SAF-RC-189
100N Field Remediation –
Soil Full Protocol
FINAL VALIDATION PACKAGE

COMPLETE COPY OF FINAL VALIDATION PACKAGE TO:

Kathy Wendt H4-21

COMMENTS:

SDG K3969 SAF-RC-189

Sample Location: UPR-100-N-6

Date: 20 September 2012
To: Washington Closure Hanford Inc. (technical representative)
From: ELR Consulting
Project: 100N Field Remediation – Soil Full Protocol - Waste Site UPR-100-N-6
Subject: Radiochemistry - Data Package No. K3969-EB

INTRODUCTION

This memo presents the results of data validation on Data Package No. K3969 prepared by Eberline Services (EB). A list of samples validated along with the analyses reported and the method of analysis is provided in the following table.

Sample ID	Sample Date	Media	Validation	Analyte
J1PWW1	8/7/12	Soil	C	See note 1
J1PWW2	8/7/12	Soil	C	See note 1
J1PWW3	8/7/12	Soil	C	See note 1
J1PWW4	8/7/12	Soil	C	See note 1
J1PWW5	8/7/12	Soil	C	See note 1
J1PWW6	8/7/12	Soil	C	See note 1
J1PWW7	8/7/12	Soil	C	See note 1
J1PWW8	8/7/12	Soil	C	See note 1
J1PWW9	8/7/12	Soil	C	See note 1
J1PWX0	8/7/12	Soil	C	See note 1
J1PWX1	8/7/12	Soil	C	See note 1
J1PWX2	8/7/12	Soil	C	See note 1
J1PWX3	8/7/12	Soil	C	See note 1

1 – Tritium, nickel-63, carbon-14, total strontium, alpha spectroscopy and gamma spectroscopy.

Data validation was conducted in accordance with the Washington Closure Hanford (WCH) validation statement of work and the 100-N Area Sampling and Analysis Plan for CERCLA Waste Sites (DOE/RL-2005-92, Rev. 0, October 2006). Appendices 1 through 6 provide the following information as indicated below:

Appendix 1. Glossary of Data Reporting Qualifiers
Appendix 2. Summary of Data Qualification
Appendix 3. 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 laboratory blank results were acceptable.

Field (Equipment) Blank

No equipment blanks were submitted for analysis.

· Accuracy

Accuracy is evaluated from laboratory control sample (LCS) or blank spike sample (BSS) batch samples and spiked samples from the analytical batch. Measured activities are compared to the known added amounts. The acceptable LCS or BSS and matrix spike (MS) recovery range is 70-130%. In addition, samples may be spiked with a radiochemical tracer to assist in isolating the radioisotope of interest with the yield of the tracer being used in calculating sample activity. The acceptable range for tracer recovery is 20% to 105%. Spike sample results outside the above ranges result in associated sample results being qualified as estimates, or not qualified, depending on the activity of the individual sample. Results are rejected for LCS/BSS recoveries of less than 30% and tracer recoveries of less than 20%, and tracer recoveries of greater than 115% for detected results.

Due to the lack of an LCS analysis, all uranium-235 (aspec), throium-228 (aspec) and thorium-232 (aspec) results were qualified as estimates and flagged "J".

Due to the lack of a matrix spike analysis, all tritium and carbon-14 results were qualified as estimates and flagged "J".

All other 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 Duplicates

One set of field duplicates (J1PWW4/J1PWX3) were submitted for analysis. Field duplicates are compared using the same criteria s for laboratory duplicates. The RPD for cesium-137 (56%) was outside QC limits. Under the WCH statement of work, no qualification is required. All other field duplicate results were acceptable.

- **Detection Levels**

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

- **Completeness**

Data package No. K3969 was submitted for validation and verified for completeness. Completeness is based on the percentage of data determined to be valid (i.e., not rejected). The completion percentage was 100%.

MAJOR DEFICIENCIES

None found.

MINOR DEFICIENCIES

The following minor deficiencies were noted:

- Due to the lack of an LCS analysis, all uranium-235 (aspec), throium-228 (aspec) and thorium-232 (aspec) results were qualified as estimates and flagged "J".

- Due to the lack of a matrix spike analysis, all tritium and carbon-14 results were qualified as estimates and flagged "J".

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

Seven analytes exceeded the RQL. Under the WCH statement of work, no qualification is required.

REFERENCES

Washington Closure Hanford Contract #S00W307A00 (March 2008), *Data Validation Services*.

DOE/RL-2005-92, Rev. 0, 100-N *Area Sampling and Analysis Plan for CERCLA Waste Sites*, U.S. Department of Energy, October 2006.

Appendix 1

Glossary of Data Reporting Qualifiers

Qualifiers which may be applied by data validators in compliance with the WCH statement of work are as follows:

U - Indicates the compound or analyte was analyzed for and not detected above the minimum detectable activity (MDA) in the sample. The value reported is the sample result corrected for sample dilution and moisture content by the laboratory. The data is usable for decision making purposes.

UJ - Indicates the compound or analyte was analyzed for and not detected at concentrations above the minimum detectable activity (MDA) in the sample. Due to a minor QC deficiency identified during the data validation, the associated quantitation limit is an estimate, but is usable for decision making purposes.

J - Indicates the compound or analyte was analyzed for and detected. Due to a minor QC deficiency identified during the data validation, the associated concentration is an estimate, but the data are usable for decision-making purposes.

R - Indicates the compound or analyte was analyzed for, detected, and due to an identified major QC deficiency, the data are unusable.

UR - Indicates the compound or analyte was analyzed for and not detected in the sample. Additionally, the data is unusable due to an identified major QC deficiency.

Appendix 2

Summary of Data Qualification

RADIOCHEMISTRY DATA QUALIFICATION SUMMARY*

SDG: K3969	**REVIEWER: ELR**	**Project: UPR-100-N-6**	**PAGE 1 OF 1**
COMPOUND	QUALIFIER	SAMPLES AFFECTED	REASON
Uranium-235 (aspec) Thorium-228 (aspec) Thorium-232 (aspec)	J	All	No LCS analysis
Tritium Carbon-14	J	All	No MS analysis

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

Appendix 3

Annotated Laboratory Reports

EBERLINE ANALYTICAL - RICHMOND

SAMPLE DELIVERY GROUP K3969

7750-001

J1PWW1

DATA SHEET

SDG 7750 | Client/Case no Hanford | SDG K3969

Contact Joseph Verville | Contract No. S00W235A01

Lab sample id S208025-01 | Client sample id J1PWW1

Dept sample id 7750-001 | Location/Matrix UPR-100-N-6 Verif.Sample SOIL

Received 08/10/12 | Collected/Weight 08/07/12 11:15 1024 g

% solids 99.4 | Custody/SAF No RC-189-088 RC-189

9/19/12

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALIFIERS	TEST
Tritium	10028-17-8	-0.493	2.0	3.55	10.0	U J	H
Carbon 14	14762-75-5	0.786	0.54	0.881	1.00	U J	C
Nickel 63	13981-37-8	0.309	2.0	3.41	30.0	U	NI_L
Total Strontium	SR-RAD	0.110	0.11	0.195	1.00	U	SR
Thorium 228	14274-82-9	0.865	0.18	0.113	1.00	J	TH
Thorium 230	14269-63-7	0.589	0.30	0.284	1.00		TH
Thorium 232	TH-232	0.691	0.14	0.060	1.00	J	TH
Uranium 233/234	U-233/234	0.522	0.27	0.250	1.00		U
Uranium 235	15117-96-1	0.040	0.079	0.302	1.00	U J	U
Uranium 238	U-238	0.457	0.26	0.250	1.00		U
Plutonium 238	13981-16-3	0	0.060	0.230	1.00	U	PU
Plutonium 239/240	PU-239/240	0.030	0.060	0.230	1.00	U	PU
Potassium 40	13966-00-2	14.4	0.57	0.260			GAM
Cobalt 60	10198-40-0	0.062	0.023	0.024	0.050		GAM
Cesium 137	10045-97-3	0.402	0.037	0.030	0.100		GAM
Radium 226	13982-63-3	0.567	0.056	0.051	0.100		GAM
Radium 228	15262-20-1	0.812	0.12	0.109	0.200		GAM
Europium 152	14683-23-9	U		0.072	0.100	U	GAM
Europium 154	15585-10-1	U		0.088	0.100	U	GAM
Europium 155	14391-16-3	U		0.083	0.100	U	GAM
Thorium 228	14274-82-9	0.788	0.038	0.035			GAM
Thorium 232	TH-232	0.812	0.12	0.109			GAM
Uranium 235	15117-96-1	U		0.164	0.300	U	GAM
Uranium 238	U-238	U		2.72	10.0	U	GAM
Americium 241	14596-10-2	U		0.161	0.300	U	GAM

Lab id EBRLNE

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Version 3.06

Report date 08/22/12

EBERLINE ANALYTICAL - RICHMOND

SAMPLE DELIVERY GROUP K3969

J1PWW2

7750-002

DATA SHEET

SDG 7750 | Client/Case no Hanford | SDG K3969

Contact Joseph Verville | Contract No. S00W235A01

Lab sample id S208025-02 | Client sample id J1PWW2

Dept sample id 7750-002 | Location/Matrix UPR-100-N-6 Verif.Sample SOIL

Received 08/10/12 | Collected/Weight 08/07/12 10:05 1000 g

% solids 95.4 | Custody/SAF No RC-189-088 RC-189

R 9/19/12

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALIFIERS	TEST
Tritium	10028-17-8	-2.06	1.9	3.43	10.0	UJ	H
Carbon 14	14762-75-5	0.865	0.48	0.780	1.00	J	C
Nickel 63	13981-37-8	3.43	2.2	3.58	30.0	U	NI_L
Total Strontium	SR-RAD	0.130	0.15	0.272	1.00	U	SR
Thorium 228	14274-82-9	0.874	0.37	0.279	1.00	J	TH
Thorium 230	14269-63-7	0.291	0.36	0.670	1.00	U	TH
Thorium 232	TH-232	0.727	0.30	0.278	1.00	J	TH
Uranium 233/234	U-233/234	0.627	0.27	0.200	1.00		U
Uranium 235	15117-96-1	0.063	0.063	0.242	1.00	UJ	U
Uranium 238	U-238	0.888	0.32	0.200	1.00		U
Plutonium 238	13981-16-3	0.042	0.17	0.324	1.00	U	PU
Plutonium 239/240	PU-239/240	0.550	0.34	0.323	1.00		PU
Potassium 40	13966-00-2	13.8	0.61	0.213			GAM
Cobalt 60	10198-40-0	0.086	0.030	0.030	0.050		GAM
Cesium 137	10045-97-3	0.355	0.033	0.030	0.100		GAM
Radium 226	13982-63-3	0.444	0.050	0.049	0.100		GAM
Radium 228	15262-20-1	0.742	0.11	0.112	0.200		GAM
Europium 152	14683-23-9	U		0.073	0.100	U	GAM
Europium 154	15585-10-1	U		0.084	0.100	U	GAM
Europium 155	14391-16-3	U		0.092	0.100	U	GAM
Thorium 228	14274-82-9	0.693	0.040	0.036			GAM
Thorium 232	TH-232	0.742	0.11	0.112			GAM
Uranium 235	15117-96-1	U		0.182	0.300	U	GAM
Uranium 238	U-238	U		3.44	10.0	U	GAM
Americium 241	14596-10-2	U		0.116	0.300	U	GAM

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EBERLINE ANALYTICAL - RICHMOND

SAMPLE DELIVERY GROUP K3969

J1PWW3

7750-003

DATA SHEET

SDG 7750 | Client/Case no Hanford | SDG K3969

Contact Joseph Verville | Contract No. S00W235A01

Lab sample id S208025-03 | Client sample id J1PWW3

Dept sample id 7750-003 | Location/Matrix UPR-100-N-6 Verif.Sample SOIL

Received 08/10/12 | Collected/Weight 08/07/12 11:05 867 g

% solids 97.5 | Custody/SAF No RC-189-088 RC-189

9/19/12

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI-FIERS	TEST
Tritium	10028-17-8	-1.44	2.2	3.89	10.0	UJ	H
Carbon 14	14762-75-5	0.953	0.52	0.848	1.00	J	C
Nickel 63	13981-37-8	5.38	2.2	3.32	30.0		NI_L
Total Strontium	SR-RAD	0.119	0.14	0.262	1.00	U	SR
Thorium 228	14274-82-9	1.19	0.38	0.234	1.00	J	TH
Thorium 230	14269-63-7	0.701	0.43	0.602	1.00		TH
Thorium 232	TH-232	1.31	0.44	0.233	1.00	J	TH
Uranium 233/234	U-233/234	1.30	0.39	0.237	1.00		U
Uranium 235	15117-96-1	0.112	0.15	0.286	1.00	U J	U
Uranium 238	U-238	1.82	0.52	0.237	1.00		U
Plutonium 238	13981-16-3	-0.038	0.076	0.292	1.00	U	PU
Plutonium 239/240	PU-239/240	0	0.076	0.292	1.00	U	PU
Potassium 40	13966-00-2	18.1	0.92	0.500			GAM
Cobalt 60	10198-40-0	0.051	0.050	0.049	0.050		GAM
Cesium 137	10045-97-3	0.689	0.055	0.046	0.100		GAM
Radium 226	13982-63-3	0.687	0.079	0.076	0.100		GAM
Radium 228	15262-20-1	1.07	0.14	0.130	0.200		GAM
Europium 152	14683-23-9	U		0.105	0.100	U	GAM
Europium 154	15585-10-1	U		0.140	0.100	U	GAM
Europium 155	14391-16-3	U		0.091	0.100	U	GAM
Thorium 228	14274-82-9	1.24	0.065	0.058			GAM
Thorium 232	TH-232	1.07	0.14	0.130			GAM
Uranium 235	15117-96-1	U		0.490	0.300	U	GAM
Uranium 238	U-238	U		4.86	10.0	U	GAM
Americium 241	14596-10-2	U		0.037	0.300	U	GAM

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EBERLINE ANALYTICAL - RICHMOND

SAMPLE DELIVERY GROUP K3969

J1PWW4

7750-004

DATA SHEET

SDG 7750 | Client/Case no Hanford | SDG K3969

Contact Joseph Verville | Contract No. S00W235A01

Lab sample id S208025-04 | Client sample id J1PWW4

Dept sample id 7750-004 | Location/Matrix UPR-100-N-6 Verif.Sample SOIL

Received 08/10/12 | Collected/Weight 08/07/12 10:15 981 g

% solids 97.9 | Custody/SAF No RC-189-088 RC-189

9/19/12

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALIFIERS	TEST
Tritium	10028-17-8	-0.174	2.2	3.77	10.0	U J	H
Carbon 14	14762-75-5	0.811	0.52	0.850	1.00	U J	C
Nickel 63	13981-37-8	1.75	2.0	3.30	30.0	U	NI_L
Total Strontium	SR-RAD	0.049	0.096	0.186	1.00	U	SR
Thorium 228	14274-82-9	0.823	0.42	0.315	1.00	J	TH
Thorium 230	14269-63-7	0.370	0.41	0.696	1.00	U	TH
Thorium 232	TH-232	0.657	0.33	0.314	1.00	J	TH
Uranium 233/234	U-233/234	0.939	0.35	0.218	1.00		U
Uranium 235	15117-96-1	0.034	0.069	0.264	1.00	U J	U
Uranium 238	U-238	0.427	0.23	0.218	1.00		U
Plutonium 238	13981-16-3	0	0.062	0.239	1.00	U	PU
Plutonium 239/240	PU-239/240	0	0.062	0.239	1.00	U	PU
Potassium 40	13966-00-2	11.8	0.59	0.240			GAM
Cobalt 60	10198-40-0	0.061	0.028	0.028	0.050		GAM
Cesium 137	10045-97-3	0.799	0.047	0.036	0.100		GAM
Radium 226	13982-63-3	0.437	0.063	0.059	0.100		GAM
Radium 228	15262-20-1	0.724	0.13	0.124	0.200		GAM
Europium 152	14683-23-9	U		0.064	0.100	U	GAM
Europium 154	15585-10-1	U		0.097	0.100	U	GAM
Europium 155	14391-16-3	U		0.086	0.100	U	GAM
Thorium 228	14274-82-9	0.658	0.038	0.037			GAM
Thorium 232	TH-232	0.724	0.13	0.124			GAM
Uranium 235	15117-96-1	U		0.169	0.300	U	GAM
Uranium 238	U-238	U		3.58	10.0	U	GAM
Americium 241	14596-10-2	U		0.109	0.300	U	GAM

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EBERLINE ANALYTICAL - RICHMOND

SAMPLE DELIVERY GROUP K3969

J1PWW5

7750-005

DATA SHEET

SDG 7750 | Client/Case no Hanford | SDG K3969

Contact Joseph Verville | Contract No. S00W235A01

Lab sample id S208025-05 | Client sample id J1PWW5

Dept sample id 7750-005 | Location/Matrix UPR-100-N-6 Verif.Sample SOIL

Received 08/10/12 | Collected/Weight 08/07/12 10:12 986 g

% solids 97.6 | Custody/SAF No RC-189-088 RC-189

9/19/12

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALIFIERS	TEST
Tritium	10028-17-8	-0.819	2.2	3.79	10.0	UJ	H
Carbon 14	14762-75-5	1.03	0.53	0.850	1.00	J	C
Nickel 63	13981-37-8	-0.482	1.8	3.11	30.0	U	NI_L
Total Strontium	SR-RAD	0.057	0.13	0.246	1.00	U	SR
Thorium 228	14274-82-9	0.632	0.14	0.105	1.00	J	TH
Thorium 230	14269-63-7	0.748	0.29	0.260	1.00		TH
Thorium 232	TH-232	0.844	0.15	0.066	1.00	J	TH
Uranium 233/234	U-233/234	0.424	0.23	0.216	1.00		U
Uranium 235	15117-96-1	0	0.068	0.262	1.00	UJ	U
Uranium 238	U-238	0.538	0.23	0.216	1.00		U
Plutonium 238	13981-16-3	-0.032	0.064	0.245	1.00	U	PU
Plutonium 239/240	PU-239/240	0	0.064	0.245	1.00	U	PU
Potassium 40	13966-00-2	12.2	0.98	0.543			GAM
Cobalt 60	10198-40-0	U		0.064	0.050	U	GAM
Cesium 137	10045-97-3	0.448	0.060	0.054	0.100		GAM
Radium 226	13982-63-3	0.419	0.092	0.089	0.100		GAM
Radium 228	15262-20-1	0.936	0.25	0.223	0.200		GAM
Europium 152	14683-23-9	U		0.134	0.100	U	GAM
Europium 154	15585-10-1	U		0.186	0.100	U	GAM
Europium 155	14391-16-3	U		0.162	0.100	U	GAM
Thorium 228	14274-82-9	0.883	0.11	0.101			GAM
Thorium 232	TH-232	0.936	0.25	0.223			GAM
Uranium 235	15117-96-1	U		0.317	0.300	U	GAM
Uranium 238	U-238	U		6.65	10.0	U	GAM
Americium 241	14596-10-2	U		0.425	0.300	U	GAM

Lab id EBRLNE

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EBERLINE ANALYTICAL - RICHMOND

SAMPLE DELIVERY GROUP K3969

J1PWW6

7750-006

DATA SHEET

SDG 7750 | Client/Case no Hanford | SDG K3969

Contact Joseph Verville | Contract No. S00W235A01

Lab sample id S208025-06 | Client sample id J1PWW6

Dept sample id 7750-006 | Location/Matrix UPR-100-N-6 Verif.Sample SOIL

Received 08/10/12 | Collected/Weight 08/07/12 10:57 996 g

% solids 98.4 | Custody/SAF No RC-189-088 RC-189

9/14/12

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALIFIERS	TEST
Tritium	10028-17-8	-0.728	2.1	3.64	10.0	U J	H
Carbon 14	14762-75-5	1.06	0.50	0.808	1.00	J	C
Nickel 63	13981-37-8	4.91	2.0	3.01	30.0		NI_L
Total Strontium	SR-RAD	-0.021	0.15	0.296	1.00	U	SR
Thorium 228	14274-82-9	0.960	0.18	0.097	1.00	J	TH
Thorium 230	14269-63-7	0.937	0.31	0.270	1.00		TH
Thorium 232	TH-232	0.814	0.16	0.070	1.00	J	TH
Uranium 233/234	U-233/234	2.44	0.64	0.252	1.00		U
Uranium 235	15117-96-1	0.080	0.080	0.306	1.00	U J	U
Uranium 238	U-238	3.93	0.82	0.252	1.00		U
Plutonium 238	13981-16-3	0	0.053	0.203	1.00	U	PU
Plutonium 239/240	PU-239/240	0.027	0.053	0.203	1.00	U	PU
Potassium 40	13966-00-2	14.8	0.66	0.206			GAM
Cobalt 60	10198-40-0	0.052	0.027	0.030	0.050		GAM
Cesium 137	10045-97-3	0.208	0.029	0.031	0.100		GAM
Radium 226	13982-63-3	0.500	0.054	0.051	0.100		GAM
Radium 228	15262-20-1	0.870	0.13	0.116	0.200		GAM
Europium 152	14683-23-9	U		0.076	0.100	U	GAM
Europium 154	15585-10-1	U		0.091	0.100	U	GAM
Europium 155	14391-16-3	U		0.088	0.100	U	GAM
Thorium 228	14274-82-9	0.799	0.041	0.033			GAM
Thorium 232	TH-232	0.870	0.13	0.116			GAM
Uranium 235	15117-96-1	U		0.162	0.300	U	GAM
Uranium 238	U-238	U		3.38	10.0	U	GAM
Americium 241	14596-10-2	U		0.048	0.300	U	GAM

Lab id EBRLNE

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EBERLINE ANALYTICAL-RICHMOND

SAMPLE DELIVERY GROUP K3969

7750-007

J1PWW7

DATA SHEET

SDG 7750 | Client/Case no Hanford | SDG K3969
Contact Joseph Verville | Contract No. S00W235A01

Lab sample id S208025-07 | Client sample id J1PWW7
Dept sample id 7750-007 | Location/Matrix UPR-100-N-6 Verif.Sample SOIL
Received 08/10/12 | Collected/Weight 08/07/12 10:52 1021 g
% solids 98.1 | Custody/SAF No RC-189-088 RC-189

9/19/12

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALIFIERS	TEST
Tritium	10028-17-8	-1.41	2.1	3.82	10.0	UJ	H
Carbon 14	14762-75-5	0.846	0.53	0.862	1.00	UJ	C
Nickel 63	13981-37-8	0	1.8	3.15	30.0	U	NI_L
Total Strontium	SR-RAD	-0.009	0.14	0.288	1.00	U	SR
Thorium 228	14274-82-9	1.00	0.18	0.107	1.00	J	TH
Thorium 230	14269-63-7	0.612	0.29	0.263	1.00		TH
Thorium 232	TH-232	0.967	0.17	0.053	1.00	J	TH
Uranium 233/234	U-233/234	0.511	0.32	0.300	1.00		U
Uranium 235	15117-96-1	0	0.095	0.364	1.00	UJ	U
Uranium 238	U-238	0.825	0.40	0.300	1.00		U
Plutonium 238	13981-16-3	-0.028	0.057	0.217	1.00	U	PU
Plutonium 239/240	PU-239/240	0	0.057	0.217	1.00	U	PU
Potassium 40	13966-00-2	11.3	0.47	0.280			GAM
Cobalt 60	10198-40-0	U		0.024	0.050	U	GAM
Cesium 137	10045-97-3	0.076	0.022	0.025	0.100		GAM
Radium 226	13982-63-3	0.401	0.046	0.044	0.100		GAM
Radium 228	15262-20-1	0.689	0.12	0.104	0.200		GAM
Europium 152	14683-23-9	U		0.056	0.100	U	GAM
Europium 154	15585-10-1	U		0.073	0.100	U	GAM
Europium 155	14391-16-3	U		0.047	0.100	U	GAM
Thorium 228	14274-82-9	0.696	0.038	0.031			GAM
Thorium 232	TH-232	0.689	0.12	0.104			GAM
Uranium 235	15117-96-1	U		0.195	0.300	U	GAM
Uranium 238	U-238	U		2.50	10.0	U	GAM
Americium 241	14596-10-2	U		0.025	0.300	U	GAM

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EBERLINE ANALYTICAL - RICHMOND

SAMPLE DELIVERY GROUP K3969

J1PWW8

7750-008

DATA SHEET

SDG 7750 | Client/Case no Hanford | SDG K3969

Contact Joseph Verville | Contract No. S00W235A01

Lab sample id S208025-08 | Client sample id J1PWW8

Dept sample id 7750-008 | Location/Matrix UPR-100-N-6 Verif.Sample SOIL

Received 08/10/12 | Collected/Weight 08/07/12 10:45 1100 g

% solids 99.1 | Custody/SAF No RC-189-088 RC-189

Ra 226/228

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALIFIERS	TEST
Tritium	10028-17-8	-2.00	2.0	3.60	10.0	U J	H
Carbon 14	14762-75-5	1.27	0.49	0.792	1.00	J	C
Nickel 63	13981-37-8	0.208	1.9	3.22	30.0	U	NI_L
Total Strontium	SR-RAD	0.096	0.12	0.233	1.00	U	SR
Thorium 228	14274-82-9	0.733	0.17	0.091	1.00	J	TH
Thorium 230	14269-63-7	0.527	0.30	0.293	1.00		TH
Thorium 232	TH-232	0.675	0.15	0.079	1.00	J	TH
Uranium 233/234	U-233/234	0.433	0.25	0.237	1.00		U
Uranium 235	15117-96-1	0	0.075	0.286	1.00	U J	U
Uranium 238	U-238	0.711	0.32	0.237	1.00		U
Plutonium 238	13981-16-3	0.024	0.094	0.180	1.00	U	PU
Plutonium 239/240	PU-239/240	0.071	0.094	0.180	1.00	U	PU
Potassium 40	13966-00-2	14.8	0.20	0.085			GAM
Cobalt 60	10198-40-0	0.108	0.011	0.011	0.050		GAM
Cesium 137	10045-97-3	0.487	0.013	0.011	0.100		GAM
Radium 226	13982-63-3	0.510	0.019	0.017	0.100		GAM
Radium 228	15262-20-1	0.754	0.040	0.038	0.200		GAM
Europium 152	14683-23-9	U		0.023	0.100	U	GAM
Europium 154	15585-10-1	U		0.028	0.100	U	GAM
Europium 155	14391-16-3	U		0.048	0.100	U	GAM
Thorium 228	14274-82-9	0.754	0.013	0.012			GAM
Thorium 232	TH-232	0.754	0.040	0.038			GAM
Uranium 235	15117-96-1	U		0.088	0.300	U	GAM
Uranium 238	U-238	U		1.00	10.0	U	GAM
Americium 241	14596-10-2	U		0.053	0.300	U	GAM

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EBERLINE ANALYTICAL - RICHMOND

SAMPLE DELIVERY GROUP K3969

J1PWW9

7750-009

DATA SHEET

SDG 7750
Contact Joseph Verville

Client/Case no Hanford SDG K3969
Contract No. S00W235A01

Lab sample id S208025-09
Dept sample id 7750-009
Received 08/10/12
% solids 99.3

Client sample id J1PWW9
Location/Matrix UPR-100-N-6 Verif.Sample SOIL
Collected/Weight 08/07/12 10:40 951 g
Custody/SAF No RC-189-088 RC-189

9/19/12

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALIFIERS	TEST
Tritium	10028-17-8	-1.53	2.1	3.68	10.0	UJ	H
Carbon 14	14762-75-5	1.00	0.49	0.788	1.00	J	C
Nickel 63	13981-37-8	1.53	1.9	3.20	30.0	U	NI_L
Total Strontium	SR-RAD	0.137	0.11	0.195	1.00	U	SR
Thorium 228	14274-82-9	0.869	0.38	0.297	1.00	J	TH
Thorium 230	14269-63-7	0.496	0.44	0.592	1.00	U	TH
Thorium 232	TH-232	0.867	0.32	0.237	1.00	J	TH
Uranium 233/234	U-233/234	0.534	0.26	0.194	1.00		U
Uranium 235	15117-96-1	0.092	0.12	0.235	1.00	UJ	U
Uranium 238	U-238	0.915	0.31	0.194	1.00		U
Plutonium 238	13981-16-3	0	0.048	0.183	1.00	U	PU
Plutonium 239/240	PU-239/240	0.024	0.048	0.183	1.00	U	PU
Potassium 40	13966-00-2	15.6	0.21	0.079			GAM
Cobalt 60	10198-40-0	0.064	0.010	0.011	0.050		GAM
Cesium 137	10045-97-3	0.430	0.010	0.007	0.100		GAM
Radium 226	13982-63-3	0.584	0.019	0.017	0.100		GAM
Radium 228	15262-20-1	0.896	0.037	0.033	0.200		GAM
Europium 152	14683-23-9	U		0.023	0.100	U	GAM
Europium 154	15585-10-1	U		0.027	0.100	U	GAM
Europium 155	14391-16-3	U		0.039	0.100	U	GAM
Thorium 228	14274-82-9	0.877	0.014	0.012			GAM
Thorium 232	TH-232	0.896	0.037	0.033			GAM
Uranium 235	15117-96-1	U		0.093	0.300	U	GAM
Uranium 238	U-238	U		1.01	10.0	U	GAM
Americium 241	14596-10-2	U		0.040	0.300	U	GAM

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EBERLINE ANALYTICAL - RICHMOND

SAMPLE DELIVERY GROUP K3969

7750-010 J1PWX0

DATA SHEET

SDG 7750 Client/Case no Hanford SDG K3969
Contact Joseph Verville Contract No. S00W235A01

Lab sample id S208025-10 Client sample id J1PWX0
Dept sample id 7750-010 Location/Matrix UPR-100-N-6 Verif.Sample SOIL
Received 08/10/12 Collected/Weight 08/07/12 10:35 858 g
% solids 98.5 Custody/SAF No RC-189-088 RC-189

