	68 %
Naphthalene		340 U	340 U	330 U	330 U
4-Chloroaniline		340 U	340 U	330 U	330 U
Hexachlorobutadiene		340 U	340 U	330 U	330 U
4-Chloro-3-methylphenol		340 U	340 U	330 U	72 %
2-Methylnaphthalene		340 U	340 U	330 U	330 U
Hexachlorocyclopentadiene		340 U	340 U	330 U	330 U
2,4,6-Trichlorophenol		340 U	340 U	330 U	330 U
2,4,5-Trichlorophenol		840 U	840 U	840 U	840 U

*= Outside of EPA CLP QC limits.

000045

RFW Batch Number: 0305L434 Client: TNUHANFORD B03-024 H2216 Work Order: 11343606001 Page: 2b

Cust ID:	J00NT8		J00NT9		SBLKUB		SBLKUB BS	
RFW#:	005		006		03LE0624-MB1		03LE0624-MB1	
2-Chloronaphthalene	340	U	340	U	330	U	330	U
2-Nitroaniline	840	U	840	U	840	U	840	U
Dimethylphthalate	340	U	340	U	330	U	330	U
Acenaphthylene	340	U	340	U	330	U	330	U
2,6-Dinitrotoluene	340	U	340	U	330	U	330	U
3-Nitroaniline	840	U	840	U	840	U	840	U
Acenaphthene	340	U	340	U	330	U	73	%
2,4-Dinitrophenol	840	U	840	U	840	U	840	U
4-Nitrophenol	840	U	840	U	840	U	60	%
Dibenzofuran	340	U	340	U	330	U	330	U
2,4-Dinitrotoluene	340	U	340	U	330	U	83	%
Diethylphthalate	340	U	340	U	330	U	330	U
4-Chlorophenyl-phenylether	340	U	340	U	330	U	330	U
Fluorene	340	U	340	U	330	U	330	U
4-Nitroaniline	840	U	840	U	840	U	840	U
4,6-Dinitro-2-methylphenol	840	U	840	U	840	U	840	U
N-Nitrosodiphenylamine (1)	340	U	340	U	330	U	330	U
4-Bromophenyl-phenylether	340	U	340	U	330	U	330	U
Hexachlorobenzene	340	U	340	U	330	U	330	U
Pentachlorophenol	840	U	840	U	840	U	47	%
Phenanthrene	23	J	340	U	330	U	330	U
Anthracene	340	U	340	U	330	U	330	U
Carbazole	340	U	340	U	330	U	330	U
Di-n-butylphthalate	330 ~~20~~ 4/7/05 JB	U	330 ~~27~~ 4/7/05 JB	U	31	J	330	U
Fluoranthene	74	J	340	U	330	U	330	U
Pyrene	100	J	340	U	330	U	81	%
Butylbenzylphthalate	340	U	340	U	330	U	330	U
3,3'-Dichlorobenzidine	340	U	340	U	330	U	330	U
Benzo(a)anthracene	41	J	340	U	330	U	330	U
Chrysene	44	J	340	U	330	U	330	U
bis(2-Ethylhexyl)phthalate	330 ~~25~~ 4/7/05 JB	U	330 ~~68~~ 4/7/05 JB	U	21	J	330	U
Di-n-octyl phthalate	340	U	340	U	330	U	330	U
Benzo(b)fluoranthene	46	J	340	U	330	U	330	U
Benzo(k)fluoranthene	45	J	340	U	330	U	330	U
Benzo(a)pyrene	44	J	340	U	330	U	330	U
Indeno(1,2,3-cd)pyrene	19	J	340	U	330	U	330	U
Dibenz(a,h)anthracene	340	U	340	U	330	U	330	U
Benzo(g,h,i)perylene	22	J	340	U	330	U	330	U

(1) - Cannot be separated from Diphenylamine. *= Outside of EPA CLP QC limits.

4/7/05

000036

Appendix 4

Laboratory Narrative and Chain-of-Custody Documentation

LIONVILLE LABORATORY INC.

Client: TNU-HANFORD B03-024
LVL #: 0305L434
SDG/SAF # H2216/B03-024

W.O. #: 11343-606-001-9999-00
Date Received: 05-17-2003

SEMIVOLATILE

Six (6) soil samples were collected on 05-15-2003.

The samples and their associated QC samples were extracted according to Lionville Laboratory OPs based on method 3550 on 05-23-2003 and analyzed according to criteria set forth in Lionville Laboratory OPs based on SW 846 Method 8270C for TCL Semivolatile target compounds on 05-25,27-2003.