V 9/12/12

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALIFIERS	TEST
Tritium	10028-17-8	0.672	2.1	3.63	10.0	UJ	H
Carbon 14	14762-75-5	0.804	0.50	0.807	1.00	UJ	C
Nickel 63	13981-37-8	1.00	1.9	3.09	30.0	U	NI_L
Total Strontium	SR-RAD	0.082	0.15	0.279	1.00	U	SR
Thorium 228	14274-82-9	0.808	0.37	0.343	1.00	J	TH
Thorium 230	14269-63-7	0.851	0.54	0.759	1.00	J	TH
Thorium 232	TH-232	1.03	0.46	0.343	1.00	J	TH
Uranium 233/234	U-233/234	0.447	0.24	0.228	1.00		U
Uranium 235	15117-96-1	0.108	0.14	0.276	1.00	UJ	U
Uranium 238	U-238	0.596	0.24	0.228	1.00		U
Plutonium 238	13981-16-3	0	0.046	0.176	1.00	U	PU
Plutonium 239/240	PU-239/240	0.597	0.23	0.176	1.00		PU
Potassium 40	13966-00-2	12.8	0.34	0.166			GAM
Cobalt 60	10198-40-0	U		0.056	0.050	U	GAM
Cesium 137	10045-97-3	0.107	0.019	0.020	0.100		GAM
Radium 226	13982-63-3	0.563	0.034	0.032	0.100		GAM
Radium 228	15262-20-1	0.861	0.088	0.077	0.200		GAM
Europium 152	14683-23-9	U		0.045	0.100	U	GAM
Europium 154	15585-10-1	U		0.060	0.100	U	GAM
Europium 155	14391-16-3	U		0.055	0.100	U	GAM
Thorium 228	14274-82-9	1.03	0.038	0.035			GAM
Thorium 232	TH-232	0.861	0.088	0.077			GAM
Uranium 235	15117-96-1	U		0.109	0.300	U	GAM
Uranium 238	U-238	U		2.12	10.0	U	GAM
Americium 241	14596-10-2	U		0.148	0.300	U	GAM

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EBERLINE ANALYTICAL-RICHMOND

SAMPLE DELIVERY GROUP K3969

7750-011

J1PWX1

DATA SHEET

SDG 7750 | Client/Case no Hanford | SDG K3969
Contact Joseph Verville | Contract No. S00W235A01

Lab sample id S208025-11 | Client sample id J1PWX1
Dept sample id 7750-011 | Location/Matrix UPR-100-N-6 Verif.Sample SOIL
Received 08/10/12 | Collected/Weight 08/07/12 10:30 1032 g
% solids 98.2 | Custody/SAF No RC-189-088 RC-189

9/19/12

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALIFIERS	TEST
Tritium	10028-17-8	-1.49	2.1	3.72	10.0	U J	H
Carbon 14	14762-75-5	1.18	0.51	0.820	1.00	J	C
Nickel 63	13981-37-8	0.188	1.7	2.91	30.0	U	NI_L
Total Strontium	SR-RAD	-0.018	0.15	0.299	1.00	U	SR
Thorium 228	14274-82-9	0.587	0.34	0.321	1.00	J	TH
Thorium 230	14269-63-7	0.418	0.42	0.709	1.00	U	TH
Thorium 232	TH-232	0.837	0.34	0.320	1.00	J	TH
Uranium 233/234	U-233/234	0.608	0.28	0.259	1.00		U
Uranium 235	15117-96-1	0.041	0.082	0.313	1.00	U J	U
Uranium 238	U-238	0.642	0.28	0.259	1.00		U
Plutonium 238	13981-16-3	-0.029	0.058	0.220	1.00	U	PU
Plutonium 239/240	PU-239/240	0.086	0.12	0.220	1.00	U	PU
Potassium 40	13966-00-2	13.8	0.22	0.085			GAM
Cobalt 60	10198-40-0	0.062	0.010	0.010	0.050		GAM
Cesium 137	10045-97-3	0.212	0.008	0.007	0.100		GAM
Radium 226	13982-63-3	0.478	0.020	0.018	0.100		GAM
Radium 228	15262-20-1	0.757	0.038	0.036	0.200		GAM
Europium 152	14683-23-9	U		0.024	0.100	U	GAM
Europium 154	15585-10-1	U		0.028	0.100	U	GAM
Europium 155	14391-16-3	U		0.039	0.100	U	GAM
Thorium 228	14274-82-9	0.731	0.014	0.011			GAM
Thorium 232	TH-232	0.757	0.038	0.036			GAM
Uranium 235	15117-96-1	U		0.109	0.300	U	GAM
Uranium 238	U-238	U		1.26	10.0	U	GAM
Americium 241	14596-10-2	U		0.016	0.300	U	GAM

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EBERLINE ANALYTICAL - RICHMOND

SAMPLE DELIVERY GROUP K3969

7750-012 J1PWX2

DATA SHEET

SDG 7750 Client/Case no Hanford SDG K3969
Contact Joseph Verville Contract No. S00W235A01

Lab sample id S208025-12 Client sample id J1PWX2
Dept sample id 7750-012 Location/Matrix UPR-100-N-6 Verif.Sample SOIL
Received 08/10/12 Collected/Weight 08/07/12 10:25 1063 g
% solids 99.2 Custody/SAF No RC-189-088 RC-189

9/19/12

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALIFIERS	TEST
Tritium	10028-17-8	-1.67	2.1	3.74	10.0	U J	H
Carbon 14	14762-75-5	1.15	0.51	0.823	1.00	J	C
Nickel 63	13981-37-8	2.21	2.1	3.35	30.0	U	NI_L
Total Strontium	SR-RAD	0.994	0.21	0.237	1.00		SR
Thorium 228	14274-82-9	0.521	0.26	0.249	1.00	J	TH
Thorium 230	14269-63-7	0.162	0.39	0.621	1.00	U	TH
Thorium 232	TH-232	0.618	0.26	0.249	1.00	J	TH
Uranium 233/234	U-233/234	0.506	0.23	0.215	1.00		U
Uranium 235	15117-96-1	0.034	0.068	0.260	1.00	U J	U
Uranium 238	U-238	0.562	0.23	0.215	1.00		U
Plutonium 238	13981-16-3	0.022	0.044	0.170	1.00	U	PU
Plutonium 239/240	PU-239/240	0.311	0.18	0.170	1.00		PU
Potassium 40	13966-00-2	12.9	0.43	0.128			GAM
Cobalt 60	10198-40-0	0.052	0.022	0.023	0.050		GAM
Cesium 137	10045-97-3	0.406	0.022	0.017	0.100		GAM
Radium 226	13982-63-3	0.470	0.040	0.037	0.100		GAM
Radium 228	15262-20-1	0.739	0.082	0.075	0.200		GAM
Europium 152	14683-23-9	U		0.051	0.100	U	GAM
Europium 154	15585-10-1	U		0.061	0.100	U	GAM
Europium 155	14391-16-3	U		0.078	0.100	U	GAM
Thorium 228	14274-82-9	0.710	0.032	0.030			GAM
Thorium 232	TH-232	0.739	0.082	0.075			GAM
Uranium 235	15117-96-1	U		0.132	0.300	U	GAM
Uranium 238	U-238	U		2.19	10.0	U	GAM
Americium 241	14596-10-2	U		0.084	0.300	U	GAM

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EBERLINE ANALYTICAL - RICHMOND

SAMPLE DELIVERY GROUP K3969

J1PWX3

7750-013

DATA SHEET

SDG 7750 | Client/Case no Hanford | SDG K3969

Contact Joseph Verville | Contract No. S00W235A01

Lab sample id S208025-13 | Client sample id J1PWX3

Dept sample id 7750-013 | Location/Matrix UPR-100-N-6 Verif.Sample SOIL

Received 08/10/12 | Collected/Weight 08/07/12 10:15 914 g

% solids 96.7 | Custody/SAF No RC-189-088 RC-189

9/19/12

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALIFIERS	TEST
Tritium	10028-17-8	-2.40	2.0	3.71	10.0	U J	H
Carbon 14	14762-75-5	0.555	0.49	0.805	1.00	U J	C
Nickel 63	13981-37-8	0.045	2.0	3.44	30.0	U	NI_L
Total Strontium	SR-RAD	0.419	0.17	0.250	1.00		SR
Thorium 228	14274-82-9	1.00	0.41	0.256	1.00	J	TH
Thorium 230	14269-63-7	0.836	0.47	0.616	1.00		TH
Thorium 232	TH-232	0.836	0.34	0.256	1.00	J	TH
Uranium 233/234	U-233/234	0.592	0.24	0.226	1.00		U
Uranium 235	15117-96-1	0.036	0.072	0.274	1.00	U J	U
Uranium 238	U-238	0.592	0.24	0.226	1.00		U
Plutonium 238	13981-16-3	0.026	0.11	0.202	1.00	U	PU
Plutonium 239/240	PU-239/240	0.053	0.053	0.202	1.00	U	PU
Potassium 40	13966-00-2	14.3	0.47	0.141			GAM
Cobalt 60	10198-40-0	0.058	0.025	0.026	0.050		GAM
Cesium 137	10045-97-3	0.449	0.024	0.018	0.100		GAM
Radium 226	13982-63-3	0.519	0.044	0.041	0.100		GAM
Radium 228	15262-20-1	0.817	0.091	0.083	0.200		GAM
Europium 152	14683-23-9	U		0.056	0.100	U	GAM
Europium 154	15585-10-1	U		0.067	0.100	U	GAM
Europium 155	14391-16-3	U		0.087	0.100	U	GAM
Thorium 228	14274-82-9	0.786	0.035	0.033			GAM
Thorium 232	TH-232	0.817	0.091	0.083			GAM
Uranium 235	15117-96-1	U		0.146	0.300	U	GAM
Uranium 238	U-238	U		2.43	10.0	U	GAM
Americium 241	14596-10-2	U		0.093	0.300	U	GAM

Lab id EBRLNE
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Appendix 4

Laboratory Narrative and Chain-of-Custody Documentation

1.0 GENERAL

Washington Closure Hanford (WCH) Sample Delivery Group K3969 was composed of thirteen solid (soil) samples designated under SAF No. RC-189 with a Project Designation of: 100N Field Remediation-Soil Full Protocol.

The samples were received as stated on the Chain-of-Custody documents. Any discrepancies are noted on the Eberline Analytical Sample Receipt Checklist. The results were transmitted to WCH via e-mail on August 22, 2012.

2.0 ANALYSIS NOTES

2.1 Tritium Analysis

No problems were encountered during the course of the analyses.

2.2 Carbon-14 Analysis

No problems were encountered during the course of the analyses.

2.3 Nickel-63 Analysis

No problems were encountered during the course of the analyses.

2.4 Total Strontium Analysis

No problems were encountered during the course of the analyses.

2.5 Isotopic Thorium Analysis

The relative percent difference in the duplicate Th-230 results was 31% and the DER was 0.8; both the original and duplicate results were less than the RDL of 1.0 pCi/g. No other problems were encountered during the course of the analyses.

2.6 Isotopic Uranium Analysis

The relative percent difference in the duplicate U233/234 results was 43% and the DER was 1.3; both the original and duplicate results were less than the RDL of 1.0 pCi/g. No other problems were encountered during the course of the analyses.

2.7 Isotopic Plutonium Analysis

No problems were encountered during the course of the analyses.

2.8 Gamma Spectroscopy

No problems were encountered during the course of the analyses.

3.0 Case Narrative Certification Statement

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

Joseph Verville
Client Services Manager

8/22/12
Date

Washington Closure Hanford

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

RC-189-088 | Page 1 of 6

Collector: Q. Stowe	Company Contact: Joan Kessner	Telephone No.: 375-4688 (7750)	Project Coordinator: KESSNER, JH
Price Code: 8L 8C 7/31/12	Data Turnaround: 21 Days		
Project Designation: 100N Field Remediation - Soil Full Protocol	Sampling Location: UPR-100-N-6 Verification Samples K3969	SAF No.: RC-189	
Ice Chest No.: WCH-009-100	Field Logbook No.: EI-1652-06	COA: RUPN062008 RUPN06GW0	Method of Shipment: Fed Ex
Shipped To: EBERLINE SERVICES / ~~LIONVILLE~~ 7/31/12	Offsite Property No.: A110487 7/31/12		Bill of Lading/Air Bill No.: See OSPC

POSSIBLE SAMPLE HAZARDS/REMARKS

Potential Rad L DOT Limits

Special Handling and/or Storage

~~Cool 4C~~ None 7/31/12

Preservation	Cool 4C	Cool 4C	Cool 4C	Cool 4C	Cool 4C	None	None	None	None	None
Type of Container	G/P	G/P	G/P	G	aG	G/P	G/P	G/P	G/P	G/P
No. of Container(s)	1	1	0	1	1	1	0	0	0	0
Volume	120mL	60mL	120mL	120mL	120mL	500mL	500mL	500mL	500mL	500mL
SAMPLE ANALYSIS	See item (1) in Special Instructions.	Chromium Hex - 7196	See item (2) in Special Instructions. 7/31/12	TPH-Diesel Range - WTPH-D +	PAHs - 8310 RCF	See item (3) in Special Instructions.	Isotopic Uranium	Isotopic Thorium	Isotopic Plutonium	Carbon-14 Low Level
92										
J1PWW1	SOIL	8-7-12	1115				34155	X	X	X	X	X
J1PWW2	SOIL	8-7-12	1005					√	X	Y	X	X
J1PWW3	SOIL	8-7-12	1105					X	X	X	X	X
J1PWW4	SOIL	8-7-12	1015				34156	X	Y	X	X	X
J1PWW5	SOIL	8-7-12	1012					X	X	X	X	X

CHAIN OF POSSESSION

Sign/Print Names	Date/Time
Relinquished By/Removed From - Quincy Stowe	8/7/12 1240
Received By/Stored In - Dennis Newman	8/7/12 1240
Relinquished By/Removed From - Dennis Newman	8/7/12 1435
Received By/Stored In - 1060 #3 A. Freier	8-7-12 1435
Relinquished By/Removed From - WCH A. Freier	8-8-12 1060#3 1230
Received By/Stored In - Fed Ex	Date/Time
Relinquished By/Removed From - FED EX	Date/Time
Received By/Stored In - [illegible]	08/10/12 0930
Relinquished By/Removed From	Date/Time
Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time
Received By/Stored In	Date/Time

SPECIAL INSTRUCTIONS

(1) ICP Metals - 6010TR (Close-out List) {Aluminum, Antimony, Arsenic, Barium, Beryllium, Boron, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Molybdenum, Nickel, Potassium, Selenium, Silicon, Silver, Sodium, Vanadium, Zinc}; Mercury - 7471 - (CV)
(2) IC Anions - 300.0 {Bromide, Chloride, Fluoride, Nitrate, Nitrite, Phosphate, Sulfate}; NO2/NO3 - 353.2; pH (Soil) - 9045
(3) Gamma Spec (Client List) {Americium-241, Cesium-137, Cobalt-60, Europium-152, Europium-154, Europium-155, Radium-226}

REVIEWED BY [illegible] DATE 8/8/12

Matrix *
S=Soil
SE=Sediment
SD=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

WCH-EE-011

Washington Closure Hanford	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST		RC-189-088	Page 4 of 6
Collector: Q. Stowe	Company Contact: Joan Kessner	Telephone No.: 375-4688 (7730)	Project Coordinator: KESSNER, JH	Price Code: 8L on 7/31/12, 8C — Data Turnaround: 21 Days on 7/31/12, 15
Project Designation: 100N Field Remediation Soil Full Protocol	Sampling Location: UPR-100-N-6 Verification Sample K3969		SAF No.: RC-189	
Ice Chest No.: WCH-009-100	Field Logbook No.: EL-1652-06	COA: RUPN06N6W0 RUPN062000 DN 8/7/12	Method of Shipment: Fed Ex	
Shipped To: EBERLINE SERVICES ~~LIONVILLE~~ DN 7/31/12	Offsite Property No.: A110487		Bill of Lading/Air Bill No.: See OSPC	

POSSIBLE SAMPLE HAZARDS/REMARKS

Potential Rad ∠ DOT Limits AF 8-8-12

Special Handling and/or Storage

~~Cool 4C~~ None DN 7/31/12

Preservation	None	None	None	None
Type of Container	G	G/P	G/P	G/P
No. of Container(s)	1	0	0	1
Volume	60mL	500mL	500mL	60mL

SAMPLE ANALYSIS 27

Sample No.	Matrix *	Sample Date	Sample Time	Tritium - H3 Low Level Soil	Nickel-63	Strontium-89,90 -- Total Sr	GEA ~~Scoping~~ screen	RCF
J1PWW1	SOIL	8-7-12	1115	X	X	X		34155
J1PWW2	SOIL	8-7-12	1005	X	X	X		
J1PWW3	SOIL	8-7-12	1105	X	X	X		
J1PWW4	SOIL	8-7-12	1015	X	X	X		34156
J1PWW5	SOIL	8-7-12	1012	X	X	X		

CHAIN OF POSSESSION — Sign/Print Names

	Date/Time		Date/Time
Relinquished By/Removed From: Quincy Stowe	8/7/12 1240	Received By/Stored In: Dennis Newman	8/7/12 1240
Relinquished By/Removed From: Dennis Newman	8/7/12 1435	Received By/Stored In: 1060 M3 A. Freier	8-7-12 1435
Relinquished By/Removed From: WCH A. Freier	8-8-12 1060 M3 1230	Received By/Stored In: Fed Ex	
Relinquished By/Removed From: FED EX		Received By/Stored In: F. LATHAM	08/10/12 0930
Relinquished By/Removed From		Received By/Stored In	
Relinquished By/Removed From		Received By/Stored In	

SPECIAL INSTRUCTIONS

REVIEWED BY DATE 8/8/12

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

WCH-EE-011

Washington Closure Hanford	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST		RC-189-088	Page 2 of 6
Collector: Q. Stowe	Company Contact: Joan Kessner	Telephone No.: 375-4688 (7750)	Project Coordinator: KESSNER, JH	Price Code: 8K 7/31/12 8C Data Turnaround: 21 Days 15 8/3/12
Project Designation: 100N Field Remediation Soil Full Protocol	Sampling Location: UPR-100-N-6 Verification Sample K3969		SAF No.: RC-189	
Ice Chest No.: WCH-009-100	Field Logbook No.: EI-1652-06	COA: RUPN06N6WQ RUPN062000 DF 8/7/12	Method of Shipment: Fed Ex	
Shipped To: EBERLINE SERVICES ~~LIONVILLE~~ 7/31/12	Offsite Property No.: A 110487		Bill of Lading/Air Bill No.: See OSPC	

POSSIBLE SAMPLE HAZARDS/REMARKS

Potential Rad L DOT Limits Af 8-8-12

Special Handling and/or Storage

~~Cool 4C~~ None 7/31/12

Preservation	Cool 4C	Cool 4C	Cool 4C	Cool 4C	Cool 4C	None	None	None	None	None
Type of Container	G/P 2	G/P 2	G/P	G	aG	G/P	G/P	G/P	G/P	G/P
No. of Container(s)	1	1	0	1	1	1	0	0	0	0
Volume	120mL	60mL	120mL	120mL	120mL	500mL	500mL	500mL	500mL	500mL

SAMPLE ANALYSIS

Sample No.	Matrix *	Sample Date	Sample Time	See item (1) in Special Instructions.	Chromium Hex - 7196	See item (2) in Special Instructions. 7/31/12	TPH-Diesel Range - WTPH-D +	PAHs - 8310	See item (3) in Special Instructions.	Isotopic Uranium	Isotopic Thorium	Isotopic Plutonium	Carbon-14 Low Level
J1PWW6	SOIL	8-7-12	1057						X	X	X	X	X
J1PWW7	SOIL	8-7-12	1052						X	X	X	X	X
J1PWW8	SOIL	8-7-12	1045					34157	X	X	X	X	X
J1PWW9	SOIL	8-7-12	1040						X	X	X	X	X
J1PWX0	SOIL	8-7-12	1035						X	X	X	X	X

CHAIN OF POSSESSION	Sign/Print Names
Relinquished By/Removed From: Quincy Stowe Date/Time: 1240 8/7/12	Received By/Stored In: Dennis Newman Date/Time: 1240 8/7/12
Relinquished By/Removed From: Dennis Newman Date/Time: 1435 8/7/12	Received By/Stored In: 1060#3 A. Freier Date/Time: 1435 8-7-12
Relinquished By/Removed From: WCH 1060#3 A. Freier Date/Time: 8-8-12 1230	Received By/Stored In: Fed Ex Date/Time:
Relinquished By/Removed From: FED EX Date/Time:	Received By/Stored In: Date/Time: 08/10/12 0920
Relinquished By/Removed From: Date/Time:	Received By/Stored In: Date/Time:
Relinquished By/Removed From: Date/Time:	Received By/Stored In: Date/Time:

SPECIAL INSTRUCTIONS

(1) ICP Metals - 6010TR (Close-out List) {Aluminum, Antimony, Arsenic, Barium, Beryllium, Boron, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Molybdenum, Nickel, Potassium, Selenium, Silicon, Silver, Sodium, Vanadium, Zinc}; Mercury - 7471 - (CV)
(2) IC Anions - 300.0 {Bromide, Chloride, Fluoride, Nitrate, Nitrite, Phosphate, Sulfate}; NO2/NO3 - 353.2; pH (Soil) - 9045
(3) Gamma Spec (Client List) {Americium-241, Cesium-137, Cobalt-60, Europium-152, Europium-154, Europium-155, Radium-226}

REVIEWED BY DWSchen DATE 8/8/12

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

WCH-EE-011

Washington Closure Hanford	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST		RC-189-088	Page 5 of 6
Collector: Q. Stowe	Company Contact: Joan Kessner	Telephone No.: 375-4688 (7750)	Project Coordinator: KESSNER, JH	Price Code: ~~8L~~ 8C 7/31/12; Data Turnaround: ~~21~~ 15 Days 7/31/12
Project Designation: 100N Field Remediation Soil Full Protocol	Sampling Location: UPR-100-N-6 Verification Sample K3964		SAF No.: RC-189	
Ice Chest No.: WCH-009-100	Field Logbook No.: EI-1652-06	COA: RUPA06N6WQ ~~RUPN062000~~ 8/1/12	Method of Shipment: Fed Ex	
Shipped To: (EBERLINE SERVICES) ~~LIONVILLE~~ 8-8-12	Offsite Property No.: A110487		Bill of Lading/Air Bill No.: See OSPC	

POSSIBLE SAMPLE HAZARDS/REMARKS
Potential Rad < DOT Limits 8-8-12

Special Handling and/or Storage
~~Cool 4C~~ None 7/31/12

Preservation				None	None	None	None
Type of Container				G	G/P	G/P	G/P
No. of Container(s)				1	0	0	1
Volume				60mL	500mL	500mL	60mL
SAMPLE ANALYSIS				Tritium - H3 Low Level Soil	Nickel-63	Strontium-89,90 – Total Sr	~~RCT GEA Shipping Screen~~ 8/1/12
Sample No.	**Matrix ***	**Sample Date**	**Sample Time**				
J1PWW6	SOIL	8-7-12	1057	X	X	X	
J1PWW7	SOIL	8-7-12	1052	X	X	X	
J1PWW8	SOIL	8-7-12	1045	X	X	X	
J1PWW9	SOIL	8-7-12	1040	X	X	X	
J1PWX0	SOIL	8-7-12	1035	X	X	X	

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RCF 34157

CHAIN OF POSSESSION — Sign/Print Names

Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Quincy Stowe	8/7/12 1240	Dennis Newman	8/7/12 1240
Dennis Newman	8/7/12 1435	1060 #3 A. Freier	8-7-12 1435
WCH A. Freier	8-8-12 1230 (06043)	Fed Ex	
FED EX		[illegible]	08/10/12 0920

SPECIAL INSTRUCTIONS

REVIEWED BY [signature] DATE [illegible]

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

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

WCH-EE-011

Washington Closure Hanford	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	RC-189-088	Page 3 of 6

Collector: Q. Stowe	Company Contact: Joan Kessner; Telephone No. 375-4688 (7750)	Project Coordinator: KESSNER, JH	Price Code: ~~8L~~ 8C (DA 7/31/12); Data Turnaround: ~~21~~ 15 Days
Project Designation: 100N Field Remediation Soil Full Protocol	Sampling Location: UPR-100-N-6 Verification Samples K3969	SAF No.: RC-189	
Ice Chest No.: WCH-009-100	Field Logbook No.: EL-1652-06; COA: ~~RUPN062000~~ RUPN06 NC4L9 (DA 7/31/12)	Method of Shipment: Fed Ex	
Shipped To: EBERLINE SERVICES / ~~LIONVILLE~~ (DA 7/31/12)	Offsite Property No.: A110487	Bill of Lading/Air Bill No.: See OSPC	

POSSIBLE SAMPLE HAZARDS/REMARKS

Potential Rad < DOT Limits
AJ 8-8-12

Special Handling and/or Storage

~~Cool 4C~~ None
DA 7/31/12

30

		Preservation	Cool 4C	Cool 4C	Cool 4C	Cool 4C	Cool 4C	None	None	None	None	None
		Type of Container	G/P	G/P	G/P	G	aG	G/P	G/P	G/P	G/P	G/P
		No. of Container(s)	1	~~1~~	0	1	1	1	0	0	0	0
		Volume	120mL	60mL	120mL	120mL	120mL	500mL	500mL	500mL	500mL	500mL
SAMPLE ANALYSIS			See item (1) in Special Instructions.	Chromium Hex - 7196	See item (2) in Special Instructions.	TPH-Diesel Range - WTPH-D +	PAHs - 8310	See item (3) in Special Instructions.	Isotopic Uranium	Isotopic Thorium	Isotopic Plutonium	Carbon-14 Low Level
Sample No.	Matrix *	Sample Date	Sample Time					RCF					
J1PWX1	SOIL	8-7-12	1030						X	X	X	X	X
J1PWX2	SOIL	8-7-12	1025					34158	X	X	X	X	X
J1PWX3	SOIL	8-7-12	1015						X	X	X	X	X
~~J1PWX4~~	~~SOIL~~ D.N.	~~7/31/12~~											

(Columns struck through diagonally, D.N. 7/31/12)

CHAIN OF POSSESSION — Sign/Print Names

Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Quincy Stowe	8/7/12 1240	Dennis Newman	8/7/12 1240
Dennis Newman	8/7/12 1435	A. Freier (1060 #3)	8-7-12 1435
A. Freier (WCH 1060 #3)	8-8-12 1230	Fed Ex	
FED EX		M. Cuatlahuatl	08/10/12 0920

SPECIAL INSTRUCTIONS

(1) ICP Metals - 6010TR (Close-out List) {Aluminum, Antimony, Arsenic, Barium, Beryllium, Boron, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Molybdenum, Nickel, Potassium, Selenium, Silicon, Silver, Sodium, Vanadium, Zinc}; Mercury - 7471 - (CV)
(2) IC Anions - 300.0 {Bromide, Chloride, Fluoride, Nitrate, Nitrite, Phosphate, Sulfate}; NO2/NO3 - 353.2; pH (Soil) - 9045
(3) Gamma Spec (Client List) {Americium-241, Cesium-137, Cobalt-60, Europium-152, Europium-154, Europium-155, Radium-226}

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

REVIEWED BY DWShu DATE 8/8/12

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

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Washington Closure Hanford

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

Collector: Q. Stowe	Company Contact: Joan Kessner	Telephone No. 375-4688 (7750)	Project Coordinator: KESSNER, JH
Price Code: ~~8L~~ 8C DF 7/31/12	Data Turnaround: ~~21~~ 15 Days 7/31/12		
Project Designation: 100N Field Remediation Soil Full Protocol	Sampling Location: UPR-100-N-6 Verification Sample K3969	SAF No: RC-189	
Ice Chest No: WCH-009-100	Field Logbook No: EI-1652-06	COA: RUPN06NEWO ~~RUPN062000~~ 8/2/12	Method of Shipment: Fed Ex
Shipped To: EBERLINE SERVICES ~~LIONVILLE~~ DF 7/31/12	Offsite Property No: A110487		Bill of Lading/Air Bill No.: See OSPC

POSSIBLE SAMPLE HAZARDS/REMARKS

Potential Rad < DOT Limits AJ 8-8-12

Special Handling and/or Storage

~~Cool 4C~~ None DH 7/31/12

Preservation			None	None	None	None						
Type of Container			G	G/P	G/P	~~G/P~~						
No. of Container(s)			1	0	0	~~1~~						
Volume			60mL	500mL	500mL	~~50mL~~						
SAMPLE ANALYSIS			Tritium - H3 Low Level Soil	Nickel-63	Strontium-89,90 – Total Sr	~~RCF GEA Shipping Screen~~ AJ 8/7/12	RCF					
Sample No.	**Matrix ***	**Sample Date**	**Sample Time**									
J1PWX1	SOIL	8-7-12	1030	X	X	X						
J1PWX2	SOIL	8-7-12	1025	X	X	X		34158				
J1PWX3	SOIL	8-7-12	1015	X	X	X						
~~J1PWX4~~	8/7/12											

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CHAIN OF POSSESSION	Date/Time	Sign/Print Names	Date/Time
Relinquished By/Removed From: Quincy Stowe	1240 8/7/12	Received By/Stored In: Dennis Newman	8/7/12 1240
Relinquished By/Removed From: Dennis Newman	1435 8/7/12	Received By/Stored In: 1060#3 A. Freier	1435 8-7-12
Relinquished By/Removed From: WCH 1060#3 A. Freier	8-8-12 1230	Received By/Stored In: Fed Ex	
Relinquished By/Removed From: Fed Ex		Received By/Stored In: M. Heathaway	08/10/12 0920
Relinquished By/Removed From		Received By/Stored In	
Relinquished By/Removed From		Received By/Stored In	

SPECIAL INSTRUCTIONS

REVIEWED BY DWShea DATE 8/8/12

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

WCH-EE-011

Appendix 5

Data Validation Supporting Documentation

APPENDIX A

RADIOCHEMICAL DATA VALIDATION CHECKLIST

VALIDATION LEVEL:	A	B	C	D	E
PROJECT:	100-N-6		DATA PACKAGE:	K3969	
VALIDATOR:	ELR	LAB: EB		DATE:	9/18/12
			SDG:	K3969	

ANALYSES PERFORMED				
☐ Gross Alpha/Beta	☒ Strontium-90	☐ Technetium-99	☒ Alpha Spectroscopy	☒ Gamma Spectroscopy
☐ Total Uranium	☐ Radium-22	☒ Tritium	X C14	X Ni-63

SAMPLES/MATRIX				
J1PWW1	J1PWW2	J1PWW3	J1PWW4	J1PWW5
J1PWW6	J1PWW7	J1PWW8	J1PWW9	J1PWX0
J1PWX1	J1PWX2	J1PWX3		
				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: _____

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_____

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: _____

_____

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_____

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

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

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

Analytes detected in method blank? ..... Yes No N/A

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

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

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

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

Comments: _____

_____

_____

_____

_____

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

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

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

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

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

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

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

Comments: no th-228 or th 232 LCS - J all (csp-c)

no U-235 (csp-c) LCS - J all

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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

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

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

Comments: _____

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_____

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: _____

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_____

_____

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: No 3H or C-14 MS - J all

_____

_____

_____

_____

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: W4(83 - FD no For Pas

FD - Cs-137 - 56%

12. Holding Times (All levels)

Are sample holding times acceptable? Yes No N/A

Comments:

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

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

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

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

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

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

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

Comments: 9 non

Appendix 6

Additional Documentation Requested by Client

EBERLINE ANALYTICAL - RICHMOND

SAMPLE DELIVERY GROUP K3969

Method Blank

7750-015

METHOD BLANK

SDG 7750 | Client/Case no Hanford | SDG K3969

Contact Joseph Verville | Contract No. S00W235A01

Lab sample id S208025-15 | Client sample id Method Blank

Dept sample id 7750-015 | Material/Matrix | SOIL

SAF No RC-189

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALIFIERS	TEST
Tritium	10028-17-8	-0.849	2.0	3.44	10.0	U	H
Carbon 14	14762-75-5	-0.152	0.50	0.845	1.00	U	C
Nickel 63	13981-37-8	0.627	1.7	2.85	30.0	U	NI_L
Total Strontium	SR-RAD	0.018	0.15	0.293	1.00	U	SR
Thorium 228	14274-82-9	-0.035	0.14	0.339	1.00	U	TH
Thorium 230	14269-63-7	-0.106	0.28	0.651	1.00	U	TH
Thorium 232	TH-232	0	0.071	0.270	1.00	U	TH
Uranium 233/234	U-233/234	0	0.059	0.225	1.00	U	U
Uranium 235	15117-96-1	0	0.071	0.272	1.00	U	U
Uranium 238	U-238	0	0.059	0.225	1.00	U	U
Plutonium 238	13981-16-3	0	0.067	0.257	1.00	U	PU
Plutonium 239/240	PU-239/240	0	0.067	0.257	1.00	U	PU
Potassium 40	13966-00-2	U		0.494		U	GAM
Cobalt 60	10198-40-0	U		0.037	0.050	U	GAM
Cesium 137	10045-97-3	U		0.041	0.100	U	GAM
Radium 226	13982-63-3	U		0.091	0.100	U	GAM
Radium 228	15262-20-1	U		0.186	0.200	U	GAM
Europium 152	14683-23-9	U		0.097	0.100	U	GAM
Europium 154	15585-10-1	U		0.129	0.100	U	GAM
Europium 155	14391-16-3	U		0.101	0.100	U	GAM
Thorium 228	14274-82-9	U		0.071		U	GAM
Thorium 232	TH-232	U		0.186		U	GAM
Uranium 235	15117-96-1	U		0.216	0.300	U	GAM
Uranium 238	U-238	U		4.44	10.0	U	GAM
Americium 241	14596-10-2	U		0.189	0.300	U	GAM

QC-BLANK #82315

Lab id EBRLNE
Protocol RC-189
Version Ver 1.0
Form DVD-DS
Version 3.06
Report date 08/22/12

EBERLINE ANALYTICAL-RICHMOND

SAMPLE DELIVERY GROUP K3969

Lab Control Sample

7750-014

LAB CONTROL SAMPLE

SDG 7750
Contact Joseph Verville

Lab sample id S208025-14
Dept sample id 7750-014

Client/Case no Hanford SDG K3969
Contract No. S00W235A01

Client sample id Lab Control Sample
Material/Matrix SOIL
SAF No RC-189

ANALYTE	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI-FIERS	TEST	ADDED pCi/g	2σ ERR pCi/g	REC %	3σ LMTS (TOTAL)	PROTOCOL LIMITS
Tritium	130	5.6	3.33	10.0		H	130	5.2	100	83-117	80-120
Carbon 14	1070	22	4.76	1.00		C	1060	42	101	83-117	80-120
Nickel 63	233	6.1	2.84	30.0		NI_L	258	10	90	83-117	80-120
Total Strontium	8.18	0.51	0.239	1.00		SR	8.43	0.34	97	81-119	80-120
Thorium 230	16.8	2.0	0.605	1.00		TH	18.9	0.76	89	80-120	80-120
Uranium 233/234	11.6	1.4	0.236	1.00		U	10.7	0.43	108	76-124	80-120
Uranium 238	10.6	1.3	0.236	1.00		U	10.7	0.43	99	77-123	80-120
Plutonium 238	9.77	1.2	0.204	1.00		PU	11.3	0.45	86	80-120	80-120
Plutonium 239/240	11.5	1.4	0.204	1.00		PU	13.2	0.53	87	80-120	80-120
Cobalt 60	1.47	0.13	0.050	0.050		GAM	1.66	0.066	89	84-116	80-120
Cesium 137	1.61	0.12	0.077	0.100		GAM	1.95	0.078	83	86-114	80-120

QC-LCS #82314

Lab id EBRLNE
Protocol RC-189
Version Ver 1.0
Form DVD-LCS
Version 3.06
Report date 08/22/12

EBERLINE ANALYTICAL-RICHMOND

SAMPLE DELIVERY GROUP K3969

J1PWW1

7750-016

DUPLICATE

SDG 7750
Contact Joseph Vervilla
DUPLICATE
Lab sample id S208025-16
Dept sample id 7750-016
% solids 99.4

ORIGINAL
Lab sample id S208025-01
Dept sample id 7750-001
Received 08/10/12
% solids 99.4

Client/Case no Hanford SDG K3969
Contract No. S00W235A01
Client sample id J1PWW1
Location/Matrix UPR-100-N-6 Verif.Sample SOIL
Collected/Weight 08/07/12 11:15 1024 g
Custody/SAF No RC-189-088 RC-189

ANALYTE	DUPLICATE pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI-FIERS	TEST	ORIGINAL pCi/g	2σ ERR (COUNT)	MDA pCi/g	QUALI-FIERS	RPD %	3σ TOT	DER σ
Tritium	1.10	2.1	3.58	10.0	U	H	-0.493	2.0	3.55	U	-		1.1
Carbon 14	0.980	0.52	0.844	1.00		C	0.786	0.54	0.881	U	22	129	0.5
Nickel 63	1.70	2.5	4.22	30.0	U	NI_L	0.309	2.0	3.41	U	-		0.9
Total Strontium	-0.052	0.13	0.263	1.00	U	SR	0.110	0.11	0.195	U	-		1.9
Thorium 228	0.707	0.33	0.246	1.00		TH	0.865	0.18	0.113		20	74	0.8
Thorium 230	0.802	0.45	0.613	1.00		TH	0.589	0.30	0.284		31	118	0.8
Thorium 232	0.738	0.33	0.245	1.00		TH	0.691	0.14	0.060		7	77	0.3
Uranium 233/234	0.804	0.31	0.228	1.00		U	0.522	0.27	0.250		43	95	1.3
Uranium 235	0	0.072	0.276	1.00	U	U	0.040	0.079	0.302	U	-		0.7
Uranium 238	0.536	0.24	0.228	1.00		U	0.457	0.26	0.250		16	108	0.4
Plutonium 238	0	0.074	0.282	1.00	U	PU	0	0.060	0.230	U	-		0
Plutonium 239/240	0.074	0.074	0.282	1.00	U	PU	0.030	0.060	0.230	U	-		0.9
Potassium 40	14.7	0.52	0.178			GAM	14.4	0.57	0.260		2	17	0.4
Cobalt 60	0.048	0.020	0.024	0.050		GAM	0.062	0.023	0.024		25	84	0.9
Cesium 137	0.341	0.030	0.027	0.100		GAM	0.402	0.037	0.030		16	24	2.0
Radium 226	0.531	0.045	0.041	0.100		GAM	0.567	0.056	0.051		7	25	0.8
Radium 228	0.841	0.10	0.097	0.200		GAM	0.812	0.12	0.109		4	32	0.3
Europium 152	U		0.062	0.100	U	GAM	U		0.072	U	-		0.2
Europium 154	U		0.073	0.100	U	GAM	U		0.088	U	-		0.3
Europium 155	U		0.065	0.100	U	GAM	U		0.083	U	-		0.3
Thorium 228	0.774	0.035	0.031			GAM	0.788	0.038	0.035		2	18	0.3
Thorium 232	0.841	0.10	0.097			GAM	0.812	0.12	0.109		4	32	0.3
Uranium 235	U		0.133	0.300	U	GAM	U		0.164	U	-		0.3
Uranium 238	U		4.31	10.0	U	GAM	U		2.72	U	-		0.6
Americium 241	U		0.039	0.300	U	GAM	U		0.161	U	-		1.5

Lab id EBRLNE
Protocol RC-189
Version Ver 1.0
Form DVD-DUP
Version 3.06
Report date 08/22/12

Date: 20 September 2012
To: Washington Closure Hanford Inc. (technical representative)
From: ELR Consulting
Project: 100N Field Remediation – Soil Full Protocol - Waste Site UPR-100-N-6
Subject: Diesel Range Organics - Data Package No. K3969-LLI

INTRODUCTION

This memo presents the results of data validation on Data Package No. K3969 prepared by Lionville Laboratories Inc. (LLI). A list of samples validated along with the analyses reported and the method of analysis is provided in the following table.

Sample ID	Sample Date	Media	Validation	Analyte
J1PWW1	8/7/12	Soil	C	See note 1
J1PWW2	8/7/12	Soil	C	See note 1
J1PWW3	8/7/12	Soil	C	See note 1
J1PWW4	8/7/12	Soil	C	See note 1
J1PWW5	8/7/12	Soil	C	See note 1
J1PWW6	8/7/12	Soil	C	See note 1
J1PWW7	8/7/12	Soil	C	See note 1
J1PWW8	8/7/12	Soil	C	See note 1
J1PWW9	8/7/12	Soil	C	See note 1
J1PWX0	8/7/12	Soil	C	See note 1
J1PWX1	8/7/12	Soil	C	See note 1
J1PWX2	8/7/12	Soil	C	See note 1
J1PWX3	8/7/12	Soil	C	See note 1

1 – Diesel range organics by 8015B.

Data validation was conducted in accordance with the Washington Closure Hanford (WCH) validation statement of work and the 100-N Area Sampling and Analysis Plan for CERCLA Waste Sites (DOE/RL-2005-92, Rev. 0, October 2006). Appendices 1 through 6 provide the following information as indicated below:

Appendix 1. Glossary of Data Reporting Qualifiers
Appendix 2. Summary of Data Qualification
Appendix 3. 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 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: Pesticide 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, 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 acceptable.

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".

All method blank results were acceptable.

Field (Equipment) Blanks

No field blanks were submitted for analysis.

Accuracy

Matrix Spike/Matrix Spike Duplicate & Blank Spike 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 below control limits are qualified as estimates and flagged "UJ". Undetected sample results are not qualified if the spike recovery is above control limits. Sample results greater than five times the spike concentration require no qualification.

Due to the lack of a matrix spike, matrix spike duplicate and LCS analysis, all motor oil results were qualified as estimates and flagged "J".

Due to an LCS recovery outside QC limits (48%), all diesel range organic results were qualified as estimates and flagged "J".

All other accuracy 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.

Due to the lack of a matrix spike and matrix spike duplicate analysis, all motor oil results were qualified as estimates and flagged "J".

All other laboratory results were acceptable.

Field Duplicate Samples

One set of field duplicates (J1PWW4/J1PWX3) were submitted for analysis. Field duplicates are compared using the same criteria s for laboratory duplicates. All field duplicate results were acceptable.

Analytical Detection Levels

Reported analytical detection levels are compared against the required quantitation limits (RQL's) to ensure that laboratory detection levels meet the required criteria. All undetected motor oil results exceeded the RQL. Under the WCH statement of work, no qualification is required. All other analytes met the RQL.

Completeness

Data package No. K3969 was submitted for validation and verified for completeness. Completeness is based on the percentage of data determined to be valid (i.e., not rejected). The completion percentage was 100%.

MAJOR DEFICIENCIES

None found.

MINOR DEFICIENCIES

The following minor deficiencies were noted:

- Due to the lack of a matrix spike, matrix spike duplicate and LCS analysis, all motor oil results were qualified as estimates and flagged "J".
- Due to an LCS recovery outside QC limits (48%), all diesel range organic results were qualified as estimates and flagged "J".

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

All undetected motor oil results exceeded the RQL. Under the WCH statement of work, no qualification is required

REFERENCES

Washington Closure Hanford Contract #S00W307A00 (March 2008), *Data Validation Services*, March 2008.

DOE/RL-2005-92, Rev. 0, 100-N *Area Sampling and Analysis Plan for CERCLA Waste Sites*, U.S. Department of Energy, October 2006.

Appendix 1

Glossary of Data Reporting Qualifiers

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

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

DIESEL RANGE ORGANICS DATA QUALIFICATION SUMMARY*

SDG: K3969	**REVIEWER: ELR**	**Project: UPR-100-N-6**	**PAGE 1 OF 1**
COMPOUND	QUALIFIER	SAMPLES AFFECTED	REASON
Diesel range organics	J	All	LCS recovery
Motor oil	J	All	No MS, MSD or LCS analysis

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

Appendix 3

Annotated Laboratory Reports

LIONVILLE LABORATORY
A division of Environmental Analytical Corporation

264 Welsh Pool Road
Exton, PA 19341
Phone: 610-280-3000
Fax: 610-280-3041

WC-Hanford, Inc. 2620 Fermi Avenue Richland WA, 99354	Project: RC-189 Project Number: K3969 Project Manager: Joan Kessner	**Reported:** 08/20/2012 12:31

9/19/12

Extractable Petroleum Hydrocarbons by SW846 8015
Lionville Laboratory

Analyte	Result and Qualifier	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method
J1PWW1 (1208031-01) Soil								
Surrogate: p-Terphenyl	*79 %*	*39-129*			*L208111*	*08/14/2012*	*08/17/2012*	*8015M*
Diesel Range Organics	1900 J J	3340	ug/kg dry	1	L208111	08/14/2012	08/17/2012	8015M
Motor Oil	3790 J J	10000	ug/kg dry	1	L208111	08/14/2012	08/17/2012	8015M
J1PWW2 (1208031-02) Soil								
Surrogate: p-Terphenyl	*69 %*	*39-129*			*L208111*	*08/14/2012*	*08/17/2012*	*8015M*
Diesel Range Organics	880 J J	3460	ug/kg dry	1	L208111	08/14/2012	08/17/2012	8015M
Motor Oil	10400 U J	10400	ug/kg dry	1	L208111	08/14/2012	08/17/2012	8015M
J1PWW3 (1208031-03) Soil								
Surrogate: p-Terphenyl	*75 %*	*39-129*			*L208111*	*08/14/2012*	*08/17/2012*	*8015M*
Diesel Range Organics	886 J J	3390	ug/kg dry	1	L208111	08/14/2012	08/17/2012	8015M
Motor Oil	10200 U J	10200	ug/kg dry	1	L208111	08/14/2012	08/17/2012	8015M
J1PWW4 (1208031-04) Soil								
Surrogate: p-Terphenyl	*82 %*	*39-129*			*L208111*	*08/14/2012*	*08/17/2012*	*8015M*
Diesel Range Organics	3390 U J	3390	ug/kg dry	1	L208111	08/14/2012	08/17/2012	8015M
Motor Oil	8220 J J	10200	ug/kg dry	1	L208111	08/14/2012	08/17/2012	8015M
J1PWW5 (1208031-05) Soil								
Surrogate: p-Terphenyl	*62 %*	*39-129*			*L208111*	*08/14/2012*	*08/17/2012*	*8015M*
Diesel Range Organics	3350 U J	3350	ug/kg dry	1	L208111	08/14/2012	08/17/2012	8015M
Motor Oil	12800 J	10100	ug/kg dry	1	L208111	08/14/2012	08/17/2012	8015M
J1PWW6 (1208031-06) Soil								
Surrogate: p-Terphenyl	*76 %*	*39-129*			*L208111*	*08/14/2012*	*08/17/2012*	*8015M*
Diesel Range Organics	3230 U J	3230	ug/kg dry	1	L208111	08/14/2012	08/17/2012	8015M
Motor Oil	20700 J	9680	ug/kg dry	1	L208111	08/14/2012	08/17/2012	8015M

LVL
LIONVILLE LABORATORY
A division of Eberline Analytical Corporation

264 Welsh Pool Road
Exton, PA 19341
Phone: 610-280-3000
Fax: 610-280-3041

WC-Hanford, Inc. 2620 Fermi Avenue Richland WA, 99354	Project: RC-189 Project Number: K3969 Project Manager: Joan Kessner	**Reported:** 08/20/2012 12:31

Extractable Petroleum Hydrocarbons by SW846 8015

V 9/19/12

Lionville Laboratory

Analyte	Result and Qualifier	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method
J1PWW7 (1208031-07) Soil								
Surrogate: p-Terphenyl	*80 %*	*39-129*			*L208111*	*08/14/2012*	*08/17/2012*	*8015M*
Diesel Range Organics	3360 U J	3360	ug/kg dry	1	L208111	08/14/2012	08/17/2012	8015M
Motor Oil	11800 J	10100	ug/kg dry	1	L208111	08/14/2012	08/17/2012	8015M
J1PWW8 (1208031-08) Soil								
Surrogate: p-Terphenyl	*71 %*	*39-129*			*L208111*	*08/14/2012*	*08/17/2012*	*8015M*
Diesel Range Organics	3290 U J	3290	ug/kg dry	1	L208111	08/14/2012	08/17/2012	8015M
Motor Oil	17500 J	9860	ug/kg dry	1	L208111	08/14/2012	08/17/2012	8015M
J1PWW9 (1208031-09) Soil								
Surrogate: p-Terphenyl	*74 %*	*39-129*			*L208111*	*08/14/2012*	*08/17/2012*	*8015M*
Diesel Range Organics	3320 U J	3320	ug/kg dry	1	L208111	08/14/2012	08/17/2012	8015M
Motor Oil	26600 J	9950	ug/kg dry	1	L208111	08/14/2012	08/17/2012	8015M
J1PWX0 (1208031-10) Soil								
Surrogate: p-Terphenyl	*70 %*	*39-129*			*L208111*	*08/14/2012*	*08/17/2012*	*8015M*
Diesel Range Organics	1220 J J	3290	ug/kg dry	1	L208111	08/14/2012	08/17/2012	8015M
Motor Oil	9870 U J	9870	ug/kg dry	1	L208111	08/14/2012	08/17/2012	8015M
J1PWX1 (1208031-11) Soil								
Surrogate: p-Terphenyl	*84 %*	*39-129*			*L208111*	*08/14/2012*	*08/17/2012*	*8015M*
Diesel Range Organics	18800 J	3330	ug/kg dry	1	L208111	08/14/2012	08/17/2012	8015M
Motor Oil	31400 J	9990	ug/kg dry	1	L208111	08/14/2012	08/17/2012	8015M
J1PWX2 (1208031-12) Soil								
Surrogate: p-Terphenyl	*78 %*	*39-129*			*L208111*	*08/14/2012*	*08/17/2012*	*8015M*
Diesel Range Organics	1680 J J	3340	ug/kg dry	1	L208111	08/14/2012	08/17/2012	8015M
Motor Oil	10000 U J	10000	ug/kg dry	1	L208111	08/14/2012	08/17/2012	8015M

LVL
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WC-Hanford, Inc. 2620 Fermi Avenue Richland WA, 99354	Project: RC-189 Project Number: K3969 Project Manager: Joan Kessner	**Reported:** 08/20/2012 12:31

Extractable Petroleum Hydrocarbons by SW846 8015

9/19/12

Lionville Laboratory

Analyte	Result and Qualifier	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method
J1PWX3 (1208031-13) Soil								
Surrogate: p-Terphenyl	*79 %*	*39-129*			*L208111*	*08/14/2012*	*08/17/2012*	*8015M*
Diesel Range Organics	2790 J J	3210	ug/kg dry	1	L208111	08/14/2012	08/17/2012	8015M
Motor Oil	6590 J J	9630	ug/kg dry	1	L208111	08/14/2012	08/17/2012	8015M

Appendix 4

Laboratory Narrative and Chain-of-Custody Documentation

LIONVILLE LABORATORY
A division of Eberline Analytical Corporation

264 Welsh Pool Road
Exton, Pennsylvania 19341
Phone (610) 280-3000
Fax (610) 280-3041

Case Narrative

Client: WC-HANFORD RC-189 K3969
LVL #: 1208031

W.O. #: 60049-001-001-0001-00
Date Received: 08-09-2012

DIESEL RANGE ORGANICS

Thirteen (13) soil samples were collected on 08-07-2012.

The samples and associated QC samples were extracted 08-14-2012 and analyzed 08-17-2012 according to criteria set forth in Lionville Laboratory SOPs. The extraction procedure was based on SW846 Method 3540C and the analysis procedure was based on SW846 Method 8015B for Diesel Range Organics.

Lionville Laboratory (LvL) is NELAP accredited by the State of Pennsylvania. For a complete listing of accrediting authorities and the corresponding analytes/methods, please contact your Project Manager. LvL certifies that all test results meet the requirements of NELAC with any exception noted in the following statements:

1. The results presented in this report are derived from samples that met LvL's sample acceptance policy.
2. All required holding times for extraction and analysis have been met.
3. All obtainable surrogate recoveries were within acceptance criteria.
4. The method blank was below the reporting limits for all target compounds.
5. The blank spike recovery was within acceptance criteria.
6. All matrix spike recoveries were within acceptance criteria.
7. All initial calibrations associated with this data set were within acceptance criteria.
8. All continuing calibration standards analyzed prior to sample extracts were within acceptance criteria.
9. The samples were reported on a dry weight basis.
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 hardcopy data package has been authorized by the laboratory manager or a designee as verified by the following signature.

Iain Daniels
LvL Laboratory Manager

8/21/12
Date

Washington Closure Hanford — CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

RC-189-088

Collector	Q. Stowe
Company Contact	Joan Kessner
Telephone No.	375-4688
Project Coordinator	KESSNER, JH
Price Code	8C
Data Turnaround	15 Days
Project Designation	100N Field Remediation - Soil Full Protocol
Sampling Location	UPR-100-N-6 Verification Sample
SAF No.	RC-189
Ice Chest No.	RCC-08-028
Field Logbook No.	EL-1652-06
COA	RUPN06N6WO
Method of Shipment	Fed-Ex
Shipped To	~~EBERLINE SERVICES~~ LIONVILLE
Offsite Property No.	A110476
Bill of Lading/Air Bill No.	See OSPC

POSSIBLE SAMPLE HAZARDS/REMARKS

Potential Rad < DOT Limits AJ 8-8-12

Special Handling and/or Storage

Cool 4C

Preservation	Cool 4C	Cool 4C	Cool 4C	Cool 4C	Cool 4C	None	None	None	None	None
Type of Container	G/P	G/P	G/P	G	aG	G/P	G/P	G/P	G/P	G/P
No. of Container(s)	1	1	0	1	1	1	0	0	0	0
Volume	120mL	60mL	120mL	120mL	120mL	500mL	500mL	500mL	500mL	500mL
SAMPLE ANALYSIS	See item (1) in Special Instructions.	Chromium Hex - 7196	See item (2) in Special Instructions.	TPH-Diesel Range - WTPH-D +	PAHs - 8310	See item (3) in Special Instructions. RCF	Isotopic Uranium	Isotopic Thorium	Isotopic Plutonium	Carbon-14 Low Level

Sample No.	Matrix *	Sample Date	Sample Time	(1)	Cr Hex	(2)	TPH	PAHs	(3)				
J1PWW1	SOIL	8-7-12	1115	X	X	X	X	X	34155				
J1PWW2	SOIL	8-7-12	1005	X	X	X	X	X					
J1PWW3	SOIL	8-7-12	1105	X	X	X	X	X	34156				
J1PWW4	SOIL	8-7-12	1015	X	X	X	X	X					
J1PWW5	SOIL	8-7-12	1012	X	X	X	X	X					

(Unused columns lined out, AJ 8/13/12)

CHAIN OF POSSESSION — Sign/Print Names

Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Quincy Stowe	8/7/12 1240	Dennis Newman	8/7/12 1240
Dennis Newman	8/7/12 1435	A. Freier 1060 #3	8-7-12 1435
A. Freier WCH 1060 #3	8-8-12 1315	Fed Ex	
Fed Ex	8/9/12 0945	Victor Hernandez	8-9-12 0945

SPECIAL INSTRUCTIONS

(1) ICP Metals - 6010TR (Close-out List) {Aluminum, Antimony, Arsenic, Barium, Beryllium, Boron, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Molybdenum, Nickel, Potassium, Selenium, Silicon, Silver, Sodium, Vanadium, Zinc}; Mercury - 7471 - (CV)
(2) IC Anions - 300.0 {Bromide, Chloride, Fluoride, Nitrate, Nitrite, Phosphate, Sulfate}; NO2/NO3 - 353.2; pH (Soil) - 9045
(3) Gamma Spec (Client List) {Americium-241, Cesium-137, Cobalt-60, Europium-152, Europium-154, Europium-155, Radium-226}

REVIEWED BY DWShea DATE 8/8/12

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

WCH-EE-011

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000000005

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

RC-189-088 | Page 2 of 13

Washington Closure Hanford	**Company Contact** Joan Kessner	**Telephone No.** 375-4688	**Project Coordinator** KESSNER, JH
Collector Q-Stone	**Sampling Location** UPR-100-N-6 Verification Sample		**SAF No.** RG-189
Project Designation 100N Field Remediation Soil Full Protocol	**Field Logbook No.** EL-1652-06	**COA** RUPN062000	**Method of Shipment** Fed Ex
Ice Chest No. RCC-08-028			**Bill of Lading/Air Bill No.** See OSPC
Shipped To ~~BIBERLINE SERVICES~~ LIONVILLE	**Offsite Property No.** A110476		

Price Code 8L 8C 8N | **Data Turnaround** 21 Days

POSSIBLE SAMPLE HAZARDS/REMARKS
Potential Rad LDDT Limits AJ 8-8-12

Special Handling and/or Storage
Cool 4C

Preservation	Cool 4C	Cool 4C	Cool 4C	Cool 4C	Cool 4C	None	None	None	None	None
Type of Container	G/P	G/P	G/P	G	aG	G/P	G/P	G/P	G/P	G/P
No. of Container(s)	1	1	0	1	1	1	2	0	0	0
Volume	120mL	60mL	120mL	120mL	120mL	500mL	500mL	500mL	500mL	500mL
SAMPLE ANALYSIS	See item (1) in Special Instructions.	Chromium Hex - 7196	See item (2) in Special Instructions.	TPH-Diesel Range - WTPH-D +	PAHs - 8310	See item (3) in Special Instructions. RCF	Isotopic Uranium	Isotopic Thorium 8/31/12	Isotopic Plutonium	Carbon-14 Low Level
Sample No. / Matrix * / Sample Date / Sample Time										
J1PWW6 / SOIL / 8-7-12 / 1057	X	X	X	X	X					
J1PWW7 / SOIL / 8-7-12 / 1052	X	X	X	X	X	34157				
J1PWW8 / SOIL / 8-7-12 / 1045	X	X	X	X	X					
J1PWW9 / SOIL / 8-7-12 / 1040	X	X	X	X	X					
J1PWX0 / SOIL / 8-7-12 / 1035	X	X	X	X	X					

CHAIN OF POSSESSION — Sign/Print Names

Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Quincy Stone	8/7/12 1240	Dennis Newman	8/7/12 1240
Dennis Newman	8/7/12 1435	A. Freier	8-7-12 1060#3 1435
A. Freier	8-8-12 1315	Fed Ex	
	8-9-12 0945	Victor Hernandez	8-9-12 0945

SPECIAL INSTRUCTIONS

(1) ICP Metals - 6010TR (Close-out List) (Aluminum, Antimony, Arsenic, Barium, Beryllium, Boron, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Molybdenum, Nickel, Potassium, Selenium, Silicon, Silver, Sodium, Vanadium, Zinc); Mercury - 7471 - (CV)
(2) IC Anions - 300.0 (Bromide, Chloride, Fluoride, Nitrate, Nitrite, Phosphate, Sulfate); NO2/NO3 - 353.2; pH (Soil) - 9045
(3) Gamma Spec (Client List) (Americium-241, Cesium-137, Cobalt-60, Europium-152, Europium-154, Europium-155, Radium-226)

REVIEWED BY NWSkea DATE 8/8/12

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

Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time

Title | Date/Time

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

WCH-EE-011

RC-189-088 | Page 1 of 13 (DA 7/31/12)

Washington Closure Hanford
CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

Collector: Q. Stowe

Company Contact: Joan Kessner | Telephone No.: 375-4688

Project Coordinator: KESSNER, JH

Price Code: 8L 8C (7/31/12)

Data Turnaround: 21 Days

Project Designation: 100N Field Remediation - Soil Full Protocol

Sampling Location: UPR-100-N-6 Verification Samples

SAF No.: RC-189

Ice Chest No.: RCC-08-028

Field Logbook No.: EL-1652-06

COA: ~~RUPN062000~~ RUPMO6N6WO (8/7/12)

Method of Shipment: Fed Ex

Shipped To: ~~EBERLINE SERVICES~~ LIONVILLE (7/31/12)

Offsite Property No.: A110476

Bill of Lading/Air Bill No.: See OSPC

POSSIBLE SAMPLE HAZARDS/REMARKS

Potential Rad < DOT Limits (AJ 8-8-12)

Special Handling and/or Storage

Cool 4C

Preservation				Cool 4C	Cool 4C	Cool 4C	Cool 4C	Cool 4C	None	None	None	None	None
Type of Container				G/P	G/P	G/P	G	aG	G/P	G/P	G/P	G/P	G/P
No. of Container(s)				1	1	0	1	1	1	0	0	0	0
Volume				120mL	60mL	120mL	120mL	120mL	500mL	500mL	500mL	500mL	500mL
SAMPLE ANALYSIS				See item (1) in Special Instructions.	Chromium Hex - 7196	See item (2) in Special Instructions.	TPH-Diesel Range - WTPH-D +	PAHs - 8310	See item (3) in Special Instructions.	Isotopic Uranium	Isotopic Thorium	Isotopic Plutonium	Carbon-14 Low Level
									RCF				
Sample No.	**Matrix ***	**Sample Date**	**Sample Time**										
J1PWX1	SOIL	8-7-12	1030	X	X	X	X	X	34158				
J1PWX2	SOIL	8-7-12	1025	X	X	X	X	X					
J1PWX3	SOIL	8-7-12	1015	X	X	X	X	X					
J1PWX4	SOIL	8-7-12	1110	X	~~DA 7/31/12~~								

(Columns Isotopic Uranium through Carbon-14 lined out, 7/31/12)

CHAIN OF POSSESSION	Date/Time	Sign/Print Names Received By/Stored In	Date/Time
Relinquished By/Removed From: Quincy Stowe	8/7/12 1240	Dennis Newman	8/7/12 1240
Relinquished By/Removed From: Dennis Newman	8/7/12 1435	A. Freier (1060#3)	8-7-12 1435
Relinquished By/Removed From: A. Freier (WCH 1060#3)	8-8-12 1315	Fed Ex	
Relinquished By/Removed From: Fed Ex	8-9-12 0945	Victor Hernandez	8-9-12 0945
Relinquished By/Removed From		Received By/Stored In	
Relinquished By/Removed From		Received By/Stored In	