The following is a summary of the QC results accompanying the sample results and a description of any problems encountered during their analyses:

1. All results presented in this report are derived from samples that met LvLI's sample acceptance policy.

2. Samples were extracted and analyzed within required holding time.

3. Non-target compounds were detected in the samples.

4. All surrogate recoveries were within EPA QC limits.

5. One (1) of twenty-two (22) matrix spike recoveries was outside EPA QC limits.

6. All blank spike recoveries were within EPA QC limits.

7. The method blank contained the common laboratory contaminants Di-n-butylphthalate and Bis (2-Ethylhexyl) phthalate at levels less than the CRQL.

8. Internal standard area and retention time criteria were met.

9. Manual integrations are performed according to OP 21-06A-125 to produce quality data with the utmost integrity. All manual integrations are required to be technically valid and properly documented. Appropriate technical flags are defined in the Glossary ("Technical Flags For Manual Integration").

10. 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.

J. Michael Taylor
President
Lionville Laboratory Incorporated

05-29-03
Date

som\gorup\data\bna\tnu-hanford-0305-434.doc
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 2 0 pages.

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

Bechtel Hanford Inc.	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	B03-024-03	Page 1 of 1

Collector: Renee Nielson	Company Contact: Rikki Thoren	Telephone No.: 521-8003	Project Coordinator: KESSNER, JH
Price Code: 8J	Data Turnaround: 7 Days	Air Quality ☐	
Project Designation: 118-C-4 Horizontal Rod Cave Soil Sampling - Verification	Sampling Location: 118-C-4 Rod Cave	SAF No.: B03-024	
Ice Chest No.: ERC 96 019	Field Logbook No.: EL-1516-2	COA: R118CD200C	Method of Shipment: Federal Express
Shipped To: TMA/RECRA RECRA	Offsite Property No.: A030231		Bill of Lading/Air Bill No.: SOE 08PC

POSSIBLE SAMPLE HAZARDS/REMARKS

Special Handling and/or Storage

Preservation	None	Cool 4C	None	Cool 4C	Cool 4C	Cool 4C					
Type of Container	aG	aG	aG	aG	aG	aG					
No. of Container(s)	1	1	1	1	1	1					
Volume	1000mL	60mL	60mL	250mL	60mL	120mL					
SAMPLE ANALYSIS	See item (1) in Special Instructions.	Chromium Hex - 7196	See item (2) in Special Instructions.	PCBs - 8082	VOA - 8260A (TCL)	Semi-VOA - 8270A (TCL)					
Sample No. / Matrix * / Sample Date / Sample Time											
J00P13 / SOIL / 5-15-03 / 0800		X	X	X	X	X					

CHAIN OF POSSESSION — Sign/Print Names

Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
R Nielson	5/15/03 1200	Ref #3C 3728	5/15/03 1200
Ref 3C 3728	5 16 03 1000	SJGALE	51603 1000
SJGALE	51603 1000	FED EX	
FED EX	5.17.03 1155		5.17.03 1155
~~FED EX~~	~~5.17.03~~ 5.17.03		

SPECIAL INSTRUCTIONS

(1) Gamma Spectroscopy (TCL List) {Cesium-137, Cobalt-60, Europium-152, Europium-154, Europium-155}; Americium-241; Isotopic Plutonium; Strontium-89,90 -- Total Sr; Isotopic Uranium
(2) ICP Metals - 6010A (Add-on) {Arsenic, Barium, Cadmium, Chromium, Lead, Selenium, Silver}; Mercury - 7471 - (CV)

Personnel not available to relinquish samples from the 3728 Ref # 3C on 5/16/03

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 (03/01/2002)

000019

Bechtel Hanford Inc.	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	B03-024-01	Page 1 of 1

Collector Renee Nielson	Company Contact Rikki Thoren	Telephone No. 521-8003	Project Coordinator KESSNER, JH
Project Designation 118-C-4 Horizontal Rod Cave Soil Sampling - Verification	Sampling Location 118-C-4 Rod Cave		SAF No. B03-024
Ice Chest No. ERC 96 019	Field Logbook No. EL-1516-2	COA R118CD200C	Method of Shipment Federal Express
Shipped To TMA/RECRA RERA	Offsite Property No. A030231		Bill of Lading/Air Bill No. SEE OSPC

Price Code 8J

Data Turnaround 7 Days

Air Quality ☐

POSSIBLE SAMPLE HAZARDS/REMARKS

Radioactive

Special Handling and/or Storage

Preservation	None	Cool 4C	None	Cool 4C	Cool 4C	Cool 4C				
Type of Container	P	aG	aG	aG	aG	aG				
No. of Container(s)	1	1	1	1	1	1				
Volume	1000mL	120mL	120mL	250mL	250mL	250mL				
SAMPLE ANALYSIS	See item (1) in Special Instructions.	Chromium Hex - 7196	See item (2) in Special Instructions.	PCBs - 8082	VOA - 8260A (TCL)	Semi-VOA - 8270A (TCL)				