SPECIAL INSTRUCTIONS

(1) ICP Metals - 6010TR (Close-out List) {Aluminum, Antimony, Arsenic, Barium, Beryllium, Boron, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Molybdenum, Nickel, Potassium, Selenium, Silicon, Silver, Sodium, Vanadium, Zinc}; Mercury - 7471 - (CV)
(2) IC Anions - 300.0 {Bromide, Chloride, Fluoride, Nitrate, Nitrite, Phosphate, Sulfate}; NO2/NO3 - 353.2; pH (Soil) - 9045
(3) Gamma Spec (Client List) {Americium-241, Cesium-137, Cobalt-60, Europium-152, Europium-154, Europium-155, Radium-226}

REVIEWED BY [signature] DATE 8/8/12

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

18

Appendix 5

Data Validation Supporting Documentation

GENERAL ORGANIC DATA VALIDATION CHECKLIST

VALIDATION LEVEL:	A	B	C	D	E
PROJECT: UPR-100-N-6			DATA PACKAGE: K3969		
VALIDATOR: ELR		LAB: LLI		DATE: 9/18/12	
			SDG: K3969		

ANALYSES PERFORMED					
8015	8021	8141	8151	8315	
		WTPH-HCID	WTPH-G	WTPH-D	

SAMPLES/MATRIX:

J1PWW1 J1PWW2 J1PWW3 J1PWW4 J1PWW5
J1PWW6 J1PWW7 J1PWW8 J1PWW9 J1PWX0
J1PWY1 J1PWX2 J1PWX3

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)

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:

GENERAL 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: no FB

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 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: LCS- 489.- J all no DR

no M/D MS/MSD/LCS- J all

GENERAL ORGANIC 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:

6. HOLDING TIMES (all levels)

Samples properly preserved? (Yes) No N/A

Sample holding times acceptable? (Yes) No N/A

Comments:

GENERAL ORGANIC DATA VALIDATION CHECKLIST

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

Results reported for all requested analyses?	(Yes)	No	N/A
Results supported in the raw data? (Levels D, E)	Yes	No	(N/A)
Samples properly prepared? (Levels D, E)	Yes	No	(N/A)
Detection limits meet RDL?	Yes	(No)	N/A
Transcription/calculation errors? (Levels D, E)	Yes	No	(N/A)

Comments: all undetected NO am

9. SAMPLE CLEANUP (Levels D and E)

Fluoricil ® (or other aborbant) cleanup performed?	Yes	No	(N/A)
Lot check performed?	Yes	No	(N/A)
Check recoveries aceptable?	Yes	No	(N/A)
Check materials traceable?	Yes	No	(N/A)
Check materials Expired?	Yes	No	(N/A)
Analytical batch QC given similar cleanup?	Yes	No	(N/A)
Transcription/Calculation Errors?	Yes	No	(N/A)

Comments:

Appendix 6

Additional Documentation Requested by Client

LIONVILLE LABORATORY
A division of Quantum Analytical Corporation

264 Welsh Pool Road
Exton, PA 19341
Phone: 610-280-3000
Fax: 610-280-3041

WC-Hanford, Inc. 2620 Fermi Avenue Richland WA, 99354	Project: RC-189 Project Number: K3969 Project Manager: Joan Kessner	**Reported:** 08/20/2012 12:31

Extractable Petroleum Hydrocarbons by SW846 8015 - Quality Control
Lionville Laboratory

Analyte	Result and Qualifiers	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch L208111 - SW 3540C									
Blank (L208111-BLK1)			Prepared: 08/14/2012 Analyzed: 08/17/2012						
Diesel Range Organics	3330 U	3330	ug/kg wet						
Motor Oil	10000 U	10000	ug/kg wet						
Surrogate: p-Terphenyl	*5840*		*ug/kg wet*	*6666.7*		*88*	*39-129*		
LCS (L208111-BS1)			Prepared: 08/14/2012 Analyzed: 08/17/2012						
Diesel Range Organics	32000	3330	ug/kg wet	66667		48	42-133		
Surrogate: p-Terphenyl	*3550*		*ug/kg wet*	*6666.7*		*53*	*39-129*		
Matrix Spike (L208111-MS1)	**Source: 1208031-01**		Prepared: 08/14/2012 Analyzed: 08/17/2012						
Diesel Range Organics	45000	3330	ug/kg dry	66573	1900	65	42-133		
Surrogate: p-Terphenyl	*5520*		*ug/kg dry*	*6657.3*		*83*	*39-129*		
Matrix Spike Dup (L208111-MSD1)	**Source: 1208031-01**		Prepared: 08/14/2012 Analyzed: 08/17/2012						
Diesel Range Organics	45800	3310	ug/kg dry	66199	1900	66	42-133	2	40
Surrogate: p-Terphenyl	*5410*		*ug/kg dry*	*6619.9*		*82*	*39-129*		

Date: 20 September 2012
To: Washington Closure Hanford Inc. (technical representative)
From: ELR Consulting
Project: 100N Field Remediation – Soil Full Protocol - Waste Site UPR-100-N-6
Subject: Inorganics - Data Package No. K3969-LLI

INTRODUCTION

This memo presents the results of data validation on Data Package No. K3969 prepared by Lionville Laboratories Inc. (LLI). A list of samples validated along with the analyses reported and the method of analysis is provided in the following table.

Sample ID	Sample Date	Media	Validation	Analyte
J1PWW1	8/7/12	Soil	C	See note 1
J1PWW2	8/7/12	Soil	C	See note 1
J1PWW3	8/7/12	Soil	C	See note 1
J1PWW4	8/7/12	Soil	C	See note 1
J1PWW5	8/7/12	Soil	C	See note 1
J1PWW6	8/7/12	Soil	C	See note 1
J1PWW7	8/7/12	Soil	C	See note 1
J1PWW8	8/7/12	Soil	C	See note 1
J1PWW9	8/7/12	Soil	C	See note 1
J1PWX0	8/7/12	Soil	C	See note 1
J1PWX1	8/7/12	Soil	C	See note 1
J1PWX2	8/7/12	Soil	C	See note 1
J1PWX3	8/7/12	Soil	C	See note 1
J1PWX4	8/712	Soil	C	See note 1

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

Data validation was conducted in accordance with the Washington Closure Hanford (WCH) validation statement of work and the 100-N Area Sampling and Analysis Plan for CERCLA Waste Sites (DOE/RL-2005-92, Rev. 0, October 2006). Appendices 1 through 6 provide the following information as indicated below:

Appendix 1. Glossary of Data Reporting Qualifiers
Appendix 2. Summary of Data Qualification
Appendix 3. 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 6 months for ICP metals and 28 days for mercury.

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 "UJ". 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 field blank (J1PWX4) was submitted for analysis. Eleven analytes were detected in the field blank. Under the WCH statement of work, no qualification is required.

Accuracy

Matrix Spike and Laboratory Control Sample

Matrix spike (MS) and laboratory control sample (LCS) analyses are used to assess the analytical accuracy of the reported data. The matrix spike is used to assess the effect of the matrix on the ability to accurately quantify sample concentrations. Recoveries must fall within the range of 70% to 130%. Samples with a recovery of less than 30% and a sample result below the IDL are rejected and flagged "UR". Samples with a recovery of 30% to 69% and a sample result less than the IDL are qualified "UJ". Samples with a recovery of greater than 130% or less than 70% and a sample result greater than the IDL are qualified as estimates and flagged "J". Finally, for samples with

a recovery greater than 130% and a sample result less than the IDL, no qualification is required.

Due to a matrix spike recovery outside QC limits, all antimony (32.3%) results were qualified as an estimate and flagged "J".

Due to LCS recoveries outside QC limits, all aluminum (148%), antimony (64.2%) and silicon (43.2%) results were qualified as estimates and flagged "J".

All other accuracy results were acceptable.

- **Precision**

Laboratory Duplicate Samples

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

Due to an RPD outside QC limits, all copper (85%) results were qualified as estimates and flagged "J".

All other laboratory duplicate results were acceptable.

Field Duplicate

One set of field duplicates (J1PWW4/J1PWX3) were submitted for analysis. Field duplicates are compared using the same criteria s for laboratory duplicates. All field duplicate results were acceptable.

- **Analytical Detection Levels**

Reported analytical detection levels are compared against the 100 Area RQLs to ensure that laboratory detection levels meet the required criteria. All results met the RQL.

- **Completeness**

Data package No. K3969 was submitted for validation and verified for completeness. Completeness is based on the percentage of data determined to be valid (i.e., not rejected). The completion percentage was 100%.

MAJOR DEFICIENCIES

None found.

MINOR DEFICIENCIES

The following minor deficiencies were noted:

- Due to a matrix spike recovery outside QC limits, all antimony (32.3%) results were qualified as an estimate and flagged "J".
- Due to LCS recoveries outside QC limits, all aluminum (148%), antimony (64.2%) and silicon (43.2%) results were qualified as estimates and flagged "J".
- Due to an RPD outside QC limits, all copper (85%) results were qualified as estimates and flagged "J".

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

REFERENCES

Washington Closure Hanford Contract #S00W307A00 (March 2008), *Data Validation Services*, March 2008.

DOE/RL-2005-92, Rev. 0, 100-N *Area Sampling and Analysis Plan for CERCLA Waste Sites*, U.S. Department of Energy, October 2006.

Appendix 1

Glossary of Data Reporting Qualifiers

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

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

UJ - Indicates the compound or analyte was analyzed for and not detected in the sample. Due to a minor QC deficiency identified during the data validation, the associated quantitation limit is an estimate.

J - Indicates the compound or analyte was analyzed for and detected. Due to a minor QC deficiency identified during the data validation, the associated concentration is an estimate, but the data are usable for decision-making purposes.

BJ - Applied to inorganic analyses only. Indicates the analyte concentration was greater than the IDL but less than the CRDL and is considered an estimated value.

R - Indicates the compound or analyte was analyzed for, detected, and due to an identified major QC deficiency, the data are unusable.

UR - Indicates the compound or analyte was analyzed for and not detected in the sample. Additionally, the data is unusable due to an identified major QC deficiency.

NJ - Indicates presumptive evidence of a compound at an estimated value. The data may not be valid for some specific applications (i.e., usable for decision-making purposes).

N - Indicates presumptive evidence of a compound. The data may not be valid for some specific applications (i.e., usable for decision-making purposes).

Appendix 2

Summary of Data Qualification

INORGANIC DATA QUALIFICATION SUMMARY*

SDG: K3969	**REVIEWER: ELR**	**Project: UPR-100-N-6**	**PAGE 1 OF 1**
COMPOUND	QUALIFIER	SAMPLES AFFECTED	REASON
Antimony	J	All	MS recovery
Aluminum Antimony Silicon	J	All	LCS recovery
Copper	J	All	RPD

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

Appendix 3

Annotated Laboratory Reports

LVL
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Phone: 610-280-3000
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WC-Hanford, Inc.
2620 Fermi Avenue
Richland WA, 99354

Project: RC-189
Project Number: K3969
Project Manager: Joan Kessner

Reported:
08/21/2012 08:22

J1PWW1
1208031-01 (Soil)

9/19/12

Lionville Laboratory

Analyte	Result and Qualifier	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method
Metals by SW846 6000/7000 series								
Aluminum	7440 J	4.56	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Antimony	0.547 U J	0.547	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Arsenic	2.86	0.912	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Barium	63.1	0.456	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Beryllium	0.257	0.182	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Boron	1.24 B	1.82	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Cadmium	0.104 B	0.182	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Calcium	5890	91.2	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Chromium	11.6	0.182	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Cobalt	5.71	1.82	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Copper	12.4 J	0.912	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Iron	17200	18.2	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Lead	3.64	0.456	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Magnesium	4070	68.4	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Manganese	278	4.56	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Molybdenum	0.361 B	1.82	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Nickel	10.0	3.65	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Potassium	1260	365	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Selenium	0.274 U	0.274	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Silicon	439 J	1.82	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Silver	0.182 U	0.182	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Sodium	234	45.6	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Vanadium	40.9	2.28	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Zinc	36.6	9.12	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Mercury	0.0244 U	0.0244	mg/kg dry	1	L208113	08/15/2012	08/16/2012	7471A

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J1PWW2
1208031-02 (Soil)

9/19/12

Analyte	Result and Qualifier	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method
Lionville Laboratory								
Metals by SW846 6000/7000 series								
Aluminum	6580 J	4.98	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Antimony	0.598 U J	0.598	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Arsenic	5.42	0.996	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Barium	41.8	0.498	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Beryllium	0.273	0.199	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Boron	1.24 B	1.99	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Cadmium	0.0749 B	0.199	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Calcium	11200	99.6	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Chromium	6.47	0.199	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Cobalt	6.02	1.99	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Copper	16.3 J	0.996	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Iron	18400	19.9	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Lead	3.83	0.498	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Magnesium	4270	74.7	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Manganese	252	4.98	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Molybdenum	0.556 B	1.99	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Nickel	7.55	3.98	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Potassium	881	398	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Selenium	0.299 U	0.299	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Silicon	754 J	1.99	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Silver	0.199 U	0.199	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Sodium	499	49.8	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Vanadium	51.7	2.49	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Zinc	42.3	9.96	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Mercury	0.0264 U	0.0264	mg/kg dry	1	L208113	08/15/2012	08/16/2012	7471A

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Project: RC-189
Project Number: K3969
Project Manager: Joan Kessner

Reported:
08/21/2012 08:22

J1PWW3 9/19/12
1208031-03 (Soil)

Lionville Laboratory

Analyte	Result and Qualifier	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method
Metals by SW846 6000/7000 series								
Aluminum	7820 J	4.08	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Antimony	0.489 UJ	0.489	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Arsenic	3.03	0.815	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Barium	65.5	0.408	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Beryllium	0.286	0.163	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Boron	1.26 B	1.63	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Cadmium	0.0907 B	0.163	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Calcium	4280	81.5	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Chromium	11.4	0.163	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Cobalt	5.80	1.63	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Copper	13.1 J	0.815	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Iron	17100	16.3	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Lead	3.91	0.408	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Magnesium	4350	61.1	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Manganese	276	4.08	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Molybdenum	0.374 B	1.63	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Nickel	10.5	3.26	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Potassium	1300	326	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Selenium	0.245 U	0.245	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Silicon	186 J	1.63	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Silver	0.163 U	0.163	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Sodium	210	40.8	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Vanadium	41.1	2.04	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Zinc	35.6	8.15	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Mercury	0.0280 U	0.0280	mg/kg dry	1	L208113	08/15/2012	08/16/2012	7471A

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J1PWW4
1208031-04 (Soil)

9/19/12

Analyte	Result and Qualifier	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method
Lionville Laboratory								
Metals by SW846 6000/7000 series								
Aluminum	6890 J	4.73	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Antimony	0.568 U J	0.568	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Arsenic	2.47	0.946	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Barium	56.9	0.473	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Beryllium	0.259	0.189	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Boron	1.73 B	1.89	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Cadmium	0.0950 B	0.189	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Calcium	4750	94.6	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Chromium	8.97	0.189	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Cobalt	6.13	1.89	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Copper	12.1 J	0.946	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Iron	17600	18.9	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Lead	3.68	0.473	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Magnesium	3810	70.9	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Manganese	280	4.73	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Molybdenum	0.465 B	1.89	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Nickel	9.04	3.78	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Potassium	1140	378	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Selenium	0.284 U	0.284	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Silicon	499 J	1.89	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Silver	0.189 U	0.189	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Sodium	281	47.3	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Vanadium	43.9	2.36	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Zinc	37.0	9.46	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Mercury	0.0306 U	0.0306	mg/kg dry	1	L208113	08/15/2012	08/16/2012	7471A

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Project: RC-189
Project Number: K3969
Project Manager: Joan Kessner

Reported:
08/21/2012 08:22

J1PWW5
1208031-05 (Soil)

9/19/12

Lionville Laboratory

Analyte	Result and Qualifier	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method
Metals by SW846 6000/7000 series								
Aluminum	6020 J	4.40	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Antimony	0.527 U J	0.527	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Arsenic	4.54	0.879	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Barium	42.4	0.440	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Beryllium	0.228	0.176	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Boron	1.25 B	1.76	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Cadmium	0.0962 B	0.176	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Calcium	9190	87.9	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Chromium	7.37	0.176	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Cobalt	5.59	1.76	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Copper	13.2 J	0.879	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Iron	16800	17.6	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Lead	4.06	0.440	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Magnesium	3800	65.9	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Manganese	271	4.40	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Molybdenum	0.407 B	1.76	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Nickel	7.97	3.52	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Potassium	1060	352	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Selenium	0.264 U	0.264	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Silicon	169 J	1.76	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Silver	0.176 U	0.176	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Sodium	229	44.0	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Vanadium	43.4	2.20	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Zinc	38.6	8.79	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Mercury	0.0242 U	0.0242	mg/kg dry	1	L208113	08/15/2012	08/16/2012	7471A

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WC-Hanford, Inc. 2620 Fermi Avenue Richland WA, 99354	Project: RC-189 Project Number: K3969 Project Manager: Joan Kessner	**Reported:** 08/21/2012 08:22

J1PWW6
1208031-06 (Soil)

V 9/18/12

Analyte	Result and Qualifier	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method
Lionville Laboratory								
Metals by SW846 6000/7000 series								
Aluminum	7620 J	4.50	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Antimony	0.540 U J	0.540	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Arsenic	2.98	0.899	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Barium	56.1	0.450	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Beryllium	0.276	0.180	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Boron	1.58 B	1.80	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Cadmium	0.102 B	0.180	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Calcium	5200	89.9	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Chromium	11.4	0.180	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Cobalt	5.79	1.80	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Copper	14.2 J	0.899	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Iron	17600	18.0	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Lead	4.61	0.450	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Magnesium	3900	67.5	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Manganese	285	4.50	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Molybdenum	0.417 B	1.80	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Nickel	10.9	3.60	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Potassium	1360	360	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Selenium	0.270 U	0.270	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Silicon	179 J	1.80	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Silver	0.180 U	0.180	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Sodium	225	45.0	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Vanadium	43.2	2.25	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Zinc	38.8	8.99	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Mercury	0.0239 U	0.0239	mg/kg dry	1	L208113	08/15/2012	08/16/2012	7471A

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J1PWW7 9/19/12

1208031-07 (Soil)

Lionville Laboratory

Analyte	Result and Qualifier	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method
Metals by SW846 6000/7000 series								
Aluminum	7710 J	4.37	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Antimony	0.524 U J	0.524	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Arsenic	2.78	0.873	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Barium	53.3	0.437	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Beryllium	0.273	0.175	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Boron	1.24 B	1.75	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Cadmium	0.0949 B	0.175	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Calcium	4330	87.3	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Chromium	11.5	0.175	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Cobalt	5.76	1.75	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Copper	14.6 J	0.873	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Iron	17200	17.5	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Lead	4.27	0.437	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Magnesium	3830	65.5	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Manganese	278	4.37	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Molybdenum	0.348 B	1.75	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Nickel	10.8	3.49	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Potassium	1320	349	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Selenium	0.262 U	0.262	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Silicon	186 J	1.75	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Silver	0.175 U	0.175	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Sodium	265	43.7	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Vanadium	43.7	2.18	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Zinc	35.7	8.73	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Mercury	0.0285 U	0.0285	mg/kg dry	1	L208113	08/15/2012	08/16/2012	7471A

LVL
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WC-Hanford, Inc.
2620 Fermi Avenue
Richland WA, 99354

Project: RC-189
Project Number: K3969
Project Manager: Joan Kessner

Reported:
08/21/2012 08:22

J1PWW8
1208031-08 (Soil)

9/19/12

Analyte	Result and Qualifier	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method
Lionville Laboratory								
Metals by SW846 6000/7000 series								
Aluminum	7110 J	4.11	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Antimony	0.494 U J	0.494	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Arsenic	2.83	0.823	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Barium	62.2	0.411	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Beryllium	0.234	0.165	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Boron	1.03 B	1.65	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Cadmium	0.0933 B	0.165	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Calcium	6520	82.3	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Chromium	15.8	0.165	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Cobalt	5.29	1.65	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Copper	13.6 J	0.823	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Iron	15800	16.5	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Lead	3.59	0.411	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Magnesium	3760	61.7	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Manganese	270	4.11	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Molybdenum	0.368 B	1.65	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Nickel	12.9	3.29	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Potassium	1080	329	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Selenium	0.247 U	0.247	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Silicon	484 J	1.65	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Silver	0.165 U	0.165	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Sodium	258	41.1	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Vanadium	40.5	2.06	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Zinc	36.6	8.23	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Mercury	0.0274 U	0.0274	mg/kg dry	1	L208113	08/15/2012	08/16/2012	7471A

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WC-Hanford, Inc. 2620 Fermi Avenue Richland WA, 99354	Project: RC-189 Project Number: K3969 Project Manager: Joan Kessner	**Reported:** 08/21/2012 08:22

J1PWW9
1208031-09 (Soil)

V 9/19/12

Analyte	Result and Qualifier	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method
Lionville Laboratory								
Metals by SW846 6000/7000 series								
Aluminum	7470 J	4.11	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Antimony	0.493 UJ	0.493	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Arsenic	2.60	0.822	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Barium	53.0	0.411	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Beryllium	0.265	0.164	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Boron	1.33 B	1.64	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Cadmium	0.0979 B	0.164	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Calcium	4340	82.2	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Chromium	11.9	0.164	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Cobalt	5.31	1.64	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Copper	13.2 J	0.822	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Iron	16100	16.4	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Lead	4.30	0.411	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Magnesium	3750	61.7	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Manganese	266	4.11	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Molybdenum	0.312 B	1.64	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Nickel	9.71	3.29	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Potassium	1320	329	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Selenium	0.247 U	0.247	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Silicon	184 J	1.64	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Silver	0.164 U	0.164	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Sodium	247	41.1	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Vanadium	38.8	2.06	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Zinc	36.3	8.22	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Mercury	0.0266 U	0.0266	mg/kg dry	1	L208113	08/15/2012	08/16/2012	7471A

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WC-Hanford, Inc. 2620 Fermi Avenue Richland WA, 99354	Project: RC-189 Project Number: K3969 Project Manager: Joan Kessner	**Reported:** 08/21/2012 08:22

J1PWX0
1208031-10 (Soil)

9/19/12

Lionville Laboratory

Analyte	Result and Qualifier	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method
Metals by SW846 6000/7000 series								
Aluminum	6980 J	4.35	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Antimony	0.522 U J	0.522	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Arsenic	2.31	0.870	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Barium	66.0	0.435	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Beryllium	0.259	0.174	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Boron	1.23 B	1.74	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Cadmium	0.0946 B	0.174	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Calcium	6380	87.0	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Chromium	9.40	0.174	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Cobalt	5.41	1.74	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Copper	12.6 J	0.870	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Iron	16900	17.4	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Lead	3.41	0.435	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Magnesium	4240	65.3	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Manganese	265	4.35	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Molybdenum	0.339 B	1.74	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Nickel	9.48	3.48	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Potassium	1380	348	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Selenium	0.261 U	0.261	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Silicon	278 J	1.74	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Silver	0.174 U	0.174	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Sodium	2890	43.5	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Vanadium	41.1	2.18	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Zinc	36.0	8.70	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Mercury	0.0275 U	0.0275	mg/kg dry	1	L208113	08/15/2012	08/16/2012	7471A

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WC-Hanford, Inc. 2620 Fermi Avenue Richland WA, 99354	Project: RC-189 Project Number: K3969 Project Manager: Joan Kessner	**Reported:** 08/21/2012 08:22

J1PWX1
1208031-11 (Soil)

9/19/12

Analyte	Result and Qualifier	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method
Lionville Laboratory								
Metals by SW846 6000/7000 series								
Aluminum	5560 J	4.78	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Antimony	0.574 U J	0.574	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Arsenic	2.49	0.956	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Barium	50.8	0.478	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Beryllium	0.207	0.191	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Boron	0.999 B	1.91	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Cadmium	0.0825 B	0.191	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Calcium	10600	95.6	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Chromium	9.62	0.191	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Cobalt	5.58	1.91	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Copper	13.3 J	0.956	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Iron	17100	19.1	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Lead	5.80	0.478	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Magnesium	4150	71.7	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Manganese	258	4.78	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Molybdenum	0.313 B	1.91	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Nickel	8.63	3.82	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Potassium	959	382	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Selenium	0.287 U	0.287	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Silicon	206 J	1.91	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Silver	0.191 U	0.191	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Sodium	216	47.8	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Vanadium	39.7	2.39	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Zinc	38.8	9.56	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Mercury	0.0294 U	0.0294	mg/kg dry	1	L208113	08/15/2012	08/16/2012	7471A

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WC-Hanford, Inc. 2620 Fermi Avenue Richland WA, 99354	Project: RC-189 Project Number: K3969 Project Manager: Joan Kessner	**Reported:** 08/21/2012 08:22

J1PWX2
1208031-12 (Soil)

9/15/12

Analyte	Result and Qualifier	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method
Lionville Laboratory								
Metals by SW846 6000/7000 series								
Aluminum	3150 J	4.48	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Antimony	0.538 U J	0.538	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Arsenic	1.52	0.896	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Barium	45.3	0.448	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Beryllium	0.174 B	0.179	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Boron	1.79 U	1.79	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Cadmium	0.0668 B	0.179	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Calcium	4920	89.6	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Chromium	2.69	0.179	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Cobalt	6.93	1.79	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Copper	11.6 J	0.896	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Iron	23400	17.9	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Lead	2.13	0.448	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Magnesium	3810	67.2	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Manganese	285	4.48	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Molybdenum	0.397 B	1.79	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Nickel	5.88	3.58	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Potassium	434	358	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Selenium	0.269 U	0.269	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Silicon	129 J	1.79	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Silver	0.179 U	0.179	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Sodium	240	44.8	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Vanadium	68.1	2.24	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Zinc	71.5	8.96	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Mercury	0.0251 U	0.0251	mg/kg dry	1	L208113	08/15/2012	08/16/2012	7471A

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WC-Hanford, Inc.
2620 Fermi Avenue
Richland WA, 99354

Project: RC-189
Project Number: K3969
Project Manager: Joan Kessner

Reported:
08/21/2012 08:22

J1PWX3
1208031-13 (Soil)

9/19/12

Lionville Laboratory

Analyte	Result and Qualifier	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method
Metals by SW846 6000/7000 series								
Aluminum	6920 J	4.52	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Antimony	0.543 U J	0.543	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Arsenic	2.48	0.905	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Barium	57.8	0.452	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Beryllium	0.261	0.181	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Boron	2.58	1.81	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Cadmium	0.0973 B	0.181	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Calcium	5290	90.5	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Chromium	9.33	0.181	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Cobalt	5.92	1.81	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Copper	12.6 J	0.905	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Iron	17300	18.1	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Lead	3.83	0.452	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Magnesium	3590	67.8	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Manganese	290	4.52	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Molybdenum	0.464 B	1.81	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Nickel	8.89	3.62	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Potassium	1150	362	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Selenium	0.271 U	0.271	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Silicon	180 J	1.81	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Silver	0.181 U	0.181	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Sodium	299	45.2	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Vanadium	41.2	2.26	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Zinc	41.1	9.05	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Mercury	0.0276 U	0.0276	mg/kg dry	1	L208113	08/15/2012	08/16/2012	7471A

000000055

LVL
LIONVILLE LABORATORY, Inc.
A division of Severn Trent Laboratories Corporation

264 Welsh Pool Road
Exton, PA 19341
Phone: 610-280-3000
Fax: 610-280-3041

WC-Hanford, Inc. 2620 Fermi Avenue Richland WA, 99354	Project: RC-189 Project Number: K3969 Project Manager: Joan Kessner	**Reported:** 08/21/2012 08:22

J1PWX4
1208031-14 (Soil)

9/19/12

Analyte	Result and Qualifier	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method
Lionville Laboratory								
Metals by SW846 6000/7000 series								
Aluminum	**201** J	4.72	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Antimony	0.566 U J	0.566	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Arsenic	0.943 U	0.943	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Barium	**2.05**	0.472	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Beryllium	0.189 U	0.189	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Boron	1.89 U	1.89	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Cadmium	0.189 U	0.189	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Calcium	**30.4** B	94.3	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Chromium	0.189 U	0.189	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Cobalt	1.89 U	1.89	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Copper	0.943 U J	0.943	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Iron	**297**	18.9	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Lead	**0.511**	0.472	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Magnesium	**19.5** B	70.8	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Manganese	**8.21**	4.72	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Molybdenum	1.89 U	1.89	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Nickel	3.77 U	3.77	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Potassium	**44.1** B	377	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Selenium	0.283 U	0.283	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Silicon	**130** J	1.89	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Silver	0.189 U	0.189	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Sodium	47.2 U	47.2	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Vanadium	**0.368** B	2.36	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Zinc	**1.28** B	9.43	mg/kg dry	1	L208078	08/12/2012	08/17/2012	6010B
Mercury	0.0290 U	0.0290	mg/kg dry	1	L208113	08/15/2012	08/16/2012	7471A

000000056

Appendix 4

Laboratory Narrative and Chain-of-Custody Documentation

LIONVILLE LABORATORY
A division of Eberline Analytical Corporation

264 Welsh Pool Road
Exton, Pennsylvania 19341
Phone (610) 280-3000
Fax (610) 280-3041

Case Narrative

Client: WC-HANFORD RC-189
LVL#: 1208031
SDG/SAF#: K3969/RC-189

W.O.#: 60049-001-001-0001-00
Date Received: 08-09-12

METALS

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

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

1. This narrative covers the analyses of 14 soil samples.

2. The samples were prepared and analyzed in accordance with methods listed on the data report forms.

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

4. Please refer to the Sample Receipt Check List for any sample discrepancies in LvL's sample acceptance policy.

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

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

7. All preparation/method blanks (MB) were within method criteria {less than the Limit of Quantitation, or samples were greater than 20X MB value}.

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

9. All Standard Reference Material (SRM) analytes were within the Prediction Interval control limits supplied by the manufacturer.

10. The matrix spike (MS) recoveries for 8 analytes were outside the 75-125% control limits.

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

following analytes:

Sample ID	Element	PDS Concentration (ppb)	PDS % Recovery
J1PWW1	Aluminum	22,000	83.3
	Antimony	100	93.5
	Boron	100	91.6
	Iron	42,000	62.1
	Lead	100	88.8
	Magnesium	21,600	81.3
	Manganese	1,000	77.8
	Silicon	2,600	131.9

12. The duplicate analyses for 3 analytes were outside the 20% Relative Percent Difference (RPD) control limit critieria. The ± 20% RPD control limit applies to sample results greater than ten times the MDL. The sample result for Molybdenum was less than ten times the MDL.

13. For the purposes of this report, the data have been reported to the Limit of Detection (LOD). Values between the LOD and the Limit of Quantitation (LOQ) are acquired in a region of less-certain quantification.

14. LvL is NELAP accredited by the State of Pennsylvania. For a complete listing of accrediting authorities and the corresponding analytes/methods, please contact your Project Manager.

15. 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.

8/21/12
Date

Iain Daniels
Laboratory Manager
Lionville Laboratory

alm/08-031hg%

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

RC-189-088 | Page 1 of 3

Washington Closure Hanford	**Company Contact** Joan Kessner	**Telephone No.** 375-4688	**Project Coordinator** KESSNER, JH
Collector Q. Stowe	**Sampling Location** UPR-100-N-6 Verification Sample		**SAF No.** RC-189
Project Designation 100N Field Remediation Soil Full Protocol	**Field Logbook No.** EL-1652-06	**COA** RUPN062000	**Method of Shipment** Fed-Ex
Ice Chest No. RCC-08-028	**Offsite Property No.** A110476		**Bill of Lading/Air Bill No.** See OSPC
Shipped To EDERLINE SERVICES LIONVILLE			

Price Code 8L 8C **Data Turnaround** 21 Days 15

POSSIBLE SAMPLE HAZARDS/REMARKS
Potential Rad < DOT Limits
AJ 8-8-12

Special Handling and/or Storage
Cool 4C

Preservation	Cool 4C	Cool 4C	Cool 4C	Cool 4C	Cool 4C	None	None	None	None	None
Type of Container	G/P	G/P	G/P	G	aG	G/P	G/P	G/P	G/P	G/P
No. of Container(s)	1	1	0	1	1	1	1	0	0	0
Volume	120mL	60mL	120mL	120mL	120mL	500mL	500mL	500mL	500mL	500mL
SAMPLE ANALYSIS	See item (1) in Special Instructions.	Chromium Hex - 7196	See item (2) in Special Instructions.	TPH-Diesel Range - WTPH-D +	PAHs - 8310	See item (3) in Special Instructions. RCF	Isotopic Uranium	Isotopic Thorium	Isotopic Plutonium	Carbon-14 Low Level
Sample No. / Matrix * / Sample Date / Sample Time										
J1PWW1 SOIL 8-7-12 1115	X	X	X	X	X	34155				
J1PWW2 SOIL 8-7-12 1005	X	X	X	X	X					
J1PWW3 SOIL 8-7-12 1105	X	X	X	X	X	34156				
J1PWW4 SOIL 8-7-12 1015	X	X	X	X	X					
J1PWW5 SOIL 8-7-12 1012	X	X	X	X	X					

CHAIN OF POSSESSION — Sign/Print Names

Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Quincy Stowe	8/7/12 1240	Dennis Newman	8/7/12 1240
Dennis Newman	8/7/12 1435	A. Freier 1060#3	8-7-12 1435
A. Freier	8-8-12 1315	Fed Ex	
Fed Ex	8/8/12 0945	Victor Hernandez	8-9-12 0945

SPECIAL INSTRUCTIONS

(1) ICP Metals - 6010TR (Close-out List) {Aluminum, Antimony, Arsenic, Barium, Beryllium, Boron, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Molybdenum, Nickel, Potassium, Selenium, Silicon, Silver, Sodium, Vanadium, Zinc}; Mercury - 7471 - (CV)
(2) IC Anions - 300.0 {Bromide, Chloride, Fluoride, Nitrate, Nitrite, Phosphate, Sulfate}; NO2/NO3 - 353.2; pH (Soil) - 9045
(3) Gamma Spec (Client List) {Americium-241, Cesium-137, Cobalt-60, Europium-152, Europium-154, Europium-155, Radium-226}

REVIEWED BY DWShea DATE 8/8/12

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

Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time

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

WCH-EE-011

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Washington Closure Hanford — CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

Collector: Q. Stowe

Company Contact: Joan Kessner — Telephone No.: 375-4688

Project Coordinator: KESSNER, JH

Price Code: 8C — Data Turnaround: 21 Days

Project Designation: 100N Field Remediation Soil Full Protocol

Sampling Location: UPR-100-N-6 Verification Sample

SAF No.: RC-189

Ice Chest No.: RCC-08-028

Field Logbook No.: EL-1652-06

COA: ~~RUPN062000~~ RC2RBA06CN6WO 8/3/12

Method of Shipment: Fed Ex

Shipped To: ~~EBERLINE SERVICES~~ LIONVILLE

Offsite Property No.: A110476

Bill of Lading/Air Bill No.: See OSPC

POSSIBLE SAMPLE HAZARDS/REMARKS

Potential Rad LDDT Limits A1 8-8-12

Special Handling and/or Storage

Cool 4C

Preservation				Cool 4C	Cool 4C	Cool 4C	Cool 4C	Cool 4C	None	None	None	None	None
Type of Container				G/P	G/P	G/P	G	aG	G/P	G/P	G/P	G/P	G/P
No. of Container(s)				1	1	0	1	1	1	0	0	0	0
Volume				120mL	60mL	120mL	120mL	120mL	500mL	500mL	500mL	500mL	500mL
SAMPLE ANALYSIS				See item (1) in Special Instructions.	Chromium Hex - 7196	See item (2) in Special Instructions.	TPH-Diesel Range - WTPH-D +	PAHs - 8310	See item (3) in Special Instructions. RCF	Isotopic Uranium	Isotopic Thorium	Isotopic Plutonium	Carbon-14 Low Level
Sample No.	Matrix *	Sample Date	Sample Time										
J1PWW6	SOIL	8-7-12	1057	X	X	X	X	X					
J1PWW7	SOIL	8-7-12	1052	X	X	X	X	X					
J1PWW8	SOIL	8-7-12	1045	X	X	X	X	X	34157				
J1PWW9	SOIL	8-7-12	1040	X	X	X	X	X					
J1PWX0	SOIL	8-7-12	1035	X	X	X	X	X					

(Columns None/Isotopic Uranium through Carbon-14 lined out, AC 7/31/12)

CHAIN OF POSSESSION — Sign/Print Names

Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Quincy Stowe	8/7/12 1240	Dennis Newman	8/7/12 1240
Dennis Newman	8/7/12 1435	A. Freier 1060#3	8-7-12 1435
A. Freier WCH 1060#3	8-8-12 1315	Fed Ex	
[illegible]	8-9-12 0945	Victor Hernandez	8-9-12 0945

SPECIAL INSTRUCTIONS

(1) ICP Metals - 6010TR (Close-out List) {Aluminum, Antimony, Arsenic, Barium, Beryllium, Boron, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Molybdenum, Nickel, Potassium, Selenium, Silicon, Silver, Sodium, Vanadium, Zinc}; Mercury - 7471 - (CV)
(2) IC Anions - 300.0 {Bromide, Chloride, Fluoride, Nitrate, Nitrite, Phosphate, Sulfate}; NO2/NO3 - 353.2; pH (Soil) - 9045
(3) Gamma Spec (Client List) {Americium-241, Cesium-137, Cobalt-60, ~~Europium-152~~, Europium-154, Europium-155, Radium-226}

REVIEWED BY DWShea DATE 8/8/12

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

WCH-EE-011

28

Washington Closure Hanford — CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

Collector	Q. Stowe
Company Contact	Joan Kessner
Telephone No.	375-4688
Project Coordinator	KESSNER, JH
Price Code	8L 8C
Data Turnaround	~~21 Days~~ 15 Days
Project Designation	100N Field Remediation - Soils Full Protocol
Sampling Location	UPR-100-N-6 Verification Samples
SAF No.	RC-189
Ice Chest No.	RCC-08-028
Field Logbook No.	EL-1652-06
COA	~~RUPN062000~~ RU PAM06N6W9
Method of Shipment	Fed Ex
Shipped To	~~EBERLINE SERVICES~~ LIONVILLE 7/31/12
Offsite Property No.	A110476
Bill of Lading/Air Bill No.	See OSPC

POSSIBLE SAMPLE HAZARDS/REMARKS
Potential Rad < DOT Limits AJ 8-8-12

Special Handling and/or Storage
Cool 4C

Preservation	Cool 4C	Cool 4C	Cool 4C	Cool 4C	Cool 4C	None	None	None	None	None
Type of Container	G/P	G/P	G/P	G	aG	G/P	G/P	G/P	G/P	G/P
No. of Container(s)	1	1	0	1	1	1	0	0	0	0
Volume	120mL	60mL	120mL	120mL	120mL	500mL	500mL	500mL	500mL	500mL
SAMPLE ANALYSIS	See item (1) in Special Instructions	Chromium Hex - 7196	See item (2) in Special Instructions.	TPH-Diesel Range - WTPH-D +	PAHs - 8310	See item (3) in Special Instructions.	Isotopic Uranium	Isotopic Thorium	Isotopic Plutonium	Carbon-14 Low Level
						RCF				

Sample No.	Matrix *	Sample Date	Sample Time	(1)	Cr Hex	(2)	TPH-D	PAHs	(3)	U	Th	Pu	C-14
J1PWX1	SOIL	8-7-12	1030	X	X	X	X	X					
J1PWX2	SOIL	8-7-12	1025	X	X	X	X	X	34158				
J1PWX3	SOIL	8-7-12	1015	X	X	X	X	X					
J1PWX4	SOIL	8-7-12	1110	X	~~D~~ 7/31/12								

CHAIN OF POSSESSION — Sign/Print Names

Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Quincy Stowe	8/7/12 1240	Dennis Newman	8/7/12 1240
Dennis Newman	8/7/12 1435	A. Freier 1060#3	8-7-12 1435
A. Freier WCH 1060#3	8-8-12 1315	Fed Ex	
Fed Ex	8-9-12 0945	Victor Hernandez	8-9-12 0945

SPECIAL INSTRUCTIONS
(1) ICP Metals - 6010TR (Close-out List) {Aluminum, Antimony, Arsenic, Barium, Beryllium, Boron, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Molybdenum, Nickel, Potassium, Selenium, Silicon, Silver, Sodium, Vanadium, Zinc}; Mercury - 7471 - (CV)
(2) IC Anions - 300.0 {Bromide, Chloride, Fluoride, Nitrate, Nitrite, Phosphate, Sulfate}; NO2/NO3 - 353.2; pH (Soil) - 9045
(3) Gamma Spec (Client List) {Americium-241, Cesium-137, Cobalt-60, Europium-152, Europium-154, Europium-155, Radium-226}

REVIEWED BY [signature] DATE 8/8/12

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

29

Appendix 5

Data Validation Supporting Documentation

INORGANIC ANALYSIS DATA VALIDATION CHECKLIST

VALIDATION LEVEL:	A	B	C	D	E
PROJECT: UPR-100-N-6			DATA PACKAGE: K3964		
VALIDATOR: ELR		LAB: LLI		DATE: 9/18/12	
			SDG: K3964		
ANALYSES PERFORMED					
SW-846/ICP	SW-846/GFAA	SW-846/Hg	SW-846 Cyanide		
SAMPLES/MATRIX					
J1PWW1 J1PWW2 J1PWW3 J1PWW4 J1PWW5					
J1PWW6 J1PWW7 J1PWW8 J1PWW9 J1PWX0					
J1PWX1 J1PWX2 J1PWX3 J1PWX4					
					5 of 1

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 (circled: N/A)
ICB and CCB results acceptable? (Levels D, E) .... Yes No N/A (circled: N/A)
Laboratory blanks analyzed? .... Yes No N/A (circled: Yes)
Laboratory blank results acceptable? .... Yes No N/A (circled: Yes)
Field blanks analyzed? (Levels C, D, E) .... Yes No N/A (circled: Yes)
Field blank results acceptable? (Levels C, D, E) .... Yes No N/A (circled: No)
Transcription/calculation errors? (Levels D, E) .... Yes No N/A (circled: N/A)

Comments:

FB - 11 detects

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

MS/MSD samples analyzed? .... Yes No N/A (circled: Yes)
MS/MSD results acceptable? .... Yes No N/A (circled: No)
MS/MSD standards NIST traceable? (Levels D, E) .... Yes No N/A (circled: N/A)
MS/MSD standards expired? (Levels D, E) .... Yes No N/A (circled: N/A)
LCS/BSS samples analyzed? .... Yes No N/A (circled: Yes)
LCS/BSS results acceptable? .... Yes No N/A (circled: No)
Standards traceable? (Levels D, E) .... Yes No N/A (circled: N/A)
Standards expired? (Levels D, E) .... Yes No N/A (circled: N/A)
Transcription/calculation errors? (Levels D, E) .... Yes No N/A (circled: N/A)
Performance audit sample(s) analyzed? .... Yes No N/A (circled: No)
Performance audit sample results acceptable? .... Yes No N/A (circled: N/A)

Comments: MS - antimony, - J all
LCS - al - 1 (48%) antimony (64%) silica (43%)

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: RPD - copper 85% - J all

FD - silica (94%)

6. ICP QUALITY CONTROL (Levels D and E)

ICP serial dilution samples analyzed? ..... Yes No (N/A)
ICP serial dilution %D values acceptable? ..... Yes No (N/A)
ICP post digestion spike required? ..... Yes No (N/A)
ICP post digestion spike values acceptable? ..... Yes No (N/A)
Standards traceable? ..... Yes No (N/A)
Standards expired? ..... Yes No (N/A)
Transcription/calculation errors? ..... Yes No (N/A)

Comments:

INORGANIC ANALYSIS DATA VALIDATION CHECKLIST

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

Duplicate injections performed as required?	Yes	No	N/A
Duplicate injection %RSD values acceptable?	Yes	No	N/A
Analytical spikes performed as required?	Yes	No	N/A
Analytical spike recoveries acceptable?	Yes	No	N/A
Standards traceable?	Yes	No	N/A
Standards expired?	Yes	No	N/A
MSA performed as required?	Yes	No	N/A
MSA results acceptable?	Yes	No	N/A
Transcription/calculation errors?	Yes	No	N/A

Comments:_____

8. HOLDING TIMES (all levels)

Samples properly preserved?	Yes	No	N/A
Sample holding times acceptable?	Yes	No	N/A

Comments:_____

INORGANIC ANALYSIS DATA VALIDATION CHECKLIST

9. RESULT QUANTITATION AND DETECTION LIMITS (all levels)

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

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

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

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

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

Comments: _____

Appendix 6

Additional Documentation Requested by Client

LVL
LIONVILLE LABORATORY
A division of Environmental Analytical Corporation

264 Welsh Pool Road
Exton, PA 19341
Phone: 610-280-3000
Fax: 610-280-3041

WC-Hanford, Inc. 2620 Fermi Avenue Richland WA, 99354	Project: RC-189 Project Number: K3969 Project Manager: Joan Kessner	**Reported:** 08/21/2012 08:22

Metals by SW846 6000/7000 series - Quality Control

Lionville Laboratory

Analyte	Result and Qualifiers		Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch L208078 - SW 3050B										
Blank (L208078-BLK1)				Prepared: 08/12/2012 Analyzed: 08/17/2012						
Aluminum	4.72	U	4.72	mg/kg wet						
Antimony	0.566	U	0.566	mg/kg wet						
Arsenic	0.943	U	0.943	mg/kg wet						
Barium	0.472	U	0.472	mg/kg wet						
Beryllium	0.189	U	0.189	mg/kg wet						
Boron	1.89	U	1.89	mg/kg wet						
Cadmium	0.189	U	0.189	mg/kg wet						
Calcium	94.3	U	94.3	mg/kg wet						
Chromium	0.189	U	0.189	mg/kg wet						
Cobalt	1.89	U	1.89	mg/kg wet						
Copper	0.943	U	0.943	mg/kg wet						
Iron	18.9	U	18.9	mg/kg wet						
Lead	0.472	U	0.472	mg/kg wet						
Magnesium	0.982	B	70.8	mg/kg wet						
Manganese	4.72	U	4.72	mg/kg wet						
Molybdenum	1.89	U	1.89	mg/kg wet						
Nickel	3.77	U	3.77	mg/kg wet						
Potassium	377	U	377	mg/kg wet						
Selenium	0.283	U	0.283	mg/kg wet						
Silicon	1.89	U	1.89	mg/kg wet						
Silver	0.189	U	0.189	mg/kg wet						
Sodium	47.2	U	47.2	mg/kg wet						
Vanadium	2.36	U	2.36	mg/kg wet						
Zinc	9.43	U	9.43	mg/kg wet						
Duplicate (L208078-DUP1)			Source: 1208031-01	Prepared: 08/12/2012 Analyzed: 08/17/2012						
Aluminum	6960		4.25	mg/kg dry		7440			6.66	20
Antimony	0.510	U	0.510	mg/kg dry		0.547 U				20
Arsenic	3.04		0.850	mg/kg dry		2.86			6.14	20
Barium	54.3		0.425	mg/kg dry		63.1			15.1	20
Beryllium	0.247		0.170	mg/kg dry		0.257			4.12	20
Boron	1.19	B	1.70	mg/kg dry		1.24			4.63	20
Cadmium	0.114	B	0.170	mg/kg dry		0.104			9.37	20
Calcium	5560		85.0	mg/kg dry		5890			5.82	20
Chromium	13.0		0.170	mg/kg dry		11.6			11.8	20
Cobalt	5.65		1.70	mg/kg dry		5.71			1.09	20
Copper	30.7		0.850	mg/kg dry		12.4			85.0*	20

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WC-Hanford, Inc. 2620 Fermi Avenue Richland WA, 99354	Project: RC-189 Project Number: K3969 Project Manager: Joan Kessner	Reported: 08/21/2012 08:22

Metals by SW846 6000/7000 series - Quality Control

Lionville Laboratory

Analyte	Result and Qualifiers	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch L208078 - SW 3050B									
Duplicate (L208078-DUP1)	**Source: 1208031-01**	Prepared: 08/12/2012 Analyzed: 08/17/2012							
Iron	18700	17.0	mg/kg dry		17200			8.46	20
Lead	3.45	0.425	mg/kg dry		3.64			5.33	20
Magnesium	4020	63.7	mg/kg dry		4070			1.30	20
Manganese	278	4.25	mg/kg dry		278			0.0949	20
Molybdenum	0.766 B	1.70	mg/kg dry		0.361			72.0*	20
Nickel	12.4	3.40	mg/kg dry		10.0			21.0*	20
Potassium	1170	340	mg/kg dry		1260			7.53	20
Selenium	0.255 U	0.255	mg/kg dry		0.274 U				20
Silicon	539	1.70	mg/kg dry		439			20.4*	20
Silver	0.170 U	0.170	mg/kg dry		0.182 U				20
Sodium	219	42.5	mg/kg dry		234			6.86	20
Vanadium	43.0	2.12	mg/kg dry		40.9			5.03	20
Zinc	35.7	8.50	mg/kg dry		36.6			2.37	20
Matrix Spike (L208078-MS1)	**Source: 1208031-01**	Prepared: 08/12/2012 Analyzed: 08/17/2012							
Aluminum	7850	4.56	mg/kg dry	182.35	7440	226*	75-125		
Antimony	14.7	0.547	mg/kg dry	45.587	0.547 U	32.3*	75-125		
Arsenic	153	0.912	mg/kg dry	182.35	2.86	82.1	75-125		
Barium	209	0.456	mg/kg dry	182.35	63.1	79.9	75-125		
Beryllium	3.94	0.182	mg/kg dry	4.5587	0.257	80.7	75-125		
Boron	68.5	1.82	mg/kg dry	91.174	1.24	73.8*	75-125		
Cadmium	3.85	0.182	mg/kg dry	4.5587	0.104	82.2	75-125		
Calcium	7810	91.2	mg/kg dry	2279.4	5890	84.2	75-125		
Chromium	25.8	0.182	mg/kg dry	18.235	11.6	77.8	75-125		
Cobalt	40.9	1.82	mg/kg dry	45.587	5.71	77.2	75-125		
Copper	30.3	0.912	mg/kg dry	22.794	12.4	78.4	75-125		
Iron	16300	18.2	mg/kg dry	91.174	17200	-1030*	75-125		
Lead	37.5	0.456	mg/kg dry	45.587	3.64	74.3*	75-125		
Magnesium	5750	68.4	mg/kg dry	2279.4	4070	73.5*	75-125		
Manganese	292	4.56	mg/kg dry	45.587	278	30.8*	75-125		
Molybdenum	73.3	1.82	mg/kg dry	91.174	0.361	80.0	75-125		
Nickel	45.1	3.65	mg/kg dry	45.587	10.0	76.9	75-125		
Potassium	3070	365	mg/kg dry	2279.4	1260	79.7	75-125		
Selenium	141	0.274	mg/kg dry	182.35	0.274 U	77.6	75-125		
Silicon	579	1.82	mg/kg dry	91.174	439	153*	75-125		
Silver	3.72	0.182	mg/kg dry	4.5587	0.182 U	81.7	75-125		
Sodium	2170	45.6	mg/kg dry	2279.4	234	84.9	75-125		

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WC-Hanford, Inc. 2620 Fermi Avenue Richland WA, 99354	Project: RC-189 Project Number: K3969 Project Manager: Joan Kessner	**Reported:** 08/21/2012 08:22

Metals by SW846 6000/7000 series - Quality Control
Lionville Laboratory

Analyte	Result and Qualifiers	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch L208078 - SW 3050B									
Matrix Spike (L208078-MS1)	**Source: 1208031-01**		Prepared: 08/12/2012 Analyzed: 08/17/2012						
Vanadium	78.6	2.28	mg/kg dry	45.587	40.9	82.7	75-125		
Zinc	73.8	9.12	mg/kg dry	45.587	36.6	81.6	75-125		
Reference (L208078-SRM1)			Prepared: 08/12/2012 Analyzed: 08/17/2012						
Aluminum	9890	14.4	mg/kg wet	6670.0		148	0-200.89		
Antimony	34.0	1.73	mg/kg wet	53.000		64.2	0-235.8		
Arsenic	112	2.88	mg/kg wet	114.00		98.3	82.8-117.54		
Barium	279	1.44	mg/kg wet	307.00		90.7	79.8-120.2		
Beryllium	104	0.577	mg/kg wet	108.00		96.3	82.8-117.6		
Boron	77.2	5.77	mg/kg wet	85.100		90.8	67.5-132.8		
Cadmium	219	0.577	mg/kg wet	225.00		97.5	83.6-116.4		
Calcium	3230	288	mg/kg wet	3360.0		96.1	83.3-116.9		
Chromium	80.8	0.577	mg/kg wet	77.200		105	73.3-126.4		
Cobalt	160	5.77	mg/kg wet	166.00		96.2	80.7-118.7		
Copper	260	2.88	mg/kg wet	271.00		96.0	80.8-119.2		
Iron	8440	57.7	mg/kg wet	8420.0		100	78.6-121.1		
Lead	179	1.44	mg/kg wet	190.00		94.1	81.6-118.4		
Magnesium	8180	216	mg/kg wet	8570.0		95.4	83.2-116.7		
Manganese	947	14.4	mg/kg wet	965.00		98.2	69.3-130.5		
Molybdenum	225	5.77	mg/kg wet	235.00		95.9	76.2-123.8		
Nickel	215	11.5	mg/kg wet	221.00		97.2	79.6-120.8		
Potassium	13600	1150	mg/kg wet	14400		94.8	81.9-118.1		
Selenium	183	0.865	mg/kg wet	187.00		97.8	75.9-124.6		
Silicon	349	5.77	mg/kg wet	807.00		43.2	0-219.3		
Silver	82.5	0.577	mg/kg wet	83.500		98.8	82.7-117.1		
Sodium	9120	144	mg/kg wet	9730.0		93.7	82.5-117.2		
Vanadium	103	7.21	mg/kg wet	98.700		104	75.9-123.6		
Zinc	192	28.8	mg/kg wet	199.00		96.3	78.4-121.6		

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WC-Hanford, Inc. 2620 Fermi Avenue Richland WA, 99354	Project: RC-189 Project Number: K3969 Project Manager: Joan Kessner	**Reported:** 08/21/2012 08:22

Metals by SW846 6000/7000 series - Quality Control

Lionville Laboratory

Analyte	Result and Qualifiers		Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch L208113 - SW 7471A Prep										
Blank (L208113-BLK1)				Prepared: 08/15/2012 Analyzed: 08/16/2012						
Mercury	0.0281	U	0.0281	mg/kg wet						
Duplicate (L208113-DUP1)		Source: 1208031-01		Prepared: 08/15/2012 Analyzed: 08/16/2012						
Mercury	0.0282	U	0.0282	mg/kg dry		0.0244 U				20
Matrix Spike (L208113-MS1)		Source: 1208031-01		Prepared: 08/15/2012 Analyzed: 08/16/2012						
Mercury	0.141		0.0244	mg/kg dry	0.13553	0.0244 U	104	75-125		20
Reference (L208113-SRM1)				Prepared: 08/15/2012 Analyzed: 08/16/2012						
Mercury	1.19		0.0281	mg/kg wet	1.2900		92.4	62.6-138		

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Date: 20 September 2012
To: Washington Closure Hanford Inc. (technical representative)
From: ELR Consulting
Project: 100N Field Remediation – Soil Full Protocol - Waste Site UPR-100-N-6
Subject: Polyaromatic Hydrocarbons - Data Package No. K3969-LLI

INTRODUCTION

This memo presents the results of data validation on Data Package No. K3969 prepared by Lionville Laboratories Inc. (LLI). A list of samples validated along with the analyses reported and the method of analysis is provided in the following table.

Sample ID	Sample Date	Media	Validation	Analyte
J1PWW1	8/7/12	Soil	C	See note 1
J1PWW2	8/7/12	Soil	C	See note 1
J1PWW3	8/7/12	Soil	C	See note 1
J1PWW4	8/7/12	Soil	C	See note 1
J1PWW5	8/7/12	Soil	C	See note 1
J1PWW6	8/7/12	Soil	C	See note 1
J1PWW7	8/7/12	Soil	C	See note 1
J1PWW8	8/7/12	Soil	C	See note 1
J1PWW9	8/7/12	Soil	C	See note 1
J1PWX0	8/7/12	Soil	C	See note 1
J1PWX1	8/7/12	Soil	C	See note 1
J1PWX2	8/7/12	Soil	C	See note 1
J1PWX3	8/7/12	Soil	C	See note 1

1 – Polyaromatic hydrocarbons by 8310.

Data validation was conducted in accordance with the Washington Closure Hanford (WCH) validation statement of work and the 100-N Area Sampling and Analysis Plan for CERCLA Waste Sites (DOE/RL-2005-92, Rev. 0, October 2006). Appendices 1 through 6 provide the following information as indicated below:

Appendix 1. Glossary of Data Reporting Qualifiers
Appendix 2. Summary of Data Qualification
Appendix 3. 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 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 14 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 acceptable.

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".

All method blank results were acceptable.

Field (equipment) Blanks

No field blanks were submitted for analysis.

Accuracy

Matrix Spike/Matrix Spike Duplicate & Blank Spike 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 below control limits are qualified as estimates and flagged "UJ". Undetected sample results are not qualified if the spike recovery is above control limits. Sample results greater than five times the spike concentration require no qualification.

All accuracy 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 laboratory results were acceptable.

Field Duplicate Samples

One set of field duplicates (J1PWW4/J1PWX3) were submitted for analysis. Field duplicates are compared using the same criteria s for laboratory duplicates. All field

duplicate results were acceptable.

Analytical Detection Levels

Reported analytical detection levels are compared against the required quantitation limits (RQL's) to ensure that laboratory detection levels meet the required criteria. All analytes met the RQL.

Completeness

Data package No. K3969 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

Washington Closure Hanford Contract #S00W307A00 (March 2008), *Data Validation Services*, March 2008.

DOE/RL-2005-92, Rev. 0, 100-N *Area Sampling and Analysis Plan for CERCLA Waste Sites*, U.S. Department of Energy, October 2006.

Appendix 1

Glossary of Data Reporting Qualifiers

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

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

POLYAROMATIC HYDROCARBON DATA QUALIFICATION SUMMARY*

SDG: K3969	REVIEWER: ELR	Project: UPR-100-N-6	PAGE 1 OF 1
COMMENTS: No qualifiers assigned			

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

Appendix 3

Annotated Laboratory Reports

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WC-Hanford, Inc. 2620 Fermi Avenue Richland WA, 99354	Project: RC-189 Project Number: K3969 Project Manager: Joan Kessner	**Reported:** 08/21/2012 10:06

J1PWX3
1208031-13 (Soil)

9/19/12

Analyte	Result and Qualifier		Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method
Lionville Laboratory									
Polynuclear Aromatic Compounds by SW846 8310									
Naphthalene	**13.7**		3.36	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Acenaphthylene	3.36	U	3.36	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Acenaphthene	**29.1**		3.36	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Fluorene	3.36	U	3.36	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Phenanthrene	**7.11**		3.36	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Anthracene	3.36	U	3.36	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Fluoranthene	**19.6**		3.36	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Indeno[1,2,3-cd]pyrene	3.36	U	3.36	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Pyrene	**17.7**		3.36	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Benz[a]anthracene	**10.6**		3.36	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Chrysene	**9.58**		3.36	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Benzo[b] fluoranthene	**6.50**		3.36	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Benzo[k] fluoranthene	**3.36**		3.36	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Benzo[a] pyrene	**10.9**		3.36	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Dibenz[a,h]anthracene	3.36	U	3.36	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Benzo[g,h,i] perylene	**9.19**		3.36	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Surrogate: Triphenylene	*91 %*		*68-129*			*L208074*	*08/11/2012*	*08/14/2012*	*8310*

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WC-Hanford, Inc. 2620 Fermi Avenue Richland WA, 99354	Project: RC-189 Project Number: K3969 Project Manager: Joan Kessner	**Reported:** 08/21/2012 10:06

J1PWW1
1208031-01 (Soil)

9/19/12

Analyte	Result and Qualifier		Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method
Lionville Laboratory									
Polynuclear Aromatic Compounds by SW846 8310									
Naphthalene	**5.84**		3.25	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Acenaphthylene	**16.8**		3.25	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Acenaphthene	3.25	U	3.25	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Fluorene	3.25	U	3.25	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Phenanthrene	**2.46**	J	3.25	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Anthracene	3.25	U	3.25	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Fluoranthene	**7.73**		3.25	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Indeno[1,2,3-cd]pyrene	**3.87**		3.25	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Pyrene	**6.08**		3.25	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Benz[a]anthracene	**4.08**		3.25	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Chrysene	**3.58**		3.25	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Benzo[b] fluoranthene	**2.88**	J	3.25	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Benzo[k] fluoranthene	**1.15**	J	3.25	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Benzo[a] pyrene	**3.30**		3.25	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Dibenz[a,h]anthracene	3.25	U	3.25	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Benzo[g,h,i] perylene	**2.44**	J	3.25	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Surrogate: Triphenylene	*94 %*		*68-129*			*L208074*	*08/11/2012*	*08/14/2012*	*8310*

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WC-Hanford, Inc. 2620 Fermi Avenue Richland WA, 99354	Project: RC-189 Project Number: K3969 Project Manager: Joan Kessner	**Reported:** 08/21/2012 10:06

J1PWW2 9/19/12
1208031-02 (Soil)

Lionville Laboratory

Analyte	Result and Qualifier		Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method
Polynuclear Aromatic Compounds by SW846 8310									
Naphthalene	7.63		3.45	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Acenaphthylene	3.45	U	3.45	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Acenaphthene	7.79		3.45	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Fluorene	3.45	U	3.45	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Phenanthrene	3.64		3.45	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Anthracene	3.45	U	3.45	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Fluoranthene	6.28		3.45	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Indeno[1,2,3-cd]pyrene	4.11		3.45	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Pyrene	4.49		3.45	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Benz[a]anthracene	3.06	J	3.45	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Chrysene	3.25	J	3.45	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Benzo[b] fluoranthene	3.45	U	3.45	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Benzo[k] fluoranthene	3.45	U	3.45	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Benzo[a] pyrene	3.45	U	3.45	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Dibenz[a,h]anthracene	3.45	U	3.45	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Benzo[g,h,i] perylene	3.45	U	3.45	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Surrogate: Triphenylene	*95 %*		*68-129*			*L208074*	*08/11/2012*	*08/14/2012*	*8310*

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WC-Hanford, Inc. 2620 Fermi Avenue Richland WA, 99354	Project: RC-189 Project Number: K3969 Project Manager: Joan Kessner	**Reported:** 08/21/2012 10:06

J1PWW3 9/14/12
1208031-03 (Soil)

Analyte	Result and Qualifier		Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method
Lionville Laboratory									
Polynuclear Aromatic Compounds by SW846 8310									
Naphthalene	9.68		3.41	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Acenaphthylene	3.41	U	3.41	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Acenaphthene	12.6		3.41	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Fluorene	3.41	U	3.41	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Phenanthrene	3.80		3.41	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Anthracene	3.41	U	3.41	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Fluoranthene	4.23		3.41	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Indeno[1,2,3-cd]pyrene	8.78		3.41	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Pyrene	7.01		3.41	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Benz[a]anthracene	4.02		3.41	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Chrysene	4.43		3.41	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Benzo[b] fluoranthene	2.35	J	3.41	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Benzo[k] fluoranthene	1.50	J	3.41	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Benzo[a] pyrene	4.77		3.41	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Dibenz[a,h]anthracene	3.41	U	3.41	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Benzo[g,h,i] perylene	2.46	J	3.41	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Surrogate: Triphenylene	*80 %*		*68-129*			*L208074*	*08/11/2012*	*08/14/2012*	*8310*

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WC-Hanford, Inc. 2620 Fermi Avenue Richland WA, 99354	Project: RC-189 Project Number: K3969 Project Manager: Joan Kessner	**Reported:** 08/21/2012 10:06

J1PWW4
1208031-04 (Soil)

9/14/12

Analyte	Result and Qualifier	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method
Lionville Laboratory								
Polynuclear Aromatic Compounds by SW846 8310								
Naphthalene	**29.8**	3.35	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Acenaphthylene	**5.37**	3.35	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Acenaphthene	**59.1**	3.35	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Fluorene	**1.48** J	3.35	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Phenanthrene	**21.3**	3.35	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Anthracene	**1.86** J	3.35	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Fluoranthene	**43.4**	3.35	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Indeno[1,2,3-cd]pyrene	3.35 U	3.35	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Pyrene	**47.0**	3.35	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Benz[a]anthracene	**21.2**	3.35	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Chrysene	**26.8**	3.35	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Benzo[b] fluoranthene	**11.2**	3.35	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Benzo[k] fluoranthene	**8.09**	3.35	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Benzo[a] pyrene	**20.9**	3.35	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Dibenz[a,h]anthracene	**2.35** J	3.35	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Benzo[g,h,i] perylene	**12.9**	3.35	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Surrogate: Triphenylene	*97 %*	*68-129*			*L208074*	*08/11/2012*	*08/14/2012*	*8310*

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WC-Hanford, Inc. 2620 Fermi Avenue Richland WA, 99354	Project: RC-189 Project Number: K3969 Project Manager: Joan Kessner	**Reported:** 08/21/2012 10:06

J1PWW5
1208031-05 (Soil)

9/19/12

Analyte	Result and Qualifier		Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method
			Lionville Laboratory						
Polynuclear Aromatic Compounds by SW846 8310									
Naphthalene	**28.8**		3.38	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Acenaphthylene	**11.3**		3.38	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Acenaphthene	**86.5**		3.38	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Fluorene	3.38	U	3.38	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Phenanthrene	**17.3**		3.38	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Anthracene	**2.27**	J	3.38	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Fluoranthene	**55.9**		3.38	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Indeno[1,2,3-cd]pyrene	3.38	U	3.38	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Pyrene	**65.3**		3.38	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Benz[a]anthracene	**34.5**		3.38	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Chrysene	**27.3**		3.38	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Benzo[b] fluoranthene	**14.3**		3.38	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Benzo[k] fluoranthene	**13.8**		3.38	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Benzo[a] pyrene	**40.2**		3.38	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Dibenz[a,h]anthracene	**3.18**	J	3.38	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Benzo[g,h,i] perylene	**33.7**		3.38	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Surrogate: Triphenylene	*101 %*		*68-129*			*L208074*	*08/11/2012*	*08/14/2012*	*8310*

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WC-Hanford, Inc.	Project: RC-189	
2620 Fermi Avenue	Project Number: K3969	**Reported:**
Richland WA, 99354	Project Manager: Joan Kessner	08/21/2012 10:06

J1PWW6
1208031-06 (Soil)

9/19/12

Lionville Laboratory

Polynuclear Aromatic Compounds by SW846 8310

Analyte	Result and Qualifier		Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method
Naphthalene	**108**		3.24	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Acenaphthylene	**13.2**		3.24	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Acenaphthene	**289**		3.24	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Fluorene	3.24	U	3.24	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Phenanthrene	**43.4**		3.24	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Anthracene	**11.1**		3.24	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Fluoranthene	**216**		3.24	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Indeno[1,2,3-cd]pyrene	**50.1**		3.24	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Pyrene	**205**		3.24	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Benz[a]anthracene	**126**		3.24	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Chrysene	**91.0**		3.24	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Benzo[b] fluoranthene	**76.3**		3.24	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Benzo[k] fluoranthene	**51.0**		3.24	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Benzo[a] pyrene	**128**		3.24	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Dibenz[a,h]anthracene	**8.83**		3.24	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Benzo[g,h,i] perylene	**105**		3.24	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Surrogate: Triphenylene	*120 %*		*68-129*			*L208074*	*08/11/2012*	*08/14/2012*	*8310*

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WC-Hanford, Inc. 2620 Fermi Avenue Richland WA, 99354	Project: RC-189 Project Number: K3969 Project Manager: Joan Kessner	**Reported:** 08/21/2012 10:06

J1PWW7
1208031-07 (Soil)

9/19/12

Analyte	Result and Qualifier		Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method
Lionville Laboratory									
Polynuclear Aromatic Compounds by SW846 8310									
Naphthalene	**28.4**		3.31	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Acenaphthylene	**2.86**	J	3.31	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Acenaphthene	**95.1**		3.31	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Fluorene	3.31	U	3.31	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Phenanthrene	**10.8**		3.31	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Anthracene	**2.17**	J	3.31	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Fluoranthene	**66.8**		3.31	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Indeno[1,2,3-cd]pyrene	**25.6**		3.31	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Pyrene	**58.7**		3.31	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Benz[a]anthracene	**42.6**		3.31	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Chrysene	**30.4**		3.31	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Benzo[b] fluoranthene	**26.4**		3.31	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Benzo[k] fluoranthene	**16.9**		3.31	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Benzo[a] pyrene	**43.3**		3.31	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Dibenz[a,h]anthracene	**2.88**	J	3.31	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Benzo[g,h,i] perylene	**33.4**		3.31	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Surrogate: Triphenylene	*102 %*		*68-129*			*L208074*	*08/11/2012*	*08/14/2012*	*8310*

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WC-Hanford, Inc. 2620 Fermi Avenue Richland WA, 99354	Project: RC-189 Project Number: K3969 Project Manager: Joan Kessner	**Reported:** 08/21/2012 10:06

J1PWW8
1208031-08 (Soil)

9/19/12

Analyte	Result and Qualifier		Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method
Lionville Laboratory									
Polynuclear Aromatic Compounds by SW846 8310									
Naphthalene	**46.3**		3.32	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Acenaphthylene	**6.07**		3.32	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Acenaphthene	**126**		3.32	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Fluorene	**2.38**	J	3.32	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Phenanthrene	**37.5**		3.32	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Anthracene	**7.85**		3.32	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Fluoranthene	**98.1**		3.32	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Indeno[1,2,3-cd]pyrene	3.32	U	3.32	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Pyrene	**75.5**		3.32	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Benz[a]anthracene	**50.0**		3.32	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Chrysene	**34.6**		3.32	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Benzo[b] fluoranthene	**24.1**		3.32	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Benzo[k] fluoranthene	**16.1**		3.32	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Benzo[a] pyrene	**43.1**		3.32	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Dibenz[a,h]anthracene	**2.96**	J	3.32	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Benzo[g,h,i] perylene	**27.2**		3.32	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Surrogate: Triphenylene	*106 %*		*68-129*			*L208074*	*08/11/2012*	*08/14/2012*	*8310*

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WC-Hanford, Inc. 2620 Fermi Avenue Richland WA, 99354	Project: RC-189 Project Number: K3969 Project Manager: Joan Kessner	**Reported:** 08/21/2012 10:06

J1PWW9
1208031-09 (Soil)

9/19/12

Analyte	Result and Qualifier		Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method
Lionville Laboratory									
Polynuclear Aromatic Compounds by SW846 8310									
Naphthalene	**24.6**		3.34	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Acenaphthylene	3.34	U	3.34	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Acenaphthene	**53.1**		3.34	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Fluorene	3.34	U	3.34	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Phenanthrene	**13.4**		3.34	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Anthracene	**1.02**	J	3.34	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Fluoranthene	**37.6**		3.34	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Indeno[1,2,3-cd]pyrene	**10.5**		3.34	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Pyrene	**32.6**		3.34	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Benz[a]anthracene	**26.6**		3.34	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Chrysene	**19.2**		3.34	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Benzo[b] fluoranthene	**27.1**		3.34	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Benzo[k] fluoranthene	**12.7**		3.34	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Benzo[a] pyrene	**23.7**		3.34	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Dibenz[a,h]anthracene	3.34	U	3.34	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Benzo[g,h,i] perylene	**11.2**		3.34	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Surrogate: Triphenylene	*103 %*		*68-129*			*L208074*	*08/11/2012*	*08/14/2012*	*8310*

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WC-Hanford, Inc. 2620 Fermi Avenue Richland WA, 99354	Project: RC-189 Project Number: K3969 Project Manager: Joan Kessner	**Reported:** 08/21/2012 10:06

J1PWX0
1208031-10 (Soil)

9/19/12

Lionville Laboratory

Analyte	Result and Qualifier		Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method
Polynuclear Aromatic Compounds by SW846 8310									
Naphthalene	**5.91**		3.31	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Acenaphthylene	3.31	U	3.31	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Acenaphthene	**9.12**		3.31	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Fluorene	3.31	U	3.31	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Phenanthrene	**1.37**	J	3.31	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Anthracene	3.31	U	3.31	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Fluoranthene	3.31	U	3.31	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Indeno[1,2,3-cd]pyrene	3.31	U	3.31	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Pyrene	**4.33**		3.31	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Benz[a]anthracene	**4.83**		3.31	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Chrysene	**2.98**	J	3.31	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Benzo[b] fluoranthene	**2.25**	J	3.31	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Benzo[k] fluoranthene	**0.910**	J	3.31	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Benzo[a] pyrene	**3.41**		3.31	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Dibenz[a,h]anthracene	3.31	U	3.31	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Benzo[g,h,i] perylene	3.31	U	3.31	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Surrogate: Triphenylene	*110 %*		*68-129*			*L208074*	*08/11/2012*	*08/14/2012*	*8310*

LIONVILLE LABORATORY
A division of Eberline Analytical Corporation

264 Welsh Pool Road
Exton, PA 19341
Phone: 610-280-3000
Fax: 610-280-3041

WC-Hanford, Inc. 2620 Fermi Avenue Richland WA, 99354	Project: RC-189 Project Number: K3969 Project Manager: Joan Kessner	**Reported:** 08/21/2012 10:06

J1PWX1
1208031-11 (Soil)

9/19/12

Lionville Laboratory

Analyte	Result and Qualifier		Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method
Polynuclear Aromatic Compounds by SW846 8310									
Naphthalene	**19.7**		3.32	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Acenaphthylene	3.32	U	3.32	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Acenaphthene	3.32	U	3.32	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Fluorene	3.32	U	3.32	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Phenanthrene	**28.3**		3.32	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Anthracene	**8.77**		3.32	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Fluoranthene	**104**		3.32	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Indeno[1,2,3-cd]pyrene	**2.03**	J	3.32	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Pyrene	**14.6**		3.32	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Benz[a]anthracene	**31.4**		3.32	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Chrysene	3.32	U	3.32	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Benzo[b] fluoranthene	**86.7**		3.32	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Benzo[k] fluoranthene	3.32	U	3.32	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Benzo[a] pyrene	**37.7**		3.32	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Dibenz[a,h]anthracene	3.32	U	3.32	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Benzo[g,h,i] perylene	**2.56**	J	3.32	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Surrogate: Triphenylene	*108 %*		*68-129*			*L208074*	*08/11/2012*	*08/14/2012*	*8310*

LIONVILLE LABORATORY
A division of Eberline Analytical Corporation

264 Welsh Pool Road
Exton, PA 19341
Phone: 610-280-3000
Fax: 610-280-3041

WC-Hanford, Inc.
2620 Fermi Avenue
Richland WA, 99354

Project: RC-189
Project Number: K3969
Project Manager: Joan Kessner

Reported:
08/21/2012 10:06

J1PWX2
1208031-12 (Soil)

9/19/12

Lionville Laboratory

Analyte	Result and Qualifier		Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method
Polynuclear Aromatic Compounds by SW846 8310									
Naphthalene	**8.16**		3.26	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Acenaphthylene	**6.87**		3.26	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Acenaphthene	**5.80**		3.26	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Fluorene	**1.52**	J	3.26	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Phenanthrene	**2.15**	J	3.26	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Anthracene	3.26	U	3.26	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Fluoranthene	**9.55**		3.26	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Indeno[1,2,3-cd]pyrene	3.26	U	3.26	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Pyrene	**7.28**		3.26	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Benz[a]anthracene	**4.78**		3.26	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Chrysene	**4.02**		3.26	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Benzo[b] fluoranthene	**2.78**	J	3.26	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Benzo[k] fluoranthene	**1.14**	J	3.26	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Benzo[a] pyrene	**4.07**		3.26	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Dibenz[a,h]anthracene	3.26	U	3.26	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Benzo[g,h,i] perylene	**2.64**	J	3.26	ug/kg dry	1	L208074	08/11/2012	08/14/2012	8310
Surrogate: Triphenylene	*94 %*		*68-129*			*L208074*	*08/11/2012*	*08/14/2012*	*8310*

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Appendix 4

Laboratory Narrative and Chain-of-Custody Documentation

LIONVILLE LABORATORY
A division of Eberline Analytical Corporation

264 Welsh Pool Road
Exton, Pennsylvania 19341
Phone (610) 280-3000
Fax (610) 280-3041

Case Narrative

Client: WC-HANFORD RC-189 K3969
LVL #: 1208031

W.O. #: 60049-001-001-0001-00
Date Received: 08-09-2012

POLYNUCLEAR AROMATIC HYDROCARBONS (PAH)

Thirteen (13) soil samples were collected on 08-07-2012.

The samples and associated QC samples were extracted 08-11-2012 and analyzed 08-14-2012 according to criteria set forth in Lionville Laboratory SOPs. The extraction procedure was based on SW846 Method 3540C and the analysis procedure was based on SW846 Method 8310.

Lionville Laboratory (LvL) is NELAP accredited by the State of Pennsylvania. For a complete listing of accrediting authorities and the corresponding analytes/methods, please contact your Project Manager. LvL certifies that all test results meet the requirements of NELAC with any exception noted in the following statements:

1. The results presented in this report are derived from samples that met LvL's sample acceptance policy.
2. All required holding times for extraction and analysis have been met.
3. All obtainable surrogate recoveries were within acceptance criteria.
4. The method blank was below the reporting limits for all target compounds.
5. All blank spike recoveries were within acceptance criteria.
6. All matrix spike recoveries were within acceptance criteria.
7. The initial calibrations associated with this data set were within acceptance criteria.
8. All continuing calibration standards analyzed prior to sample extracts were within acceptance criteria.
9. The samples were reported on a dry weight basis.
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.

Iain Daniels
LvL Laboratory Manager

8/24/12
Date

7/31/12

Washington Closure Hanford	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	RC-189-088	Page 1 of 3
Collector: Q. Stowe	Company Contact: Joan Kessner; Telephone No.: 375-4688	Project Coordinator: KESSNER, JH	Price Code: 8L 7/31/12, 8C; Data Turnaround: 21 Days, 15 7/31/12
Project Designation: 100N Field Remediation Soil Full Protocol	Sampling Location: UPR-100-N-6 Verification Sample	SAF No.: RC-189	
Ice Chest No.: RCC-08-028	Field Logbook No.: EI-1652-06; COA RUPN062000 RUPN062000 8/2/12	Method of Shipment: Fed Ex	
Shipped To: ~~EDERLINE SERVICES~~ LIONVILLE 7/31/12	Offsite Property No.: A110476	Bill of Lading/Air Bill No.: See OSPC	

POSSIBLE SAMPLE HAZARDS/REMARKS
Potential Rad L DOT Limits
AJ 8-8-12

Special Handling and/or Storage
Cool 4C

Preservation	Cool 4C	Cool 4C	Cool 4C	Cool 4C	Cool 4C	None	None	None	None	None
Type of Container	G/P	G/P	G/P	G	aG	G/P	G/P	G/P	G/P	G/P
No. of Container(s)	1	1	0	1	1	1	0	0	0	0
Volume	120mL	60mL	120mL	120mL	120mL	500mL	500mL	500mL	500mL	500mL
SAMPLE ANALYSIS	See item (1) in Special Instructions.	Chromium Hex - 7196	See item (2) in Special Instructions.	TPH-Diesel Range - WTPH-D +	PAHs - 8310	See item (3) in Special Instructions. RCF	Isotopic Uranium	Isotopic Thorium 7/31/12	Isotopic Plutonium	Carbon-14 Low Level

Sample No.	Matrix *	Sample Date	Sample Time										
J1PWW1	SOIL	8-7-12	1115	X	X	X	X	X	34155				
J1PWW2	SOIL	8-7-12	1005	X	X	X	X	X					
J1PWW3	SOIL	8-7-12	1105	X	X	X	X	X					
J1PWW4	SOIL	8-7-12	1015	X	X	X	X	X	34156				
J1PWW5	SOIL	8-7-12	1012	X	X	X	X	X					

CHAIN OF POSSESSION	Sign/Print Names		
Relinquished By/Removed From: Quincy Stowe	Date/Time: 1240 8/7/12	Received By/Stored In: Dennis Newman	Date/Time: 1240 8/7/12
Relinquished By/Removed From: Dennis Newman	Date/Time: 1435 8/7/12	Received By/Stored In: 1060 #3 A. Freier	Date/Time: 1435 8-7-12
Relinquished By/Removed From: WCH 1060#3 A. Freier	Date/Time: 8-8-12 1315	Received By/Stored In: Fed Ex	Date/Time:
Relinquished By/Removed From: Fed Ex	Date/Time: 8/9/12 0945	Received By/Stored In: Victor Hernandez	Date/Time: 8-9-12 0945
Relinquished By/Removed From:	Date/Time:	Received By/Stored In:	Date/Time:
Relinquished By/Removed From:	Date/Time:	Received By/Stored In:	Date/Time:

SPECIAL INSTRUCTIONS

(1) ICP Metals - 6010TR (Close-out List) {Aluminum, Antimony, Arsenic, Barium, Beryllium, Boron, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Molybdenum, Nickel, Potassium, Selenium, Silicon, Silver, Sodium, Vanadium, Zinc}; Mercury - 7471 - (CV)
(2) IC Anions - 300.0 {Bromide, Chloride, Fluoride, Nitrate, Nitrite, Phosphate, Sulfate}; NO2/NO3 - 353.2; pH (Soil) - 9045
(3) Gamma Spec (Client List) {Americium-241, Cesium-137, Cobalt-60, Europium-152, Europium-154, Europium-155, Radium-226}

REVIEWED BY DuShea DATE 8/8/12

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

WCH-EE-011

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5000000

8A 7/31/12

Washington Closure Hanford	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	RC-189-088	Page 2 of 23

Collector: Q. Stowe

Company Contact: Joan Kessner — Telephone No. 375-4688

Project Coordinator: KESSNER, JH

Price Code: 8L 8C — Data Turnaround: 21 Days 15 Days

Project Designation: 100N Field Remediation Soil Full Protocol

Sampling Location: UPR-100-N-6 Verification Sample

SAF No. RC-189

Ice Chest No. RCC-08-028

Field Logbook No. EI-1652-06

COA: RUPN062000 RC00AU0CAV 8/31/12

Method of Shipment: Fed Ex

Shipped To: ~~EBERLINE SERVICES~~ (LIONVILLE) 8/31/12

Offsite Property No. A110476

Bill of Lading/Air Bill No. See OSPC

POSSIBLE SAMPLE HAZARDS/REMARKS
Potential Rad < DDT Limits AF 8-8-12

Special Handling and/or Storage
Cool 4C

Preservation	Cool 4C	Cool 4C	Cool 4C	Cool 4C	Cool 4C	None	None	None	None	None
Type of Container	G/P	G/P	G/P	G	G	G/P	G/P	G/P	G/P	G/P
No. of Container(s)	1	1	0	1	1	1	0	0	0	0
Volume	120mL	60mL	120mL	120mL	120mL	500mL	500mL	500mL	500mL	500mL
SAMPLE ANALYSIS	See item (1) in Special Instructions.	Chromium Hex - 7196	See item (2) in Special Instructions.	TPH-Diesel Range - WTPH-D +	PAHs - 8310	See item (3) in Special Instructions. RCF	Isotopic Uranium	Isotopic Thorium	Isotopic Plutonium	Carbon-14 Low Level

8A 7/31/12

Sample No.	Matrix *	Sample Date	Sample Time										
J1PWW6	SOIL	8-7-12	1057	X	X	X	X	X					
J1PWW7	SOIL	8-7-12	1052	X	X	X	X	X					
J1PWW8	SOIL	8-7-12	1045	X	X	X	X	X	34157				
J1PWW9	SOIL	8-7-12	1040	X	X	X	X	X					
J1PWX0	SOIL	8-7-12	1035	X	X	X	X	X					

CHAIN OF POSSESSION — Sign/Print Names

Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Quincy Stowe	8/7/12 1240	Dennis Newman	8/7/12 1240
Dennis Newman	8/7/12 1435	A. Freier 1060#3	8-7-12 1435
A. Freier WCH 1060#3	8-8-12 1315	Fed Ex	
Fed Ex	8-9-12 0945	Victor Hernandez	8-9-12 0945

SPECIAL INSTRUCTIONS

(1) ICP Metals - 6010TR (Close-out List) {Aluminum, Antimony, Arsenic, Barium, Beryllium, Boron, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Molybdenum, Nickel, Potassium, Selenium, Silicon, Silver, Sodium, Vanadium, Zinc}; Mercury - 7471 - (CV)
(2) IC Anions - 300.0 {Bromide, Chloride, Fluoride, Nitrate, Nitrite, Phosphate, Sulfate}; NO2/NO3 - 353.2; pH (Soil) - 9045
(3) Gamma Spec (Client List) {Americium-241, Cesium-137, Cobalt-60, Europium-152, Europium-154, Europium-155, Radium-226}

REVIEWED BY A W Shea DATE 8/8/12

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

WCH-EE-011

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RC-189-088 | Page 3 of 13

Washington Closure Hanford

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

Collector: Q. Stowe	Company Contact: Joan Kessner — Telephone No. 375-4688	Project Coordinator: KESSNER, JH	Price Code: 8L 8C — Data Turnaround: 21 Days 15
Project Designation: 100N Field Remediation - Soil Full Protocol	Sampling Location: UPR-100-N-6 Verification Samples	SAF No.: RC-189	
Ice Chest No.: RCC-08-028	Field Logbook No.: EL-1652-06	COA: RUPA106N6WO ~~RUPN062000~~ 8/7/12	Method of Shipment: Fed Ex
Shipped To: ~~EBERLINE SERVICES~~ LIONVILLE 7/31/12	Offsite Property No.: A110476		Bill of Lading/Air Bill No.: See OSPC

POSSIBLE SAMPLE HAZARDS/REMARKS

Potential Rad < DOT Limits AJ 8-8-12

Special Handling and/or Storage

Cool 4C

Preservation	Cool 4C	Cool 4C	Cool 4C	Cool 4C	Cool 4C	None	None	None	None	None
Type of Container	G/P	G/P	G/P	G	aG	G/P	G/P	G/P	G/P	G/P
No. of Container(s)	1	1	0	1	1	1	0	0	0	0
Volume	120mL	60mL	120mL	120mL	120mL	500mL	500mL	500mL	500mL	500mL
SAMPLE ANALYSIS	See item (1) in Special Instructions.	Chromium Hex - 7196	See item (2) in Special Instructions.	TPH-Diesel Range - WTPH-D +	PAHs - 8310	See item (3) in Special Instructions.	Isotopic Uranium	Isotopic Thorium	Isotopic Plutonium	Carbon-14 Low Level
						RCF				

(Columns Isotopic Uranium through Carbon-14 lined through, initialed 7/31/12)

Sample No.	Matrix *	Sample Date	Sample Time	(1)	Cr Hex	(2)	TPH	PAHs	(3)	U	Th	Pu	C-14
J1PWX1	SOIL	8-7-12	1030	X	X	X	X	X					
J1PWX2	SOIL	8-7-12	1025	X	X	X	X	X	34158				
J1PWX3	SOIL	8-7-12	1015	X	X	X	X	X					
J1PWX4	SOIL	8-7-12	1110	X	~~D~~ 7/31/12								

CHAIN OF POSSESSION — Sign/Print Names

Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Quincy Stowe	8/7/12 1240	Dennis Newman	8/7/12 1240
Dennis Newman	8/7/12 1435	A. Freier 1060#3	8-7-12 1435
A. Freier WCH 1060#3	8-8-12 1315	Fed Ex	
Fed Ex	8-9-12 0945	Victor Hernandez	8-9-12 0945

SPECIAL INSTRUCTIONS

(1) ICP Metals - 6010TR (Close-out List) {Aluminum, Antimony, Arsenic, Barium, Beryllium, Boron, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Molybdenum, Nickel, Potassium, Selenium, Silicon, Silver, Sodium, Vanadium, Zinc}; Mercury - 7471 - (CV)
(2) IC Anions - 300.0 {Bromide, Chloride, Fluoride, Nitrate, Nitrite, Phosphate, Sulfate}; NO2/NO3 - 353.2; pH (Soil) - 9045
(3) Gamma Spec (Client List) {Americium-241, Cesium-137, Cobalt-60, Europium-152, Europium-154, Europium-155, Radium-226}

REVIEWED BY DWS DATE 8/8/12

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

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Appendix 5

Data Validation Supporting Documentation

GENERAL ORGANIC DATA VALIDATION CHECKLIST

VALIDATION LEVEL:	A	B	C	D	E
PROJECT: UPR-100-N-6			DATA PACKAGE: K3969		
VALIDATOR: ELR		LAB: LLI		DATE: 9/18/12	
			SDG: K3969		

ANALYSES PERFORMED					
8015	8021	8141	8151	8315	8310
		WTPH-HCID	WTPH-G	WTPH-D	

SAMPLES/MATRIX:

J1PWW1 J1PWW2 J1PWW3 J1PWW4 J1PWW5
J1PWW6 J1PWW7 J1PWW8 J1PWW9 J1PW80
J1PW81 J1PW82 J1PW83

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)

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:

GENERAL 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: no FB

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 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

GENERAL ORGANIC 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: _____

6. HOLDING TIMES (all levels)

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

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

Comments: _____

GENERAL ORGANIC DATA VALIDATION CHECKLIST

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

Results reported for all requested analyses? ..... Yes No N/A
Results supported in the raw data? (Levels D, E) ..... Yes No N/A
Samples properly prepared? (Levels D, E) ..... Yes No N/A
Detection limits meet RDL? ..... Yes No N/A
Transcription/calculation errors? (Levels D, E) ..... Yes No N/A

Comments: _____

9. SAMPLE CLEANUP (Levels D and E)

Fluoricil ® (or other aborbant) cleanup performed? ..... Yes No N/A
Lot check performed? ..... Yes No N/A
Check recoveries aceptable? ..... Yes No N/A
Check materials traceable? ..... Yes No N/A
Check materials Expired? ..... Yes No N/A
Analytical batch QC given similar cleanup? ..... Yes No N/A
Transcription/Calculation Errors? ..... Yes No N/A

Comments: _____

Appendix 6

Additional Documentation Requested by Client

264 Welsh Pool Road
Exton, PA 19341
Phone: 610-280-3000
Fax: 610-280-3041

LVL Lionville Laboratory
A division of Eberline Analytical Corporation

WC-Hanford, Inc. 2620 Fermi Avenue Richland WA, 99354	Project: RC-189 Project Number: K3969 Project Manager: Joan Kessner	Reported: 08/21/2012 10:06

Polynuclear Aromatic Compounds by SW846 8310 - Quality Control

Lionville Laboratory

Analyte	Result and Qualifiers		Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch L208074 - SW 3540C										
Blank (L208074-BLK1)				Prepared: 08/11/2012 Analyzed: 08/14/2012						
Naphthalene	3.33	U	3.33	ug/kg wet						
Acenaphthylene	3.33	U	3.33	ug/kg wet						
Acenaphthene	3.33	U	3.33	ug/kg wet						
Fluorene	3.33	U	3.33	ug/kg wet						
Phenanthrene	3.33	U	3.33	ug/kg wet						
Anthracene	3.33	U	3.33	ug/kg wet						
Fluoranthene	3.33	U	3.33	ug/kg wet						
Indeno[1,2,3-cd]pyrene	3.33	U	3.33	ug/kg wet						
Pyrene	3.33	U	3.33	ug/kg wet						
Benz[a]anthracene	3.33	U	3.33	ug/kg wet						
Chrysene	3.33	U	3.33	ug/kg wet						
Benzo[b] fluoranthene	3.33	U	3.33	ug/kg wet						
Benzo[k] fluoranthene	3.33	U	3.33	ug/kg wet						
Benzo[a] pyrene	3.33	U	3.33	ug/kg wet						
Dibenz[a,h]anthracene	3.33	U	3.33	ug/kg wet						
Benzo[g,h,i] perylene	3.33	U	3.33	ug/kg wet						
Surrogate: Triphenylene	*159*			*ug/kg wet*	*166.67*		*95*	*68-129*		
LCS (L208074-BS1)				Prepared: 08/11/2012 Analyzed: 08/14/2012						
Naphthalene	117		3.33	ug/kg wet	166.67		70	0-127		
Acenaphthylene	126		3.33	ug/kg wet	166.67		76	50-140		
Acenaphthene	128		3.33	ug/kg wet	166.67		77	17-139		
Fluorene	129		3.33	ug/kg wet	166.67		77	28-145		
Phenanthrene	129		3.33	ug/kg wet	166.67		78	30-152		
Anthracene	134		3.33	ug/kg wet	166.67		81	19-171		
Fluoranthene	140		3.33	ug/kg wet	166.67		84	34-159		
Indeno[1,2,3-cd]pyrene	143		3.33	ug/kg wet	166.67		86	31-156		
Pyrene	133		3.33	ug/kg wet	166.67		80	33-152		
Benz[a]anthracene	149		3.33	ug/kg wet	166.67		89	32-157		
Chrysene	140		3.33	ug/kg wet	166.67		84	31-159		
Benzo[b] fluoranthene	152		3.33	ug/kg wet	166.67		91	33-164		
Benzo[k] fluoranthene	147		3.33	ug/kg wet	166.67		88	28-161		
Benzo[a] pyrene	155		3.33	ug/kg wet	166.67		93	29-149		
Dibenz[a,h]anthracene	151		3.33	ug/kg wet	166.67		91	27-153		
Benzo[g,h,i] perylene	150		3.33	ug/kg wet	166.67		90	32-157		
Surrogate: Triphenylene	*152*			*ug/kg wet*	*166.67*		*91*	*68-129*		

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WC-Hanford, Inc. 2620 Fermi Avenue Richland WA, 99354	Project: RC-189 Project Number: K3969 Project Manager: Joan Kessner	**Reported:** 08/21/2012 10:06

Polynuclear Aromatic Compounds by SW846 8310 - Quality Control
Lionville Laboratory

Analyte	Result and Qualifiers	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch L208074 - SW 3540C									
Matrix Spike (L208074-MS1)	**Source: 1208031-01**		Prepared: 08/11/2012 Analyzed: 08/14/2012						
Naphthalene	124	3.26	ug/kg dry	162.97	5.84	73	0-127		
Acenaphthylene	128	3.26	ug/kg dry	162.97	16.8	68	50-140		
Acenaphthene	118	3.26	ug/kg dry	162.97	3.25 U	73	17-139		
Fluorene	128	3.26	ug/kg dry	162.97	3.25 U	79	28-145		
Phenanthrene	132	3.26	ug/kg dry	162.97	2.46	80	30-152		
Anthracene	135	3.26	ug/kg dry	162.97	3.25 U	83	19-171		
Fluoranthene	140	3.26	ug/kg dry	162.97	7.73	81	34-159		
Indeno[1,2,3-cd]pyrene	137	3.26	ug/kg dry	162.97	3.87	82	31-156		
Pyrene	135	3.26	ug/kg dry	162.97	6.08	79	33-152		
Benz[a]anthracene	139	3.26	ug/kg dry	162.97	4.08	83	32-157		
Chrysene	135	3.26	ug/kg dry	162.97	3.58	81	31-159		
Benzo[b] fluoranthene	134	3.26	ug/kg dry	162.97	2.88	81	33-164		
Benzo[k] fluoranthene	136	3.26	ug/kg dry	162.97	1.15	83	28-161		
Benzo[a] pyrene	146	3.26	ug/kg dry	162.97	3.30	87	29-149		
Dibenz[a,h]anthracene	144	3.26	ug/kg dry	162.97	3.25 U	89	27-153		
Benzo[g,h,i] perylene	144	3.26	ug/kg dry	162.97	2.44	87	32-157		
Surrogate: Triphenylene	*139*		*ug/kg dry*	*162.97*		*85*	*68-129*		
Matrix Spike Dup (L208074-MSD1)	**Source: 1208031-01**		Prepared: 08/11/2012 Analyzed: 08/14/2012						
Naphthalene	115	3.20	ug/kg dry	160.16	5.84	68	0-127	6	40
Acenaphthylene	126	3.20	ug/kg dry	160.16	16.8	68	50-140	0.1	40
Acenaphthene	131	3.20	ug/kg dry	160.16	3.25 U	82	17-139	12	40
Fluorene	126	3.20	ug/kg dry	160.16	3.25 U	79	28-145	0.5	40
Phenanthrene	134	3.20	ug/kg dry	160.16	2.46	82	30-152	3	40
Anthracene	135	3.20	ug/kg dry	160.16	3.25 U	84	19-171	2	40
Fluoranthene	147	3.20	ug/kg dry	160.16	7.73	87	34-159	7	40
Indeno[1,2,3-cd]pyrene	150	3.20	ug/kg dry	160.16	3.87	91	31-156	11	40
Pyrene	141	3.20	ug/kg dry	160.16	6.08	84	33-152	6	40
Benz[a]anthracene	150	3.20	ug/kg dry	160.16	4.08	91	32-157	9	40
Chrysene	146	3.20	ug/kg dry	160.16	3.58	89	31-159	9	40
Benzo[b] fluoranthene	144	3.20	ug/kg dry	160.16	2.88	88	33-164	9	40
Benzo[k] fluoranthene	145	3.20	ug/kg dry	160.16	1.15	90	28-161	8	40
Benzo[a] pyrene	157	3.20	ug/kg dry	160.16	3.30	96	29-149	9	40
Dibenz[a,h]anthracene	150	3.20	ug/kg dry	160.16	3.25 U	93	27-153	5	40
Benzo[g,h,i] perylene	156	3.20	ug/kg dry	160.16	2.44	96	32-157	9	40
Surrogate: Triphenylene	*149*		*ug/kg dry*	*160.16*		*93*	*68-129*		

Date: 20 October 2012
To: Washington Closure Hanford Inc. (technical representative)
From: ELR Consulting
Project: 100N Field Remediation – Soil Full Protocol - Waste Site UPR-100-N-6
Subject: Wet Chemistry - Data Package No. K3969-LLI

INTRODUCTION

This memo presents the results of data validation on Data Package No. K3969 prepared by Lionville Laboratories Inc. (LLI). A list of samples validated along with the analyses reported and the method of analysis is provided in the following table.

Sample ID	Sample Date	Media	Validation	Analyte
J1PWW1	8/7/12	Soil	C	See note 1
J1PWW2	8/7/12	Soil	C	See note 1
J1PWW3	8/7/12	Soil	C	See note 1
J1PWW4	8/7/12	Soil	C	See note 1
J1PWW5	8/7/12	Soil	C	See note 1
J1PWW6	8/7/12	Soil	C	See note 1
J1PWW7	8/7/12	Soil	C	See note 1
J1PWW8	8/7/12	Soil	C	See note 1
J1PWW9	8/7/12	Soil	C	See note 1
J1PWX0	8/7/12	Soil	C	See note 1
J1PWX1	8/7/12	Soil	C	See note 1
J1PWX2	8/7/12	Soil	C	See note 1
J1PWX3	8/7/12	Soil	C	See note 1

1 - Chromium VI by 7196A, IC anions by 300.0 and nitrate/nitrite by 353.2.

Data validation was conducted in accordance with the Washington Closure Hanford (WCH) validation statement of work and the 100-N Area Sampling and Analysis Plan for CERCLA Waste Sites (DOE/RL-2005-92, Rev. 0, October 2006). Appendices 1 through 6 provide the following information as indicated below:

Appendix 1. Glossary of Data Reporting Qualifiers
Appendix 2. Summary of Data Qualification
Appendix 3. 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: 30 days for chromium VI, 28 days for

nitrate/nitrite, chloride, fluoride, bromide, sulfate; 48 hours for nitrate, nitrite and orthophosphate; and immediate (24 hours) for pH

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".

Due to the holding time being exceeded by greater than twice the limit, all detected pH, nitrate, nitrite and orthophosphate results were qualified as estimates and flagged "J".

Due to the holding time being exceeded by greater than twice the limit, all undetected nitrite and orthophosphate results were qualified as rejected and flagged "R".

All other holding times were acceptable.

- **Method Blanks**

Method Blanks

Method blank analyses are performed 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. All blank results must fall below the contract required detection limit (CRQL) to be acceptable.

Due to method blank contamination, the sulfate result in samples J1PWW6, J1PWW7, J1PWW8, J1PWW9 and J1PWX2 were qualified as undetected and flagged "U".

All other method blank results were acceptable.

Field (Equipment) Blank

No field blanks were submitted for analysis.

- **Accuracy**

Matrix Spike and Laboratory Control Sample

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

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

Due to the lack of a matrix spike analysis, all chromium VI results in samples J1PWW3, J1PWW4, J1PWW5, J1PWW6, J1PWW7, J1PWW8, J1PWW9, J1PWX0, J1PWX1, J1PWX2 and J1PWX3 were qualified as estimates and flagged "J".

All other accuracy results were acceptable.

- **Precision**

Laboratory Duplicate Samples

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

Due to the lack of a duplicate analysis, all chromium VI results in samples J1PWW3, J1PWW4, J1PWW5, J1PWW6, J1PWW7, J1PWW8, J1PWW9, J1PWX0, J1PWX1, J1PWX2 and J1PWX3 were qualified as estimates and flagged "J".

All other laboratory duplicate results were acceptable.

Field Duplicate

One set of field duplicates (J1PWW4/J1PWX3) were submitted for analysis. Laboratory duplicates are compared using the same criteria as for laboratory results. All field duplicate results are acceptable.

- **Analytical Detection Levels**

Reported analytical detection levels are compared against the required quantitation limits (RQLs) to ensure that laboratory detection levels meet the required criteria. All analytes met the RQL.

- **Completeness**

Data package K3969 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 79%.

MAJOR DEFICIENCIES

The following major deficiency was noted:

- Due to the holding time being exceeded by greater than twice the limit, all nitrite and orthophosphate results were qualified as rejected and flagged "R".

Rejected data is unusable and should not be reported.

MINOR DEFICIENCIES

The following minor deficiency was noted:

- Due to method blank contamination, the sulfate result in samples J1PWW6, J1PWW7, J1PWW8, J1PWW9 and J1PWX2 were qualified as undetected and flagged "U".

- Due to the holding time being exceeded by greater than twice the limit, all nitrate results were qualified as estimates and flagged "J".

- Due to the lack of a duplicate analysis, all chromium VI results in samples J1PWW3, J1PWW4, J1PWW5, J1PWW6, J1PWW7, J1PWW8, J1PWW9, J1PWX0, J1PWX1, J1PWX2 and J1PWX3 were qualified as estimates and flagged "J".

- Due to the lack of a matrix spike analysis, all chromium VI results in samples J1PWW3, J1PWW4, J1PWW5, J1PWW6, J1PWW7, J1PWW8, J1PWW9, J1PWX0, J1PWX1, J1PWX2 and J1PWX3 were qualified as estimates and flagged "J".

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

REFERENCES

Washington Closure Hanford Contract #S00W307A00 (March 2008), *Data Validation Services*.

DOE/RL-2005-92, Rev. 0, 100-N *Area Sampling and Analysis Plan for CERCLA Waste Sites*, U.S. Department of Energy, October 2006.

Appendix 1

Glossary of Data Reporting Qualifiers

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

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

UJ - Indicates the compound or analyte was analyzed for and not detected in the sample. Due to a minor QC deficiency identified during the data validation, the associated quantitation limit is an estimate.

J - Indicates the compound or analyte was analyzed for and detected. Due to a minor QC deficiency identified during the data validation, the associated concentration is an estimate, but the data are usable for decision-making purposes.

BJ - Applied to inorganic analyses only. Indicates the analyte concentration was greater than the IDL but less than the CRDL and is considered an estimated value.

R - Indicates the compound or analyte was analyzed for, detected, and due to an identified major QC deficiency, the data are unusable.

UR - Indicates the compound or analyte was analyzed for and not detected in the sample. Additionally, the data is unusable due to an identified major QC deficiency.

NJ - Indicates presumptive evidence of a compound at an estimated value. The data may not be valid for some specific applications (i.e., usable for decision-making purposes).

N - Indicates presumptive evidence of a compound. The data may not be valid for some specific applications (i.e., usable for decision-making purposes).

Appendix 2

Summary of Data Qualification

WET CHEMISTRY DATA QUALIFICATION SUMMARY*

SDG: K3969	**REVIEWER: ELR**	**Project: UPR-100-N-6**	**PAGE_1_OF_1**
COMPOUND	QUALIFIER	SAMPLES AFFECTED	REASON
pH	J	All	Hold time
Nitrate	J	J1PWW1, J1PWW2 J1PWW3, J1PWW4 J1PWW5, J1PWW6 J1PWW8, J1PWW9 J1PWX0, J1PWX1 J1PWX3	Hold time
Nitrate	UR	J1PWW7, J1PWX2	Hold time
Nitrite	UR	All	Hold time
Orthophosphate	J	J1PWW1, J1PWW4 J1PWW5, J1PWW6 J1PWW7, J1PWW8 J1PWW9, J1PWX0 J1PWX3	Hold time
Orthophosphate	UR	J1PWW2, J1PWW3 J1PWX1, J1PWX2	Hold time
Sulfate	U	J1PWW6, J1PWW7 J1PWW8, J1PWW9 J1PWX2	Method blank contamination
Chromium VI	J	J1PWW3, J1PWW4 J1PWW5, J1PWW6 J1PWW7, J1PWW8 J1PWW9, J1PWX0 J1PWX1, J1PWX2 J1PWX3	No MS or duplicate analysis

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

Appendix 3

Annotated Laboratory Reports

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WC-Hanford, Inc. 2620 Fermi Avenue Richland WA, 99354	Project: RC-189 Project Number: K3969 Project Manager: Joan Kessner	**Reported:** 08/24/2012 11:49

Wet Chemistry
Lionville Laboratory

V 9/19/12

Analyte	Result and Qualifier	LOD	LOQ	Units	Dilution	Batch	Prepared	Analyzed	Method
J1PWW1 (1208031-01) Soil									
%Solids	99.7		0.1	% by Weight	1	L208079	08/12/2012	08/13/2012	SM2540G
Bromide	0.9 U	0.9	4.6	mg/kg dry	1	L208178	08/20/2012	08/20/2012	EPA 300.0 (1993)
Chloride	25.3	0.9	4.6	mg/kg dry	1	L208178	08/20/2012	08/20/2012	EPA 300.0 (1993)
Fluoride	0.9 U	0.9	4.6	mg/kg dry	1	L208178	08/20/2012	08/20/2012	EPA 300.0 (1993)
Nitrate	0.9 B J	0.9	4.6	mg/kg dry	1	L208178	08/20/2012	08/20/2012	EPA 300.0 (1993)
Nitrite	0.9 U R	0.9	4.6	mg/kg dry	1	L208178	08/20/2012	08/20/2012	EPA 300.0 (1993)
Orthophosphate	3.8 B J	1.8	9.2	mg/kg dry	1	L208178	08/20/2012	08/20/2012	EPA 300.0 (1993)
Sulfate	15.6	0.9	4.6	mg/kg dry	1	L208178	08/20/2012	08/20/2012	EPA 300.0 (1993)
Nitrate/Nitrite as N	1.77	0.09	0.46	mg/kg dry	1	L208190	08/20/2012	08/21/2012	EPA 353.2
Hexavalent Chromium	0.20 U	0.20	0.50	mg/kg dry	1	L208176	08/20/2012	08/21/2012	SW846 7196A
pH	8.69 J		0.10	pH Units	1	L208085	08/13/2012	08/13/2012	SW846 9045D
J1PWW2 (1208031-02) Soil									
%Solids	94.7		0.1	% by Weight	1	L208079	08/12/2012	08/13/2012	SM2540G
Bromide	1.0 U	1.0	4.8	mg/kg dry	1	L208178	08/20/2012	08/20/2012	EPA 300.0 (1993)
Chloride	579 D	9.7	48.5	mg/kg dry	10	L208178	08/20/2012	08/21/2012	EPA 300.0 (1993)
Fluoride	1.8 B	1.0	4.8	mg/kg dry	1	L208178	08/20/2012	08/20/2012	EPA 300.0 (1993)
Nitrate	56.1 J	1.0	4.8	mg/kg dry	1	L208178	08/20/2012	08/20/2012	EPA 300.0 (1993)
Nitrite	1.0 U R	1.0	4.8	mg/kg dry	1	L208178	08/20/2012	08/20/2012	EPA 300.0 (1993)
Orthophosphate	1.9 U R	1.9	9.7	mg/kg dry	1	L208178	08/20/2012	08/20/2012	EPA 300.0 (1993)
Sulfate	217 D	9.7	48.5	mg/kg dry	10	L208178	08/20/2012	08/21/2012	EPA 300.0 (1993)
Nitrate/Nitrite as N	12.7 D	0.19	0.97	mg/kg dry	2	L208190	08/20/2012	08/21/2012	EPA 353.2
Hexavalent Chromium	0.21 U	0.21	0.53	mg/kg dry	1	L208176	08/20/2012	08/21/2012	SW846 7196A
pH	8.52 J		0.10	pH Units	1	L208085	08/13/2012	08/13/2012	SW846 9045D

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WC-Hanford, Inc.
2620 Fermi Avenue
Richland WA, 99354

Project: RC-189
Project Number: K3969
Project Manager: Joan Kessner

Reported:
08/24/2012 11:49

Wet Chemistry
Lionville Laboratory

Analyte	Result and Qualifier	LOD	LOQ	Units	Dilution	Batch	Prepared	Analyzed	Method
J1PWW3 (1208031-03) Soil									
%Solids	97.4		0.1	% by Weight	1	L208079	08/12/2012	08/13/2012	SM2540G
Bromide	1.0 U	1.0	5.1	mg/kg dry	1	L208178	08/20/2012	08/20/2012	EPA 300.0 (1993)
Chloride	104 D	2.0	10.2	mg/kg dry	2	L208178	08/20/2012	08/20/2012	EPA 300.0 (1993)
Fluoride	1.0 U	1.0	5.1	mg/kg dry	1	L208178	08/20/2012	08/20/2012	EPA 300.0 (1993)
Nitrate	25.6 J	1.0	5.1	mg/kg dry	1	L208178	08/20/2012	08/20/2012	EPA 300.0 (1993)
Nitrite	1.0 U R	1.0	5.1	mg/kg dry	1	L208178	08/20/2012	08/20/2012	EPA 300.0 (1993)
Orthophosphate	2.0 U R	2.0	10.2	mg/kg dry	1	L208178	08/20/2012	08/20/2012	EPA 300.0 (1993)
Sulfate	39.4	1.0	5.1	mg/kg dry	1	L208178	08/20/2012	08/20/2012	EPA 300.0 (1993)
Nitrate/Nitrite as N	5.98	0.10	0.51	mg/kg dry	1	L208190	08/20/2012	08/21/2012	EPA 353.2
Hexavalent Chromium	0.21 U J	0.21	0.51	mg/kg dry	1	L208182	08/21/2012	08/21/2012	SW846 7196A
pH	8.70 J		0.10	pH Units	1	L208085	08/13/2012	08/13/2012	SW846 9045D
J1PWW4 (1208031-04) Soil									
%Solids	97.9		0.1	% by Weight	1	L208079	08/12/2012	08/13/2012	SM2540G
Bromide	1.0 U	1.0	5.0	mg/kg dry	1	L208178	08/20/2012	08/20/2012	EPA 300.0 (1993)
Chloride	33.9	1.0	5.0	mg/kg dry	1	L208178	08/20/2012	08/20/2012	EPA 300.0 (1993)
Fluoride	1.0 U	1.0	5.0	mg/kg dry	1	L208178	08/20/2012	08/20/2012	EPA 300.0 (1993)
Nitrate	30.3 J	1.0	5.0	mg/kg dry	1	L208178	08/20/2012	08/20/2012	EPA 300.0 (1993)
Nitrite	1.0 U R	1.0	5.0	mg/kg dry	1	L208178	08/20/2012	08/20/2012	EPA 300.0 (1993)
Orthophosphate	2.2 B J	2.0	10.0	mg/kg dry	1	L208178	08/20/2012	08/20/2012	EPA 300.0 (1993)
Sulfate	24.6	1.0	5.0	mg/kg dry	1	L208178	08/20/2012	08/20/2012	EPA 300.0 (1993)
Nitrate/Nitrite as N	7.05	0.10	0.50	mg/kg dry	1	L208190	08/20/2012	08/21/2012	EPA 353.2
Hexavalent Chromium	0.20 U J	0.20	0.51	mg/kg dry	1	L208182	08/21/2012	08/21/2012	SW846 7196A
pH	8.97 J		0.10	pH Units	1	L208085	08/13/2012	08/13/2012	SW846 9045D

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WC-Hanford, Inc. 2620 Fermi Avenue Richland WA, 99354	Project: RC-189 Project Number: K3969 Project Manager: Joan Kessner	**Reported:** 08/24/2012 11:49

Wet Chemistry
Lionville Laboratory

9/19/12

Analyte	Result and Qualifier	LOD	LOQ	Units	Dilution	Batch	Prepared	Analyzed	Method
J1PWW5 (1208031-05) Soil									
%Solids	98.1		0.1	% by Weight	1	L208079	08/12/2012	08/13/2012	SM2540G
Bromide	1.0 U	1.0	5.1	mg/kg dry	1	L208178	08/20/2012	08/20/2012	EPA 300.0 (1993)
Chloride	16.4	1.0	5.1	mg/kg dry	1	L208178	08/20/2012	08/20/2012	EPA 300.0 (1993)
Fluoride	1.0 U	1.0	5.1	mg/kg dry	1	L208178	08/20/2012	08/20/2012	EPA 300.0 (1993)
Nitrate	40.6 J	1.0	5.1	mg/kg dry	1	L208178	08/20/2012	08/20/2012	EPA 300.0 (1993)
Nitrite	1.0 U R	1.0	5.1	mg/kg dry	1	L208178	08/20/2012	08/20/2012	EPA 300.0 (1993)
Orthophosphate	3.0 B J	2.0	10.1	mg/kg dry	1	L208178	08/20/2012	08/20/2012	EPA 300.0 (1993)
Sulfate	27.2	1.0	5.1	mg/kg dry	1	L208178	08/20/2012	08/20/2012	EPA 300.0 (1993)
Nitrate/Nitrite as N	9.44 D	0.20	1.01	mg/kg dry	2	L208190	08/20/2012	08/21/2012	EPA 353.2
Hexavalent Chromium	0.20 U J	0.20	0.51	mg/kg dry	1	L208182	08/21/2012	08/21/2012	SW846 7196A
pH	8.83 J		0.10	pH Units	1	L208085	08/13/2012	08/13/2012	SW846 9045D
J1PWW6 (1208031-06) Soil									
%Solids	99.3		0.1	% by Weight	1	L208079	08/12/2012	08/13/2012	SM2540G
Bromide	1.0 U	1.0	4.9	mg/kg dry	1	L208178	08/20/2012	08/20/2012	EPA 300.0 (1993)
Chloride	35.3	1.0	4.9	mg/kg dry	1	L208178	08/20/2012	08/20/2012	EPA 300.0 (1993)
Fluoride	1.0 U	1.0	4.9	mg/kg dry	1	L208178	08/20/2012	08/20/2012	EPA 300.0 (1993)
Nitrate	25.4 J	1.0	4.9	mg/kg dry	1	L208178	08/20/2012	08/20/2012	EPA 300.0 (1993)
Nitrite	1.0 U R	1.0	4.9	mg/kg dry	1	L208178	08/20/2012	08/20/2012	EPA 300.0 (1993)
Orthophosphate	5.6 B J	1.9	9.7	mg/kg dry	1	L208178	08/20/2012	08/20/2012	EPA 300.0 (1993)
Sulfate	13.1 U	1.0	4.9	mg/kg dry	1	L208178	08/20/2012	08/20/2012	EPA 300.0 (1993)
Nitrate/Nitrite as N	5.86	0.10	0.49	mg/kg dry	1	L208190	08/20/2012	08/21/2012	EPA 353.2
Hexavalent Chromium	0.20 U J	0.20	0.50	mg/kg dry	1	L208182	08/21/2012	08/21/2012	SW846 7196A
pH	8.62 J		0.10	pH Units	1	L208085	08/13/2012	08/13/2012	SW846 9045D

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A division of Eberline Analytical Corporation

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Fax: 610-280-3041

WC-Hanford, Inc. 2620 Fermi Avenue Richland WA, 99354	Project: RC-189 Project Number: K3969 Project Manager: Joan Kessner	**Reported:** 08/24/2012 11:49

Wet Chemistry
Lionville Laboratory

V 9/19/12

Analyte	Result and Qualifier	LOD	LOQ	Units	Dilution	Batch	Prepared	Analyzed	Method
J1PWW7 (1208031-07) Soil									
%Solids	98.7		0.1	% by Weight	1	L208079	08/12/2012	08/13/2012	SM2540G
Bromide	0.9 U	0.9	4.7	mg/kg dry	1	L208178	08/20/2012	08/20/2012	EPA 300.0 (1993)
Chloride	125 D	1.9	9.4	mg/kg dry	2	L208178	08/20/2012	08/21/2012	EPA 300.0 (1993)
Fluoride	0.9 U	0.9	4.7	mg/kg dry	1	L208178	08/20/2012	08/20/2012	EPA 300.0 (1993)
Nitrate	0.9 U R	0.9	4.7	mg/kg dry	1	L208178	08/20/2012	08/20/2012	EPA 300.0 (1993)
Nitrite	0.9 U R	0.9	4.7	mg/kg dry	1	L208178	08/20/2012	08/20/2012	EPA 300.0 (1993)
Orthophosphate	6.0 B J	1.9	9.4	mg/kg dry	1	L208178	08/20/2012	08/20/2012	EPA 300.0 (1993)
Sulfate	7.2 V	0.9	4.7	mg/kg dry	1	L208178	08/20/2012	08/20/2012	EPA 300.0 (1993)
Nitrate/Nitrite as N	0.73	0.09	0.47	mg/kg dry	1	L208190	08/20/2012	08/21/2012	EPA 353.2
Hexavalent Chromium	0.20 U J	0.20	0.51	mg/kg dry	1	L208182	08/21/2012	08/21/2012	SW846 7196A
pH	8.69 J		0.10	pH Units	1	L208085	08/13/2012	08/13/2012	SW846 9045D
J1PWW8 (1208031-08) Soil									
%Solids	99.6		0.1	% by Weight	1	L208079	08/12/2012	08/13/2012	SM2540G
Bromide	0.9 U	0.9	4.7	mg/kg dry	1	L208178	08/20/2012	08/20/2012	EPA 300.0 (1993)
Chloride	5.8	0.9	4.7	mg/kg dry	1	L208178	08/20/2012	08/20/2012	EPA 300.0 (1993)
Fluoride	0.9 U	0.9	4.7	mg/kg dry	1	L208178	08/20/2012	08/20/2012	EPA 300.0 (1993)
Nitrate	2.5 B J	0.9	4.7	mg/kg dry	1	L208178	08/20/2012	08/20/2012	EPA 300.0 (1993)
Nitrite	0.9 U R	0.9	4.7	mg/kg dry	1	L208178	08/20/2012	08/20/2012	EPA 300.0 (1993)
Orthophosphate	4.7 B J	1.9	9.4	mg/kg dry	1	L208178	08/20/2012	08/20/2012	EPA 300.0 (1993)
Sulfate	4.2 B V	0.9	4.7	mg/kg dry	1	L208178	08/20/2012	08/20/2012	EPA 300.0 (1993)
Nitrate/Nitrite as N	0.72	0.09	0.47	mg/kg dry	1	L208190	08/20/2012	08/21/2012	EPA 353.2
Hexavalent Chromium	0.20 U J	0.20	0.50	mg/kg dry	1	L208182	08/21/2012	08/21/2012	SW846 7196A
pH	9.17 J		0.10	pH Units	1	L208085	08/13/2012	08/13/2012	SW846 9045D

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WC-Hanford, Inc.
2620 Fermi Avenue
Richland WA, 99354

Project: RC-189
Project Number: K3969
Project Manager: Joan Kessner

Reported:
08/24/2012 11:49

Wet Chemistry
Lionville Laboratory

9/19/12

Analyte	Result and Qualifier	LOD	LOQ	Units	Dilution	Batch	Prepared	Analyzed	Method
J1PWW9 (1208031-09) Soil									
%Solids	99.7		0.1	% by Weight	1	L208079	08/12/2012	08/13/2012	SM2540G
Bromide	1.0 U	1.0	4.9	mg/kg dry	1	L208178	08/20/2012	08/20/2012	EPA 300.0 (1993)
Chloride	55.0	1.0	4.9	mg/kg dry	1	L208178	08/20/2012	08/20/2012	EPA 300.0 (1993)
Fluoride	1.0 U	1.0	4.9	mg/kg dry	1	L208178	08/20/2012	08/20/2012	EPA 300.0 (1993)
Nitrate	3.9 B J	1.0	4.9	mg/kg dry	1	L208178	08/20/2012	08/20/2012	EPA 300.0 (1993)
Nitrite	1.0 U R	1.0	4.9	mg/kg dry	1	L208178	08/20/2012	08/20/2012	EPA 300.0 (1993)
Orthophosphate	10.6 J	2.0	9.8	mg/kg dry	1	L208178	08/20/2012	08/20/2012	EPA 300.0 (1993)
Sulfate	8.2 J	1.0	4.9	mg/kg dry	1	L208178	08/20/2012	08/20/2012	EPA 300.0 (1993)
Nitrate/Nitrite as N	0.88	0.10	0.49	mg/kg dry	1	L208190	08/20/2012	08/21/2012	EPA 353.2
Hexavalent Chromium	0.20 U J	0.20	0.50	mg/kg dry	1	L208182	08/21/2012	08/21/2012	SW846 7196A
pH	8.80 J		0.10	pH Units	1	L208085	08/13/2012	08/13/2012	SW846 9045D
J1PWX0 (1208031-10) Soil									
%Solids	99.1		0.1	% by Weight	1	L208079	08/12/2012	08/13/2012	SM2540G
Bromide	9.9 U	9.9	49.4	mg/kg dry	10	L208178	08/20/2012	08/21/2012	EPA 300.0 (1993)
Chloride	8750 D	494	2470	mg/kg dry	500	L208178	08/20/2012	08/21/2012	EPA 300.0 (1993)
Fluoride	9.9 U	9.9	49.4	mg/kg dry	10	L208178	08/20/2012	08/21/2012	EPA 300.0 (1993)
Nitrate	109 D J	9.9	49.4	mg/kg dry	10	L208178	08/20/2012	08/21/2012	EPA 300.0 (1993)
Nitrite	9.9 U R	9.9	49.4	mg/kg dry	10	L208178	08/20/2012	08/21/2012	EPA 300.0 (1993)
Orthophosphate	2.1 B J	2.0	9.9	mg/kg dry	1	L208178	08/20/2012	08/20/2012	EPA 300.0 (1993)
Sulfate	502 D	9.9	49.4	mg/kg dry	10	L208178	08/20/2012	08/21/2012	EPA 300.0 (1993)
Nitrate/Nitrite as N	24.5 D	0.49	2.47	mg/kg dry	5	L208190	08/20/2012	08/21/2012	EPA 353.2
Hexavalent Chromium	0.20 U J	0.20	0.50	mg/kg dry	1	L208182	08/21/2012	08/21/2012	SW846 7196A
pH	7.72 J		0.10	pH Units	1	L208085	08/13/2012	08/13/2012	SW846 9045D

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WC-Hanford, Inc. 2620 Fermi Avenue Richland WA, 99354	Project: RC-189 Project Number: K3969 Project Manager: Joan Kessner	**Reported:** 08/24/2012 11:49

Wet Chemistry
Lionville Laboratory

9/19/12

Analyte	Result and Qualifier	LOD	LOQ	Units	Dilution	Batch	Prepared	Analyzed	Method
J1PWX1 (1208031-11) Soil									
%Solids	**98.7**		0.1	% by Weight	1	L208079	08/12/2012	08/13/2012	SM2540G
Bromide	0.9 U	0.9	4.3	mg/kg dry	1	L208178	08/20/2012	08/20/2012	EPA 300.0 (1993)
Chloride	**138** D	1.7	8.5	mg/kg dry	2	L208178	08/20/2012	08/21/2012	EPA 300.0 (1993)
Fluoride	0.9 U	0.9	4.3	mg/kg dry	1	L208178	08/20/2012	08/20/2012	EPA 300.0 (1993)
Nitrate	**9.7** J	0.9	4.3	mg/kg dry	1	L208178	08/20/2012	08/20/2012	EPA 300.0 (1993)
Nitrite	1.7 U R	1.7	8.5	mg/kg dry	2	L208178	08/20/2012	08/21/2012	EPA 300.0 (1993)
Orthophosphate	1.7 U R	1.7	8.5	mg/kg dry	1	L208178	08/20/2012	08/20/2012	EPA 300.0 (1993)
Sulfate	**54.8**	0.9	4.3	mg/kg dry	1	L208178	08/20/2012	08/20/2012	EPA 300.0 (1993)
Nitrate/Nitrite as N	**2.25**	0.09	0.43	mg/kg dry	1	L208190	08/20/2012	08/21/2012	EPA 353.2
Hexavalent Chromium	0.20 U J	0.20	0.51	mg/kg dry	1	L208182	08/21/2012	08/21/2012	SW846 7196A
pH	**8.88** J		0.10	pH Units	1	L208085	08/13/2012	08/13/2012	SW846 9045D
J1PWX2 (1208031-12) Soil									
%Solids	**99.6**		0.1	% by Weight	1	L208079	08/12/2012	08/13/2012	SM2540G
Bromide	0.9 U	0.9	4.6	mg/kg dry	1	L208178	08/20/2012	08/20/2012	EPA 300.0 (1993)
Chloride	**1.7** B	0.9	4.6	mg/kg dry	1	L208178	08/20/2012	08/20/2012	EPA 300.0 (1993)
Fluoride	0.9 U	0.9	4.6	mg/kg dry	1	L208178	08/20/2012	08/20/2012	EPA 300.0 (1993)
Nitrate	0.9 U R	0.9	4.6	mg/kg dry	1	L208178	08/20/2012	08/20/2012	EPA 300.0 (1993)
Nitrite	0.9 U R	0.9	4.6	mg/kg dry	1	L208178	08/20/2012	08/20/2012	EPA 300.0 (1993)
Orthophosphate	1.9 U R	1.9	9.3	mg/kg dry	1	L208178	08/20/2012	08/20/2012	EPA 300.0 (1993)
Sulfate	**3.1** B U	0.9	4.6	mg/kg dry	1	L208178	08/20/2012	08/20/2012	EPA 300.0 (1993)
Nitrate/Nitrite as N	0.09 U J	0.09	0.46	mg/kg dry	1	L208190	08/20/2012	08/21/2012	EPA 353.2
Hexavalent Chromium	0.20 U J	0.20	0.50	mg/kg dry	1	L208182	08/21/2012	08/21/2012	SW846 7196A
pH	**9.18** J		0.10	pH Units	1	L208085	08/13/2012	08/13/2012	SW846 9045D

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WC-Hanford, Inc.
2620 Fermi Avenue
Richland WA, 99354

Project: RC-189
Project Number: K3969
Project Manager: Joan Kessner

Reported:
08/24/2012 11:49

Wet Chemistry
Lionville Laboratory

9/19/12

Analyte	Result and Qualifier	LOD	LOQ	Units	Dilution	Batch	Prepared	Analyzed	Method
J1PWX3 (1208031-13) Soil									
%Solids	98.7		0.1	% by Weight	1	L208079	08/12/2012	08/13/2012	SM2540G
Bromide	0.9 U	0.9	4.5	mg/kg dry	1	L208178	08/20/2012	08/20/2012	EPA 300.0 (1993)
Chloride	29.6	0.9	4.5	mg/kg dry	1	L208178	08/20/2012	08/20/2012	EPA 300.0 (1993)
Fluoride	0.9 U	0.9	4.5	mg/kg dry	1	L208178	08/20/2012	08/20/2012	EPA 300.0 (1993)
Nitrate	26.1 J	0.9	4.5	mg/kg dry	1	L208178	08/20/2012	08/20/2012	EPA 300.0 (1993)
Nitrite	0.9 U R	0.9	4.5	mg/kg dry	1	L208178	08/20/2012	08/20/2012	EPA 300.0 (1993)
Orthophosphate	2.9 B J	1.8	9.0	mg/kg dry	1	L208178	08/20/2012	08/20/2012	EPA 300.0 (1993)
Sulfate	20.7	0.9	4.5	mg/kg dry	1	L208178	08/20/2012	08/20/2012	EPA 300.0 (1993)
Nitrate/Nitrite as N	6.01	0.09	0.45	mg/kg dry	1	L208190	08/20/2012	08/21/2012	EPA 353.2
Hexavalent Chromium	0.20 U J	0.20	0.51	mg/kg dry	1	L208182	08/21/2012	08/21/2012	SW846 7196A
pH	8.93 J		0.10	pH Units	1	L208085	08/13/2012	08/13/2012	SW846 9045D
J1PWX4 (1208031-14) Soil									
%Solids	100		0.1	% by Weight	1	L208079	08/12/2012	08/13/2012	SM2540G

Appendix 4

Laboratory Narrative and Chain-of-Custody Documentation

LIONVILLE LABORATORY
A division of Eberline Analytical Corporation

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Exton, Pennsylvania 19341
Phone (610) 280-3000
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Case Narrative

Client: WC-HANFORD RC-189 K3969
LVL#: 1208031

Date Received: 08-09-12

INORGANIC NARRATIVE

1. This narrative covers the analyses of 14 soil samples.

2. The samples were prepared and analyzed in accordance with the methods indicated on the data summary report. Results for soil or solid pH are measured in water at 25°C unless otherwise specified.

   Lionville Lab (LvL) is NELAP accredited by the State of Pennsylvania. For a complete list of accrediting authorities and the corresponding analytes/methods, please contact your Project Manager. LvL certifies that all test results meet the requirements of NELAC with any exception noted in the following statements.

3. Sample holding times as required by the method and/or contract were met with the exceptions of Nitrate, Nitrite and Orthophosphate.

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

5. The method blanks were within the method criteria.

6. The Laboratory Control Samples (LCS) were within the laboratory control limits and method criteria.

7. The matrix spike recoveries were within the 75-125% control limits.

8. The replicate analyses were within the 20% Relative Percent Difference (RPD) control limit.

9. Results for soil samples are reported on a dry weight basis.

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 package has been authorized by the Laboratory Manager or a designee, as verified by the following signature.

8/24/12
Date

Iain Daniels
Laboratory Manager
Lionville Laboratory

njp\i08-031

7/31/12

Washington Closure Hanford

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

RC-189-088 | Page 1 of 13

Collector: Q. Stowe	Company Contact: Joan Kessner	Telephone No.: 375-4688	Project Coordinator: KESSNER, JH
Project Designation: 100N Field Remediation-Soil Full Protocol	Sampling Location: UPR-100-N-6 Verification Sample		SAF No.: RG-189
Ice Chest No.: RCC-08-028	Field Logbook No.: EI-1652-061	COA: ~~RUPN062000~~ RUPN062800 7/27/12	Method of Shipment: Fed-Ex
Shipped To: ~~EBERLINE SERVICES~~ LIONVILLE 7/31/12	Offsite Property No.: A110476		Bill of Lading/Air Bill No.: See OSPC

Price Code: 8L 7/31/12 8C | Data Turnaround: 21 Days 15 7/31/12

POSSIBLE SAMPLE HAZARDS/REMARKS
Potential Rad L DOT Limits AJ 8-8-12

Special Handling and/or Storage
Cool 4C

Preservation	Cool 4C	Cool 4C	Cool 4C	Cool 4C	Cool 4C	None	None	None	None	None
Type of Container	G/P	G/P	G/P	G	aG	G/P	G/P	G/P	G/P	G/P
No. of Container(s)	1	1	0	1	1	1	0	0	0	0
Volume	120mL	60mL	120mL	120mL	120mL	500mL	500mL	500mL	500mL	500mL
SAMPLE ANALYSIS	See item (1) in Special Instructions	Chromium Hex - 7196	See item (2) in Special Instructions	TPH-Diesel Range - WTPH-D +	PAHs - 8310	See item (3) in Special Instructions. RCF	Isotopic Uranium	Isotopic Thorium 7/31/12	Isotopic Plutonium	Carbon-14 Low Level
Sample No.	Matrix *	Sample Date	Sample Time								
J1PWW1	SOIL	8-7-12	1115	X	X	X	X	X	34155		
J1PWW2	SOIL	8-7-12	1005	X	X	X	X	X			
J1PWW3	SOIL	8-7-12	1105	X	X	X	X	X			
J1PWW4	SOIL	8-7-12	1015	X	X	X	X	X	34156		
J1PWW5	SOIL	8-7-12	1012	X	X	X	X	X			

CHAIN OF POSSESSION

Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Quincy Stowe	8/7/12 1240	Dennis Newman	8/7/12 1240
Dennis Newman	8/7/12 1435	WCH #1060 #3	1435
WCH #1060 #3	8-8-12 1415	A. Freier	8-7-12
A. Freier	8-8-12 1415	Fed Ex	
Fed Ex	8/9/12 0945	Victor Hernandez	8-9-12 0945

Sign/Print Names

SPECIAL INSTRUCTIONS

(1) ICP Metals - 6010TR (Close-out List) {Aluminum, Antimony, Arsenic, Barium, Beryllium, Boron, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Molybdenum, Nickel, Potassium, Selenium, Silicon, Silver, Sodium, Vanadium, Zinc}; Mercury - 7471 - (CV)
(2) IC Anions - 300.0 {Bromide, Chloride, Fluoride, Nitrate, Nitrite, Phosphate, Sulfate}; NO2/NO3 - 353.2; pH (Soil) - 9045
(3) Gamma Spec (Client List) {Americium-241, Cesium-137, Cobalt-60, Europium-152, Europium-154, Europium-155, Radium-226}

REVIEWED BY DWShea DATE 8/8/12

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

WCH-EE-011

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8R 7/31/12

Washington Closure Hanford	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST		RC-189-088	Page 2 of 3
Collector: Q. Stone	Company Contact: Joan Kessner	Telephone No.: 375-4688	Project Coordinator: KESSNER, JH	Price Code: 8L 8C 7/31/12 Data Turnaround: 21 Days 15 8/7/12
Project Designation: 100N Field Remediation Soil Full Protocol	Sampling Location: UPR-100-N-6 Verification Sample		SAF No.: RG-189	
Ice Chest No.: RCC-08-028 7/31/12	Field Logbook No.: EL-1652-061	COA: RUPN062000 8/1/12	Method of Shipment: Fed Ex	
Shipped To: ~~EBERLINE SERVICES~~ LIONVILLE	Offsite Property No.: A 110476		Bill of Lading/Air Bill No.: See OSPC	

POSSIBLE SAMPLE HAZARDS/REMARKS
Potential Rad LDDT Limits
AJ 8-8-12

Special Handling and/or Storage
Cool 4C

Preservation	Cool 4C	Cool 4C	Cool 4C	Cool 4C	Cool 4C	None	None	None	None	None
Type of Container	G/P	G/P	G/P	G	aG	G/P	G/P	G/P	G/P	G/P
No. of Container(s)	1	1	0	1	1	1	0	0	0	0
Volume	120mL	60mL	120mL	120mL	120mL	500mL	500mL	500mL	500mL	500mL
SAMPLE ANALYSIS	See item (1) in Special Instructions.	Chromium Hex - 7196	See item (2) in Special Instructions.	TPH-Diesel Range - WTPH-D +	PAHs - 8310	See item (3) in Special Instructions. RCF	Isotopic Uranium	Isotopic Thorium 7/31/12	Isotopic Plutonium	Carbon-14 Low Level

Sample No.	Matrix *	Sample Date	Sample Time										
J1PWW6	SOIL	8-7-12	1057	X	X	X	X	X					
J1PWW7	SOIL	8-7-12	1052	X	X	X	X	X					
J1PWW8	SOIL	8-7-12	1045	X	X	X	X	X	34157				
J1PWW9	SOIL	8-7-12	1040	X	X	X	X	X					
J1PWX0	SOIL	8-7-12	1035	X	X	X	X	X					

CHAIN OF POSSESSION	Sign/Print Names	
Relinquished By/Removed From: Quincy Stone Date/Time: 8/7/12 1240	Received By/Stored In: Dennis Newman Date/Time: 8/7/12 1240	
Relinquished By/Removed From: Dennis Newman Date/Time: 8/7/12 1435	Received By/Stored In: 1060#3 A. Freier Date/Time: 8-7-12 1435	
Relinquished By/Removed From: WCH 1060#3 A. Freier Date/Time: 8-8-12 1315	Received By/Stored In: Fed Ex Date/Time:	
Relinquished By/Removed From: Fed Ex Date/Time: 8-9-12 0945	Received By/Stored In: Victor Hernandez Date/Time: 8-9-12 0945	
Relinquished By/Removed From: Date/Time:	Received By/Stored In: Date/Time:	
Relinquished By/Removed From: Date/Time:	Received By/Stored In: Date/Time:	

SPECIAL INSTRUCTIONS

(1) ICP Metals - 6010TR (Close-out List) {Aluminum, Antimony, Arsenic, Barium, Beryllium, Boron, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Molybdenum, Nickel, Potassium, Selenium, Silicon, Silver, Sodium, Vanadium, Zinc}; Mercury - 7471 - (CV)
(2) IC Anions - 300.0 {Bromide, Chloride, Fluoride, Nitrate, Nitrite, Phosphate, Sulfate}; NO2/NO3 - 353.2; pH (Soil) - 9045
(3) Gamma Spec (Client List) {Americium-241, Cesium-137, Cobalt-60, Europium-152, Europium-154, Europium-155, Radium-226}

REVIEWED BY AWSher DATE 8/8/12

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

WCH-EE-011

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9000000000

DA 7/31/12

Washington Closure Hanford	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	RC-189-088	Page 1 of 3
Collector: Q. Stowe	Company Contact: Joan Kessner — Telephone No.: 375-4688	Project Coordinator: KESSNER, JH	Price Code: 8L DA 7/31/12 8C — Data Turnaround: 21 Days
Project Designation: 100N Field Remediation Soils Fish Protocol	Sampling Location: UPR-100-N-6 Verification Samples	SAF No.: RC-189	
Ice Chest No.: RCC-08-028	Field Logbook No.: EL-1652-06 — ~~COA: RLPA06N6WJ0 RUPN062000~~ DA 8/7/12	Method of Shipment: Fed Ex	
Shipped To: ~~EBERLINE SERVICES~~ LIONVILLE DA 7/31/12	Offsite Property No.: A110476	Bill of Lading/Air Bill No.: See OSPC	

POSSIBLE SAMPLE HAZARDS/REMARKS
Potential Rad ∠ DOT Limits AJ 8-8-12

Special Handling and/or Storage
Cool 4C

Preservation	Cool 4C	Cool 4C	Cool 4C	Cool 4C	Cool 4C	None	None	None	None	None
Type of Container	G/P	G/P	G/P	G	aG	G/P	G/P	G/P	G/P	G/P
No. of Container(s)	1	1	0	1	1	1	0	0	0	0
Volume	120mL	60mL	120mL	120mL	120mL	500mL	500mL	500mL	500mL	500mL
SAMPLE ANALYSIS	See item (1) in Special Instructions	Chromium Hex - 7196	See item (2) in Special Instructions	TPH-Diesel Range - WTPH-D +	PAHs - 8310	See item (3) in Special Instructions	Isotopic Uranium DA 7/31/12	Isotopic Thorium	Isotopic Plutonium	Carbon-14 Low Level

Sample No.	Matrix *	Sample Date	Sample Time											
J1PWX1	SOIL	8-7-12	1030	X	X	X	Y	X						
J1PWX2	SOIL	8-7-12	1025	X	X	X	X	X	34158					
J1PWX3	SOIL	8-7-12	1015	X	X	X	X	X						
J1PWX4	SOIL	8-7-12	1110	X	~~D~~		~~7/31/12~~							

21

CHAIN OF POSSESSION	Sign/Print Names		
Relinquished By/Removed From: Quincy Stowe — Date/Time: 8/7/12 1240	Received By/Stored In: Dennis Newman — Date/Time: 8/7/12 1240		
Relinquished By/Removed From: Dennis Newman — Date/Time: 8/7/12 1435	Received By/Stored In: 1060#3 A. Freier — Date/Time: 8-7-12 1435		
Relinquished By/Removed From: WCH A. Freier — Date/Time: 1060#3 8-8-12 1315	Received By/Stored In: Fed Ex — Date/Time:		
Relinquished By/Removed From: Fed Ex — Date/Time: 8-9-12 0945	Received By/Stored In: VICTOR HERNANDEZ — Date/Time: 8-9-12 0945		
Relinquished By/Removed From: — Date/Time:	Received By/Stored In: — Date/Time:		
Relinquished By/Removed From: — Date/Time:	Received By/Stored In: — Date/Time:		

SPECIAL INSTRUCTIONS

(1) ICP Metals - 6010TR (Close-out List) {Aluminum, Antimony, Arsenic, Barium, Beryllium, Boron, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Molybdenum, Nickel, Potassium, Selenium, Silicon, Silver, Sodium, Vanadium, Zinc}; Mercury - 7471 - (CV)
(2) IC Anions - 300.0 {Bromide, Chloride, Fluoride, Nitrate, Nitrite, Phosphate, Sulfate}; NO2/NO3 - 353.2; pH (Soil) - 9045
(3) Gamma Spec (Client List) {Americium-241, Cesium-137, Cobalt-60, Europium-152, Europium-154, Europium-155, Radium-226}

REVIEWED BY DWS DATE 8/8/12

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

WCH-EE-011

Appendix 5

Data Validation Supporting Documentation

GENERAL CHEMISTRY ANALYSIS DATA VALIDATION CHECKLIST

VALIDATION LEVEL:	A	B	C	D	E
PROJECT: UPR-100-N-6			DATA PACKAGE: K3969		
VALIDATOR: FLR		LAB: LLI		DATE: 9/18/12	
			SDG: K3969		

ANALYSES PERFORMED					
Anions/IC	TOC	TOX	TPH-418.1	Oil and Grease	Alkalinity
Ammonia	BOD/COD	Chloride	Chromium-VI	pH	NO_3/NO_2
Sulfate	TDS	TKN	Phosphate		

SAMPLES/MATRIX
J1PWW1 J1PWW2 J1PWW3 J1PWW4 J1PWW5
J1PWW6 J1PWW7 J1PWW8 J1PWW9 J1PWX0
J1PWX1 J1PWX2 J1PWX3
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

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: _____

GENERAL CHEMISTRY 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: Sulfate - W6, W7, W8, W9, Y2 — J

no FB

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

Spike samples analyzed? ..... (Yes) No N/A
Spike recoveries acceptable? ..... (Yes) No N/A
Sike standards NIST traceable? (Levels D, E) ..... Yes No (N/A)
Spike 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:

CR VI - HHLYHHL1 - noms - J

no PA

GENERAL CHEMISTRY ANALYSIS DATA VALIDATION CHECKLIST

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

Duplicate RPD values acceptable? .... Yes No N/A [Yes circled]
Duplicate results acceptable? .... Yes No N/A [Yes circled]
MS/MSD standards NIST traceable? (Levels D, E) .... Yes No N/A [N/A circled]
MS/MSD standards expired? (Levels D, E) .... Yes No N/A [N/A circled]
Field duplicate RPD values acceptable? .... Yes No N/A [Yes circled]
Field split RPD values acceptable? .... Yes No N/A [N/A circled]
Transcription/calculation errors? (Levels D, E) .... Yes No N/A [N/A circled]

Comments: CR VI — 11 — no dup J all

6. HOLDING TIMES (all levels)

Samples properly preserved? .... Yes No N/A [Yes circled]
Sample holding times acceptable? .... Yes No N/A [No circled]

Comments: pH, nitrite, nitrate ... — >2x — J/UR

GENERAL CHEMISTRY ANALYSIS DATA VALIDATION CHECKLIST

7. RESULT QUANTITATION AND DETECTION LIMITS (all levels)

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

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

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

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

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

Comments: _____

_____

_____

_____

_____

_____

_____

_____

Appendix 6

Additional Documentation Requested by Client

LVL
LIONVILLE LABORATORY
A division of Physics Analytical Corporation

264 Welsh Pool Road
Exton, PA 19341
Phone: 610-280-3000
Fax: 610-280-3041

WC-Hanford, Inc. 2620 Fermi Avenue Richland WA, 99354	Project: RC-189 Project Number: K3969 Project Manager: Joan Kessner	**Reported:** 08/24/2012 11:49

Wet Chemistry - Quality Control
Lionville Laboratory

Analyte	Result and Qualifiers	LOD	LOQ	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch L208079 - Default Prep										
Duplicate (L208079-DUP1)	**Source: 1208031-01**			Prepared: 08/12/2012 Analyzed: 08/13/2012						
%Solids	99.9		0.1	% by Weight		99.7			0.2	20
Batch L208085 - Default Prep GenChem										
Duplicate (L208085-DUP5)	**Source: 1208031-01**			Prepared & Analyzed: 08/13/2012						
pH	8.77		0.10	pH Units		8.69			0.916	20
Reference (L208085-SRM1)				Prepared & Analyzed: 08/13/2012						
pH	4.05		0.10	pH Units	4.0000		101	99-101		
Batch L208176 - Default Prep GenChem										
Blank (L208176-BLK1)				Prepared: 08/20/2012 Analyzed: 08/21/2012						
Hexavalent Chromium	0.20 U	0.20	0.50	mg/kg wet						
LCS (L208176-BS1)				Prepared: 08/20/2012 Analyzed: 08/21/2012						
Hexavalent Chromium	4.28	0.20	0.50	mg/kg wet	4.0000		107	80-120		
LCS (L208176-BS2)				Prepared: 08/20/2012 Analyzed: 08/21/2012						
Hexavalent Chromium	1150 D	20.0	50.0	mg/kg wet	1165.6		99	80-120		
Duplicate (L208176-DUP3)	**Source: 1208031-01**			Prepared: 08/20/2012 Analyzed: 08/21/2012						
Hexavalent Chromium	0.20 U	0.20	0.50	mg/kg dry		0.20 U				20
Matrix Spike (L208176-MS5)	**Source: 1208031-01**			Prepared: 08/20/2012 Analyzed: 08/21/2012						
Hexavalent Chromium	3.97	0.20	0.50	mg/kg dry	4.0117	0.20 U	99	75-125		

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WC-Hanford, Inc. 2620 Fermi Avenue Richland WA, 99354	Project: RC-189 Project Number: K3969 Project Manager: Joan Kessner	**Reported:** 08/24/2012 11:49

Wet Chemistry - Quality Control
Lionville Laboratory

Analyte	Result and Qualifiers	LOD	LOQ	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch L208176 - Default Prep GenChem										
Matrix Spike (L208176-MS6)	**Source: 1208031-01**			Prepared: 08/20/2012 Analyzed: 08/21/2012						
Hexavalent Chromium	1150 D	20.1	50.1	mg/kg dry	1130.3	0.20 U	102	75-125		
Batch L208178 - Default Prep GenChem										
Blank (L208178-BLK1)				Prepared & Analyzed: 08/20/2012						
Fluoride	1.0 U	1.0	5.0	mg/kg wet						
Chloride	1.0 U	1.0	5.0	mg/kg wet						
Bromide	1.0 U	1.0	5.0	mg/kg wet						
Orthophosphate	2.0 U	2.0	10.0	mg/kg wet						
Sulfate	2.9 B	1.0	5.0	mg/kg wet						
Nitrate	1.0 U	1.0	5.0	mg/kg wet						
Nitrite	1.0 U	1.0	5.0	mg/kg wet						
LCS (L208178-BS1)				Prepared & Analyzed: 08/20/2012						
Fluoride	43.4	0.9	4.7	mg/kg wet	47.423		91.6	80-120		
Chloride	41.8	0.9	4.7	mg/kg wet	47.423		88.2	80-120		
Bromide	42.7	0.9	4.7	mg/kg wet	47.423		90.0	80-120		
Orthophosphate	41.4	1.9	9.5	mg/kg wet	47.423		87.4	80-120		
Sulfate	43.4	0.9	4.7	mg/kg wet	47.423		91.6	80-120		
Nitrate	43.3	0.9	4.7	mg/kg wet	47.423		91.4	80-120		
Nitrite	42.5	0.9	4.7	mg/kg wet	47.423		89.6	80-120		
Duplicate (L208178-DUP1)	**Source: 1208031-01**			Prepared & Analyzed: 08/20/2012						
Fluoride	1.0 U	1.0	5.1	mg/kg dry		0.9 U				20
Chloride	23.4	1.0	5.1	mg/kg dry		25.3			8.10	20
Bromide	1.0 U	1.0	5.1	mg/kg dry		0.9 U				20
Orthophosphate	3.4 B	2.0	10.2	mg/kg dry		3.8			12.3	20
Sulfate	15.1	1.0	5.1	mg/kg dry		15.6			3.20	20
Nitrate	6.9	1.0	5.1	mg/kg dry		0.9 J				20
Nitrite	1.0 U	1.0	5.1	mg/kg dry		0.9 U				20

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Fax: 610-280-3041

WC-Hanford, Inc. 2620 Fermi Avenue Richland WA, 99354	Project: RC-189 Project Number: K3969 Project Manager: Joan Kessner	**Reported:** 08/24/2012 11:49

Wet Chemistry - Quality Control
Lionville Laboratory

Analyte	Result and Qualifiers	LOD	LOQ	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch L208178 - Default Prep GenChem										
Matrix Spike (L208178-MS1)	**Source: 1208031-01**			Prepared & Analyzed: 08/20/2012						
Fluoride	47.6	0.9	4.4	mg/kg dry	44.351	0.9 U	107	75-125		
Chloride	69.2	0.9	4.4	mg/kg dry	44.351	25.3	98.9	75-125		
Bromide	44.9	0.9	4.4	mg/kg dry	44.351	0.9 U	101	75-125		
Orthophosphate	48.0	1.8	8.9	mg/kg dry	44.351	3.8	99.7	75-125		
Sulfate	60.0	0.9	4.4	mg/kg dry	44.351	15.6	100	75-125		
Nitrate	52.6	0.9	4.4	mg/kg dry	44.351	0.9 J	119	75-125		
Nitrite	45.8	0.9	4.4	mg/kg dry	44.351	0.9 U	103	75-125		
Batch L208182 - Default Prep GenChem										
Blank (L208182-BLK1)				Prepared & Analyzed: 08/21/2012						
Hexavalent Chromium	0.20 U	0.20	0.50	mg/kg wet						
LCS (L208182-BS1)				Prepared & Analyzed: 08/21/2012						
Hexavalent Chromium	3.93	0.20	0.50	mg/kg wet	4.0000		98	80-120		
LCS (L208182-BS2)				Prepared & Analyzed: 08/21/2012						
Hexavalent Chromium	1060 D	20.0	50.0	mg/kg wet	1101.2		97	80-120		
Batch L208190 - Default Prep GenChem										
Blank (L208190-BLK1)				Prepared: 08/20/2012 Analyzed: 08/21/2012						
Nitrate/Nitrite as N	0.10 U	0.10	0.50	mg/kg wet						
LCS (L208190-BS1)				Prepared: 08/20/2012 Analyzed: 08/21/2012						
Nitrate/Nitrite as N	4.78	0.10	0.50	mg/kg wet	5.0000		95.6	90-110		

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Wet Chemistry - Quality Control
Lionville Laboratory

Analyte	Result and Qualifiers	LOD	LOQ	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch L208190 - Default Prep GenChem										
Duplicate (L208190-DUP1)	**Source: 1208031-01**			Prepared: 08/20/2012 Analyzed: 08/21/2012						
Nitrate/Nitrite as N	1.90	0.10	0.51	mg/kg dry		1.77			6.76	20
Matrix Spike (L208190-MS1)	**Source: 1208031-01**			Prepared: 08/20/2012 Analyzed: 08/21/2012						
Nitrate/Nitrite as N	6.10	0.09	0.44	mg/kg dry	4.4351	1.77	97.6	75-125		