Sample No.	Matrix *	Sample Date	Sample Time									
J00NT5	SOIL	5-15-03	0815		X	X	X	X	X			
J00NT6	SOIL	5-15-03	0830		X	X	X	X	X			
J00NT7	SOIL	5-15-03	0840		X	X	X	X	X			
J00NT8	SOIL	5-15-03	0850		X	X	X	X	X			
J00NT9	SOIL	5-15-03	0815		X	X	X	X	X			

CHAIN OF POSSESSION — Sign/Print Names

Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
R Nielson / R Nielson	5-15-03 1200	REF# 3C 3728	5/15/03 1200
REF3C 3728	51603 1000	SJGALEWski	51603 1000
SJGALEWski	51603 1000	FED EX	
Fed Ex	5.17.03 1155	D. Smith	5.17.03 1155

SPECIAL INSTRUCTIONS

(1) Gamma Spectroscopy (TCL List) {Cesium-137, Cobalt-60, Europium-152, Europium-154, Europium-155}; Americium-241; Isotopic Plutonium; Strontium-89,90 -- Total Sr; Isotopic Uranium
(2) ICP Metals - 6010A (Add-on) {Arsenic, Barium, Cadmium, Chromium, Lead, Selenium, Silver}; Mercury - 7471 - (CV)

Personnel not available to relinquish samples from the 3728 Ref # 3C on 5/16/03

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

000020

BHI-EE-011 (03/01/2002)

Appendix 5

Data Validation Supporting Documentation

GC/MS ORGANIC DATA VALIDATION CHECKLIST

VALIDATION LEVEL:	A	B	C	D	E
PROJECT: 118-C-4			DATA PACKAGE: H2216		
VALIDATOR: TLI		LAB: LLI		DATE: 6/6/00	
CASE:			SDG: H2216		
ANALYSES PERFORMED					
SW-846 8260		SW-846 8260 (TCLP)	SW-846 8270		SW-846 8270 (TCLP)
SAMPLES/MATRIX					
J00P13 J00NT5 J00NT6 J00NT7					
J00NT8 J00NT9					
					Soil

1. DATA PACKAGE COMPLETENESS AND CASE NARRATIVE

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

Comments:

2. INSTRUMENT TUNING AND CALIBRATION (Levels D and E)

GC/MS tuning/performance check acceptable? ..... Yes No N/A

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

Continuing calibrations 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:

GC/MS ORGANIC DATA VALIDATION CHECKLIST

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

Calibration blanks analyzed? (Levels D, E) ..... Yes No N/A
Calibration blank 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/trip blanks analyzed? (Levels C, D, E) ..... Yes No N/A
Field/trip blank results acceptable? (Levels C, D, E) ..... Yes No N/A
Transcription/calculation errors? (Levels D, E) ..... Yes No N/A

Comments: di-n-butylphthalate – U all detects at CRDL
bis(2-ethylhexyl)phthalate – U all detects at CRDL

di-n-butylphthalate & bis(2-ethylhexyl)phthalate in lab

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

Surrogates/system monitoring compounds analyzed? ..... Yes No N/A
Surrogate/system monitoring compound recoveries acceptable? ..... Yes No N/A
Surrogates traceable? (Levels D, E) ..... Yes No N/A
Surrogates expired? (Levels D, E) ..... Yes No N/A
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? (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: No PAS

GC/MS ORGANIC DATA VALIDATION CHECKLIST

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

MS/MSD samples analyzed? ..... Yes No N/A
MS/MSD RPD values 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: _____

6. SYSTEM PERFORMANCE (Levels D and E)

Internal standards analyzed? ..... Yes No N/A
Iinternal standard areas acceptable? ..... Yes No N/A
Internal standard retention times 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: _____

7. HOLDING TIMES (all levels)

Samples properly preserved? ..... Yes No N/A
Sample holding times acceptable? ..... Yes No N/A
Comments: _____

GC/MS ORGANIC DATA VALIDATION CHECKLIST

8. COMPOUND IDENTIFICATION, QUANTITATION, AND DETECTION LIMITS (all levels)

Compound identification acceptable? (Levels D, E) ..... Yes No N/A

Compound quantitation acceptable? (Levels D, E) ..... Yes No N/A

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

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

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

Laboratory properly identified and coded all TIC? (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: No RDL specified

9. SAMPLE CLEANUP (Levels D and E)

GPC cleanup performed? ..... Yes No N/A

GPC check performed? ..... Yes No N/A

GPC check recoveries acceptable? ..... Yes No N/A

GPC calibration performed? ..... Yes No N/A

GPC calibration check performed? ..... Yes No N/A

GPC calibration check retention times acceptable? ..... Yes No N/A

Check/calibration materials traceable? ..... Yes No N/A

Check/calibration materials Expired? ..... Yes No N/A

Analytical batch QC given similar cleanup? ..... Yes No N/A

Transcription/Calculation Errors? ..... Yes No N/A

Comments: